Altruism and The Role of Affect:

An investigation into the causal effects of positive emotions and its rationality on Altruism.

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Declaration

I George Kinyanjui hereby declare that this thesis is based on my original work except where acknowledgements are cited and that neither the whole nor any part of the thesis has been, is being, or is to be submitted for another degree in this or any other university. I authorise the University of Cape Town to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

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Date: April 19, 2021

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Dedication

For Dad, *Godfrey Kinyanjui*,
For mum, *Esther Njeri Kinyanjui*,
Continue resting with the angels.
TO GOD BE THE GLORY.

Abstract

There is now well established evidence that shows that growing up in poor neighbourhoods can keep people locked in poverty. One response to neighbourhood distress – i.e., situations in which neighbourhoods serves as poverty traps – is to move people out of such situations. Experiments conducted in the United States of America (for example, the *Moving to Opportunity experiment*) provides a compelling case for this approach. However, when the scale of neighbourhood distress reaches a majority of the population, as is does in South Africa, where the legacy of Apartheid spatial inequality persists, alternative approaches are necessary. One such alternative is to seek to better understand the behavioural mechanisms at work that tilt communities toward the low level equilibria characterising a poverty trap and to target those behaviours that can aggregate to produce neighbourhood distress. Behaviour modification programmes attempt to do this, for example, by targeting the underlying drivers of crime, violence, risky sexual behaviour and fatalism that characterises so many marginalised communities in South Africa. This dissertation uses data from a rare lab-in-the-field experiment to investigate one important mechanism of behaviour modification: the impact of emotions on pro-social preferences. The results show that positive emotions causes an increase in individual altruism and do not imply irrationality according to standard axiomatic frameworks in economics. This contrasts with the view of earlier investigators that emotions are disruptive in decision making.

This dissertation is divided into five chapters. Chapter one focuses on a general introduction of endogenous preferences, the link between

emotions, pro-social preferences and decision making. In chapter two I discuss the novel behaviour modification experiment that this dissertation is based on: the *Activate! Change Driver's* programme (hereafter, simply referred to as *Activate!*), an empowerment programme aimed at youth that live in distressed neighbourhoods in South Africa. *Activate!* consists of a nexus of interventions that aims to promote prosocial preferences (i.e., preferences for altruism, trust, and commitment to the public good), as well as interventions that are aimed at changing mindsets and perceptions that foster destructive risk-taking, myopia and civic apathy. The programme runs 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 chapter three, I investigate the causal effect of positive affect on altruism. I employed two estimation strategies where in the first strategy, I used an instrumental variable approach to estimate the effects of affect on altruism. In the second strategy, I relaxed the assumption that affect does not directly impact altruism by using a mood inducement experiment to vary affect within the subjects. Both identification strategies support the same conclusion: positive affect is shown to be a significant and positive cause of altruism. Subjects in the positive affect treatment send significantly more tokens to anonymous others in a dictator game as compared to subjects in the mild neutral affect treatment. This result is robust in all specifications considered.

Chapter four focuses on characterising whether emotions disrupt rational choices in altruism. In psychology, emotions are theorised to influence decision making since they influence a person's decision to exert effort and be productive at work. There is also evidence indicating that emotions reduce time preferences over money, that they can increase cognitive flexibility, reduce spending and willingness to pay as well as increase reciprocity in gift exchange. I made use of data from a modified dictator game experiment and employed the axioms of revealed preferences to test for economic rationality. I found that subjects treated to positive affect elicited altruistic preferences that are indifferent to subjects treated to neutral affect and that their preferences fit the standard economic definition of rationality. Thus, by this account even though emotions are seen to be disruptive, they do not imply irrationality.

In summary, the dissertation presents a number of implications. First, behaviour modification programmes especially in the context of marginalised communities may result in increasing pro-social outcomes and therefore have the potential to reverse fatalistic preferences among young people. Second, behaviour modification and ultimately belief updating towards pro-social preferences has the potential to spark civic mindedness among young people. Third, positive emotions mediate pro-sociality and do not blur individual rationality in decision making.

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CHAPTER 1

ENDOGENOUS PREFERENCES, EMOTIONS AND RATIONAL ALTRUISM.

1.1 Introduction

There is vast literature that has documented overarching results on endogenous preferences. For instance, framing effects have been seen to confound endogenous preference in that re-ordering the presentation of choices often determine the preferences elicited. Tversky and Kahneman (1985) in the "Asian disease" problem find that individual decision vary with the manner in which choices are presented. In a disease that threatens the lives of 600 people, individuals are presented with two undesirable choices to make. In one of the choices rather referred as the "positive frame", individuals are to chose between a sure bet saving 200 lives or a gamble in which all the 600 lives can be saved with probability 0.3 and 0.7 of saving no one. In the "negative frame", the choice is between a sure bet with 400 people dying for sure and a gamble where 600 lives are lost with probability 0.7 and 0.3 for no one dying. Despite that both sets of choices present the same outcomes in terms of lives lost and risks, individuals prefer the sure gamble in the "positive frame". Surprisingly, in the "negative frame", individuals chose to gamble rather than the sure bet.

Tversky and Kahneman (1975) and Camerer, Loewenstein, and Rabin (2011) demonstrate that individuals anchor preferences they elicit on an otherwise random event. In an experiment, Tversky and Kahneman (1975) showed subjects a spin of a "wheel of fortune" that ranged from 0 - 100. After the spin, subjects were asked to guess whether African countries subscribing to the United Nations were either greater or less than the number on the wheel of fortune. Subjects were then asked to make a guess on the actual number of member countries. Noting that spinning the wheel was a random event that returned a random number, Tversky and Kahneman (1975) found out that subjects' guesses were significantly influenced by the outcome on the "wheel of fortune". The intuition is that subjects anchored their judgement on a random event and adjusted preferences accordingly. There are numerous experiments done on preference anchoring that largely conclude that individuals pitch judgements about choices they have to make (Ariely, Loewenstein, & Prelec, 2003; Camerer et al., 2011; Schkade & Johnson, 1989; Tversky & Kahneman, 1975). Anchoring may be on attributes that are unrelated to the choice about to be made.

Another argument is that preferences are malleable to reversals in that different elicitation methods may often return choices that are contrary to the classical principal of transitivity. Where bundle A is revealed preferred to B in some method, A may be treated as inferior in other methods. The application of this scenario is prominent in marketing where commodity A may be evaluated higher than commodity B in a mutually exclusive evaluation but value B highly than A when they are valued and priced together (Hsee & Leclerc, 1998).

At the same time, another classical violation involves the independence of irrelevant alternatives assumption. Individuals are indeed bothered by other options present in the choice set. Therefore, choices are dependent on what other options are in the set. For instance, dominant options are more attractive than dominated ones. Huber, Payne, and Puto (1982) demonstrate that adding an alternative that dominates other alternatives by at least one aspect considerably increases the chances of it being preferred to the rest.

These results elucidate that preferences are malleable and dependent on the context in which they are elicited. However, influences to endogenous preferences are not limited to the cognitive biases identified since Alm, Schulze, Von Bose, and Yan (2019) opines that social norms are also important in determining behavior particularly in the context of tax compliance. The study finds that if social norms tended towards non-compliance, tax compliance dropped to almost zero. One implication of this finding, for instance, is that if social norms are a dominant influence on the current level of taxpayer compliance, the policy intervention then lies in the enhancement of these norms for increased compliance. Since social norms are understood to be sets of rules and standards that are understood by members of a group, and that guide and/or constrain social behavior without the force of law Cialdini and Trost (1998) individual preferences can also be affected by social them. Indeed, in our study, we seek to identify exogenous influences to preferences ensuring that our setup does not permeate influences of social norms. In a complex world therefore preference patterns are influenced in distinct ways. Features that may seem not to matter while making a decision, largely influence peoples preferences and subsequent decisions made.

Yet, an under-explored area especially in economics is the role of emotions on preferences. There is however vast evidence on the generality of pro-social preferences (e.g., altruism), both in the laboratory and in the field (Andreoni & Miller, 2002; Bowles & Gintis, 2005; Elster, 2010; Gneezy & Rustichini, 2000).

This study explores the connection between emotions and pro-social preferences. Specifically, it focuses on those emotions that might have co-evolved with altruism which might otherwise be termed as *pro-social emotions*.

Classical economic theory postulates that rational behaviour is purely self-interested. In economic interactions, individuals maximize their payoffs with regards to the value of their own reciprocity. However, there is sufficient literature showing that subjects are not overly selfish. In prisoners' dilemma games, a Nash equilibrium to cooperate is often established while agents contribute resources in public good games indicating that individuals care about the welfare of others, (Andreoni & Miller, 2002; Bowles, 1998; Brosig-Koch, Riechmann, & Weimann, 2007). Similarly, there are numerous parsimonious assumptions that the classical preference theory incorporates. For instance, preferences are considered to be invariant with regard to the manner in which choices are presented (Camerer et al., 2011). The only binding expectation is that methods used to measure preferences ought to be "incentive compatible" in that there are sufficient incentives for individuals to reveal their "true" preferences. Another assumption is that preferences are not affected by transitory asset holding. This implies that preferences are reference independent (Camerer et al., 2011). Significant evidence has shown that most of these classical assumptions are in reality violated (Elster, 1982; Slovic, 1995). In modeling endogenous preferences, it is important to therefore understand at least the determinants of individual choice behavior. Hence, economic theory is able to make correct predictions about choice outcomes within varying circumstances, (Elster, 2010; Friedman, 1994; Volk, Thöni, & Ruigrok, 2012).

1.2 Emotions and Pro-sociality.

There has been little focus on the effects of emotions on individual decision making especially in economics. However, the influence of emotive feelings on decision makers cannot be ignored (Elster, 2010; Isen, 2008). Andrade and Ariely (2009) defines emotions as specific and brief subjective feelings for which a cause can be identified. People are able to say what they are happy with or angry with. On the other hand, moods are mild emotions for which the cause is not directly identifiable. For instance, people can say they are in good or bad moods without necessarily having a reason for it.

Affect is one of the overarching category that cuts across moods and emotions, (Schwarz & Clore, 1996). Such feelings have substantial influences on individual decision making processes. For instance, positive affect has been shown to have effects on workers' motivation, efficiency and productivity (Oswald, Proto, & Sgroi, 2015). Ifcher and Zarghamee (2011) find out that positive mild affect significantly reduces a decision makers time preference. Fredrickson and Losada (2005) predict that a ratio of positive to negative affect at or above 2.9 characterizes individuals in flourishing mental health. Sanfey, Rilling, Aronson, Nystrom, and Cohen (2003) observe biological brain function in agents participating in ultimatum games. They find out that when agents receive unfair offers, there is substantial activity elicited in the brain areas related to both emotion (anterior insula) and cognition (dorsolateral prefrontal cortex). The implication is that unfair treatment mediates the activation of emotional feelings and cognitive abilities hence bearing substantial effects on decision-making processes.

Unlike negative emotions, research on pro-social emotions (affect, empathy, remorse, shame and guilt) is scant. In economics, pro-social emotions have received considerably little attention. According to Bowles and Gintis (2005), emotions are pro-social if they induce individuals to pass proportionately higher payoffs to others. It therefore becomes imperative that such emotions can alter the basic understanding of the cardinal economic assumptions. Does the consistency of choices under varying emotions uphold the cardinal rule of transitivity? At the same time, should emotions introduce errors in decision making, what effects does this hold for future episodes of making a decision? There is no doubt that under behavioral consistency, individuals basically benchmark decisions they have to now make with outcomes of similar decisions made in the past Andrade and Ariely (2009).

There could also be loses in consistency in situations where experiences from the outcomes of a choice tend to shape the pattern of future decisions. These affective experiences in the outcome of choices may activate emotions that may overturn future decision patterns, (Schwarz, 2000). For instance, the tragedy of the commons is arguably an elicitation of selfish interests in classical economic maximisers. However, the outcomes of selfishness easily stir up emotions of guilt and shame for which experiences may render a new decision path. Evidence from experiments indicate that individuals care about the response from other members of the society regarding their contributions to the public good. Hence, they suffer from shame and guilt if other members of the group regard their contributions as selfish. In the next round of decision making, individuals make choices that are centrally affective responses to the social expectations, individual experiences from previous outcomes and environments (Schwarz, 2000). In the endeavor of this dissertation, we theorize that it is an open question as to whether a finding that emotions alter altruistic behaviour is evidence of endogenous preferences. As we demonstrate in chapter 4, emotions may enter the utility function indirectly through concerns of the price incurred in passing resources to another person. We hope to elucidate the fact that indeed emotions do not necessarily directly shift economic decisions such as how one would share limited resources with another person.

1.3 Positive Emotions and Altruism

The foundation of classical and neo-classical economic theory vests on the concept of homo-economicus. Homo economicus primarily postulates that individuals behave rationally, narrowly selfish and are ever optimizing agents (Sołtys, Sowińska-Gługiewicz, Chęć, & Tyburski, 2017). According to Smith (1776), every human interaction is driven by selfish motives. Individuals maximize on their self interests and do not regard other people's welfare. Smith (1776) says that;

> It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from the regard of their own interest. We address ourselves not to their humanity, but to their self-love, and never talk to them of our necessities, but of their advantage.

However, it is evident even in Smith's own work that individuals do not essentially fit into the "me-first" caricature. Smith's earlier work in *The theory of Moral sentiments*, concludes that individuals also exult at others' improved well being.

In his book, he says;

> How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it, except the pleasure of seeing it. Of this kind is pity or compassion, the emotion which we feel for the misery of others, when we either see it, or are made to conceive it in a very lively manner.

There are several ways in which affect can mediate altruistic preferences. First, affect can provide an information link at the moment of making an altruistic choice (Peters, Vastfjall, Gärling, & Slovic, 2006). Subjects are known to consult what they feel about the choice they are making and such feelings are more often than not based on less relevant emotional states such as affect, (Damasio, 1994; Marg, 1995; Schwarz & Clore, 1983).

Secondly,affect accentuates complex stored information which in turn get used by a decision maker to determine their choices. More broadly, affect (positive or negative) may help bring forth other new information regarding a decision about to be completed and thus influencing it, (Nabi, 2003; Peters et al., 2006). Thirdly, affect seems to motivate how subjects synthesize information and behave. It seems to reduce the ambiguities around the thought process thus influencing the choice behavior (Peters et al., 2006). In terms of altruism, incidental affect can make overly optimistic decision makers lower the levels of resources they share with other subjects (Frank, 1988).

1.4 Structure of the dissertation.

This chapter introduces the concept of endogenous preferences, their complexity and generality. It displays the failures of the longstanding classical axioms of economic theory thus setting stage for the current investigation on how malleable rational choice is to pro-social emotions. Even though the rest of the chapters are closely intertwined, chapters three and four are our core research objectives. They stand alone as independent inquiries under the broad thesis investigation.

Chapter two describes the study design, field and laboratory experiments as well as building the case for the measurement of affect and altruism. This chapter deals with the general structure of our empirical approach and elucidates potential assumptions and strengths of our study. In chapter three, we address our first research objective. We investigate the underlying causal effect of affect on altruism. We answer this question through a behavior modification field experiment which sought to develop peoples' capacities for pro-social behavior. The intervention directly targeted the aspirations of subjects in an effort to moderate overly pessimistic and optimistic aspirations. Thus we would expect the programme to have a causal effect on affect, thereby permitting use of the random assignment mechanism to the intervention to identify the causal effect of affect on altruism.

However, this approach has the drawback of the strong assumption that the programme does not directly cause a change in altruism. In this second part of chapter three, we follow an alternative identification strategy that relaxes this assumption by inducing temporary positive affect to subjects randomly in both the treatment and control groups of the behavior modification intervention.

In chapter four, we seek to establish whether decisions made under emotions (affect) can be expressed in the economists language of rationality. That is, how consistent are decisions made under emotions? In answering this question, we propose to evaluate all potential violations of the axioms of revealed preference that can be observed from choices made by our subjects in the laboratory experiment. We intend to use the axioms of revealed preference due to Samuelson (1938), Houthakker (1950) and Varian (1982) to evaluate the extent to which decisions made under positive affect can be termed as rational. Finally, chapter five will conclude.

CHAPTER 2

THE STUDY DESIGN.

