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Documents de travail GREDEG
GREDEG Working Papers Series

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GREDEG WP No. 2013-21

<http://www.gredeg.cnrs.fr/working-papers.html>

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Rationality and Efficiency: from Experimentation in (recent) Applied Microeconomics to Conceptual Issues

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Abstract

This paper investigates how foundational and conceptual issues around economic rationality, which are usually discussed with respect to economic theory, materialize into *recent* applied microeconomics. We concentrate on three radically different subfield of microeconomics – the economics of discrimination, development economics and the economics of insurance – to look at how the recent rise of experimental methods and behavioral economics within mainstream economics have changed the conceptual relationship between economic rationality and economic efficiency, without changing the substance of these notions. The perspective of going from applied work of microeconomics in the field to conceptual and foundational issues on rationality reveals another issue that has not been much discussed in the reflexive literature yet: how warranted is the analytical distinction made in economics among interpersonal preferences, intertemporal preferences and preferences for risk and uncertainty? We show that this issue has straightforward consequences both on both economic theory and on the real world through the policy recommendations made by microeconomists.

Introduction

Lawrence Blume and David Easley (2008, p.1) start their entry on “Rationality” in *The New Palgrave Dictionary of Economics* as follows:

“Rationality is for economists as pornography was to the US Supreme Court, undefinable but nonetheless easily identified; and yet, like the Justices of the Court, no two economists share a common definition”.

Nevertheless, when their entry is read along with the one of Amartya Sen (2008) on “Rational Behaviour” it is possible to identify some of the major threads that characterize the evolution of rationality in postwar mainstream economics and to

point out some the main features explaining its definitional ambiguity. Basically, at a foundational and conceptual level, there are two main ambiguities surrounding rationality in mainstream economics.

The first ambiguity concerns the relationship between, on the one hand, rationality as *consistency of choices* and rationality as *self-interest maximization* (Blume and Easley 2008 pp.5-6; Sen 2008 pp.1-5). Although these two conceptions have technical¹ and historical² differences, the correspondence between them was an important topic of discussion from the 1950s to the 1970s, known as the problem of “rationalizability” (Sen 2008, p.2 quoting Richter 1971; see also Hands 2006, pp.173-176). The distinction between both conceptions of rationality was quite clear in the highly theoretical discussion of the time. However, it bequeathed some confusion within subsequent developments in the mainstream of economic *theory*. For instance, the conception of rationality as consistency of choice fits well “[t]he first stage in the development” (Blume and Easley 2008, p.8) of analytical work in general equilibrium theory where the “analysis will be as abstract and general as possible, to encompass as large a repertory of behavior as possible” (*ibid.*). However, “[t]he second stage [...] requires explicit behavioural assumptions about agent behaviour and describing the resulting equilibrium”. Hence, while most economists often talk about rationality as consistency, most economists often practice economics with rationality as self-interest maximization (*ibid.*, p.5). One important – but perhaps implicit – reason for the prevalence of working with rationality as self-interest maximization in economics stems from its analytical necessity for the dual correspondence between Pareto optimality and competitive equilibrium (one implies the other *and vice-versa*) proven by the “Fundamental Theorem of Welfare

¹ Technically, both consist in imposing logical relations but on different primitive concept: in the former, they are imposed on a *choice function* that takes the choices of an economic agent as primitive from which his underlying preferences are determined, and in the latter, they are imposed on the agent’s preference ordering which are taken as primitive and represented by a *utility function* which determines his choices; see Mas-Colell et. al. (1995) chap. 1 for a pedagogical and technical discussion of this issue.

² The consistency of choice approach is an important feature of the 20th century history of demand theory, while the self-interest maximization approach has an older though quite complex history in economics.

Economics” (Sen 2008, p.3 quoting Arrow 1951, Debreu 1959 and Arrow and Hahn 1971).

The second and related ambiguity surrounding rationality in economics concerns its status as a positive/descriptive *versus* normative/prescriptive hypothesis (Blum and Easley 2008, pp.6-7; Sen 2008, pp.1-2; see also Sen 1987). In other words, it is not always obvious and there is no general agreement on whether rationality is conceptualized in order to predict and explain how rational people act (by first characterizing rationality and then assuming that people are rational), or in order to evaluate and prescribe the way people ought to act to be rational.

The issues discussed by Blume and Easley (2008) and Sen (2008) are quite conceptual in that they are principally related to economic *theory*. In this paper, we seek to illustrate how these conceptual issues *materialize* into recent applied microeconomics. The purpose of our contribution is to demonstrate that, when these ambiguities around rationality are investigated from this point of view (from the applied, not theoretical, work in microeconomics) it reveals another foundational and conceptual issue that has not been much discussed yet from a reflexive perspective: *how warranted is the strong analytical and conceptual division made in economics among (a) interpersonal decisions, (b) decisions under risk and uncertainty, and (c) intertemporal decisions?* We will see that this issue also has its set of ambiguities which have straightforward consequences on economic theory as well as on the real world through the policy recommendations made by microeconomists.

It is interesting to notice that Blume and Easley’s entry is made from the “point of view [...] of working economists” (*ibid*) who defend: (1) “methodological individualism, the claim that social phenomena must be explained in terms of *individual actions* which in turn must be explained through individuals’ motivation” (*ibid.*, our emphasis); and (2) “The *rationality principle*, that individuals act in their best interest as they perceive it” (*ibid.*, original emphasis) to be the underlying theory of action in economics. They emphasize that their “interest is in social life rather than in the psychology of an individual” (*ibid.*, p.2; see also pp.10-13). Our perspective of going from the applied work to the foundational and conceptual issue provides a critical assessment of how well the rationality principle allows *economics* to grasp “social life” *with and without* being interested “in the psychology of an individual”.

In this respect, and to be consistent with the specific perspective taken in this paper, our discussions of applied microeconomics will stress the importance of (a) the

social context into which the economic problems investigated are embedded, and (b) the scientific context into which applied microeconomics is embedded. The latter point is mainly constituted by two interrelated aspects: (b.1) the *local* evolution of the standard framework in each of the subfield of microeconomics that we are going to discuss, and (b.2) the *global* recent rise of experimental methods and of behavioral economics within the mainstream of economics. Although we are going to stress (a), (b) and (b.1) along our discussions in the core of the paper, the brief remaining of this introduction is dedicated to (b.2).

Let's start by considering the following quote:

“The difficulty is as follows: an important objective of research on organization is to be able to compare different organizations and to assess their efficiency. For that, it is necessary to have some criterion of efficiency. In economic models the criterion of efficiency usually depends on individual preferences, as is the case with the Pareto criterion, as well as various proposed notions of fairness. If preferences are endogenous, the logical basis for a normative analysis is unclear.” (Reiter 1989, p.286, quoted by Lee 2013, p.29)

Lee is here quoting Reiter to illustrate the changes that were happening in the late 1980s around the legitimacy of experimental methods in economics. At the time, there was already a tension between two ways of using experimental methods in economics that are now usually known as *experimental market economics* and *behavioral economics*. The evolution of this tension along with its implications at methodological, theoretical and normative levels is the subject of a growing body of reflexive contributions (*e.g.*, Guala 2005; Davis 2006, 2008; Heukelom 2011; Santos 2011; Lee 2011; Jullien and Vallois 2013). Moreover, since the Nobel memorial attribution to Daniel Kahneman and Vernon Smith in 2002 the use of experimental methods has definitely established their legitimacy within the mainstream of economic theory, and behavioral economics is part of this mainstream. Correspondingly, reflexive contributions have focused their attention to the way *either* experimental market economics or behavioral economics have respectively impacted mainstream economics (*e.g.*, Lee 2004 and Santos 2012 on experimental market economics; Sent 2004; Hands 2006, 2011; Heukelom 2012; Davis 2013a, 2013b on behavioral economics).

Our paper contributes to this second line of reflection: through the perspective explained above (*i.e.*, from applied work to conceptual issues) we seek to illustrate how the important issue raised by Reiter (in the previous quote) about preferences and

efficiency is still pervasive today in applied microeconomics *despite* the impact of behavioral economics and the legitimization of experimental methods which have both participated to make key contributions on the endogeneity of preferences.

