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How Sapient is Homo Economicus?
The Evolutionary Origins of Trade, Ethics and Economic Rationality

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Abstract

The paper argues that economism and, in particular, the individual drive to maximize utility and amass profit are not enough to ensure the efficient functioning of an economy; and that even for elementary economic activities, such as trade, exchange and contracting to occur smoothly, it is essential that human beings be endowed with appropriate social norms, such as a critical level of trustworthiness. This, in turn, implies that an economy's development can depend significantly on whether the citizenry is endowed with the relevant norms. Where these norms come from and how they gather stability remain open questions, though we can get some important insights from theories of evolutionary processes.

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HOW SAPIENT IS HOMO ECONOMICUS?

The evolutionary origins of trade, ethics and economic rationality

Kaushik Basu and Ashok Guha

The primary parable of introductory chapters in most textbooks of economics used to be that of Robinson Crusoe – the sole inhabitant of a lonely island so organizing his limited resources as to optimally satisfy his unlimited wants. Perhaps the Crusoe economy is still the basic stuff of undergraduate economics. Very different however is the message of *The Wealth of Nations*, the classic that most economists would recognize as the fountainhead of their discipline. Adam Smith's primary interest was in individuals immersed in social interaction, enmeshed in a far-flung network of transactions; and he discovered the key to growth, to 'the wealth of nations' in the density and extent of this network. Exchange, not isolation, is, in Smith's view, the secret of economic progress. Wealth emerges, and can be augmented, only in a social context and trade is its essential process.

Economics in its origins was thus a *social* science, not an exercise in optimization in the solitude of some private space. It revolved around the relationships of individuals to others and could not therefore ignore the part played in these relationships by their attitudes to society at large. To spell this point out in some detail, exchange – which Smith and all subsequent economists view as the central mechanism of economics – is believed by mainstream economists to be the inevitable consequence of the pursuit of self-interest by a set of selfish agents provided their preferences have the following two characteristics (1) non-satiation and a consequent desire for more goods, (2) an appetite for variety in preference to more of the same, and provided (3) the distribution of pre-trade endowments among them is asymmetric. This is not however a belief one can test by controlled experiment on human beings in a laboratory setting: every individual brings to such experiments his cultural and social baggage and one can never rule out the possibility that the emergence or absence of trade is due to the impact of some omitted socio-cultural variable.

Undaunted by such problems, economists have conducted experiments with non-human agents, experiments the outcomes of which are presumably unclouded by human culture and social influences. Drawing on different experiments done by economists at different times, it was argued in Basu (2000) that, contrary to a widespread presumption in economics, (1), (2) and (3) are not sufficient for trade and exchange to occur. It has been known for some time that rats prefer more to less. One does not need experiments to see this: they run around all the time looking for food and ravaging everything in their way. In 1975, a group of economists led by John Kagel at the University of Texas did some controlled experiments where they showed that rats also prefer variety (Kagel et al., 1975). The Swedish economist, Karl Warneryd (1995), reports on an experiment in which some economists—who else?--decided to give rats an asymmetric initial distribution of food and check whether they perform trade and exchange. Surprisingly, trade was not the outcome. Most often, it was war and plunder. The rats mostly fought amongst themselves to acquire the largest possible stock of each kind of food.

Apparently, the three conditions mentioned in the previous paragraph do not suffice to induce trade. Certainly, they do not in rats. Nor is it logically inevitable that they would do so in self-interested automata that have the option of fighting as well as trading. Which of these options is selected depends on the values of parameters like the probability of victory and its spoils. The central message in Basu (2000, Chapter 4) was that trade is not the automatic consequence of self-interested calculation but, in addition, of other elements of man's psychological baggage that have been so deliberately excluded from the experiment with rats. The primary economic activity, the mainspring of economic growth is not activated by selfish maximization alone.

