MAN and SOCIETY
A Journal of North East Studies

VOLUME V ◊ SPRING 2008

Indian Council of Social Science Research
North Eastern Regional Centre
Shillong Meghalaya
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Book Reviews:
How Poor Farmers Behave: Interpreting ‘Irrationality’

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Understanding what prompts poor farmers to act in ways in which they do is important because it enables us to craft more effective policy interventions and also helps us to help the farmers. Understanding the mainspring of behavior which may be harmful to the person is often critical to steering the person away from it; just as understanding what makes a person smoke is the first step in helping him quit smoking. The fact that poor farmers often take loans at exorbitant interest rates, or sign on to tenancy contracts the terms of which seem to the observer to be patently skewed against them, or voluntarily walk into bonded labor contracts is often puzzling to the analyst. And it is this puzzle that has, in turn, prompted a huge amount of research by economists and anthropologists and, consequently, to a better understanding of agrarian behavior.

This is well illustrated by the history of share tenancy research. Share tenancy—also known as sharecropping or *metayage*—is widespread in developing countries and has flourished over long stretches of time in the United States and Continental Europe. A standard textbook analysis of share tenancy suggests that it leads to inefficient behavior and does not yield as much return to the landlord as some other forms of contract, such a fixed rent or a wage agreement. Since a share tenant earns a fraction of the output (the remainder being the landlord’s share), she will consider an application of an input worthwhile only if it results in so much additional output that her share of this additional input is greater than the input cost. Hence, so goes the argument, there will be sub-optimal use of fertilizer, labor and other inputs. Hence, the early reaction of economists, typified by Adam Smith and Alfred Marshall (no doubt aided by a touch of chauvinism), was to take a normative stance, castigate the system of *metayage* and urge Continental landlords to switch over to the British system of fixed rental tenancy forthwith.

But when one encounters such seemingly irrational behavior, an alternative response is to take the more introspective line of questioning one’s own assumptions. Could there be something in the environment of a poor farmer that is different from our

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standard assumptions and renders the behavior, which at first sight looks irrational, rational? Indeed, that is precisely what happened in the theory of share tenancy. It was realized that once we introduce uncertainty in the environment or recognize that, even among poor farmers, contracts frequently come with an underlying ‘limited liability’ clause, share tenancy turns out to be a rational and possibly dominant contractual form for landlords to use (Stiglitz, 1974; Newbery, 1977; Basu, 1992). This new research showed that uncertainty however had to occur in two markets for the use of share tenancy to be a rational choice for the landlord. In poor areas with negligible facility for formal insurance, this is not an unrealistic assumption. A farmer frequently confronts uncertainty in the product market and the labor market. As for limited liability, a chance discovery by Atchi Reddy (1996) of a cache of actual agrarian contracts from Nellore, a coastal district of Andhra Pradesh, India, from the late nineteenth-century and early twentieth-century showed that, in regions prone to famines and other natural calamities, it is natural to have tenancy contracts with explicit limited liability clauses. Here are two quotes from, respectively, an 1873 contract and a 1934 contract (Atchi Reddy, 1996, pp.191-2): “If the land lies uncropped due to famines, you need not pay the rent, but should pay the quit rent and road fund in such a year.” And: “In case of total failure of crops due to lack of rains or floods, the tenant need not pay the rent but only the land revenue Rs. 9.”

In retrospective, share tenancy was a relatively the easy subject. There are other more puzzling phenomena, such as the tenacious refusal of farmers to adopt new and better fertilizers or other new technology that seems clearly more productive, or for poor women to rely solely on their household and, in particular, the husband for support and livelihood when this is what so often turns out to be the cause of women’s destitution in old age.

Recent research shows that we can understand much of this behavior if we extend our premise by recognizing that rationality must not always be equated with selfishness, that social norms can temper individual choice, that most individuals function within households with their socially-constructed rites of behavior, and that all this can give rise to behavior which looks perverse in the individualistic setting of old-fashioned economics but may well be the best response of the hapless individual (Duflo, Kremer
and Robinson, 2004; Duflo, 2005; Basu, 2006). This, in turn, brings us to the brink of the debate, mediated by the rise of behavioral economics, about whether it can all be understood by suitably modifying our rationality assumptions or if there is an essential need to go beyond rationality.

2.