A last element needs to be stressed: we take for granted that, at a foundational and conceptual level, notions of rationality are the ground of notions of efficiency in economics, as illustrated above by Sen's emphasis on the role of rationality in the dual correspondence between Pareto optimality and competitive equilibrium and Reiter's quote³.

A first section illustrates how foundational and conceptual issues around rationality are materialized into three applied microeconomic contributions taken from radically different subfields of economics – the economics of discrimination, development economics and the economics of insurance. A second section discuss how these issues impact the world through the relationships between rationality, efficiency and policy recommendations, *and at the same time* reveal another set of ambiguities related to the foundational and conceptual issue of the distinction among interpersonal decisions, decisions under risk and uncertainty, and intertemporal decisions in economics.

1. The impact of experimental methods on the relationships between rationality and efficiency in applied microeconomics

“Increasingly, economists have turned to the experimental model of the physical science as a method to understand human behavior. Much of this research has taken the form of laboratory experiments in which volunteers enter a research lab to make decisions in a controlled environment. Over the past decade, economists have increasingly made use of field experiments to explore economic phenomena”. (Levitt and List, 2009, 2)

³ This might be criticized from a set of reflections on the pioneering work of Dhananjay Gode and Shyam Sunder (1993) inspired by Gary Becker (1962), *e.g.*, Phillip Mirowski (2002, p.551) and Ivan Moscati and Paola Tubaro (2011). However the ideas in these contributions have not impacted the mainstream of economic theory yet, at least not as much as experimental methods and behavioral economics have to this date.

Experimental methods within economics take several forms, which can be difficult to distinguish. Nevertheless, such distinctions are necessary to really understand what experimental methods allow to show or to learn in economics.

In this respect, Harrison and List (2004) offer a useful typology of experimental methods in economics. First, they define six criteria (ibid, p.1010): (1) the nature of the subject pool (economics students are viewed as the standard subject pool for experiments in economics); (2) the information that the subject has and the experience that the subject bring to the task; (3) the nature of the commodity involve in the experiment, whether it is virtual goods, or actual goods or services; (4) the nature of the task or the institutional rules, which are applied within the experiment; (5) the nature of the stakes; (6) the nature of the environment in which the subject operates.

Based on these six criteria Harrison and List's typology consists of four kinds of experiments:

- “A *conventional lab experiment* is one that employs a standard subject pool of students, an abstract framing, and an imposed set of rules;
- An *artefactual field experiment* is the same as conventional lab experiment but with a nonstandard subject pool;
- A *framed field experiment* is the same as an artefactual field experiment but with field context in either the commodity, task, or information set that the subjects can use;
- A *natural field experiment* is the same as a framed field experiment but where the environment is one where the subjects naturally undertake these tasks and where the subjects do not know that they are in the experiment.” (Harrison and List, 2004, 1013-1014)

This section illustrates how experimental methods translate the relationships between rationality and efficiency in economics *across* these four types of experiments. To do so, we discuss a conventional lab experiment and an artefactual field experiment from the economics of discrimination (1.1), a framed field experiment from development economics (1.2), and a natural field experiment from the behavioral economics of insurance (1.3). Thus, we have three different backgrounds of both societal contexts and standard theoretical framework of microeconomics, that allow us to present some of the main results obtained from the use of experimental methods in economics around a plurality of applications. Finally,

we summarize the conceptual implications that we can draw from these three applied microeconomics works (1.4).

1.1 Irrationality and Efficiency: Laboratory and artefactual experiments from the recent economics of discrimination

In order to illustrate two types of experiments within Harrison and List's typology – conventional lab and artefactual experiments – we discuss two experiments from the economics of discrimination.

Discrimination became a political issue in the wake of the civil right movement after the WW2 in US and with the development of the Women's Movement in US and Europe. In 1964, the Civil Right Act outlawed major forms of discrimination (against racial, ethnic, national and religious minorities, and women) and officially ended the institutional segregation – that governed racial relations along the “separate but equal” since 1896. Discrimination has a variety of “definitions” (discrimination in hiring process, income disparity etc.) and of “contents” (gender, race, age, etc.).

In standard economics of discrimination⁴, the two main models are, on the one hand, Becker's (1957) model based on a “taste for discrimination”, and, on the other hand, Arrow (1972) and Phelps'(1972) models of “statistical discrimination”, based on beliefs, stereotypes and signal effect. Beginning in the 1970s, wage decomposition methods⁵ became the bulk of empirical work on discrimination (Blinder, 1973; Oaxaca, 1973). In the 1980s, the development of experimental methods in economics criticized wage differentials models (Yinger, 1981, 1986). As discrimination is an unobservable phenomenon, experimentalist criticism were directed to the indirect aspect of wage differentials analysis, which assimilates discrimination to gun smoke but says nothing on who pulls the trigger and how and why the shot was fired off. Experimentalists, on the other hand, claimed to be able to make discrimination visible.

⁴ For a review of feminist approaches, see Figart (1997); for a survey on “heterodox” approaches, see Marshall (1974).

⁵ Models suppose equal wages for identical productive endowments; meaning all individuals “convert” productivity variables – diplomas, years of labor experience – into effects on wages⁵. Discrimination coefficients represent wage differentials between two demographic groups that remain unexplained after controlling for productivity variables.

Adida, Laitin and Valfort's (2010; 2011) work on discrimination against the "Muslim minority" in France is methodologically representative of the recent economics of discrimination in that it contains wage differentials analysis, supplemented by *conventional lab experiments* and an *artefactual field experiment*. The political background that motivates their work is based on two "facts": prejudices against Muslim are wide spread in Western countries, and the Muslim share of the population will grow in European countries. Thus "[g]iven these demographic trends, how will anti-Muslim prejudice evolve over the next decades?" translates in "will rooted Westerners be more or less generous toward Muslims as Muslim numbers around them increase (what we call Muslim out-group salience)?" (Adida *et al.*, 2011, p.2).

Their (standard) wage differentials analysis is based on a data set from a survey on 466 households from Senegalese Serer and Joola origin⁶. The analysis shows that "Muslim households" earn 400€ less in average compared to "Christians" ones (Adida *et al.* 2010). Their experimental work then seeks to understand how such discrepancy is actually an outcome of discrimination.

Their *artefactual field experiment* is based on an audit testing using CV⁷. In a later working paper, the authors replicate the audit testing into two *conventional lab experiments* using a "dictator game"⁸ (Adida *et al.* 2011). The first dictator game consists in screening pictures of people associated with a name. People on the picture are not present in the room and the participants are asked how much they are willing to transfer to these "faces", which are associated with "Muslim" sound-like names, or with "Christian" sound-like name. Each participant has a 5€ allocation for each "face". They could choose to keep the money, to give it all or to give a certain amount. They are told the pictures correspond to real person. The second dictator

⁶ Religion criteria is based on declaration by agents. "These immigrants belong to two ethno-linguistic groups in Senegal, the Joolas and the Seres that are divided by religion, with one portion of them being Muslim and another portion being Christian. With the exception of religion, Senegalese Muslims and Senegalese Christians from these two ethno-linguistic groups are similar. They share the same culture and migrated to France in the same time period" (Adida, *et al.*, 2011, p.2). See Adida, Laitin, Valfort, 2010 for the full identification strategy. In a French context, the study was discussed on the choice to test for religion criteria and not for ethnicity or national origin.

⁷ Audit testing are field experiments which mainly dealt with paired application of two candidates differing only on characteristics tested in the study (gender, race etc.).

⁸ The authors refers directly to the methodology offered by Kahneman, Knetsch and Thaler (1986).

game tests for the role of contact related to discrimination especially among who they call “rooted French”⁹, referring explicitly to debate in psychology in the 1950s and 1960s. The authors then replicate this second game after a sequence of “socialization”¹⁰ between participants.