2.1 The Data

The data for this dissertation was collected as part of an evaluation of the *Activate! Change Driver's* programme (hereafter, simply referred to as *Activate!*), which is an empowerment programme aimed at youth that live in distressed neighbourhoods in South Africa. *Activate!* consists of a nexus of interventions that aims to promote prosocial preferences (i.e., preferences for altruism, trust, and commitment to the public good), as well as interventions that are aimed at changing mindsets and perceptions that foster destructive risk-taking, myopia and civic apathy. The programme runs 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.

The data set used in this dissertation contains a large amount of rich survey and experimental data gathered as part of a scientific evaluation of *Activate* conducted by the *Southern Africa Labour and Development Research Unit* at the University of Cape Town. In addition to the data that will will described in detail in the sections and chapters to follow in this thesis, the data set also includes experimental game data on cooperation, trust, trustworthiness, gambles over gains and losses, discount rates, and bargaining.

The study uses pipeline randomisation; i.e., it adopts a treatment-control set-up but the programme is not denied to the control group but merely delayed. This approach effectively creates a queue/pipeline, and one's place in the queue is randomly assigned. Applications to the Activate Chage Drivers programme were made to organisation by interested youths. Once successful, applicants were randomly assigned to participate either in 2014 or in 2015 and were notified. As such, the 2015 group technically formed the control/counterfactual group, while the 2014 group constituted the treatment group. Importantly the outcomes of the treatment group (both survey-based outcomes as well as behavioural outcomes) were measured *before* the control group embarked on the programme (between January-July 2015). This design helps us to be confident of the measured impacts of the programme for two reasons. First the focus only on *successful* applicants means that the study sample will be homogeneous with regard to the selection criteria – leadership and innovation potential, as well as a commitment to the public good. Second, by randomising the year of training, our variables of interest should be statistically similar in the treatment and control groups at the baseline, thus allowing us to attribute any *differences* that arise after completion of the training programme by the treatment group to the intervention itself and not other unobserved factors.

Tables 2.1 – 2.2 (see the end of this section) presents a check on how well the randomisation worked. In each table, we conducted a test of differences in means between the treatment and control groups according to the participants randomly assigned treatment status. At baseline, there were 1012 individuals that were offered places in the programme. Half of the participating subjects were randomly assigned to treatment and the other half to control. Due to attrition along the training period, only 610 study participants had their outcomes successfully measured at the endline. Thus take-up of the programme was about 60%. To check that selective take-up and attrition did not bias our estimates, we also conducted tests of differences in means for the final sample of 610 individuals (this group is represented by the column labelled "Actual" in the tables).

A final point worth noting is that there is almost universal compliance with the randomised treatment assignment for the final sample of 610 individuals: only about 5% of individuals did not comply with their randomly assigned status (i.e., they either joined the control group if assigned to the treatment group or vice-versa). Note that non-compliance here generally means that the implementing agency did not comply in about 5% of cases and not that the study subjects themselves had any choice in the matter. Also, all qualifying candidates had no prior knowledge that the behavior modification programme would have certain tests in the end. Therefore there was no chance that participants would align to project expectations in the course of the programme.

2.2 Measuring altruism through the dictator game.

Experimenting participants' regard to others assumes various modifications of the dictator games originally used by Forsythe, Horowitz, Savin, and Sefton (1994b). These games involve two players with one receiving some amount of

Table 2.1: T-tests: of difference in characteristics I

	Assigned		Actual	
Excellent health (1=yes)	-0.0387	(-1.17)	0.00150	(0.04)
presenthealth==Very good	0.0590**	(2.05)	0.0472	(1.29)
presenthealth==Good	-0.0422	(-1.46)	-0.0583	(-1.57)
presenthealth==Fair	0.0201	(1.58)	0.00909	(0.56)
presenthealth==Poor	0.00185	(0.49)	0.000524	(0.10)
exercise==Never	0.0219	(1.01)	-0.0180	(-0.65)
exercise==Less than once a week	-0.00203	(-0.10)	0.00750	(0.30)
exercise==Once a week	-0.0196	(-0.85)	-0.0352	(-1.25)
Exercise 3 or more times a week (1=yes)	0.0110	(0.45)	0.0307	(0.99)
Don't drink alcohol (1=yes)	-0.0331	(-1.08)	0.0150	(0.38)
Smoke cigarettes (1=yes)	-0.0122	(-0.58)	-0.0357	(-1.28)
Smoke cigarettes in the past (1=yes)	0.0205	(0.85)	0.0198	(0.62)
alcohol==I have never drank alcohol	-0.0447	(-1.51)	0.0122	(0.32)
alcohol==I no longer drink alcohol	0.0155	(0.67)	0.00207	(0.07)
alcohol==I drink very rarely	0.0461	(1.44)	0.0186	(0.46)
alcohol==Less than once a week	0.00350	(0.15)	0.0134	(0.50)
alcohol==One or two days a week	-0.0217	(-1.38)	-0.0441**	(-2.10)
alcohol==Three or four days a week	0.00139	(0.24)	-0.00227	(-0.29)
On a day that you do drink, how many standard drinks do you have?	0.107	(0.41)	0.0881	(0.26)
HIV test (1=yes)	-0.0182	(-0.80)	-0.0338	(-1.17)
Have you ever engaged in unprotected sex? That is sexual intercourse where you a	-0.0331	(-1.02)	0.00493	(0.12)
Friend/Neighbour unlikely to return wallet (1=yes)	0.0243	(0.77)	0.0346	(0.85)
Stranger unlikely to return wallet (1=yes)	0.0641**	(2.07)	0.0499	(1.25)
Strong preference to stay in neighbourhood (1=yes)	0.00346	(0.12)	0.0153	(0.41)
Strong preference to leave neighbourhood (1=yes)	0.0563**	(2.29)	0.0435	(1.34)
High or very high chance of staying in neighbourhood (1=yes)	0.0128	(0.43)	0.0538	(1.41)
Happy or very happy with life (1=yes)	-0.0115	(-0.39)	-0.00768	(-0.20)
Totally in control or control over most things in life (1=yes)	-0.00354	(-0.13)	0.0270	(0.81)
Little or no control over most things in life (1=yes)	-0.0142	(-0.67)	-0.0263	(-0.96)
Observations	1012		610	

* $p < 0.01$, ** $p < 0.05$, *** $p < 0.10$. Std. errors reported in parenthesis, robust to individual clustering. The coefficients presented in this table are differences in response between the treatment and control groups. At 95% confidence interval, we find no significant differences in the attributes of our subjects randomly assigned to treatment and control arms of the experiment.

endowment from the experimenter. The player can pass some, all or nothing to the second player who receives whatever amount offered. The game is non-strategic in that the second player receives the donation from the first player and the game ends. It is often iterated with *player one* receiving different endowments in each iteration. For every round of decision making, player one decides the amount to give to *player two* and the much to hold.

A dictator game is best compared to a linear public goods experiment. In a public goods experiment, participants are endowed with m tokens. Participants are then asked to divide some, all or none of their endowments to a public good. For

Table 2.2: T-tests: of difference in characteristics II

	Assigned		Actual	
Biological mother alive (1=yes)	-0.0241	(-0.94)	-0.0369	(-1.14)
Biological father alive (1=yes)	0.0370	(1.11)	0.0453	(1.06)
Assume that you become unemployed, what is the absolute lowest monthly take-home	0.811	(0.00)	-145.4	(-0.42)
What is the highest level of education you have successfully completed?	-0.194	(-0.82)	-0.536***	(-1.81)
Are you currently enrolled in any school, classes or correspondence courses of a	-0.0200	(-0.61)	-0.0328	(-0.78)
Driver's license (1=yes)	0.0104	(0.36)	-0.0179	(-0.49)
Advanced computer literacy (1=yes)	0.00116	(0.04)	-0.0281	(-0.69)
Basic computer literacy (1=yes)	-0.0126	(-0.40)	0.0228	(0.57)
Not computer literate (1=yes)	0.0115	(0.93)	0.00524	(0.33)
Unemployed and actively searching for work (1=yes)	0.0198	(0.89)	0.00720	(0.26)
Working for pay (1=yes)	0.0179	(0.60)	0.0117	(0.30)
Full time student (1=yes)	-0.0423	(-1.56)	0.0150	(0.42)
Unpaid volunteer (1=yes)	-0.0205	(-1.16)	-0.0338	(-1.37)
Observations	1012		610	

* $p < 0.01$, ** $p < 0.05$, *** $p < 0.10$. Std. errors reported in parenthesis, robust to individual clustering. The coefficients presented in this table are differences in response between the treatment and control groups. At 95% confidence interval, we find no significant differences in the attributes of our subjects randomly assigned to treatment and control arms of the experiment.

each token a participant retains, they earn a cent while for every token that they decide to give to the public good earn some amount α cents to each participant in the experimental group. It is obvious to observe that $0 < \alpha < 1$. In other words, the share of earnings from the token given for public good to each participant is obviously less than the whole. Suppose we let x be the amount of tokens a given participant chooses to keep while the remainder is given for public good. We can denote this amount by k. Therefore, to the specific participant, the payoffs to himself will change along the relationship $\pi_s = x + \alpha k$. The first term on the right denotes his choice of tokens kept while the second represents the amount he gets having contributed to a public good. Any other participant in the group will then have $\pi_o = \alpha k$. It follows therefore that x and k will have to satisfy the budget constraint $x + k = m$.

To show how this public goods game is similar to a dictator game, we can replace x and k with payoff notations π_o and π_s for payoff to others and payoff to self respectively. The dictator game budget constraint will therefore be given by

$\pi_s + \rho\pi_o = m$ where $\rho = \frac{1-\alpha}{\alpha}$ is the price of other participant's payoffs in terms of one's own payoffs.

A key construct of this comparison would however be whether agents do behave similarly in the two games. Forsythe, Horowitz, Savin, and Sefton (1994a) finds out that on average, participants give away 25 per cent of their endowment in the dictator game. On the other hand, public game participants behave similarly by giving 25 per cent of their total budgets where the earnings from giving to a public good are approximately, $\alpha = \frac{1}{2}$. This implies that $\rho = 1$ which is basically the concept of a standard dictator game.

The standard application of the preference elicitation in dictator games ignores other non-game and game attributes. However, Andreoni and Miller (2002) suggest a more general model that incorporates more complex game and non-game attributes. Specifically, the study suggests that future research should focus on incorporating the dynamics of changing game environments such as rules of the game itself, the gender of the paired counterpart, the framing of the decision, the level of anonymity among others that are all known to affect the outcome. In this dissertation we shall examine the impact of positive affect on preferences for altruism both in a behavior modification programme and in the laboratory.

2.3 Formal representation of pro-social emotions in a dictator game.

Formally, let π_i represent monetary payoffs for person i and let $\prod$ be the set of possible payoffs for a game. For simplicity, let us consider choices made by person s, for self, that have consequences for his own payoff, π_s , and the payoff of one other person, π_o. Any choice in the strategy space for person s implies a mapping into the set of payoffs. Therefore in a given non-strategic setting, person s can be thought of as choosing the $(\pi_s, \pi_o) \in \prod$ that maximizes her utility. It is unlikely that altruism is only an error committed by money maximizers even though past literature has indicated the presence of a great deal of errors (Andreoni, 1995). Indeed many subjects clearly understand that they are being generous to other subjects and that their choices are volitional and free from error and hence altruism is voluntary and primarily a concept of choice (Palfrey & Prisbrey, 1997). If we assume that subjects in experiments are money maximizers, then we are assuming that they maximize utility of the form $U_s = \pi_s$. However to capture the presence of altruistic preferences, we allow a more general functional form for utility given as,

$$U_s = u_s(\pi_s, \pi_o) \tag{2.1}$$

This is to say that individuals maximize utility from both payoffs to self and payoffs to others. In this more general model, subjects choose over the bundles (π_s, π_o). Andreoni and Miller (2002) suggests incorporating other heterogeneous factors that may influence choices among the payoffs. To allow for a more complex utility function, let θ be a vector of attributes of a game. Clearly, θ could take numerous variables that are known to significantly influence the outcome of a game. In our study, we incorporate emotions in the vector θ to determine the causal effect of positive affect on altruistic behavior. Thus we assume a utility function of the form;

$$U_s = u_s(\pi_s,\, \pi_o;\, \theta) \tag{2.2}$$

Loewenstein (2000) adds to this type of formalism while attempting to demonstrate the possible inclusion of visceral states into a dynamic utility maximizing behavior. But even in the static form of it, people elicit preferences for one good over another conditional on the underlying emotions at that time while fully cognitive of the dynamic effects of outcomes. Ariely and Loewenstein (2006) finds that sexually aroused college students were sufficiently more willing to indulge in unprotected sex as compared to unaroused counterparts even though the outcomes would affect future lifetime decisions. Emotions therefore strongly impact on judgment and decision making temporarily or interoperability. Our consideration for the static rather than a dynamic utility function is therefore a matter of convenience.

2.4 Measuring Affect

2.4.1 Conceptualising Emotion

Emotions are known to introduce variations in the way individuals perceive interactions and more importantly make decisions. Traditionally, the theory of economics had repudiated the influence of emotions as a concept in economic decision making particularly because of its elusive definition and nature (Frijda, 1986; Phelps, 2009). However, there is an upsurge of new evidence that variances of emotional valence could indeed be at play in economic decision making (Eaton, Flisher, & Aarø, 2003; Frijda, 1986; Ifcher & Zarghamee, 2011; Isen, 1987, 2007, 2008; Peters et al., 2006). Even more recent, is the realization that emotions do not work as a single entity in influencing decision making but do, in most instances, work through mechanisms that involve only certain of its components. We focus on the influence of emotional component that is responsible, even momentarily, for arousing an individual's affective state. Our main aim is to appreciate the focus of the disaggregated mechanisms present in the influence of emotions on economic decision making.

Although past literature, including Cacioppo, Tassinary, and Berntson (2007); Frijda (1986), has attempted to differentiate the components of emotions and affect, there is still considerable overlap on the mechanisms at play. Indeed, emotions and affect encompasses the subjective responses to both external and internal occurrences including physical body responses, experiences and habitual tendencies. Emotions too reflect the ways in which individuals appraise and evaluate events. For instance, thinking about an individual who is suffering co-evolves with related emotions of empathy or grief and so influences the appraisal of such an event. Frijda (1986) provides an elaborate differentiation of forms and types of emotional components. Our current study is specific to the economic question of preferences for altruism and seeks to investigate its effects on economic rationality.

2.4.2 Experimental Mood Inducement Approaches

By definition, mood is an affective state that is characterized by the subjectivity of one's feelings that are mildly intense and can be sustained long enough to influence a decision making process. Moods can either evolve through an exogenous induction that is identifiable or can also emanate from sources that are not directly identifiable. The most peculiar feature of moods is their subjective nature and the ability to influence decision making behavior in several dimensions that are not particularly related to the decision making process.

Nonetheless, empirical analysis of the impact of moods on economic decision making processes hinges on the ability to induce and measure them in a laboratory setting. Even though the complexity of emotions and its components presents limitations as to what can be measurable in the lab, empirical research has identified effective techniques that can be used to understand the effects of specific components of emotions on economic decision making. It is also important to note that there are standing ethical considerations that deliberate the extent to which empirical research can manipulate emotions.

One of the emotion manipulations inherent in empirical research is the emotion-eliciting stimuli (Frijda, 1986). Through laboratory experiments, past research has made use of emotionally evocative stimuli and situations to induce varied components of emotions. This approach invites the empirical question on which of the stimuli and situations are most effective in inducing emotions. Two of the widely used stimuli in social psychology and neuroscience include emotional scenes and words. There are several encyclopaedias of emotional scenes curated that provide varied emotional contents. Such databases include the International Affective Picture System (IAPS) developed by Bradley and Lang (1999). A further development involves the use of affective words in inducing emotions widely known as the Affective Norms for English Words (ANEW) and sounds (International Affective Digital Sounds (IADS)[1]. Other stimuli available include the use of faces

[1]Freely available on http://csea.phhp.ufl.edu/media.html

depicting emotional expressions. This approach hinges on the muscle patterns of the basic six facial expressions that have been widely studied in neuroscience and social psychology (Adolphs, 2002; Izard, Kagan, & Zajonc, 1984; Tassinary & Cacioppo, 1992; Zajonc, 1984). Additional approaches involve designs that utilize stimuli focused on inducing emotions such as conditioned fear and threat of shock. These approaches have been very effective in eliciting anxiety responses in individuals experiencing fear or shock.

