

## Evolutionary economics and household behavior

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This paper provides an introduction to the field of evolutionary economics with emphasis on the evolutionary theory of household behavior. It shows that the goal of evolutionary economics is to improve upon neoclassical economics by incorporating more realistic and empirically grounded behavioral assumptions and technological innovation and that the goal of the evolutionary theory of household behavior is to improve upon the neoclassical theory of household behavior by replacing the neoclassical assumption of selfish utility maximization with bounded rationality and satisficing and by incorporating the reaction of households to the introduction of new goods and services. The paper concludes with a brief discussion of loss aversion and self-interest versus altruism.

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**Keywords:** altruism, altruistic bequest motive, behavioral assumptions, behavioral economics, bequest motives, bounded rationality, consumption behavior, creative destruction, destructive technologies, dynastic bequest motive, evolution, evolutionary biology, evolutionary economics, group selection, household behavior, kin selection, loss aversion, natural selection, neoclassical economics, observational implications, profit maximization, pure altruism, rationality, reciprocal altruism, satisficing, selfishness, self-interest, strategic bequest motive, survival of the fittest, technology, technological innovation, technological progress, utility maximization

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### 1. What is evolutionary economics?

Economics is a science that studies human behavior, but so are the other social sciences such as anthropology, history, law, political science, psychology, and sociology. What currently distinguishes economics from the other social sciences is that it uses more mathematics and statistics, constructing rigorous theoretical models to describe human behavior and testing these models through rigorous statistical analysis. Thus, economics is much closer to the natural sciences than the other social sciences in terms of the methodology it uses.

Since economics is so close to the natural sciences in terms of the methodology used, it is not surprising that concepts from the natural sciences are very often incorporated into economics. For most of the previous century, physics was the natural science whose methods economics sought to emulate the most closely.<sup>1</sup> In more recent decades, however, economists have shown increasing interest in biological concepts and methods, partly fulfilling Alfred Marshall's well-known assertion that biology, not mechanics, is the "true Mecca" of economics. One excellent example of this trend is evolutionary economics, which is the incorporation of evolutionary biology into economics.

The great British biologist Charles Darwin (1809-1882) developed the theory of evolution in his seminal book *On the origin of species*, which was first published in 1859. According to Darwin's theory, species evolve over time, with traits adapted to their specific environment becoming more and more dominant, and disadvantageous traits being gradually phased out. For example, in a certain environment (say, a habitat with many tall trees), giraffes with long necks will be more likely to survive and procreate than giraffes with short necks because they can reach leaves that are higher up in the tree; hence giraffes with long necks will gradually come to dominate giraffes with short necks, eventually causing the latter to become totally extinct. This phenomenon is also called "natural selection" or "survival of the fittest."

Social scientists have been incorporating concepts from evolutionary biology into human behavior in general and economic behavior in particular since soon after Darwin unveiled his theory more than a century and a half ago. For example, the eminent British philosopher Herbert Spencer (1820-1903) argued in his book *First principles of a new system of philosophy* [1862/2000], which was first published in 1862, just three years after Darwin published *On the origin of species*, that evolutionary processes are at work throughout the cosmos, applying to everything from stars and galaxies to biological organisms and human social organization. Spencer's name is virtually synonymous with Social Darwinism, a social theory that applies the concept of evolution to human society (in particular to *laissez-faire* capitalistic societies) and argues that the "strong" (however defined) would see their wealth and power increase, whereas the "weak" (however defined) would see their wealth and power decrease and perhaps perish altogether. Social Darwinism has acquired a bad name (perhaps deservedly so) because it has been used to justify not only *laissez-faire* capitalism, but also racism, and preservation of the status quo. Nonetheless, Spencer deserves credit for being perhaps the first scholar to apply concepts from evolutionary biology to human behavior generally and economic behavior in particular.

As another example, Karl Marx (1818-1883), the great German philosopher, economist, and revolutionary socialist, developed a theory of economic

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<sup>1</sup> This is discussed and critiqued most extensively by Mirowski [1989]. Fabella [2013] also criticizes economists' adulation of physics.

development that also contains elements of evolutionary biology that informed his work including *Das Kapital* [1867, 1894]. Marx's evolutionary theory is most explicitly summarized in the introduction to his *Contribution to the critique of political economy* [1859]. Here, he argues that economic systems as a whole evolve over the course of history, with superior economic systems replacing inferior ones as the latter are beset by contradictions between technological progress and emergent human possibilities on the one hand and inefficient property rights on the other, which prevent them from surviving over the long term. In Marx's scheme, feudalism was replaced by capitalism, which in turn would eventually be replaced by socialism due to evolutionary forces.