These three experiments aim at make the gun smoke visible and measurable. The testing shows that an individual with a “Muslim sound-like” name on his CV has 2.5 times less chance to be called by a recruiter. The first dictator game shows systematic transfer to other participants, with, however, a systematic inferior amount transferred to people associated with “Muslim names” compared to people with “Christian names”. The second dictator game shows that “Rooted French” do not display a “taste for discrimination” when they are surrounded by other “rooted French” but give significantly less to “Muslim Senegalese” when surrounded by participants “from other cultural backgrounds”. The authors label this result the “Hortefeux effect”¹¹: discrimination is not reduced by contact with disliked group members. The replication was meant to interpret the “Hortefeux effect” through two theories: the “intergroup contact theory” (Allport 1954) based on the ignorance and misconception of others and the “group threat theory” (Blalock 1967) based on feelings to be jeopardized. In the first theory, contact is said to reduce discrimination, while the second one predicts an increase of discrimination when contact occurs. Since, in the replication of the second dictator game, the “contact” before the game does not reduce discrimination, the authors validate the second theory. Then, “the paper predicts that [the] demographic trend will increase anti-Muslim prejudice” and “call for solutions to anti-Muslim prejudice in the West” (Adida *et al.*, 2011, p.1).

The authors then build a model to undercover the rationale behind the “Hortefeux effect”: “[d]oes the Hortefeux effect emerge because FdS [rooted French] donors respond to changes in the behavior of non-FdS donors when SM [Senegalese

⁹ The second part of the study concentrates on what the authors call “rooted French” (“Français de souche”), referring to “French citizens with four grandparents born inside metropolitan France” (Adida, Laitin, Valfort, [2011: 2]). This “objective” statistical category is not justified, and, by assumption, “rooted French” are supposed to discriminate more than other French citizens.

¹⁰ This “sequence of socialization” take the form of a “speed dating” of few minutes. The temporality taken into account is therefore very short term oriented.

¹¹ In reference to a word by at the time French Minister of the Interior (Home Affairs) Brice Hortefeux in France, “when there’s one, that’s ok; it’s when there’s a lot of them that there are problems” (Adida, Laitin, Valfort, [2011: 2]).

Muslim] numbers increase, or because FdS donors assign a lower weight to the well-being of SM recipients when SM number increase?” (Adida *et al.*, 2011, p.23). The rational model providing the two explanations of the decrease in “Rooted French” generosity is empirically tested (through the difference between what they give and what other players give) and does validate a preference-based explanation rather than a strategic explanation: “[in] other words, FdS donors are the only donors in the dictator game to change their behavior when Muslim numbers increase” (*ibid.*, p.23). The FdS behavior may result from error in anticipating the others behaviors but the authors reject this hypothesis:

“One could object that the Hortefeux effect arises because FdS donors wrongly anticipate that non-FdS donors change their donations when Muslim numbers increase. Although we do not have information on FdS actual beliefs about non-FdS reactions to SM out-group salience, we consider this assumption unrealistic. First, we know that FdS beliefs about other FdS reactions to SM out-group salience (as compared to SX [Senegalese Christians] out-group salience) are correct, which is not consistent with FdS misreading other players’ behavior. Second, our FdS players stem from the ethnically diverse 19th district in Paris. They therefore have many opportunities outside the lab to update their beliefs about non-FdS (and notably Muslim’) behavior when Muslim numbers increase. If they fail to do so, we believe that this should be attributed to their anti-Muslim prejudice that is exacerbated in that context and therefore prevents them from interacting productively with Muslims” (Adida *et al.*, 2011, p23).

Therefore, they concludes that “based on a rational model and an empirical test of the mechanisms this model uncovers, we identify that the Hortefeux effect derives from an activation of FdS taste-based discrimination against Muslims when Muslims members increase” (*ibid.*, p.26). As in Becker’s model, consistence between actual behavior and rationality is maintained by referring to agent’s preference. However, in Adida *et. al.*’s lab experiments, systematic transfer to “pictures” is *in contradiction with standard rationality* (maximizing money profit) as the authors point out¹². Furthermore, in the Beckerian framework that the authors use in the interpretations of their results, systematic inferior amounts transferred to members of specific group – discrimination *per se* – has no economic justification in terms of economic efficiency, apart from being described as a result of “personal taste”

¹² “In experimental economics, the dictator game provides compelling evidence for other-regarding preferences challenging the *homo oeconomicus* postulate, which predicts that the donor should not give anything of his initial endowment to the recipient. Indeed, Forsythe, Horowitz and Sefton (1994) show that 80% of their subjects choose to give a strictly positive share of their initial endowment, with 20% choosing to divide this endowment equally. Reviewing eleven results from dictator games, Camerer (2003) reveals the generality of this finding, as the mean offer range from 10% to 52%”. (Adida *et al.*, 2011, p.3).

(Becker, 1957,). Indeed, on Becker's account, "tastes for discrimination" are formalized as a cost playing the role of a tariff in a trade model. Nonetheless, in Adida et. al.'s lab experiments, systematic inferior amount given to members of a disliked group do imply greater money profit in this specific interaction, compared to other interaction with other group; hence at the individual level, discriminatory behavior clearly is efficient.

1.2 Rationality and Inefficiency: A framed field experiment in development economics

To illustrate the third kind of experiments within Harrison and List's typology, we discuss a framed field experiment from development economics; more precisely, the experiment in question is a *randomized experiment*, the most representative kind of framed field experiment in economics

With the collapse of the Washington Consensus¹³ at the beginning of the 1990s, the question of the development aid became very vivid. Two camps, the pro-aid one and the anti-aid, started a strong debate on this issue. The leading researcher in the pro-aid camp is Jeffrey Sachs (2005) who advocates a massive aid plan in order to allow the poor to escape from poverty traps. In the anti-aid camp, the leading researcher is William Easterly (2006), who criticizes the pro-aid camp as being just a continuity of occidental imperialism from the West. Explicitly advocating itself as a third way in this debate, the J-PAL, a famous laboratory in development economics based at the MIT led by Esther Duflo and Abhijit Banrjee, promotes the use of randomized experiments in order to collect evidences concerning aid efficiency. This subsection focuses on the latter's randomized experiments, after having briefly sketched the (pre-J-PAL) standard theoretical framework of development economics.

The economies of developing countries are highly dependent on agricultural rather than manufactory production. In 1964, Theodore Schultz published his famous book, *Transforming Traditional Agriculture*, in which he developed a neoclassical

¹³ In the beginning of the 1980s the International Monetary Fund and the World Bank imposed to developing countries a set of structural policies in order to stabilize and develop their economies. This set of structural policies was called "Washington consensus" by John Williamson (1990, 2003). This set of structural policies was a social and economic failure (see Jolly et al.,1987; see also Stiglitz 2002 for an analysis of the related social cost along with a strong criticisms of these economic policies; see also World Bank 2005 and Rodrik 2006 more detailed conclusions)

theoretical framework for understanding poverty that became the standard framework in development economics. The main idea developed by Schultz is summarized in his motto 'poor but efficient'. In other words, poor people manage to make efficient use of their few resources. The work of Schultz mainly focused on agriculture in developing countries, and contradicted the main position on this field around the 1950s. During this period the agriculture in developing countries was perceived with a null marginal product because of tradition and culture, and the idea was to move labor from agriculture to industry. On Schultz's account, considering the circumstances in which they live, poor people do the best they can: if they are not productive it is only because they cannot be so.

More recently and with respect to agricultural problems in development economics, it has been noticed that farmers in developing countries do not use fertilizers which would produce higher returns. Duflo did a randomized experiment in Kenya with Michael Kremer and Jonathan Robinson (Duflo *et al.*, 2011) in order to understand what can be done to make farmers use fertilizers. The persistence of low agricultural harvest in Africa is commonly interpreted as resulting from the low adoption of fertilizers. Hence the question is: why are fertilizers not adopted by the poor when it can substantially increase their agricultural production? Duflo *et al.* chose to test an answer to this question which is inspired by the growing behavioral economics literature on intertemporal choices: the behavior of the poor are driven by "timing and impatience" (J-PAL, Policy Briefcase 2011, 4). During the harvest season, when farmers have enough money to buy fertilizers in advance for the next season they do not do so and buy something else, hence when the next season arrives, farmers do not have enough money to buy fertilizers.