In economics, monetary based stimuli has also been used although in this context it is best viewed as a secondary reinforcer of the properties that it represents to the person. Thus giving or taking away of money will reinforce the emotion associated with that loss or gain. Economic studies of choice behaviour have been shown to produce physiological responses that can be tied to emotional reactions (Delgado, Gillis, & Phelps, 2008).

Another approach that has been used in empirical research is the pharmacological manipulation of emotions. This approach is not frequently used owing to its ethical concerns but can be significantly useful in interrogating the neural basis of emotions. Past studies have used pharmacological agents that target biological neural systems responsible for certain emotions. For instance, in understanding behavioural associations in humans, Young, Lim, Gingrich, and Insel (2001) use Oxytocin, a hormone responsible for human social interactions, to find that it facilitates affiliations and social bonding in monogamous species. In economics, Kosfeld, Heinrichs, Zak, Fischbacher, and Fehr (2005) finds that Oxytocin increases individual risk profiles in a trust game. Despite numerous studies including Fehr and Gächter (2002); Kosfeld et al. (2005); Young et al.

(2001) concluding that Oxytocin is singularly responsible for increased trust levels in humans, other studies such as Miller (2013); Pfeiffer (2013) criticize not only its failure in experiments to elicit differences but also its unknown intrusive effects in the development of the human brain. The suggestion that Oxytocin can effectively be used in matrimonial counselling, triadic relations and cohesion does not offer support for the natural and long term safety of the human brain.

The emotion elicitation procedure adopted in this study is through mood induction. The mood induction approach typically focuses on the manipulation of affect in a laboratory setting with the aim of altering moods. Mood induction attempts to shift subjective baseline affective states while sustaining these shifts for a period long enough to observe what effect it will have on decision making. A standard practice, and the one followed in this study, is to use short video clips that are relevant to the component of mood that is being studied. The videos in practice range from scenes in a comedy setting aimed at inducing momentary elation or happiness, excerpts of movies depicting death scenes to implore empathy or sadness, or calm depictions of nature that induce neutral moods. Further details of the exact mood inducement procedure are given in section 3.3.3 of the next chapter.

Another commonly used mood inducement approach is the use of static vignettes that depict a range of intended mood shifts. For instance, to implore empathy, one could make use of vignette profiles that present identifiable victims. Engraving the effects of such situational empathy, a perspective taking task that seeks to place subjects in the victim's circumstance becomes significantly relevant. However, the success of this type of approach depends on whether subjects can subjectively report a shift of their mood state in the direction intended by the researcher.

2.4.3 Measuring changes to mood

Psychometric approaches to measuring mood shifts based on subject self-reports of how they feel before and after a mood inducement procedure are among the most common measurement practices. A series of questions answered on a Likert scales is the standard approach. The approach is significantly less costly to implement in the field relative to some of the other more invasive approaches discussed below and has the advantage of not requiring specialised equipment. However. one shortcoming with this approach is that it has the potential to prime individuals to think about what they are asked to rate and hence in retrospect appraise the effects unrelated to the mood inducement. In other words, people may be induced to feel, say happy, if they are asked to rate how happy they feel right now.

An alternative to psychometric screening are physiological measures. Cacioppo et al. (2007) outlines a host of physiological measures that are efficient in measuring mood shifts. These measures provide an effective approach to analysing emotions because they have the potential to focus on specific and neuromodulatory response patterns which may present different orientations of the underlying neural mechanisms (Frijda, 1986). They are also unique to specific emotions. One such measure used in past literation is the Skin Conductance Response (SCR) which provides an indication of the arousal of the nervous system. A classic example in the use of SCR is in the determination of changes in arousal where electrodes pegged on the subjects finger may give an indication of skin electrical conductance as a result of increased sweat levels. When aroused, human sweat glands respond by excreting sweat that in turn increase electrical conductance of the skin. The advantage of this approach is that its not intrusive and subjects do not feel anything. Even though its advantageous in that it does not interfere with other physiological measures, SCR can be difficult to implement particularly with subjects not conversant with the technology. It is also unable to discriminate the direction of feelings, whether negative or positive valence.

The *electromyography* (EMG) approach is significantly useful in measuring facial muscle responses to mood perturbation. There are two scenarios that the EMG is applicable. In one state, the EMG approach is utilised as an index for the magnitude of the startle reflex. This is a response that individuals may elicit if suddenly surprised by a driver honking at close range. One variable of use within this approach is the subject's intensity of the eye blink. Since the measure makes use of magnetic electrodes, it may be difficult to simultaneously use other emotion measurement mechanisms such as the functional magnetic resonance imaging (fMRI). It is also viewed as intrusive on subjects.

2.4.4 The International PANAS Short Form (I-PANAS-SF)

While SCR, EMG and fMRI all have advantages in certain contexts, SCR cannot be tied to the direction of emotions (valence). Furthermore, EMG has drawbacks of its own relative to fMRI making the latter perhaps the better tool. However the field nature of the study makes it impractical and financially infeasible to consider this approach. Instead, the International Short Form Positive Affect

Negative Affect Schedule (I-PANAS-SF) was used to measure both positive and negative affect. 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. The I-PANAS-SF is a dominant psychometric tool in the psychological literature and presents a basic formalism for which subjects self report their feelings around specific emotional lexicons. Edmans, Garcia, and Norli (2007) builds on a cross cultural validation of the 10 item I-PANAS-SF and correlates with the original 20 item PANAS. The study finds that I-PANAS-SF is stable across samples and over time, internally reliable as well as invariant cross-culturally.

In a similar study, Karim, Weisz, and Rehman (2011) examined the factorial invariance of the I-PANAS-SF between the french and the Pakistan cultures. Using multigroup structural equation models to contrast the structure of I-PANAS-SF, the study found that the subjects interpreted the measures similarly despite their cultural differences. Hence, the I-PANAS-SF builds a reliable yet externally valid tool to measure affective states. Since our sample was highly multi-cultured, this tool feasibly provided a means to compare our subjects' affective states. On average and in lieu of other complicated measures applicable in a field experiment, this dissertation hinged on the success of the instrumentation of the I-PANAS-SF.

In our experiment, the positive affect lexicons were; *active, determined, attentive, alert and inspired*. The negative affects were; *ashamed, hostile, upset, nervous and afraid*. For both the control and treatment groups, subject completed the I-PANAS-SF before and after the modified dictator game. Following Ifcher and Zarghamee (2011), we use the net affect score computed as the difference between positive affect and negative affect scores in our analysis. The International Positive Affect Negative Affect Short Form schedule is presented in figure A.2 in the appendix.

2.5 Testing for rationality.

The fourth of our chapters deals with testing for violations of axioms of revealed preferences across our sample. The argument why emotions fail to be considered in a broad spectrum of classical economic theories is that they are disruptive to the *boundedness* of systematic reasoning (Arthur, 1994; Gigerenzer & Selten, 2002; Kahneman, 2003). That is, the idea of bounded rationality fails to hold if emotions are allowed to galvanize decision making. In chapter four, we technically seek to verify whether indeed affect introduces substantial errors in preferences for altruism.

We hypothesize that if affect disrupts reasoning, then substantial errors using revealed preference axioms will be observed. It therefore becomes important to ask whether these errors mediate choices that people make from time to time. Using modified dictator game experiment, we are able to attribute these errors in choice to the effects of emotions. We use the Critical Cost Efficiency Index (CCEI) to distinguish systemic errors to those purely introduced by the affect treatment.

2.6 Altruism and the review of the axioms of revealed preferences.

The theory of revealed preferences is central to the understanding of basic consumer behavior (Samuelson, 1948). In this dissertation, we adopt the definitions of axioms of revealed preference as in Andreoni and Miller (2002).

Formally, Let *A, B...Z* be distinct bundles of alternatives, each lying on a linear budget constraint. Axioms of revealed preferences can be defined in two intuitive terms. First is the *"Directly Revealed Preferred" preference* in which bundle A is *directly revealed preferred* to bundle B if B was in the choice set when A was chosen. Second, a choice is said to be *"indirectly revealed preferred"* if A is *directly revealed preferred* to *B*, B is *directly revealed preferred* to C , ... to Y , and Y is *directly revealed preferred* to *Z*, then A is said to be *indirectly revealed preferred* to *Z.* This forms the entry point to the understanding of preference theory in microeconomics.

In the classic revealed preference axioms due to Samuelson (1938) and Houthakker (1950), the analysis assumes more generalized definitions as in the following quotes;

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

Varian (1982), in applying the theorems of Afriat (1967), assumes generalized forms of the theory to allow indifference curves that are not strictly convex. Thus we have the,

> *Generalized Axiom of Revealed Preference (GARP)*: If A is indirectly

revealed preferred to B, then B is not *strictly directly* revealed preferred to A, that is, A is not strictly within the budget set when B is chosen.

Clearly, where WARP is violated, SARP does not hold. Similarly where GARP is violated, subjects must also elicit preferences that violate SARP even though the reverse is not true. Therefore, the generalized axioms of revealed preference is both a necessary and sufficient condition for the existence of well-behaved preferences assuming linear budget sets and the potential for indifference. In this dissertation, we will use data obtained from the modified dictator game experiments for the revealed preference tests particularly the GARP.

CHAPTER 3

THE CAUSAL EFFECT OF AFFECT ON ALTRUISM.

3.1 Introduction

One of the most important determinants of choice in decision making process is the individual's underlying emotions (Andrade & Ariely, 2009; Bowles & Gintis, 2005; Bregu, Deck, Ham, & Jahedi, 2017; Ifcher & Zarghamee, 2011; Isen, 2008). In the last few decades, substantial interest in psychological research has focused on how different emotions impact on decision making. There has been a surge in research on decision theory to the extent that psychological scientists and behavioural economists consider emotions as the single most important driver of decision making (Lerner, Li, Valdesolo, & Kassam, 2015; Loewenstein, 2000; Oatley, Keltner, & Jenkins, 2006). In fact, in Bentham (1996)'s (originally published in 1789) construct of utility, emotions featured vastly as key determinants of individual preferences. It is not until the classical economists focused on adopting the concept of ordinal utility and the theory of revealed preferences with a view that Bentham (1996)'s idea about utility being the net sum of positive over negative emotions was non predictive (Loewenstein, 2000). Since that time, economic theory has not had a serious focus on how emotions mediate economic decision making processes.

Unlike in psychology, behavioral economists interested in the effects of emotions on economic decision making have had vast interest on anticipated emotions that come as an experience of having made a decision. Examples of such emotions include guilt, regret and disappointment (Loewenstein, 2000). Psychologists in contrast have had substantial focus on emotions experienced prior to and during instances of decision making such as affect, empathy and remorse. Perhaps the most tangible explanation about the economists' bias to anticipated emotions is the belief that their inclusion prior to and during decision making is not only disruptive of the concept of rationality but also renders decisions not predictive. This chapter focuses on the effects of emotions that are inherent prior to and during making a decision.

The vast majority of economic theories support the idea that agents operate within a framework of rationality. The consideration is that, individuals are *homo economus* (economic beings) who pursue selfish interest in a consistent manner. Growing evidence however show that individuals care about others and are therefore not purely self interested in many contexts (Andreoni, 1995; Andreoni & Miller, 2002; Brosig-Koch et al., 2007; Pereda, Brañas-Garza, Rodríguez-Lara, & Sánchez, 2017). Thus, peoples' desire to give can be explained in an economist's language of rationality. In furtherance of this understanding and in line with literature on the effects of emotions on decision making, this chapter elucidates the causal effect of affective emotions on altruism.

According to Andrade and Ariely (2009), emotions are specific and short-lived subjective feelings whose cause is identifiable. People are able to say what they are happy with or angry about. On the other hand, moods are mild emotions for which the cause is not directly identifiable. For instance, people can say that they are in good or bad moods without necessarily having a reason for it. Affect is one of the overarching category that cuts across moods and emotions, (Schwarz & Clore, 1996). For the rest of this chapter, we adopt the use of the word "affect" for purposes of consistency.

3.2 Literature review.

The last few decades has seen considerable focus on the impacts of attributes such as framing, anchoring and context effects on decision making, (Ariely et al., 2003; Camerer et al., 2011; Hsee & Leclerc, 1998; Huber et al., 1982; Schkade & Johnson, 1989; Tversky & Kahneman, 1975, 1985). There is also a growing literature focusing on the mediation of interpersonal emotions on decision making (Isen, 1987, 2007). In particular, positive affect has been found to lead decision makers into more efficient problem solving mechanisms and strategies (Isen, 2008), significantly reduce time preference in uncertainty (Ifcher & Zarghamee, 2011) and also has effects on workers' motivation, efficiency and productivity (Oswald et al., 2015).

Kugler, Connolly, and Ordóñez (2012) used three closely related randomized experiments to show the effect of two negative affects, fear and anger, on risk taking behavior. Participants were induced to either anger or fear by completing a writing task. Then, they were asked to make decisions on an uncertain event generated by either a lottery (lottery risk) or by the uncertain action by another person (people-based risk). Their finding was that fearful subjects were more risk averse than their angry counterparts in the lottery experiment. In the people-based risk experiment, fearful subjects elicited less risk aversion than those treated to anger. The study concludes that the impact of different emotions on risk is dependent on the type and intensity of uncertainty facing the decision maker. This evidence suggests that economic theory that analyses risk behavior may closely estimate true risk preferences by including parameters that consider individual underlying emotions.

More recent research emphasizes the salience of both positive and negative affect in judgment and decision making (Andrade & Ariely, 2009; Camerer et al., 2011; Damasio, 1994; Ifcher & Zarghamee, 2011; Kahneman, 2011; Loewenstein, 2000; Srivastava, Espinoza, & Fedorikhin, 2009). Using medical functional magnetic resonance imaging (fMRI) to monitor brain action, Sanfey et al. (2003) find that perceived unfair offers in an ultimatum game causes activations in brain areas associated with both cognition (dorsolateral prefrontal cortex) and emotion (anterior insula). Further, there is noticeably higher action in the insula with regard to rejected offers. Van't Wout, Kahn, Sanfey, and Aleman (2006) demonstrate that subjects faced with unfair offers in an ultimatum game present higher skin electro-dermal response (skin conductance) and are highly likely to reject the offers. The activity is even higher when the unfair offer is decided by a human as opposed to a computer. Certainly, responders get more emotionally aroused when a fellow human treats them to unfair offers. This evidence affirms that emotions are salient in decision making and response. It is however difficult to attribute these differences in neurological responses to a particular emotion.

In the classical economic theory literature, the existence of a general price equilibrium with the assumption that both buyers and sellers value and view commodities in the same way (Willig, 1976). However, in an endowment effect analysis, Kahneman, Knetsch, and Thaler (1990) demonstrates that there are vast differences in the willingness-to-pay and willingness-to-accept measure that can be extended to the goods market. It therefore means that more salient cues interplay in price determination. People's momentous emotions have been found to strongly mediate the elicited measures of valuation. When judging the value of consumer goods, individuals tend to construct the judgment and preference on the spot (Slovic, 1995). These preferences therefore can differ with respect to specific individuals and especially when elicited through more classical modes such as choice and pricing. In fact, Peters, Slovic, and Gregory (2003) use randomized within and between subjects experiment to demonstrate individuals willingness-to-pay and willingness-to-accept preferences for lottery tickets. The study examines the information that is salient to sellers and buyers as they value commodities. Buyers with stronger feelings for owning a ticket were willing to quote higher prices for the tickets while sellers who had stronger negative feelings for disposing the tickets demanded a greater minimum quote in exchange for the tickets. Peters et al. (2006) conclude that affect plays a significant role in constructing the value prices. Similar past literature has demonstrated converging results albeit the different experimental approaches and context (Johnson, Hershey, Meszaros, & Kunreuther, 1993; Knetsch, 1990; Viscusi, Magat, & Huber, 1987). The direction of causality between decisions and emotions is two fold. First, people are aroused by the outcomes of decisions they have already made. Through cognitive appraisal and learning theories, people are considered to consult their feelings about the outcome of their decisions and tend to act on such cues in the actual decision making (Kahneman, 2011). For instance, in a giving game, people may want to feel elated by altruistic decisions they make. Positive affect (elation) is associated with the altruistic outcomes.

Thus, such cognitive emotions mediate peoples' preferences for altruism. Emotional experience from decisions made in the past can as well act as information bundles in the future. By learning from similar decisions made in the past, individuals are able to update their expectations in the future. There is vast evidence on how this belief updating mechanism can form basis for future behavior even when the first instance of decision making was marred with errors (Connolly & Butler, 2006; Ditto, Pizarro, Epstein, Jacobson, & MacDonald, 2006; Lerner et al., 2015; Lerner & Tiedens, 2006).

