Emotions and Revealed Preference for Rational Altruism.[☆☆]

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Abstract

Emotions are seen to be disruptive on individuals' behavior since they influence people's decision to exert effort and be productive at work, reduce time preference over money, increase cognitive flexibility, reduce spending and willingness to pay as well as increase reciprocity in gift exchange. However, there is hardly no evidence that individuals behave rationally under emotions. We conduct random assignment experiments to verify whether affect disrupts rationality in altruism. Specifically, we employ the axioms of revealed preferences to test for economic rationality. We find that subjects treated to positive affect elicit altruistic preferences that are indifferent to subjects treated to neutral affect and that their preferences fit in an economist's definition of rationality. We therefore confirm that even though emotions are seen to be disruptive, they do not imply irrationality.

Keywords: *Affect, Preferences, Pro-social Emotions, Rational Altruism.*

[☆]This paper is an extract of the fourth chapter in my thesis titled: **Rational Altruism and The Role of Emotions: *An investigation into the causal effects of positive affect on altruism.***

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1. Introduction

A simple online search for the phrase "revealed preference" returns hundreds of more journal articles since Varian (2006) found approximately 997 articles on JSTOR and even more on Google Scholar in 2005. The importance of the study of revealed preference as a tool to understand the pure theory of consumer behavior cannot be overemphasized. Following the work of Samuelson (1938), the theory of revealed preference attracted substantial research interest. Some researchers have even suggested that the revealed preference method of understanding consumer behavior is simply not a theory but instead a broad research project in the theory of consumer choice (Hands, 2013). Many of its refinements have been applied widely in many spheres in economics due to their versatile and dynamic non-parametric nature.

In this paper, while giving a chronology of refinements and extensions made on the initial Samuelson (1938) paper, we advance this research project on revealed preferences by examining whether consistency requirements are altered by emotions. Indeed, according to Bentham (1996), the concept of consumer utility was based on psychological feelings for which emotions largely determined the extent to which people revealed preferences over consumption goods. Nonetheless, this idea did not attract a lot of research interest. It was considered that emotions were disruptive and therefore economists found it difficult to predict choice behavior Loewenstein (2000).

In lieu of this approach, the *cardinalists* assumed an argument that utility was indeed quantifiable and could be measured (Quandt, 1956). The *cardinalists* argued that the consumer had the ability to assign numbers over utilities derived from commodity consumption. This implied that utilities could therefore be added, subtracted and even differences between them compared. At the centre of the analysis was the assumption that individuals elicit homogeneous preferences.

Despite numerous refinements on the cardinal approach to utility, the controversy around the measurement of utility remained in contention until the 1930s (Hicks and Allen, 1934). Hicks and Allen (1934) argued that the cardinalist assumption that utility was measurable was not necessary in explaining the theory of consumer behavior. Instead, they showed that utility was actually an ordinal phenomenon in that consumers only needed to rank preferences. This was however considered largely complementary to the cardinal approach as the results basically revolved around the complete ordering axiom. That is, for any two goods A and B, there can only be either one of this cases: A is preferred to B or B is preferred to A. A consumer can also be indifferent between A and B. Furthermore, in a more than two goods basket, the ordering axiom depicts a consumer who is able to elicit preferences transitively.

A formal description of these concepts was provided by Samuelson (1938) under what he called the *revealed preference* theory. In what would later be called the "Weak Axiom of Revealed Preference", Samuelson (1938) argued that if an individual selected bundle A over bundle B, there is no way he would select bundle B over A at the same time while A was still affordable. Formally, Varian (1982) considers the definitions of Revealed Preferences as;

Definition 1. Consider P^n and X^n as vectors of prices and bundles chosen by a consumer for $n = 1, ..., N$. Bundle x^n is directly revealed preferred to bundle x iff $p^n x^n \geq p^n x$ and is written in shorthand as $x^n R_D x$. The transitive closure of the revealed preference relation is formulated when a consumer orders a sequence

of bundles such that for $m, n, ..., o, p$ we have; $p^m x^m \geq p^m x^n, p^n x^n \geq p^n x^o, ..., p^o x^o \geq p^o x$. Therefore, the Weak Axiom of Revealed Preference (WARP henceforth) states that for two bundles of commodities m and n, if $x^m R_D x^n$ then it cannot be that $x^n R_D x^m$.