In collaboration with an International NGO (ICS¹⁴), the authors tested a specific program through a randomized experiment, which belong to the *framed field experiment* category of Harrison and List (2004). The « Savings and Fertilizer Initiative Program » (SAFI) aimed to improve the use of fertilizers by facilitating the purchase of fertilizers for the farmers. Basically, in order to reduce farmers' procrastination, an officer visited the farmers and gave them the possibility to buy the fertilizers just *after* the harvest season. The experiment was hold in Kenya from 2003

¹⁴ International Child Support (ICS) is a Kenyan NGO which aims to promote development programs to improve the life of children.

to 2004, so that it lasted for two seasons. The farmers who were allowed to participate to the experiment were randomly divided in two groups: a *treatment group* which receives the SAFI program, *i.e.*, the visit of the officer, and a *control group* which does not receive the SAFI program. During the second season, the experimental design was enriched. Three groups were added to the initial experimental design. The first added group was constituted by a new set-up of farmers randomly selected to receive the initial SAFI program. The second added group of farmers received the SAFI program with *ex ante* choice of timing, *i.e.*, they were visited before the harvest and had the possibility to say when they wanted to be visited again later. In the third added group, the farmers were visited just *before* when they were suppose to apply the fertilizers to the crops.

Dufflo et. al. (2011) drew three main conclusions from this experiment: (1) the SAFI program increases the use of fertilizers *but only on the duration of the experiment*; (2) many farmers are conscious of the difficulty that they have to save money for fertilizers; (3) there is no evidence of “impulsive purchasing” – such as alcohol or tobacco – as the authors were wondering (Duflo *et al.*, 2011, 2376).

This experiment clearly challenges the standard theoretical framework of Schultz. Conversely to Schultz’s theory, Duflo *et al.* (2011) show that poor people are not on the productive efficiency frontier, in other words they are not efficient. The poor are not efficient because they are not using fertilizers, which can increase consequently their agricultural productions and therefore they are not on their productive efficiency frontier. The main issue seems to be that the poor do not arrive to be on this frontier because, in the example of fertilizers, they face many difficulties to save. These difficulties are mainly explained by the fact that:

“being poor almost certainly affects *the way people think and decide*. Perhaps when choices involve the subsistence of one’s family, trade-offs are *distorted* in different ways than when the question is how much money one will enjoy at retirement. Pressure by extended family members or neighbors is also stronger when they are at risk of starvation. Or, decision making may be influenced by stress.” (Duflo, 2006b pp.376-377)

For Duflo, poverty changes the decision making process of individuals in a way that leads to inefficient decisions. Poor people are rational but the complexity of their lives imply inefficient behaviors. In consequence, Duflo aims to define a new

research agenda and therefore to develop “a new paradigm, ‘poor but neoclassical’” (Duflo, 2006b, p.367). That is to say, that the poor are not efficient, as Schultz emphasized, but they are rational. They do the best they can do, considering the difficulties they face, but it leads them to inefficient choices.

1.3 Irrationality and Inefficiency: a natural experiment from the behavioral economics of insurance

Finally, we illustrate the last type of experiment within Harrison and List’s typology, a natural field experiment from the behavioral economics of insurance.

The early 1990s United States saw the beginning of national debates on the economic consequences of deregulation with respect to the increase in lawsuits (Jost 1992, Frayssé 1995; see also Marciano and Medema 2013 for a broader history of economic thought perspective). A small part of these debates concerned the strong price increase in auto insurance (*i.e.* in insurance premiums). The three main positions in the debate over auto insurance prices were that (1) insurance companies were abusing consumers, or (2) consumers had an excessive tendency to go to court, or (3) there was too much regulation if the prices were not due to a temporary market fluctuation¹⁵. In order to please these three parties:

“A number of states have changed or are considering changing their automobile liability insurance laws *to give consumers more choice* [...]. One approach to reform that has gained favorable attention in several states is to give motorists a choice between a “full-priced” policy that includes the right to sue for any auto-related injury and a less expensive policy that places certain restrictions on the right to sue. With restricted rights, motorists may sue for pain and suffering when they sustain severe injuries in an accident, but they may not sue for pain and suffering if their injuries are not serious. In all cases, they can still sue for economic damages and medical costs.” Johnson *et. al.* (2000, p.235, our emphasis)

In standard economics of insurance, consumers’ choices among policies are conceptualized through expected utility theory, which is considered to be both a descriptive and a normative theory of rational choice under risk and uncertainty. The only constraint that expected utility theory puts on consumers’ *rationality* is

¹⁵ For contemporary accounts of the problem see Anderson, Heaton and Carroll (2010; RAND 2010 for a summary) and Insurance Information Institute (2013); we do not discuss these accounts here since we are interested in Johnson *et. al.*’s account of the problem *at the time* (*i.e.*, early 1990s) and the contrast they make between their approach and the standard economics of insurance’s (*cf.*, *infra*).

*consistency, i.e., a consumer is either risk seeker, or risk neutral, or risk averse, at least for a given decision problem. Insurance markets exist primarily because of risk averse consumers. By virtue of the law of large numbers, insurance companies are able to make a profit out of insuring risk-averse consumers*¹⁶. Insurance companies' premiums (*i.e., prices*) are supposed to match consumers' willingness to pay (*i.e., degree of risk aversion*), and the only sources of inefficiencies underlying this schema are to be found in the potential rigidities to the profit maximizing behavior of insurance companies, which are (Arrow 1963, quoted by Johnson et. al. 2000, p. 225): (1) moral hazard (individuals undergoing greater risks *because* they subscribed an insurance policy), (2) adverse selection (asymmetrical information between the insurer and the consumer), and (3) transaction costs (searching for an insurance company, filling the paper work, failure to borrow to insure against something one would want to etc.). Each is a by-product of consumers' *rational* behaviors, *i.e., it is in their interest* to behave as such.

The contribution of Johnson *et. al.* (2000) consists in showing that there are inefficiencies in the insurance market which are not due to either one of the latter three causes. Regarding the case discussed above, they remarked that, in states where auto insurances are compulsory by law, when the limited right policy is introduced it has to be either set as the default insurance policy, or as the alternative insurance policy. Johnson et. al. (2000) notice that a theoretical implication of the standard economics of insurance framework is that “[t]he choice between the two options (wealth and budget aside), should be the same whether consumer currently has the right to sue or the limited right” (ibid, p.235).

In 1992, the states of Pennsylvania and New Jersey, where auto-insurance is compulsory, introduced a limited right policy respectively as the alternative option and as the default option. Observing the discrepancy in choices between consumers in Pennsylvania and consumers in New Jersey (through the data made available in Insurance Information Institute 1992) constituted a *natural experiment* to test for the theoretical implication of standard economics of insurance mentioned above (*i.e., the*

¹⁶ For the law of large number to enable insurance company to pursue profit maximization the risks against which risk-averse consumers insured themselves have to be heterogeneous (diversified types of risks) and independent (non-correlated risky events).

non-impact of alternative *versus* default setting of an option on consumers' choices)¹⁷. The results of the natural experiment were that: when *the limited right policy* was set as the default option (in New Jersey), 80% of the drivers chose to stay with this policy, although when it was set as the alternative option (in Pennsylvania), only 25% of the drivers chose to shift toward this policy. They concluded from this natural experiment that this pattern of choices contradicted the non-impact of default option predicted in the standard economics of insurance, which had

“significant economic consequences. [...] If we assume that Pennsylvanians would have adopted limited tort as the same frequency as New Jersey residents, if limited tort had been the default, Pennsylvanians would have paid over \$200 million dollars less for auto insurance.” (Johnson *et. al.* 2000, p.238).

