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Poverty and aspirations failure[*]

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Abstract

We develop a model of internal constraints to show that a greater degree of initial disadvantage results in a higher likelihood of low aspirations and low achievement. Our model and results are supported by evidence from anthropology, sociology and social psychology. Our analysis suggests that internal constraints are a key ingredient in perpetuating poverty traps. We show that a poor person will choose to restrict her cognitive window (the set of other individuals who are her role models) and study the conditions under which a role model could alter her aspirations and achievement. We show how endogenously chosen cognitive windows interact with the inital distribution of status to determine whether or not a society is connected, and hence the transmission of aspirations across individuals in that society. Our work provides a normative justification for programs that aim at empowering disadvantaged individuals by directly shocking their aspirations.

JEL Classification: O10,O15,O12, D03.

Keywords: Aspirations failure, persistent poverty, relative deprivation, self-confidence, role models, cognitive neighbourhood, interacting thresholds.

1 Introduction

More than 300 million people world-wide have lived in persistent poverty in the late 1990s[1]. According to the Chronic Poverty Report (2004-2005), 40% of the poverty in Sub-Saharan Africa and 35% of the poverty in South Asia is persistent. The probability of remaining poor over a 5-year period is about 50% in Vietnam, 40% in Ethiopia and Philippines and 35% in India and Bangladesh. Persistent poverty is a condition that requires an understanding of a multidimensional process which makes people poor and keeps them poor.

An influential literature on poverty traps argues that poverty exists and persists due to constraints that are *external* to the individual.[2] Examples of such constraints are credit or insurance market imperfections (e.g. Loury, 1981; Galor and Zeira, 1993; Banerjee and Newman, 1991, 1993; Torvik, 1993), coordination problems (e.g. Da Rin and Hellman, 2002; Kremer, 1993), institutional or governmental failures (e.g. Bardhan, 1997), malnutrition (e.g. Dasgupta and Ray, 1986), neighborhood effects (Durlauf, 2003) or fertility decisions (Nelson 1956).

An alternative view is that internal constraints (beliefs, aspirations, self-image) are more likely to bind for poorer individuals and, in turn, by affecting her decisions (eg. responding to new economic opportunities), could end up perpetuating poverty. "Long-run poverty is fundamentally self-perpetuating [and] the entrapment goes hand in hand with [...] lack of hope." (Mookherjee, 2003, p.5). Appadurai (2004, p.59)) notes that poor people may lack the capacity to aspire to "contest and alter the conditions of their own poverty."

Both approaches have distinctive policy implications. The first approach justifies policies that aim to relax external constraints. Financial aid, institutional strengthening, extension of property rights or change of neighborhoods are some examples of such interventions. The second approach justifies interventions that directly alter internal constraints either to enhance the impact of interventions that relax external constraints or more interestingly, as a means by which poor people could "contest and alter the conditions of their own poverty." Examples of such interventions include the "classical music orchestras for children from disadvantaged backgrounds" in Venezuela, "football for hope" initiative by FIFA[3] or "dream a dream" program in India[4] and are widely used by governmental and non-governmental development agencies worldwide.

In this paper we develop a theoretical framework that (a) explicitly models internal constraints;

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[1] Persistent poverty is defined by the incapability to fulfill basic needs during a period greater than 5 years. For evidence on persistent poverty see Jalan and Ravallion (1998), Fouarge and Layte (2003), Biewen (2003), Duncan et. al. (1993), among others.

[2] See for example Azaridis and Stachurski (2004) or Azaradis (2004) for a literature review on Poverty Traps

[3] http://www.fifa.com/aboutfifa/worldwideprograms/footballforhope/

[4] http://www.dreamadream.org/dreamadream/wcms/en/home/

(b) explains how internal constraints interact with external circumstances and (c) informs on interventions aimed at altering internal constraints.

Our model is based on three central premises: first, an aspiration level is a reference point; second, aspirations are influenced by people's own actions; third, individuals do not fully internalize the way aspirations are determined by actions. We argue that these premises find strong support in evidence from across the social sciences.

The intuition of our model is as follows. Think of a decision maker (DM) who, in order to undertake a new economic opportunity, has to choose a costly action (e.g. effort) with an uncertain outcome: the action impacts on the probability distribution over final social status. We define the aspiration level of the DM as the expected social status given her action and an individual's aspiration level is a reference point that affects the benefit she obtains from her final social status.

We define a *behavioral* DM as one who does not fully internalize the fact that her aspirations are influenced by her choices. Therefore, when she chooses an action, she takes her aspirations as given. We evaluate the decisions made by a behavioral DM against the normative benchmark of a *standard* DM who chooses an optimal action accounting for the fact that her aspirations will be endogenously influenced by her choice of effort. The resulting induced preferences of the standard DM is defined solely on actions. A standard DM (rational choice), by definition, will end up choosing an action and aspiring to the status that maximizes her utility: such a DM cannot be internally constrained. A *behavioral* DM (boundedly rational choice), in contrast, ends up aspiring to a status and choosing an action that may not be (and often, isn't) utility maximizing. Although aspirations adapt to actions, since a behavioral DM takes her aspirations as given, she does not realize that she is choosing a suboptimal action.

We show that a greater degree of initial disadvantage (measured in terms of lower initial status of the DM) raises the likelihood that the internal constraint binds, and hence, that an aspirations failure occurs. The underlying reason for this result is that a DM who has a low initial social status requires higher aspirations than a DM with a higher initial status to undertake a costly action that alters the status quo with positive probability.

Next, we examine the efficacy of some well-known approaches which aim to mitigate the impact of internal constraints. One specific mechanism that in practice that has worked particularly well in ensuring that poor people contest "the conditions of their own poverty" is are interventions that involve role models. One of the most remarkable examples comes from Kolkata (Calcutta), India where the incidence of condom usage was substantially increased and the incidence of HIV substantially decreased following interventions involving convincing and training a small group of sex workers who would pass the important information about the use of condoms as peers education

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to their co-workers (Rao and Walton 2004)).

We first show that a DM will restrict the set of other individuals (i.e. a "cognitive window") whose experience/outcomes alter the beliefs of the DM about the likelihood of achieving success. Ideally, what a DM wants to observe is someone who is identical (similarity one) to herself but with a higher level of aspirations and achievement. If the DM's includes only those individuals who are similar to her in her cognitive window, she is likely to observe other individuals who have similar aspirations and make similar decisions to herself. In order to increase the likelihood of observing an individual who has a higher degree of self-confidence and therefore, has higher aspirations and achievement she will need to include individuals who aren't similar (i.e. have a higher initial social status) to herself. However, we show that there is a limit on how far the individual will go so that, typically, there will be individuals, with a very different initial status, who will be excluded from her cognitive window. We show that the size of the cognitive window is larger whenever (i) the cost of effort is lower, (ii) the benefit from achieving success in altering status quo is higher, and (iii) the probability the DM attaches to achieving success is higher. Moreover, a DM with a lower initial status has a smaller cognitive window than a DM with a higher initial status.

Our model makes explicit the importance of the interaction between external (e.g. initial status and actual cost/benefit of changing) and internal factors (e.g. beliefs and aspirations) to break an aspirations trap. In contexts with extreme poverty and very fatalistic beliefs, changing only the external factors may not be enough to break a poverty trap. The presence of a role model may not be sufficient either in such extreme contexts, so public policies aiming at relaxing both external and internal constraints may be needed. In less extreme scenarios, however, the sole presence of a successful person from similar background may be enough to inspire a change of status quo, thus breaking the poverty trap.

We finish our paper by studying the link between the distribution of initial status and the transmission of aspirations. We show how endogenously chosen cognitive windows interact with the initial distribution of status to determine whether or not a society is connected, and hence the transmission of aspirations across individuals in that society. We found some subtle effects. On the one hand, when the distribution of initial social status is polarized, the society may fail to be connected and therefore, there will be failure in the transmission of aspirations across individuals. On the other hand, when there is perfect equality in the distribution of initial social status, either all individuals in a society have high aspirations and seek to change their status quo or all individuals in a society are caught in an aspirations trap. The latter is the more likely scenario if all individuals in that society are poor to begin with.

Our model can account for a number of important patterns associated with persistent poverty.

It also gives rise to a clear welfare standard and has novel implications for public policy. Through an understanding of the non-trivial interaction between external and internal constraints, we show the conditions under which the two existing approaches of poverty persistence can complement each other.

The remainder of the paper is organized as follows. Section I describes some important patterns associated with poverty persistence that require formal explanation in economics. Section II lays out and justifies, with particular reference to evidence from anthropology and social psychology, the central premises of our model. Section III presents the formal model, including how internal constraints endogenously arise. Section IV explores the model's policy implications, focusing of the impact of role models and income distribution on aspirations and choices. Section V clarifies the relationships between our model of poverty persistence and others that appear in the literature. Section VII concludes and discusses directions for future research. Proofs of all propositions are collected in the appendix.

2 Patterns of Persistent Poverty and Evidence of Aspirations failure

Persistent poverty is an issue that has been of central focus in economics for several decades. In this section, we discuss evidence that suggests, despite the plausibility of the existing explantations, there are important aspects of this phenomenon that aren't adequately accounted for. Based on a review of the existing research on poverty persistence in social psychology, anthropology, sociology and ethnography we make our case for the theory presented here.

Social psychologists have documented how beliefs are associated with poverty. The lack of hope and aspirations are a typical characteristic in the personality of the poor population. Moreira (2003), for example, studied the poor in the North-eastern Brazil and pointed out that "as the poor lose their values, they no longer believe in themselves. They go through a process of Nihilism [denial of hope]". Moreira provides evidence that the greatest part of the poor population has these nihilistic characteristics, submitting themselves to the destiny that is 'given by God'.[5] Similar patterns have been found elsewhere, for instance, in the Appalachian folk subculture (Rabow et al, 1983), in low-income urban neighborhoods in America (MacLeod, 1995), in Jamaican male youths (Walker, 1997) and in rural Ethiopian households (Frankerberger et al, 2007). In Ethiopia, for instance, a third of a sample of 144 poor households believes success or failure in life is primarily the result of destiny

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[5] Atkinson (1998) defines social exclusion as a related concept that involves agency (people may exclude themselves) and it implies future hopes and expectations. People are excluded not just because they are currently without a job or an income but because they have little prospects for the future.

and/or luck. As a consequence, these households are less likely to take out larger loans and make longer-term investments (Frankerberger et al, 2007).

The extent to which individuals believe they can control events that affect them has been widely studied in social psychology under the name of "locus of control" (Rotter, 1954). Individuals with "external" locus of control believe that powerful others, fate or chance are the most important determinants of events. Those with "internal" locus of control, however, believe that events result primarily from their own actions. A *behavioral* DM, as defined in this paper, is consistent with a person with external locus of control. Ceteris Paribus other personal characteristics such as ability and intelligence, a person with external locus of control will put less effort to change her circumstances than one with internal locus of control. This is not because she wouldn't like to change, but because she believes she has low control over the outcomes of her choices. Therefore, external locus of control suggest the presence of a binding internal constraint and support our definition of *behavioral decisions*.

Psychological studies provide evidence of an income gradient in measures of external locus of control: poor and minorities have higher external locus of control than other more advantaged sections of society (see, for example, Furnham 1986 and Poortinga et al, 2008). The two figures below reflect such differences based on data from the Longitudinal Study of Young People in England (LSYPE, 2006):
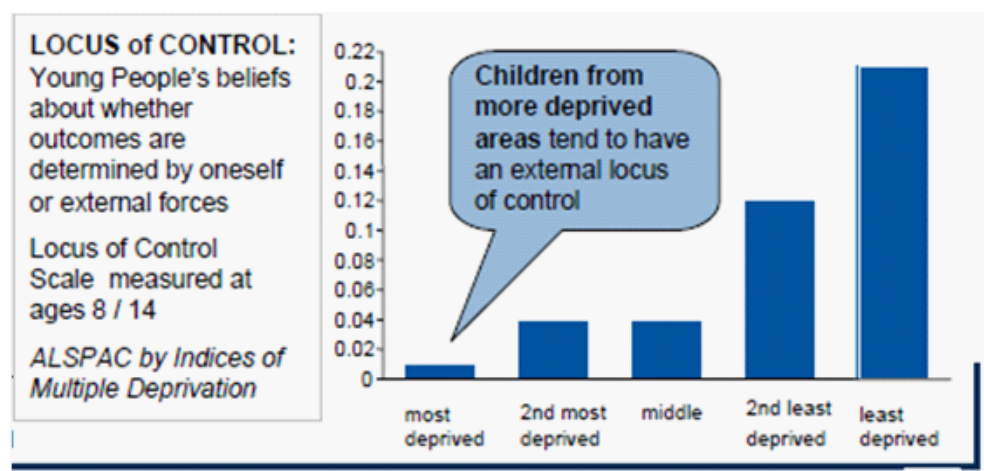

Figure 1: Locus of control and initial dissadvantage

The above figure shows that young people from deprived backgrounds believe that external factors have a bigger role to play in their life outcomes than their own efforts. Youth in the LSYPE also demonstrate less faith in their own academic abilities, or overall intelligence as depicted in the figure below.
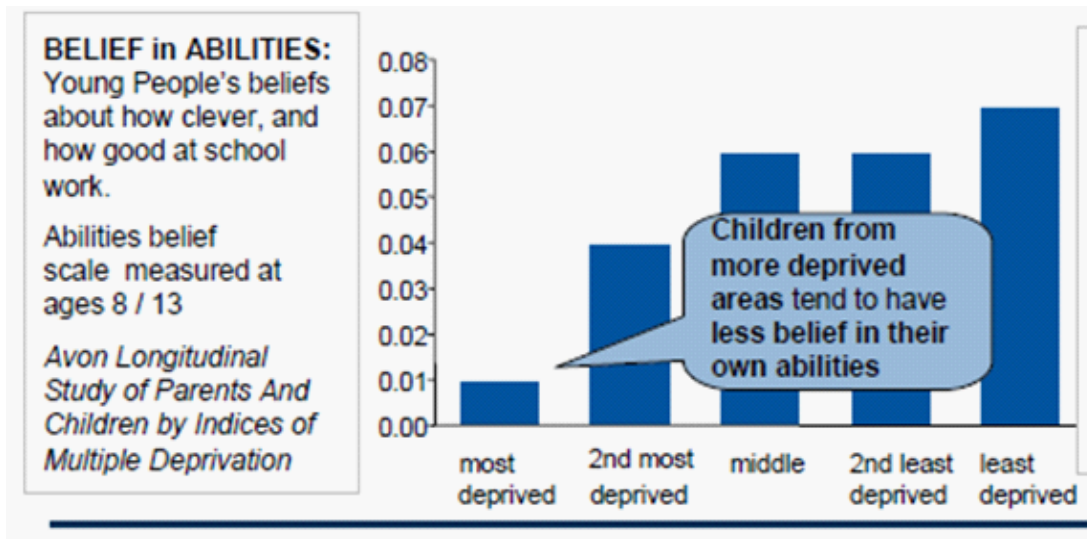
Figure 2: Belief in abilities and initial dissadvantage

Deprived youth in the LSYPE study had the lowest academic aspirations across all income quintiles.

