



## Moral markets

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### ABSTRACT

Is market exchange solely dependent on selfishness or does other-regarding behavior play any substantial role? This article reviews the philosophical, psychological and neurological basis for moral values, showing that they are consistent and measurable. I demonstrate that values play a role in social interactions, including market exchange. Indeed, market exchange in moderately regulated economies is predicated on the notion that most people, most of the time, behave morally – albeit in the shadow of enforcement. This idea is of ancient origin, but is most clearly articulated in Adam Smith's Theory of Moral Sentiments. The moral nature of social decisions is used to identify modifications of the standard expected utility model, and implications for a value-based approach to human decisions are elucidated for law, regulation, business organization, economic growth, and happiness. The conditions that lead to moral market failures like the Enron debacle are also described. Not only do morals underpin markets, but intriguing new evidence suggests that markets may strengthen moral values.

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## 1. Introduction

Just as nature is “red in tooth and claw,” so are markets. Dog-eat-dog competition eliminates inefficiencies unlike any other known force. Consumers search for the lowest price for a product that is often made in a far-away land where capital and labor are the cheapest. Managers run lean operations consistently working near capacity, and any shirking earns a pink slip. Boards of directors scrutinize financial statements, revenue forecasts, and survey tax options to maximize share prices. Ivan Boesky's exhortation that “greed is good” is immortalized on the big screen, and it seems in all our capitalist hearts, even as Boesky and many other business people have done prison stints for legal transgressions.

That self-interest leads to socially optimal outcomes has been part of the DNA of economics since Adam Smith described the dance we do with the butcher and the baker in the *Wealth of Nations*. We simply accept as a truism that it is self-interest that drives the creation of wealth, not some altruistic tendency to help the other guy. Indeed, as positivists, nearly all modern economists have abjured any discussion of morals in our analyses.

While the story of capitalist wealth may resonate with portions of the U.S. population and other Western countries, for many in the developed and especially less developed countries, the caricature of capitalist selfish greed is profoundly disturbing. Indeed, if market economies are the path to reduce poverty, drive down astronomical fertility and infant mortality

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rates, halt the scourge of AIDS, and induce transitions to democracy (Feng et al., 2000; Zak and Feng, 2003; Easterlin, 2006; Rajan and Zingales, 2004; Easterly, 2002), as Westerners and social scientists we should be profoundly concerned with the opposition to markets.

How can competing to satisfy our selfish desires be reconciled with the philosophy of Larry Page and Sergey Brin, founders of Google, Inc., who have designed their very profitable company on maxims such as “You can make money without doing evil” and “Work should be challenging and the challenge should be fun”? Work...fun? This runs counter to 200 years of research in economics that assumes work provides disutility. Moreover, could the Google guys be correct that businesses ought to be moral? My late colleague Peter Drucker promoted the view that businesses were societies in miniature, and were therefore places individuals sought to fulfill human needs such as the desire for accomplishment and respect, well beyond simply earning a living (Drucker, 2003, p. 14).

So which version of economics—“greed is good” or “do no evil”—is correct? This article will present a variety of data to support the thesis that market exchange requires morality. I will further argue that markets reinforce human morals. The approach I will take will be from the ground up: going from evolution, to animal models, to the brain, to institutions and economics. Because human beings exchange in markets, we must understand the human propensity to exchange before we can weigh the evidence for or against moral behavior in markets. There are moral failures in exchange to be sure, and I will use the Enron debacle as a case study to demonstrate the kinds of conditions that cause moral failings and associated market punishment. Modern economic exchange does not require perfectly moral behavior at all times, just mostly moral behavior most of the time.

Much of the evidence I will present is not new, but will be deployed in novel ways to examine market exchange. I have endeavored to provide convergent evidence for moral markets by surveying findings across disciplines. The evidence presented is a synthesis of a 2-year research program by a transdisciplinary group of scholars; many of the arguments I present here for moral markets can be found in the volume I edited reporting our finding (Zak, 2008). Let me stress that what follows, like all new findings, is an informed opinion. It is derived from a large number of studies, many of them experimental, and many neurological. I hope to begin a dialog on moral markets with this article, rather than it being seen as the final word.

We will begin with basic questions such as: What are “morals”? Is there any evidence that morals are consistent and measurable? Do institutions promote or inhibit morality? Does trade degrade human dignity? These questions are ancient in origin: In the Confucian social hierarchy, “shang,” or merchants, were near the bottom, only one rung above social parasites. This was justified by the fact that merchants did not produce anything unlike farmers, craftspeople, or scholars (Eastman, 1988). Similar degradations of merchants can be found in Plato’s Republic, the Vedic caste system, and the writings of Karl Marx.

The belief in the selfishness of merchants, and by extension, anyone who trades in markets, persists because it makes compelling story-telling (Casebeer, 2008). It is more interesting to tell a tale of the selfish, cheating merchant than the quotidian normalcy of purchase and delivery. After all, the movie “Wall Street” earned fifty million dollars because it was a great story, not because it was true. I dare say that even the most free-market-oriented economists get a small thrill when Michael Milken, Dennis Kozlowski or Jeffrey Skilling did the “perp walk.” Selfish bastards! They got what they deserved. The idea of Wal-Mart driving out the Mom and Pop business raises our hackles because Goliath is beating David. The “evils of the market” presumptive stories persist precisely because of their pathos, even while they contain some element of truth. There is nothing interesting or memorable about managing a business and treating customers well. It is a quirk of the human brain that we remember best that which is unusual and emotionally charged. Thus the caricature of selfishness persists. The question we will explore here is the interplay between self-serving and other-serving behaviors in markets.

### 1.1. The plan

The quote in the first sentence about competition in nature from Alfred Lord Tennyson was deliberately chosen to link markets to biology. After defining what morals are, I will examine the biological foundations of morality. Using evolution as the organizing principle grounds and constrains the subsequent behavioral analyses. This structure permits an examination of behaviors among a broad continuum, including behaviors in species closely related to humans such as apes. Conclusions that violate evolutionary principles are fundamentally suspect.

Cultural norms are also subject to evolution. Historical evidence indicates that exchange has led to institutions that tend to reinforce moral behaviors. Clearly, not everyone is virtuous in every circumstance, so exchange must occur in the shadow of enforcement. Once this is established, we then look at how laws and public policy promote or inhibit moral markets. I conclude with a discussion of how moral values can be used to augment the traditional economic model and then draw implications from these modifications for institutional design, public policy, law, economic growth, and happiness.

In this paragraph, I will preview the primary supporting mechanisms producing moral markets for those who prefer not to read the entire article and to foreshadow the core argument for those who will read on so that it will resonate more strongly when it reappears. Human beings are a highly social species. In particular, we interact routinely with strangers. As a result, we gauge our own and others’ behaviors against social expectations. This social constraint on behavior manifests as shared values, and militates towards virtue because virtue is rewarded and vice is vigorously punished. Indeed, because uncoerced market exchange requires gains for both parties (i.e. positive consumer and producer surplus), exchange itself is necessarily other-regarding. The “win-win” aspect of exchange is known to all parties, and therefore a buying decision is

contingent on understanding that the producer needs to make a fair profit to stay in business and that consumers have budget constraints and alternative suppliers. In reasonably competitive markets, sharing the gains from exchange is the norm; a variety of field and laboratory evidence reveals that excessive greed results in an absence of exchange and a subsequent loss of the gains to trade (Babcock and Loewenstein, 1997; Cooter and Rubinfeld, 1989). Neuroeconomics experiments show that the human brain is finely tuned to aggressively punish those who violate sharing norms. Fairness is part of human nature. Market exchange reinforces our notion that honesty, trustworthiness and sharing are how humans live together in societies. We return to those who treat us well, and avoid those who do not.

This essay's thesis is controversial primarily because of the Confucian/Vedic/Marxian residue that invades our daily thought and language, as well as the practice of narrow neoclassical economics. Exchange is somehow considered "dirty business," even though nearly all of us are economic actors every waking moment: we are working, shopping, eating, watching movies or reading books, bribing our children to behave well, or thinking about how to do one of these. I hope to convince you that this market behavior is by-and-large dependent on morality.

## 2. Philosophical underpinnings

In this section, I provide a philosophical basis for the existence of moral values. This treatment is not extensive, but is meant to provide definitions to concretize the analysis. Good additional references include the books by Hauser (2006), Shermer (2004), and Ridley (1998), and the review articles by Greene and Haidt (2002) and Casebeer (2003).

### 2.1. Morality defined and examples

Morality is derived from the Latin *moralitas*, meaning "manner, character, or proper behavior". It identifies a behavior that is virtuous or upholds moral values. I conceptualize moral values as guides to action. They are beliefs that are more basic than heuristics. Instead, they are part of the foundation for heuristics. Moral values are deeply held constituents of one's personality, though not immutable. Values tend to evolve as children mature (Peterson and Seligman, 2004, p. 27), but in adults tend to be stable within an individual, though there is variation across individuals. Some moral values appear to be universal. Schwartz (1994) identifies a set of broad values that appear in nearly all societies from a survey of 44 countries. A value that prohibits dishonesty, if generally followed, offers one protection against cheating at a low or zero investigative cost. Other values similarly support social probity.

Aristotle argued that *eudaimonia* or happiness was obtained by living a virtuous life. He identified eight virtues: courage, temperance, liberality, magnificence, proper pride, good temper, modesty, and friendliness. Two thousand years later, Benjamin Franklin recognized thirteen virtues: temperance, silence, order, resolution, frugality, industry, sincerity, justice, moderation, cleanliness, tranquility, chastity, and humility. At age 20, Franklin designed a weekly checklist to ensure he was practicing every one of these virtues as he believed this was the way to achieve happiness (Haidt, 2006; Solomon, 2008). Adam Smith, in the *Theory of Moral Sentiments* (1759) stated that our happiness comes from practicing the virtues of prudence, justice and beneficence. The expression of these virtues, Smith believed, came from both our own self-interest, as well as the desire for approbation from others.

In their tour de force examining values and character traits, Peterson and Seligman (2004) provide a taxonomy of virtuous behaviors. They find support for the universal values of wisdom, courage, humanity, justice, temperance, and transcendence. Following one's values may generate internal rewards, while violations can induce a sense of pain. Psychologically, one may consider oneself a "good" person when one follows one's values.