The authors did not interpret this inefficiency as being the result of moral hazard, adverse selection or transaction cost, but of consumers' violations of expected utility theory (EUT). More precisely, they emphasized two interrelated violations: (1) consumers' preferences were not defined over objective and absolute outcomes (in contradiction with the definition of a preference structure in EUT), because (2) consumers gave economic weight to the economically irrelevant fact that an option is either an alternative or a default (in contradiction with the principle of EUT maximization in standard insurance economics). They argued that these deviations are systematic in insurance problems, as they illustrated with other laboratory experiments throughout their paper and other references to behavioral decision research and behavioral economics. They specifically relied on Daniel Kahneman and Amos Tversky's concepts of framing and loss aversion to predict and explain the observed patterns of choice. Research on 'framing' (Tversky and Kahneman 1981, 1986; Kahneman and Tversky 1984) show that subjective perceptions (or representations) of outcomes do not necessarily match their objective presentation, *i.e.*, a gain can be seen as a loss and a loss can be seen as a gain. In the natural experiment case discussed above, this suggests that when the limited right is set by default, consumers are more likely to see the premium difference with the full right (a monetary loss); whereas when the full right is set by default, consumers are more likely to see the benefit difference with the limited right (a monetary gain). Basically,

¹⁷ They challenge this implication by means of paper-and-pencils laboratory experiments that were conducted before the natural experiment, which confirm their laboratory results (the effects are indeed stronger in the real market). We do not discuss the relationships between natural and laboratory experiments in Johnson *et. al.*'s paper in this section.

loss aversion (Kahneman and Tversky 1979; Tversky and Kahneman 1991, 1992) is the idea that the disutility from a loss is (usually around two times) greater than the utility from a gain of the same absolute value. In the case discussed above, this would explain why, once the options ‘framed’ (as ‘alternative’ and ‘default’), less consumers changed when the limited right is set by default (in New Jersey).

1.4 Do experimental methods in economics imply greater conceptual ambiguities between rationality and efficiency?

Taken from different subfields of economics and using different types of experimental methods in economics, the three applied microeconomic studies discussed in the previous subsections highlight three different relationships between rationality and efficiency at the individuals’ level. The interpretations of the authors were that discriminators’ behaviors are irrational and efficient, poor farmers’ behaviors are rational and inefficient, and insurance consumers’ behaviors are irrational and inefficient. How are we to explain these different relationships at a conceptual level? As we have seen in introduction, (1) on a standard account rationality is suppose to imply efficiency but (2) the foundational issues underlying rationality in economics are ambiguous. Hence, are we to attribute the three different relationships between rationality and efficiency highlighted in the previous sections to an ‘interplay among ambiguities’ so to speak?

On the rationality issue, one could argue that consistency of choices and self-interest maximization were intertwined in each study. Consistency of choices concerning the amounts of money to give to other people was related to self-interest maximization of monetary gains, consistency of choices concerning the use of fertilizers was related to self-interest-maximization of harvesting, and consistency of choices of insurance policy was related to self-interest-maximization of expected monetary gains. Since the authors were not explicit about which underlying view of rationality they were taking as primitive in their experiments, the ambiguity at the foundational level investigated in introduction crystallizes in these applied microeconomics’ contributions. The ambiguity of the descriptive/positive *versus* normative/prescriptive status of rationality was also present in these contributions since the authors made claims about the efficiency of individual behaviors. However, as we have also discussed in introduction, methodological individualism requires

rationality to be understood at the individual level, but only for the sake of understanding higher aggregated/market/social phenomena. This means that the efficiency issues are to be understood at a higher level than the individual one.

Clearly, the interpretational issues concerning rationality in economics, which are well known and well discussed at a foundational/conceptual and theoretical level (*cf.* introduction) crystallizes into in the applied microeconomists' contributions we have scrutinized. It is understandable that these issues are not explicitly discussed within the contributions we have considered since it is not the purpose of applied microeconomics to tackle foundational/conceptual issues *that are not even settled at the proper level of investigation*. However, in the next section we try to make the case that there is no such a thing as a 'proper level of investigation' for the foundational/conceptual issues around rationality in economics, because a full understanding of these issues require an investigation *from* what economists are actually doing in the world.

2. From economic policies to economic theory and the three pillars of economic rationality

In line with a recent set of reflections (Putnam and Walsh 2012; see also Davis 2013a, 2013b), we claim that a full understanding of the foundational/conceptual issues facing economics cannot overlook the fact that economics is political – implicitly so when economists claim to do 'economics' and explicitly so when they claim to do 'political economics' (*e.g.* Putnam and Walsh 2012 and the references therein). From this reflexive perspective on economics, three *methodological* implications follow quite straightforwardly with respect to our approach from applied microeconomics to foundational and conceptual issues: (1) the notions of efficiency and rationality are to be considered as *norms*, of evaluation and of behavior respectively, (2) these norms have to be understood at the very applied level *complementarily* to the foundational/conceptual and theoretical levels at which they are most often discussed, and (3) that the ambiguities around economic rationality and efficiency are to be analyzed *at the level of policy recommendation*.

This section shows how economic rationality grounds economic efficiency, thus yielding policy recommendations. In this respect, we seek to make an

analytically fruitful use of the (small) emphasize we did put on the theoretical (*i.e.*, historically internal) and societal (*i.e.*, historically external) dimensions of the applied microeconomic contributions scrutinized. To do so, we first discuss the relationships between economic rationality, economic efficiency and policy recommendation in these contributions (2.1). Because the notions of rationality underlying each experiments rely solely upon one of the three dimension of rational economic behaviors – other regarding preferences, intertemporal preferences and preferences for risk and uncertainty – when then move to the conceptual and foundational level to argue that the lack of theoretical relationships among these dimensions in economics prevent a complete understanding of the social phenomena that these experiments and the related policy recommendations aimed to tackle (2.2).

2.1 From economic policies to economic theory

Recall that the experiments discussed previously referred to specific societal problems: discrimination against “Muslims” in western countries, foreign aid to eradicate poverty in developing agricultural economy, and the economic drawbacks of deregulation for auto-insurance markets in the U.S. The three applied microeconomic contributions scrutinized in the previous section share a common intellectual pattern that we are going to investigate in this subsection: there is a problem “out there” in society that represents a puzzle for standard theoretical frameworks of economic theory which cannot propose clear policy recommendation and experimenters tries to collect evidence to understand better what’s going on and then propose policy guidelines that embody standard notions of rationality and efficiency but non standard relationships between these notions.

In order to make this point explicit, we will first, investigate the policy guidelines that each microeconomic contribution proposes implicitly or explicitly (2.1.1). Then we will show that these policy guidelines rest upon notions of efficiency which are grounded on solely one of the three pillars of economic rationality – other regarding preferences or intertemporal preferences or preferences for risk and uncertainty (2.1.2).

2.1.1 From policy recommendations to economic efficiency

Discrimination

If discrimination is rational but inefficient in standard economics of discrimination, the resulting political recommendations are much more complex. In the standard models of discrimination, the policy recommendations are: “Laissez-faire” according to Becker’s model, or improvement of information on the market and policies focusing on “pre-market” factors – essentially education – according to Arrow/Phelps’s theories.

No such recommendation is drawn in the experiments studied, in which discriminatory behaviors were rational but inefficient. Even if the results of Adida *et al.* (2011) corroborated Becker’s standard theory of discrimination, the policy recommendations they draw are modest and pessimistic but do not rely on “laissez-faire” and market solutions:

“Solution to discrimination against Muslims is of urgent concern. As shown by Paluck and green (2009), evidence on prejudice-reducing policies is at best inconclusive, such that there is so far no efficient intervention to fight against anti-Muslim discrimination. We hope that the search for policies that work effectively to reduce anti-Muslim prejudice will be aided by our identification of one of the mechanisms – *i.e.* the activation of distaste toward Muslims by Muslim out-group salience – that sustain it” (*ibid.*, p.27).

Identifying a mechanism – the “Hortefeux effect” – underlines the existence of FdS’s taste-based discrimination: tastes or preferences “activated” in a specific context, *i.e.* increasing “Muslim” presence. These preferences are in contradiction with the anti-discrimination laws and have to be the focus of policies recommendations. Therefore, based on the experiments of Adida *et al.* the main policy recommendation which can be drawn is to target anti-social preferences.

Poverty

The policy recommendation from Duflo *et al.* is extremely clear: Duflo *et al.* recommend the program they tested – the SAFI program -- because it is the most efficient one:

“A small “nudge” at the appropriate time was as powerful as a heavy subsidy – and may be a better policy [1]. Critics of fertilizers subsidies contend that they promote overuse of fertilizer, leading to environmental damage and ultimately reduced effectiveness. Large subsidies are also fiscally costly, typically regressive (benefiting the wealthiest farmers most), and often necessitate that the government get involved in fertilizer distribution. A SAFI-style program could reduce these negative side effects, since the smaller incentive would not promote overuse among farmers who are able to save money for fertilizer.