As yet another example, the Austrian-American economist Joseph Schumpeter (1883-1950), one of the most influential economists of the twentieth century, applied the concept of evolution to innovation or technology in his books *The theory of economic development* [1934, 1982], which was first published in 1911, and *Capitalism, socialism, and democracy* [1942, 1994], which was first published in 1942. He argued that macroeconomic equilibrium obtains during normal times, but that the successful introduction of new innovations or technologies (which he called "disruptive technologies") by entrepreneurs forces already-existing technologies and means of production to lose their positions within the economy, leading to "creative destruction." Schumpeter argued that capitalism could only be understood as an evolutionary process of continuous innovation and creative destruction, and hence he can be regarded as the forefather of evolutionary economics. I should note parenthetically that while the use of the word "destruction" might suggest that "creative destruction" is a bad thing, Schumpeter viewed it positively since it is what leads to the adoption of newer and better technologies.

Moreover, Schumpeter believed that economic systems as a whole also evolve, and he predicted that competition would force firms to co-opt entrepreneurs, which in turn would destroy their entrepreneurial spirit and ultimately lead to the demise of capitalism. Thus, both Marx and Schumpeter believed that economic systems as a whole evolve and that capitalism would be replaced by socialism, but they differed with respect to the mechanism that they thought would cause this transition and with respect to whether or not it was desirable; Marx rejoiced in the demise of capitalism and Schumpeter bemoaned it.

For the most part, however, economists such as Marx, Schumpeter, and their immediate followers used evolutionary theory only as a metaphor or analogy without any explicit attempt to link economic behavior directly to the implications of biological Darwinian theory for human and social behavior. Many of Darwin's observations on human sociality, cooperation, and altruism, as contained in his other great work, *The descent of man* [1871], are only now being seriously incorporated into economic thinking in what is now called evolutionary economics proper.

Whereas Schumpeter can be regarded as the harbinger of evolutionary economics, the American economists Richard R. Nelson (1930- ) and Sidney G. Winter (1935- ) are widely regarded as the fathers of this new field of evolutionary economics. They applied the concept of evolution to firms in their book *An evolutionary theory of economic change* [1982]. They argued that more successful firms (firms that have found innovative, or imitative, solutions to improve their profits) would grow at the expense of less successful firms, at times driving less successful firms out of business altogether.

Thus, economists have applied the concept of evolution to individuals (as in the case of Spencer), to technologies (as in the case of Schumpeter), to firms (as in the case of Nelson and Winter), and even to economic systems as a whole (as in the case of Marx and Schumpeter). But as I have tried to show, technology plays an especially crucial role in the evolution of economies and economic growth, which is why it is highly appropriate that the Veia family, with its close links with technology, has endowed a professorial chair in technology and evolutionary economics. Technology evolves over time, with newer and better technologies driving out older and inferior ones, and this in turn leads to increases in productivity (or equivalently, reductions in production costs), improvements in product quality, and the development of new goods and services, all of which lead to economic growth and improvements in people's quality of life. To put it another way, technology increases the size of the pie that can be baked from a given amount of capital, labor, and other factors of production so that everyone can have more pie without taking any away from others. Technology is a "magic pill" for achieving economic growth because it can get an individual something for nothing.

Schumpeter fully recognized the importance of the role played by technological innovation in economic growth, and he lamented the fact that neoclassical economics did not adequately address technological innovation and that, in effect, it assumed an economic world that is free of innovation. The Schumpeterian challenge was to create a theoretical framework for analyzing innovation-driven economic growth. This is the *raison d'être* for evolutionary economics, and it is in this sense that Schumpeter can be considered the forefather of evolutionary economics.

## **2. The inadequacies of neoclassical economics**

I shall introduce evolutionary economics by first discussing the two most serious defects of neoclassical economics and of the neoclassical theory of household behavior. Then I shall discuss how evolutionary economics has tried to improve upon neoclassical economics by correcting these defects. I shall argue that the ultimate goal of evolutionary economics is to develop a complete theoretical alternative to neoclassical economics that remedies the two major defects of neoclassical economics.