Similarly, varying emotions prior to decision making can have substantial impact on the choice process. Evidence from laboratory experiments show that induced affect can change the dynamics of perceived rationality (Ifcher & Zarghamee, 2011; Slovic, Finucane, Peters, & MacGregor, 2007; Tversky & Kahneman, 1975). However, the bulk of the literature focuses on cognitive as opposed to affective rationality. This is perhaps due to beliefs that affect and ultimately emotions disrupt the boundedness of systematic reasoning and thus economic theory is yet to incorporate emotions as salient determinants of choice (Slovic et al., 2007). In this chapter we address this gap by demonstrating empirical differences in the impact of affect on altruism. We consider both positive and negative valences of affect that are induced in both field and laboratory experiments. We then observe how subjects make choices in a standard dictator game.

3.3 Methodology

3.3.1 Experimental design

This chapter examined the effects of positive affect on altruism using two experiments. The first experiment was a behavior modification programme aimed at promoting pro-social preferences. The programme ran a series of *modularized* workshops covering self-belief, goal orientation, creative thinking, trust building and commitment to the public good. We theorized that the training would cultivate a sense of optimism about social cohesion,integration into the labour market and entrepreneurial mindsets among youths in marginalized communities. Such behavior change would co-evolve with affect which will in turn foster preferences for pro-sociality. We anticipated that at the end of the social experiment, participants assigned to programme treatment would be more susceptible to pro-social emotions. Pro-social emotions and particularly affect would be seen to have mediated pro-sociality.

Even though the social experiment provides an opportunity to inform social policy, it would be difficult to infer direct causality between affect and altruism. To address this challenge, we nested a second experiment within the behaviour modification programme. This second experiment was meant to exogenously induce affect on subjects in a laboratory setting. Firstly, this experiment served as a direct test of causality from affect to altruism. Secondly, in support of the external validity of the first experiment, the second one provided an approach for robustness check.

In brief, the experimental procedure involved subjects settling in large rooms that had been arranged by the experimenters. A consent sheet to participate in the experiment was issued by the experimenters which subjects read through and appended their signatures if they agreed to participate. Subjects were told that they would watch a short video clip and immediately after the video clip they would participate in a dictator game. In the dictator game, they would be required to decide sharing valued tokens between them and anonymous others. Their decisions in the game would be used to earn them real money in the end of the experiment and so they had to take each decision as if their earnings depended on it. In the end of the experiment, their earnings would be determined and the payments done the following day[1] into their personal bank accounts. There was a final short demographic survey that all subjects filled before leaving the laboratory. The total time taken averaged at fifty minutes.

3.3.2 Sample participants.

Our sample consisted of 610 youths of between $20 - 30$ years. All participants were randomly selected from a pool of applicants following an advertisement into the *Activate!* programme that was placed on popular dailies and on the *Activate!* Change Drivers Programme's website. There were 18 experimental sessions across different provinces in South Africa each with approximately 35 participants. Subjects gathered in large public venues[2]. They were not allowed to converse with one another during the experiment. Each experimental session took no more than one hour. As noted in Chapter 2, none of the participants had prior knowledge that the behavior modification programme would be tested

[1] This excluded experiments done on Fridays and Saturdays.
[2] These included University lecture halls, public schools and social halls.

for certain outcomes.

3.3.3 Mood inducement procedure

We made use of video clips to induce affect on our subjects. The use of video clips has gained traction lately in the fields of economics (Frijda, 1986; Ifcher & Zarghamee, 2011; Lerner et al., 2015; Lerner & Tiedens, 2006; Oswald et al., 2015; Westermann, STAHL, & Hesse, 1996). Ifcher and Zarghamee (2011) finds that mild positive affect significantly reduces time preference over money compared to neutral affect. Further, Westermann et al. (1996) asserts that the use of video clips is the most effective methods of inducing affect.

For the dictator game experiment, the treatment group watched two short comedy video clips from two local stand-up comedians[3]. The use of comedy clips was intended to induce mild positive affect. Subjects in the control group watched a video of low-tide ocean waves for approximately two minutes to induce mild neutral affect. Immediately after watching the video clips, subjects participated in the dictator game.To the best of our knowledge, none of our subjects had participated in a mood elicitation experiment before. Additionally, no subjects participated in more than one experimental session.

It is also feared that subjects may not sustain their incidental affective states to the time of actual choice experiment especially when affect is induced in laboratory experiments. However, Feinstein, Duff, and Tranel (2010)

[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. The videos can be accessed online via Vimeo on the following links: https://vimeo.com/387893570 and https://vimeo.com/387893636

demonstrates that patients with severe amnesia and who thus quickly lost memory, reported subjective feelings related to the induced treatment. This affirms that affective states can persist beyond the conscious recollection of the treatment. Kahneman, Knetsch, and Thaler (1986) also finds that emotions induced through showing film clips can sustain beyond influencing decision made at the moment to those made in subsequent times.

3.3.4 Experimental tasks and procedures.

After participants committed to taking part in the experiment by signing the consent forms, each of them received a detailed instruction sheet which the experimenter read out loudly. After reading the instructions, subjects were told to ask any questions that they had regarding the experiment to the experimenter and his assistant only. Save for the affect treatment, the experimental protocol was similar for both the treatment and control groups.

The experimenter then issued out envelopes containing shuffled decision sheets, a pencil, an eraser and a small electronic calculator. There were ten decision tasks to be completed. Each decision task differed in terms of the number of tokens available and the amount of points that each token held. Subjects filled in their personal details, the subject's number together with their bank particulars on sheets provided by the experimenter. First, there was a practice round that replicated the tasks to be completed. After the practice round, subjects proceeded to complete the actual decision tasks.

A token was worth either 1, 2, 3 or 4 South African Rands each while the total number of tokens available for each task was either 40, 60, 75 or 100. In essence, subjects received $m \in$ (*40, 60, 75, 100*) amount of tokens in one decision task. They were required to pass some, all or no tokens to their anonymous others by completing statements like;

"Devide 75 tokens: Keep _____ at R1 each, and pass _____ at R2 each."

The amount passed, π_o, and the amount kept, π_s, added up to the initial endowment m such that $\pi_s + \pi_o = m$. Subjects were also allowed to use calculators. Consider a particular subject who is making a decision to divide 75 tokens between him and an anonymous subject. He chooses to keep 50 tokens to himself and pass the remaining 25 tokens. Consider further that the value of giving a token is set at *R1* and the value of receiving a token is *R2*. The particular subject would receive $50\,X\,1 = R50$ for the game while their counterpart receives $25\,X\,2 = R50$. Figure 3.1 represents a typical decision problem with 50 tokens given to each player in the experiment.

At the end of the experiment, subjects returned the completed decision sheets into the envelopes. A representative was randomly selected to roll a ten-sided dice. The *rolled* number was used to determine the decision sheet to be used in computing the earnings. The experimenter then computed all earnings and each subject signed against their pay. On average, it took 2 days for the payments to reflect in subjects' bank accounts.

3.4 Model Specifications.

The *Activate!* programme was an ideal experiment in the field that was meant to moderate pervasive beliefs about the outcomes of crime, unsafe sex and

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 3.1: Example decision task with 50 tokens.

Each player enters their player ID and the decision number before carrying out the decision tasks. From the Total Tokens provided in each task, each player decides how much to keep to himself and how much to send to player B. These amounts are entered respectively within the boxes under column labeled (A) DECISION. They then have to multiply the respective amounts kept for self and those sent to player B by the value amounts under column labeled (B). The product is entered in respective boxes under column 4 labeled "Total money". Note that the subdivision of the available endowment must add up to the total tokens provided. Each player was provided with a pocket size calculator to aid in calculations.

drug use among youths in marginalised communities. This behaviour modification experiment was meant to promote more pro-social preferences that are seen to foster social cohesion, entrepreneurship and participation in the labour market. We theorized that, affect is an important pro-social emotion in mediating the expected behavior change. Positive emotions generated from increased self esteem, entrepreneurial skills as well as creative thinking evolve with positive affect to mediate pro-sociality. However, in the absence of exogenous variation in affect, it would be challenging to identify both the internal and external validity of the causal relationship. We therefore addressed this challenge through two identification strategies. In the first strategy, we extracted exogenous variation in affect through the behavior modification experiment. In the second strategy, we experimentally varied the affect levels through a mood inducement procedure. We discuss each of these approaches in the next two subsections.

3.4.1 Identification through behavior modification experiment.

The context of the *Activate!* programme was a behavior modification experiment targeted at young people. It consisted of a nexus of interventions meant to foster the development of pro-social preferences (i.e., preferences for altruism, trust, and commitment to the public good), as well as interventions that were aimed at changing mindsets that incubate destructive risk-taking, the lack of entrepreneurial innovation, impatience, and civic apathy.

The training programme ran as a series of three modularized workshops covering self-belief, goal-orientation, creative thinking, problem solving, resilience, communication skills, trust building, project management, and political engagement. These interventions are theorized to lead to an actualization of greater pro-social preferences as well as better outcomes in terms of risk taking, tolerance for delayed gratification, civic engagement, and economic opportunity. However, our hypothesis was that the causal effect is not directly observed in the absence of affective emotions. The feeling of happiness is often thought to be a key factor in promoting pro-social preferences. We therefore hypothesized that if the behaviour modification succeeded, participation into the *Activate!* programme would promote pro-social behaviour and that affect would have played a mediating role.

In the presence of exogenous variation in affect, one would estimate its direct effect on altruism. However, in this case, affect is co-determined with altruism through the behaviour modification programme. Affect therefore emerges endogenously in this context. To extract exogenous variation in affect, we followed an instrumental variable strategy where in the first stage, we estimated the impact of programme assignment on affect. Here, we sought to examine whether assignment into the programme impacted on participants' affect.

It is worth noting that even though all subjects participated in only one modified dictator game session, each of them answered the International Positive and Affect Negative Affect Schedule Short Form (I-PANAS-SF) questions twice. The I-PANAS-SF is a scale through which subjects can subjectively rate their affect levels both in surveys and laboratory experiments (see §2.4.4 for details). This psychometric mood screen asks subjects to rate on a scale of 1 to 5 how they felt with respect to 5 positive affect and 5 negative affect lexicons. It has been extensively used both in the psychological and behavioral economics literature (Ifcher & Zarghamee, 2011; Isen, 1987, 2008). The first I-PANAS-SF scoring was completed before subjects' moods were experimentally altered. Our generalised identification strategy uses these pre mood inducement I-PANAS-SF scores as our measure of affect. To control for the endogeneity of inherent with this measure, we instrument this score with the random assignment to the *Activate!* behaviour modification programme. The key identifying assumption here of course is that the programme only works through affect and not on altruism directly.

The first stage model is given by;

$$N_{affect} = \beta_0 + \beta_1 T_i + \sum \beta_i X_i + \mu \tag{3.1}$$

Where the dependent variable is net affect score obtained from taking a difference between the sum of individual positive affect scores and neutral affect scores (Positive affect-neutral affect), T_i indicates the individual treatment assignment and X_i captures demographic controls. The second stage equation is given by,

$$\pi_i = \tilde{\beta}_0 + \tilde{\beta}_1 N_{affect} + \sum \tilde{\beta}_i X_i + \mu \tag{3.2}$$

where π denotes the amount of tokens that our subjects passed to the anonymous counterparts, $\tilde{\beta}_1$ is the predicted net affect from the reduced form estimation.

3.4.2 Identification through the mood inducement experiment

The instrumental variable strategy has a drawback of imposing a strong assumption that programme assignment does not directly impact altruism at least in the absence of affective emotions. To relax this assumption, we followed an alternative identification strategy by randomly assigning all our subjects to a mood inducement procedure in the laboratory.

As noted earlier, the treatment group watched two short comedy video clip from two local stand-up comedians and the control group watched calm ocean tides before the actual experiments started. Immediately after watching the video clips, the dictator game experiment was conducted. Subjects then completed the second PANAS-SF.

The success of the mood inducement was an appropriate way to randomly perturb emotions and hence estimate their direct impact on decisions made in the dictator game. First, we used equation 3.3 to test the success of the mood perturbation where $\alpha_1 \neq 0$ was our expectation.

$$N_{affect2} = \alpha_0 + \alpha_1 M + \mu \tag{3.3}$$

Where $M = 1$ denotes a dummy for whether a subject watched a comedy clip or $M = 0$ if they watched the ocean waves. $N_{affect2}$ was the objective measure of affect obtained from the second PANAS-SF. The success of the mood perturbation as estimated by equation 3.3 allows us to proceed to directly estimate the impact of affect on altruism. We therefore estimated;

$$\pi_o = \beta_0 + \beta_1 M + \sum \beta_i X_i + \varepsilon \tag{3.4}$$

The specification given by equation 3.4 is noteworthy for several reasons. Firstly $\hat{\beta}_1 \neq 0$ is a direct test of affect as a pro-social emotion. Bowles and Gintis (2005) define an emotion as pro-social if they induce individuals to behave in ways that increase the average payoffs to others. By this definition, happiness co-evolves in support of altruism. Thus, triggering the emotion, even momentarily, should increase pro-social behavior. This is precisely what our mood-inducement procedure seeks to accomplish. Moreover the full cross-randomization allows us to test the robustness of pro-social emotions to perturbation through behavior modification. With the success of mood inducement as indicated in Table 3.5, equation 3.4 fits a specification that directly estimates the impact of affect on altruism. To estimate this, we used OLS and presented the results under Table 3.6.

3.5 Results.

3.5.1 Summary statistics.

Approximately half of the subjects were randomly assigned to the treatment group and the other half in the control group in the *Activate!* programme. The primary variable of interest was money since we measured altruism through a monetized dictator game. We therefore needed to ensure that the estimated altruism was not confounded by intrinsic wealth. One obvious source of financial wealth would be employment wages. We used the employment status as a key indicator of financial ability. We then compared this characteristic distribution between subjects in the treatment and control groups. Table 3.1 presents the mean differences in subjects' labour market characteristics. There were no significant differences between the treatment and control groups.

Table 3.1: Mean differences in labour market characteristics. (*Activate!* Programme)

	Control	Treatment	Differences	P-Value
Searching for a job	0.1383 (0.02)	0.1311 (0.02)	0.0072	0.7953
Full time working	0.3440 (0.03)	0.3323 (0.03)	0.0117	0.7620
Full time studying	0.2589 (0.03)	0.2439 (0.02)	0.0150	0.6714
Volunteering	0.0851 (0.02)	0.1189 (0.02)	-0.0338	0.1720
Hours of work	78.5234 (4.49)	74.2646 (4.05)	4.2588	0.4809
Average wages (Rand)	3098.95 (290.24)	3230.97 (354.97)	-132.0193	0.7766
Observations	282	328	610	

(Standard errors in parenthesis.) The survey data were collected from all participants recruited into the Activate programme in 2014. Since the sample population involves youth between 20-30 years of age, it is possible that some would still be in school while others were engaged in gainful employment. Note that our measure of altruism is hinged on a monetized dictator game and thus a subject's outside option could bias their altruistic preferences. Of those actively **searching for a job**, there was no statistical differences. **Fulltime working** indicates that a subject had a full time job. **Full time studying** captures subjects who did not have any other commitment other than being in school. **Volunteering** indicates subjects who were on an unpaid engagements. The survey also sought to verify the hours worked in a week for each subject in their various activities. For the employed subjects, they also reported their average wages in South African Rand. Within the randomization, we found no statistical differences in all labour market characteristics.

We also found no significant differences in individual demographics that could potentially confound our experiments. There were approximately as many male subjects as females in both treatment and control groups. There were no significant differences in gender, race, education and the language in which our subjects were able to fluently speak.

In the dictator game experiment, we used an eight point Centre for Epidemiologic Studies Depression scale to examine our subjects' heterotypic stability which specifically infers an underlying consistent psychological manifestation of personality traits. The eight point scale is a short form prototype of the aggregate twenty point scale. This was particularly important because in our laboratory experiment, outrageous emotional states would have confounded the success of the mood perturbation. Table 3.2 shows no statistical differences in our subjects' depression scores.

Table 3.2: Differences in depression scores.