To compare the relative desirability of heavy subsidies, a SAFI-style program, and no intervention [2], the researchers created a model to estimate which policy option delivers the *highest welfare – i.e. which makes society as a whole better off*. They find that a SAFI-style program improves welfare relative to taking no policy action, and it may provide larger welfare gains than heavy subsidies [3].” (J-PAL, Policy Briefcase 2011, 4, our emphasis)

Compare to heavy subsidies, which is highly recommended by some economist such as Frank Ellis (1992) or Jeffrey Sachs (2004), the SAFI program is considered to be more efficient by J-PAL researchers. The main reasons are that heavy subsidies can create an overuse of fertilizers and therefore cause environmental damages; furthermore a heavy subsidy is extremely costly for the government. That is why, for the same effect on the use of fertilizers, the authors promote the SAFI program [1].

Randomized experiments allow comparing the control group (which receives no intervention) and the treatment group (which benefits from the SAFI program), in the light of Duflo *et al.* experiment, the J-Pal was able to show that the SAFI program has more efficient effects on the use of fertilizers compare to no intervention [2]. At the end, the authors conclude that the SAFI program is the intervention, which provides the “highest welfare” [3]. The policy recommendation appears here extremely clear: promoting the SAFI program. The reason is that this program offers the largest welfare compare to no intervention or heavy subsidies.

Insurance

The policy recommendations made by Johnson *et al.* (2000) are rather implicit and in any case quite indirect. Nonetheless, it is possible to draw, from the experiment of Johnson *et al.*, one specific policy recommendation: change the default option. The idea is, for the authors, to replace the default option by limited-tort policy and to place the full right policy as an alternative option

“In Pennsylvania, just as in New Jersey, limited-tort policies were offered in order to provide economic relief to many of the consumers who felt overburdened by high automobile insurance rates [1].” (p.240)

“The considerably lower premium associated with the limited-tort policy was designed to encourage consumers to take advantage of this option. However, status-quo framing apparently led many drivers to accept the default option, even though it was more expensive than the alternative. Framing thus had a systematic and predictable effects on market behavior that produced significant economic consequences [2].” (p.240)

Standard economics of insurance’s normative policy recommendations to repair these failures (lowering prices by expanding the range of choices available to consumers) have been implemented [1]. However these implementations have not repaired the market failures [2]

It is interesting to notice a non-trivial fact concerning the contemporary scientific context of applied microeconomics. Johnson *et al.* (2000) has been instrumental in the rise of libertarian paternalism and other behavioral welfare economics related research program. The original paper was initially published in 1993, and, although it treated a very contemporary question of the time, it had a rather weak impact in the literature until the rise of libertarian paternalism in the early 2000s as shown by the following graph (taken from Google Scholar):



Interestingly, Johnson *et al.* (2000) and other related work in behavioral economics of insurance had a rather limited impact on auto-insurance regulations (Anderson, Heaton and Carroll 2010, p. 137), *e.g.*, default and alternative options have not switched in Pennsylvania (see also Insurance Information Institute 2013). However, along with Samuelson and Zeckhauser (1988), Johnson *et. al.* (2000) is practically always referenced to ground policy recommendations by behavioral economists based on default options in varied market and non-market areas. The reason is quite explicit in these policy recommendations: both Samuelson and Zeckhauser (1988) and Johnson *et. al.* (2000) have demonstrated the power of default options by means of *natural experiments*, the former concerning intertemporal preferences for retirement savings, the latter concerning preferences under risk and uncertainty for auto-insurance.

From these three microeconomics contributions, three different policies recommendations have been drawn. The first one aims to focus on the preferences of the agent – discrimination. The second and the third one propose a nudge device in order to improve the use of fertilizer and to reduce market failures – in the case of insurance. All of these recommendations focus on the behavior of the agent and try to orient it.

2.1.2 From economic efficiency to economic rationality

These three policy recommendations are grounded on criteria of economic efficiency. Here, we try to briefly identify the nature of these criteria of efficiency and how they are grounded on economic rationality.

Discrimination

Using Becker and statistical theories of discrimination, market mechanism were said to eliminate discrimination essentially because discrimination was rational (consistent with taste), but inefficient (a cost). In Becker's model, firms with taste for discrimination are eliminated by firms with no taste for discrimination, essentially because the later face inferior cost.

In alternative narratives (*e.g.* Arrow, 1972, 1998), discrimination is described as a result of imperfect information available to agents. The agents anticipate a specific economic characteristic to be correlated with a group affiliation and made probabilistic judgment on the probability that this correlation is true for a particular individual they interact with. Here, the efficiency question (at an individual or firm level) depends on the veracity of the anticipation. Therefore, in statistical discrimination models, discrimination reflects an error of productivity perception and is therefore eliminated by learning effect. Discrimination is sustainable only if it interacts with *real* differences in productivity.

In the experiment of Adida *et al.*, the rationale of the agents' behavior relies on a taste-based (preference) explanation. However, contrary to Becker's model where having a taste and being able to pay for it is still rational though inefficient, in the experiment, discrimination is efficient because profitable to individuals who commit it (monetary gains and utility maximization according to their preference).

Poverty

Let us, now, turn on the underlying criterion of efficiency within the framed experiment on fertilizers. As we have pointed out, the SAFI program is recommended by the authors because it the program which allow the highest welfare. But the authors do not clearly define what they mean by highest welfare.

However, the authors give a path, the highest welfare should be considered as the welfare "which makes the society as a whole better off" (J-PAL, Policy Briefcase 2011, 4). But which society is considered here? The farmers? The farmers plus the rest of the population? What is taken into account? The notion of the "whole society" can refer to two dimensions: 1) The better off for each individual who constitutes the society, or 2)The average better off for the society.

The first ambiguity is to determine whether the society as a whole expresses the welfare of each of its constitutive individuals or if it refers to the sum of individuals and in that perspective do not focus on individual level. The second ambiguity is the meaning of welfare. The use of fertilizer, because it can generate high returns, will imply more income for the farmers. Is that the implicit definition of welfare? The only dimension evaluated by the experiment is the use of fertilizer, is that to say that the use of fertilizer is the end, and describe the welfare? Or is it a

mean for a higher welfare? What the authors consider as a clue for efficiency is what they test, that is to say the use of fertilizer with respect to intertemporal choice of use of fertilizers. The efficiency, here, is pretty explicit. However, the norm below this efficiency is implicit.

Insurance

Johnson et. al. (2000) do not, again, really define what is the economic efficiency underlying their recommendation for a change of frame, *i.e.*, of default option. They evoke only once the notion of efficiency in their experiment:

“If consumers exhibit systematic biases, insurance markets may fail to operate efficiently.” (p.239)

Generally speaking, standard economics of insurance do not take into account well documented psychological mechanisms in the normative models of choice that underlie their normative criterion of economic efficiency, which relies instead solely on economic factors. While, descriptive models can be used to inform policy makers, firms and consumers of the discrepancy between what they ought to do to attain economic efficiency and what they are actually doing.

Roughly speaking, *given that* (a) there is an agreement on the highest level of auto-insurance prices (b) it is possible to decrease these prices by introducing cheaper insurance policies and that (c) consumers are prone to systematic psychological biases which make them not choosing the cheapest policy against their interests because they have inconsistent preferences for risk and uncertainty, then (d) it is better to put the cheapest policy as a default option so as to maximize consumer surplus. Therefore the notion of efficiency into the authors seem to refer is linked to the one of neoclassical framework. That is to say, the one that focuses on surplus analysis in order to promote the Pareto efficiency situation.

Through these different experiments, we searched the invisible definition of efficiency that supplanted the different policies recommendations we illustrated. In each case, this definition does not appear clearly. As economic efficiency is supposed to be grounded in economic rationality, we next investigate the causes of the lack of

clarity on the former by investigating the latter on a more conceptual and foundational level, without losing sight of the field so to speak.