If neither rodents nor robots are programmed for trade, is the 'natural propensity to truck', dearly beloved of the classical economists, a myth? Is trade purely a learned response, a product of social conditioning? This is a question to which we shall return later. However, the example of the rats certainly suggests what we would all recognize – that trade cannot develop if individuals do not, or

cannot, control the temptation to attack others in the market-place and snatch away their baskets of goods. More obliquely, it suggests that language, the ability to communicate one's intention to come in peace and engage in bargaining and barter is essential for an exchange economy. Human norms, a modicum of mutual trust, customs and language practices are the underlying conditions that sustain trade. Recent work by Guiso, Sapienza and Zingales [2004, 2006] indicates, for example, that lower levels of trust towards the citizens of a country lead to less trade, investment and growth in that country. Putnam [1995] correlates the economic growth of particular regions with their stocks of 'social capital' – essentially the density of their social networks. Social norms constitute the social infrastructure that determines how more complex economic processes, the repercussions of market behaviour, the consequences of economic policies etc, work themselves out.

But what are social norms and how are they established? The economist's, and increasingly the social scientist's, analysis of this question relies basically on game theory. This is a branch of mathematics that studies human interaction on the postulate that individuals are all hyper-rational maximizers of personal utility. One may well argue that such a postulate represents a very limited view of human motivation. Among other things, it ignores behaviour like trusting and reciprocating trust, which constitute a 'rationality-limiting norm' (Basu, 2000) that allows people to hold back on minor personal gains for the sake of greater social cooperation.

To illustrate the point made in the previous paragraph, refer to the game of the Travellers' Dilemma (Basu [1994]). There are two travelers who have just returned to civilization from a remote Pacific island. In this island, each of them bought a special antique; but, when they get their bags at the airport, each finds that his antique has been damaged. So, they approach the airline manager and seek compensation. The manager, the skilled corporate climber that he is, makes the following offer: "I will reward you for this damage, but I have a problem; I do not know the price of this strange object. If I ask you the price, of course, you will inflate the figure. That being so, I am giving you a rule by which I will compensate you. Since both of you bought identical objects, I am presuming you paid the same price. So here is the rule: Sit at two separate desks and each of you write down the price of

this object. You are allowed to write any integer from 2 to 100 dollars, i.e., 2, 3, 4, up to 100 dollars. If both of you write the same number I will take that to be the correct price and I will give each of you that amount. But, if one writes a higher number than the other, it is evident that that person is trying to make money from the airline. So, I will treat the lower number as the true price and give both of you the lower number but with an additional reward and penalty. The person who wrote the lower number will get the true price, i.e., the low number, plus 2 dollars and the person who wrote the higher number will receive the true price, minus 2 dollars".

Hence, if both of them write down 40, they will get 40 dollars each. But if traveler A writes down 40 and traveler B writes 90, traveler A will get 42 dollars, i.e., the lower price plus 2 dollars as reward, while traveler B gets 38 dollars, i.e., the lower price minus 2 because of dishonesty.

At first both travellers are delighted because this object was, let us assume, very cheap, so that it appears at first sight that they can now make some money. Each traveller thinks: "I will write down 100, I am sure my co-passenger will also be sensible and write down 100; so we will get 100 dollars each". He is about to write 100 when it suddenly strikes him that: "If, instead of writing 100, I write 99 then I will get 101. So, I should write 99 instead of 100". But it will soon strike him that the other person will surely figure out the same thing and write 99. If they both write 99 they will get 99 dollars each. However, in that case he can do better by writing 98. He will then get 100. But surely the other person will do the same. Continuing with this line of reasoning, we have a process of introspective *backward induction.* This leads us all the way to the prediction that each of the travellers will write 2 and get 2 dollars each. This also happens to be the equilibrium prediction because if the other player writes 2 there is nothing better that one can do than writing 2. If he writes a higher number he will actually get zero: $2 - 2 = 0$. And he is not allowed to write a lower number. So, if the other person writes 2, he may as well write 2. In the parlance of game theory, each player writing 2 constitutes a Nash equilibrium..