	Control	Treatment	Differences	P -Value
Bothered	1.6293 (0.04)	1.6412 (0.03)	-0.0119	0.8143
Concentration	1.5543 (0.04)	1.5282 (0.03)	0.0260	0.5985
Depressed	1.5214 (0.04)	1.5333 (0.03)	-0.0119	0.8079
Hopeful	2.5930 (0.04)	2.5800 (0.04)	0.0130	0.8121
Fearful	1.5984 (0.03)	1.6061 (0.03)	-0.0076	0.8702
Restless	1.5233 (0.04)	1.5100 (0.04)	0.0133	0.8038
Happy	2.4749 (0.03)	2.4585 (0.03)	0.0164	0.7250
Lonely	1.5946 (0.04)	1.5800 (0.03)	0.0146	0.7681
Observations	259	301	560	

Standard errors in parenthesis Each of the eight lexicons was a rating from a statement such as: **Bothered:** *I was bothered by things that usually don't bother me.* A subject was to indicate the frequency that they experienced the feelings within a week . The values presented in column two and three are the mean scores for each measure in both the treatment and control groups. Column labelled **differences** indicates the difference between the mean scores while the **P-Values** tell us whether the differences were statistically significant.

3.5.2 Subjects exhibit altruism.

In this chapter, we used the standard dictator game budgets for purposes of parsimony in interpreting the results. Standard dictator game budgets have been used widely in experimental economics (Andreoni & Miller, 2002; Andreoni, Rao, & Trachtman, 2017; Bester & Güth, 1998; Brosig-Koch et al., 2007). They differ from the modified dictator game version in that prices do not change and are standardized at 1. In our experiment, other than the initial endowments, the prices of giving and receiving in budgets 7 and 8 were kept constant at one Rand. In Table 3.3, we present the distribution of budget tasks and the corresponding average tokens passed by all subjects.

Budgets 7 and 8 had 60 and 100 tokens as initial endowments respectively.

Donating a token away earned one Rand to the donor as well as the recipient. Therefore, the relative price of giving was one Rand. Considering results from the *Activate!* programme, subjects passed 17.6 tokens on average to their anonymous counterparts in budget 7 while approximately 26.7 tokens were given out in budget 8. There was also evidence of significant differences in tokens passed by the treatment group and the control group.

When pooled together, subjects in the *Activate!* programme closely estimated the findings of Andreoni and Miller (2002). It is worthwhile to note that even though Andreoni and Miller (2002) did not consider treatment on emotions, having our subjects collectively estimate a similar giving behavior emphasized the robustness of our results.

From the laboratory experiment, we also found significant differences in tokens that subjects passed. In all the budget sets, the treatment group gave substantially higher on average. The exogenous variation in affect through videos impacted on subjects preferences for altruism thus identifying with our expectations that positive affect impacts altruism positively. Note that despite a full cross-randomization of subjects between the two experiments, the results in the laboratory experiment closely estimated those of the behavior modification experiment. Table A.1 in the appendix shows the summary statistics from the laboratory experiment.

3.5.3 Endogenous affect mediates pro-sociality.

In the behavior modification experiment, we used an instrumental variable approach to extract exogenous variations in affect. We considered several

Table 3.3: Allocation choices (Behavior Modification Experiment)

Budget	Endowment	Hold value	Pass value	Relative Price	Average Tokens Passed
1	40	3	1	3	13.1
2	40	1	3	0.33	10.2
3	60	2	1	2	18.5
4	60	1	2	0.5	15.4
5	75	2	1	2	19.9
6	75	1	2	0.5	19.4
7	60	1	1	1	17.6
8	100	1	1	1	26.7
9	40	4	1	4	13.6
10	40	1	4	0.25	9.4

The table shows the distribution of initial endowments across the 10 budgets in the dictator game. In **Budget** (Task) 1, the player was given an endowment worth 40 tokens to share with another random player B (anonymous). The value for holding a token to self was worth 3 Rand while each token passed to player B was worth 1 Rand. For this budget, the relative price of giving as shown in column 5 is therefore 3. To compute the relative price of giving, note that giving one token within budget 1 raises Player B's payoff by 1 rand while reducing "own" payoff by 3. Hence the price of opponent's payoff is 1 (1/1) while the price for self-payoff is 0.33 (1/3).That is, the inverse of the hold value is the price of self-payoff π_s and inverse of the pass value is the price of other-payoff π_o. Thus, for the relative price of giving, we divide the price of other-payoff with the price of self-payoff demonstrated as; $\frac{\rho_o}{\rho_s} = \frac{1/1}{1/3} = 3$. Note that during the experimental sessions, all tasks were presented randomly such that there was no order in which task that was completed first or last.

specifications for robustness. Specification 1 and 5 involved tasks completed in budget 7 alone where specification 5 included a set of controls. Specifications 2 and 6 used decisions made under budget 8. We pooled all observations in budget tasks 7 and 8 within specifications 3 and 7.

Since each subject responded to a total of 10 decision tasks, we were mindful that individual fixed effects could confound our analysis especially when we pooled observations from budget 7 and 8. Besides, Sorin (1992) argues in support of a possibility of individual fixed effects in repeated games with complete information especially in altruism, reputation and cooperation. In games of complete information, subjects elicit behavior with a pattern consistent with what they already know about the game. Thus later decisions are blurred by what is known about earlier decisions made. To overcome this possible drawback, we fitted a panel fixed effect approach in specifications 4 and 8.

In all the eight specifications, we found affect to be a positive and significant predictor of altruism. Results from the first estimation strategy showed that higher net affect considerably increases the average tokens passed. For instance, controlling for demographics, specification 4 shows that an increase in net affect by one score implies that approximately 3 tokens more will be passed to the anonymous other. We also note that controlling for the covariances lead to a significant jump in the estimate compared to the basic specification even though the standard errors are considerably higher. When we add several controls, we find that this effect considerably increases in specifications 5, 6, 7 and 8 and remains positive and significant. When budget 8 is considered alone in columns 2 and 6, the magnitude of the effect is larger than in other specifications even though with higher standard errors. We also observe albeit in specifications 7 and 8 that having a job significantly reduces a subjects altruistic behavior. Fewer tokens are donated by subjects who reported to having a job. It is not straight forward why this is the case or why our subjects with a job chose to be significantly less altruistic. While explaining the mechanism here is not the intention of the study, we suggest that this is an interesting result. We do not however think that it is as a result of an unintended consequence of the programme and therefore would prefer the question to be empirically tested in a lab setting.

Table 3.4: Results of estimating equation 3.2

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	2.351**	3.865*	2.756**	2.753**	3.238**	6.005*	4.023**	4.196*
	(0.938)	(2.037)	(1.221)	(1.133)	(1.324)	(3.584)	(1.575)	(2.164)
African					3.845	-1.322	-1.029	-1.689
					(7.214)	(10.73)	(6.018)	(5.894)
Coloured					-	-4.313	-4.826	-5.825
						(18.31)	(9.646)	(11.09)
Wage (logs)					-0.234	-0.324	-0.270	-0.290
					(0.263)	(0.432)	(0.248)	(0.253)
Hours of work (logs)					0.724	0.854	0.601	0.424
					(0.863)	(1.603)	(0.866)	(0.670)
Matric (Grade 12)					3.472	10.29	5.591*	5.271
					(2.812)	(7.367)	(3.358)	(3.942)
Tertiary					3.672	10.31	5.916*	5.537
					(2.865)	(7.202)	(3.355)	(4.231)
Volunteering					-3.723	-10.40*	-6.295**	-4.697
					(3.067)	(5.388)	(2.887)	(2.838)
Has a job					-3.182	-6.842	-4.474**	-3.610*
					(2.455)	(4.322)	(2.277)	(1.644)
Searching for a job					-2.656	-1.550	-1.910	-1.534
					(2.797)	(4.301)	(2.617)	(2.618)
Full time student					-1.665	-6.510	-3.490	-2.521
					(2.626)	(4.274)	(2.445)	(2.382)
Constant	-7.233	-14.23	-7.122	-7.090	-23.57	-42.23	-22.75	-23.35
	(9.936)	(21.60)	(12.95)	(11.99)	(19.29)	(43.14)	(18.14)	(28.80)
Observations	509	481	990	990	392	365	757	757

Notes: This table presents the 2SLS coefficients with standard errors clustered at individual level and *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$. The dependent variable π_o is the value of tokens (in South African Rand) that were passed to player B on average in respective decision tasks. The variable of interest is **affect** as instrumented by treatment into programme. Models 1 and 5 present the regression result using budget task 7 (60 tokens with standardized prices) with model 5 including controls on race, labour market characteristics and education levels. Models 2 and 6 focus on budget task 8 (100 tokens with standardized tokens) and follows a similar presentation of controls. Models 3 and 7 pool all observations within budget task 7 and 8. Model 4 and 8 control for the fact that observing more than two rounds of decisions in a game of complete information could be confounded by individual fixed effects.Thus we fitted a panel fixed effects yielding coefficients in model 4 and 8 respectively.

3.5.4 Success of the experimental mood inducement.

Did the treatment group report higher net affect than the control group? From the second estimation strategy we started off by testing the success of the mood inducement procedure. The results of estimating equation 3.3 show that the mood inducement procedure was successful. In this estimation we considered a number of specifications controlling for possible confounding effects. Table 3.5 shows that being on the positive affect group increases net affect affect scores by 0.786 under specification 5. The coefficient for affect assignment remained significant and positive across all specifications.

Table 3.5: The success of the mood inducement procedure.

Variables	(1)	(2)	(3)	(4)	(5)
Mood Inducement	0.619***	0.458***	0.666***	0.724***	0.786***
	(0.150)	(0.155)	(0.171)	(0.172)	(0.171)
Gender		1.304***	1.231***	1.227***	1.178***
		(0.157)	(0.176)	(0.175)	(0.176)
African		-2.475*	-3.314**	-3.917***	-4.316***
		(1.455)	(1.461)	(1.460)	(1.468)
Coloured		-2.656*	-3.362**	-3.848**	-4.238***
		(1.530)	(1.602)	(1.598)	(1.599)
Wage (Logs)			0.114***	0.132***	0.153***
			(0.0256)	(0.0257)	(0.0259)
Matric (Grade 12)				-0.232	-0.405
				(0.405)	(0.402)
Tertiary				-1.095***	-1.250***
				(0.409)	(0.406)
Volunteering					1.909***
					(0.360)
Has a job					-0.226
					(0.305)
Searching for a job					0.457
					(0.353)
Full time student					0.330
					(0.321)
Observations	3,850	3,580	2,900	2,900	2,900

Notes: This table presents the coefficients for the estimation equation 3.3 with Standard errors in parentheses and *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$. The variable of interest is **Mood Inducement** which is an indicator variable taking on 1 for whether the subject was treated for positive affect and 0 if the treatment was for neutral affect. The outcome variable is net affect scores which captures the difference between positive affect and negative affect scores obtained from the PANAS-SF. Model 1 is a simple fit of the impact of mood inducement on net affect While model 2, 3, 4 and five control for race, gender, wages, education and labour market characteristics.

3.5.5 Positive affect increases altruism.

Equation 3.4 is particularly noteworthy as it provides a direct test of the impact of affect on altruism. Similar to the findings of the behavior modification programme, results presented under Table 3.6 showed that exogenous positive affect increases altruism. Subjects in positive affect treatment passed at least one token higher than those in the neutral affect group. In all specification, the magnitude and significance of the positive affect coefficient remained stable.

3.6 Discussion

In view of these results, we interpret that subjects in positive affect elicit higher pro-sociality by giving more relative to those in neutral affect. Thus affect is seen to significantly impact pro-social preferences in a positive way. Based on the results obtained from our randomized experiments, it is plausible to infer that affect has a causal relationship on altruism. In addition, the cross-randomization of two experiments reaffirms the robustness of these results. In both the laboratory experiment and the behavior modification experiments result, we found consistency in significance and direction. Moreover, our findings also closely estimated the results in Andreoni and Miller (2002) on the average tokens passed especially on the standard dictator game budgets. In congruence with studies such as Ifcher and Zarghamee (2011), Isen (2007), Ariely and Loewenstein (2006) and Bregu et al. (2017), our study supports the evidence that affect influences people's decision making.

Our study also demonstrates possible ways in which positive affect impacts altruism. From the psychological literature, and indeed in support of this study,

Table 3.6: The impact of positive affect on altruism.

Variables	(1)	(2)	(3)	(4)
Positive Affect	1.282***	1.244***	1.194**	1.132**
	(0.450)	(0.462)	(0.464)	(0.463)
Gender		-0.517	-0.532	-0.635
		(0.470)	(0.471)	(0.475)
African		-0.792	-0.425	0.375
		(4.337)	(4.346)	(4.391)
Coloured		0.433	0.770	1.933
		(4.565)	(4.572)	(4.612)
Matric (Grade 12)			0.294	0.482
			(1.098)	(1.097)
Tertiary			0.898	0.693
			(1.118)	(1.117)
Volunteering				-1.223
				(0.991)
Has a job				-0.312
				(0.836)
Looking for a job				0.507
				(0.967)
Full time student				-2.822***
				(0.864)
Observations	3,820	3,562	3,562	3,562

Notes: This table presents results from estimation equation 3.4. Robust standard errors clustered at individual level are in parentheses and *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$. Equation 3.4 is a direct test of the impact of positive affect on altruism. The outcome variable is the Rand value of tokens sent to player B by player A. The coefficient of interest is against the **Positive Affect** variable within respective models. **Positive Affect** is an indicator variable taking on 1 for subjects who watched stand-up comedy clips and 0 for those who watched calm ocean tides. **Gender** takes 1 for males and 0 otherwise. The rest of the controls are exactly as defined before.

there are at least two channels through which affect can influence decision making. First, Schwarz (2000) emphasize that peoples' everyday decisions are nuanced by emotions. These emotions could be related or unrelated with the decisions to be made. Our study focuses on emotions that are unrelated with the outcomes of the decisions to be made. Since individuals are more likely to evaluate a decision relative to their apparent affective states, Schwarz (2000) concludes that happier people will more often evaluate such decisions positively than those in sad states.

Secondly, and probably more related to our current findings, Isen (2008) finds that positive affect considerably raises peoples' cognitive flexibility through empowering attention, facilitating openness to information synthesis and integration. Thus, the observed likelihood for people to be kinder while happy could be as a result of higher cognitive flexibility that empowers peoples' attention to reward others. Neural-scientists place dopamine[4] in the centre of peoples' desire to give more particularly when they are happy. People in affective states are therefore more prone to high levels of dopamine. The act of giving leaves a pleasant emotional feeling on people and can thus be more exaggerated in the presence of dopamine laded neural environs.

One practical implication of our study is that behavior modification programmes may result in increasing pro-social outcomes. This has the advantage of complementing public policy efforts that are geared towards paternalism. In most instances, government policy efforts that are intended to reduce crime rates, improve school attendance and enrollment, increase youth employability as well as improve civic apathy among the youths, lack the contextual framework of social-emotions and their influence on pro-social preferences. For example, Edmans et al. (2007) finds a significant link between crime and suicide rates, political views, self-confidence, stock returns and affective changes due to sports outcomes. Thus, elections that may follow major sporting events may not reflect the true preferences of the voter. Therefore, designing policy interventions around the right social-emotional contexts has the

[4] Dopamine is a chemical released by neurons (nerve cells) to send signals to other nerve cells and also plays a major role in the motivational component of reward-motivated behavior.

potential of enhancing policy outcomes.

We also deduce from our study that youths from marginalized communities can benefit from the awareness that positive affect promotes pro-sociality. Behavior modification and ultimate belief updating towards pro-social preferences has the potential to spark positive conscience around "doing the right thing". As Ifcher and Zarghamee (2011) argue, the awareness on how to objectively comprehend the ramifications of one's emotions can help in arriving at decisions that are beneficial to the individual. In deed, the reasons why youths from marginalized communities may be ending up with decisions that cause ferocious outcomes could be that they do not understand the underlying mechanisms that interplay to manifest such preferences. Field programmes designed to provide such awareness present ways through which youths embrace preferences that promote pro-sociality.