### *2.1. Its unrealistic behavioral assumptions*

The first major defect of neoclassical economics is that it is a deeply flawed theory of human behavior and of the behavior of human organizations in any context, static or dynamic, because it makes behavioral assumptions that are not realistic or empirically grounded. For example, it assumes that households maximize utility and that firms maximize profits, even though it is highly unlikely that households and firms have the enormous information-gathering and information-processing capabilities needed to maximize their utility or their profits. Evolutionary economics has tried to remedy this defect by making more realistic and empirically grounded assumptions about household and firm behavior—in particular, by assuming that both households and firms suffer from “bounded rationality” and “satisfice” instead of maximizing utility or profits (more on this later).

### *2.2. Its failure to address technological innovation*

The other major defect of neoclassical economics is that it assumes that economies are static and free of technological innovation, even though economies are dynamic and technological innovation plays a crucial role in economic growth and development. Evolutionary economics has tried to remedy this defect by developing a dynamic theory of capitalist economies that are always in motion and always generating and reacting to technological innovations of all types.

## **3. The inadequacies of the neoclassical theory of household behavior**

Turning our attention to household behavior, which is the main focus of my own research, the neoclassical theory of household behavior suffers from the same two defects from which neoclassical economics as a whole suffers—namely, that it makes behavioral assumptions about household behavior that are not realistic or empirically grounded and that it is static rather than dynamic and, in particular, it does not adequately address the reaction of households to the introduction of new goods and services.

### *3.1. Its unrealistic behavioral assumptions*

The key assumption of the neoclassical theory of household behavior is that households pick their consumption bundles optimally (i.e., so as to maximize their utility). The problem with this assumption is that it is unrealistic due to the presence of “bounded rationality”, a concept borrowed from the Carnegie School of Herbert A. Simon (1916-2001) [1955, 1959], the winner of the 1978 Nobel Prize in Economics, and others. Simon argued that, in order to make decisions rationally and to maximize their utility, individuals need to identify all possible alternatives, determine the consequences of each alternative, and select the

alternative that confers the greatest utility on them. This requires an almost infinite amount of information and information-gathering and information-processing capabilities, which human beings do not have due to their “bounded rationality.” Thus, he argued, individuals are forced to settle for “satisficing” (a portmanteau of the words “satisfy” and “suffice”) rather than utility maximization; they search through the available alternatives until an acceptability threshold is met rather than searching through *all* possible alternatives and picking the one that maximizes their utility, thereby making the decision-making process much simpler, shorter, and more manageable.<sup>2</sup>

Nelson and Consoli [2010], who can be regarded as the fathers of the evolutionary theory of household behavior, as explained later, acknowledge that the neoclassical theory of household behavior may not be a bad approximation of reality in the case of relatively small changes in the prices of goods and services with which households have considerable experience, where “changing the mix” is all that is required. However, they argue that their own theory based on bounded rationality has at least as much explanatory power even in this case and that it is based on much more plausible and empirically grounded assumptions.

### *3.2. Its failure to address technological innovation*

The other major defect of the neoclassical theory of household behavior is that it does not incorporate the reaction of consumers to the introduction of new goods and services even though, as evolutionary economists emphasize, technological innovation plays a central role in economic growth and development and a significant portion of technological innovation in capitalist economies consists of the development of new goods and services. The neoclassical theory of household behavior may do an adequate job of addressing, predicting, and explaining the response of households to changes in the prices of familiar goods and services, but it does not address the response of households to the introduction of entirely new goods and services.

The problem, as pointed out by Nelson and Consoli [2010:284], is that “(neoclassical) theory represses the uncertainties and the time involved, for households to make significant changes in their patterns of behavior particularly when these entail learning about and learning to do new things. We note two important weaknesses of neoclassical theory here. One is the assumption that households have well defined preferences regarding goods and services they never have experienced (or do not yet exist). The second is failure to recognize that even awareness of choice sets is to a considerable extent dependent on what has in fact been chosen, and the process of choosing.” In reality, preferences will

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<sup>2</sup> The late José Encarnación, Jr., long-serving dean of the School of Economics of the University of the Philippines, was himself an adherent and prominent advocate of “satisficing” behavior, as can be seen in his theory of L\*-ordering, or threshold-augmented lexicographic preferences. See Encarnación [1964].

be influenced by which goods and services households have already experienced and which they have not yet experienced, meaning that preferences will be endogenous, path-dependent, and potentially unstable.