2.2 Appraising the three pillars of economic rationality

We have seen that the theoretical problems faced by the applied microeconomics contributions we have scrutinized collapse into questions of other-regarding preferences, intertemporal preferences, and preferences for risk and uncertainty. The references discussed in introduction (Blume and Easley 2008 and Sen 2008) do stress that the foundational/conceptual ambiguities around rationality (consistency of choices *versus* self-interest maximization and descriptive/positive *versus* normative/prescriptive status) carry over to the work on interpersonal decisions¹⁸ and to the work on decisions under risk and uncertainty¹⁹ *in economics and in behavioral economics* (Blume and Easley 2008, p.10 and pp.2-3 resp.; Sen 2008, pp.4-5 and pp.8-11 resp.). It is fair to say that the same remark applies to intertemporal decisions²⁰ (*e.g.*, Vallois 2011, 2012). As stressed by both Blume and Easley (*ibid*) and Sen (*ibid*), these ambiguities (at least slightly) fade away in *decision theory* which is more concerned with individual *contra* social outcomes of decisions.

One could argue that in economics, behavioral economics and decision theory, the analytical specialization around these three pillars of rationality has enhanced our

¹⁸From Gary Becker's (1976) discussion of "enlightened self-interest" there has been a huge literature (and debates) on the conception and conceptualization of other-regarding preferences in economics, behavioral economics and decision theory (*e.g.*, Muramatsu 2006, chap. 7 for a detailed discussion).

¹⁹ From John von Neumann and Oskar Morgenstern (1944) along with Leonard Savage (1954)'s axiomatizations of expected utility theory under risk and uncertainty respectively, and John Pratt (1964) and Arrow's (1965) operationalizations of expected utility theory to measure risk attitudes in microeconomics, there has been a huge literature (and debates) on the conception and conceptualization of preferences for risk and uncertainty in economics, behavioral economics and decision theory (*e.g.*, Muramatsu 2006, chap.6 for a detailed discussion)

²⁰ From the seminal contribution of Paul Samuelson (1937) on exponentially discounted utility along with the one of Robert Strotz (1955) on impatience, there has been a huge literature (and debates) on intertemporal preferences in economics, behavioral economics and decision theory (*e.g.*, Muramatsu 2006, chap.5 for a detailed discussion).

understanding of individual behaviors with respect to ‘time’, ‘other people’ and ‘the unknown’, to use terms that stress the commonsensical strength of the analytical distinction. We have previously emphasized how notions of rationality are the ground of notions of efficiency in economics, which altogether are the ground of policy recommendation. Therefore, it is not so surprising that the rise of experimental methods in applied microeconomics has changed the relationship between rationality and efficiency through a better understanding of the nature of the three pillars that constitute the former.

However, given the complex social issues into which policy recommendations are embedded (as we have illustrated), one could question whether it is warranted to base policy recommendation solely on one of the three pillars. In other words and to illustrate with the cases we have discussed previously, is it warranted to consider only ‘other people’ and not ‘time’ and/or ‘the unknown’ to fight discrimination? Is it warranted to consider only ‘time’ and not ‘other people’ and/or ‘the unknown’ to fight poverty? Is it warranted to consider only ‘the unknown’ and not ‘time’ and/or ‘other people’ to regulate the insurance market? We think that, in each case, this is not totally warranted.

The three pillars of economic rationality with respect to discrimination

First, consider the two main frameworks from which considerations of efficiency are derived in economics of discrimination. The ‘taste-based’ framework of Becker holds that discrimination stems from specific other-regarding (anti-social) preferences that are rational but not efficient at the market level. The statistical framework of Arrow and Phelps holds that discrimination stems from probabilistic judgments made by the economic agent about the odds that the individuals they are interacting with share the economic characteristic correlated with a specific group affiliation; in other words, the economic agent first form a subjective probability that an individual has some economic characteristic, and then make his economic decision according to his risk attitude. In both frameworks, discriminatory behaviors are rational: *De gustibus non est disputandum* for Becker, and economic agents’ risk attitude are suppose to be consistent for Arrow and Phelps. The only two explanations we have of the (economic dimension of the) complex social phenomena of discrimination are either in terms of one pillar of rationality or the other but not both. Note that expected utility theory, which grounds the Arrow/Phelps framework,

contains what is called in decision theoretic terms an independence axiom, which technically ensure that the rationality of an agent *entails* the independence between his preferences (tastes) and his probabilistic judgments (beliefs), so as to prevent wishful thinking and other types of irrational behaviors (*e.g.* MacCrimmon and Larsson 1979 for a detailed discussion). When Arrow (1972) said that discrimination is the result of cognitive biases, it means that (technically) economic agents who discriminate do not respect the independence axiom, *i.e.*, they let their tastes influence their beliefs. In this case the rationality of the phenomenon does not hold anymore, though for different reasons than the ones discussed by Adida *et al.*. It has to be noticed that the latter also stick to a univocal interpretation of their results: discrimination has to be *either* a problem of preferences *or* a problem of belief formation (*i.e.* subjective probability). It is striking to see how the analytical distinction between the pillars of economic rationality carries over to applied microeconomics work, even when the authors appeal to the methodology of behavioral economics (they quote Kahneman, Knetsch and Thaler 1986 concerning the dictator design they are using) and refer to literatures that are quite external to economics (the social psychology of Allport and the sociology of Blalock). But behavioral economics severely challenges the actual (descriptive/positive) relevance of the independence axiom (*e.g.*, Kahneman and Tversky 1979), and more recent work in social psychology makes it quite clear that discrimination cannot be a problem, even in its economic dimension, explainable only in terms of one of the three pillars of economic rationality without considering their interactions. Note that some account of discrimination in social psychology especially emphasizes the importance of ‘time’ in the interplay between beliefs about ‘the unknown’ and tastes about ‘the others’ – *e.g.*, the conditions that are suppose to hold in *contemporary* accounts of group contact theory to warrant experimental test in Pettygrew and Tropp (2006) and Pettygrew *et. al.* (2011); these conditions were not respected in Adida *et al.*’s experimental design.

The three pillars of economic rationality with respect to poverty

Second, consider the framework of Duflo from which considerations of efficiency are derived in development economics with respect to the experiment we have scrutinized. According to Duflo, the farmers did not act efficiently because they

were unable to save the sufficient amount of money to buy fertilizers²¹. Buying the fertilizers suppose to be able to buy it in advance (during the harvest season) or to have some saving to buy it when it needs to be applied on the crops. As the farmers explained to Duflo, when they have money the shops do not have fertilizers and when the shops have the fertilizers the farmers do not have the money. Aware of that and in order to pursue an efficient behavior, the farmers should have saved the money when the shops have fertilizers. But why the farmers were unable to save? For Duflo, the farmers were unable to save because they do not have a proper vision about how they will act in the future. They hope to be more patient in the future when they are impatient in the present. In that sense, they exhibit time inconsistencies. Duflo defines the time inconsistency following Robert Strotz's (1955) work on impatience²². Consequently, these individuals do not make decisions that maximize lifetime satisfaction. By advocating that poor people are time inconsistent, Duflo points out

²¹ “A simple explanation for these facts is that saving money for fertilizer is difficult, and farmers may overestimate their ability to save. Economists have labeled this type of behavior as “time inconsistency.” In essence, time inconsistency means that the way people plan to act in the future is different from the way they actually do act when the future arrives. The popularity of SAFI suggests that many farmers are aware of that difficulty and therefore have demand for commitment device to help them make good investments.” (J-PAL, Policy Briefcase 2011, 4)

²² “An individual is imagined to choose a plan of consumption for a future period of time so as to maximize the utility of the plan as the present moment. His choice is, of course, subject to a budget constraint. Our problem arises when we ask: If he is free to reconsider his plan at later dates, will he abide by it or disobey it – even through his original expectations of future desires and means of consumption are verified? Our answer is that the optimal plan of the present moment is generally one which will not be obeyed, or that the individual's future behavior will be inconsistent with his optimal plan.” (Strotz, 1956, 165)