Let us now abandon game theory and formal economics and do some free thinking. If we do play the Traveller's Dilemma game, would we really write down

2? Our own hunch is that we would not. We would trust the other player and write a high number, say 98 or 99 or maybe even 100, and assume that the other person is going to do something similar. Indeed, there has been a whole series of experiments in laboratories with the Traveller's Dilemma game, which included actual financial rewards. For instance, Charles Holt and his colleagues at the University of Virgnia ran some experiments (Capra et al., 1999).[1] There have also been experiments without actual payments but for a large number of people conducted by Ariel Rubinstein (2006). These experiments observe how people play this game and the finding is that, in fact, people do not play by the rules of rationality. The widespread evidence is that a large number of people choose numbers in the high 90s, few choose 100, and very few choose 2. Our own guess is that people who chose 2 are just trying to show that they have studied game theory and that they know what equilibrium is all about. Human instinct is to trust one another and to go for a higher number.

Game theory thus assumes away the limits to rationality that experimentalists and behaviorists claim to observe. Further, it implies that individuals are not only supremely rational (in this sense) themselves, but also that they attribute the same measure of rationality to others. Such interactive rationality is best illustrated by the fable of the Hat-seller and the Monkey, reported in Basu (2007). There was once a hat seller – so goes the fable – who was walking down a forest path with his ware of hats, when he felt very sleepy. So he put down the whole bunch of hats and decided to take a siesta. When he woke up he saw that a group of monkeys had carried all the hats to the top of a tree and were wearing them. He was distressed since his livelihood depended on the hats. In frustration and dismay he took off his own hat and threw it down on the ground. Monkeys, as we know, love to imitate; so all the hats were thrown down. He picked up the hats and went his way.

Forty years later, the hat seller's grandson, who had also taken up the time-honored profession of hat-selling, was going with his collection of hats down the same forest path when he suddenly felt sleepy. He put down the hats and went off to

[1] These experiments comprised financial rewards of a lower order than the original 100 dollars.

sleep. When he woke up he saw that monkeys had taken the hats to the top of a tree and were wearing them. What could he do? He suddenly remembered his grandfather's story. So, he took off his hat and threw it down. At that point, one monkey came down, picked up the hat, put it on and scrambled up the tree, saying: "You think only you have a grandfather?" The hat seller's grandson had ignored the basic game theory principle of interactive rationality.

Economists search for equilibria in games of social interaction – collections of individual behaviour patterns in which each person's actions represent his best response to everyone else's, so that no one has any incentive to act differently and the specific set of actions is replicated indefinitely. Given interactive rationality however, many, if not most, games have multiple equilibria. An excellent example of this relates to punctuality (Basu and Weibull, 1993). There is a large literature on punctuality by social scientists outside of economics, mainly social psychologists, regarding differences in punctuality behavior across people. What is remarkable and catches a social scientist's attention is that, although there are individual differences in punctuality, there are also society-level differences: some societies—countries or communities—are systematically less punctual than others. Punctuality is a much more rewarding exercise in a society where other people are punctual. Where they are not, individual punctuality is not fruitful, but only frustrating. Therefore, punctuality behavior can generate multiple equilibria.

Multiplicity of equilibria means that, in the absence of a coordination mechanism, none of these equilibria may be realized. Economists interpret social *conventions* as coordination mechanisms or selection devices by which all (or almost all) members of a society may choose between the variety of equilibria open in any given social situation. These conventions acquire the moral force of *norms* when people come to expect them to be generally followed and base their own actions on this expectation – so that they are inconvenienced and therefore resentful when anyone violates the convention; the violator in turn experiences shame and guilt.