Arguably, there are at least three distinct channels through which low aspirations can be linked to poverty: the *opportunity* channel, the *informational* channel and the *internal* channel.

The role of the first two channels in perpetruating poverty traps has been already extensively examined. Could poor people have low aspirations simply because their objective opportunity set is small (opportunity channel)? For example, a poor person may not want to aspire to be a lawyer because she wouldn't have the funds to pay her studies. Objectively, being a lawyer is not an achievable status for this person and it is entirely rational not to aspire to it. In this case enlarging the opportunity set would suffice for the person to aspire higher and eventually become a lawyer. However, this opportunity channel alone is inconsistent with very recent empirical evidence from field experiments. For example, in Kenya, Miguel and Kremer (2004) provide evidence that only 57% of the sample picked-up the free deworming pills, which was shown to greatly improve children's health and school performance. Similarly, Duflo (2003) documented that less than 15% of a sample of Maize farmers in Kenya used fertilizers despite being offered convenient opportunities to buy fertilizer at reasonable prices.

The second explanation for poverty traps has to do with the view that poverty reduces people's aspirations due to an *informational disadvantage*: poor witness too few success stories in their social milieu to learn what matters for success. This is related to the view of anthropologist Arjun Appadurai (2004), who argues that the higher the initial disadvantage, the less chances an individual has to set higher aspirations and to *see the pathways* which lead to their fulfillment. However, there

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is evidence that suggests information may not be a binding constraint. For instance, program participants in both instances cited above had ample evidence to rule out the role of the second explanation – *informational* constraints. Farmers in Busia, Kenya had ample opportunity to learn both how to use the fertilizer, and to realize that the rates of return from its use were greater than 100%! In a somewhat different context, Jensen (2010) reports the results of a field experiment in the Dominican Republic, where students were informed about the actual return differential between primary and secondary/tertiary education, which they had previously underestimated. There was a substantial increase in perceived returns to education – but almost no discernible effect on the actual rates of completion of secondary schooling. Also, Cole et al (2009) show evidence on the effects of financial literacy training (in Indonesia and India). They find that it has a negligible impact on actual likelihood to open a bank account.

These pieces of evidence suggest the possibility that a third (internal) channel may have a role to play, perhaps arising as an adaptive response to external constraints but persisting even after the latter are relaxed. The *internal* channel pins down the psychological consequences of poverty and deprivation. Poverty stifles aspirations not only due to opportunities and informational disadvantages, but also because it affects beliefs about own abilities to alter the condition of being poor and hence their motivation for the same.

There is considerable evidence that confirms the existence of this third channel. One source of evidence comes from the literature of "locus of control" which was already discussed above. Other related evidence comes from the literature of cognitive dissonance in psychology, which argues that people adapt beliefs and preferences to the external conditions in order to reduce dissonance between the status they would like to achieve and what they actually can achieve.[6] Moreover, those beliefs and preferences are persistent. For example, a poor person for whom being a lawyer is not in her possibility set, may believe that being a lawyer is something that she doesn't actually want. If the external conditions happened to be relaxed, given her adapted preferences, it is plausible that she may not aspire to be a lawyer anyway: i.e. aspiration failure. Finally, the internal channel is also related to the behavioral bias call "learned helplessness" (Abramson et al, 1978). Learned helplessness is the distortion of one's ability to change the environment after being exposed to exogenous negative shocks.

Positive evidence for the importance of such psychological effects comes from work by, for instance, Jensen and Oster (2009). They report substantial changes in beliefs and attitudes on a variety of gender-related issues as a result of exposure to Cable TV programs with inspiring female

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[6]Oxoby (2004) explores status seeking when individuals experience dissonance and act (consciously or unconsciously) to reduce it.

protagonists. For instance, women in villages with cable TV reported lower tolerance to domestic violence, weaker preference for sons as well as increases in autonomy and declines in fertility (see also La Ferrara et al (2008) on fertility effects). The authors also find an increase in school enrollment for girls, in villages where cable TV arrived earlier (and increased gender related programming).

3 A model of internal constraints

3.1 Set-up

The theory proposed in this paper is based on three key premises. These are:

(1) Aspirations are reference points which affect individual utility from given outcomes

(2) An individual's actions themselves influence his (future) aspirations, through the outcomes realized.

(3) However, individuals may not fully internalize the feedback from their (current) actions to (future) aspirations.

We now present a model based on these three key building blocks.

We consider a decision-maker (DM), characterized by a given initial endowment/social status θ_0.[7] She must choose a costly action a that will determine the probability distribution over her final outcome $\theta \in \Theta$. We will assume that Θ is a closed bounded interval (so that $\Theta = [\underline{\theta}, \overline{\theta}]$) and A is a closed, bounded set (possibly finite), $\Theta \subset \Re$, $A \subset \Re$ and that all payoff relevant functions are continuous. The decision-maker has an aspiration (or goal) $g \in \Theta$ over the final outcome she would like to achieve. Given her aspiration g, the payoff she receives from an action a equals her expected benefit from this action, net of her cost of effort – as described by the utility function below:

$$u(a,g) = \int_{\theta \in \Theta} p(\theta, a) b(\theta, g) \, d\theta - c(a)$$

In the expression above, $p(\theta, a)$ is the belief an individual has about the likelihood of achieving a final outcome θ for an action/effort level a, $b(\theta, g)$ is the benefit she obtains from achieving a social status θ, which could be affected by her goal g and $c(a)$ is the cost of action a. We now elaborate on the individual arguments of the utility function above, in line with the key premises of our framework, justifying our modeling choices along the way with well-documented evidence.

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[7]For ease of exposition, we suppress initial status θ_0 in our notation for the variables and functions used in this section, since all the analysis reported here is for a fixed value of θ_0.

Our first key premise is that individual aspiration serves as a *reference point* for the benefit the individual derives from achieving a final outcome. In our framework, this translates into the marginal benefit $b_\theta(\theta, g)$ from achieving a better outcome θ being greater for a person with a higher aspiration level g: other things being equal, a person with a higher aspiration level will have an incentive to try harder to achieve a particular outcome. This premise is consistent with wide-ranging evidence from psychology and economics. For instance, Heath et al (1999) present evidence from experiments in psychology that subjects with high goals exert higher effort and persist more in different physical and cognitive tasks. They exercise at a higher rate, lift more weight, pedal more rapidly on a bicycle and perform more rapidly on tasks like addition, subtraction or anagrams (Locke & Latham, 1990). Recent experiments in economics (Abeler et al (2010)) also show that when participants have higher reference points for earnings, they persevere longer at the experimental task. Inasmuch as aspirations may be regarded as 'reference points for life goals', this evidence points to how higher goals can affect people's life outcomes. Recent field evidence is also consistent with this interpretation of aspirations as reference points. On the positive side, a field experiment with female entrepreneurs in India by Field et al (2009) shows how higher aspirations can motivate changes in women's financial behavior. On the negative side, the Dunedin Longitudinal Study in New Zealand suggests that pessimistic expectations significantly increase the likelihood of low effort even in non-market activities such as personal health maintenance(more frequent smoking and less frequent exercise)(Clark et al, 2003).

Note that our assumption does *not* imply that individuals with high aspirations will necessarily have higher utility – because there is a cost to higher effort as well. Indeed, the first two studies cited above find that those with higher goals are not happier than those with lesser goals. The authors point out that this apparent puzzle can be explained if goals are construed as reference points that affect realized utility (as outlined in the value function approach of Prospect Theory (Kahneman and Tversky, 1979)): achieving a given outcome θ gives lower utility to a person if her aspiration level is higher. Formally, this key assumption of *complementarity* between θ and g can be stated as follows:

Assumption 1. $b(\theta, g)$ is increasing in θ and satisfies increasing differences in θ and g i.e. for $\theta' \geq \theta$ and $g' \geq g$,

$$b\left(\theta', g'\right) - b(\theta, g') \geq b\left(\theta', g\right) - b\left(\theta, g\right).$$

When $b(\theta, g)$ is twice continuously differentiable, $\frac{\partial}{\partial \theta} b(\theta, g) > 0$ and $\frac{\partial^2}{\partial \theta \partial g} b(\theta, g) > 0$.

To fix ideas, the following example lists a few specific benefit functions that satisfy assumption 1.

Example 1: (Specific benefit functions that satisfy Assumption 1) Consider

$$b(\theta, g) = \beta(\theta) + v(\theta, g)$$

where $\beta(\theta)$ is increasing in θ so that the decision-maker gets a direct payoff gain when her final status is higher rather than lower and

$$v(\theta, g) = \begin{cases} \theta - g, & \text{if } \theta < g \\ \alpha(\theta - g), & 0 < \alpha < 1 \text{ if } \theta \geq g, \end{cases}$$

is a loss averse value function a la Kahneman and Tversky over final social status where the reference point is an aspiration level: the decision-maker's frustration from falling short of her aspiration is greater than her pleasure from exceeding her aspirations.

Another symmetric (and smooth) example of a benefit function, one where gains and losses in the final social status relative to an aspiration level are treated in the same way, is

$$b(\theta, g) = K\theta - (\theta - g)^2, \text{ for large but finite } K.$$

In this example, note that K has to be a large but finite number to ensure that $b(\theta, g)$ is increasing in θ.

In both these examples, the incremental gain from enhanced social status is higher, the higher the aspiration level. It is straightforward to check by computation that both the functional forms of $b(\theta, g)$ discussed above satisfy assumption 1[8]. When assumption 1 is violated, the incremental gain from enhanced social status could be decreasing in aspirations: for instance, when aspirations are too high to begin with, actions may be decreasing in g when g is high enough.

A natural question that arises in any discussion of aspirations is one about their *source: What determines individual aspirations? Where do they come from?* No doubt, there could be multiple influences on individual aspiration – from the family, to the neighborhood, events in the wider world or cultural norms. However, in order to clarify the mechanisms by which such factos impact on individual aspirations, our starting point in this section is to model how constraints internal to an individual can affect outcomes, hence we focus on a specific, important channel: How a person's (current) action choices themselves could influence his (future) aspirations, through the outcomes realized? This then, is our second central premise: that individual aspirations adapt to actions chosen. Indeed, this premise is supported by work in both economics going as far back as Simon

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[8]Note that, in both the above examples, $b(\theta, g)$ is decreasing in g for some values of θ. Strictly speaking, from a formal viewpoint, we do not require this assumption. Assumption 1 would also be satisfied in an example where $b(\theta, g)$ increasing in both θ and g as in the case when

$$b(\theta, g) = \beta\theta - \beta' |\theta - g|$$

and both $\beta > \beta' > 0$.

(1955). More recently, Easterlin (2001) provides evidence from survey-based data that aspirations for the future adapt to current income outcomes. Lant (1992) also empirically examines the adjustment of aspiration levels in a behavioral simulation and shows that aspirations do adjust to performance. Psychologists Brickman and Campbell (1971) apply the label "hedonic relativism" to the empirical pattern that humans adapt to their current situation, becoming habituated to the good or the bad. "As we rise in accomplishments and possessions, our expectations also rise. This idea has also been empirically validated by economists (eg. Stutzer (2004) amongst others). Most related to our paper is the idea that aspirations adjust 'to what is seen as possible' discussed by Jon Elster (1983). Consistent with Elster's view, Barr and Clark (2009) find that poors' beliefs about the amounts of income necessary to get by and live well increase with both their own household income and the incomes of proximate others. They also find a positive relationship between beliefs about education necessary to get by and live well and own education. As noticed by Clark (2009), the process of adjusting aspirations 'to what is seen as possible' can occur in two different ways. The first involves adjusting aspirations downwards to reflect disadvantaged circumstances. This is the notion of adaptation invoked in the capability literature. The second type of adaptation involves adjusting aspirations upwards to reflect new opportunities and what "relevant" others have managed to achieve. This notion of adaptation is closely related to recent empirical work on happiness in economics and psychology.

Our formulation accommodates both types of aspirations adaptation. Specifically, we model aspirations, g, as the expected status given individual's actions:

$$g = \int_{\theta \in \Theta} p(\theta, a)\theta d\theta = \pi(a).$$

This formulation is consistent with ethnographer MacLeod's (1995, p.15) view that "aspirations

reflect individual's view of his or her own chances for getting ahead and are an internalization of objective probabilities." It implies that agents have *rational expectations* in their choice of aspirations and actions.

Our definition of aspirations has the desirable feature that, in the absence of uncertainty (i.e., when final status is a deterministic function of actions), the aspiration level of the individual is simply the final status she will achieve given her actions. Of course, with uncertainty, captured by the prior beliefs $p(\theta, a)$, the individual will only be able to aspire to the *expected* final status of her actions.

Having elaborated on the nature of the benefit function $b(\theta, g)$, we now state the assumptions on the other two elements in the utility function – an individual's beliefs about the likelihood of achieving a given outcome θ for a given effort level a, $p(\theta, a)$ and the cost of such effort, $c(a)$:

Assumption 2: *(i)* $p(\theta, a')$ first order stochastically dominates $p(\theta, a)$ whenever $a' \geq a$; *(ii)* $c(a)$ is increasing in a.

Assumption 2*(i)*, together with assumption 2*(ii)*, states that the probability of achieving a higher social status increases when the DM chooses a costlier action. We will return to a more detailed analysis of individual beliefs in section 4 below.

Our formulation is similar to that in recent papers on reference-dependent preferences by Koszegi and Rabin(200X, 200Y).

3.2 Internal constraints

We are now ready to formalize the idea of an "internally-constrained" DM with prior beliefs $p(\theta, a)$. To set the stage for this, we first distinguish between standard solution and the behavioral solution to the individual decision problem of how effort and aspiration choice. We begin with the standard solution which serves as a normative benchmark for our analysis.