Rokeach (1973) distinguishes between instrumental and terminal values. Instrumental values are the means to achieve a goal. Examples include being courageous, honest, and ambitious. Terminal values are end goals in themselves. Examples of terminal values include prosperity, freedom, security, and pleasure. Values, especially instrumental values, can further be broken down into those that are primarily personal and those that are interpersonal or social. The latter are often called moral values, where "morality" denotes broad acceptance or prohibition of a behavior within or even across societies. As I will discuss below, engaging in, or observing violations of, moral values typically produces a strongly felt physiologic response. Values are therefore a motivation for behavior.

A defining characteristic of values is that they affect our choices. Further, values are often exercised at a cost because some choices will be judged objectionable and thus avoided. An example is that most people, absent psychopathology, have a deeply held prohibition against killing others. This means that the person talking on the cell phone who is holding up traffic cannot be killed (even though we might fleetingly desire this; Buss (2005) reports that 91% of men and 84% of women have had at least one vivid homicidal fantasy). In most societies, the prohibition against killing is lifted for soldiers fighting other soldiers, police officers chasing dangerous criminals, and those in imminent mortal danger from another. Values, then, proscribe behavior. Values may be limited to those in one's social group; "enemies", "slaves", and "savages" have, at certain times in history, been considered subhuman and therefore some values can be violated when interacting with them. In any situation, several values may interact or even conflict when deciding how to behave. Further, the weight put on instrumental versus terminal values varies across individuals (Schwartz, 1994).

The environment one is in, including institutional settings, may impact the expression of moral values. For example, moral violations are modulated when others from one's social group are doing the same thing. This is an explanation for the moral violations of "ordinary" German citizens who tortured and killed Jews under the Nazi regime. Because their neighbors

were doing this, and due to the threat of severe punishment for not complying, killing Jews became morally neutral. Social psychologist James Waller termed this “moral disengagement” (Waller, 2002).

I draw two conclusions from the discussion above. First, values are real, stable, and therefore measurable (e.g. see the survey instruments at <http://www.authentic happiness.sas.upenn.edu>). Economists blanch at using “squishy” immeasurable factors in their analyses—moral values are not squishy. Second, moral values affect behavior generally, and therefore potentially economic behavior.

## 2.2. Which Adam Smith?

Of Adam Smith's two great books, *The Theory of Moral Sentiments* (TMS), first published in 1759 is typically considered much less important than *An Inquiry into the Nature and Causes of the Wealth of Nations* (WN) published in 1776, though this view is starting to change (Smith, 1998). In its time, TMS caused a sensation, selling out in weeks, and propelling Adam Smith from holding a minor professorship at the University of Glasgow, to being a well-remunerated public intellectual. Smith considered TMS so important that he continued to revise and expand it until his death.

In TMS, Smith identified the social nature of human beings and sought to understand the nature of, and motivation for, morality. Smith used the notion of sympathy—an emotional response to another's needs—as a primary psychological feature that guided moral behaviors. (This response is closer to what we now call “empathy,” and I will use empathy from now on to indicate socially-induced emotional reactions.) Smith claimed that emotional responses act as a social glue that connects us to others and are the basis for moral behavior. In TMS Smith (1759)(1790, I.1.14), he wrote:

Man, say they, conscious of his own weakness, and of the need which he has for the assistance of others, rejoices whenever he observes that they adopt his own passions, because he is then assured of that assistance; and grieves whenever he observes the contrary, because he is then assured of their opposition. But both the pleasure and the pain are always felt so instantaneously, and often upon such frivolous occasions, that it seems evident that neither of them can be derived from any such self-interested consideration.

Smith suggested that this concordance was emotional not cognitive, and could not be suppressed. While Smith had these insights 250 years ago, only in the last 10 years have rigorous experiments demonstrated how the brain *effectuates* an emotional correspondence between people (see Section 4.1 below).

An uncritical reading of both of Adam Smith's great books makes him appear two-faced on markets and morality (Smith, 1998). In Book 1 of Chapter 1 of WN, Adam Smith begins his extensive support of self-interest as beneficial, and perhaps even essential, to the workings of the economy. His argument is that the division of labor produces surplus and a desire to trade (1904, I.1.12):

Every workman has a great quantity of his own work to dispose of beyond what he himself has occasion for; and every other workman being exactly in the same situation, he is enabled to exchange a great quantity of his own goods for a great quantity, or, what comes to the same thing, for the price of a great quantity of theirs. He supplies them abundantly with what they have occasion for, and they accommodate him as amply with what he has occasion for, and a general plenty diffuses itself through all the different ranks of the society.

There is no need to concern oneself with another's work, just do one's own. This reasoning permeates the WN, and is distinct from TMS and the tradition of the Scottish school of philosophy as exemplified by Smith's teacher Francis Hutcheson (1742/2002).

How can these two views of human nature be reconciled? First, self-interest and an empathic desire to help others are not mutually exclusive. One can be quite focused on working hard to raise one's salary to purchase a new BMW, as well as to support an ailing child or to make a donation to help disaster victims. Second, these motivations may operate in different locations and environments. While I ruthlessly seek the lowest price when purchasing a stock, I also pay more to have my shirts laundered by a shopkeeper near my home because I know her and want to support her business. Lastly, though empathic responses, as I'll review below, are largely unconscious, they may or may not affect decisions. I may feel empathy for the homeless beggar, but still choose not to give him money perhaps out of a belief that I'm supporting his drug habit. Yet, empathy is important in supporting reciprocity: we cooperate with those who cooperate with us because it feels right, and it feels wrong not to do so. The empathy response connects us to others and modulates our narrowly selfish instincts to obtain the potential gains from cooperation. In short, we constantly adapt to our social environment by shuttling between narrow self-interest and generosity towards others.

Robert Frank eloquently argued that empathy for others serves as a commitment device that bolsters the fulfillment of contracts (Frank, 1988). In the unconscious calculus of “cheat versus fulfill,” if most of those who intend to cheat can be detected by, for example, a flushed face or averted eyes, then transactions are not consummated with likely cheaters. Frank argues that subtle physical signs often betray intentions, from the dog preparing to attack to nonhuman primates who intend to share (Frank, 2008). Moral emotions increase economic efficiency by guiding the selection of likely noncheating transaction partners, and by reducing the transactions costs associated with contract enforcement. Laboratory experiments confirm that people are good at predicting who will cheat, and who will not in one-shot games (Frank et al., 1993).

Karl Marx grabbed the notion of narrow self-interest from WN to critique capitalism. A primary misunderstanding made by Marx is that exploitation (e.g. of workers) is the way to add maximal value in production. Marx correctly understood that a temptation to exploit others exists in decentralized market economies, but he largely missed the reputational restraints on this behavior imposed by competition and customers' own values. We often choose to purchase products or patronize businesses that achieve goals besides the lowest price. Examples include dolphin-safe tuna, "fair-trade" coffee farmed by indigenous peoples, and Chik-fil-A fast-food restaurants that close on Sundays to honor the Christian Sabbath. It is important to note that moral sentiments are strongly felt but not immutable. Violations will occur and there is scope for institutional constraints and remedies for these.

So where is Adam Smith on morals and markets? Smith clearly distinguished self-interest from selfishness. Unlike Marx, Smith argued that self-interested behavior includes empathy for others: this is what allows us to live together in societies, and is the foundation for the reciprocity that enables impersonal exchange in market economies. There is no contradiction in Adam Smith's two great books as moral sentiments precede and make possible the mutual gains available through market exchange. Indeed, the invisible hand of the market may well be our moral sentiments. Moral values help us determine when, and with whom, to exchange, producing a check on exploitation. Smith writes in TMS that "By acting according to the dictates of our moral faculties, we necessarily pursue the most effective means for promoting the happiness of mankind" (vol. II, p. 316), including our own happiness.

### 3. The evolution of moral values

In this section, I review findings showing that moral values arose during primate evolution. In addition, I present evidence that economic institutions co-evolved with humans, leading to rules that arose to specify appropriate behaviors during exchange, especially exchange with strangers.

#### 3.1. Moral animals

If moral sentiments affect human decisions, a plausible account of their evolution must be demonstrated to understand how and where morals arise. Moral values often motivate prosocial behaviors, including altruism (benefiting another at expense to oneself), so this is where we will start. The most easily explained type of altruism is that focused on kin. Offspring can be considered parasites that require resources until they are self-sufficient. An extreme example of sacrifice to kin is the invitation by the mother to her offspring to consume her (matriphagy) in the spider *Amaurobius ferox* (Kim and Horela, 1998). Cooperation towards kin is well-explained by evolutionary fitness considerations, first formalized by William Hamilton (Hamilton, 1964), though the mathematical evolutionary biologist J.B.S. Haldane stated the concept in 1932, but surprisingly did not derive the mathematical relationship (Dugatkin, 2006).

The first evolutionary analysis of cooperative behaviors in unrelated animals was Russian Prince Peter Kropotkin's (1902) book *Mutual Aid: A Factor of Evolution*. Kropotkin argued that "mutual aid is as much a law of animal life as mutual struggle." Kropotkin's resolution of the evolutionary mystery of cooperation among non-kin was that the costs of cooperation are less than the (eventual) benefits. This was formalized in Robert Trivers's celebrated 1971 paper under the term "reciprocal altruism" (Trivers, 1971). Reciprocal altruism predicts individually costly altruism towards another under the expectation that the other will sacrifice in the future to help the initial altruist. This mutualism is the basis for many repeat economic interactions.

Trivers speculated about the psychological mechanisms that would support reciprocal altruism. These include gratitude in response to an altruistic act, empathy for the altruist, and moralistic aggression (punishment) of nonreciprocators. These closely echo Adam Smith's claim "That whatever appears to be the proper object of gratitude, appears to deserve reward; and that, in the same manner, whatever appears to be the proper object of resentment, appears to deserve punishment" (TMS, Part II, Section 1, Chapter 1).