In most of the situations we have mentioned, of course, no one has any incentive to violate an established convention. If everyone else is following it, it is

in my interest to follow it as well. It is easy enough however to visualize innumerable situations in which the opposite holds. The classic prototype of such situations is the Prisoner's Dilemma. Two prisoners, suspected of being partners in a crime, are being interrogated in separate cells. If both confess, they will be sentenced to a life in prison. If neither confesses, there will be no evidence against them and both will be set free. But if one confesses and the other doesn't, the confessor turns approver and is set at liberty to enjoy by himself the fruits of the crime without having to share them with his partner who is hanged to death. With payoffs thus structured, the dominant strategy for each prisoner is to confess – regardless of what the other might be doing. They end up therefore spending their lives in prison when they might both have been free if neither had confessed. If criminal communities evolve a cooperative norm of never confessing, there are, in situations of the kind described, strong incentives to defect from this norm. It is when such conflicts arise between norms and self-interest that moral values are put to the test. However, if a dilemma is a unique episode never-to-be-repeated in the personal experience of the prisoners, the temptation to defect would be almost irresistible – unless of course the criminal community changes the structure of payoffs by devising its own exquisite punishments for the confessors. In the one-off situation, a defector does better today and can never be punished in future.

Things are very different when the prisoner's dilemma is an indefinitely recurring scenario. The first-period defector can now be punished in subsequent re-runs. Indeed, game theory has a celebrated Folk Theorem which assures us that in any indefinitely repeated game where the players care about the future, punishments can always be devised that would deter any would-be defector by outweighing any present gain that defection may yield. Moreover, there are infinitely many punishment strategies that would achieve this end. The simplest effective punishment strategy (that works provided certain conditions are satisfied) is one that embodies the principle of reciprocity – Tit-for-Tat[2]. This prescribes cooperation in the first period; thereafter, it proposes replicating the behaviour of the other player in the previous period.

[2] Interestingly, the Tit-for-Tat strategy does not have all the formal game-theoretic properties one looks for in describing equilibrium behavior.

Tit-for-Tat – doing unto others as they've done unto you after an initial overture of good will – is a strategy with the virtue of simplicity. If one's partner responds in like manner to one's initial gesture, a relationship of cooperation is forged. If he defects, one withholds cooperation subsequently until he changes his ways. One avoids prolonged vulnerability to, and exploitation by, cheats. One also avoids however the costs of permanently unforgiving retaliation (such as those involved in the so-called 'grim' strategy of punishing a defection by defecting relentlessly ever after, leaving no scope for a change of heart on the part of the original defector). No wonder then that Tit-for-Tat has emerged the winner in computerized tournaments between hundreds of alternative strategies, indicating that it is likely to evolve spontaneously and sustain itself in any large population of individuals involved in repeated interaction (Axelrod, 1984).

The Tit-for-Tat principles of reciprocal altruism and revenge find their echoes in almost every human society. 'An eye for an eye and a tooth for a tooth' on the one hand and 'One good turn deserves another' are maxims at the root of the moral codes of Judaism and Islam; and while Jesus's injunction to 'Love them that hate you' constitutes a radical departure from them, it is doubtful if many Christian communities obeyed it in practice. Confucius, when asked if a single word could serve as a guidepost for all of life, suggested 'reciprocity.'

Pairwise reciprocity does not however constitute an adequate solution for the prisoners' dilemma in a large population in which there is a low probability of repeat encounters between any particular pair. The principle needs to be extended and generalized to involve the community at large: a method must be designed to ensure that, after A and B have interacted, the next member of the community to encounter A (or B) does the reciprocation. This perhaps could work through a reputation mechanism. If A is known to have cheated B, C is not very likely to trust A enough to engage with him in any transaction that offers the slightest opportunity for fraud. If A has been honest and generous to B, C will be happy to interact with him in the expectation of similar honesty and generosity. However, the possibility remains that A, after cheating B, will persuade C to interact with him by sharing some of his

cheating gains with C – so that C abdicates his presumed function, of punishing A for cheating B. In effect, A and C have formed a coalition to defraud B. An extension of reciprocity to the multilateral plane requires that the community should punish C if he fails to punish A. A self-sustaining equilibrium can evolve on the basis of an implicit social contract that (1) every member of a community should punish any member who is known to have cheated any other, and that (2) any member who does not do so receives the same punishment from the other members. A classic example of such an equilibrium is portrayed in Avner Greif's famous description of the medieval Maghribi merchant community (Greif, 1993).