3.2.1 Standard decisions

Here, we consider a DM who recognizes – and anticipates – the fact that her (current) actions will influence her (future) aspirations, via the outcomes that they generate. In choosing her optimal action, a standard DM therefore behaves as a farsighted individual who internalizes this feedback. A standard decision corresponds to rational choice in our setting where the DM internalizes the fact that her aspirations are a function of her chosen actions as they are nothing but the expected final status given her actions. The idea here is that the individual is farsighted. She anticipates that her aspirations at are affected by her actions, and taking this into account, she chooses her optimal action. We do not claim that actual individuals behave like this. Rather, this provides us with a normative benchmark against which the outcomes of a behavioral decision can be evaluated. We formalize the concept of a *standard* solution in the following definition:

Definition 1. A *standard* solution is a pair $(\hat{a}, \hat{g})$ such that

$$\hat{a} \in \arg\max_{a \in A} m(a) = \int_{\theta \in \Theta} p(\theta, a) b\left(\theta, \pi(a)\right) d\theta - c\left(a\right)$$

and

$$\hat{g} = \pi(\hat{a}) = \int_{\theta \in \Theta} p(\theta, \hat{a}) \theta d\theta$$

Let M denote the set of standard solutions. Note that $m(a)$ is continuous in a and as A is compact, M is non-empty. By definition, any two distinct standard solutions must yields the same payoff.

3.2.2 Behavioral decisions and internal constraints

The solution concept we apply to this decision-making problem makes use of our third behavioral premise – that individuals do not fully anticipate the aspirations adaptation process corresponding to boundedly rational choice. This premise implies that choices and preferences could diverge, hence invalidating the principle of revealed preferences[9]. In our framework, we model this by assuming that the DM does not internalize the fact that her aspirations g adapt to her actions a. Rather, she takes g as given while choosing her action a, failing to internalize the implications of this adaptive process on her payoffs fully.

There is considerable evidence of this kind of behavior in various kinds of life situations– but also specifically with respect to aspirations. Easterlin (2001) provides evidence that people do not anticipate the fact that their aspirations will adapt with income, hence overpredicting their future happiness following an income increase. In a similar vein, Knight and Gunatilaka (2008) present field evidence of rural-urban migrant households settled in urban areas who don't foresee how their aspirations will adapt to their new situation. Migrants are found to have a happiness score that is lower than the mean score of both the rural sample, and the rest of the urban sample. The authors show that the failure to anticipate that their aspirations will adapt when they move to the city is what makes them choose suboptimally.

We label this situation described above as a Behavioral Decision. Note that we will require that in any decision outcome, aspirations and actions are mutually consistent. An outcome of a behavioral decision can be interpreted as the steady state of an adaptive mechanism in which the aspiration level at adapts to actions achosen in the past but the individual myopically does not internalize the adjustment of aspirations to chosen actions and instead takes aspirations as given.

In a behavioral decision, the DM chooses a, while taking g as given, to solve

$$Max_{a \in A} u(a, g, \theta_0) = \int_{\theta \in \Theta} p(\theta, a) b(\theta, g) \, d\theta - c(a)$$

Let $a(g)$ denote the set of payoff maximizing actions.

Definition 2: A *Behavioral Solution* is a pair (a^*, g^*) such that (i) $a^* \in a(g^*)$ and (ii) $g^* = \pi(a^*)$.

In a behavioral solution the individual takes her aspirations as given, although the chosen action and the aspirations have to be mutually consistent via the feedback $\pi(.)$. Therefore, at a behavioral

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[9]In a related paper, "Behavioral Decisions and Welfare" (Dalton and Ghosal (2010)) formalize this point by axiomatic characterization of standard and behavioral decisions using choice correspondences alone for a general class of models which includes the specific framework and other related analysis (such as reference dependent preferences (Kahneman and Tversky (1979), Tversky-Kahneman (1991), Shalev (2000), Sugden and —(200X), Koscegi and Rabin (200X, 200X) and projection bias (Lowenstein et. al. (200X)) as special cases. For a contrary normative position that never contradicts observed choice see Bernheim and Rangel (200X) and Rubinstein and Salant (200X).

solution, the individual does not internalize the feedback from actions to aspirations and imposes an externality on herself. As a result, she may end up limiting her efforts and aspirations, hence shortchanging herself on the life satisfcation she could attain. We refer to such an outcome as an 'aspirations failure', i.e. an outcome where an individual effort choice a yields an (expected) outcome θ and utility level lower than the maximum the individual can achieve.

Let B denote the set of behavioral solutions. The following useful result clarifies the structure of the set of behavioral solutions and provides an explicit characterization of this set.

Proposition 1: *Under assumptions 1 and 2, payoffs satisfy the property of increasing differences in (a, g) and it follows that there exists a minimal and maximal element in $a(g)$, $\underline{a}(g)$ and $\overline{a}(g)$, both of which are increasing in g. Moreover, there exists a minimal and maximal elements in B, $\left(\underline{a}^*, \underline{g}^*\right)$ and $\left(\overline{a}^*, \overline{g}^*\right)$.*

Proof. See appendix. ∎

Proposition 1 shows that when an individual ignores how her (future) aspirations may change with her (current) actions, there are multiple levels of effort and aspiration that are solutions to her optimization problem. Across these behavioral solutions, higher aspiration levels would induce an individual to optimally choose higher effort levels. These features of the behavioral solution create the *possibility* of an aspiration failure, i.e. that the individual may end up at an outcome lower than the best she can achieve – but it does not guarantee it.

To address this issue, we begin by providing a definition of what it means to be internally constrained. Our normative benchmark is a standard solution. At a standard solution, the individual is maximizing over consistent pairs of a, g, the payoff at each standard solution has to be (weakly) greater the maximal payoff in a behavioral solution which corresponds to the payoff at the maximal behavioral solution. The payoff to the individual at a standard solution sets a normative benchmark against which the payoffs of a behavioral decision can be compared. In other words, whenever ignoring the feedback of (current) aspirations on (future) actions results in a disadvantageous effort and aspiration choice yielding less than the maximal payoff, the individual is said to be internally constrained. The sub-optimal outcome is regarded as an aspirations failure. Formally:

Definition 3. An individual is *internally constrained* at a behavioral solution (a^*, g^*) whenever $(a^*, g^*) \notin M$.

It is useful to link the behavior of the standard and behavioral decision makers to our discussion on the locus of control, in section 2. At an intuitve level, the action choices of a standard decision maker are consistent with the world view of an individual with a strong *internal* locus of control: She fully internalizes the impact of her own actions on her life outcomes, hence she chooses actions that maximizes her payoff. In contrast, a behavioral decision makers' action choices are consistent

with having a more external locus of control: She fails to appreciate how her actions feed into her aspirations, hence she perceives external factors as having greater influence over her life outcomes than her own actions.[10].

When the intersection between the set of behavioral solutions and the set of standard solutions (i.e. $B \cap M$) is empty, the individual is always internally constrained. In proposition 1, we saw that that ignoring the feedback effect from actions to aspirations in this way can lead to multiple equilibra (a^*, g^*) in effort and (expected) outcomes. However, we noted that despite the behavioral decision-maker's omissions, the standard (maximal) outcome could, in principle, still emerge as an outcome. Lemma 1 below outlines the necessary and sufficient condition under which the behavioral decision maker could still end up at the maximal outcome, like the standard decision-maker, i.e. $(a^*, g^*) \in M$.

Lemma 1 *Consider condition (C): For (a, g), (a', g') such that $g = \pi(a)$ and $g' = \pi(a')$, if $u(a, g) \geq u(a', g)$, then $u(a, g) \geq u(a', g')$. A behavioral solution (a^*, g^*) is also a standard solution if and only if (C) holds.*

Proof: See appendix. ∎

As seen from Lemma 1, the conditions under which the BDM would end up at her best possible outcome (of the SDM) are quite stringent: If, and only if, there exists a unique (action, expected outcome pair), (a, g) that payoff dominates every other action/expected outcome pair $\{a', g'\}$ of the BDM, will her action lead to the maximal payoff outcome. If such an action choice does not exist and hence (C) is violated, the individual is internally constrained at a behavioral solution (a^*, g^*).[11] In general, (C) is not easily satisfied. If actions a are continuous, and the set of actions A is convex, the standard solution must satisfy the first order condition

$$0 = \partial_a m(\hat{a})$$

(i.e. the marginal benefit of additional effort, taking into account that aspirations depend on action via $\pi(.)$, should be zero) while a behavioral solution must satisfy the first order condition:

$$0 = \partial_a u(a^*, g^*), \ g^* = \left(\int_{\theta \in \Theta} p(\theta, a^*) \theta d\theta \right).$$

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[10]Note that our framework is consistent with a scenario where the decision-maker partially internalises the feedback from actions to aspirations with probability λ. In such scenario, the individual in a behavioral decision chooses actions to maximize $\tilde{u}(a, g, \theta_0) = \lambda u(a, g, \theta_0) + (1 - \lambda)v(a, \theta_0)$.

[11]In order to interpret just how restrictive condition (C) is it will be convenient to use first-order conditions to characterize both a behavioral solution and a standard solution. We will need to assume that the set of action choices A is a continuous variable, contained in a convex and compact set. [SEE APPENDIX FOR FURTHER DETAILS: However, in addition, there is a technical difficulty which we need to be careful about. Our formulation allows for a value function a la Kahneman and Tversky and as 0 is a kink-point of the value function, the value function isn't differentiable in g. However, as we work with integrals, as long as the underlying gross payoffs are continuous, are continuously differentiable almost everywhere and bounded, we can characterize decision-outcomes with take derivatives].

(i.e. the marginal benefit of additional effort, at the aspiration level consistent with chosen effort via $\pi(.)$, is equal to zero). These two conditions do not typically overlap.

Proposition 2. *In a smooth setting the decision-maker is, typically, internally constrained.*

Proof: See appendix. ∎.

Proposition 2 makes the point that in a smooth setting, where some version of first-order conditions can be used to characterize solution to both behavioral and standard decision problems, condition (C) is, typically, never satisfied and the Behavioral DM is internally constrained.

4 Initial Disadvantage and Aspirations Failure

So far, we have seen how ignoring the feedback from actions to aspirations can result in individual aspirations failure. In this section, we examine the channels through which poverty (or more broadly, initial disadvantage) increases the likelihood of such aspirations failure. Our interest in this link is driven by two points in our study so far: (i) the choices of behavioral decision makers is consistent with having a more external locus of control, as noted earlier, and (ii) having an external locus of control is more common among the poor (as the descriptive evidence reviewed in section 2 suggests).

4.1 Initial status and behavioral solutions

Formally, we explore how poor initial condition/status (captured by the paramenter θ_0), could affect various components of individual utility. To this end, we introduce the initial social status of the DM explicitly into the utility fuction introduced in section 3 so that now $u(a, g, \theta_0) = \int_{\theta \in \Theta} p(\theta, a; \theta_0) b(\theta, g) \, d\theta - c(a; \theta_0)$.

Note that in the above fomulation, θ_0 impacts on both beliefs and the cost of effort. We turn to each component, separately, below:

1. *Beliefs*: As MacLeod (1995) observes, in his ethnographic studies on aspirations in deprived neighborhoods, success is rarer – unlike in the social world of middle-class children, "where the connections between effort and reward is taken for granted" (p.15). In other words, poor initial conditions θ_0 is likely to give rise to much more pessimistic beliefs $p(\theta, a; \theta_0)$ about the likelihood of achieving a particular outcome through greater effort. This is simply because those in a poor neighborhood observe a biased selection of individual outcomes, i.e. of those who failed to achieve good outcomes for their effort. This lowers the expected benefit of a certain action, and in expectation, their aspirations as well. [12]

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[12] For the purposes of this section, we treat individual beliefs $p(\theta, a; \theta_0)$ as exogenously dependent on his external environment. In the next section, we endogenize these beliefs, i.e. we model how an individual rationally chooses his *relevant* reference group (or 'cognitive window') , whose experience he draws upon to form his own beliefs.

2. *Costs*: Earlier, we simply noted that the cost of higher effort is greater. But there are several plausible reasons why even the *same* amount of effort may be more costly for the poor. This could be through higher *direct* costs due to lack of information or access to networks (for e.g. about how to apply for college scholarships), higher *opportunity* costs (for e.g., foregoing wage income to remain in college) or even *psychological* costs (for e.g. it may be more intimidating for a poor person to deal with a well-heeled bank official).

Formally, our discussion above can be summarized with the following assumption:

Assumption 3:

(i) For a given θ and action a, $p(\theta, a; \theta_0) = p_1(\theta, a)p_2(\theta, \theta_0)$ where both $p_1(., a)$ and $p_2(., \theta_0)$ are two probability distributions over Θ where $p_1(., a)$ satisfies assumtion 1 and $p_2(., \theta_0')$ first order stochastically dominates $p_2(., \theta_0')$ whenever $\theta_0' \geq \theta_0$;

(ii) $c(a, \theta_0) = C_1(a)C_2(\theta_0)$ where $C_1(.)$ satisfies assumption 1 and $C_2(.)$ is an increasing, continuous functions of θ_0[13].

The next proposition clarifies how the set of behavioral solutions behaves as initial status changes:

Lemma 2. *Under assumptions 1,2 and either 3(i) or 3(ii), the minimal and maximal elements in $B(\theta_0)$, $\left(\underline{a}^*(\theta_0), \underline{g}^*(\theta_0)\right)$ and $(\overline{a}^*(\theta_0), \overline{g}^*(\theta_0))$, are increasing in θ_0.*

Proof: See appendix. ∎.

Lemma 2 shows that the set of behavioral solutions is (weakly) increasing in the initial social status of the individual, θ_0 so that both higher aspirations and higher actions (which, in turn, have higher likelihood of changing status quo) are associated with higher initial status. This observation is intuitive: If a person has more pessimistic beliefs about the effects of his actions on outcomes, then it is perfectly rational for him to pick aspirations and action choices that are lower. A similar outcome will obtain if his cost of effort are higher.

However, Lemma 2 doesn't tell us that a poorer individual is more likely to suffer from an aspirations failure (i.e. be internally constrained), with respect to his lower aspirations- or why. This is the subject of the proposition below.