In a theoretical perspective, our study re-emphasizes the mounting evidence that affect significantly influences various aspects of decision making and that researchers as well as academics in behavioral economics ought to find ways of including affect in their theoretical modeling. In doing so however, it is probably important to note that our findings do not imply a linear or non-linear increase in altruism with the intensity of affect. We cannot not conclude that with intense positive affect, subjects will behave increasingly altruistic. Neither does it follow that intense negative affect substantially lowers preferences for altruism. In fact, as Ifcher and Zarghamee (2011) note, there can never be a reason to have a "continuum" of effects from negative affect to positive affect. The two are vastly unrelated as each is associated with distinct neural-transmitters. Thus, our findings assume a general implication comparing distinct affective states as opposed to a continuum within the states.

CHAPTER 4

EMOTIONS AND REVEALED PREFERENCES FOR RATIONAL ALTRUISM.

4.1 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 understanding the pure theory of consumer behavior cannot therefore be overemphasized. Since its introduction 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). Some of its refinements have been applied widely in many spheres in economics owing to their versatile and dynamic non-parametric nature.

In this chapter, 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, in the initial arguments of Jeremy Bentham found in 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* had 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 consuming commodities. 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' utility was homogeneous.

Despite numerous refinements on the cardinal approach to utility, the controversy around the measurement of utility remained in contention until the 1930s (Hicks & 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 for one commodity over another. 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 4.1.1 *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 4.1.2 *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. We revisit this development more succinctly in the review of literature section.

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 4.1.3 *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 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 was deemed to always maximize utility regardless of any 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 chapter, 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. Empirically conceivable, there are inherent optimization errors in utility maximization made by consumers. This errors could lead to *Type I error* in which a true null of rational optimization is rejected. On the other hand, optimization errors can lead to the possibility that random choices are 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 an error possibility in consumer optimization.

Following Varian (1990)'s GARP with errors (e-GARP), we investigate the implication of emotions on consistency. Particularly, we employ a rich experimental modified dictator game dataset to test whether emotions can introduce errors in preferences for altruism. Psychological literature on the effects of emotions in decision making still remains inconclusive largely (Isen, 1987, 2007, 2008; Jung, Wranke, Hamburger, & Knauff, 2014). While visceral feelings may increase workers productivity and efficiency as well as reduce peoples' time preference, they also influence a subject's logical reasoning that leads to less optimal outcomes Ariely and Loewenstein (2006); Ifcher and Zarghamee (2011); Isen (2007). That notwithstanding, there is a dearth of evidence on whether emotions mediate a violation of economic rationality. We test our data for the effects of emotions against the axioms of revealed preferences while allowing for endogenous errors in optimization.

4.2 Motivation.

Over the years, economic literature has continued to narrowly define the behavior of the human agent. 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 not only are preferences heterogenous across individuals, available economic tools can be used to analyze these preferences in addition to introducing other determinants of behavior (Afriat, 1967; Houthakker, 1950; Samuelson, 1938, 1948; Varian, 1982). In the same vein, it is probably so, that a more psychological approach to consumer behavior was abandoned for a less realistic classical approach that paid little attention to the influences of decision making (Bentham, 1996; Isen, 2008; Loewenstein, 2000; Quandt, 1956; Varian, 2006). Recent literature however has assumed a more psychological approach (behavioral economics) in redefining the homo economicus (Becker, 2013; Camerer et al., 2011; Gintis, 2000). Visceral feelings have been found to influence decision patterns away from the classical belief as well as firming up existing assumptions. For instance, the long standing classical notion that individuals are selfish and seek to maximize own utility has been experimentally challenged (Andreoni & Miller, 2002; Bester & Güth, 1998; Brosig-Koch et al., 2007). Happiness has also been documented to influence risk preferences, time preference, efficiency and productivity (Ariely & Loewenstein, 2006; Bowles & Gintis, 2005; Ifcher & Zarghamee, 2011; Isen, 1987).

In our study, 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 whether positive affect exacerbates violations of the axioms of revealed preference using data from a modified dictator game.

The rest of the chapter will focus 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 then follow a non-parametric empirical approach to identify the optimization behavior of our subjects. The chapter will then conclude and with a relevant discussion of our results. Since each of the chapters in this dissertation stand independent of the other, we shall make several repetitions of the empirical narrative, experimental procedures and may as well toggle between different notations of the same concepts. We however make the exposition as simplified as possible to read.

4.3 Literature review.

The revealed preference theory provided a new paradigm to understanding the consumer theory. Its development since Samuelson (1938)'s note has seen hundreds of empirical papers published. Many of these scholarly articles improved the original revealed preference idea through diverse schools of thought while others criticized the very foundations that the theory was built on.

One of the major criticism of the revealed preference theory is that it did not have the necessary power to discriminate (Cosaert, 2015). Where observations related to price and incomes data return budget lines that fully dominate one another, the revealed preference theory is unable to reliably report any preference ordering. This weakness followed the critic of Varian (1982)'s work that sort to apply post world war data to analyze demand behavior using GARP. Varian (1982) had found no violation of the GARP for the period 1947-1978. His argument was that there was a disproportionate change in both prices and incomes after the world war with incomes growing much faster than prices had changed over the period. That meant that each year's observations were revealed preferred to the previous year's observations.

Whereas his results would hold in the literal definition of GARP, Bronars (1987) argued that this was not sufficient criticism of the post world war data. It indirectly implied that the revealed preference theory had little power to discriminate where levels of data fully dominated each other. Bronars (1987) further argued that, considering relative prices, the budget sets of the representative agent showed the tendency to intersect in the positive orthant (Bronars, 1987).

These studies barely focused on the objectives of our current study. However, the arguments provided emphasize the need to ensure that the revealed preference theory remains relevant as a tool to analyze consumer behavior. To avert the loss of power of the test, Sippel (1997) and Harbaugh, Krause, and Berry (2001) suggest the use of experimental data. Applying revealed preference test in experimental data is advantageous since one is able to maximize the power of the test a priori. The experimenter sets prices and incomes such that the budget sets do not fully dominate one another. 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. The study argues that;

> Over the years, some prominent researchers in both economics and psychology have criticized some of the tenets of mainstream economics as psychologically unrealistic and proposed alternative assumptions that they believed would improve economic analysis. This agitation for greater psychological realism is now yielding results. Commonly labeled "behavioral economics", these efforts to incorporate more realistic notions of human nature into economics have expanded enormously in the last decade.

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 (Rabin, 2002; Tversky & Kahneman, 1975; von Neumann, 1944).

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. However, Andreoni and Miller (2002) uses the axioms of revealed preference to show that people care about others. 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. It is therefore straight forward to think that psychological issues do enter into peoples maximization behavior. In our case, we seek to examine how rationality responds to subjects' perturbed emotions.

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. We are able to retrieve back the utility function that is consistent with the maximization behavior we observe in the data (Andreoni & Miller, 2002). Chapter five of this dissertation will focus on firstly identifying the possible forms of utility functions we observe in the data. 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 chapter, we hope to contribute to the ongoing literature on the axioms of revealed preferences by introducing emotions as one of the most important artefacts of decision making. The inclusion of psychological aspects into mainstream economic measures has gained tract lately. Behavioral economists are using psychological literature to either firm up previous assumptions in modelling economic agents or provide more realistic approaches to economic theory. The nature of our data mitigates the problems of the power of the test as well as stationarity since each of our subjects had ten distinct budgets and prices.

Stationarity of preferences is primarily a fundamental requirement for consistency to hold and thus, it is important to observe the subject making several choices.

4.4 Methodology.

It would be really difficult to use observational data to study rationality especially under emotions. People are emotional beings, positive or negative, at any given point in time. These emotions influence patterns of subjects' decision making. While extensive literature covers voluminous aspects of consumer theory, psychological features and especially peoples' emotions and their influence in decision making, have not had the necessary attention. As explained in chapter two of this dissertation, we make use the subjects who participated in the *Activate!* programme for the analysis in this chapter. We follow the experimental designs in both Andreoni and Miller (2002) and Ifcher and Zarghamee (2011). However, it is important to emphasize the key departure of our study from the two. First, we follow Andreoni and Miller (2002)'s suggestion that future research should focus on more general utility functions that apply further assumptions on other game attributes that are known to affect outcomes. Thus, in our case, we advance this research by including emotions in the vector of attributes that compound an individual's decision making process. As noted in chapter 2, we assume an individual whose utility function is characterized by;

$$U_s = u_s(\pi_s, \pi_o; \theta) \tag{4.1}$$

Where θ is the vector of emotional attributes for which each choice is subject to. Secondly, we follow Ifcher and Zarghamee (2011)'s procedure in implementing affect treatment. Broadly, whereas we add onto these two studies independently, our experiment combines the techniques employed in the two studies primarily to test the hypothesis of our study.

This chapter moves towards using the tools of revealed preference to evaluate the salient effects of emotions on economic rationality. It additionally presents an unusually large experimental sample of subjects thus ameliorates the possibility of homogeneous preferences, a phenomenon that is inherent in small experimental samples. We also use the non-parametric revealed preference approach which is particularly advantageous as it lays no assumptions on the data a priori. There is also no functional specifications on the data. Clearly, this amplifies the power of our test because there are no rejections of otherwise rational choices on the account of functional form mis-specification.

4.4.1 Using a revealed preferences test of rationality.

Varian (1982) points out that the economic theory of consumer demand typically revolves around three issues. First, it involves demonstrating when observed demand behaviour is consistent with utility maximization while secondly it also endeavours in trying to recover individual preferences given a set of observations on consumer behaviour. Thirdly, it tries to extrapolate the behavior of consumers facing different price regimes. In this chapter, we focus on the first attribute by using the revealed preference tests to find out whether consumers are malleable to emotions in their preference maximization. A *Nonparametric* approach to consumer demand do not impose assumptions on the data, neither do they place *ad hoc* functional form specification for demand equations. Instead, it employs data in its raw form in addition to using finite mathematical techniques to deal with each of the three issues of focus in consumer demand (Varian, 1982).

To test for consistency with the maximization hypothesis of preferences for altruism in the presence of emotions, we follow Afriat (1967), Samuelson (1948), Houthakker (1950) and further Varian (1982) postulation of the axioms of revealed preferences. 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 the definition below Varian (1982).

Definition 4.4.1 *A strictly continuous and strongly monotone utility function $u(q)$ rationalizes a set of observations $S = \{(p^i, q^i);\ i = 1, ..., 10\}$ if and only if $u(q^i) \geq u(q)\ \forall\ q \,\epsilon\, \boldsymbol{q}$ such that $p^i q^i \geq p^i q$.*

Where observed data is potentially nontrivial[1] the following specific definitions become crucial.

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

Definition 4.4.2 *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 4.4.3 *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.*

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 4.1 is consistent with GARP but violates SARP. This generalization 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 4.4.4 *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.*

4.5 Data issues and Summary Statistics.

In chapter two, we extensively discussed the nature of our field experiment and the nested laboratory experiment on affect. In this chapter, we will use data from both experiments to present the results of the revealed preference tests of rationality. Our experiments involve continuous budget choices and thus the data fits a straight forward application of the revealed preference tests. We then discuss our subjects' test violations and the associated power of our GARP test. Our aim here is to find out whether affect potentially impacts an individuals decision making process. In other words, do we find substantial differences in the behavior of our subjects as far as conformity to the axioms of revealed preference is concerned?

The advantage in our experiments is that our results can evidently speak to social policy particularly on mindsets and how they transcend to influencing decision making. This dissertation motivated the hypothesis that social-economic deprivation of pockets of population has significant effects on long-borne emotions. This emotions shape peoples' day to day decision making processes and particularly those that are related to labour market participation, beliefs about future health outcomes and the benefits of pro-sociality. Thus, to some extent, the experiment based on the *Activate* programme helps us to mildly infer causality of emotions on pro-sociality. However, since emotions in the *activate* programme were not a direct outcome of interest, we needed to test this hypothesis in a laboratory setting. The nested experiment provided the introduction of an exogenous perturbation of emotion on our subjects which then allowed us to determine the differences in decision making on a dictator game environment.

The analysis in this chapter requires balanced price and related quantity data points. That is, the test of rationality considers both quantities demanded and the associated prices for each bundle. Thus, we only included subjects whose data on shared and kept tokens as well as the prices of giving and keeping was available. Table 4.1 below show the split of subjects in both the *Activate* field experiment and the nested laboratory experiment.

Table 4.1: Sample Randomization.

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

This table shows the random distribution of subjects in the two experiments. In the **Activate Programme** there were 188 subjects in the first round of the training programme (treatment group that Started in 2014) and 230 who only joined the training programme after the treatment group had completed training (Control group started their programme in 2015). The **laboratory experiment** had 221 subjects in the positive affect treatment group and 164 in the neutral affect group. Note that this chapter relied on an extra set of information on prices of giving to complete the three dimensional matrices necessary for the non-parametric optimization. As such, observations with missing data were dropped.

Each subject completed ten difference allocation decisions. Each allocation presented different initial endowments as well as different prices. We provided a more detailed procedure of the experiment in chapter three in addition to illustrating how each of the decision task was presented to subjects in figure 3.1. Table 4.2 shows allocations made by a subject 9 in the *Activate* experiment. Note that in the order in which the tasks were presented to subject 9, tasks 1 and 8 were in the typical standard dictator game setting. As noted earlier in chapter three, decision tasks were presented randomly to every subject. Even though we will embark on a full discussion of the types of decision makers we observe in chapter five, it is straight forward to classify subject nine's preference for altruism. Subject nine appears significantly selfish since irrespective of the tokens in each decision task, he keeps substantially higher amounts to himself while passing zero amounts to the anonymous other in 8 out of 10 decision tasks.

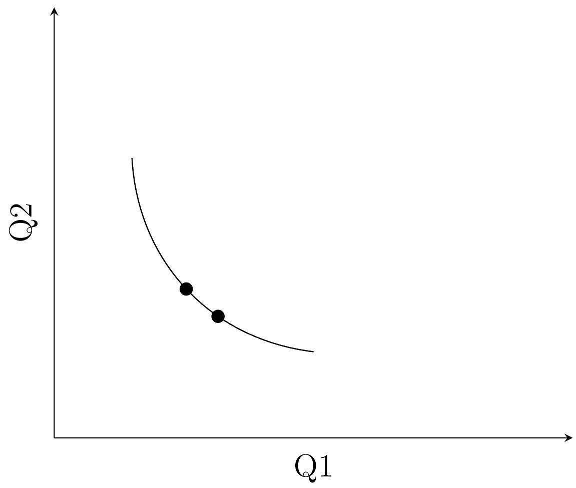

Figure 4.1: Multivalued demand functions.

Table 4.2: Typical Allocations From One Subject.

Task	Rands Kept	Rands Passed	Keep Value	Pass Value	Relative Price
1	100	0	1	1	1
2	120	0	3	1	3
3	40	0	1	3	0.33
4	140	5	2	1	2
5	160	0	4	1	4
6	120	0	2	1	2
7	36	16	1	4	0.25
8	60	0	1	1	1
9	60	0	1	2	0.5
10	75	0	1	2	0.5

This table presents the decision outcomes of subject 9 in the *Activate* programme. It is straight forward to observe the salient classification of this subject as having strongly selfish preferences. In 80% of the budgets presented to this player, there were 0 rand-valued tokens passed to player B. Where the relative price of giving is significantly low, this player seems to pass substantially more rand-valued tokens to player B as seen in budget **Task 7**.

4.6 Checking Rationality.

This section presents the test results for our experiment. We first present the results focusing on individual agent conformity to the three axioms of revealed preferences. That is, we show whether subjects passed the test of rationality or violated the axioms altogether. We shall then see what differences exist in these pass rates conditional on the affect treatment. For each of the experiments, we shall draw statistical differences in these scores between the treatment groups. We will also present the statistics on the preference violations. This way, we will try and demonstrate any violations that could best explain the visceral effects of affect on peoples rational decision making process. 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.

4.6.1 Pass rates.

The test of rationality was conducted on every of our subjects in all the three axioms of revealed preference. The test was that, a subject's choices are rationalizable if they pass at least one of the axioms of revealed preferences. 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 4.3 therefore 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 the 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 random choice behavior. 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.

Table 4.3 presents the results of both of our experiments. 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 at 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 4.5 these differences were not significantly different from zero.

Table 4.3: 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
Laboratory 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

This table shows the average pass rates decomposed between the two experiments with Standard errors in parenthesis. Within the **Activate Programme** the raw pass rates stand at 47%, 47% and 49% for WARP, SARP and GARP respectively for the treatment group. The control group reported 49%, 49% and 53% for WARP, SARP and GARP respectively. Within the **Laboratory Experiment**, the positive affect group reported 48%, 48% and 54% pass rates for WARP, SARP and GARP respectively while the neutral affect group reported 47%, 47% and 49% for WARP, SARP and GARP respectively.

