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Abstract

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 vs. altruism.

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Key words: 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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INTRODUCTION

It is my great honor and privilege to have been appointed to the Vea Family Professorial Chair in Technology and Evolutionary Economics Centennial in the School of Economics at the University of the Philippines and to have this opportunity to deliver this professorial lecture before such a large and distinguished audience.

THE VEA FAMILY

Before starting my lecture, I would like to say a few words about two members of the Vea Family, the family that endowed the Chair to which I was appointed—Mr. Orlando B. Vea and Dr. Reynaldo B. Vea. Neither of them needs any introduction, but to introduce them briefly, Mr. Orlando B. Vea was born in 1951 to a father who was a civil servant and a mother who was a schoolteacher. He had a strong interest in science and technology as a child, but he majored in Economics in college and received his B.A. in Economics *cum laude* from the School of Economics of the University of the Philippines in 1970. Mr. Vea co-founded Smart Communications, Inc., the Philippines' pioneer and still leading wireless services provider, in 1991, served as its first President and CEO until 1999, then after Smart's acquisition by PLDT, he served as head of the PLDT Group's media and content businesses as President and CEO of MediaQuest Holdings, Inc., before returning to Smart Communications, Inc., as Chief Wireless Advisor in 2008. Mr. Vea is one of the most distinguished alumni of this School in addition to being one of the leading technology entrepreneurs in the Philippines.

Turning to Dr. Reynaldo B. Vea, the younger brother of Orlando, he is equally accomplished and also has a technology connection. He received his B.S. in Mechanical Engineering *magna cum laude* from the University of the Philippines in 1978, an M.S. in Naval Architecture and Marine Engineering from the Massachusetts Institute of Technology in 1981, and a Ph.D. in Engineering from the University of California, Berkeley, in 1991. He served as Naval Architect and Marine Engineer at a number of U.S., companies and as professor and dean of the College of Engineering of the University of the Philippines and is now President and Chief Executive Officer of the Mapua Institute of Technology, one of the leading technological institutions in the Philippines.

Since both Vea brothers are leaders in the technology field, it is fitting that the Vea family graciously endowed two technology-related Professorial Chairs in the University of the Philippines in 2008 in connection with the university's centennial celebration: the Vea Family Professorial Chair in "Technology for All" in the College of Engineering and the Vea Family Professorial Chair in Technology and Evolutionary Economics in the School of Economics. We are all truly grateful to the Vea family for its great generosity and for its promotion of teaching and research in technology, and I am very honored and humbled to have been named to one of the two prestigious Chairs endowed by the Vea Family.

Given that the title of the Chair to which I have been appointed is the Vea Family Professorial Chair in Technology and Evolutionary Economics Centennial, I feel obligated to speak about either technology or evolutionary economics. Given that my primary expertise is household behavior, I have decided to speak on the topic of "Evolutionary Economics and Household Behavior." But before talking about this topic, I would like to talk briefly about what economics is, what evolution is, and what evolutionary economics is.

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.[1] 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.

As I am sure you already know, the theory of evolution was developed by the great British biologist Charles Darwin (1809-1882) in his seminal book *On the Origin of Species* (Darwin, 1859), which was first published in 1859. According 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, and 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* (Spencer, 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. The name of Herbert Spencer 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 for itself (perhaps deservingly so) because it has been used to justify laissez-faire capitalism, racism, and preservation of the status quo, but Spencer deserves credit nonetheless for being perhaps the first scholar to apply concepts from evolutionary biology to human behavior generally and economic behavior in particular.

[1] This is discussed and critiqued most extensively by Mirowski (1989). Fabella (2013) criticizes economists' adulation of physics.

As another example, Karl Marx (1818-1883), the great German philosopher, economist, and revolutionary socialist, developed a theory of economic development that also contains elements of evolutionary biology that informed his work including *Das Kapital* (Marx, 1867-94). Marx's evolutionary theory is most explicitly summarized in the introduction to his *Contribution to the Critique of Political Economy* (Marx, 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* (Schumpeter, 1934/1982), which was first published in 1911, and *Capitalism, Socialism, and Democracy* (Schumpeter, 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." He argued that capitalism could only be understood as an evolutionary process of continuous innovation and creative destruction and hence 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, just as Marx did, and 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, with Marx rejoicing in the demise of capitalism and Schumpeter bemoaning 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* (Darwin, 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* (Nelson and Winter, 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 Vea family has endowed a Professorial Chair in Technology and Evolutionary Economics. Like everything else, 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 you something for nothing.