4.2 Initial status, aspirations failure and behavioral poevrty traps

To this end, we consider a setting where behavioral solutions may be payoff ranked so that the maximal solution, namely the one with highest effort and highest aspirations levels, dominates all other solutions with respect to payoffs. We will, now, develop an arguement- formally a selection mechanism- that will pin down why the decision-maker with will converge to a payoff dominated

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[13]Note that assumption 3(ii) doesn't require (nor does it rule out) that the "production function" of final status is non-convex in initial status. An example of a cost function that satisfies assumption 3(ii) is $c(a, \theta_0) = \theta_0 a$.

behavioral solution i.e be internally constrainted.

We consider the case where the individual has a finite number of available actions so that $A = \{a_1, ..., a_N\}$ with $a_n < a_{n+1}$, $n = 0, 1, ..., N-1$ and suppose Θ is a compact interval interval $[\underline{\theta}, \overline{\theta}]$. We assume that a_1 results in the DM obtaining status quo with probability one i.e. $p(\theta_0, a_1) = 1$ and $p(\theta', a_1) = 0$ for all $\theta' \neq \theta_0$. We assume that $m(a, \theta_0)$ is increasing in a so that (a_K, g_K) is the unique standard solution and that it is also a behavioral solution as is $(a_1, g_1 = \theta_0)$.

In order to develop a selection mechanism that will allow us derive why a DM will converge to a payoff dominated behavioral solution, we will distinguish between a pre-decision aspiration level g_0 which is the aspiration level a behavioral DM takes as given when choosing an action and a post-decision aspiration level g determined by the feedback effect $\pi(.)$. Of course, a standard DM will ignore the pre-decision aspiration level so that (a_K, g_K) will continue to be the unique standard solution. Further, we will asssume that the pre-decision aspiration level is determined stochastically by some pdf $f(g)$ (with associated cdf $F(g)$) over Θ. Although, we would agree with the argument that a DMs environment (family, neighborhood, friends, social networks) could affect the pre-decision aspiration level, we will assume that the stochastic process genertaing the pre-decision aspiration level does not depend on initial status in order to tie our hands as we want to *derive* the link between initial status and the likelihood of converging to a payoff dominated behavioral solution. The selection mechanism involves two steps:

Step 1: An initial aspiration level g_0 generated by some . Given g_0, the individual chooses an action a;

Step 2: Given a, the actual aspiration level is realized via the function $\pi(a)$.

Given such a selection mechanism, the following proposition characterizes the link between initial status and the likelihood of convergeing to a payoff dominated behavioral solution:

Proposition 5: *Under assumptions 1,2 and either 3(i) or 3(ii), the greater the disadvantage (the lower the initial status) of the DM, (a) the greater is the likelihood that the DM converges to a payoff dominated behavioral solution (the DM is internally constrained), and (b) lower the likelihood that the DM chooses, and aspires, to perpetuate her initial status.*

Proof: See appendix. ■.

The proposition relies on the result that for each initial status θ_0, there is a threshold value of aspirations so that if the pre-decision level of aspirations falls below the threshold value, a behavioral DM always converges to a payoff dominated solution. Moreover we show that the threshold value is itself lower the higher the intial status of the DM is: this captures the point a poorer person has to have a higher level of aspirations than a rich person in order not to be internally constrained. As the stochastic process that generates the pre-decision aspiration level is independent of initial

status, a poorer DM is more likely to be internally constrained than one with a higher initial status. Importantly, Proposition 5 also suggests the possibility of a *behavioral poverty trap* i.e. a DM with a lower initial status is more likely to choose, and aspire, to perpetuate her initial status.

5   Policy Analysis

We have characterized an internally constrained DM. We have showed how initial disadvantage make more likely that an aspiration failure occurs and a behavioral poverty trap is perpetuated. We will now examine interventions that aim to to break, or avoid, such a trap.

Social psychologists have already addressed this question. Beck's cognitive therapy, for example, aims at changing negative expectations and interpretations into more hopeful ones so that the DM begins to believe that her responses produce desirable outcomes (Beck, 1970). What is central to the path out of helplessness is the realization that one's behavior can effect change (i.e. the effect of own effort on own aspirations/achievements that makes a behavioral DM to become a standard DM). Exposure to the fact that responding produces reinforcement is an effective way of breaking up learned helplessness (Seligman, 1975). It is critical to allow people to discover solutions for themselves (Maier, 1961), which can be eased by observing successful similar others (e.g. role models) or by being expericieng succesfully novel activities. The major principle for social psychologists seems to be one of differentiating events that can be controlled from those beyond control.

From a policy perspective, the relevant instruments should attempt to influence (a) the process by which the pre-decision aspirations levels of the DM are generated, $F(.)$, (b) the initial status of the DM, θ_0, and (c) the way the DM update her beliefs about the consequences of her actions, $p(.)$.

However, in order to analyse the impact of such interventions, we will first, in a special case of the model studied in the preceeding section, analyse in one framework, both a behavioral poverty traps and one which is driven by material deprivation alone. Then, using this model, we will study the impact on individual behaviour of such policy interventions.

5.1   A simple of poverty traps

The DM chooses between just two actions, $A = \{\underline{a}, \bar{a}\}$ where $p\left(\theta_0, \underline{a}\right) = 1$ and $p\left(\theta', \underline{a}\right) = 0$ for all $\theta' \neq \theta_0$ so that choosing action $\underline{a}$ results in the individual perpetuating her initial status while $p\left(\theta_0 + \Delta, \bar{a}\right) = p$, $p\left(\theta_0, \bar{a}\right) = 1 - p$ and $p\left(\theta', \bar{a}\right) = 0$ for all $\theta' \notin \{\theta_0, \theta_0 + \Delta\}$ so that at $\bar{a}$, the individual attaches a probability p to improve her initial status by a discrete amount Δ while she believes that she will remain at her initial social status with probability $1 - p$. Let $\underline{g} = \pi(\underline{a})$ and $\bar{g} = \pi(\bar{a})$. To further simplify matters, assume that at Further, it will be convenient to normalize

payoffs so that $b\left(\theta_0, \underline{g}\right) = c\left(\underline{a}, \theta_0\right) = 0$ (implying $c\left(\overline{a}, \theta_0\right) > 0$) and her payoff at $\left(\underline{a}, \underline{g}\left(\theta_0\right)\right)$ is set equal to zero. Finally, let $\tilde{g}\left(\theta_0\right)$ solve the equation

$$\int_{\theta \in \Theta} p(\theta, \overline{a}) b\left(\theta, g\right) d\theta - c\left(\overline{a}, \theta_0\right) = 0.$$

There are three cases to consider:

CASE 1: $\underline{g}\left(\theta_0\right) < \tilde{g}\left(\theta_0\right) < \overline{g}\left(\theta_0\right)$ so that both $\left(\overline{a}, \overline{g}\left(\theta_0\right)\right)$ and $\left(\underline{a}, \underline{g}\left(\theta_0\right)\right)$ are behavioral solutions. In this case, we assume that $\left(\overline{a}, \overline{g}\left(\theta_0\right)\right)$ is the unique standard solution.

CASE 2: $\tilde{g}\left(\theta_0\right) \geq \overline{g}\left(\theta_0\right)$ so that $\left(\underline{a}, \underline{g}\left(\theta_0\right)\right)$ is both the unique behavioral solution and the unique standard solution.

CASE 3: $\tilde{g}\left(\theta_0\right) \leq \underline{g}\left(\theta_0\right)$ so that $\left(\overline{a}, \overline{g}\left(\theta_0\right)\right)$ is both the unique behavioral solution and the unique standard solution.

Note that $\left(\underline{a}, \underline{g}\left(\theta_0\right)\right)$ corresponds to an aspirations trap: as $\underline{g}\left(\theta_0\right) = \theta_0 < \tilde{g}\left(\theta_0\right)$ she aspires to remain at her initial social status and actually remains there. Further, $\left(\overline{a}, \overline{g}\left(\theta_0\right)\right)$ corresponds to a scenario with raised aspirations: $\overline{g}\left(\theta_0\right) = \theta_0 + p\Delta > \tilde{g}\left(\theta_0\right)$ so that she aspires to improve her initial status and believes she can do so with probability p.

Clearly $\tilde{g}\left(\theta_0\right)$ is decreasing in θ_0 and as long as $\pi(., \theta_0)$ is non-creasing in θ_0, both $\underline{g}\left(\theta_0\right)$ and $\overline{g}\left(\theta_0\right)$ are non-decreasing in θ_0 as well.

It follows that we can partition Θ into three regions as follows:

(i) $\underline{\Theta} = \{\theta \in \Theta : \tilde{g}\left(\theta\right) \geq \overline{g}\left(\theta\right)\}$: if $\theta_0 \in \underline{\Theta}$, $\left(\underline{a}, \underline{g}\left(\theta_0\right)\right)$ is both the unique behavioral solution and the unique standard solution (a poverty trap driven by material deprivation);

(ii) $\Theta_M = \left\{\theta \in \Theta : \underline{g}\left(\theta\right) < \tilde{g}\left(\theta\right) < \overline{g}\left(\theta\right)\right\}$: if $\theta_0 \in \Theta_M$ both $\left(\overline{a}, \overline{g}\left(\theta_0\right)\right)$ and $\left(\underline{a}, \underline{g}\left(\theta_0\right)\right)$ are behavioral solutions and the former is a standard solution (the possibility of a behavioral poverty trap);

(iii) $\overline{\Theta} = \left\{\theta \in \Theta : \underline{g}\left(\theta\right) \geq \tilde{g}\left(\theta\right)\right\}$: if $\theta_0 \in \overline{\Theta}$ so that $\left(\overline{a}, \overline{g}\left(\theta_0\right)\right)$ is both the unique behavioral solution and the unique standard solution (no poverty trap).

It follows that a DM with very low initial status in $\underline{\Theta}$ or a DM with a very high initial status in $\overline{\Theta}$ cannot be internally constrained. It is only a DM whose initial status is somewhere between the two extremes in Θ_M who can be potentially internally constrained i.e. be caught in a behavioral poverty trap where she chooses an action (and aspires to) perpetuating her status quo.

What is the likelihood that a DM with an initial status in Θ_M is internally constrained? As in Proposition 5, let the pre-decision aspiration level g_0 be generated by some pdf $f(g)$ (with associated cdf $F(g)$) over Θ_M. Then, (i) if $g_0 < \tilde{g}\left(\theta_0\right)$, the individual will choose $\underline{a}$ and will end up with an aspiration level $\underline{g}$ i.e. $\left(\underline{a}, \underline{g}\left(\theta_0\right)\right)$ is selected, and (ii) if $g_0 \geq \tilde{g}\left(\theta_0\right)$, the individual will choose $\overline{a}$ and end up with an aspiration level $\overline{g}$ i.e. $\left(\overline{a}, \overline{g}\left(\theta_0\right)\right)$ is selected. It follows, from Proposition 5, that the

probability that a DM with an initial status Θ_M is internally constrained is close to one if her initial status is just above the boundary of $\underline{\Theta}$ after which it monotonically declines to zero for a DM with an intial status close to the boundary of $\overline{\Theta}$.

We summarize the analysis as the following proposition:

Proposition 6: *(i) The probability that the DM chooses an action, and aspires to, perpetuate her initial staus is monotonically decreasing in θ_0; (ii) Only a DM with an initial status in Θ_M has the potential to be stuch in a behavioral poverty trap and the likelihood of such an occurence is declining in the initial status of the DM: a DM whose initial status is in either $\underline{\Theta}$ (poverty trap driven by material deprivation) or $\overline{\Theta}$ (no poverty trap) isn't internally constrained.*

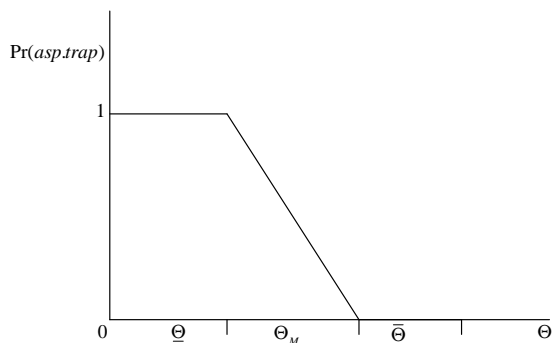Figures 3 and 4 illustrate[14] this result:
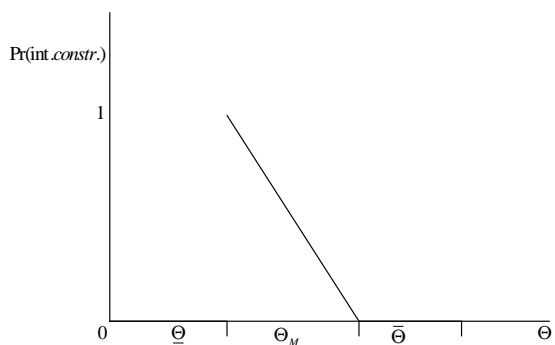

Figure 3: Probability of an "aspirations trap"

Figure 4: Probability that the DM is internally constrained

In what follows, starting from a situation where the DM is located at $\left(\underline{a}, \underline{g}\left(\theta_0\right)\right)$, we examine the efficacy of different policy interventions.

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[14]In both the figures, it is assumed that $f(.)$ is uniform

5.2 Changing the initial status (θ_0) or the distribution of pre-decision ($F(.)$)

Changes in $F(.)$ correspond to changes in the process by which the pre-decision aspirations levels are generated. This process can be affected in at least two different ways. One way is by affecting parents' expectations and aspirations for their children, which have been shown as important predictors of educational attainment. There is evidence that parental interest in a child's education has four times more influence on attainment by age 16 than does socioeconomic background (Leitch, 2006). Parenting programs which help families improve child behaviour and achievement are examples of policy interventions aiming at influencing $F()$.[15]

An alternative way to affect $F()$ is by designing policy interventions which help the poor children to discover that the realization of their behavior can affect positive changes. One such programme is the Venezuelan Classical Music Orchestras for children from disadvantaged backgrounds. More than 400,000 Venezuelan children, most coming from poor families have taken and take part of a network of orchestras directed by Jose Antonio Abreu that began being carried out 30 years ago. The lessons are free of charge and a public foundation "FESNOJIV" provides the instruments. The project does not primarily aim to create professional musicians, but to integrate poor children into the society. 96 percent of the young musicians have good to excellent school records. They stand out as high achievers thanks to their steady relationship with music. UNESCO awarded FESNOJIV its International Music Award in 1993-94 and in 1998 UNDP commended it as an outstanding example of poverty reduction. In the words of its founder, Antonio Abreu[16]: "The majority of the children and juveniles belong to the groups that are most vulnerable and excluded in all of Venezuelan society. Participating in the orchestral movement has made it possible for them to set up new goals, plans, projects and dreams, and at the same time it is a way of creating meaning and helping them in their day-to-day struggle for better conditions of life through the variety of opportunities that the orchestral movement offers them."