Considering the pooled sample of each of our experiments, we found out that there were still no significant differences in pass rates between the two experiments. Table 4.4 presents pass rates of the pooled experimental samples. Both WARP and SARP tests reported the same pass rates.

The main objective in this chapter was to investigate the consistency of choice in giving conditional on varied emotions. Since this chapter focuses on the non-parametric rationality tests, it seems plausible to verify whether the pass rates were statistically significantly different across the randomized experimental samples. Table 4.5 presents the differences in the pass rates.

Table 4.4: Pooled Sample Pass Rates

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

This table shows the average pass rates pooled for each experiment with Standard errors in parenthesis. Within the **Activate Programme** the raw pass rates stand at 48%, 48% and 51% for WARP, SARP and GARP respectively while in the **Laboratory Experiment**, the pass rates are 48%, 48% and 52% pass rates for WARP, SARP and GARP respectively.

We found no significant differences in behavior between the treatment and control groups' pass rates in both of our experiments. 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 lab. In general, subjects elicited rationality irrespective of the underlying treatment.

Table 4.5: Statistical Differences in Pass Rates

	Control Group	Treatment Group	Differences	pscore
Activate Programme				
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	P-Value
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		

The values presented in this table are average pass rates reported within each axiom of revealed preference and the corresponding standard errors are in parenthesis. We report the statistical differences in the averages under the column labelled **"Differences"** The associated P-values are presented under the column labelled **"P-Value"**

4.6.2 The severity of violations of revealed preferences.

To contextualize the choice 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 the figures 4.2. 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 4.2 shows a 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 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 (1991) suggests that the value be fixed at 0.95. Notably, 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 rationality test pass rate stood at approximately 95 percent closely approximating 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.

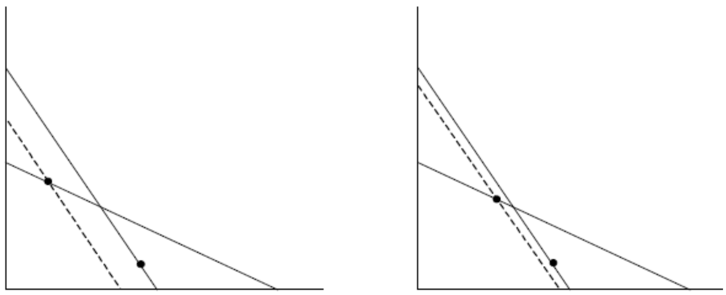

Figure 4.2: Adopted from Andreoni et al. (2013).

4.6.3 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. Experimental power calculations have been at centre stage of the debate around internal and external validity of experimental results. In our case, power of the test reports the probability of our design to discriminate against *irrational* behavior. There are a number of these tests in literature developed for specific test environments (Andreoni et al., 2013). In this study, 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 hyperplane.

Becker (1962) postulates 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).

We consider the generic version of the Bronars test since it provides the least structured behavioral model. In addition, it is natural and simple to apply and hinges on the definition of the alternative hypothesis as a minimally informative prior in the Bayesian sense (Andreoni et al., 2013; Cosaert, 2015). Since the test is based on each participating subject, power is calculated at an individual level. We therefore report sample averages from both of our experiments.

As mentioned earlier, both of our experiments reported high test power. 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.

According to the Bornars criterion, our result implies that the null finding of no statistically significant difference in rationality between the positive mood inducement group and the neutral mood inducement group cannot be due to an underpowered experimental set-up. Both experiments are appear to have sufficient power to reject the null hypothesis. This also offers support to our utility maximization hypothesis.

4.7 Characterising preferences for altruism.

We characterise our subject's preferences for altruism and fit the observed behavior within typical microeconomic theory. We start by showing the distribution of choices made to pass tokens to other subjects in the dictator games. Additionally, we provide evidence for across-treatment distribution of choices with an aim of unravelling any differences. Figure 4.3 shows a scatter plot (jittered) of amount passed to "other" against amount kept to self. There is a visible concentration of income towards the lower right of the scatter plot indicating that the pooled sample was relatively biased towards giving to self (mild selfishness). Even more, there are substantial points concentrated towards the far right relative to the top left of the scatter indicating that there were more "selfish" players than there were purely altruistic ones.

Since our data was randomised across affect treatment, Figure 4.4 shows a scatter plot of decision allocations within treatment. We observe approximately a similar decision behavior across treatment.

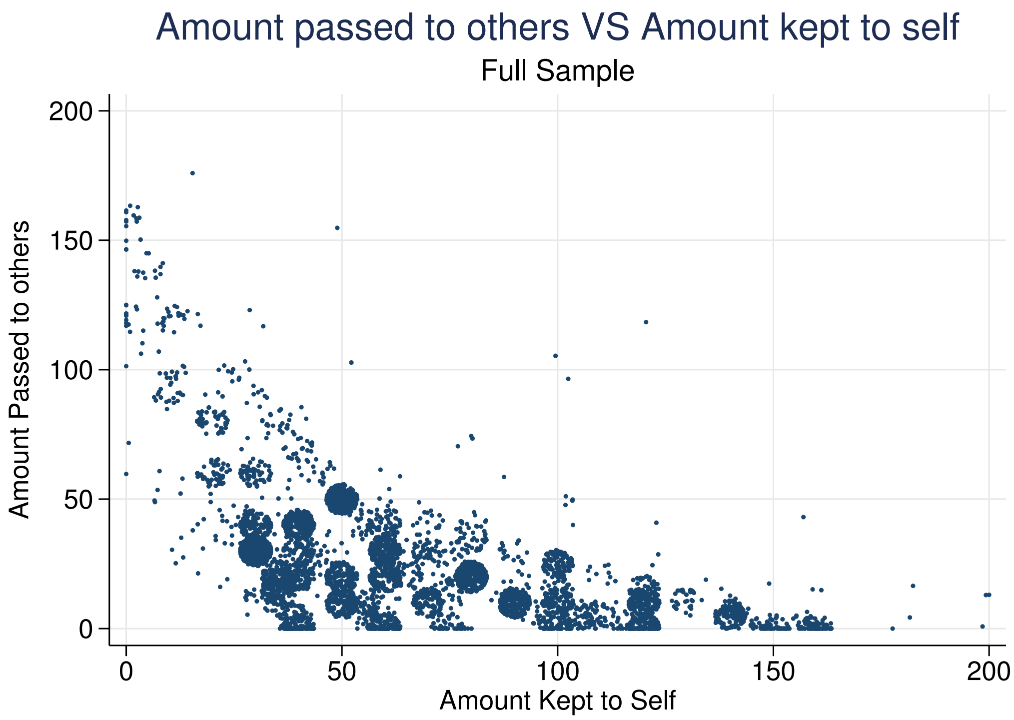

Figure 4.3: The figure shows the allocation behavior of our subjects pooled across the affect treatment. The scatter plot shows the resulting budget hyperplanes observed from data. A jitter option is used so that the cluster of observations in a particular point are easily discernible. We see a visible clutter of points towards the lower right of the scatter plot. This implies that our subjects preferred to keep proportionately more to themselves. Generally, our subjects elicited selfishness across the dictator game choices.

4.7.1 Fitting the price theory.

Since our data indicates a positive relationship between income and amounts passed to "other", we can contextualize the giving behavior by our subjects in a price theory. Subjects elicit considerations that depict giving as a normal good and thus conform to the price mechanisms.

Figure 4.5 displays graphical results of both *"Price of giving"* and *"price of keeping to self"* against the income received by *"other"*. Surprisingly, and closely

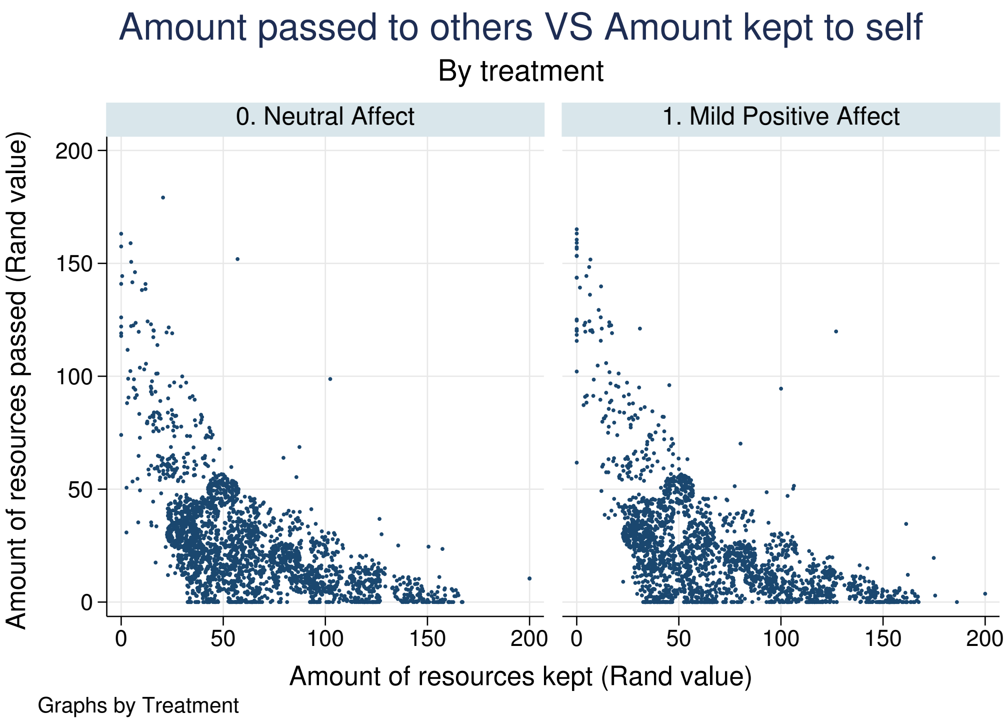

Figure 4.4: The scatter plot overlays subjects in both treatment streams. Similar to the pooled sample, there are no discernible differences in giving behavior between subjects in the neutral affect and mild positive affect treatments.

approximating Andreoni and Miller (2002) data, the price of giving to other is negatively related to the income received by other. That is, as the price of giving to other increases, the amount of income passed to other reduces. This is consistent with the law of demand that the price of a substitute good negatively relates to its consumption. The left pane in Figure 4.5 elaborates this relationship. The right pane of Figure 4.5 shows a strong relationship of the price of giving to *"self"* against the amount received by *"other"*. As the price of giving to self increases, the amount of income received by other increases further indicating that the two *"goods"* i.e. π_s and π_o are substitutes.

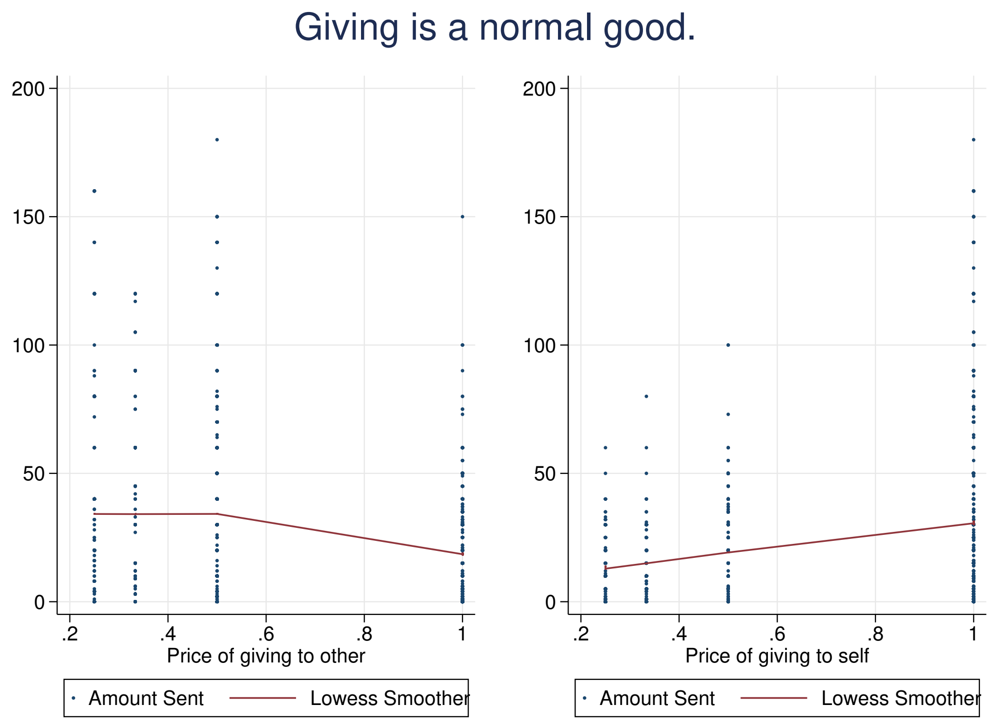

Figure 4.5: The left pane shows the relationship between the price of giving and the amount passed to *"other"*. As the price of giving increases, subjects substitute their choices from the π_o good to the π_s good such that less is passed on to *"other"*. The right pane describes the opposite price mechanism where an increase in price of payment to self results in an increase in the allocation spent on *"other"*

.

We corroborate this evidence using regression techniques. Table 4.6 provides results from various regressions considered. First, we estimate a basic OLS regression of amount of income received by *other* on price of giving and price of keeping. The effect of the prices on income received by *other* is substantial and highly significant. In addition, the sign of the price coefficients is as expected and supports the law of demand. However, adding income as a control, the price effects are even much substantial. Income is a strong positive predictor of amount of endowment passed to *other*.

However, the two regressions are biased in that a substantial number of our subjects were comparatively selfish. That is, from Figure 4.3, we find that there was a substantial clutter around 0 amounts sent to other. For this reason, our data does not conform to normality conditions. We thus fit a left censored tobit estimation with cluster-robust standard errors. We also fit a random effects tobit estimation since each subject answered to a set of decisions. A random effects tobit estimation emphatically depicts the between subject heterogeneity as seen from the significant estimate of σ_u , of 15.06.

Table 4.6: Giving is a Normal Good

VARIABLES	OLS	OLS with Income	Tobit	Panel Tobit
Price of Giving	-17.29***	-23.38***	-23.60***	-22.43***
	(1.596)	(1.661)	(1.774)	(1.181)
Price of Keeping	11.82***	24.48***	24.55***	22.69***
	(0.795)	(1.583)	(1.658)	(1.234)
Income		0.320***	0.317***	0.301***
		(0.0257)	(0.0267)	(0.0121)
Constant	28.82***	-5.006**	-5.993**	-3.856*
	(1.662)	(2.475)	(2.656)	(2.172)
Sigma			22.42***	
			(0.644)	
Sigma (*mu*)				15.06***
				(0.642)
Sigma (*epsilon*)				16.20***
				(0.210)
Observations	4,904	4,904	4,904	3,749

Robust standard errors in parentheses *** p <0.01, ** p <0.05, * p <0.1

The table presents different estimation strategies. The column labelled "OLS" presents the results of a fitted OLS estimation. The estimated coefficients are consistent with the theory of demand. Since the dependent variable is the amount of tokens (rand value) passed on to *other*, this means that as the price of giving increases subjects give less. A reverse of the effect is captured but the price of keeping. In other words, subjects keep more when it favors them the most. In the second column, we added the income control. Consistent with theory, as initial endowments increased subjects were willing to give more. The data provided in 4.3 shows that a number of subjects gave nothing on average. OLS may therefore be inefficient. For this, we fitted a tobit model presented in column labelled "Tobit". Surprisingly, the results were not different from the OLS. We also fitted a panel tobit noting that subjects answered to a panel of decision task. The last column presents no different estimates.

4.7.2 Estimating the parameters of a CES utility function.

The CES utility function is widely used in economic literature due to its flexibility to data. A simple CES utility function takes the form[2];

$$U(\pi_o, \pi_s) = [\alpha \Pi_s^{\rho} + (1-\alpha)\Pi_o^{\rho}]^{\frac{1}{\rho}} \tag{4.2}$$

where $0 \leq \alpha \leq 1$ and $-\infty \leq \rho \leq 1$

In this setting, the parameter α is our measure of selfishness while ρ represents the degree of substitutability (willingness to trade off equity and efficiency in response to price variations). When $0 \leq \rho \leq 1$, that implies the choices reflect a focus on efficiency while values of ρ less than zero indicate a concern for equality in payoffs. From this setting, we can define the elasticity of substitution using;

$$\sigma = \frac{1}{1-\rho} \tag{4.3}$$

A large elasticity of substitution implies that the indifference curve is less curved such that as it approaches positive infinity, the indifference curves are those of perfect substitutes. When σ approaches zero, the indifference curves are those of the Leontieff form. This implies that decision makers care about equality of payoffs. The CES however collapses to the standard Cobb-Douglas preferences if $\sigma = 1$.