This initial development of the revealed preference theory and the analysis of the indifference curve had considered a simple two goods market and therefore a more general approach was required. Houthakker (1950) extended this approach by providing the indirect revealed preference relation through which a finite number of bundles was made possible for analysis. Formally, the indirect revealed preference definition by Houthakker (1950) was given as;

Definition 2. Consider that $x^n R x^m$, then it is not possible that $x^m R x^n$. This came to be known as the Strong Axiom of Revealed Preference (SARP henceforth)due to Houthakker (1950). $x^n R x^m$ algebraically implies implies that $p^m x^m < p^m x^n$.

According to Cosaert (2015) SARP exhibits all the implications of the utility maximization model. Andreoni and Miller (2002) cites that while WARP is necessary for the existence of strictly convex preferences, SARP is both necessary and sufficient. At the same time, while testing the violations of revealed preference axioms, any WARP violation implies a consequent violation of SARP.

Since Houthakker (1950), there were series of refinements and extensions of the revealed preference theory. Most notable was Afriat (1967) who proceeded to use data with finite vectors of price and commodity quantities to examine whether there existed underlying utility functions that generated the observed data. The study concluded that as long as the data satisfied the *cyclical consistency* property, an underlying utility function was tenable.

Perhaps in line with this study, Varian (1982) developed a more easier and practical approach to revealed preference theory. Even though similarly characterized as the Afriat (1967)'s cyclical consistency construct, Cosaert (2015) argues that Varian (1982) approach was more easier to test in practice. In the core of his approach, Varian (1982) assumed a more strict relation of the directly revealed preference, P. That is;

$$p^n x^n > p^n x^m \implies x^n P x^m$$

The study refined the cyclical consistency such that;

Definition 3. If x^n is indirectly revealed preferred to x^m, then x^m cannot be strictly directly revealed preferred to x^n. In other words, x^n is not strictly in the choice set when x^m is chosen. This was then referred to as the **Generalized Axiom of Revealed Preference (GARP)**.

GARP followed the same constructs of WARP and SARP besides allowing for linear indifference curves. Testing for consistency also proved easier using GARP as opposed to Afriat's inequalities.

The development and analysis of the revealed preference theory focused on modeling a *homo economicus* who only maximizes utility regardless of any underlying contingent influences of decision making. Critics of the revealed preference theory argue that in the end, it offered similar conclusion as the cardinal and ordinal utility approaches. However, the formalisms of the revealed preference theory were more suitable for a real analysis of consumer behavior compared to other approaches (Cosaert, 2015).

In this paper, we extend this research project in the line of Varian (1990). According to Varian (1990), the exact application of the revealed preference tests presents an overly restrictive phenomenon. There are inherent optimization errors made by consumers in utility maximization. These errors could lead to *Type I error* in which a true null of rational optimization is rejected. On the other hand, random choices can be deemed rational. That is, *Type II error* is substantially high such that observations from an alternative hypothesis fail to reject a null. For this reason, Afriat (1967) emphasized adoption of the preference analysis for which the optimizing behavior allows for errors. His work proposed the adoption of "*nearly optimizing behavior*" requirement from the more restrictive "*exactly optimizing behavior*". Varian (1990) put more structure to this argument by refining GARP and including a possibility of error in maximization.

Following Varian (1990)'s GARP with errors (e-GARP), we investigate the implication of emotions on consistency. Particularly, we employ a rich modified dictator game dataset to test whether emotions can introduce errors in preferences for altruism. Psychological evidence on the effects of emotions in decision making still remains largely inconclusive (Jung et al., 2014; Isen, 1987, 2007, 2008). While visceral feelings may increase workers productivity and efficiency, reduce peoples' time preference over money and influence people's logical reasoning that leads to less optimal outcomes, there exists scarce evidence whether these effects imply irrationality Isen (2007); Ifcher and Zarghamee (2011); Ariely and Loewenstein (2006). We test our data for the effects of emotions using the axioms of revealed preferences.