To put it another way, learning (i.e., learning about, learning to use, and learning the value of new goods and services) is ignored in the neoclassical theory of household behavior. Moreover, neoclassical theory is also deficient in assuming that household preferences are fixed and in ignoring the possibility that new wants emerge from time to time and that these new wants often lead to the emergence of new goods and services capable of meeting those wants. (See Witt [2001] for more on the concept of wants and how new wants can prevent consumption from becoming satiated despite the growth of per capita income.)

#### **4. The evolutionary theory of household behavior**

I will now discuss the evolutionary theory of household behavior and show how it remedies the two major defects of the neoclassical theory of household behavior.

Until recently, evolutionary economists have focused mostly on the supply side—namely, firm behavior and technological innovation—and have paid little attention to the demand side, especially household behavior. But this is an important omission because a significant portion of technological innovation in capitalist economies consists of the development of new goods and services, as a result of which a theory that realistically describes how consumers react to new goods and services is badly needed. Fortunately, Richard R. Nelson and Davide Consoli published a paper entitled “An Evolutionary Theory of Consumption Behavior” in the *Journal of Evolutionary Economics* in 2010 that addresses this very topic and proposes the broad outlines of a behavioral or evolutionary theory of household behavior that does not suffer from the two major defects of neoclassical household behavior discussed above.

One option is to have separate theories to deal with dynamic contexts in which change, especially technological innovation, is rapid and another to deal with static contexts in which change is slower or more episodic. But Nelson and Consoli [2010] start with the assumption that a unified theory that can explain household consumption behavior in all contexts is preferable to having separate theories for different contexts.

To briefly summarize Nelson and Consoli’s [2010] proposed theoretical framework, they argue that the assumption that households have a stable, well-defined general utility function and maximize their utility subject to a budget constraint is unrealistic. Instead, they assume that “a household has a set of particular wants it attends and that the goods and services it purchases are intended for use in meeting those wants” [2010: 670], and that households can judge at least roughly whether, and to what extent, particular wants are being met, given what they know and believe.

Nelson and Consoli [2010: 673] acknowledge that there is a continuum among types of purchases of goods and services, but they find it useful nonetheless to “make a distinction between circumstances where the purchases of goods and services are largely a matter of routine, involving little in the way of self-conscious selection, and circumstances which require the household to dedicate a certain amount of thought and effort to deciding what to do.”<sup>3</sup> Examples of the latter include circumstances that require households to engage in certain activities for the first time, such as buying baby goods for their first baby, and circumstances that require a major commitment of resources, such as the purchase of cars and other big-ticket items, but the best example is circumstances that involve the purchase of newly introduced goods or services. Households need to do a substantial amount of learning when new goods and services are introduced (about what wants the good or service satisfies, how to use the good or service, etc.), especially if the new good or service is unlike any existing good or service. Thus new goods and services provide challenges as well as opportunities and require a considerable amount of learning on the part of households.

## 5. More on behavioral assumptions

### 5.1. Loss aversion

Another objection that evolutionary economists have to the neoclassical assumption of utility maximization by households is that other assumptions may be more relevant depending on the environment in which the individual or household is placed. For example, when an individual is living at a subsistence level where a reduction in resources may mean death, it may be rational for him or her to place greater value on losses than on gains (i.e., to exhibit loss aversion).

Daniel Kahneman (1934- ) and Amos Nathan Tversky (1937-1996), a renowned team of Israeli-born psychologists and behavioral economists, first proposed the concept of “loss aversion” in Kahneman and Tversky [1984]. Kahneman received the 2002 Nobel Prize in Economics. “Loss aversion” refers to the fact that the decrease in an individual’s utility from losing 1,000 pesos is greater than the increase in that individual’s utility from winning 1,000 pesos. This tendency has been observed in numerous economic experiments, although there have been some experiments that find no evidence of loss aversion, and even one experiment that used non-human subjects (capuchin monkeys) found evidence of loss aversion. This widely observed empirical regularity can be explained by evolutionary economics, but not by neoclassical economics.

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<sup>3</sup> This is reminiscent of the neuroscientific distinction Daniel Kahneman makes in his book *Thinking, fast and slow* (Kahneman, 2011) between “System 1” and “System 2” thinking. The former is almost automatic and uses heuristics, while the latter is deliberate and logical and requires effort.

## 5.2. *Self-interest versus altruism*

Yet another objection that evolutionary economists raise to the behavioral assumptions of neoclassical household theory is that it assumes that individuals are completely selfish, caring only about themselves and deriving utility only from their own consumption, even though individuals often exhibit cooperative or altruistic behavior in the real world. These behaviors are difficult to explain using neoclassical economists, but they can easily be explained using evolutionary biology.