The maximization of the CES function with respect to the budget constraint yields;

[2]See a step by step mathematical derivation in appendix A.1.

$$\Pi_s = \frac{P_1^{\frac{\rho}{\rho-1}}}{P_1^{\frac{\rho}{\rho-1}} + (\frac{\alpha}{1-\alpha})^{\frac{1}{\rho-1}} P_2^{\frac{\rho}{\rho-1}}} + \epsilon \tag{4.4}$$

Where Π_s is total allocation to self i.e. $\Pi_s = \frac{p_1 \pi_1}{m}$. We turn the deterministic demand function into an estimable model by appending the error term. Since the demand function is non-linear in the parameters of interest, we then use the non-linear least squares to estimate the parameters of the demand function. Non-linear estimations are not different from the OLS since the aim is to minimize the sum of squares with respect to the estimable parameters α and ρ. That is:

$$\sum_{i=1}^{n} = \left[\Pi_{si} - \frac{P_1^{\frac{\rho}{\rho-1}}}{P_1^{\frac{\rho}{\rho-1}} + (\frac{\alpha}{1-\alpha})^{\frac{1}{\rho-1}} P_2^{\frac{\rho}{\rho-1}}} \right]^2 \tag{4.5}$$

Instrumenting this estimation in Stata and consequently computing the value of the elasticity of substitution, the results indicate that the estimate of the elasticity of substitution for our pooled sample is approximately 1.58. Disaggregating the estimation across our randomization returns an elasticity of substitution of approximately 1.59 for subjects treated to mild positive affect while those within the neutral affect treatment are at 1.58. We thus deduce two critical findings with reference to our data. First, subjects elicit similar preferences across treatment. There is no significant difference in the elasticity of substitution for subjects within the positive affect treatment and those in the neutral affect treatment. Secondly, and perhaps most importantly, the elasticity of substitution is larger than 1 thus implying that our subjects are inclined to efficiency of payoffs as opposed to equality. That is, all that matters is the total payoff as the indifference curves are less curved.

In addition, the coefficient of parameter α is approximately 0.65 in the pooled sample and does not substantially change across the treatment samples (0.65 for the positive affect treatment group and 0.64 for the mild neutral affect group). This coefficient implies the proportion of income that our subjects would prefer to keep to *self* if prices were unitary. The coefficients are significant and the confidence intervals is in support of relatively selfish subjects.

4.8 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.

CHAPTER 5

CONCLUSIONS

5.1 General Conclusions.

This dissertation adds to a growing literature on the role of emotions in decision making. Emotions largely define how one forms a view of the world and thus could be instrumental in shaping one's view of the world. Behavioural economists has in the recent past began focusing on how emotions impact various aspects of decision making and social responses to policy. As cited earlier, this dissertation focuses on demonstrating that psycho-social emotions developed as a result of low inter-generational mobility could be perturbed through behavior modification programmes. While behaviour modification may not work in isolation, it has the potential to break the poverty cycle particularly within distressed communities.

This dissertation makes use of a novel behavior modification programme dubbed The *Activate!* Change Drivers programme. The behavior modification programme was conducted over a period of two years. It followed a pipeline randomization in that by the end of the programme, both the experimental treatment and control groups had undertaken all training modules. The central premise of the programme was that in order to reduce the high levels of crime, violence, risky sexual behaviour and fatalism that characterizes marginalized communities, there is need to change the underlying social norms that allow corruption and destructive risk to persist in these communities.The training modules were designed with the aim of disrupting the social and economic aspects that underlie fatalism among the young people living in distressed communities. Some of the social and economic aspects that affect most youths in marginalized communities of South Africa include self-belief, goal-orientation, creative thinking, problem solving, resilience, communications kills, trust building, project management, and political engagement. The hypothesis was that the programme would result in the development of pro-social preferences such as altruism, trust and commitment to the public good as well as a mindset change from fatalistic preferences, lack of entrepreneurial innovation, impatience and civic apathy.

Chapter three uses two experiments to leverage on exogenous emotions and its impact on altruism. In the behavior modification experiment, we use an IV approach to demonstrate that positive affect mediates pro-sociality in social programmes that are aimed at altering perverse outcomes among youths. We find that positive affect is a significant and positive predictor of altruism. Subjects who had completed their behavior modification programme demonstrated higher preferences for altruism. We corroborate this evidence in a controlled laboratory experiment ensuring that we relax the assumption that positive affect is endogenous within a behavior modification programme. We experimentally induce exogenous affect using video clips. Subjects then participate in a dictator game experiment. We find a close approximation of our estimates within the behavior modification programme and with all robustness checks.

Since emotions are largely claimed to be disruptive within choice behavior, a critical question hence arises. Could it be the case that the observed higher altruism in our results is driven by irrationality? Can this altruistic behavior be sustained outside and after the behavior modification programme? These questions can best be answered by the use of the available tools within the choice theory. Hence in chapter four we focused on testing the conformity of choices made under emotions to general axioms of revealed preferences. We tested rationality of preference for altruism based on the three commonly used axioms; the WARP, SARP and GARP. The aim was to compare the choice behavior of subjects under different treatments. From the results we found that there was no statistical differences in either violations or conformity to the axioms of revealed preferences between the treatment and control groups. This is to imply that devoid of emotion treatment, subjects elicited preferences that largely conformed to an economist's definition of rationality.

As a way of direct contribution to literature, this dissertation demonstrates that social programmes can be designed to change mindsets and ultimately behavior that is fatalistic. Emotions are central to the behavior change process as individuals are seen to consult what they feel emotionally while making a decision. Unlike in past literature where emotions have been termed as disruptive in decision making processes, this dissertation demonstrates that positive affect significantly impacts altruistic behavior. This behavior is also consistent with rationality as defined in economics.

Finally, this dissertation has demonstrated that the revealed preference theory is versatile in application and can be used to determine rationality of behavior of single economic entities. Further, it shows that there is a potential viability of including individual emotions in preference theory. Our findings also support Rabin (2013)'s research program on portable extensions of existing economic models particularly on the inclusion of psychology into economics. Summarily, we disapprove the notion that emotions disrupt the decision making process. We emphasize that behavior modification programmes are effective in changing mindsets particularly among people living distressed communities. However, since the impetus for fatalism can also be structural, behavior modification programmes cannot work in isolation. Hence public action on improving the conditions within the marginalized communities is complementary.

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APPENDIX

A

A.1 Derivation of the demand function for the CES utility function.

The problem of Agent S can be presented as

$$Max\,(\beta\pi_s^{\rho}\,+\,(1-\beta)\pi_0^{\rho})^{1/\rho}$$

Subject to

$$\pi_s + P\pi_o = m^{'}$$

The first order conditions yield;

$$\rho\beta\pi_s^{\rho-1} * \frac{1}{\rho}\,(\beta\pi_s^{\rho}\,+\,(1-\beta)\pi_0^{\rho})^{\frac{1}{\rho}-1} = \lambda$$

$$\rho(1-\beta)\pi_0^{\rho-1} * \frac{1}{\rho}\,(\beta\pi_s^{\rho}\,+\,(1-\beta)\pi_0^{\rho})^{\frac{1}{\rho}-1} = \lambda P$$

taking the ratio of the two equations;

$$\frac{\beta\pi_s^{\rho-1}}{(1-\beta)\pi_o^{\rho-1}} = \frac{1}{P}$$

Therefore,

$$\pi_s = \left(\frac{\beta-1}{\beta} * \frac{1}{P}\right)^{\frac{1}{\rho-1}}\pi_0$$

Now let;

$$A = \left(\frac{\beta - 1}{\beta} * \frac{1}{P}\right)^{\frac{1}{\rho-1}} = \left(\frac{\beta}{1-\beta}\right)^{\frac{1}{1-\rho}} * P^{\frac{1}{1-\rho}}$$

Hence;

$$\pi_s = A\pi_o$$

From the budget constraint, we can have;

$$\pi_o = \frac{m^{'} - \pi_s}{P}$$

Therefore for π_s we will have;

$$\pi_s = A\left(\frac{m^{'} - \pi_s}{P}\right)$$

$$\left(1 + \frac{A}{P}\right)\pi_s = \frac{A}{P}m^{'}$$

$$\left(\frac{P + A}{P}\right)\pi_s = \frac{A}{P}m^{'}$$

Thus;

$$\pi_s = \frac{A}{P + A}m^{'}$$

Now we can substitute back the value of A in the equation above so that;

$$\pi_s = \frac{\left(\frac{\beta}{1-\beta}\right)^{\frac{1}{1-\rho}} * P^{\frac{1}{1-\rho}}}{P + \left(\frac{\beta}{1-\beta}\right)^{\frac{1}{1-\rho}} * P^{\frac{1}{1-\rho}}}m^{'}$$

Note that $P^{\frac{1}{1-\rho}} * P^{\frac{-p}{1-\rho}} = P$, then.

$$\pi_s = \frac{\left(\frac{\beta}{1-\beta}\right)^{\frac{1}{1-\rho}} * P^{\frac{1}{1-\rho}}}{P^{\frac{1}{1-\rho}} * P^{\frac{-p}{1-\rho}} + \left(\frac{\beta}{1-\beta}\right)^{\frac{1}{1-\rho}} * P^{\frac{1}{1-\rho}}} m^{'}$$

Thus our simplified demand function for tokens to self can be presented as;

$$\pi_s(P, m^{'}) = \frac{\left(\frac{\beta}{1-\beta}\right)^{\frac{1}{1-\rho}}}{P^{\frac{-\rho}{1-\rho}} + \left(\frac{\beta}{1-\beta}\right)^{\frac{1}{1-\rho}}} m^{'}$$

A.2 Summary tables and figures.

Table A.1: Allocation choices. (Laboratory Experiment)

Budget	Endowment	Relative Price	Treatment Group	Control Group	Average Tokens Passed
1	40	3	14.24	12.46	13.48
2	40	0.33	10.85	9.80	10.40
3	60	2	19.55	18.22	19.01
4	60	0.5	16.41	15.60	16.05
5	75	2	20.93	19.49	20.29
6	75	0.5	20.35	19.53	20.01
7	60	1	18.52	17.00	17.86
8	100	1	28.82	26.45	27.77
9	40	4	14.62	13.15	14.01
10	40	0.25	10.16	9.49	9.88

The table shows the distribution of initial endowments across the 10 budgets in the dictator game. In **Budget** (Task) 1, the player was given an endowment worth 40 tokens to share with another random player B (anonymous). Following the explanation on table 3.3, the value for holding a token to self was worth 3 Rand while each token passed to player B was worth 1 Rand. For this budget, the relative price of giving as shown in column 5 is therefore 3. To compute the relative price of giving, note that giving one token within budget 1 raises Player B's payoff by 1 rand while reducing "own" payoff by 3. Hence the price of opponent's payoff is 1 (1/1) while the price for self-payoff is 0.33 (1/3).That is, the inverse of the hold value is the price of self-payoff π_s and inverse of the pass value is the price of other-payoff π_o. Thus, for the relative price of giving, we divide the price of other-payoff with the price of self-payoff demonstrated as; $\frac{\rho_o}{\rho_s} = \frac{1/1}{1/3} = 3$. The column labelled **Treatment group** presents the average tokens passed to player B by subjects in the positive affect treatment group. The column labelled **Control Group** presents average tokens passed by subjects in the neutral affect treatment. The last column takes an average of the pooled sample. Note that that in all budgets, the treatment group significantly passed over substantially more tokens than the control group.

Table A.2: The First Stage Regression Results: Estimation equation 3.1

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	-1.175***	-0.876**	-1.028***	-0.985***	-0.972**	-0.583	-0.787**	-0.772**
	(0.402)	(0.407)	(0.283)	(0.297)	(0.451)	(0.468)	(0.322)	(0.320)
African					0.358	0.461	0.414	0.465
					(0.573)	(0.596)	(0.407)	(0.370)
Coloured					-2.263*	1.866	2.098**	2.170**
					(1.232)	(1.725)	(1.005)	(0.723)
Wages (log)					0.0712	0.0620	0.0654	0.0627*
					(0.0753)	(0.0760)	(0.0531)	(0.0320)
Hours of work (log)					0.0189	-0.201	-0.0841	-0.0451
					(0.277)	(0.281)	(0.196)	(0.183)
Matric (Grade 12)					-0.870	-1.425	-1.122	-1.097
					(1.045)	(1.074)	(0.746)	(0.892)
Tertiary					-0.809	-1.319	-1.035	-1.015
					(1.050)	(1.077)	(0.749)	(0.963)
Volunteering					0.897	1.021	0.952	0.594
					(0.975)	(1.006)	(0.694)	(0.702)
Has a job					0.315	0.745	0.524	0.363
					(0.833)	(0.866)	(0.595)	(0.871)
Searching for a job					0.182	0.229	0.207	0.0369
					(0.962)	(0.988)	(0.683)	(0.425)
Full time student					0.285	0.544	0.422	0.220
					(0.926)	(0.942)	(0.655)	(0.547)
Constant	11.10***	11.02***	11.07***	11.05***	12.91***	11.88***	11.21***	11.12***
	(0.270)	(0.285)	(0.196)	(0.200)	(2.233)	(1.949)	(1.367)	(1.648)
Observations	508	478	986	986	392	363	755	755

Notes: This table presents the fist stage regression coefficients from equation 3.1 with standard errors clustered at individual level and *** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$. The dependent variable is **Net Affect** as computed from PANAS-SF. The main interest in the first stage is to obtain the predicted values for use in the second stage. Models 1 and 5 present the regression result using budget task 7 (60 tokens with standardized prices) with model 5 including controls on race, labour market characteristics and education levels. Models 2 and 6 focus on budget task 8 (100 tokens with standardized tokens) and follows a similar presentation of controls. Models 3 and 7 pool all observations within budget task 7 and 8. Model 4 and 8 control for the fact that observing more than two rounds of decisions in a game of complete information could be confounded by individual fixed effects.The predicted values from the first stage are used in the second stage correspondingly.

Figure A.1: Center for Epidemiologic Studies Depression Scale

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

	During the Past Week			
	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me.	☐	☐	☐	☐
2. I did not feel like eating; my appetite was poor.	☐	☐	☐	☐
3. I felt that I could not shake off the blues even with help from my family or friends.	☐	☐	☐	☐
4. I felt I was just as good as other people.	☐	☐	☐	☐
5. I had trouble keeping my mind on what I was doing.	☐	☐	☐	☐
6. I felt depressed.	☐	☐	☐	☐
7. I felt that everything I did was an effort.	☐	☐	☐	☐
8. I felt hopeful about the future.	☐	☐	☐	☐
9. I thought my life had been a failure.	☐	☐	☐	☐
10. I felt fearful.	☐	☐	☐	☐
11. My sleep was restless.	☐	☐	☐	☐
12. I was happy.	☐	☐	☐	☐
13. I talked less than usual.	☐	☐	☐	☐
14. I felt lonely.	☐	☐	☐	☐
15. People were unfriendly.	☐	☐	☐	☐
16. I enjoyed life.	☐	☐	☐	☐
17. I had crying spells.	☐	☐	☐	☐
18. I felt sad.	☐	☐	☐	☐
19. I felt that people dislike me.	☐	☐	☐	☐
20. I could not get "going."	☐	☐	☐	☐

SCORING: zero for answers in the first column, 1 for answers in the second column, 2 for answers in the third column, 3 for answers in the fourth column. The scoring of positive items is reversed. Possible range of scores is zero to 60, with the higher scores indicating the presence of more symptomatology.

Figure A.2: Positive Affect Negative Affect Schedule - Full Scale

The International Positive and Negative Affect Schedule Short Form (I-PANAS-SF)
Question, Measure, and Item Order

Question: Thinking about yourself and how you normally feel, to what extent do you generally feel:

Items in order:

- Upset
- Hostile
- Alert
- Ashamed
- Inspired
- Nervous
- Determined
- Attentive
- Afraid
- Active

Interval measure: *never* 1 2 3 4 5 *always*