2. Motivation.

Vast economic theory is flawed on the assumption that people's preferences are homogenous. This has led to the widespread aggregation of consumer preferences in both macroeconomics and microeconomics. However, experimental evidence shows that preferences are heterogeneous across individuals,and are also malleable to other determinants of behavior (Samuelson, 1938, 1948; Houthakker, 1950; Afriat, 1967; Varian, 1982). In the same vein, it is probably so, that a more psychological approach to consumer behavior should be emphasized so as to demonstrate the influence of other factors such as emotions on decision making (Bentham, 1996; Loewenstein, 2000; Isen, 2008; Varian, 2006; Quandt, 1956). Recent literature however has assumed a more psychological approach (behavioral economics) in redefining the homo economicus (Camerer et al., 2011; Becker, 2013; Gintis, 2000). Visceral feelings have been found to influence decision patterns away from the classical belief. For instance, the long standing classical notion that individuals are selfish and seek to maximize own utility has been empirically challenged (Andreoni and Miller, 2002; Bester and Güth, 1998; Brosig-Koch et al., 2007). Happiness has also been shown to influence risk preferences, time preference, efficiency and productivity (Isen, 1987; Ifcher and Zarghamee, 2011; Ariely and Loewenstein, 2006; Bowles and Gintis, 2005).

In this paper, we follow Andreoni and Miller (2002) by introducing emotions in the investigation of rational altruism. We seek to investigate the effects of perturbed emotions on the altruistic behavior. We use the axioms of revealed preference owing to Samuelson (1938), Afriat (1967) and Varian (1982) to examine decisions made undere varied affect may imply irrationality using data from a modified dictator game.

The rest of the paper focuses on the following sections. First, we review the related literature with the aim of exposing the stretch that the theory of revealed preference has reached as well as possibly identifying

the gap for which we wish to fill. We give a brief summary of the experimental procedure before using a non-parametric empirical approach to identify the optimization behavior of our subjects. The paper will then conclude with a discussion of our results.

3. Literature review.

There are numerous papers that have used experimental data and the revealed preference to analyze different aspects of consumer behavior. Cox (1997) uses experimental data to extend the generalized axiom of revealed preference by including labor supply and portfolio choice. Andreoni and Miller (2002) uses data from dictator game experiment to analyze rationality in altruism using the axioms of revealed preference. Cosaert (2015) uses experimental data and revealed preference axioms to test consistency with children as subjects. Harbaugh et al. (2001) has also used experimental data and applied the generalized axioms of revealed preference on children to analyze rational choice behavior. In this study, we use experimental data to examine whether emotions play a role in subjects' preference revelation in a modified dictator game.

Another problem with the original revealed preference was that WARP, SARP and GARP were defined based on a homo economicus whose behavior had been narrowly defined. Similar to the classical assumption, revealed preference theory defined subjects who only care about their welfare and seek to selfishly maximize their utility. However, people tend to care about other people's welfare. This behavior is even more evident when the recipient stands to benefit more from the caring nature of the maximizing agent. Rabin (2002) provides numerous psychological perspectives that could be incorporated in economics through the revealed theory analysis.

Rabin (2002)'s argument is that there are numerous economic assumptions made about the nature of human behavior that are vastly unrealistic. Firstly, game theorists assume that individuals are able to distribute probabilities over outcomes while game related equilibrium analysis lays emphasis on an individual who is able to process Bayesian information (Tversky and Kahneman, 1975; Rabin, 2002). Secondly, classical economic theory assumes that people are selfish and seek to maximize their own expected utility. The definition of rationality considers a consumer who only cares about own preferences over final outcomes. Rabin (2002) demonstrates how psychological aspect of a utility maximizing individual can change the classical understanding of preference ordering. Indeed, people make decisions subject to a set of beliefs about the outcomes as well as regarding what they feel about the decisions they are about to make. Hence psychological attributes influence a consumers maximization behavior. In our case, we seek to examine whether this maximization behavior fits in a rational frame when emotions are introduced.

Habits are known to shape current and future decisions. Models that allow for the intrinsic influence of habits have been extensively studied both in microeconomics and macroeconomics. Crawford (2010) uses the revealed preference theory to examine rationality under the intrinsic habits models. The study finds out that adding habit formation while analyzing discounted utility model considerably improves the *rationalizability* of the employed data. Thus understanding consumer behavior is more consistent when habits are included in the model. However, whereas habits may be long term formations of repeated cycles of action, visceral feelings are known to disrupt habits thus leading to non-predictable decision patterns. To this end, our

study attempts to investigate the effects of emotions on rationality in the context of the revealed preferences theory.