Reciprocal altruism has been extended several ways, most prominently, to "indirect reciprocity": I help you today so that some other person will help me in the future (Alexander, 1979, 1987). Indirect reciprocity requires that an animal has a long life and sufficient cognitive resources to remember social accounts for an extended period. Alexander (1987) argues convincingly that indirect reciprocity is the basis for moral behaviors. Reputation matters for human beings.

Nowak and Sigmund (1998, 2005) demonstrate that indirect reciprocity in a one-shot dyadic interaction, under the set of conditions stated above, is an evolutionarily stable strategy; that is, it cannot be squashed by an invading set of unconditional noncooperators. Importantly, stability requires that defectors are punished and that interactions are embedded in a multi-member social setting. That social structure precedes reciprocity again resonates with Adam Smith in TMS.

Additional evolutionary mechanisms that support cooperation include strong reciprocity (Gintis, 2000) and group (or multi-level) selection models. Strong reciprocity, defined as using one's resources to reward cooperators and punish defectors, uniquely predicts third-party punishment—a behavior often observed in the laboratory and in the world. Group selection can support cooperation with nonkin as an evolutionarily stable strategy if individuals can be excluded from the group (Panchanathan and Boyd, 2004; Sober and Wilson, 1999).

The evidence for kin-based and direct reciprocity is strong in mammals. Examples include directed intertemporal food sharing among chimpanzees, vampire bats, dolphins, and in some species of monkey (de Waal, 2006). Similarly, grooming in chimpanzees increases the likelihood of subsequent food sharing. Indirect reciprocity has only clearly been demonstrated

in humans, and appears to derive from empathic concerns (Zak et al., 2007; de Waal, 2006; Preston and de Waal, 2002). This view of indirect reciprocity predicts that I share with you because I understand (and perhaps feel) the pain that you are suffering by your deprivation. The evidence for the role of empathy in other-regarding behaviors is presented in detail in Section 4.1. Fehr et al. (2002) argue that strong reciprocity explains moral behaviors in humans better than existing theories since it contains an explicit punishment component.

Even though human beings have big brains, extensive accounting of social merits and demerits is cognitively costly. As a result, we use emotional signals such as facial expressions and eye gaze to intuit intentions to cooperate. Cooperation is not a “veneer” over our base selfish instincts (de Waal, 2006), or necessarily due to confusing one-shot with repeated interactions (Fehr et al., 2002), but appears to be part of our evolved predispositions as social animals. We have a penchant to cooperate, it seems to make us happy, and we dislike those who are noncooperators.

### 3.2. Cultural evolution

Because our sense of right and wrong has extensive evolutionary roots, it is unlikely that morality is unconnected with market behaviors. Indeed, markets themselves are human creations. Markets grew out of the human propensity to “truck, barter, and exchange” (WN, I.II.157). Exchange presumably occurred first among kin-based groups, but eventually evolved to include nonkin as civilizations appeared around 10,000 years ago following the warmer climate after Pleistocene–Holocene transition (Richerson and Boyd, 2006; Ridley, 2010). The hallmark of civilization is the agglomeration of mostly unrelated individuals who live and work in a community. Civilization requires exchange, and communities formed once a consensus regarding norms of exchange emerged. Because we are imperfect cooperators and are tempted to defect, the move from personal exchange with kin to impersonal exchange in a society required the development of institutions to enforce trading standards. The key values that potentiate exchange include the Smithian virtues of fairness, honesty, patience, and trustworthiness. The institutions that developed reflected our evolved expectation of fair dealing and the punishment of transgressors. The cultural convention to institutionalize virtues has been called the “moral hidden hand” (Richerson and Boyd, 2006, 2008).

As the complexity of economic exchange grew, the institutions needed to enforce moral values also evolved. These institutions economized on cognitive resources by specifying appropriate behaviors during exchange when our moral sentiments might fail us. When economic power is widely distributed, the enforcement of contracts is more efficiently outsourced to a central authority—the blossoming of government (Buchanan, 2001; Sened, 1997). The formalization of economic values may have induced a co-evolutionary feedback mechanism where the moral hidden hand pervades other social realms such as education, criminal law, and public goods use. The bothersome “No ball playing” sign at the Jersey shore is one example where an explicit social value is identified (if not necessarily enforced) because, presumably, many people’s own values regarding appropriate behavior fail. Institutions take up this slack.

We can conclude that human beings evolved a strong propensity to be conditional cooperators. Cooperation is an evolutionarily stable strategy under a variety of reasonable conditions, starting with kin, and extending to nonkin. Moral values facilitate exchange absent perfect third-party enforcement of violations. As the extent of the market broadened, informal and then formal institutions co-evolved to clarify expected behaviors, including virtues such as honesty, fairness, and trustworthiness. These institutions are clearly imperfect, as evidenced by the corruption and extraordinarily poor economic performance in much of the world (North, 1990). Continued institutional evolution to promote moral behaviors that underpin economic exchange is expected, if not perfectly understood (North, 2005).

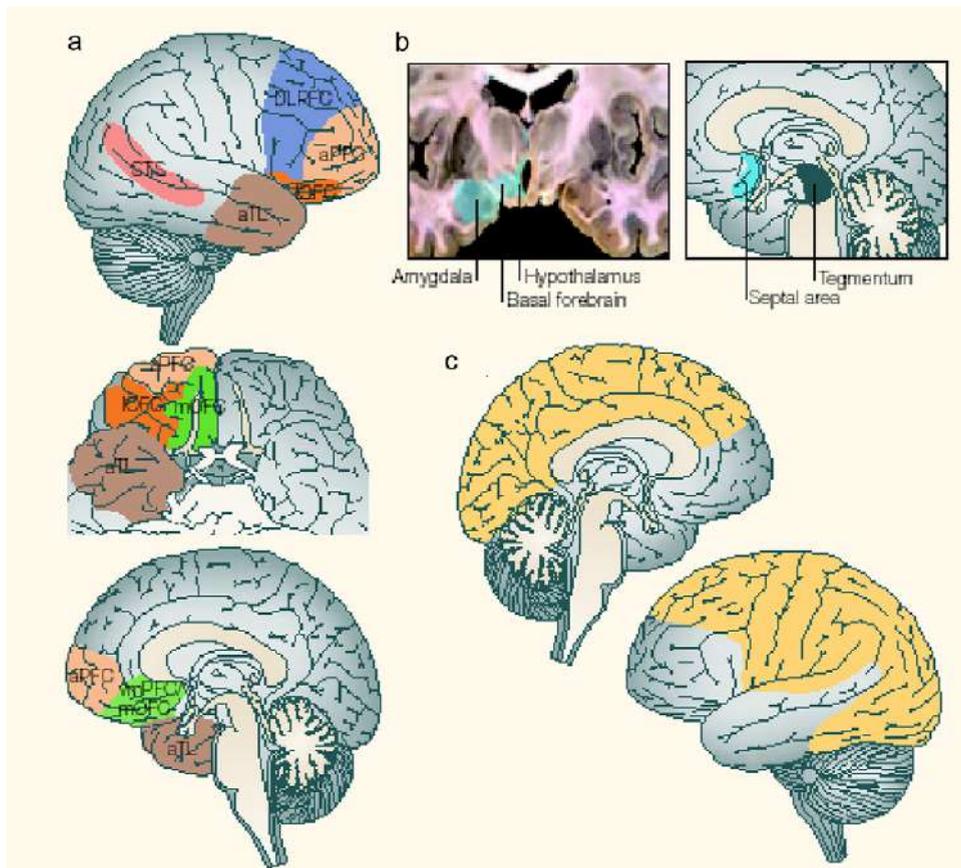
## 4. Morals in the brain

In this section, I first identify the primary brain mechanisms that support moral behaviors. Next, I survey the neuroscience literature to distinguish how the proposed mechanisms operate. I then conclude with a review of a number of neuroeconomics experiments that support Adam Smith’s view in TMS that empathy is a critical element supporting moral behaviors.

For orientation during this discussion, areas in the brain that are on the outer surface or cortex (Latin for “bark”) and towards the front of the brain (anterior) are evolutionarily newer. Humans differ from all other animals in our expanded prefrontal cortex that first appeared five million years ago. Brain regions that are closer to midline (medial) and the base of the brain (ventral, Latin for “belly”) are evolutionarily older. Basic reviews of neuroanatomy can be found in Zak (2004) or Dubin (2002). The application of the findings discussed in this section for building improved economic models is discussed in Section 6 (also see Park and Zak, 2007; Vercoe and Zak, 2010).

### 4.1. Neural mechanisms supporting moral values

There are three primary mechanisms that have been discovered in the human brain that together appear to function as a moral compass. These systems are: mirror neurons, theory of mind, and affective representations. These are distinct but not independent neural structures that support social behaviors. Fig. 1 shows the locations in the brain of these structures.



**Fig. 1.** Brain regions associated with social cognition. Red shows areas with mirror neurons; blue are regions associated with theory of mind; green regions active when we view the affective states of others. (For interpretation of the references to color in the figure caption, the reader is referred to the web version of the article.)

Source: Moll et al. (2005), <http://www.nature.com/nrn/journal/v6/n10/abs/nrn1768.html>.

Observing others' movements involuntarily activates brain regions associated with the planning and execution of such movements in the observer. These neurons have been called "mirror neurons" (Rizzolatti et al., 1996) as they appear to produce an internal simulation in the observer of the occurring action. Mirror neurons have been found in primates, including humans and in some birds (Rizzolatti et al., 2001; Decety and Jackson, 2004; Iacoboni and Dapretto, 2006). Mirror neurons appear to encode not only motor movements, but intentions associated with movements. This system also modulates regions of the brain associated with emotions during social interactions.

A second brain mechanism permits us to infer the cognitive states of others. This has been called "mentalizing" or having a "theory of mind" (ToM). ToM permits us to forecast the beliefs and intentions of others by putting ourselves into the other's place and asking what we would do in such a situation. This is an extraordinarily useful ability that facilitates social interactions, especially with strangers, and is the brain mechanism behind choosing a Nash strategy. Children under 5 years old are unable to mentalize, and impairments in ToM are common in those with autism. ToM has been localized to the medial prefrontal cortex and temporal-parietal junction (Saxe and Wexler, 2005), and has been shown by neuroeconomists to affect decision-making (McCabe et al., 2001).