To introduce these conundrums with an actual problem, consider the vexing subject of fertilizer adoption. There is plenty of evidence that farmers are tardy in adopting new technology even when there is demonstrable evidence that the new technology is profitable. This carries over to the use of new fertilizers. The Ministry of Agriculture in Kenya has been, for a while, been promoting the use of hybrid seeds and fertilizer to increase maize productivity among farmers in Western Kenya. The specific recommendation about use is not, in retrospect, optimal but it can be shown that it is profitable and, moreover, for smaller quantities of fertilizer use, the returns can be shown to be substantial. Yet, this fertilizer adoption among Western Kenyan farmers has been way below what standard theory would predict, to wit, 100%. A study by Duflo, Kremer and Robinson (2004) showed that in 2000, less than 45% of farmers had ever used fertilizers and only 15% had used fertilizers the year before.

How does one explain this seemingly irrational behavior? Interesting insights were gained by Duflo, Kremer and Robinson (2004) by using a series of randomized field experiments in the Busia district of Western Kenya. The details of the study are long and complex but, to cut to the chase, they chose a group of farmers from among a random selection of parents of school children of the region and from each farmer’s land selected three 30-square meter plots and applied fertilizer and hybrid seed to one, only fertilizer as top dressing on another, and did nothing on the third. The experiment demonstrated that fertilizer as top-dressing is highly rewarding—with average return to a 8-month investment being between 28% and 134%.

These experiments, being done on actual land, with the farmers being shown the results and being assisted in making calculations, effectively constituted an extension service. Indeed, they almost mimicked a Farmer Field School (FFS)⁴, where farmers are
actually schooled with real field demonstration and interaction about new technology. If the reason why farmers do not adopt profitable technology is that they do not know what the returns are, then clearly the farmers who were selected for the above experiments on their land would have no further excuse not to use fertilizer. So, after the actual demonstrations on land were over, Duflo, Kremer and Robinson monitored the adoption of fertilizer by these farmers. It was discovered that their adoption was indeed higher than that of other farmers. Adoption among farmers who did not participate in the trial was 20% and among farmers who did so it was 37%. Clearly, knowledge plays a role but, equally interestingly, the research still leaves open the question of why 63% of the farmers who had personally seen the benefit nevertheless failed to use fertilizers.

It is possible that, even when farmers know the benefit, they find it difficult to make the investment. This can simply be a matter of heavy discounting or a commitment problem, as suggested by contemporary behavioral economics (O’Donoghue and Rabin, 2000). Duflo, Kremer and Robinson showed that, with suitably designed experiments it can indeed be demonstrated that the immediacy of the investment and the delay in the return can explain a further part of the non-adoption; but, even with this, some unexplained behavior persists. But the general point is well-established, namely, that what looks like a yawning gap in our understanding can largely be closed by introducing greater and greater realism into our models of the setting in which we are observing individual behavior.

Once attention gets directed to lack of knowledge as a critical factor, interesting further questions arise. How exactly does the lack of knowledge affect our choices? If a farmer does not know the benefits of adopting a technology, she does not, by definition, know the benefits of not adopting that technology. So why should the lack of knowledge lead to under-adoption? Why not to over-adoption? Our understanding of this is still meager. But an interesting recent study in Peru by Warnick, Escobal and Laszlo (2006) shows that human beings may have an inherent ‘ambiguity aversion’—to be distinguished from risk aversion. That human beings are generally averse to risk is well-known. But how do they react to not even knowing the probabilities of the outcomes or to confronting Knightian uncertainty? That is what the Peru study was about.
In essence, what Warnick, Escobal and Laszlo did was give subjects a choice between option A, where they may earn \( x \) units of money or \( y \) units of money, with probabilities unknown, and another option B, where they may earn \( x \) units of money with probability \( \frac{1}{2} \) or \( y \) units with probability \( \frac{1}{2} \). But to take option B the subject has to pay some money, whereas A comes for free. They found that people have a preference for B, that is, they are prepared to pay money to avoid ambiguity. Since in many real-life problems—whether it be adopting new technology or sending a child to school or contemplating life after a partner’s death—one faces this kind of Knightian uncertainty, it is to be expected that people will shirk what is new.

It is worth commenting that this finding can equally be interpreted as that of ‘probability pessimism’. That is, we can argue that what the above study shows is that when people do not know the probabilities of outcomes, they tend to deflate the probabilities of the good outcomes and exaggerate the probabilities of the bad outcomes.

But, more importantly, this and the above studies point to a deep analytical problem with knowledge. They suggest that, while, through careful analysis and well-crafted empirical studies, we can understand the seemingly puzzling decisions of the poor better and better, there may remain an irreducible core that a purely rationality-based analysis cannot unravel. This somewhat abstract idea will be picked up and formalized in section 4.

Let us now turn to the topic of behavior and the household.

3.