Here are a few examples of seemingly altruistic or cooperative behaviors in the animal world than can be explained by evolutionary biology.

**Kin selection.** If individuals are concerned not about maximizing their own utility but about perpetuating their own genes, they may sacrifice their own life in order to save the life of a blood relative because doing so will help perpetuate their own genes, a phenomenon that is called “kin selection.” To cite an example of this phenomenon in the animal world, the male Australian redback spider (*Latrodectus hasselti*) “somersaults” and twists his abdomen directly onto the fangs of his mate while copulating, and approximately 65 percent of males are consumed by their mates at this stage. Males that “sacrifice” themselves in this manner enhance the survival prospects of their own genes because the mother of their progeny will be better nourished as a result of their sacrifice and be more likely to give birth to healthy progeny.

**Reciprocal altruism.** Individuals who want to perpetuate their own genes may help a complete stranger to survive in the expectation that the stranger will return the favor in the future when one’s own life is in danger, a phenomenon that is called “reciprocal altruism”. One example of this phenomenon in the animal world is that of vampire bats. Vampire bats commonly regurgitate blood to share with unlucky or sick roost mates that have been unable to obtain enough blood on their own, presumably in the expectation that the beneficiary of their generosity will return the favor when the tables are turned.

**Group selection.** An individual may help ensure the survival of the group to which it belongs, whether or not the other members are blood relatives, since enhancing the survival prospects of the group as a whole will enhance the survival prospects of each member of the group including the individual itself, a phenomenon called “group selection”. In the animal world, wolves hang out in packs because this facilitates the capture of prey, and conversely, chimpanzees live in groups because this provides a more effective defense against predators and promotes the defense of valuable territory. To cite another example, vervet monkeys give alarm calls to warn fellow monkeys of the presence of predators, thereby enhancing the survival prospects of the group as a whole, even though in

doing so they attract attention to themselves, thereby increasing their individual chances of being attacked.

As these examples illustrate, there are many instances of seemingly altruistic or cooperative behaviors in the animal world, but they can be explained via self-interest if we assume that animals are selfish in the sense that they care about the perpetuation of their own genes (or of the group to which they belong).<sup>4</sup>

I would now like to cite examples from human behavior. There is no doubt that humans engage in seemingly altruistic or cooperative behaviors to the same extent as, or to a greater extent than, animals: they make enormous sacrifices for their children's education and well-being, leave large bequests to their spouses and children, make large contributions to various charitable organizations, volunteer large amounts of their time and labor to helping others, donate their organs, bone marrow, and blood to complete strangers, to cite a few examples. Thus, human behavior is seemingly at odds with the neoclassical assumption of utility maximization.

Note, however, that seemingly altruistic or cooperative behaviors can be selfishly motivated in the case of humans as well. The best example of this is Becker's "Rotten Kid Theorem" [1991, chapter 8], which states that the child of an altruistic parent will exhibit seemingly altruistic behavior (at least with respect to the maximization of family income) no matter how selfish he or she is.

In the context of bequests, a parent who leaves a bequest to his or her child is selfishly motivated if the bequest is a *quid pro quo* for nursing care, financial assistance, visits, phone calls, and the like from that child during old age (i.e., if the threat of disinheritance is used to induce the child to provide care and/or attention during old age). Bernheim, Shleifer, and Summers [1985] conduct a theoretical and empirical analysis of this case, which they call the "strategic bequest motive". To cite another example, a parent who leaves a bequest to his or her child is selfishly motivated if the bequest is a *quid pro quo* for carrying on the family line and/or the family business. Chu [1991] constructs a theoretical model of this case, which he calls "primogeniture" and which has also been referred to as the "dynasty model". Using the terminology we used in the case of the animal world, the first example can be regarded as an example of kin selection (because parents help their children, with whom they share half of their genes, to survive and conversely) or as an example of reciprocal altruism (because children help

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<sup>4</sup> Some writers would dispute whether selfishness should include behavior in favor of group selection. They would argue that individual sacrifice in favor of group survival is actually a form of altruism, especially in cases in which other group members are not genetically related, as in human society. On the other hand, it can be argued that an ant or bee colony can be regarded as being one giant organism that is behaving selfishly. Richard Dawkins, the author of *The selfish gene* [2006]), is the most prominent opponent of the idea of group selection, whereas Edward O. Wilson is its greatest defender (see, e.g., Wilson [2012]).

their parents to survive in anticipation of having the favor returned in the form of a bequest), and the second example can be regarded as an example of kin selection (because parents are primarily concerned about the perpetuation of their genes). Thus, both examples of seemingly altruistic behavior are actually selfishly motivated and possibly motivated by a desire to perpetuate one's own genes.