A third system the brain uses to decipher what others are doing is through affective representation. This can occur when we observe an action occurring (either a real-time action or a photo or video), or by observing a facial expression (commonly fear, disgust, or pain), or even simply by being told that another is in an emotional state (Singer et al., 2004; Wicker et al., 2003; Canli and Amin, 2002; Decety and Chaminade, 2003). Fig. 2a and b provides examples of photographs that typically produce an emotional reaction when they are observed. The areas activated during affective representation vary by study, but include regions associated with emotional responses and cortical regions that modulate such responses (see Fig. 1). This internal representation of another's emotions can be called empathy.

#### 4.2. Neuroethics

Neuroethics has emerged as a distinct interdisciplinary field in the last 10 years as the cost of brain imaging techniques has fallen. The field has sufficiently developed that a professional society recently formed (<http://www.neuroethics.org>).



**Fig. 2.** (a) A photograph that demonstrates emotional contagion. The faces not only display emotion, but also can induce a similar state in the viewer if one focuses on the expressions. (b) A photograph of a person who was stabbed in the head. This type of image can generate disgust in the viewer. *Source:* (a) International Affective Picture System, University of Miami. (b) *Source:* Medical Images. From: Coursin D, Habibi S, McDermott J, Helgerson R. Atlas of Anesthesia: Subspecialty Care. Edited by Ronald Miller (series editor), Stanley Muravchick.

The first neuroimaging study of moral decisions was led by [Greene et al. \(2001\)](#). They asked subjects to answer yes/no questions about how they would behave in a series of personal and impersonal moral dilemmas developed by philosophers. Personal moral dilemmas take the form “Would you do something directly to harm another to save a group of people from certain harm.” Impersonal dilemmas are similar, but the proposed action occurs at a distance; i.e. would you put into motion actions that would harm one person to save others. Behaviorally, most people are “utilitarian” when solving impersonal moral dilemmas; that is, they say it is acceptable to allow one person to be sacrificed to save a group of people. The opposite occurs when answering personal moral questions: most people are averse to personally harming one person to save a group of others.

Contrasting neural activation during personal and impersonal moral dilemmas, these researchers found that personal decisions produced greater brain activation in prefrontal ToM regions, as well as evolutionarily older subcortical regions associated with emotions. They also found that brain regions associated with working memory had reduced activations during personal moral dilemmas. This suggests that people don’t cogitate during personal moral dilemmas, they simply



**Fig. 3.** A photograph of an emotionally charged moral violation.

Source: Moll et al. (2005).

intuit (or even have a feeling about) the “right” answer. This shows that personal moral dilemmas differentially draw on rapid affective representations of harm to others (“empathy”), rather than focusing on outcomes (“utilitarian”).

In a related brain imaging study, Moll et al. (2002) had subjects view pictures of emotionally charged or neutral scenes and asked them to rate their moral content. An example of an emotionally charged stimulus is a photograph of a man with a knife to the throat of a woman (Fig. 3). Comparing neural activity during moral violations to activity when viewing pictures that were simply unpleasant (e.g. a mutilated body), Moll and colleagues found the strongest activation in subcortical regions associated with emotions, especially in the amygdala. These neural signals often have a peripheral (somatic) basis as measured by skin conductance and heart rate (Scheman, 1996).

Social distance and evaluations of other’s character also affect how the brain reacts to social stimuli. Singer et al. (2004) compared the infliction of moderate amounts of pain (an electrical shock) on a woman or on her male spouse seated next to her. Activations of the “pain matrix” in these women’s brains were nearly identical when pain was directly received and when one’s spouse received pain.

These findings indicate that humans have representations of another’s intentions and social situation using brain regions associated with emotions. Affective representations are both found in the brain, and in the periphery. William James (1890) believed that emotional responses affected body states, an idea that was extended by Antonio Damasio as the “somatic marker hypothesis” (Damasio, 1994). Under this view of emotions, we appear to not only simulate another’s situation in our brains, but also experience what others may be feeling in our bodies. For example, when we are asked to make a moral decision, we may be able to “try out” choices by seeing how it feels to be a person who chooses one thing or another. Less personally-engaging impersonal moral decisions use evolutionarily newer regions of the prefrontal cortex associated with cognitive deliberation that modulate emotional responses. Patients with prefrontal damage behave like utilitarians, even when making decisions in personal moral dilemmas, because they lack the somatic feedback that guides empathic responses (Koenigs et al., 2007). More generally, moral decisions use both newer cognitive brain regions and older brain regions that process emotions and regulate body states. The literature in neuroethics has consistently demonstrated that the Kantian notion of morality as being learned by rational deduction is by-and-large wrong.

#### 4.3. Neuroeconomics of moral behaviors

Several neuroeconomics studies have examined brain activity when engaging in behaviors we might call as a short-hand “good” (e.g. cooperative) or “bad” (e.g. noncooperative). The rationale for doing neuroeconomics experiments is to put the human back into economics by directly measuring how humans make decisions. Since in many experiments, subjects are unable to articulate why they make their decisions, measuring neural activity gets us out of this dead-end (Park and Zak, 2007). Neuroeconomics studies can also offer clues to individual differences in behaviors. These studies often use well-known tasks in economics, such as choosing between lotteries, or various strategic games. Differences can be explained by different patterns of brain activation to the same stimulus.

Behavior in experimental games is very sensitive to framing effects. For example, a recent study of the ten dollar dictator game found that making sentences from words associated with civic responsibility or words associated with God increased offers by 69–129%, respectively, compared to making sentences with neutral words (Shariff and Norenzayan, 2007). As a result, neuroeconomics experiments are careful to instruct subjects using neutral terms in standard versions of games so not to lead subjects’ behaviors.

In an early neuroeconomics study, Rilling et al. (2002) had 36 female subjects play an iterated prisoner’s dilemma game, where decision-maker 1 (DM1) and decision-maker 2 (DM2) choose to either cooperate or defect. Subjects were informed if they were playing against a human being or a computer that moved randomly. Contrasting activity in the human versus

computer treatments, these researchers found that cooperation activated midbrain regions associated with reward, as well as frontal regions associated with conflict resolution (the anterior cingulate cortex). The conclusion from this study is that cooperation is rewarding, but requires mediation of the conflicting concerns of taking money immediately relative to ceding control to another for the possibility of receiving a larger reward. Rilling and colleagues also found that the region with the strongest activation during cooperation is the somatosensory association cortex, a region that monitors physical body states. This is consistent with Damasio's somatic market hypothesis (1994) and a general role for feelings affecting social decisions. In a similar study, McCabe et al. (2001) found strong activation during cooperation with a person in a medial prefrontal region associated with ToM. This suggests that two primary mechanisms support cooperative behaviors, one is cognitive (ToM) and the other affective (reward and body states).

A related study by Sanfey et al. (2002) asked subjects to make decisions in the ultimatum game (UG). In the UG there is a proposer and a responder. The proposer is given sum of money, say \$10 and is instructed to offer a split of this to the responder. If the responder accepts the split, the money is paid. But, if the responder rejects the split, both parties earn nothing. Behaviorally, offers by the proposer of less than 30% of the total are almost always rejected in industrialized societies (this regularity does not hold for "small scale" nomadic, agrarian, and pastoral societies, see Henrich et al., 2004). The question Sanfey and colleagues asked was why DM2s in the UG reject good money to punish another person for being stingy in a blinded one-shot interaction. They demonstrated that neural activity when a responder received a low offer of the split, contrasted with an equal or hyperfair offer, was greater in regions of the brain associated with monitoring visceral states (the insular cortex). When the insula is stimulated electrically, people feel disgust or nausea. Subjects who received stingy offers appeared to be disgusted by them and were motivated to punish the transgressor even at a cost to themselves.

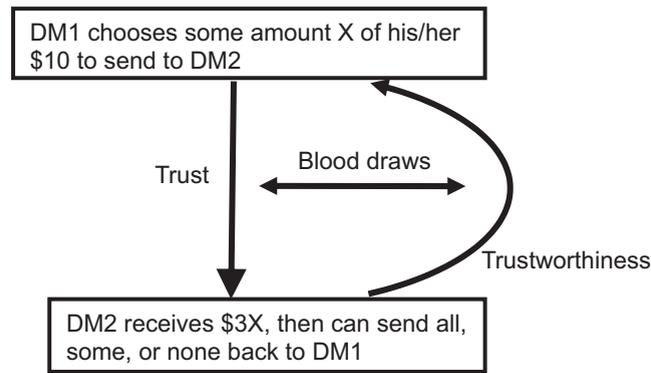
In another study of costly punishment, de Quervain et al. (2004) asked 15 men to play a game that admitted cooperation and defection, with the ability to directly punish those who defected (either at a cost or symbolically without cost). Individuals in the study knew that they interacted only once with each other participant, so that costly punishment would not benefit their future earnings from the game (though punishment might be viewed as benefiting others). Costly punishment, when compared to symbolic punishment, produced strong activation in mid-brain regions associated with reward. Men in this study appeared to punish others because it felt good.

Delgado et al. (2005) examined brain activation in a monetary cooperation/defection task between strangers. Prior to making decisions, subjects in the magnetic resonance imaging (MRI) scanner read (fictitious) descriptions of their (fictitious) dyadic partner that were either praiseworthy, neutral, or negative. Cooperation rates were lower for the partner with diminished moral character, and these interactions produced less rewarding activity in midbrain regions. Extending this study, Singer et al. (2006) inflicted mild electrical shocks on partners in a monetary cooperation task who were either cooperative or defected. In men (but not women), activation of the pain matrix was reduced when observing noncooperative people receiving shocks. More tellingly, men also had reward-associated activations when watching noncooperative people being shocked.