Some individual behavior puzzles can be understood better once we situate the individual in the household and recognize that the household is not a monolith but a domain of complicated interaction that involves cooperation but also the strains of bargain, affection but also power play (Bourguignon and Chiappori, 1994). The focus here is on a sliver of this large topic—the well-being of women in poor households. While a small part of this large topic, this is a large part of the global problem of poverty.
We know that in most countries of the world, including rich ones, in households that are poor, the women are poorer; that when household are too poor to send all children to school, it is the girl child that gets left behind. Hence, contrary to what old-fashioned models would have us believe, it is not just households that are poorer and more vulnerable than other households but, within each household there are more and less poor people and more and less vulnerable members.

The relation between gender and household-based vulnerability was dramatically demonstrated by Mead Cain and some co-authors with a study of Bangladesh and India (Cain, Khanam, Nahar, 1979; Cain, 1986). Because in many traditional societies a woman relies exclusively on the male members of her household, mainly her husband, for well-being—given that she usually does not have an outside job and not even many social links outside the home, when a husband dies a woman’s descent into destitution is much more likely than a man’s when his wife dies. Indeed, this study illustrates numerous cases where, on a husband’s death, a relatively wealthy rural housewife is forced to sell off land under distress and becomes poor. The authors report that among 14 women in their Bangladesh sample, at the time of being widowed, ten were left with some land and four were landless. By the time they were interviewed all sold off substantial portions of their land and four had to sell off all land under extreme distress. Of the four landless one became a beggar and all were destitute. In sharp contrast in Maharashtra, India, where women have greater work force links, a husband’s death is not such an economic calamity. Of 14 similarly placed widows of whom nine had land, only one lost or sold land. The three landless widows had managed to subsist on their own through wage employment and by running small businesses. The paper connected the greater downward impact on women in Bangladesh compared to that in western India to the more active economic role that women have in the latter region.

In poor countries an important objective has to be to help women have networks beyond their immediate household. And the best way to do this is to get more women join the labor force. On this the new household economics sheds interesting light. Basu (2006) takes the agenda of Bourguignon and Chiappori further by arguing that a woman’s power is not exogenous to the choices that a household makes. For example, start with a
household with a certain distribution of power between the husband and the wife. Suppose this household takes a decision to send the wife out to work. It seems reasonable to suppose that this in turn will affect the household balance of power. Once the endogeneity of power is recognized, it becomes possible to show that two \textit{a priori} identical households may exhibit very different ex post behaviors. In other words, a household that sends its women out to work and one that does not, need not have any fundamental—be it cultural, genetic or any other exogenous—difference. Different patterns in women’s work need not be as deeply structural as we often suppose. This new model suggests that if governments, NGOs or other activists can construct short-term interventions to alter the behavior, then this could stick, since the household can get into a new self-fulfilling equilibrium.

Getting more women out to the workplace will not be unmitigated good news, since there is enough evidence that working women continue to take on a disproportionate burden of household work, thereby overworking greatly. But there is reason to believe that this is a left over habit of societies where women had no power and had to do all the housework. It is arguable that their changing work status will, not in one day, but gradually, alter their status at home and eventually lead to a greater sharing of household power and with it the responsibilities and chores.

4.

Let us return to the connection between knowledge and rationality that was discussed in section 2. Consider a farmer facing a choice between two technologies, A (the new one) and B (the old one). Denote the returns from A and B by R(A) and R(B), respectively. The farmer knows the value of R(B) but not the value of R(A). Suppose all that the farmer knows is that the return from A is R(B) + X or R(B) − X, where X (≥0). Let us suppose that in reality \(R(A) = R(B) + X\), and that we the analysts know this. As the above section shows, it would not be surprising at all if, in this situation, the farmer rejects A, since she does not \textit{know} it is superior.

It is usually the case that by spending effort on experimentation and evaluation the farmer can find out the value of R(A). So why does she not do so? This can easily be
answered using the language of rationality. Evaluation and experimentation is typically costly. If this cost is incurred by someone else, such as in the above case where Duflo, Kremer and Robinson organized the experiments on the fields of the farmers, there is no problem in finding out which is better, A or B, and making the right choice. But in most real situations, the farmer has to incur the evaluation cost himself or herself before discovering if A is superior. Let this evaluation cost be C. In other words, to discover which of A and B is better the farmer has to incur the cost C. If C happens to be greater than X/2, it makes sense not to incur the evaluation cost and simply stay with technology B. So staying with the worse technology may be rational, in this ‘meta-rational’ sense, when we take account of the evaluation cost. In summary, refusing to evaluate and then choosing between A and B (and instead simply persisting with B) seems to be rational if the evaluation cost is large.