The revealed preference theory is versatile in both theoretical and practical application. Varian (2006) provides four questions which the theory of revealed preferences helps to address. The first of them is rational consistency. Here, the revealed preference theory helps determine whether the observed behavior in the data is consistent with utility maximization. Secondly, it addresses whether a particular form of utility function is consistent with the maximization behavior. That is, different forms of utility functions can only be mapped to certain observed maximization behavior observed in the data. Thirdly, the revealed preference theory provides the foundation for recovering the underlying utility function that produced the data we observe. The last of the questions that the revealed preference theory concerns with is forecasting. Having been able to recover utility and characterizing the maximization behavior, revealed preference theory thus provides ground to construct predictions of future demand given new budgets. In this paper, we hope to contribute to the ongoing literature on the axioms of revealed preferences by introducing emotions as one of the most important determinants of decision making.

4. Method.

4.1. The Experiments

In order to investigate the consequences of affect, even momentarily, on rational decision making, we conducted two full cross-randomized experiments. The first was an experiment in the field dubbed *The Activate Change Drivers Programme*[2]. *Activate!* was essentially a programme about altering the preferences and beliefs of young people from predominantly marginalised communities in order to spark what might be termed "active social capital". The ultimate goal is to build better individual and collective leadership amongst young people so that they might begin to effect positive changes in their communities. *Activate!* consisted of a nexus of interventions. These included interventions that foster the development of pro-social preferences such as altruism, trust, and commitment to the public good. The training programme ran as a series of three modularised workshops covering self-belief, goal-orientation, creative thinking, problem solving, resilience, communication skills, trust building, project management, and political engagement. These interventions are theorised to lead to an actualisation of greater pro-social preferences as well as better outcomes in terms of risk taking, tolerance for delayed gratification, civic engagement, and economic opportunity. In the centre of these actualizations, we hypothesized that affect played a major mediating role particularly on changing our participants' altruism. With this in mind, we instrumented a pipeline randomization where half of our subjects went through the training in the start of 2014. The other half participated in the programme in 2015 after we had collected our experimental data in the close of the first group training.

One obvious problem with our experiment in the field was that affect was inherently endogenous. Even though we argue that affect mediated the actualization of the perceived outcomes, it indeed evolved with

[2]We refer this programme as simply *Activate!* in the rest of the paper

treatment. To address this drawback, we conducted a laboratory experiment to exogenously perturb affect before subjects participated in a modified dictator game. We used the short form of the Positive Affect Negative Affect Schedule (PANAS-SF) to induce affect on randomly assigned group of subjects.

4.2. Participants

The *Activate!* experiment had a total of 418 subjects drawn from marginalised communities around 7 provinces of South Africa. They ranged between 20 - 30 years of age. 188 were randomly assigned to start the training in 2014 while 230 participated in the 2015 wave. Of all the participants in the *Activate!* experiment, 385 participated in the laboratory experiment. Here, 221 were assigned to the treatment group while 164 were in the control group. Table 1 below show the split of subjects in both the *Activate!* field experiment and the nested laboratory experiment.

Table 1: Sample Randomisation.

	Treatment	Control	Total
Activate Programme	188	230	418
Affect Experiment	221	164	385
	409	394	803

4.3. Experimental affect inducement

We used the PANAS-SF to measure both positive and negative affect. Subjects are asked to rate questions regarding what they currently feel in a scale of 1 to 10. In our experiment, the positive affect lexicons were; active, determined, attentive, alert and inspired while the negative affects were; ashamed, hostile, upset, nervous and afraid. Following Ifcher and Zarghamee (2011), we use the net affect score computed as the difference between positive affect and negative affect scores.

Before the actual experiments started, the treatment group watched two short comedy video clips from two local stand-up comedians[3]. Participants in the control group watched a video of low-tide ocean waves for approximately two minutes. The comedy clip was meant to induce positive affect[4] while the ocean waves induced neutral affect. Immediately after watching the video clips, participants completed the PANAS-SF before making their choices in the dictator game.

4.4. Dictator game instructions.

When the experiments started, the experimenter issued out envelops containing the instructions sheet, ten decision sheets, a pencil, a small calculator and an eraser. The decision sheets were presented at random

[3]The two clips featured Riaad Moosa and Ndumiso Lindi who are renown local South African stand-up comedians. Each of the clips averaged approximately two minutes long.

[4]According to Watson et al. (1988), positive affect refers to the extent to which an individual subjectively experiences positive moods such as joy, interest, and alertness. Positive affect is usually measured through the use of self-report scales, such as the Positive and Negative Affect Schedule (PANAS), in which respondents are presented with words describing both positive and negative moods. They are asked to rate each according to the extent that it describes them.

so that for every task, participants would answer to different budget sets from their immediate neighbours. Participants followed as the experimenter read out the instructions of the game. They were told that in the game, they would be paired with others who were not at the venue and who had been randomly selected.