Taken as a whole, these studies indicate that cooperation is rewarding and that, at least men, have a desire to punish those who violate social norms. An open question is whether behavior in an MRI scanner is useful to understand what people do "in the field." MRI scanners are very large donut-shaped magnets that are quite noisy when they are running. Experimental subjects who are comfortable in this environment can make consistent decisions while lying prone in the magnet. Functional MRI (fMRI) is a technique to measure brain activity over time while people engage in specific tasks. fMRI measures small changes in the ratio of oxygenated to deoxygenated blood. This ratio is an indirect measure of localized neural activity (brain tissue uses oxygen when working that must be replaced) while the entire brain is being scanned. Analysis of fMRI data subtracts activity during a task of interest from a control task, and then one determines which locations (called "voxels") among about 50,000 measured throughout the brain are statistically more active when comparing tasks. Typical differences in regional activity between tasks in fMRI data amount to one-half percent to one-percent. These differences are often statistically significant because of the sheer amount of data collected. A standard fMRI experiment will collect data every four seconds for an hour or more for all 50,000 measurable voxels.

Given the unusualness of the MRI environment, the inherent noisiness of physiologic data, and the small absolute differences in brain activity, it is important to have convergent evidence besides fMRI before concluding that a particular behavior can be traced to the differential activity in brain regions. For example, there are ways to "turn on" and "turn off" brain activity to show the necessity of regions producing a behavior by using drugs or magnetic pulses. Patients with localized brain damage in regions of interest can also be studied to extract causal claims. Animal models are also useful in experiments to gauge the evolutionary foundations of a behavior. All these methods, fMRI, drug infusions, magnetic pulses, animal studies, and studying lesion patients are part of the neuroeconomics toolbox. See Zak (2004) and Camerer et al. (2005) for surveys of methods in neuroeconomics.

Let's look at another strain of evidence. Nonhuman primates also act in ways that are consistent with their having primitive moral values (de Waal, 2006). For example, several species of monkeys appear to have a sense of fairness and a desire for equity. In a number of studies, monkeys and apes have demonstrated a willingness to forgo food to punish a conspecific who has violated sharing norms (Brosnan, 2008). Since nonhuman primates have quite small prefrontal cortices relative to humans, this suggests that moral values have evolutionarily deep roots and are not dependent on sophisticated cognitive abilities. It is also worth pointing out that some monkeys understand symbolic exchange of useless objects for food; a latent use of money (Brosnan, 2008; Chen et al., 2006). Social animals, including humans, exchange.



**Fig. 4.** The trust game used in Zak et al. (2005). All subjects receive \$10 for participating and are randomly put into dyads. There is random assignment as Decision-Maker 1 (DM1) and DM2. All choices are mediated by computer and are immediately followed by blood draws.

#### 4.4. Oxytocin and empathy

Emotional responses in the brain can be provoked simply by the knowledge of another's intentions. Horror movies use the anticipation of the villain stalking his prey to arouse our fear. On the other end of the spectrum, movies in which the hero dies tragically or the guy finally gets the girl can provoke tears. While the brain regions that produce empathy, reviewed above, have been identified, proximate mechanisms that induce empathy and their evolutionary roots are just beginning to be found. Knowledge of the proximate mechanisms for empathy permit a general characterization of situations in which they are expected to be active or inhibited. This information is essential for our task in Section 6 where the economic impact of moral markets and associated applications are explored.

A candidate proximate mechanism for empathy is the neuro-active hormone oxytocin (OT). OT is Greek for "fast birth," and this uniquely mammalian hormone is classically associated with contraction of the uterus during parturition and initiation of milk-letdown for breastfeeding. In animal models, OT has also been shown to facilitate maternal attachment to, and care for, offspring. In monogamous mammals, OT release also mediates pair-bonding and what might be called pro-social behaviors in same-sex conspecifics (Carter et al., 2006).

There are OT receptors in evolutionarily old brain regions associated with emotions, regulation of body states, and social behaviors. Indeed, OT knock-out mice suffer from "social amnesia" (Ferguson et al., 2000). The behavioral effects of OT in humans were unstudied prior to the discovery by my lab of its effects mediating trusting behaviors between strangers (Zak, 2004, 2005). OT had not been studied behaviorally in humans because it is medically uninteresting except for during and just after women give birth, it is notoriously hard to measure, and non-reproductive stimuli that could be used in a laboratory setting had not been found. OT has a half-life of three minutes, and degrades rapidly at room temperature, so careful timing and handling are required to measure it. And OT must also be measured in blood, requiring an invasive procedure. To make matters worse, basal OT levels are near the level of measurement of standard assays, so figuring out how to "spike" OT was essential for accurate measurement. My collaborators and I designed an experiment to surmount these hurdles because an extensive animal literature suggested OT might explain cooperation between strangers.

To raise OT levels, we used the sequential social dilemma known as the trust game (Berg et al., 1995). In the trust game (depicted in Fig. 4), DM1s and DM2s are randomly assigned to dyads with their identities masked. Each receives an endowment for participation, typically \$10. After instruction, and absent deception, DM1 is prompted by computer to decide if he or she would like to take an integer amount out of his or her account and transfer this money to the DM2 in the dyad. Money transferred is permanently withdrawn from DM1's account, and it is tripled in DM2's account. Computer software reports to DM2 the amount received from DM1, and then DM2 is prompted to choose a return transfer to DM1. The return transfer can range from zero to the total in DM2's account, and this transfer comes out of DM2's account and is not tripled but goes into DM1's account one-to-one. After making these decisions, participants are privately paid their earnings. All DMs get identical instructions, full information about the game's structure, and are informed in advance that they will only make a single decision after which the game ends.

The consensus view in experimental economics is that the DM1 to DM2 transfer can be considered an index of trust. Reciprocity by DM2, similarly, can be called trustworthiness (Smith, 1998). This protocol is clever because showing trust in someone is costly, but is done in the hope of a greater reward if DM2 reciprocates. The subgame perfect Nash equilibrium of this game is for DM1 to send zero and for DM2 to return zero. Less than 10% of DM1s chose this strategy, and 98% of DM2s who receive money, return at least some (Zak, 2007).

After developing a tight timing protocol for the blood draw and a careful handling protocol for the isolation of blood products that contain OT, we ran the experiment. Based on the animal literature showing that a safe interaction between animals causes OT release, we hypothesized that when DM2s in the trust game received an intentional signal of trust their brains would release OT. In three related studies, we found that DM2s who received an intentional monetary transfer from DM1s had a surge in OT relative to DM2s who received an identically-sized transfer determined randomly by a public pull

of a ping-pong ball (Zak, 2004, 2005; Morhenn et al., 2008). The greater the signal of trust, the more OT was released, and in turn, the greater trustworthiness DM2s showed. Because any physiologic measurements are inherently noisy, we ran a very large sample ( $N = 156$ ) to demonstrate that the findings were robust. Experiments with physiologic measurements are typically small due to the difficulty of obtaining data and the high cost (this experiment cost approximately \$300 per subject, or nearly \$50,000, for data). Measuring nine other hormones that interact with OT, we did not find a direct or indirect effect of these on trustworthy behaviors.

Finding that OT facilitates reciprocity is important for several reasons. First, because these experiments involve monetary transfers by computer, absent face-to-face communication, it reveals how socially connected humans are to each other. OT appears to facilitate a temporary “attachment” to, or interest in the welfare of, a stranger who has demonstrated trust, and induces a desire to reciprocate. In this way, OT supports cooperation. Second, OT is modifiable through one’s developmental history. Rodents who are insufficiently nurtured after birth show marked reductions in the number of OT receptors in their brains (Carter et al., 2006). Differences in OT release, as well as the densities and locations of OT receptors, may partially explain the wide variance in trusting behaviors seen in the trust game.

My lab also showed that DM2s in the trust game who are unconditional nonreciprocators (that is, who play the sub-game perfect Nash strategy), have a dysregulation of the OT system (Zak, 2005). In psychological surveys, these Machiavellian players have characteristics similar to psychopaths (they are manipulative, feel entitled to certain things as “their right”, have a lack of remorse, shame or guilt, shallow emotions, a lack of empathy, and are sexually promiscuous; see Diagnostic and Statistical Manual IV TR, American Psychiatric Association, 2000). Social phobics have a similar OT dysregulation (Hoge et al., 2008), and autistics may as well (Hollander et al., 2003).

Third, OT is part of our adaptive response to changes in our external environment. Environments that are highly stressful inhibit OT release, while those that are safe and socially supportive promote trust and raise OT levels (Zak and Fakhar, 2006; Carter et al., 2006). The causal effect of OT on trust was shown recently when I collaborated with a group at the University of Zurich. In this study we infused a moderate dose of synthetic OT in the brains of almost 200 men through their noses and had them play the trust game. DM1s given OT were not only more trusting on average (versus placebo), but more than twice as many people in the OT group sent *all* their money to the DM2 in their dyad relative to those on placebo (45% vs. 21%). In control tasks involving nonsocial risk-taking, OT had no effect. Psychological surveys also showed that subjects were cognitively intact and had stable moods when on OT.