The trouble arises from the fact that the argument cannot be left at this, for once we go into evaluation costs, we must ask how a person chooses between making an evaluated choice and simply staying on with the status quo. Just as there was the initial choice between A and B, once we bring in evaluation, a new choice problem opens up for the farmer—whether to evaluate (and then choose between A and B) or not to evaluate (and stay with B). This meta choice cannot be obvious since there is no way of knowing in advance the precise cost of evaluating the returns from technology A. If we use A_1 to denote the option of “making an evaluated choice between technologies A and B” and option B_1 to denote the option of not undertaking the evaluation and staying with B, one has to recognize that the choice between A_1 and B_1 once again will entails some evaluation cost. Call this cost C_1, and we are back to the same kind of problem. And by now it will be obvious that, once we introduce evaluation cost into the picture, there arises an infinite regress problem that is impossible to solve. In other words, there is an irreducible problem of rational behavior which no amount of meta-rationality can resolve.

Staying away from the philosophical difficulty that this raises (the economist must however realize that for him or her to stay away from this does not mean the problem is resolved), one important practical implication of this is that it compels us to recognize that there are some situations where instead of trying to rationally understand poor farmers’ choice, we may simply have to observe their behavior for regularity. And
this is the basis of behavioral economics. If we know that, faced with lack of knowledge, farmers tend to stay with the status quo, then that is important enough for us, the analysts, even though the rationality of this behavior may remain an open question.

In other words, the individual rationality assumption may be a useful organizing tool for economists, but we will be wrong if we treat that as the last word in our analysis.

There is also a general flaw in our policy environment that has arisen from the powerful influence that economists have had as public intellectuals and in propagating the rational-actor model. In the modern world the physically weak person does not have to fear losing his assets and property to the physically strong, something which was pretty much expected in primitive society. However, the rationality-challenged person looses out often--cutting poor deals, taking loans at interest rates which are higher than he realizes and signing contracts that are not in his interest—and becomes impoverished in the long run. The reason why the rationality-challenged person is so poorly protected is because of our presumption that individual adults are always rational, that is, nobody is ever rationality-challenged. The analysis in this and the previous section demonstrates that human beings are often less than fully rational. Hence, we may need some policy to protect such people. Usury laws, anti-bonded labor laws and similar legislation can have a foundation in behavioral economics that has not been adequately recognized in the past.

Notes

1 This paper is an adaptation from a paper written for the World Bank’s World Development Report 2008. The paper benefited greatly from the comments of Alain de Janvry.

2 Though the focus in this paper is on the decision-making of poor farmers, much of the analysis applies to other classes of agents as well. Misjudging the interest burden of loans and over borrowing is by no means special to poor farmers as the recent crisis on sub-prime mortgage in the United States demonstrates.

3 It is true that some poor countries, like India, the consumption of the poor does not fluctuate anywhere as sharply as the income of the poor (Townsend, 1994). But this could be precisely because people use costly informal methods to shield themselves against consumption risks, that is, they may be dropping down to a disproportionately low consumption in order to ensure a steady consumption.

4 While we often speak of ‘extension services,’ as if it were one thing, extension service can take many forms, FFS being one of them. Prior studies have shown that a well-designed extension service can yield
large returns. A study by Godtland et al (2004) of potato farmers in the Andes shows that FFS can raise returns by, on average, 32%.

Though, even here, modeling risk innovatively can lead to important new insights. We have, for instance, known for long that poverty can lead to child labor. But that analysis gets vastly enriched once we recognize that the poor are not just poor but also vulnerable to large shocks and that schooling tends to be characterized by state dependence, that is, once a child is withdrawn from school to supplement his or her household’s income, it is difficult for the child to get back to school (PROBE Team, 1999; de Janvry, Finan, Sadoulet and Vakis, 2006). This, in turn, suggests new ways of combating the problem of child labor, which eludes other non-stochastic models or even stochastic models that do not recognize the state-dependent nature of schooling.

These studies in Bangladesh were done before the rise to prominence of Grameen Bank and other microfinance programs, with their great impact of women. There are studies that show that the mere interaction that poor women have with outsiders, such as the microfinance and NGO officials, alters their status at home and empowers them, even when the interaction does not result in more money for the household.

To see this, suppose the farmer treats the probability that \( R(A) \) will be \( R(B) + X \) to be \( \frac{1}{2} \). If she decides to evaluate and then choose between A and B, there is \( \frac{1}{2} \) probability that B will turn out to be better (that is, \( R(A) = R(B) - X \)) and half probability worse. Hence, her expected return is \( \frac{1}{2}R(B) + \frac{1}{2}[R(B) + X] \). Since evaluation has a cost of \( C \), evaluation is worth it if \( \frac{1}{2}R(B) + \frac{1}{2}[R(B) + X] - C > R(B) \). Hence, evaluation is worth it only if \( \frac{1}{2}X > C \).

I had discussed some of this problem, including its philosophical ramifications in Basu (1980).

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