Thus, in our pursuit of the basis of trade, we have stumbled upon behaviour patterns well beyond the limits of narrow self –interest, patterns like cooperation and loyalty to the group, reciprocity (both in the form of gratitude and of revenge), kindness and trust (which ensure that the initial gesture in a transaction is one of generosity), social obligation and duty (to punish those who have cheated others or have possibly colluded with such cheats by not punishing them in their own interactions). All of this behaviour can evolve as a self-sustaining set of strategies in an evolutionarily stable equilibrium. All of it also comprises a universally recognized set of ethical principles. How did this behaviour actually originate – through the competition of alternative strategies or as a consequence of deeply ingrained moral values? Certainly, it is not a part of human psychological experience that most of us rationally and consciously calculate the discounted long term gains and losses of a 'strategy' of honesty or trust before deciding to act honestly or trustingly. There is a deeper emotional content that underlies most of our 'prosocial' behaviour, a subconscious source from which it draws its energy. There is now a growing literature that argues that prosocial behavior is an innate characteristic of human beings even though it can be both nurtured and muted through conditioning (Benabou and Tirole, 2006; Ellingsen and Johannesson, 2008; Basu, 2009).

One reason why we have hard-wired into us elements of pro-social behavior could lie in the realms of evolutionary biology and psychology. These sciences reject the picture of man as a fully rational maximizer of expected utility, a point on

which they have been endorsed by recent work in experimental and behavioural economics. Kahneman and Tversky, for example, have demonstrated that people have an irrational aversion to selling assets at what they perceive is a loss, even when faced with the certainty of larger losses if they delay the sale. Their decisions seem to depend on what they consider to be a reference point (for example the price at which they acquired the asset). Loss aversion has often been regarded as a by-product of the 'endowment effect' – the attachment people have to their possessions and the consequent tendency to overvalue them relative to the same objects when not in their hands. Experiments such as the well-known Ultimatum Game reveal that people reject utility-maximizing offers that they consider to be unfairly low in comparison to what others are receiving, even if there is no prospect whatsoever of a revised offer[3]. Economists are slowly coming round to the biologist's view that man is no *homo economicus*. He is indeed guided to some extent by conscious reason but is moved also by passions and emotions that deflect him from the path of utility-maximization.

The evolutionary biologist views man as he does other animals, not as a utility-maximizing machine that has appeared from nowhere, but as the product of a process of natural selection designed to maximize total genetic proliferation in the environment in which he has spent most of his existence. And since man has spent 95% of his time on earth in the forest environment of a hunter-gatherer society, he has acquired the genetic make-up and the characteristics that enhance his ability to proliferate as a hunter-gatherer. For example, all species that hunt larger animals must cooperate and share food, a requirement that ensures that only species with an inborn sense of fairness and an ability to control narrow personal desires in the interest of group cooperation can flourish. Capacities for friendship, affection, gratitude, sympathy and trust constitute the emotional cement that fosters group cooperation. However, unless supplemented by a capacity for retaliation, fuelled by anger and resentment, in the event of a betrayal of trust, these positive traits will not be evolutionarily stable. A few opportunists will be able to successfully exploit the

[3] It is of course possible to defend the utility-maximization axiom by defining the chosen action to be the one that gives maximum utility. Recourse to such a strategy would however render the theory useless, since by being able to explain all behavior it would lose the ability to predict any particular behavior.

rest of the group and proliferate relative to the others. Thus, reciprocity is part of the essential formula for genetic success. Fair sharing likewise requires the ability to identify with others and perceive how a given distribution looks from their point of view: it is impossible without the gift of empathy. Morality is part of the genetic equipment without which man could not have survived in the environment in which he emerged, utility maximization is not.