A bequest from the parent to his or her child can be regarded as being altruistically motivated only if the parent does not demand any *quid pro quo* in exchange for leaving a bequest to his or her child and leaves the bequest out of love for the child. Becker [1991, chapter 8] constructs a theoretical model of this case.

Since some bequest motives are consistent with self-interest and some with altruism, we need information on whether people leave bequests and their motives for doing so, in order to know whether or not their behavior is consistent with self-interest or altruism.

Fortunately, such data are available in a household survey called the "Preference Parameters Study of Osaka University" conducted in four countries by a team, from Osaka University, of which I was a member. This survey asked respondents about their bequest motives, asking them to choose from among the following choices:

Responses consistent with altruism:

1. I plan to leave an inheritance to my child(ren) no matter what.
2. I do not plan to leave an inheritance to my child(ren) under any circumstances because doing so may reduce their will to work.

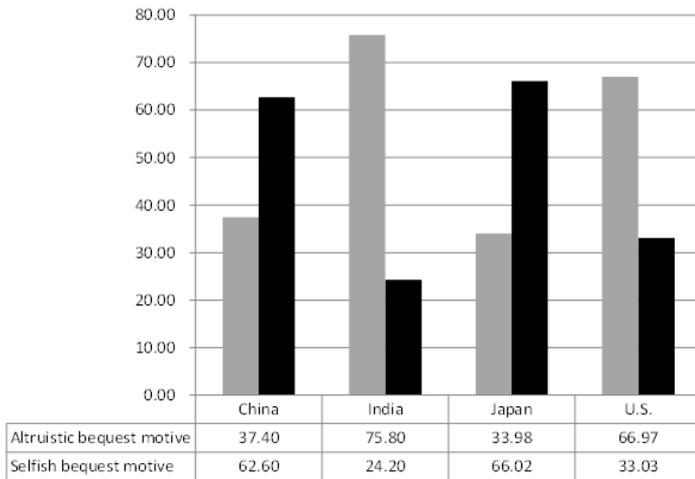
Responses consistent with self-interest:

1. I plan to leave an inheritance to my child(ren) only if they provide care (including nursing care) during old age.
2. I plan to leave an inheritance to my child(ren) only if they provide financial assistance during old age.
3. I do not plan to make special efforts to leave an inheritance to my child(ren), but I will leave whatever is left over.<sup>5</sup>
4. I do not plan to leave an inheritance to my child(ren) under any circumstances because I want to use my wealth myself.
5. I plan to leave an inheritance to my child(ren) only if they carry on the family business.

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<sup>5</sup> This option may be consistent with altruism if the rest of the money is given to charitable organizations or foundations, as in the case of Warren Buffett or Bill Gates.

We found that respondents with an altruistic bequest motive (viz., respondents planning to leave a bequest to their children even if they receive nothing in return and respondents not planning to leave a bequest to their children because doing so may reduce their will to work, options 1-2) were prevalent in all four countries but especially in India and the United States: 75.8 percent of Indians and 67.0 percent of Americans had such altruistic bequest motives. This proportion was much lower but still sizable in China (37.4 percent) and Japan (34.0 percent). In contrast, respondents with a selfish bequest motive (viz., respondents not planning to leave a bequest at all to their children and respondents planning to leave a bequest to their children only if they receive some sort of *quid pro quo* from their children, options 3-7) were in the majority in China (62.6 percent) and Japan (66.0 percent), but in the minority in India (24.2 percent) and the United States (33.0 percent) [Horioka 2014]. The fact that altruistic individuals are in the majority in the United States and India and that they constitute a sizable minority in China and Japan suggests that the degree of applicability of the neoclassical assumption of self-interest varies greatly from country to country, but that it is not predominant in any country.



**FIGURE 1. An international comparison of bequest motives**

Notes: The gray bars show the proportion of respondents having an altruistic bequest motive, while the black bars show the proportion of respondents having a selfish bequest motive. The denominator excludes those who did not respond to the question about bequest motives and those who replied that they want to leave a bequest to their child(ren), but they won't because they don't have the financial capacity to do so.