The formal analysis suggests that direct attempts to change the extrinsic circumstances (by, for example, enhancing the economic status via transfers of wealth) will be welfare enhancing for very poor individuals.

In the model presented above, such individuals will have an initial status $\theta_0 \in \underline{\Theta}$. We interpret such individuals as being in a situation characterized by a conventional poverty trap driven by external circumstances as for such individuals a change in their material circumstances has to precede

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[15]See for example "Supporting parents on kids education (SPOKE)" program in UK, which work with parents to set personal goals for their children (Silva et al 2008)

[16]See http://www.rightlivelihood.org/recip/abreu.htm

any other sort of intervention. However, an intervention that alters the material circumstances so that initial status is just tipped into Θ_M may not alter the choices of the DM she likely to be internally constrained, and theefore caught in a behavioral poverty trap, with very high probability. In such a scenario, a DM will benefit from policy interventions that directly impact on the process by which pre-decision aspirations are generated.

It follows that interventions that solely focus on altering the material circumstances of individuals may be less effective than those that are complemented by programs that directly impact on the process by which pre-decision aspirations are generated. Even when the former class of policies succeed in lifting individuals out of material deprivation, such individuals could still be caught in an "aspirations trap" from which they might escape only with the help of complementary policies that raise aspirations.

Our analysis also identifies conditions under which altering internal constraints on their own would enable poor people to "contest and alter the conditions of their own poverty." Such a siltuation would obtain when the initial status of the DM is in Θ_M: in such a case, an intervention that successfully raises the pre-decision aspirations of the DM would alter the choices the DM makes and therefore alter her initial status.

We refer the reader to the extensive discussion in section 2 above for evidence on how interventions solely focused on improving material circumstances might not break "aspirations traps" but interventions that seek to improve both material circumstances and the process generating initial aspirations might.

5.3   Role models and cognitive neighborhoods (p)

Another way to raise the aspirations of individuals belonging to a disadvantaged group would be to alter the behavior of a carefully chosen subset of such individuals (e.g. role models).

Individuals draw on the aspirations of their cognitive neighbors and, in this sense, role models may become an important variable in the formation of their aspirations (Rao and Walton, 2004). Moreover, role models also enable a poor DM to "contest, and alter, the conditions of her own poverty". But what determines which other individuals are cognitive neighbors and, thus, potential role models of the DM? We address this question below.

Consider an internally constrained individual located in an aspirations trap. The role model comes into the picture as an external signal. Suppose the individual observes an external signal which consists in the following information about a different individual: the initial status, θ'_0, action $\bar{a}$ and a final status $\theta'_0 + \Delta$. We say that this individual becomes a role model when the internally constrained individual located in an aspirations trap chooses the action $\bar{a}$ after observing the signal,

i.e. the individual becomes inspirational. When does it happen? Will any external signal convinces a "fatalistic" individual to choose an action that shifts her to a better equilibrium? If not, what are the conditions under which this happens?

Social psychologists have studied these concerns for decades, and have consistently highlighted the similarity of others as an important aspect for the transmission of aspirations (e.g. Lockwood and Kunda, 1997). There are countless programs showcasing the successes of a superior individual that are designed to boost the aspirations of a particular target group with similar initial conditions. For example, prominent women scientists are often invited to address high school girls or eminent African Americans are introduced to African American children. Moreover, not only similarity has been shown to be an important aspect for the transmission of aspirations, but also research have confirmed that social comparison is an endogenous process (e.g., Festinger, 1954, Goethals & Darley, 1977; Wood, 1989). That is, people *choose* to compare only with similar others and avoid comparisons with dissimilar others. For example, Hoffner C. and M. Buchanan (2005) study the factors that make television characters appealing as role models to young adults. Respondents identified more strongly with characters whom they regarded as similar to themselves. Specifically, respondents reported higher levels of wishful identification with characters of the same gender, and with characters whom they perceived as sharing their own attitudes.

In order to model the conditions under which an external signal serves as a role model, following Gilboa and Schmeidler (2001), we endow the individual with a similarity function $s : \Theta \times \Theta \to [0, 1]$ where $s\left(\theta_0, \theta_0'\right) = 0$ denotes no similarity and $s\left(\theta_0, \theta_0'\right) = 1$ denotes full similarity. This function provides a quantification of the DM's similarity assessment of how similar her own initial status is relative to the initial status of the potential role model. We assume that assessing the similarity across different pairs of initial status is the main cognitive task of the DM. Importantly, the similarity function is subjective in the same sense in which probabilities are subjective in expected utility theory. Gilboa and Schmeidler (2001) provide an axiomatic treatment of choice determined by

similarity weighted payoff estimation.[17] A continuous similarity function that is consistent with Gilboa and Schmeidler (2001) is:

$$s\left(\theta_0', \theta_0\right) = 1 - \frac{\left|\theta_0' - \theta_0\right|}{\left|\bar{\theta} - \underline{\theta}\right|}$$

Consistent with the above similarity function, we assume that $s\left(\theta_0, \theta_0\right) = 1$ and that $s\left(\theta_0', \theta_0\right)$ is decreasing in the distance between θ_0' and θ_0.

Fix the external signal $\left(\theta_0', \bar{a}, \theta_1' = \Delta + \theta_0'\right)$. Given a similarity function, the DM updates her payoffs from choosing $\bar{a}$ as follows:

$$s\left(\theta_0', \theta_0\right) \left[b\left(\Delta + \theta_0, \underline{g}\left(\theta_0\right)\right) - c\left(\bar{a}, \theta_0\right)\right] + pb\left(\Delta + \theta_0, \underline{g}\left(\theta_0\right)\right) - c\left(\bar{a}, \theta_0\right)$$
$$= \left(s\left(\theta_0', \theta_0\right) + p\right) b\left(\Delta + \theta_0, \underline{g}\left(\theta_0\right)\right) - \left(1 + s\left(\theta_0', \theta_0\right)\right) c\left(\bar{a}, \theta_0\right)$$

which, after an affine transformation of payoffs, is equivalent to

$$\frac{s\left(\theta_0', \theta_0\right) + p}{1 + s\left(\theta_0', \theta_0\right)} b\left(\Delta + \theta_0, \underline{g}\left(\theta_0\right)\right) - c\left(\bar{a}, \theta_0\right)$$

This has the interpretation that after observing the external signal, the DM has updated her prior beliefs so that her posterior beliefs of changing her social status is:

$$p_1 = \frac{s\left(\theta_0', \theta_0\right) + p}{1 + s\left(\theta_0', \theta_0\right)}$$

and with probability $1 - p_1$ she believes that she will remain at her initial social status. As p_1 is increasing in $s\left(\theta_0', \theta_0\right)$ so that $p_1 \geq p_0$ with the strict inequality whenever $s\left(\theta_0', \theta_0\right) > 0$. Therefore, the updating of priors after observing the external signal is an example of similarity based learning.

After observing the external signal, the DM will choose $\bar{a}$ iff

$$\frac{s\left(\theta_0', \theta_0\right) + p}{1 + s\left(\theta_0', \theta_0\right)} b\left(\Delta + \theta_0, \underline{g}\left(\theta_0\right)\right) - c\left(\bar{a}, \theta_0\right) \geq 0$$

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[17] We note that there may be an objective element in the assessment of similarity. The problem is familiar from econometrics where one might want to infer the conditional distribution $p\left(y \in A | x_0\right)$ where the sample frequency of x_0 is zero i.e. $p(x_0) = 0$. Assume that all variables are unidimensional. In such scenarios, it is standard in econometrics to use a uniform kernel estimate (Hardle, 1990; Manski, 1995) which is an estimate of the sample frequency with which $y \in A$ amongst those observations x_i such that $\left|x_i - x_0\right| < d$ (where d is the sample specific bandwidth chosen to confine attention to those observations in which x_i is close to x_0). In a sample with n observations, the expression for the uniform kernel estimate is

$$\frac{\sum_{i=1}^{N} \mathbf{1}\left(y \in A\right) \mathbf{1}\left(\left|x_i - x_0\right| < d\right)}{\sum_{i=1}^{N} \mathbf{1}\left(\left|x_i - x_0\right| < d\right)}.$$

Then, the uniform kernel estimate corresponds to a "bandwidth" similarity function where

$$s\left(\theta_0', \theta_0\right) = \begin{cases} 1, & \text{if } \left|\theta_0' - \theta_0\right| \leq d \\ 0, & \text{otherwise} \end{cases}$$

or equivalently

$$\frac{s\left(\theta_0',\theta_0\right)+p}{1+s\left(\theta_0',\theta_0\right)} \geq \hat{p}\left(\theta_0\right) = \frac{c\left(\overline{a},\theta_0\right)}{b\left(\Delta+\theta_0,\underline{g}\left(\theta_0\right)\right)}$$

Observe that as $s\left(\theta_0',\theta_0\right) \to 0$, $p_1 \to p$. Moreover, if $s\left(\theta_0',\theta_0\right) \cong 1$, $p_1 \cong \frac{1+p}{2}$. Therefore, even when $s\left(\theta_0',\theta_0\right) = 1$, the external signal serves as a role model iff $\frac{1+p}{2} \geq \hat{p}\left(\theta_0\right)$. Specifically, whenever $\hat{p}\left(\theta_0\right) > \frac{1+p}{2}$, the individual located at θ_0 will never learn from observing an external signal. More interesting note that if $\lim_{s\left(\theta_0',\theta_0\right)\to 0}\frac{s\left(\theta_0',\theta_0\right)+p}{1+s\left(\theta_0',\theta_0\right)} = p < \hat{p}\left(\theta_0\right)$. It follows that as long as $s\left(\theta_0',\theta_0\right)$ is (weakly) decreasing in the distance between θ_0' and θ_0 there is an endogenous upper bound to the cognitive window of the individual which can be computed from the inequality

$$s\left(\theta_0',\theta_0\right) \geq \frac{\hat{p}\left(\theta_0\right)-p}{1-\hat{p}\left(\theta_0\right)}.$$

The fraction on the right hand side of the preceding inequality is increasing in $\hat{p}\left(\theta_0\right)$ and decreasing in p. As $\hat{p}\left(\theta_0\right) = \frac{c\left(\overline{a},\theta_0\right)}{b\left(\Delta+\theta_0,\underline{g}\left(\theta_0\right)\right)}$, it follows that the size of the cognitive window of the individual located at θ_0 is decreasing when (i) the cost of choosing the action $\overline{a}$ is higher; (ii) the benefit of achieving a higher final status is low when the individual has low pre-decision aspirations to begin with; (iii) the prior beliefs of the individual are more pessimistic.

Note that for the individual who consists of the external signal to choose $\overline{a}$, it must be the case that she attaches a sufficiently high probability to alter her initial status in the first place i.e. $p' \geq \hat{p}\left(\theta_0'\right)$ where p' is the initial belief of the individual in question. It follows that the ideal role model is one with a similar initial status to the DM but a much higher self-confidence than the DM locked in an aspirations trap.

The following proposition summarizes the above discussion:

Proposition 7. *Suppose $p' \geq \hat{p}\left(\theta_0'\right)$ but $p < \hat{p}\left(\theta_0\right)$. The external signal will be a role model if and only if $p < \hat{p}\left(\theta_0\right) \leq \frac{s\left(\theta_0',\theta_0\right)+p}{1+s\left(\theta_0',\theta_0\right)}$. If $s\left(\theta_0',\theta_0\right)$ is (weakly) decreasing in the distance between θ_0' and θ_0, the size of the cognitive window of the individual located at θ_0 is implicitly defined by the inequality $s\left(\theta_0',\theta_0\right) \geq \frac{\hat{p}(\theta_0)-p}{1-\hat{p}(\theta_0)}$ and is decreasing in $c\left(\overline{a},\theta_0\right)$ and increasing in $b\left(\Delta+\theta_0,\underline{g}\left(\theta_0\right)\right)$ and p.*

The above proposition explains how the DM chooses her "cognitive window", the sample of individuals from which the DM draws her role models. Ideally, what a DM wants to observe is someone who is identical (similarity one) to herself but with a higher level of aspirations and achievement. However, a person similar to herself is likely to have the same aspirations, and make the same decisions as herself. So the DM needs to include individuals with a higher initial status than herself in her cognitive window and/or similar initial status but different beliefs i.e. have a much higher degree of self-confidence

Proposition 7 implies that a DM with a low initial status will exclude those with a higher

initial status from her cognitive window when the similarity assessment is decreasing in the distance between initial status. If the DM's includes only those individuals who are similar to her in her cognitive window, she is likely to observe other individuals who have similar aspirations and make similar decisions to herself. In order to increase the likelihood of observing an individual who has a higher degree of self-confidence and therefore, has higher aspirations and achievement she will need to include individuals who aren't similar (i.e. have a higher initial social status) to herself. However, Proposition 7 implies that there is limit on how far the individual will go so that, typically, there will be individuals who will be excluded from her cognitive window. Thus, the DM will not attach much weight on the experience of success of an individual who is characterized by very different circumstances such as culture or wealth or any other relevant dimension viewed as relevant by the decision maker as determining initial status.

The evidence presented in La Ferrara et al (2009) emphasizes both the potential and the limitations of other successful persons in serving as role models. On the one hand, the authors provide persuasive evidence that strong female protagonists and characters in various soap operas shown in Brazil resulted in higher aspirations and lower fertility outcomes in the country between the early 1970s to the 1990s. However, unlike the effects of programs made by Rede Globo, a rival company Sistema Brasileiro de Televisao (SBT)'s programs had little impact on fertility outcomes. The authors found that SBT broadcasts programs were imported from Mexico and the US, and were generally not perceived as realistic portraits of Brazilian society. Brazilian women strongly identified with the female characters in Rede Globo's soaps (making it common for their girl children to be given the names of lead characters) – but the lack of 'similarity' with American or Mexican women resulted in their negligible impact of the latter set of serials.