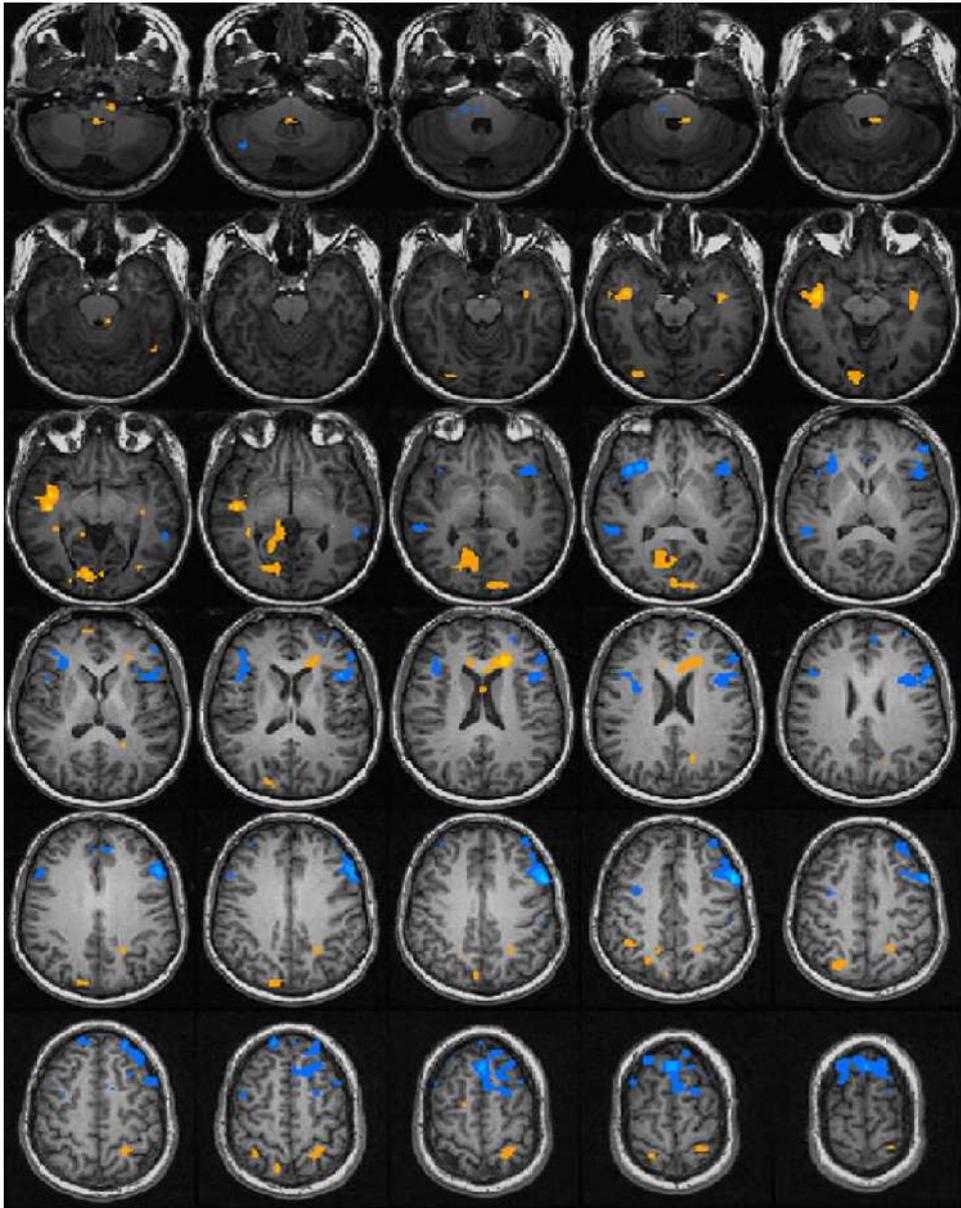
Recent brain imaging experiments from my lab have confirmed that deciding to trust another person, and the decision to be trustworthy, are associated with activation of regions in the human brain that processes emotions, especially the amygdala, as shown in Fig. 5 (Zak et al., 2006).

To summarize this section, OT release is associated with the subjective experience of empathy (Barraza and Zak, 2009), the same mechanism Adam Smith hypothesized formed the basis for moral behaviors. OT release is automatic and therefore beyond our conscious control: for most of us, the sense of empathy is innate. That is not to say that OT, and other brain mechanisms that permit us to understand what others intend are not modulated by the external and internal environments. For example, during episodes of extreme stress, other-regarding behavior is often suppressed as survival of the individual becomes paramount. Such empathy “malfunctions” are a partial explanation for selfish peccadilloes, as well as the evils of torture and murder (Raine, 1993).

Both casual observation and laboratory studies show that there is great heterogeneity across people in the ability to empathize with others and, we have found, OT release after a stimulus. Brain activation predicts well those who are most empathetic as measured by psychological surveys (Canli and Amin, 2002) and OT release (Barraza and Zak, 2009). Variations in empathy are evolutionarily useful. For example, the two percent of DM2s who do not reciprocate trust shown in them require that the trust decision by DM1s to be conditional on the setting of the interaction (Zak, 2005; see also Gunnthorsdottir et al., 2002). This “two percent principle” (Shermer, 2008), tunes the balance between appropriate levels of trust and distrust that we face every day. Absent the two percent, over time we would become gullible and, having lost our skepticism of others’ motives, we would be vulnerable to exploitation.

#### 4.5. Recent findings: generosity, sacrifice, and distrust

If we seek to relate morality to market behaviors, additional evidence linking empathy to economic decisions would give us greater confidence in this relationship. Certainly, strong evidence is obtained from Kosfeld et al. (2005) as we exogenously increased empathy by infusing OT into participants’ brains to demonstrate the causal effect of OT on trust. What about other behaviors besides trust? Recent findings from my lab have shown that OT increases generosity in the UG. Participants given 40IU of OT intranasally were 80% more generous as DM1s in the UG than those given placebo, where generosity is defined as a DM1 offer that exceeds the average DM2 rejection threshold ( $N = 68$ , two-tailed Mann–Whitney  $U$ -test  $p = 0.005$ ; Zak et al., 2007). Offers in the UG for those on OT averaged \$4.86, while offers of those given a placebo averaged \$4.03. OT did not affect the DM2 rejection threshold or altruism as measured by transfers in the dictator game, and the effect of OT on UG generosity maintained significance even when one’s level of altruism was controlled. (In the dictator game DM1 is asked to offer a unilateral transfer from his or her endowment to DM2, while DM2 makes no decision; this transfer is believed to measure altruism, see Camerer, 2003.) Further, in the UG generosity was *costly* as DM1s given OT did not avoid rejections of their offers more than did DM1s given a placebo, so those in the OT group left with less money. They may have done this because OT is known to facilitate dopamine release in reward regions of the brain to motivate



**Fig. 5.** Functional MRI image of the contrast in activation of a DM1 playing the trust game with a human partner versus a computer that plays randomly. The bilateral orange spots are the amygdala which is a brain region that processes emotions. (For interpretation of the references to color in the figure caption, the reader is referred to the web version of the article.)  
 Source: Zak et al. (2006).

attachment behaviors. Subjects may have taken home less money, but they were “compensated” for this by a pleasurable sensation.

In another recent study, my collaborators and I examined nonpharmacologic methods to raise OT and facilitate trustworthiness. We thought about the varieties of nonverbal communication that occur between humans that might support cooperative behaviors. In particular, most people constantly touch others, for example, with handshakes, hugs, or kisses. In rodents and some human studies, touch has been shown to release OT. We tested whether touch affected trustworthiness by assigning one-half of the participants to receive a 15 min moderate pressure back massage by a massage therapist. Control subjects rested quietly for 15 min. Both groups then played the trust game for money. Blood draws occurred before massage or rest, and after making a single decision in the trust game.

We found that relative to the rest group, massage coupled with the receipt of a signal of trust by DM2s increased OT release relative to untouched controls. Further, DM2s who were trusted and given massages sacrificed 243% more money to

DM1s than did DM2 controls, and the amount returned was highly correlated with the change in OT levels ( $N = 33$ , two-tailed  $t$ -test  $p = .007$ , Morhenn et al., 2008). This suggests that touch helps sustain prosocial behaviors in humans.

Moral violations invite punishment; if others are aware of a moral violation, a variety of direct punishments can be expected, ranging from verbal aggression, to physical aggression, to social ostracization, to legal sanctions. People are often tempted to violate moral conventions, for example, when sufficient money is involved. We recently investigated this effect by examining if there was a physiologic correlate associated with the violation of the norm to trust others. Using the trust game, we built a measure of the distrust that DM2s experienced. We defined distrust as the money that DM2s did *not* receive, that is,  $30 - 3 \times$  (money received from DM1). Maximal distrust (a zero transfer from DM1) received a score of 30, while maximal trust yielded a distrust score of zero. We hypothesized that distrust would produce an aggressive response, and we found it. Taking blood samples after DM1 decisions were reported to DM2s, we found a positive correlation between distrust and the “high octane” form of testosterone, called dihydrotestosterone (DHT) in men, but not women (in men,  $r = 0.32 > 0$  by a  $t$ -test with  $p = 0.05$ ,  $N = 212$ ; Zak, 2005).

The male reaction to being distrusted appeared to produce a desire to (physically) punish the DM1s who didn't know how the game “should” be played. Those with high DHT returned nothing or very little to the DM1s who distrusted them. These findings are consistent with brain imaging evidence reviewed above showing that men derive pleasure from punishing those who violate social norms (de Quervain et al., 2004; Singer et al., 2006). This emotional response to a violation of a social norm of trust is important and socially useful. If I am tempted to be untrusting, I might still show trust if I expect, based on my previous experience, that it might provoke an aggressive response in my trading partner. The threat of aggression can motivate others to be more trusting and cooperative than they might otherwise be. This finding again demonstrates how moral violations provoke emotional responses.

#### 4.6. Summary

Let's summarize this section. A large number of researchers have demonstrated that the neural representation of moral values are automatic and difficult to suppress, and often utilize regions of the brain associated with emotions. Appropriate social behaviors require a balance between approach and withdrawal, trust and distrust. In healthy adults, we are constantly adapting to the people and environments we find ourselves in, resetting the approach/withdrawal balance. The approach system prominently utilizes OT and people report that they experience OT release as empathy. The withdrawal system uses aggressive responses such as DHT release.

### 5. Enron and morals in the market

If the brain systems that support moral behaviors work so superbly and largely without conscious control, why do moral failings occur? I'll use the Enron accounting debacle as a case-study to examine moral failures.

#### 5.1. Moral failings: Enron

Enron grew from a small oil and gas pipeline company in the 1980s in Houston, Texas, to become the seventh largest U.S. corporation by 2000. It did this by trading contracts for energy. In the late 1990s, Enron began using legally and ethically questionable business practices. Only one senior executive at Enron, Vice-Chairman J. Clifford Baxter, left a clear paper trail warning Enron's CEO Jeff Skilling and Chairman Kenneth Lay “about the inappropriateness of our transactions” according to former Enron Vice-President Sherron Watkins (CNN.com, 2006). Baxter resigned in protest from Enron in May, 2001, but continued to work for the company as a consultant for the next half-year. Between October, 1998 and his resignation, he exercised \$22 million in stock options.

Early in the morning of January 26, 2002, Baxter wrote the following note to his wife.

Carol,

I am so sorry for this. I feel I just can't go on. I have always tried to do the right thing but where there was once great pride now its gone. I love you and the children so much. I just can't be any good to you or myself. The pain is overwhelming. Please try to forgive me.