They were also informed that this was a paid experiment and that decisions made would be used to determine their earnings. Each decision therefore had to be honest and thoughtful as if the earnings depended on it. After reading the instructions, participants were told to ask any questions they had regarding the decision tasks to the experimenter. Having understood the instructions, participants were asked to fill in their details together with their bank particulars. The participants then proceeded to complete their decision tasks.

There were ten decision tasks to be completed and each decision task was printed in a separate sheet. Table 2 shows the ten decision tasks and the associated allocations after the experiment. Each decision task differed in terms of the number of tokens available for a player and the amount of points each token held. All participants were informed that in the end of the game, they would roll a ten-sided die. Whatever number they rolled, that would be the decision sheet that would be picked to compute the earnings. Whatever decision they made on that random decision sheet would form the basis of their payment and their anonymous counterparts. Therefore, each decisions they made had to be treated as if real money was at stake. Figure 1 presents a typical decision sheet that our subjects completed.

PLAYER ID:_____ **DECISION NO:** _____

Divide 50 tokens: **Keep Value = R2** **Send Value = R1**

TOTAL TOKENS **50**	(A) DECISION	(B) VALUE (Rands)	Total money (A x B)
KEEP FOR YOURSELF		KEEP = R2	
SEND TO PLAYER B		SEND = R1	
TOTAL	**50**		

Figure 1: Typical Decision Table.

At the end of the experiment, subjects placed the completed decision sheets into the envelops. They then rolled a 10-sided dice to determine which decision sheet would be used to compute their earnings. The experimenter then computed their earnings and recorded it on a list in which each subject signed against. In addition to signing, each subject received a promissory note indicating that their earnings shall be paid in their respective bank accounts the following day[5]. On average, it took 2 days for the payments to reflect in subjects bank account.

[5]Earnings from experimental sessions conducted on Fridays had to be paid the next Bank working day

Table 2: Typical Allocations From One Subject.

Task	Rands Kept	Rands Passed	Keep Value	Pass Value	π_s Price	π_o Price
1	100	0	1	1	1.00	1.00
2	120	0	3	1	0.33	1.00
3	40	0	1	3	1.00	0.33
4	140	5	2	1	0.50	1.00
5	160	0	4	1	0.25	1.00
6	120	0	2	1	0.50	1.00
7	36	16	1	4	1.00	0.25
8	60	0	1	1	1.00	1.00
9	60	0	1	2	1.00	0.50
10	75	0	1	2	1.00	0.50

This table presents the decision outcomes of subject 9 in the *Activate!* experiment. It is straight forward to observe the salient classification of this subject as having strong selfish preferences.

4.5. Using a revealed preferences test of rationality.

In this paper, we focus on using the revealed preference tests to find out whether our subjects are malleable to emotions in preference maximization. A *Nonparametric* approach to consumer demand does not impose assumptions on the data, neither does it place *ad hoc* functional form specification for demand equations. Instead, it employs data in its raw form and uses finite mathematical techniques (Varian, 1982).

To test for consistency with the maximization hypothesis, we follow Afriat (1967), Samuelson (1948), Houthakker (1950) and further Varian (1982) postulation of the axioms of revealed preferences. As defined in the background section of this paper, let $\mathbf{q}^I = (q_1^i, ..., q_s^i)$ be the vector of i quantities of some k goods and $\mathbf{p}^I = (p_1^i, ..., p_s^i)$ be the vector of the associated prices. Note further that we observed ten sets of different prices and corresponding quantities for every of our subjects in the experiment i.e.

$$S = (p^i, q^i); i = 1, ..., 10$$

This dataset from a representative subject satisfies economic rationality if and only if there exists a strictly continuous and strongly monotone utility function U that rationalizes the data. To demonstrate whether these observations fit in the neoclassical utility maximization behavior, we first consider Varian (1982)'s definition.

Definition 4. A strictly continous and strongly monotone utility function $u(q)$ rationalizes a set of observations $S = \{(p^i, q^i);\ i = 1, ..., 10\}$ if and only if $u(q^i) \geq u(q)\ \ \forall\ \ q\,\epsilon\,\mathbf{q}$ such that $p^i q^i \geq p^i q$.

Where observed data is potentially nontrivial[6] the following specific definitions become crucial.