“In the present, we are impulsive, governed in large part by emotions and immediate desire: small losses of time (standing in line to get child immunized) or petty discomforts (glutes that need to be woken up) that have to be endured right now feel much more unpleasant in the moment than when we think about them without a sense of immediacy (say, after a Christmas meal that was heavy enough to rule out all thoughts of immediate exercise). The reverse, of course, goes for small “rewards” (candy, a cigarette) that we really crave in the present; when we plan for the future, the pleasure from these treats seems less important.” (Banerjee and Duflo, 2011, 64-65)

that the poor are not fully rational because one dimension is missing in order to be efficient. It is only with an understanding about the lack of rationality from which poor suffer that we can understand completely the recommendation of Duflo *et al.* The notion of efficiency, in Duflo's approach, is totally linked to the implicit one of rationality. And here rationality refers only to one dimension: time consistency. When Duflo challenged the theory of Schultz by saying that the poor are not efficient but inefficient, she asked "Poor but Rational?" (cf. title of Duflo 2006b) and maintained that the poor are rational but inefficient. Considering the life they face, the poor do the best they can. But at the end, when we try to understand what is behind this inefficiency of the poor, it seems that the only thing we see is irrationality as time inconsistency. To be sure, time inconsistency does not always implies irrationality as it is hotly debated in the literature on the topic (*e.g.* Vallois 2011, 2012 for detailed discussions). Roughly speaking, either time inconsistency is due to individuals' lack of self control, hence it is usually considered irrational, or it is due to pathological environments, hence it is usually considered rational (the individual has no responsibility what-so-ever for the environment he lives in). Duflo's policy recommendation through nudging clearly points toward the first interpretation, while her emphasis on the rationality of the poor points toward the second one. However, for the second interpretation to hold a detailed account of the structure of the environment is needed to understand where the problem lies; and there is no such account in Duflo's interpretation. It is interesting here to draw a parallel with the early work done by Pierre Bourdieu (1977) in Algeria throughout the 1960s. Bourdieu's account of the economic problems, especially regarding agriculture, faced by (or rather imposed on) a specific region of Algeria (Kabylie) makes it clear that 'time' is a crucial element structuring economic behaviors. But he strongly emphasizes that it is *impossible* to understand the way 'time' actually structures economic behaviors without understanding the way 'time' and social relations with 'other people' are *mutually constitutive of each other*, on the one hand, and *constitute economic behaviors*, on the other hand. But more importantly, is it enough to understand the behavior of the poor in order to fight poverty? Or do we need a larger definition of rationality? Today poverty is viewed as a multi-dimensional phenomenon, therefore focusing on time inconsistency hides some essential aspects of poverty. Furthermore, Duflo *et al.* target the real choices and leave out the potential choices of individual. In

Senian terminology (see Sen 1999), Duflo *et al.* focused on the *functionings* of farmer but not on their *capabilities* – potential choices (see also Davis 2013b).

The three pillars of economic rationality with respect to insurance and default options more generally

Third, consider the framework of Johnson *et al.* (2000) from which considerations of efficiency are drawn in behavioral economics. We have seen previously that Johnson *et al.* (2000) has been instrumental in the rise of libertarian paternalism although without having any real impact on *actual* auto-insurance regulations. Obviously there is more than just individuals' behavior toward 'the unknown' that drives the efficiency or inefficiency of auto-insurance markets, especially when auto-insurance is compulsory by law (*e.g.*, Anderson, Heaton and Carroll 2010 for a detailed discussion of auto-insurance market in the U.S). From experimental and theoretical perspectives, it is interesting to briefly draw a parallel between Johnson *et al.* (2000) and two other lines of decision theoretically oriented research. The first one concerns the relationships between intertemporal decision and decision under risk and uncertainty, and is already fairly discussed in economics so we shall be very brief on it, and just mention that since the seminal contribution of Menahem Yaari (1965), decision theorists have worked on how "the crucial cognitive distinction between the present and the future can be traced to the certainty of the former and the inherent uncertainty associated with the latter" (Halevy 2008, p.1146; see this reference for a detailed discussion of this line of research). The second line of research concerns the relationships between interpersonal decisions and decision under risk and uncertainty developed in the work of social psychology-oriented decision theorist Craig McKenzie. Since it is hardly discussed in economics, we will rapidly expose the substance of this line of research. The work of McKenzie and his co-authors has makes it clear that behind every framing effects related to choices under risk and uncertainty discussed in behavioral economics, there is an issue of, roughly speaking, interpersonal decision (McKenzie and Nelson 2003, McKenzie *et al.* 2006, Sher and McKenzie 2006, 2008, 2011). More precisely, drawing on psycholinguistic analysis of pragmatics (see Keren 2011 for detailed discussions), McKenzie and his co-authors conceive every decision problem as taking place between *a listener*, *i.e.*, the decision maker who makes the decision, and *a speaker*, *i.e.*, the decision modeler who frame the decision problem. Their research strategy

roughly proceeds as follows. They start by reproducing the results of behavioral economics in terms of *listener's* inconsistent preferences for risk and uncertainty, *i.e.* the traditional preference reversals using the related traditional experimental designs. Then, they conduct further experiments using new experimental designs which they call “embedded creativity” (Sher and McKenzie 2006, p.487) to test (1) the factors that determine *speakers' choice of frame* and (2) if these factors (that are implicit in the decision problems) explicitly influence the choices of the *listeners*, which is usually the case. They interpret their results as going against the usual interpretation of behavioral economics in terms of irrationality of the decision makers. For McKenzie and his co-authors, it is not the choices of the decision makers that explain the reversals of preferences, rather, it is the normative models of choices that do not properly account for the interactions between (in our terms) behaviors (of the listener/decision maker) toward ‘the unknown’ and behaviors toward ‘other people’ (*i.e.* speakers/decision modeler). They discussed this interpretation around the problems of default options to show how listeners (citizen/consumers in the real world) adapt their behaviors toward ‘the unknown’ by paying attention to ‘other people’, *i.e.*, to the way speakers (the government/firms in the real world) frame decision problems (McKenzie et. al. 2006).

We have tried to make the case that the analytical distinction between the three pillars of economic rationality, however fruitful for our comprehension, at an abstract level, of the respective dimensions of behaviors they respectively refer, clearly is not sufficient to understand economic behaviors at the applied level we have discussed here. This is somewhat surprising since an understanding of each of the social phenomena we have discussed in this paper exists in literatures that are more or less outside of economics, and that the applied microeconomics contribution we have scrutinized here all advocates for theoretical and methodological interdisciplinarity. This might be even more surprising when such understanding is partly provided by economics-oriented decision theorist.

To be clear, we do not call for systematically taking into account of the three pillars of economic rationality in applied microeconomics (the technical issues that this raises are well known), but rather for a reflection on how the three pillars *are (at least partly) mutually constitutive of each others.*

Conclusion

This paper has investigated how foundational and conceptual issues around economic rationality that are usually discussed with respect to economic *theory*, materialize into *recent* applied microeconomics. We have concentrated on three radically different subfield of microeconomics – the economics of discrimination, development economics and the economics of insurance – and have observed how the recent rise of experimental methods and behavioral economics within mainstream economics has impacted these subfields. The main impact, we have argued, is the changes in the conceptual relationship between economic rationality and economic efficiency, *without* changes in the substance of these notions. We have insisted on how the specificity of our reflexive perspective to go from applied work of microeconomics in the field to conceptual and foundational issues on rationality reveals another issue that has not been much discussed in the reflexive literature yet, around the analytical distinction made in economics among interpersonal preferences, intertemporal preferences and preferences for risk and uncertainty. We have argued that, although very sound at a theoretical level, this analytical distinction is not (never?) warranted at an applied level; and this has straightforward consequences both on both economic theory and on the real world through the policy recommendations made by microeconomists.

Twenty years ago, Daniel Hausman remarked about the work done in decision theory on choices under risk and uncertainty that:

“For the most part only faint echoes of the controversies concerning expected utility theory are heard within economics, since most economic models still assume that agents have perfect knowledge and employ only ordinal utility theory. [...]. The challenges to expected utility theory raise *interesting methodological issues about the role of evidence in economics*. (1992, p.27, our emphasize).

Twenty years later, we can say that this remark still applies at the theoretical level Hausman is discussing, *extends* to the explosion of decision theoretic work on interpersonal decisions and intertemporal decisions that has happened ever since, *carries over* to the applied level we have discussed here, and further *impact* the real world through the implicit/indirect or explicit/direct policy recommendations made by microeconomists.

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