Cliff.

This note was found in his car, parked a block from his house. Cliff Baxter wrote it before killing himself with a gun-shot blast to the head.

Why was the pain of Enron's failings so overwhelming for this former Air Force Captain who had worked at Enron for 10 years? Why didn't other Enron employees suffer its moral failings enough to at least write a memo about its business practices? The neuroscientific findings reviewed above suggest that the way that Enron was organized contributed to these moral failings and Enron's downfall.

Recall that high levels of stress inhibit OT release and moves attention to immediate survival rather than empathizing with, or helping, others. Senior managers at Enron devised the company's compensation and employment policies to pit employees against each other for survival and provided incentives to violate accounting standards. For example, in a practice

called “rank and yank” implemented by Jeffrey Skilling, employees with the lowest 10 percent in twice-yearly evaluations were fired (McLean and Elkin, 2003, p. 54). The survival stress of “making the numbers” caused employees to, at some point, to make up the numbers any way they could.

The moral failings at Enron were also made more palatable because decisions were broken up into parts so most individuals were only responsible for moving the decision forward and could not claim ultimate responsibility. As a result, the negative reaction most of us have to observing a moral violation may have been reduced because decisions were compartmentalized and others at Enron were doing the same thing. Given this environment, many employees acquiesced to the incentives that ultimately resulted in unethical and illegal behavior.

What do we conclude from this? Most humans have an intact moral compass that guides us with our decisions. This mechanism uses both evolutionarily older areas of the brain associated with emotions and regulation of body states, as well as newer brain regions that generate cognitive deliberations. Nevertheless, our sense of moral right and wrong is fallible and conditioned on the environment we are in. Moral violations will occur if the incentives to lie, cheat, or steal are sufficiently pronounced, if stress is high, and especially if others are known to be engaging in similar behaviors. As social creatures, we acclimate to the social environment we find ourselves in and respond to its incentive structure. The moral compass, like most behavioral responses, is flexible and appears to need tuning or it loses its utility (Damon, 2002; Peterson and Seligman, 2004). Morals must be practiced to remain instantiated in the brain. Folk knowledge of this effect may be why we spend so much time instructing children in moral values, and why most children’s stories contain moral lessons.

Unquestionably, cheating and dishonesty occur constantly in all aspects of life, including the economic. Typically, these moral failures are small—as we have seen, the human moral sense makes us literally feel disgusted by others’ and our own moral breaches providing a self-limiting mechanism for most of us. There is clearly an important role for management and government oversight (discussed below) in corralling dishonest business practices, but the main lesson from the Enron case is that if the incentives to cheat are sufficiently strong, it will occur regardless of the regulatory environment. Our moral sentiments are environmentally responsive, leading to moral mistakes. Nevertheless, cheating is typically a short-term strategy: often cheats are caught and the penalties can be severe. On the other hand, at most typically organized businesses, the incentives to behave honestly are often sufficiently strong that absent constant oversight, cheating is mostly low. This is due to both our innate sense of right and wrong, the understanding that social and business relationships are long-term, and the fear of punishment.

## 5.2. *Morals and the market*

An important consequence of the physiology of moral values is that market exchange provides an opportunity to behave morally. There are several reasons for this. First, a mutual decision to exchange requires an understanding that both parties to the transaction must be made better off if exchange is going to occur. If one makes unreasonable demands, then exchange will fail and the gains from trade lost. Thus, I must think about, and deliver, what the other person needs, if I want to get what I need. In this way, exchange is other-regarding.

Second, since few businesses have a single employee, working puts us in contact with other people who have a set of common goals. The need to cooperate to “bring home the bacon” has ancient roots when early humans organized to bring home the mastodon. Many employees also interact with customers, some new, some repeat. This, too, provides us with a moral laboratory to receive feedback on whether our behaviors with others are accepted or rejected. Market rewards (a raise) or punishment (being fired) provide powerful incentives to behave in morally acceptable ways.

Third, exchange in imperfectly monitored markets depends on moral values such as honesty, cooperation, trustworthiness, and fairness. As a result, each time we enter markets and exchange, we are provided with the opportunity to be virtuous—to follow through on contracts made, to pay those who work for us, and to share the gains of exchange with trading partners and fellow employees.

In the brain, the process of repeatedly stimulating a network of neurons is called “long term potentiation” (LTP). LTP is the cellular basis for learning as it “strengthens” connections between groups of brain cells. In this context, “strengthen” means that post-potentiation, the network is biased to similarly activate when encountering the same stimulus or similar stimuli (see Lisman, 2003). As Benjamin Franklin believed, and recent researchers have shown (Damon, 2002), the practice of virtues reinforces them. The upshot of this is that practicing virtues during market exchange may lead to more virtue in, and outside of, markets. In their study of 16 small-scale pastoral, nomadic, and agrarian communities, Henrich et al. (2004) found exactly this: greater market exposure predicted in which communities people playing the UG were likely to offer an equal split of money. This finding is the polar opposite of the Confucian/Marxian/Vedic view of markets as degrading one’s humanity.

While typical market exchange draws on, and can enhance, our expression of virtues, economic transactions also present moral dilemmas. These range from the delivery of substandard goods or services, to breach of contract, to fraud. A simple example can elucidate the emotional and cognitive responses that guide moral decisions in markets. Suppose your paycheck this month had an extra \$10,000 in it. You would likely feel joy (extra money!), and then perhaps fear (I know they’ll find me!), and then maybe a cost-benefit calculation (if I cash the check and play dumb, I can always return the money if they find out). This might be followed by an emotion-weighted decision (I didn’t work for this money so I’m getting this unfairly, and therefore I should return it). Not all of us would go through all these stages, but this example is meant to show that emotions and cognition are integrated and evolved to help us solve moral dilemmas, including economic moral dilemmas.

## 6. Economic models and implications

In this section, I discuss how human virtues might be used to modify the standard utility maximization model. Next, I draw implications for this approach for several of topics in economics and policy.

### 6.1. Modifying the standard economic model

The discussion of moral behaviors above makes two primary claims. First, a subset of moral values are held by nearly everyone and are exhibited in most circumstances. Second, there are consistent neural representations of such moral values. A subsidiary finding is that some moral behaviors, including observing moral violations and benefiting from virtuous behaviors such as trust, are associated with emotional responses. Emotions produce coarse but quick reactions to stimuli, rather than slower reasoned responses.

The standard economic model of self-interested constrained utility optimization can be modified to include moral values. Francis Ysidro Edgeworth (1845–1926) was the first to propose a utility function that directly included “sympathy” for others in his *Mathematical Psychics: An essay on the application of mathematics to the moral sciences* (1881). Consistent with the thesis of this essay, Edgeworth, too, considered economics to be a “moral science”. Edgeworth used an additively separable utility function over one’s own consumption and another’s consumption, weighted by a parameter he called “effective sympathy” (1881, p. 53). This notion was resurrected, extended, and applied by Sally (2001, 2002) to examine the role of sympathy in economic decision-making. To me, this seems a reasonable way to model morally-weighted decisions. Similar models were recently proposed by Levitt and List (2007) and Zak et al. (2007). The type of model I am proposing is similar to models of fairness or altruism (see below), but with a stronger nondeliberative component and with greater emphasis on the milieu of the interaction, the individuals interacting, and their physiologic states.

This type of model would predict that following one’s moral values may be costly, even though it “feels right” and produces a utility flow. In such a model, how a decision is made may be as important as the outcome of the decision (that is, the utility function includes both terminal and instrumental values). The changes I am proposing are similar to the models of “procedural utility” by Frey and colleagues (Frey et al., 2004; Frey and Stutzer, 2005; also see Benz, 2005; business applications of this idea are explored in Seidman, 2007).

An example of the novel predictions of a model with moral values occurs in the UG that we discussed earlier. Most subjects prefer more money to less, but the average DM2 who is offered a 10% split of money by DM1 will reject it out of the obvious inequality and stinginess of the proposer. (A typical subject response to a stingy offer in experiments I have run is “Who the hell does he think he is!”) A model that includes moral values would predict that the utility gain from receiving a small sum of money is less valuable than the process of accepting it, and that emotions alert us when violations occur motivating a desire for costly punishment.

Related models of social preferences have been developed by Andreoni (1990), Rabin (1993), Fehr and Schmidt (1999), among others. The difference between social preference models and the moral values model is that in the latter, institutions as well as intentions of individuals matter. Meanwhile, social preference models more narrowly focus on outcomes (Benz, 2005). I am proposing we go one step deeper and ask *why* people reciprocate, or are fair. Moral values are my candidate explanation.

A model of prosocial emotions has been proposed by Gintis and Bowles (2005), with a book-length treatment in Gintis et al. (2005). In the Gintis and Bowles (2005) model, agents engage in a public goods-type game and receive utility from individual benefits as well as positive or negative utility due to pride, guilt, empathy, shame and regret. In equilibrium, agents display a higher degree of cooperation than in the standard model absent prosocial emotions. Prosocial emotions can be thought of as levers through which moral values are brought to decision-making. The Gintis and Bowles model nicely captures the notion that emotion-tagged moral values guide economic decisions.

A formal model with moral values is beyond the scope of this paper. A particular modeling difficulty is the prediction of others’ intentions as utility flows (though see Rabin, 1993). The reasons for a decision, and processes through which decisions are made, clearly matter to human beings in many personal exchange settings. How this is best modeled is still an open question. Nevertheless, this outline of a model with moral values can still be used to draw some implications in a number of areas of economic decision-making.

### 6.2. Applications

In this section, I apply the outlined moral utility model to issues in business organization, regulation, law, economic growth, and happiness.

#### 6.2.1. Business organization

The research reviewed on virtues indicates that designing businesses as places for the fulfillment of human needs, beyond simply a place to earn income, can have positive returns. Market competition occurs not only for goods and their prices, but also for ethical behaviors. People prefer to do business with firms that treat them well, and companies build strong brand loyalty this way. This starts, many argue (e.g. see Seidman, 2007), by treating employees with respect and concern, while still holding them accountable for performing their jobs. Examples of firms that have used the strategy profitably include:

Chik-fil-A, Johnson and Johnson, Southwest Airlines, and Commerce Bank. Concern for those inside the organization is then translated to respect and concern for customers. Thus, businesses may well seek to compete on the “virtue margin” as well as the profit margin to harness employees’ and customers’ innate moral sense.