Definition 5. *Weak Axiom of Revealed Preference (WARP)*: In a finite set of two goods, q_1 is observed to be directly revealed preferred to q_2, if and only if q_2 is not directly revealed preferred to q_1.

Definition 6. *Strong Axiom of Revealed Preference (SARP)*: If q_1 is indirectly revealed preferred to q_2, then q_2 is not *directly* revealed preferred to q_1. WARP is necessary and SARP is both necessary and sufficient for the existence of strictly convex preferences that could have produced such data.

[6] A trivial solution to any finite dataset can be rationalized by a constant utility function $u(q) = 1$ for all q

Applying Afriat (1967)'s theorems, Varian (1982) assumes generalized forms of the theory to allow indifference curves that are not strictly convex. This allows for the existence of multivalued demand functions such that data in figure 2 is consistent with GARP but violates SARP. This generalisation of the axiom of revealed preference is necessary and sufficient for data to be consistent with utility maximization. Varian (1982) argues that this generalization is computationally easier to implement in addition to being equivalent to Afriat's condition on cyclical consistency.

Definition 7. *Generalized Axiom of Revealed Preference (GARP)*: If q_1 is indirectly revealed preferred to q_2, then q_2 is not *strictly directly* revealed preferred to q_1, that is, q_1 is not strictly within the budget set when q_2 is chosen.

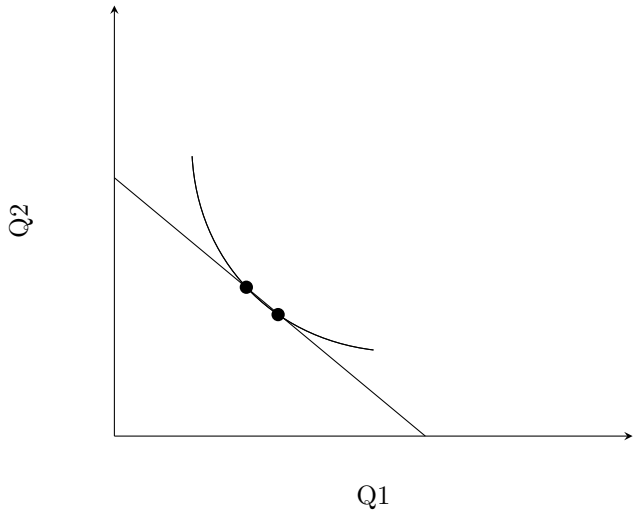

Figure 2: Multivalued demand functions.

5. Checking Rationality.

In this section we show how subjects faired on the test of rationality. We shall then demonstrate the differences that exist in these pass rates conditional on the affect treatment. We will also present the statistics on the preference violations. Finally, for the purposes of validity of the results, this section will present the results of the discriminatory power of our experiments. Discriminatory power tests report the probability that the observed choice behaviour is not as a results of a random process.

5.1. Pass rates.

We conducted the rationality test on every of our subjects for all the three axioms of revealed preference. Thus, we had as many test results as the number of subjects who participated in the actual experiments and whose data on prices and quantities we had. Table 3 presents the average test score in the samples.

For many of our subjects, we found out that there was a high level of violations across three axioms of revealed preference. As we shall demonstrate in the next subsections, the low pass rates were generally not an issue of concern since the power of our tests was sufficiently strong to discriminate against potential

randomness in choice. In addition, the high number of preference violations is spread out across our treatment groups. Contextually, our results are not substantially different from the raw results of Andreoni and Miller (2002) who find significant preference violations in their experiment.

On average, both the treatment and control groups had approximately the same pass rates across all the three tests. However, it is notable that there was a substantial difference in percentage points for the GARP test. Whereas the treatment group in the field experiment had a pass rate of approximately 49 percent, the control group had 53 percent pass rate. In the laboratory experiment, the treatment group had pass rates at 54 percent which was 5 percentage points higher than the control group. As we show on table 5, these differences were not significantly different from zero.

Table 3: Average Pass Rates

		WARP	SARP	GARP	Obs
Activate Programme	Treatment	0.47 (0.04)	0.47 (0.04)	0.49 (0.04)	188
	Control	0.49 (0.03)	0.49 (0.04)	0.53 (0.04)	230
Affect Experiment	Positive Affect	0.48 (0.03)	0.48 (0.03)	0.54 (0.03)	221
	Neutral Affect	0.47 (0.04)	0.47 (0.04)	0.49 (0.04)	164

*Standard errors in parenthesis.