Changing a role model to break an aspiration trap has been empirically showed to be a very effective policy of poverty reduction. One of the most remarkable examples comes from Kolkata (Calcutta), India. The objective of the Government by the 1990s was to decrease the HIV infections in Sonagachi, Kolkata's oldest and best established red-light district, with over 4,000 sex workers working in 370 brothels that service about 20,000 clients a day (see Rao and Walton, 2004, p.7). As Rao and Walton (op. cit.) points out, during the 1990s, the Government's "interventions tended to reflect the values of the middle-class bureaucrats who crafted them. They focused on rehabilitating the sex workers, rescuing them, and [...] training them." to be ready for an insertion in the "good life". This strategy did not work. As Rao and Walton argues, the relatively high earnings in sex work and the discrimination faced by former sex workers in the world outside Sonagachi, led most women to return prostitution.

In this context, a very different strategy worked out. A strategy that involved convincing and

training twelve sex workers which would pass the important information about the use of condoms as peers education to their co-workers. This process, as argued by Rao and Walton, led over a period of two or three years, to a "metamorphosis" in the sex worker's aspirations. Moreover, the program was remarkably successful as a health intervention, with almost all sex workers using condoms at least some of the time and the HIV incidence in Sonagachi substantially decreased.

This successful health intervention can be interpreted with the lens of our model as a change in the quality of the cognitive window of a DM.

There is plenty of evidence that role models can inspire individuals to become actively involved in activities that they wouldn't have chosen otherwise. Notwithstanding the fact that role models can create behavioral changes in people from any socioeconomic condition, the distribution of role models across the income spectrum is uneven, which makes the introduction of role models more stringent for poor than for rich people.

In a randomized transfer program in Nicaragua, Macours and Vakis (2009) show that communication with motivated and successful nearby leaders can lead to higher aspirations and corresponding investment behavior. Nguyen (2008) provides evidence from a field experiment in Madagascar that observing a role model of poor background has a larger impact on poor children's test scores than observing someone of rich background. Buunk et al (2007) show that a positive role model stimulates career-oriented behavior. They examined the effects of social comparison among students in their final year of study. Participants were presented with a fictitious interview with a new graduate who was either successful or unsuccessful in the job market. Exposure to the successful target led to a higher degree of inspiration, identification, and proactive career behavior than did exposure to the unsuccessful target.

Recent laboratory work has shown that role models may be capable of buffering stereotyped individuals from the adverse effects of stereotype threat when the role models' counter-stereotypic behavior is observed. For example, Marx and Goff (2005) show that when a black experimenter gave a verbal test to black participants, they did not suffer the typical performance decrements associated with stereotype threat.

Finally, there is also empirical evidence of the inspirational role of President Barack Obama for Black-Americans. Using a random sample, Marx et al (2009) show that Obama's speech before the presidential election had a profound beneficial effect on Black-Americans' exam performance.

5.4 Social connectedness and the transmission of aspirations

The upshot of the above analysis is that an individual included in the cognitive window of the DM (i.e. has the status of a role model) generates an information externality as, with positive

probability, the DM will change her aspirations and her choices upon observing the achievement of such an individual. This suggests that there is the possibility that aspirations could be transmitted across individuals in a society. We conclude this section with a simple N-person extension of the preceding model where the transmission of aspirations is linked to the distribution of initial social status (i.e. the nature of inequality) in a society.

To this end, consider a society with N (a large but finite number) individuals distributed on $[\underline{\theta}, \overline{\theta}]$. We say that i is connected to j if $\theta_0^i < \theta_0^j$ but when j chooses $\bar{a}$ j belongs to the cognitive neighborhood chosen by i and is a role model for i. A society is strongly connected if between any two individuals i, j in a society there is a chain of individuals $k_1, ..., k_M$ such that i is connected to k_1, k_m is connected to k_{m+1}, $m = 1, ..., M-1$, and k_M is connected to j. In other words, in a connected society, any two individuals are linked by a chain of overlapping cognitive windows.

Define the similarity function so that $s\left(\theta_0', \theta_0\right) = 1 - \frac{|\theta_0' - \theta_0|}{|\overline{\theta} - \underline{\theta}|}$. Then, Proposition 7 implies that $\hat{p}\left(\theta_0\right) \leq \frac{s\left(\theta_0', \theta_0\right) + p}{1 + s\left(\theta_0', \theta_0\right)}$ if and only if $\left|\theta_0' - \theta_0\right| \leq \left|\overline{\theta} - \underline{\theta}\right| \left(\frac{1 + p - 2\hat{p}(\theta_0)}{2\hat{p}(\theta_0)}\right) = \varepsilon$.

One final definition: the distribution of individuals in a society is *globally dense* if for each individual player i there exists a different individual j with $\left|\theta_0^i - \theta_0^j\right| < \left|\overline{\theta} - \underline{\theta}\right| \left(\frac{1 + p - 2\hat{p}(\theta_0)}{2\hat{p}(\theta_0)}\right)$. When the distribution of initial status is globally dense, then any two individuals in a society are linked via a chain of overlapping cognitive windows. In this sense, when the distribution of initial status is globally dense, a poor individual is linked to rich individual in a sequence of small steps. Note that when the distribution of initial status is polarized so that groups of DMs are clustered at very different points in terms of initial status, the distribution of initial status will fail to be globally dense (example 3 below).

One final piece of notation: let $G(.)$ denote the cumulative distribution function that generates the initial beliefs p of each individual in the society.

In this society, each individual is solving a decision-problem where the choice is between choosing an action that perpetuates her initial status or an action that changes her initial status with positive probability. Individuals choose in sequnece with an inidividual with highest initial status choosing first, followed by the second highest initial status and so on. If a subset of individuals have the same initial status, then the order with which each inidividual move is determined randomly. We assume that the pre-decision aspiration level of a DM is to perpetuate her initial status, although the individual could observe the actions and achievement of other individual included in her cognitive window before choosing her action.

Proposition 8. *If the distribution of individuals is globally dense the society is strongly connected. As long as there exists one individual k with $p^k \geq \hat{p}\left(\theta_0^k\right)$, all individuals in it choose $\bar{a}$ and aspire to change their social status. The probability that all individuals will choose $\bar{a}$ is*

$\max_{k \in N} 1 - G(\hat{p}\left(\theta_0^k\right))$.

Proof. See appendix. ∎

Thus, when the distribution of initial status is globally dense, the society is strongly connected. In a connected society, whether or not any one DM is internally constrained depends on what other individuals included in her cognitive neighborhood do: each such individual imposes an information externality on the individual that determines whether or not she is internally constrained. Therefore, as long as one individual is able to relax her internal constraint, all individuals in the society are also able to relax their internal constraints.

The following example examines what happens when the distribution of individuals fails to be globally dense.

Example 2. (Polarization and aspirations failure)

Consider a society where a fraction α individuals are initially located at $\underline{\theta}$ and $1 - \alpha$ individuals are initially located at $\overline{\theta}$ with $s\left(\overline{\theta}, \underline{\theta}\right) = 0$. Assume that $p < \hat{p}\left(\theta_0\right)$ for all $\theta_0 = \underline{\theta}$ while $p' \geq \hat{p}\left(\theta_0'\right)$ for all $\theta_0' = \overline{\theta}$. Observe that no $\theta_0' = \overline{\theta}$ is in the cognitive neighborhood of any $\theta_0 = \underline{\theta}$. Therefore, all individuals initially located at $\underline{\theta}$ are internally constrained.∎

The next example examines what happens in an egalitarian but poor society where the distribution of individuals is concentrated at a specific disadvantageous initial status.

Example 3. (Equality and aspirations failure)

Consider a society where all individuals are initially located at $\underline{\theta}$. Assume that $\hat{p}\left(\underline{\theta}\right) > 1$. Then, clearly $p < \hat{p}\left(\theta_0\right)$ for all $\theta_0 = \underline{\theta}$ and there is aspirations failure for all individuals initially located at $\underline{\theta}$. More generally, the probability that all individuals choose $a = \overline{a}$ is $1 - [G(\hat{p}\left(\theta_0\right))]^N$. ∎

Proposition 8, together with the examples 2 and 3, suggests that inequality in the distribution of initial status may have subtle effect on the how individuals in a society aspire and choose actions. On the one hand, when the distribution of initial status is polarized, the society may fail to be connected and therefore, there will be failure in the transmission of aspirations across individuals in that society and individuals with a low initial social status will be internally constrained and caught in an aspirations trap. On the other hand, when there is perfect equality in the distribution of initial status, either all individuals in a society have high aspirations and seek to change their status quo or all individuals in a society are caught in an aspirations trap. The latter is the more likely scenario if the group of individuals is poor to begin with so that individuals within the group reinforce each other's choices and aspirations.

The work of sociologist W. J. Wilson provides a clear evidence of the link "social exclusion-lack of aspirations-poverty" that was observed in U.S. urban ghettos since 1970. Wilson (1987) makes the case that the increasing "social isolation" of the poor, especially the black poor, has greatly

contributed to their poverty. "Out of sight, out of mind" allowed most of the non-poor to either deny or forget the conditions in the ghetto. Moreover, Wilson argues that poverty implies exclusion. He claims that concentration of poverty results in the isolation of the poor from the middle class and its corresponding role models, resources, and job networks. More generally, he argues that being poor in a mixed-income neighborhood is less damaging than being poor in a high poverty neighborhood. Likewise, they are consistent with empirical evidence showing that communities with higher levels of social cohesion and narrow gaps between poor and rich produce better health and welfare outcomes than wealthier societies with higher levels of social disintegration (Putnam, 2000). Marmot and Wilkinson (1999) show that in addition to economic prosperity, equality and social cohesion are also powerful determinants of health. The experience of Kerala is also a very clear evidence that social cohesion through participation of the poor in programs contributes to achieve high positive indices of Human Development (see for example, Kannan, 2000).

6 Related Literature

The idea that choices are determined by aspirations is not new in the economics literature and goes back to the seminal work of Simon (1955) and more recently, Selten (1998). This paper contributes to this literature by offering a formal equilibrium analysis to model this idea.

Moreover, much of standard economic analysis makes a sharp distinction between preference parameters (aspirations) and external circumstances (initial status or endowments) and assumes that these are both exogenous to the individual. In order to account for a systematic link between initial disadvantage and aspirations and beliefs, one could *assume* that external circumstances directly operate via a psychological channel and show how such a direct link could perpetuate poverty traps. In fact two recent papers, Genicot and Ray (2009) (via the assumption of an exogenous aspirations neighborhood) and Bannerjee and Mullainathan (2010) (via the assumption that the proportion of extra income spent on temptation goods is decreasing with overall income) take precisely this approach. In contrast to these two works, our paper *derives* the link between initial disadvantage with aspirations failure and disadvantageous choices[18]. Note that if we had assumed that external circumstances directly operate via a psychological channel in perpetuating poverty traps, we would have to conclude that only changing extrinsic circumstances (i.e. enhancing income, changing neighborhoods or occupation) could alter poverty traps. In contrast, our analysis suggests that one way out of poverty traps is to directly shock the aspirations of individuals thus relaxing their internal

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[18]Our model can be viewed as a contribution to fill the gap in the literature pointed out by Esther Duflo (2003, p10): "... what is needed is a theory of how poverty influences decision-making, not only by affecting the constraints, but by changing the decision-making process itself".

constraints, a view consistent with interventions designed to alter goal-setting behavior or the use dream building sessions in specific programs aimed at disadvantaged groups[19].

Ray (2003) (commenting on Appadurai (2004)) and Genicot and Ray (2009), argue that poverty and failure of aspirations may be reciprocally linked within a self-sustaining trap. By studying a model in which individuals choose a level of effort to minimize their aspirations gap, Ray (2003) and Genicot and Ray (2009) show that individual investment efforts should be minimal for both high and low aspiration gaps. In both these papers, the aspirations neighborhood of an individual is taken as exogenous and as aspirations are formed as a function of an individual's exogenous aspirations neighborhood, Genicot and Ray (2009) assume that aspirations is the psychological channel by which extrinsic circumstances affect individual choices and play a role in perpetuating poverty traps.

Bannerjee and Mullainathan (2010) also examine poverty traps in model where poorer individuals allocate a higher proportion of their income to temptation goods relative to individuals with a higher income. A key assumption in their analysis relates to the shape of temptation viewed as a function of overall consumption so that temptation is assumed to be the psychological channel by which extrinsic circumstances affect individual choice and thus perpetuate poverty traps.

Our paper is also related to the literature on endogenous reference points (Shalev (2000), Koszegi (2005), Koszegi and Rabin (2006) and (2007), Heifetz and Minelli (2006), Dalton and Ghosal (2010)). We add to this literature by specifying a selection mechanism to account for why individuals would converge to a payoff dominated decision outcome and also the different ways in which reference may be manipulated (eg role models).

Our paper contributes to the literature of role models by introducing the notion of similarity based learning. The paper in this literature which is most related to ours is Manski (1993), which also introduces a notion of closeness in terms of past history between the role model and the person who learns. Manski focus in on the conditions under which the expected utility of an action can be estimated nonparametrically after observing a "role model". Our focus, however, is on the

Another related paper is Chung (2000), which introduces a simple model of role models where individuals are rational Bayesian learners. In contrast to what we do in this paper Chun assumes that individuals attach a similarity weight of one to the achievement of other individuals.

Our paper is also related to the literature of relative deprivation because the concept of poverty we use is a relative one.[20] It is also related to the literature of empowerment, since it provides an

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[19] A specific intervention discused in greater detail in section 6 below where dream building as a key ingredient in empowering disadvantaged groupd is the Songachi Project, an initiative aimed at sex worker's collective in Kolkata, India.

[20] See Stark and Taylor (1991) for a general introduction to relative deprivation, Deaton (2001) for an application to health, Stark (2006) for an application to growth. For empirical papers on relative deprivation, see Duclos and Philippe (2002), Satya (1991), Berrebi and Silber (1985) among others.

analytical framework to support the theoretical ideas of empowerment.[21] As in the literature of neighborhood effects (Durlauf, 2003), we also obtain the result that persistence in economic status could be generated by group-level influences on individuals, although unlike that literature, we focus on aspirations as the transmission mechanism.

That aspirations adapt to chosen actions also appears in a strategic context in the literature of reinforcement learning in games where agents adapt by comparing payoffs achieved from actions chosen in the past relative to an aspiration level. (See for instance Bendor, Mookherjee and Ray, 2001 or Karandikar et al, 1998).