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

THE INADEQUACIES OF NEOCLASSICAL ECONOMICS

With this as historical background, in the remainder of this lecture, I would like to introduce you to evolutionary economics by first discussing the two most serious defects of neoclassical economics and of the neoclassical theory of household behavior and then discussing how evolutionary economics has tried to improve upon neoclassical economics by correcting these defects. I will try to 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.

(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) 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 economics 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.

THE INADEQUACIES OF THE NEOCLASSICAL THEORY OF HOUSEHOLD BEHAVIOR

Turning our attention to household behavior, which is the main focus of my own research and of today's lecture, 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, that it does not adequately address the reaction of households to the introduction of new goods and services.

(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) (Simon, 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, searching 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.[2]

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.

(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

[2] 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, e.g., Encarnación (1964).

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 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, p. 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 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 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.)

THE EVOLUTIONARY THEORY OF HOUSEHOLD BEHAVIOR

Next, I would like to 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 (Nelson and Consoli, 2010) that addresses this very topic and propose 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 and assume instead 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 (Nelson and Consoli, 2010, p. 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, p. 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."[3] 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.

MORE ON BEHAVIORAL ASSUMPTIONS

(1) LOSS AVERSION

Getting back to our discussion of the objections evolutionary economists have to the neoclassical assumption of utility maximization by households, another objection they have 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).

The concept of "loss aversion" was first proposed by Daniel Kahneman (1934-) and Amos Nathan Tversky (1937-1996), a renowned team of psychologists and behavioral economists (one Israeli-American and the other Israeli), the former of whom received the 2002 Nobel Prize in Economics, in Kahneman and Tversky (1984). "Loss aversion" refers to the fact that the decrease in an individual's utility from losing 1000 pesos is greater than the increase in that individual's utility from winning 1000 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.

(2) SELF-INTEREST VS. 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

[3] 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.

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.

(1) **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% 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.

(2) **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.

(3) **Group selection.** An individual may help ensure the survival of the group to which it belongs, whether or not the other members are their 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 himself or herself, a phenomenon that is called "group selection." To cite two examples of this phenomenon 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 personal chance of being attacked.

As these examples illustrate, there are many examples 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).[4]

Our discussion has focused thus far on examples from the animal world, but I would now like to turn to 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. To cite a few examples, humans make enormous sacrifices for their children's education and

[4] 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* (Dawkins, 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).

well-being, they leave large bequests to their spouses and children, they make large contributions to various charitable organizations, they volunteer large amounts of their time and labor to helping others, they donate their organs, bone marrow, and blood to complete strangers, etc., etc. 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 (1991, Chapter 8) "Rotten Kid Theorem," 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, etc., from that child during old age (i.e., if the threat of disinheritance is used to induce their 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) construct 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 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 children and leaves the bequest out of love for his or her children (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 not only on whether or not people leave bequests but also on their motives for leaving bequests 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," which was conducted in 4 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)

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

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, with 75.8% of Indians and 67.0% of Americans having such altruistic bequest motives. This proportion was much lower but still sizable in China and Japan (37.4% in China and 34.0% in Japan). By 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 and Japan (62.6% and 66.0%, respectively) but in the minority in India and the United States (24.2% and 33.0%, respectively) (Horioka, 2014). The fact that altruistic individuals are in the majority in the United States and India and 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.

[Insert Figure 1 about here.]

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, a result that 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 as an example the dictator game, a game in which player 1 is required to decide how to allocate 1000 pesos between himself/herself and player 2, and player 2 simply receives what player 1 allocates to him/her. Player 1 can keep all 1000 pesos for himself/herself, give all 1000 pesos to player 2, or keep part of the 1000 pesos and give the rest to player 2. If player 1 is selfish, he/she should keep all 1000 pesos for himself/herself and give nothing to player 2, but in virtually all cases, player 1 gives at least part of the 1000 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 observe how experimental subjects in fifteen small-scale primitive societies from throughout the world (Africa, Mongolia, Papua New Guinea, South America, etc.) play the ultimatum, public goods, and dictator games and find that the selfishness axiom is violated almost consistently across these societies, with few, if any, of the subjects in

[5] 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.

these societies offering nothing to player 2 in the dictator game. Moreover, the authors find that the degree of unselfishness varies 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.

Evolutionary economists are therefore justified in criticizing the neoclassical assumption of self-interest and 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.