It is the morality of reciprocity that constitutes the essential infrastructure of trade; and the experiments of Kagel and others demonstrate that this infrastructure is missing in rats. Does this establish that the ethical basis of trade (and with it the whole superstructure of economic transactions) is cultural, determined by nurture, rather than by nature?

Any answer to this question requires an examination of the interactions, not only of rats, but of our closer relatives, the primates as well. Observation and experiment have now established beyond doubt that primates routinely indulge in elementary trades in services (see for example, Barrett and Henzi [2006]), exchanging grooming for sex (Gumert [2007]) and political support (Watts [2000]), sometimes even for goods like food (de Waal [1997]). While they do not spontaneously develop commodity barter in deals not mediated by man, they have the capacity for it and can learn with little difficulty to trade goods (Noe [2006]). Indeed, Laurie Santos and her group of researchers at Yale have even trained them to use 'money', inherently worthless tokens that they can use to 'buy' goods from the experimenter. What is more, once a community of primates believes that the tokens constitute purchasing power over goods, a rudimentary money economy may evolve: tokens have even been offered –and accepted and traded for food – by primates as payment for sex – the oldest profession reappearing in simian garb. The Generalized Axiom of Revealed Preference and the law of demand have been verified as valid for primates. Even the deviations that prospect theory finds to expected utility maximization in man have their echoes in primate behaviour: Capuchin monkeys have been shown to exhibit reference-dependence and loss-aversion in their demand responses (Brosnan and de Waal, [2004], Chen *et al* [2006]). Finally, while chimpanzees tend to be reluctant to trade goods (but not services), this appears to

reflect the insecurity of contract and of property in chimpanzee – and indeed in all non-human primate – societies (Brosnan and Grady [2009])..

Apes and some monkeys then trade services and have a capacity to trade goods, which is not often realized because of the precariousness of ownership regimes in simian society. Not surprisingly, recent observation and experiment has revealed the rudiments of a primate morality very similar to the human traits that form the moral foundation of trade. Apes and monkeys have a well-developed code of reciprocity and exhibit behaviour indicative of gratitude and revenge. They form alliances and friendships and resent and punish the betrayal of trust. They also have a keenly- developed sense of fairness (see for example Brosnan and de Waal [2003]). They exhibit empathy and compassion. They also reveal the negatives of these traits, the proclivity to exploit the positive characteristics of others for personal benefit. Typically, this involves deceit and dishonesty. Examples of primate behaviour that displays such characteristics are legion, reliably reported and profusely documented (de Waal [1989], de Waal [2005], Wright [1994]). Less abundant is the evidence on the cognitive aspects of morality among primates; but even here, de Waal [1995] and others have cited examples of primate behaviour indicative of guilt and shame after having secretly infringed the established norms of their society – and guilt and shame are of course the basic building blocks of conscience.

Thus, the capacities for trade and for morality are important but not unique to our species. They are present at least in our closest cousins in the animal kingdom. Further, they seem to have co-evolved through the selective advantage they confer in all species that hunted larger animals.

A final, closely related theme is that of property. Respect for, and infractions of, the right of property are major issues in ethics; and they are central to the expansion of trade, investment and economic growth (as demonstrated by the inability, cited above, of chimpanzees to fully exploit their well-developed capacity for trade and realize the benefits that this could have yielded). The selective advantage of a generally accepted convention of property or, more generally, a prior, collectively-agreed-upon specification of rights in situations of potential conflicts of

interest is that it facilitates the peaceful resolution of conflicts. It would not be surprising therefore for such conventions to evolve spontaneously. Wherever an asymmetry between rival claims to an asset can be readily observed and verified, these claims can be settled on the basis of this asymmetry, thus creating a rule of property (Sugden [1986]) or on the basis of a commonly-accepted convention (Myerson [2004]).