Oxytocin is a likely mechanism that motivates employees to sacrifice for the good of the company. It does this by facilitating the formation of attachments to the mission of, and people at, the workplace. This can account for the low rates of employee turnover at the companies listed above, and the lack of shirking typically observed in many companies counter to the standard principal-agent model. An implication of employee attachment to firms is that activities that bring employees together to “bond” to each other may have an economic payoff in higher productivity. For example, Google, Inc. gives all engineers one day per week to work on whatever they want to, known as “innovation time off” as many of Google’s innovations have come from this practice. Google also feeds its employees as much healthy, well-prepared food as they want. Interestingly, eating induces OT release (Carter et al., 2006), and may further build ties between employees and the company. More extremely, Commerce Bank has an elaborate set of rituals that new employees go through to inculcate the spirit of fun and customer service that distinguishes this highly profitable bank (Taylor and Labarre, 2006).

We should be skeptical when applying laboratory findings to understanding what happens in businesses. Several recent field experiments address this issue. In the first, sales representatives were instructed to randomly distribute product samples as gifts (Maréchal and Thöni, 2007). These researchers found that distributing gifts to store managers boosted sales revenue substantially, consistent with a reciprocity effect. Similarly, a field study that included gifts as inducements to make a charitable contribution found that gifts increased donations, and larger gifts produced larger donations (Falk, 2007). These experiments suggest that developing social relationships between market participants can increase reciprocal behaviors.

### 6.2.2. Regulation

Two recent studies reveal the implications of moral markets on economic regulation. A recent experiment run at two Israeli daycare centers explored the role of endogenous virtuous behavior relative to behavior induced with a sanction. Both daycare centers had a rule that parents must pick up their children no later than 4 pm. When parents picked up children late, one of the teachers had to remain until the parents arrived. For the experiment, one location imposed a fine of \$3 for each time the child was picked up late. The other daycare center simply stayed with the stated policy that depended on the parents’ being punctual so as not to inconvenience the teacher. After the imposition of the fine, parents’ mindset seemed to have changed; the fine seemed to have removed the implicit moral failing associated with being late. Instead, one simply paid a penalty. Over the course of three weeks, the daycare with the fine saw a doubling of the parents who came late. Interestingly, the proportion of latecomers stayed steady even after the fine was eliminated (Gneezy and Rustichini, 2000).

An experimental study of contractual punishment found a related result. Fehr and Gächter (2002) set up an experimental goods market in which sellers offered contracts to buyers with either high or low prices. If the contract was accepted, buyers provided goods and privately decided on their quality. In one condition, sellers trusted that buyers would deliver high quality goods when the price was high (high quality goods cost more to produce), in the other, the seller specified a fine that the buyer must pay if the delivered goods were low quality. These researchers found that the fine crowded out voluntary responses to the “gift” of a high price in the contract. That is, a high price and the threat of a fine produced fewer high quality goods delivered than a high price absent a fine.

These papers indicate that the threat of penalties may crowd out the reciprocal behaviors that most people, most of the time, follow. This suggests that heavily regulated economies may have a higher level of moral violations and therefore lower productivity. Taking into account the increased transactions costs of monitoring and enforcement, one would expect lower rates of income growth in more regulated economies. Moderately regulated economies would be expected to produce more rapid income growth. Further, moderate levels of regulation permit individuals the freedom to choose how to behave, rather than to be compelled to do something. This recognizes our innate moral sentiments.

### 6.2.3. Law

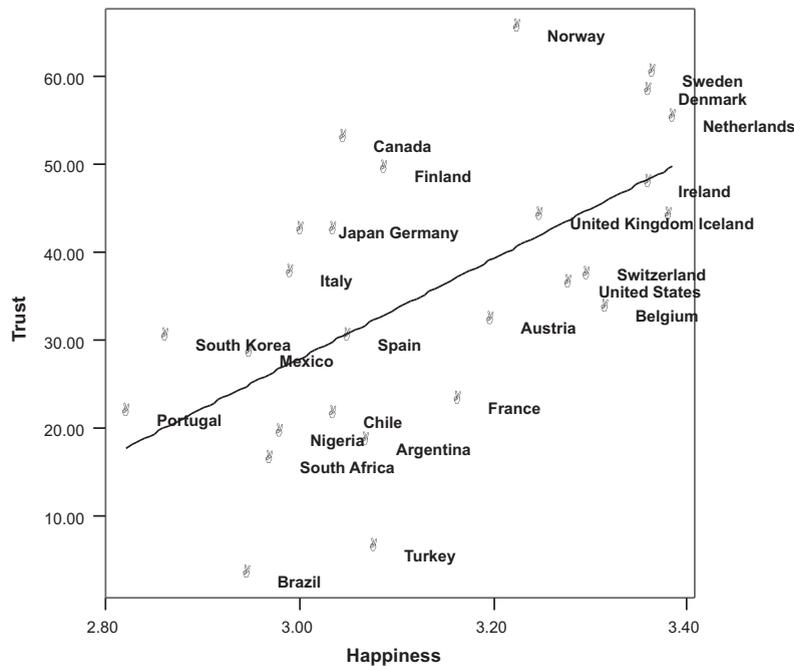
The law has followed the approach of punishment as social engineering since the heyday of Oliver Wendell Holmes (1841–1935). Civil laws can be understood as an institutionalized approach to punish immoral behaviors in markets. For example, why as a society do we spend millions of dollars to prosecute minor economic violations and punish the convicted with jail time? Economic efficiency would argue for a simple payment to the aggrieved party, but such fines do not assuage our desire to punish moral violators.

Holmes’ view, which is dominant in U.S. law today, is that punishment is simply a price one pays to engage in a particular activity. Holmes famously said that “This is a court of law, young man, not a court of justice.” Stout (2008) argues that this approach overlooks our innate moral sense. In doing so, it ignores potentially effective ways to reduce crime, for example, by using social sanctions such as shaming, as moral leverage. It may also increase crime since if caught, one simply pays the fine (money and/or prison time), rather than being seen by oneself and others as a socially reprehensible moral violator.

The moral violations approach is being tried in a number of jurisdictions, with some successes, but not uniformly so. For example, a number of cities post mug shots of men who are caught paying for the services of prostitutes on public websites, with some evidence of success (Weitzer, 1999).

Relatedly, both direct damages for contract breaches as well as punitive penalties are rarely used, and yet breaches are less common than a simple cost–benefit calculation predicts (O’Hara, 2008). This indicates that a small threat of sanctions and likely an internal check on inappropriate behaviors sustains business relationships. Laws, therefore, that seek to modify





**Fig. 7.** A scatter plot of trust and self-reported happiness. Among 85 variables examined that correlate with trust, happiness is the strongest. This relationship is maintained when income levels are controlled.  
Source: Zak and Fakhar (2006).

two-tailed  $t$ -test,  $N = 27$ ,  $p = 0.001$ ), while depression is significantly negative related to trust ( $r = -0.56 > 0$ , two-tailed  $t$ -test,  $N = 26$ ,  $p = 0.003$ ). These results continue to maintain significance when income is controlled.

These data square with the view of Aristotle, Ben Franklin and many other philosophers that virtue produces *eudaimonia* or happiness. Haidt (2006) reports survey evidence that those who are more virtuous are also happier. This suggests that virtuous behavior, including exchange in moral markets, can make us both wealthier and happier.

## 7. Conclusions

The evidence surveyed in this article indicates that the human brain is exquisitely adapted for exchange, including exchange with strangers. This unique ability appears to have come from a division of labor within clans that extended to entire societies. One of the reasons this occurred is our extended period of adolescence. This necessitated bi-parental care and led to the evolution of a powerful attachment system using the neurohormone oxytocin. Oxytocin, we have discovered, allows us to reciprocate with those who show us trust, modulating our narrowly selfish instincts with a sense of empathy. The empathy response, as intuited by Adam Smith in TMS and recently shown neuroscientifically, is the basis for many moral judgments.

Having an appropriate balance between distrust and trust, and a mechanism that processes these quickly, permitted the formation of civilizations, a further division of labor and the creation of surplus. Pedersen (2004) argues that the OT attachment system also caused the growth in human intelligence because it allowed us to enter into larger social groups where intelligence was critical to reproductive success.

Exchange among strangers is promoted by the expression of virtues such as trustworthiness, honesty and fairness. Societies with higher levels of trustworthiness have faster rates of economic growth, and have happier citizens. Without a sufficient amount of trustworthiness, economies will remain mired in poverty. Zak and Knack (2001) show that if less than 30% of people in a country think their compatriots are trustworthy, investment will be so low that positive income growth will not occur. Institutions designed to promote prosperity and happiness can harness the virtues found in human nature to be more effective. This recognizes that exchange must occur in the shadow of enforcement, but the enforcement mechanisms themselves can be improved by understanding how evolutionarily old virtues are in humans. Virtues, often driven by empathy, are how humans sustain social relationships. Many economic relationships are also social.

Markets are moral in two senses. Moral behavior is necessary for exchange in moderately regulated markets, for example, to reduce cheating without exorbitant transactions costs. In addition, market exchange itself can lead to greater expression of morals in nonmarket settings. Market competition is necessary to drive efficiencies and productivity gains, and I am not making a case against competitive markets. I only hope to convince you that the commonly held view of the economy as being dominated by greed and selfishness is wrong. This pervasive belief is inconsistent with the scrutiny of scholars ancient and modern.

The American patriot and President Thomas Jefferson eloquently captured the essence of the argument that we are social creatures and most of the time take others rights and feelings into account when he wrote:

These good acts give pleasure, but how happens it that they give us pleasure? Because nature hath implanted in our breasts a love of others, a sense of duty to them, a moral instinct, in short, which prompts us irresistibly to feel and to succor their distresses.

Thomas Jefferson, June, 1814

Societies that recognize our moral nature are those that will flourish.

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