Data Source: 2012 Preference Parameter Survey of Osaka University (*Kurashi to Nonomi to Manzokudo ni tsuite no Anke-to Chousa*) except for rural China, for which the 2010 survey was used. The results for the urban and rural surveys for China and India were weighted by the proportions of the urban and rural populations in each country (52/48 percent in China and 32/68 percent in India).

Horioka [2014] conducts a comprehensive survey of more formal econometric tests of whether parents and children are selfishly or altruistically motivated and finds that Americans are largely altruistically motivated, whereas Japanese are largely selfishly motivated. This result is consistent with the findings from the Osaka University survey discussed above.

Evidence from economic experiments also sheds light on whether or not people are selfish or altruistic. Take, for example, the dictator game, a game in which player 1 is required to decide how to allocate 1,000 pesos between himself/herself and player 2, and player 2 simply receives what player 1 allocates to him/her. Player 1 can keep all 1,000 pesos for himself/herself, give all 1,000 pesos to player 2, or keep part of the 1,000 pesos and give the rest to player 2. If player 1 is selfish, he/she will keep all 1,000 pesos for himself/herself and give nothing to player 2, but in virtually all cases, player 1 gives at least part of the 1,000 pesos (sometimes as much as 50 percent) to player 2, suggesting that he/she is at least partly altruistic.

A particularly striking falsification of the neoclassical assumption of self-interested behavior among humans is presented in a well-known work by Henrich [2001] and Henrich, et al. [2005] (see also de Dios [2008]). The authors observed how experimental subjects in 15 small-scale primitive societies throughout the world (Africa, Mongolia, Papua New Guinea, South America, etc.) play the ultimatum, public goods, and dictator games, and they found that the selfishness axiom was violated almost consistently across these societies, with few, if any, of the subjects in these societies offering nothing to player 2 in the dictator game. Moreover, the authors found that the degree of unselfishness varied with the degree of cooperation required for survival in a particular society as well as with how much experience the society has had with market exchange.

Therefore, evolutionary economists are justified in criticizing the neoclassical assumption of self-interest. The fact that evolutionary economics can explain selfish behavior, seemingly altruistic behavior that is actually selfishly motivated, and genuinely altruistic behavior makes it more realistic than neoclassical economics.

## **6. The verdict on the evolutionary theory of household behavior**

In sum, I believe that Nelson and Consoli's [2010] theory of household behavior is superior to the neoclassical theory because its assumptions are realistic and empirically grounded, because it incorporates technological innovation, the new goods and services that technological innovation often produces, and changes in preferences and wants, and because it incorporates learning into the decision-making process.

However, the Friedmanesque challenge to all attempts to change behavioral axioms has always been to show that they make a difference in terms of observable behavior and result in better predictions. The burden of proof is on

evolutionary economists to demonstrate that their theory has observational implications that are different from those of neoclassical theory and that their observational implications are verified empirically. Going back to our earlier discussion of bequest motives, we would expect households with bequest motives to have higher saving rates than households without bequest motives. And indeed Horioka et al. [2002] find, as expected, that, in Japan, households with bequest motives have a higher rate of accumulation (saving rate) than households without bequest motives and that the difference is proportional to the magnitude of their intended bequest. This is one example of a case in which alternatives to neoclassical theory have observational implications that are different from those of neoclassical theory and in which these observational implications have been tested and verified.

## **7. Evolutionary economics versus behavioral economics**

Before ending, let me say a word about the connection between evolutionary economics and behavioral economics. Evolutionary economics and behavioral economics are very closely related to one another and specialists in the two fields are on very good terms with one another because they have a common enemy—namely, neoclassical economics! Their common goal is to improve upon neoclassical economics by making it more realistic, and they differ only in emphasis. Namely, evolutionary economists place more emphasis on making neoclassical economics more dynamic and incorporating technological innovation, whereas behavioral economists place more emphasis on making the behavioral assumptions of neoclassical economics, such as the assumption of selfish utility maximization by households, more realistic and empirically grounded.

## **8. Summary**

As I have tried to show, evolutionary economics is an important, promising, and growing field of economics that vastly improves upon neoclassical economics by incorporating more realistic and empirically grounded behavioral assumptions and technological innovation. It is therefore in a much better position than neoclassical economics to explain and to predict a broader range of economic behavior. The School and the economics profession as a whole are fortunate that the Vea family has the generosity and foresight to endow a chair that encourages inquiry in this field.