THE VERDICT ON THE EVOLUTIONARY THEORY OF HOUSEHOLD BEHAVIOR

In sum, 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.

EVOLUTIONARY ECONOMICS VS. 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.

SUMMARY

As I have tried to show in this lecture, 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 much better able to explain and predict economic behavior and is able to explain and predict a broader range of economic behaviors than neoclassical economics. It is indeed fortunate for the School of Economics of the University of the Philippines and for the economics profession as a whole that the Vea family had the generosity and foresight to endow the Vea Family Professorial Chair in Technology and Evolutionary Economics Centennial and to encourage teaching and research in this important, promising, and growing field of economics. For that we are eternally grateful.

Thank you very much for your kind attention.

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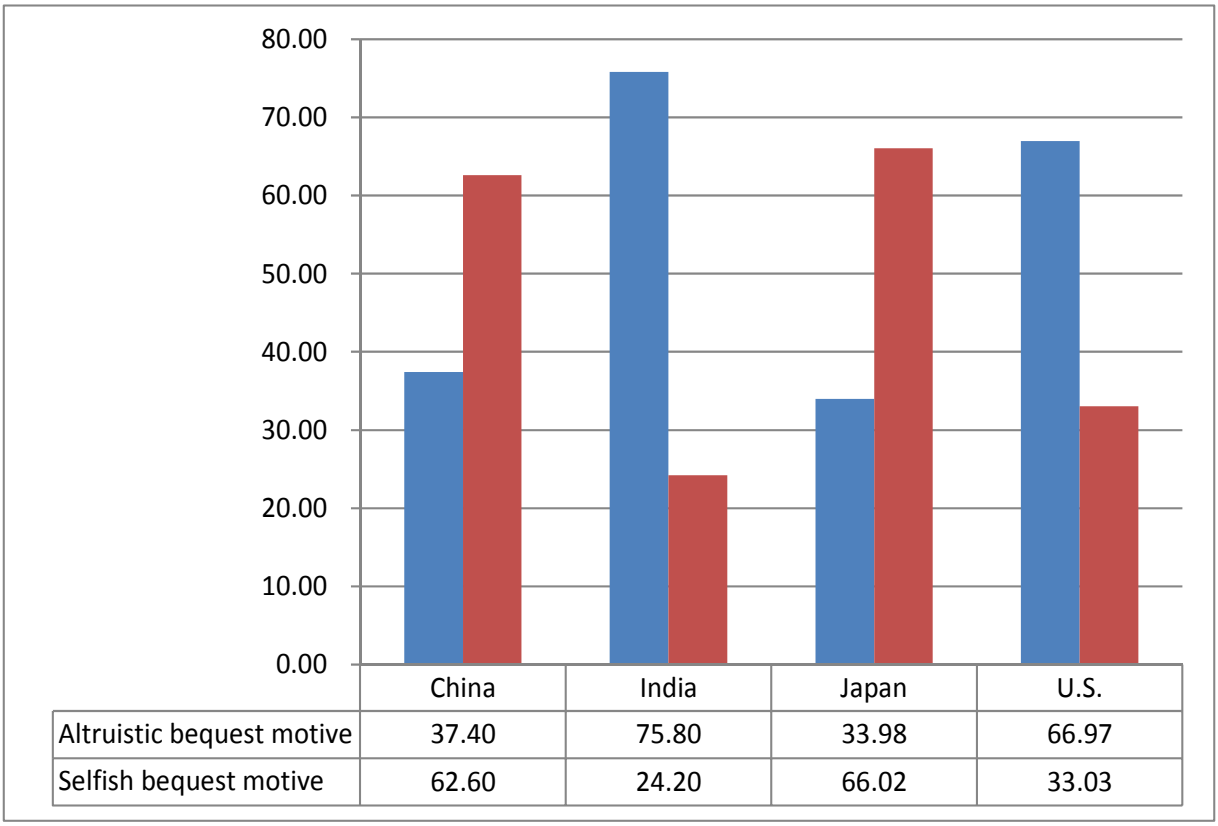
Figure 1: An International Comparison of Bequest Motives



	China	India	Japan	U.S.
Altruistic bequest motive	37.40	75.80	33.98	66.97
Selfish bequest motive	62.60	24.20	66.02	33.03

Notes: The blue bars show the proportion of respondents having an altruistic bequest motive, while the red 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 won't because they don't have the financial capacity to do so.

Data Source: 2012 Preference Parameter Survey of Osaka University (Kurashi to Konomi 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% in China and 32/68% in India).