Finally, our paper is related to some specific particular models that take identity issues into consideration to study poverty and social exclusion, such us Akerlof and Kranton (2000), Hoff and Pandey (2004) or Hoff and Sen (2005).

7   Final Remarks

We propose a model that associates initial disadvantage, aspirations and choices to alter initial status. Our analysis suggests internal constraints are a key ingredient in perpetuating poverty traps. We find that initial disadvantage is likely to generate aspirations failures, a combination of aspirations and choices that perpetuate initial status. We then study how and under what conditions a role model can help a poor person to solve her aspirations failure and climb out of poverty. We allow the person to choose her cognitive window and show that, in principle, a poor person will restrict the set from where the role model is selected. Our model and results are supported by evidence from anthropology, sociology and social psychology. The fact that the same condition of poverty affects (and is affected by) lack of aspirations and hope is a recurrent topic in any of these disciplines, although surprisingly, it has been disregarded in formal economic models. The concept of empowerment has also been understudied in economics theory, despite the great importance that is given to the concept in the anti-poverty policy agenda.

The model could be extended in a variety of ways. Possibilities include: extending it to a n-player strategic context; studying the dynamics of different initial income distributions, analyzing the effect of different types of policies (other than a role model) on solving an aspirations failure; accounting for overlapping generations; considering role models who are not always positive and studying the interaction of different types of aspirations such us material, religious, etc.

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[21]See for instance Stern (2004), World Bank (2002), or Alsop and Heinsohn (2005)

References

[1] Abeler J, A. Falk, L. Goette and D. Huffman (2010) "Reference Points and Effort Provision," forthcoming, *American Economic Review*.

[2] Abramson, L. Y., Seligman, M. E. P., and Teasdale, J. D. (1978). "Learned helplessness in humans: Critique and reformulation" *Journal of Abnormal Psychology*, 87, 32-48.

[3] Akerlof G. and R. Kranton (2000) "Economics and Identity," *Quarterly Journal of Economics*, 115, 3, 715-753.

[4] Alsop R. and N. Heinsohn (2005) "Measuring Empowerment in Practice: Structuring Analysis and Framing Indicators," *World Bank Policy Research Working Paper* 3510.

[5] Appadurai (2004) "The Capacity to aspire," in V. Rao and M. Walton (eds.), *Culture and Public Action*, The International Bank for Reconstruction and Development, The World Bank, Washington, DC.

[6] Atkinson, A.B. (1998) "Social Exclusion, Poverty and Unemployment," in *Exclusion, Employment and Opportunity*, A. B. Atkinson and J. Hills (Eds.) Centre for Analysis of Social Exclusion, January.

[7] Atkinson, A.B. (2003) "Income Inequality in OECD Countries: Data and Explanations," *CESifo Economic Studies*, 49, 479-513

[8] Azariadis C. and J. Stachurski (2004) "Poverty Traps," Forthcoming in the *Handbook of Economic Growth*, Philippe Aghion and Steven Durlauf, eds.

[9] Azariadis, C. (2004): "The theory of poverty traps: what have we learned?" in *Poverty Traps*, S. Bowles, S. Durlauf and K. Ho, eds.

[10] Banerjee A. V. and A.F. Newman (1991) "Risk-Bearing and the Theory of Income Distribution," *Review of Economic Studies*, 58, 211-235

[11] Banerjee A. V. and A.F. Newman (1993) "Occupational Choice and the Process of Development," *Journal of Political Economy*, 101, 2, 274-298

[12] Banerjee A. V. and S. Mullainathan (2010) "The shape of temptation: implicatinos for the economic lives of the poor," *NBER Working Paper,* No. 15973.

[13] Bardhan P (1997) "Corruption and Development: A Review of the issues," *Journal of Economic Literature*, 35, 1320-1346

[14] Barr A. and D. Clark (2009) "Do the Poor Adapt to Low Income, Minimal Education and Ill-health?," *Journal of African Economies*, 19, 3, 257–293

[15] Beck A.T. (1970) "Cognitive therapy: nature and relation to behavioral therapy," *Behavior Therapy*, 1, 2, 184-200

[16] Bendor, J., D. Mookherjee, and D. Ray. (2001) "Aspiration-Based Reinforcement Learning in Repeated Games: An Overview," *International Game Theory Review,* 3(2-3): 159-174.

[17] Biewen M. (2003) "Who Are the Chronic Poor? Evidence on the Extent and the Composition of Chronic Poverty in Germany," IZA *DP* No. 779

[18] Bloom, D. E., D. Canning and J. Sevilla (2003) "Geography and Poverty Traps," *Journal of Economic Growth*, 8, 355-378.

[19] Brickman, P. and Campbell, D.T. (1971) "Hedonic Relativism and Planning the Good Society", in M.H. Apley (ed.) *Adaptation-Level Theory: A Symposium*, New York: Academic Press, 287-302.

[20] Buunk A P (2007), "A positive role model may stimulate career-oriented behavior," *Journal of Applied Social Psychology*, 37, 7, pp. 1489-1500

[21] Chung, Kim-Sau (2000), "Role models and arguments for affirmative action", *American Economic Review,* 90(3), 640-648.

[22] Clark, D. A. (2009) "Adaptation, Poverty and Well-being: Some Issues and Observations with Special Reference to the Capability Approach and Development Studies," *Journal of Human Development and Capabilities*, 10 (1): 21–42.

[23] Clark, J., R. Poulton and B. Milne (2003) "Bleak Expectations: The Role of Pessimism in Smoking, Hazardous Drinking and Exercise," *Working Paper 2003/03*, Department of Economics, University of Canterbury, Christchurch

[24] Clark A., P. Frijters and M. Shields (2008) "Relative Income, Happiness and Utility: An Explanation for the Easterlin Paradox and Other Puzzles", *Journal of Economic Literature*, vol.46, no.1, pp.95-144.

[25] Cole S., T. Sampson and B. Zial (2009) "Money or Knowledge? What drives demand for financial services in emerging markets?" *Harvard Business School Working Paper* 09-117.

[26] Da Rin, M. and T. Hellmann (2002) "Banks as Catalysts for Industrialization," *Journal of Financial Intermediation*, 11, 366-397

[27] Dalton P. and S. Ghosal (2010) "Behavioral Decisions and Welfare," *CentER Discussion Paper 2010-22*, Tilburg University

[28] Dasgupta and Ray (1986) "Inequality as a Determinant of Malnutrition and Unemployment," *The Economic Journal*, 96, 1011-1034

[29] Deaton, A. (2001) "Relative Deprivation, Inequality, and Mortality," National Bureau of Economic Research, Inc, *NBER Working Papers*: 8099

[30] Dickerson, S.S. and M.E.Kemeny (2004), "Acute stressors and cortisol responses: a theoretical integration and synthesis of laboratory research", *Psychological Bulletin*, 130(3), 355-391.

[31] Dixon J. and D. Macarov (Eds) (1998) *Poverty: a Persistent Global Reality*, London; New York: Routledge.

[32] Duclos, J-Y and G. Philippe (2002) "Absolute and Relative Deprivation and the Measurement of Poverty," *Review of Income and Wealth,* 48, 4, 471-92

[33] Duclos, J-Y, J. Esteban and D. Ray (2004) "Polarisation: Concepts, Measurement, Estimation," *Econometrica*, 72, 6, 17-37.

[34] Duncan, G.J., B. Gustafsson, R. Hauser, G. Schmauss, H. Messinger, R. Muffels, B. Nolan, and J.C. Ray (1993), "Poverty dynamics in eight countries," *Journal of Population Economics*, 6, 215-234

[35] Durlauf (2003) "Groups, Social Influences and Inequality: A Membership Theory Perspective on Poverty Traps," University of Wisconsin, mimeo.

[36] Duflo E. (2003) "Poor but rational," mimeo, MIT

[37] Easterlin, R. A. (2001) "Income and happiness: towards a unified theory," *Economic Journal*, 111, 465-84.

[38] Easterlin, R. A. (2005) "A puzzle for adaptive theory" *Journal of Economic Behavior & Organization*, vol. 56, issue 4, pages 513-521

[39] Ellerman, D. (2002) "Autonomy-respecting assistance: Towards new strategies for Capacity Building and development assistance," in: Fukuda-Parr, Sakiko, Carlos Lopes and Khalid Malik (eds.) *Capacity for development. New solutions to old problems*, London: Earthscan Publications

[40] Elster, J. (1983) *Sour Grapes: Studies in the Subversion of Rationality*, Cambridge: Cambridge University Press

[41] Festinger, L. (1954) "A theory of social comparison processes", *Human Relations*, 7: 117–140.

[42] Field E., S. Jayachandran and R. Pande (2009) "Empowering Female Entrepreneurs in India? A Field Experiment on Business Counseling," mimeo, Harvard University.

[43] Foster A. and M. Rosenzweig (1995) "Learning by Doing and Learning from Others: Human Capital and Technical Change in Agriculture," *Journal of Political Economy*, 103, 1176-1209

[44] Fouarge, D. and R. Layte (2003). "Duration of Poverty Spells in Europe," EPAG Working Paper 2003-47. Colchester: University of Essex.

[45] Frankenberger T. R., P. Sutter, A. Teshome, A Aberra, M. Tefera, M Tefera, A. S. Taffesse, T. Bernard, T. Spangler and Y. Ejigsemahu (2007) "Ethiopia: the path to self-resiliency," report prepared Partners in Rural Development on behalf Canadian Network of NGOs in Ethiopia, July.

[46] Furnham A. (1986) "Economic Locus of Control," *Human Relations*, 39: 29.

[47] Galor O. and Zeira. J. (1993) "Income Distribution and Macroeconomics," *Review of Economic Studies*, 60, 35-52

[48] Genicot and D. Ray (2009) "Aspirations, Inequality, Investment and Mobility," mimeo.

[49] Gilbert, D., and J.E.J. Ebert (2002) "Decisions and revisions: The affective forecasting of changeable outcomes," *Journal of Personality and Social Psychology*, 82, 503-514.

[50] Gilboa I. and D. Schmeidler (2001) *A Theory of Case-Based Decisions,* Cambridge University Press, 210 pages.

[51] Goethals, G.R. and Darley, J. (1977). "Social comparison theory: An Attributional approach" In J.M. Suls & R.L. Miller (Eds.), *Social Comparison Processes: Theoretical and Empirical Perspectives* (pp. 259-278), Halsted-Wiley, Washington, DC.

[52] Graham B. S. and J. R. W. Temple (2004) "Rich nations, poor nations: how much can multiple equilibria explain?," *The Institute for International Integration Studies Discussion Paper Series.*

[53] Hardle W. (1990) *Applied Non-parametric Regression, Oxford University Press.*

[54] Heath C., R. P. Larrick and G. Wu (1999) "Goals as reference Points", *Cognitive Psychology* 38, 79–109

[55] Heifetz, A. and E. Minelli (2006) "Aspiration traps," mimeo.

[56] Helson, H. (1964) *Adaptation-Level Theory: An Experimental and Systematic Approach to Behavior.* Harper and Row, New York.

[57] Hoff K and P Pandey (2004) "Belief systems and durable inequalities: an experimental investigation of Indian caste," Policy Research Working Paper; no. 3351, The World Bank.

[58] Hoff K. and A. Sen (2005) "The Kin System as a Poverty Trap?," forthcoming in *Poverty Traps*, eds, Samuel Bowles, Steven Durlauf and Karla Hoff, Princeton University Press., 2006

[59] Hoffner, C. and M. Buchanan (2005) "Young adults' wishful identification with television characters: The role of perceived similarity and character attributes," *Media Psychology* 7 , pp. 325-352.

[60] Jalan J. and M. Ravallion (1998) "Determinants of Transient and Chronic Poverty. Evidence from Rural China," *Policy Research Working Paper* No 1936, World Bank.

[61] Jensen R (2010) "The (Perceived) Returns to Education and the Demand for Schooling," *The Quarterly Journal of Economics*, 125, 2, pp. 515-548

[62] Jensen R. and E. Oster (2009) "The Power of TV: Cable Television and Women's Status in India" *The Quarterly Journal of Economics,* 124(3), pp. 1057-94

[63] Kahneman, D., & Tversky, A. (1979) "Prospect theory: An analysis of decisions under risk" *Econometrica*, 47, 263-291.

[64] Kannan, K. (2000) "Poverty Alleviation as advancing basic human capabilities: Kerala's achievements compared,". In G. Parayil (Ed.) *Kerala: The Development Experience* (pp. 40-65). New York. NY: Zed Books.

[65] Karandikar, D. Mookherjee, D. Ray and F. Vega-Redondo (1998) "Evolving Aspirations and Cooperation," *Journal of Economic Theory* 80, 292-331 (1998).

[66] Knight J. and R. Gunatilaka (2008) "Aspirations, Adaptation and Subjective Well-Being of Rural-Urban Migrants in China," *Economics Series Working Papers 381*, University of Oxford, Department of Economics.

[67] Kremer M. (1993) "The O-ring Theory of Economic Development," *Quarterly Journal of Economics*, August, 551-575

[68] La Ferrara, E., A. Chong, and S. Duryea (2008), "Soap Operas and Fertility: Evidence from Brazil", *BREAD Working Paper* No. 172.

[69] Lant T. K. (1992) "Aspiration level adaptation: an empirical exploration," *Management Science*, 38, 5, pg 623.

[70] Leitch R. (2006) "Prosperity for all in the global economy, world class skills" *Leitch Review of Skills: Final Report*, HM Treasury on behalf of the Controller of Her Majesty's Stationery Office, 145 pgs.

[71] Locke E. A. and G. P. Latham (1990) *A theory of goal setting and task performance,* Prentice Hall, N.J., 413 p.

[72] Lockwood, P., & Kunda, Z. (1997) "Superstars and me: Predicting the impact of role models on the self" *Journal of Personality and Social Psychology*, 73, 91-103.

[73] Loury G. (1981) "Intergenerational Transfers and the Distribution of Earnings," *Econometrica*, 49, 843-867

[74] Nelson R. R. (1956) "A Theory of The Low Level Equilibrium Trap," *American Economic Review*, 46, 894-908

[75] Nguyen T. V. (2008) "Education and health care in developing countries," *PhD Thesis*, MIT, Economics Department.

[76] MacLeod Jay (1995) *Ain't no makin' it: Aspirations & Attainment in a Low-Income Neighborhood*, Westview Press, Boulder, Colorado.