Considering the pooled cross-randomization, we found out that there were still no significant differences in pass rates between the two experiments. Table 4 presents pass rates of the pooled experimental samples. Both WARP and SARP tests reported the same pass rates.

Table 4: Pooled Sample Pass Rates

	WARP	SARP	GARP	obs
Activate Programme	0.48 (0.02)	0.48 (0.02)	0.51 (0.02)	418
Affect Experiment	0.48 (0.48)	0.48 (0.48)	0.52 (0.03)	385

*Standard errors in parenthesis.

The main objective in this paper was to investigate the consistency of choice in giving conditional on varied emotions. Since this paper focuses on the nonparametric rationality tests, it seems plausible to verify whether the pass rates were statistically significantly different across the randomized experimental samples. Table 5 presents the differences in the pass rates.

Despite the differences in affect treatment, there were no significant differences in pass rates. Since the rationality test is conducted on an individual level, it is plausible that the cross-randomization between our two experiments had no effect on rationality. That is, it did not matter the treatment in which a given subject was assigned in the *Activate* field experiment and subsequently in the laboratory experiment. In general, subjects elicited rationality irrespective of the underlying treatment.

Table 5: Statistical Differences in Pass Rates

Activate Programme				
	Control Group	Treatment Group	Differences	pscore
WARP	0.4870 (0.03)	0.4734 (0.03)	0.0136	0.7833
SARP	0.4870 (0.03)	0.4734 (0.04)	0.0136	0.7833
GARP	0.5304 (0.03)	0.4947 (0.04)	0.0358	0.468
	230	188		
Laboratory Experiment.				
	Control Group	Treatment Group	Differences	pscore
WARP	0.4695 (0.04)	0.4842 (0.03)	-0.0147	0.7767
SARP	0.4695 (0.04)	0.4842 (0.03)	-0.0147	0.7767
GARP	0.4878 (0.04)	0.5430 (0.03)	-0.0552	0.2851
	164	221		

*Standard errors in parenthesis.

5.2. The severity of violations of revealed preferences.

To contextualize the behaviour of our subjects, we also computed Varian (1990)'s modification of the Afriat (1967) critical cost efficiency index. The CCEI simply demonstrates the severity of violations by computing the largest value, say ϵ where $0 \leq \epsilon \leq 1$, that relaxes a budget so that there are no violations. Intuitively, consider figures 3. The construct of the severity index is such that the further the chosen bundle is to the frontier, the more severe the violation of the revealed preference. The left panel of figure 3 shows a bundle chosen along the dotted line. This bundle presents a more severe violation than the one on the right and will therefore give a smaller value of the efficiency index. Andreoni et al. (2013) suggests that a researcher can set a critical value of the CCEI apriori, say $\widehat{\epsilon}$, so that any $\epsilon^* \geq \widehat{\epsilon}$ is considered an acceptable GARP violation. Different studies have used different levels of of $\widehat{\epsilon}$ for rather sentimental reasons. Andreoni and Miller (2002) used a value of 0.90 while Varian et al. (1991) suggests that the value be fixed at 0.95. Nonetheless, there are no empirical thresholds to this measure even though a high enough index will convincingly discriminate detectable randomness in choice.

Since our experiment resembles that of Andreoni and Miller (2002), we fixed the critical value at 0.90. Surprisingly, the tests' pass rate stood at approximately 95 percent closely estimating Andreoni and Miller (2002)'s findings. Out of the 385 subjects in our laboratory experiment, only 24 had severe violations below the 0.9 critical value. Similarly, of the 418 subjects in the *Activate!* field experiment, only 27 had CCEI lower than 0.9. Thus, on average, 95 percent of our subjects elicited behavior that is consistent with utility maximization irrespective of the affect treatment.

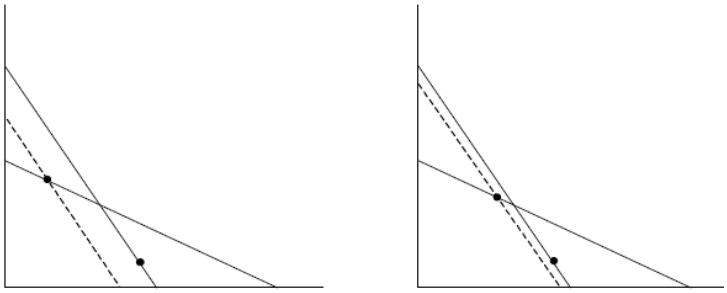

Figure 3: Adopted from Andreoni et al. (2013).