The most obvious asymmetry of course is that of prior possession[4]; and possession tends therefore to become nine points of the law of property. Again, this is not a unique feature of our species. Most animals obey 'the territorial imperative' (Ardrey, [1966]). They respect the right of the incumbent in occupation of any territory; challenges, if any, are confined to brief ritual gestures, and, if combat actually occurs, the incumbent wins over 80% of such battles, regardless of the relative size and strength of the combatants. Among apes, the right of incumbency even trumps that of hierarchy: even the dominant male has no automatic right to food in the possession of someone far down the pecking order: he must beg for a share in it. The characteristic that tends to induce such behaviour has been described as 'the endowment effect', the tendency of the possessor to overvalue his possessions relative to the same goods when not in his hands: things acquire a special value for me once they become 'my own'. The endowment effect implies 'loss aversion'. It means that incumbents fight harder for their possessions than challengers do – and this not only ensures that they nearly always win but also that most others are deterred from mounting a challenge. This has been observed in all primate species and all territorial animals. It also is the phenomenon that constitutes the most important exception to the rationality postulate (that people maximize expected utility) that experimental and behavioural economists have observed in human behaviour. The pervasiveness of the endowment effect in the animal kingdom and, according to recent research, in human behaviour as well suggests that it has evolved due to strong selective advantages, perhaps because it facilitates the peaceful resolution of property disputes. Certainly, evolutionary considerations suggest a biological basis for an ethics of property, backed up by a powerful territorial instinct

[4] This is not to deny that the meaning of prior possession itself has important ambiguities and what property rights means depends in part on how we resolve these ambiguities.

and the emotions that this stirs up. Where this is implemented by social institutions or translated into law and enforced by a coercive apparatus (like the state), more and more complex forms of property – ranging from the durable to the non-material – can emerge and stimulate investment and growth.

This is not to deny that human beings can 'learn' to curtail and keep within limits this instinct for prior possession. In many societies human beings pay up their income taxes without resistance, contribute voluntarily to common causes, desist from polluting the atmosphere even when no one is watching them. Growth and, in particular, equitable development often depends on a society's ability to nurture such desirable norms. Traditional economics has been concerned with economic policy. That is certainly important; but, at the same time, many of the secrets of a society's potential success lie in the structure of its social norms and institutions. Given that we have thus far paid only cursory attention to these 'non-economic' factors, the marginal returns from studying these are likely to be large.

References

Ardrey, R. (1966). *The Territorial Imperative*. New York. Atheneum.

Axelrod, R. (1984). *The Evolution of Cooperation.* New York. Basic Books.

Axelrod, R., and Hamilton, W. D. (1981). The evolution of cooperation. *Science*, 211, 1390–1396.

Barrett, L. and Henzi, S. P. (2006). Monkeys, markets and minds: biological markets and primate sociality. In *Cooperation in Primates and Humans* (ed. P. M. Kappeler and C. P. Van Schaik).

Basu, K. (1994). The Traveler's Dilemma: Paradoxes of Rationality in Game Theory, *American Economic Review* 84: 391-395.

Basu, K. (2000). *Prelude to Political Economy: A Study of the Social and Political Foundations of Economics.* Oxford. Oxford University Press.

Basu, K. (2006). Desarollo desde una perspectiva multidisciplinaria: analysis economico y normas socials. *Cuestiones Economicas* 22: 57-71.

Basu, K. (2007). The Traveler's Dilemma. *Scientific American* 296: 90-95.

Basu, K. (2009). Altruism, Other-Regarding Behavior and Identity: The Moral Basis of Prosperity and Oppression. *Economics and Philosophy*. Forthcoming.

Basu, K. and Weibull, J. (2003), Punctuality. A Cultural Trait as Equilibrium, in Arnott, R., Greenwald, B., Kanbur, R. and Nalebuff, B. (eds.), *Economics for an Imperfect World: Essays in Honor of Joseph Stiglitz*, Cambridge, MA: The MIT Press.

Benabou, R. and Tirole, J. (2006), 'Incentives and Prosocial Behavior,' *American Economic Review*, vol. 96, 1652-79.

Brosnan, S. F. and de Waal, F. (2003). Monkeys Reject Unequal Pay, *Nature* 425, 297-299.