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## References

- Becker, G. S. [1991] *A treatise on the family: enlarged edition*. Cambridge, Mass.: Harvard University Press.
- Bernheim, B. D., Shleifer, A., and Summers, L. H. [1985] “The strategic bequest motive”, *Journal of Political Economy*, **93**(6): 1045-1076.
- Chu, C. Y. C. [1991] “Primogeniture”, *Journal of Political Economy*, **99**(1): 78-99.
- Darwin, C. [1859] *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life*. London: John Murray.
- Darwin, C. [1871] *The descent of man*. London: John Murray.
- Dawkins, R. [2006] *The selfish gene*. 3<sup>rd</sup> edition. Oxford: Oxford University Press.
- de Dios, E. S. [2008] “Secular morality and the university”, *Sentenaryo 1908-2008: lectures on the occassion of the centennial of the University of the Philippines*. Quezon City: Office of the President, University of the Philippines System.
- Encarnacion, J. [1964] “A note on lexicographical preferences”, *Econometrica*, **32**(1-2): 215-217.
- Fabella, R. [2013] “Time to outgrow physics envy”, mimeo., School of Economics, University of the Philippines, Diliman, Quezon City, the Philippines.
- Henrich, J. [2001] “In search of homo economicus: behavioral experiments in 15 small-scale societies”, *American Economic Review*, **91**(2): 73-78.
- Henrich, J., R. Boyd, S. Bowles, C. Camerer, E. Fehr, H. Gintis, R. McElreath, M. Alvard, A. Barr, J. Ensminger, N. Smith Henrich, K. Hill, F. Gil-White, M. Gurven, F. W. Marlowe, J. Q. Patton, and D. Tracer [2005] “‘Economic man’ in cross-cultural perspective: behavioral experiments in 15 small-scale societies”, *Behavioral and Brain Sciences*, **28**: 795-855.
- Horioka, C. [2014] “Are Americans and Indians more altruistic than the Japanese and Chinese? Evidence from a new international survey of bequest plans”, *Review of Economics of the Household*, **12**(3) (lead article of Special Issue on “Altruism and monetary transfers in the household: inter and intra-generation issues”), forthcoming.
- Horioka, C., K. Yamashita, M. Nishikawa, and S. Iwamoto [2002] “On the importance, nature, and impact of the bequest motives of the Japanese” [Nihonjin no Isan Douki no Juuyoudo, Seishitsu, Eikyou ni tsuite], *Monthly Review of the Institute of Posts and Telecommunications Policy* [Yuusei

- Kenkyuusho Geppou], **163**: 4-31.
- Kahneman, D. [2012] *Thinking, Fast and Slow*. New York: Macmillan.
- Kahneman, D. and A. Tversky [1984] “Choices, values, and frames”, *American Psychologist*, **39**(4): 341-350.
- Marx, K. [1859] *Contribution to the critique of political economy*, Vienna: Alfred Hoelder.
- Marx, K. [1867-1894], *Das Kapital*, Volumes I-III. Hamburg: Verlag von Otto Meisner
- Mirowski, P. [1989] *More heat than light*. New York: Cambridge University Press.
- Nelson, R. R. and D. Consoli [2010] “An evolutionary theory of household consumption behavior”, *Journal of Evolutionary Economics* **20**(5): 665-687.
- Nelson, R. R. and S. G. Winter [1982] *An evolutionary theory of economic change*. Cambridge, Mass.: Belknap Press/Harvard University Press.
- Schumpeter, J. [1934/1982] *The theory of economic development: an inquiry into profits, capital, credit, interest, and the business cycle* [Theorie der Wirtschaftlichen Entwicklung. Eine Untersuchung ueber Unternehmergewinn, Kapital, Kredit, Zins und den Konjunkturzyklus]. Piscataway, N.J.: Transaction Publishers.
- Schumpeter, J. [1942/1994] *Capitalism, socialism and democracy*. Abington, Oxford, England: Routledge/Taylor and Francis Group
- Simon, H. [1955] “A behavioral model of rational choice”, *Quarterly Journal of Economics* **69**(1): 99-118.
- Simon, H. [1959] “Theories of decision making in economics”, *American Economic Review* **49**(3): 223-283.
- Spencer, H. [1862/2000] *First principles of a new system of philosophy*. Chestnut Hill, Mass.: Adamant Media Corporation.
- Wilson, E. [2012] *The social conquest of earth*. New York: Liveright.
- Witt, U. [2001] “Learning to consume: a theory of wants and the growth of demand”, *Journal of Evolutionary Economics* **11**(1): 23-36.