5.3. Power of the rationality tests.

The veracity of preference elicitation and the subsequent validity of the test results depends on the power of our test. In our case, power of the test reports the probability of our design to discriminate against *irrational* behavior. We make use of the test due to Bronars (1987). The Bronars test is appropriate for linear budget sets as it computes the power index by generating a large number of random samples from a uniform distribution drawn from the budget hyper-lane.

Becker (1962) argues that irrational behavior consists of choices made randomly and are uniformly distributed around the budget set frontier. Bronars (1987) further put structure on this argument by demonstrating that it is possible to analytically calculate exact probabilities that a random choice set violates GARP. The probability that a random choice set violates GARP is therefore the power of a test (Andreoni et al., 2013; Bronars, 1987; Cosaert, 2015).

As mentioned earlier, both of our experiments reported high power of the test. In the *Activate!* field experiment, the power value of the test was 0.88. This implies that the null hypothesis of rationality is rejected with a probability of 0.88 should the alternative hold. Surprisingly, there was no much of a difference in the power of the laboratory experiment. Here, the power of the test reported a value of 0.87. These power results are significantly high indicating that the design of our experiments was sufficient. This also offers support to our utility maximization hypothesis. Considering these power values, we are confident that the pass rates were sufficiently high.

6. Discussion.

We focused on contextualizing peoples consistency for rational altruism in the presence of perturbed emotions. We first used a field experiment with subjects drawn from marginalized communities in South Africa. We theorize that the fundamental attribute of peoples' preferences for prosociality is mediated by the underlying emotions. The general perceptions of social neglect and marginalization can foster long standing negative emotions that in turn hinder social cohesion and prosociality. The field experiment was therefore a programme about altering the preferences and beliefs of young people from predominantly marginalized communities to ultimately build better individual and collective leadership so that they might begin to effect positive changes in their communities. However, emotions in such a field experiment are inherently endogenous.

We thus cross-randomized our subjects into a controlled lab experiment through which we endogenously varied affect. This way, we would be able to directly measure the causal effect of affect on altruism. But even more importantly, emotions and particularly affect have been found to disrupt peoples attitudes towards risk, time preference and productivity. Whereas studies on the impact of visceral emotions on atltruism are significantly scarce, the available ones fail to demonstrate whether observed behavior remains in the frames of rationality. This paper therefore builds on the work of Andreoni and Miller (2002) to demonstrate the visceral effects of affect on the consistency of preferences for rational altruism. In the dictator game, subjects were randomly assigned to either treatment or control groups. The treatment group was treated to positive affect by way of watching two short comedy video clips. The control group watched a video of calm ocean tides to induce mild neutral affect. The use of video clips has been widely used in both psychology and behavioral economics literature as an effective means to induce affect. Immediately after the affect treatment, subjects completed 10 tasks in a modified dictator game.

Our findings are puzzling. First, existing literature emphasizes on the disruptive nature of emotions in decision making. This is often seen as a mild implication that such disruption renders decision makers who are incongruent with rationality. However, our findings show that irrespective of underlying emotions, individuals elicit behavior that is consistent with utility maximization hypothesis. Perhaps Peters et al. (2006) offers a suitable explanation for our finding on the potential role of affect on decision making. The study argues that affect acts as information at the moment of judgment or choice. People do consult their feelings on how they feel about a judgment they are about to make. This is perhaps the disruption observed in affective subjects who tend to be more altruistic. However, they do not lose their cognitive ability about preference ordering.

Secondly, our results closely approximate the findings in Andreoni and Miller (2002) who found that in a standard dictator game, 96 percent of subjects did not violate either of axioms of revealed preference. Even though this finding was not based on a randomized treatment, 95 percent of our subjects elicited preferences that are consistent with utility maximization hypothesis. Our results imply that whereas affect can potentially increase people's altruism, this takes place in the frames of economic rationality.

One essential argument that supports the implications for policy is that, social programmes that can alter pervasive preferences of specific groups of people can be used to increase prosociality. The outcomes of such programmes are sustainable within the constructs of belief formation and updating. Another critical aspect is that it is possible to analyze preferences at an individual level without necessarily aggregating them. A better understanding of people's underlying behaviour can be reached by first analyzing each individual independently before aggregating their preferences.

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