[77] Macours K and R. Vakis (2009) "Changing households' investments and aspirations through social interactions: evidence from a randomized transfer program," *World Bank Policy Research Working Paper,* No. 5137.

[78] Maier, N.R.F. (1961) *Frustration: The Study of Behavior Without a Goal*, University of Michigan Press, Ann Arbor, Michigan.

[79] Manski, C. E. (1995) *Identification Problems in Social Sciences*, Harvard University Press, 194 pgs.

[80] Marmot, M. and R. Wilkinson (Eds). (1999) *Social Determinants of Health*, New York: Oxford University Press.

[81] Marx D.M. and P.A. Goff (2005) "Clearing the air: The effect of experimenter race on target's test performance and subjective," *British Journal of Social Psychology*, 44, 645–657

[82] Marx D.M., S.J. Ko, R.A. Friedman (2009) "The "Obama Effect": How a salient role model reduces race-based performance differences*," Journal of Experimental Social Psychology,* 45, 953–956

[83] McGregor D. (1960) *The Human Side of Enterprise*, McGraw Hill Higher Education, pp 256.

[84] Miguel E. and M. Kremer (2004) "Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities," *Econometrica*, 72(1), 159-217.

[85] Mookherjee D. (2003) "Poverty Persistence and Design of Anti-Poverty Policies," forthcoming in Banerjee, R. Benabou and D. Mookherjee (eds), *Understanding Poverty*, Oxford University Press

[86] Moreira V. (2003) "Poverty and Psychopathology," in Carr S. C. and Sloan T. S. (eds.) *Poverty and Psychology. From Global Perspective to Local Practice*, Kluwer Academic/Plenun Publishers New York.

[87] Mullainathan S. (2006) "Development Economics through the lens of Psychology," mimeo.

[88] Oxoby R. J. (2004) "Cognitive dissonance, status and growth of the underclass," *Economic Journal*,114, 498, pages 727-749

[89] Parducci, A. (1995) Happiness, *Pleasure, and Judgment: The Contextual Theory and Its Applications.* Erlbaum, Hillsdale.

[90] Poortinga, W., Dunstan, F.D., & Fone, D.L. (2008). "Health locus of control beliefs and socio-economic differences in self-rated health" *Preventive Medicine*, 46 (4), 374-380.

[91] Putnam R. (2000) *Bowling Alone: The Collapse and Revival of American Community.* New York, NY: Simon and Schuster.

[92] Quah D. T. (1993) "Empirical cross-section dynamics in economic growth," *European Economic Review*, 37, 426-434

[93] Quah D. T. (2005) "Growth and Distribution," mimeo, LSE.

[94] Rabow J., Sherry L. Berkman and R. Kessler (1983) "The Culture of Poverty and Learned Helplessness: A Social Psychological Perspective," *Sociological Inquiry*, 53, 4, 419-434.

[95] Ray, D. (2003) "Aspirations, Poverty and Economic Change," in A. Banerjee, R. Benabou and D. Mookherjee (eds) *Understanding Poverty*, Oxford University Press

[96] Rao, V. and M. Walton (2004) "Culture and Public Action: Relationality, Equality of Agency, and Development," in V. Rao and M. Walton (eds.), *Culture and Public Action*, The International Bank for Reconstruction and Development, The World Bank, Washington, DC.

[97] Rotter, J.B. (1954). *Social learning and clinical psychology*. New York: Prentice-Hall.

[98] Selten, R. (1998). "Aspiration Adaptation Theory." *Journal of Mathematical Psychology* 42 (2-3), 191-214.

[99] Sen, A. (2004) "How Does Culture Matter?," in V. Rao and M. Walton (eds.), *Culture and Public Action*, The International Bank for Reconstruction and Development, The World Bank, Washington, DC.

[100] Simon, H. (1955). "A Behavioral Model of Rational Choice." *The Quarterly Journal of Economics* 69 (1), 99-118.

[101] Silva, K; S. Scott; V. Totsika; K. Ereky-Stevens; C. Crook, (2008) "Training Parents to help their children read: a randomized control trial," *British Journal of Educational Psychology*,78, 435-455

[102] Stark, O. and J.E. Taylor (1991) "Migration Incentives, Migration Types: The Role of Relative Deprivation," *Economic Journal*, 101, 408 1163-78

[103] Stark O (2006) "Status Aspirations, Wealth Inequality, and Economic Growth," *Review of Development Economics*, 10, 1, 171-176

[104] Stern N., J-J. Dethier and F. H. Rogers (2005) *Growth and Empowerment. Making Development Happen*, Munich Lectures in Economics, The MIT Press, Cambridge, Massachusetts, and London, England.

[105] Stutzer, A. (2004) "The role of income aspirations in individual happiness," *Journal of Economic Behavior & Organization*, vol. 54(1), pages 89-109

[106] Torvik R. (1993) "Talent, growth and Income Distribution," *Scandinavian Journal of Economics*, 95, 4, 581-596.

[107] Walker, K A. (1997), "The Aspirations formation of disadvantaged jamaican men youths," PhD dissertation, Virginia Polytechnic Institute and State University, Virginia, January.

[108] Wilson, W. J., (1987), *The Truly Disadvantaged*, Chicago: University of Chicago Press.

[109] Wood, J.V. (1989). "Theory and research concerning social comparisons of personal attributes" *Psychological Bulletin*, 106, 231-248.

[110] World Bank (1998) "Assessing Aid: What Works, What Doesn't and Why?," *World Bank Policy Research Report*, Oxford University Press.

[111] World Bank (2002) *Empowerment and Poverty Reduction: A Sourcebook*, preliminary draft, pp. 280.

Appendix 1: Proofs

Proof of proposition 1:

By continuity of $u(a,g)$ in a and by the compactness of A, $a(g)$ is non-empty. For $a' \geq a$ and $g' \geq g$, note that

$$[u(a',g) - u(a,g)] - [u(a',g) - u(a,g)]$$
$$= \int_{\theta \in \Theta} [p(\theta, a') - p(\theta, a)] [b(\theta, g') - b(\theta, g)] \, d\theta \geq 0.$$

The first equality follows by computation. The second inequality follows from the assumption that $p(\theta, a')$ first order stochastically dominates $p(\theta, a)$ and $b(\theta, g)$ satisfies increasing differences in θ, g.

By continuity $a(g)$ is non-empty and as payoffs satisfy increasing differences in (a, g), it follows that there exists a maximal and minimal element in $a(g)$ which is increasing in g.

As $p(\theta, a')$ first order stochastically dominates $p(\theta, a)$ for $a' \geq a$, $\pi(a)$ is increasing in a. Therefore, by Tarski's fix point theorem, B is non-empty and there exists a maximal and minimal element in B.∎

Proof of Proposition 2:

By definition, (a^*, g^*), for all $a' \in A$, $u(a,g) \geq u(a',g)$ for $g = \pi(a)$. By (C), for all $a' \in A$, $u(a,g) \geq u(a',g')$, $g' = \pi(a')$. It follows that $(a^*, g^*) \in M$. Next, suppose, by contradiction, $(a^*, g^*) \in M$ but (C) doesn't hold. As $(a^*, g^*) \in B$, for all $a' \in A$, $u(a,g) \geq u(a',g)$ for $g = \pi(a)$. As, by assumption, (C) doesn't hold there exists $a' \in A$ such that $u(a,g) \geq u(a',g)$ but $u(a,g) < u(a',g')$, $g' = \pi(a')$. But, then, $(a^*, g^*) \notin M$, a contradiction. ∎

Proof of Proposition 3:

Note that at a standard solution it is the case that

$$0 = \left\{ \begin{array}{c} \left(\int_{\theta \in \Theta} \partial_a p(\theta, \hat{a}) b(\theta, \hat{g}) \, d\theta \right) - \partial_a c(\hat{a}) \\ + \left(\int_{\theta \in \Theta} p(\theta, \hat{a}) \partial_g b(\theta, \hat{g}) \, d\theta \right) \left(\int_{\theta \in \Theta} \partial_a p(\theta, \hat{a}) \theta \, d\theta \right) \end{array} \right\}$$

while the "first order condition" characterizing a behavioral solution is equivalently,

$$0 = \left\{ \left(\int_{\theta \in \Theta} \partial_a p(\theta, a^*, \theta_0) b(\theta, g^*) \, d\theta \right) - \partial_a c(a^*, \theta_0) \right\}$$

and

$$g^* = \left(\int_{\theta \in \Theta} p(\theta, a^*) \theta d\theta \right)$$

Clearly, in this setting, condition (C) is equivalent to requiring that

$$0 = \{ \partial_g u(a^*, g^*) \partial_a \pi(a^*) \}$$

or equivalently,

$$0 = \left\{ \left(\int_{\theta \in \Theta} p(\theta, a^*) \partial_g b(\theta, g^*) \, d\theta \right) \left(\int_{\theta \in \Theta} \partial_a p(\theta, a^*) \theta d\theta \right) \right\}$$

an equality that cannot hold in our model under assumption 1 is satisfied. ∎

Proof of Proposition 4:

Under assumption 3(i), $p(\theta, a, \theta_0)$ satisfies increasing differences in a, θ_0. Under assumption 3(ii), $c(a, \theta_0)$ satisfies decreasing differences in a, θ_0. It follows, by computation, that if either assumption 3(i) or assumption 3(ii) holds

$$\left[u\left(a', g, \theta_0'\right) - u\left(a, g, \theta_0'\right) \right] - \left[u\left(a', g, \theta_0\right) - u(a, g, \theta_0) \right] \geq 0.$$

and $\pi\left(a, \theta_0'\right) \geq \pi(a, \theta_0)$. Therefore, the maximal and minimal element in $B(\theta_0)$ are increasing in θ_0. ∎

Proof of Proposition 5:

For simplicity we prove the proposition under assumption 3(ii) (a symmetric argument would hold under assumption 3(i)). For each action a_n let

$$g_n = \int_{\theta \in \Theta} p(\theta, a_n) \theta d\theta.$$

By first order stochastic dominance note that $g_n < g_{n+1}$, $n = 0, 1, ..., N - 1$. Define a sequence $\{\tilde{g}_k(\theta_0) : 0 \leq k \leq K\}$ where for each $k \geq 1$, $k < K$, $\tilde{g}_k(\theta_0)$ solves the equation

$$\int_{\theta \in \Theta} p(\theta, a_{k+1}) b(\theta, g) \, d\theta - c(a_{k+1}, \theta_0)$$
$$= \int_{\theta \in \Theta} p(\theta, a_k) b(\theta, g) \, d\theta - c(a_k, \theta_0).$$

with $\tilde{g}_0(\theta_0) = \underline{\theta}$ and $\tilde{g}_K(\theta_0) = \overline{\theta}$. Observe that under assumption 2 and 3, as $c(a, \theta_0)$ satisfies decreasing differences in a, θ_0, the right hand side of the equation (derived by re-arranging terms in the preceding equation)

$$\int_{\theta \in \Theta} (p(\theta, a_{k+1}, \theta_0) - p(\theta, a_k, \theta_0)) b(\theta, g) \, d\theta$$
$$= c(a_{k+1}, \theta_0) - c(a_k, \theta_0).$$

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is decreasing in θ_0. Therefore, $\tilde{g}_k(\theta_0)$ is decreasing in θ_0 for each $k \geq 1$, $k < K$.

By construction, note that for each k such that (a_k, g_k) is a behavioral solution, (i) $g' \in (\tilde{g}_{k-1}(\theta_0), \tilde{g}_k(\theta_0))$, $u(a_k, g', \theta_0) > u(a, g', \theta_0)$ for all $a \in A$ so that a_k is the unique best response and (ii) $g_k \in (\tilde{g}_{k-1}(\theta_0), \tilde{g}_k(\theta_0))$. Therefore, $(\tilde{g}_{k-1}(\theta_0), \tilde{g}_k(\theta_0))$ is the basin of attraction of the behavioral decision outcome (a_k, g_k). Then if $g_0 \in (\tilde{g}_{k-1}(\theta_0), \tilde{g}_k(\theta_0))$, the individual will choose a_k and there will end up with an aspiration level g_k i.e. the behavioral decision (a_k, g_k). Therefore, the probability with which the internal constraint binds is equal to the probability that g_0 is not in the basin of attraction of the behavioral decision (a_K, g_K) which, in turn, is the probability that $g_0 < \tilde{g}_{K-1}(\theta_0)$ which is $F(\tilde{g}_{K-1}(\theta_0))$.

As $\tilde{g}_{K-1}(\theta_0)$ is decreasing in θ_0, the probability that internal constraint binds, $F(\tilde{g}_{K-1}(\theta_0))$, is decreasing in θ_0. Therefore, the lower is the initial status of the individual the greater is the probability that the internal constraint binds and in a behavioral decision.

By a similar argument, note that $\tilde{g}_0(\theta_0)$ is decreasing in θ_0, the probability that internal constraint binds, $F(\tilde{g}_0(\theta_0))$, is decreasing in θ_0. Therefore, the lower is the initial status of the individual the lower is the probability that the DM will choose a_1 and aspire $g_1 = \theta_0$ i.e. choose, and aspire, to perpetuate her initial status and be stuck in a behavioral poverty trap. ∎

Proof of Proposition 7:

Suppose the initial distribution of status is globally dense. Then, by construction, the society is strongly connected. Consider an individual i located at θ_0^i choosing $a = \underline{a}$ with aspiration level $\Delta = 0$. Now suppose there is one individual with k with $p^k \geq \hat{p}(\theta_0^k)$. This individual k will choose $a = \bar{a}$. Moreover, as the society is strongly connected, there is a finite chain linking k to every other individual j, $j \neq k$ i.e. there is a finite chain of individuals $i_0, i_1, ..., i_{\hat{n}}$ with $i_0 = k$ and $i_{\hat{n}} = j$ such that $i_{\hat{n}}$ belongs to the cognitive neighborhood of i_{n+1}, $n = 0, ..., \hat{n} - 1$. Therefore, each i_n, $n = 0, ..., \hat{n}$, chooses $a = \bar{a}$ and aspiration level $\Delta = \Delta'$. It follows that if there exists one individual k with $p^k \geq \hat{p}(\theta_0^k)$, all individuals will choose $\bar{a}$. More generally, the probability that all individuals will choose all individuals in it choose $\bar{a}$ is $\max_{k \in N} 1 - G(\hat{p}(\theta_0^k))$ where $G(.)$ is the cdf that determines the initial beliefs p of any one individual in the society. ∎