Brosnan, S. F. and de Waal, F. (2004). Socially Learned Preferences for Differentially Rewarded Tokens in the Brown Capuchin Monkey. *Journal of Comparative Psychology*, 118, 2, 133—139.

Capra, M., Goeree, J. Gomez, R. and Holt, C. (1999), "Anomalous Behavior in a Traveler's Dilemma", *American Economic Review* 89: 678-690

Chen, M. K., Lakshminaryanan, V. & Santos, L. R. (2006). The evolution of our preferences: Evidence from Capuchin monkey trading behavior. *Journal of Political Economy*. 114(3). 517-537.

De Waal, F. (1989). Food sharing and reciprocal obligation among chimpanzees. *Journal of Human Evolution.* 18. 433-459.

De Waal, F. (1995). *Good-Natured: the Origins of Right and Wrong in Humans and other Animals.* Cambridge. Harvard University Press.

De Waal, F. (1997). The chimpanzee's service economy: food for grooming. *Evolution and Human Behaviour.* 18. 375-386.

De Waal, F. (2005). *Our Inner Ape*. London. Granta Publications.

Ellingsen, T. and Johannesson, M. (2008), 'Pride and Prejudice: The Human Side of Incentive Theory,' *American Economic Review.* Forthcoming.

Greif, A. (1993). Contract Enforceability and Economic Institutions in Early Trade: The Maghribi Traders' Coalition. *American Economic Review.* 83: 525-48.

Guiso, L., P. Sapienza and L. Zingales (2004). The role of social capital in financial development. *American Economic Review*. 94. 526-556.

Guiso, L., P. Sapienza and L. Zingales (2006). Does culture affect economic outcomes? *Journal of Economic Perspectives*. 20. 23-48.

Gumert, M. D. (2007). Payment for sex in a macaque mating market. *Animal Behaviour*. 74. 1655-1667.

Hamilton, W. D. (1964). The genetical evolution of social behaviour. *Journal of Theoretical Biology*. 7. 1-52.

Kagel, John H., R.C. Battalio, H. Rachlin, R.L. Basmann, L. Green and K.R. Klemm (1975), Experimental Studies of Consumer Demand Behavior Using Laboratory Animals, *Economic Inquiry* 8: 22-38.

Kahneman, D. and Tversky, A. (1979). Prospect theory. An analysis of decision under risk. *Econometrica.* 47. 263-292.

Kahneman, D., and Tversky, A (1991). Loss aversion in riskless choice: a reference-dependent model. *Quart. J. Econ.*, 106, 1039–1061.

Myerson, R. (2004). 'Justice, Institutions, and Multiple Equilibria,' *Chicago Journal of International Law.* 5: 91-107.

Noe, R (2006). Digging for the roots of trading. In *Cooperation in Primates and Humans* (ed. P. M. Kappeler and C. P. Van Schaik)

Putnam, R. F. (1995). Bowling alone: America's declining social capital. *Journal of Democracy*. 6(1). 65-78.

Rubinstein, A. (2006), Dilemmas of an Economic Theorist, *Econometrica*, vol. 74, 865-884.

Sober, E., and Wilson, D. S. (1998). *Unto Others: The Evolution and Psychology of Unselfish Behavior*, Cambridge, MA: Harvard University Press.

Sugden, R. (1986). *The Economics of Rights, Cooperation and Welfare.* Oxford. Blackwell.

Trivers, R. L. (1971). The evolution of reciprocal altruism. *Quart. Rev. Biol*., 46, 35–57.

Warneryd, K. (1995), 'Language, Evolution and the Theory of Games,' in Casti, J. L. and Karlqvist, A. (eds.) *Cooperation and Conflict in General Evolutionary Processes*, New York: John Wiley.

Watts, D. P. (2000), Grooming between male chimpanzees at Ngogo, Kibale National Park. Influence of male rank and possible competition for partners, *International Journal of Primatology*, 21, 211-238.

Wright, R. (1994). *The Moral Animal*. New York. Random House.