Alternative Microeconomics

Chapter three

Ways of Knowing

I Introduction to ways of Knowing

Knowledge is imperfect

Introspection helps to understand the strengths and weaknesses of what we think we know.

Knowledge about economic phenomena is imperfect. The problem of knowing is not unique to economics. An understanding of the methods by which knowledge is accumulated aids in the identification of potential biases and weaknesses of any discipline or field of study. Academic disciplines, like individuals, can benefit from introspection. By examining our values, objectives, and methods of achieving those goals, we better understand ourselves, consider other perspectives and hopefully improve the discipline.

The study of methodology and epistemology provides a process by which this introspection of economics as an academic discipline can proceed. Any understanding of the methods used in economics requires some introduction to a few important contributions to the literature on the process of knowing. It is a fundamental part of cultural literacy in a world dominated by ”science” and the “scientific method.” A brief summary of some of the basic concepts and major contributors is presented here.

There is a long history of various approaches to the study of the economy. These approaches are not self contained, isolated bits of knowledge; they are extensions of and reactions to earlier approaches in economics and other fields. The process of “knowing” is difficult. Two questions that should be paramount are:

What do I know?

How do I know what I think I know?

Epistemology is a study of the nature and limits of knowing.

Epistemology is the study of the origin, nature, methods and limits of knowledge. There are several approaches to the study of processes that contribute to knowing; the history of science and the sociology of knowledge are two closely related fields. Methodology is one aspect of epistemology. Methodology is generally seen as the system of values, beliefs, principles and rules that guide analysis within a given discipline. The methodology(ies) that prevails within a discipline plays a major role in the nature of questions that are asked as well as the answers that are offered.

There is a large and growing body of literature on methodology in philosophy and the sciences (both natural and social). This trend has also influenced economics. Many economists have participated in the explorations into methodology and epistemology. One explanation for a renewed interest in methodology in economics is that the basic processes created to explain the development of market systems and mature industrial economies may need to be adjusted if there are significant structural changes in the economy. The study of the history of economic thought and methodology adds the questions

of

"What do I believe?"

"Why do I believe what I believe?"

One of the most difficult tasks in any discipline is to understand the nature of knowledge and the process by which it is acquired within the discipline. In this matter, economics is no different from any other body of knowledge. The methods used to study the phenomena influence the phenomena we select to study and the conclusions we draw.

FACTS, INFORMATION, KNOWLEDGE AND WISDOM

Facts or data are phenomena.

Information is the recognition of patterns in a set of facts or data.

Knowledge is a understanding of the causes and relationships in a set of facts.

Wisdom implies a system of ethics to make judgments about knowledge.

In any period of history, there is a problem of determining the nature of what we think we know. Facts, information, knowledge and wisdom are not the same things. It is possible to engage in long arguments about the meaning of these words. (For our purposes, we will accept facts in the spirit of its Latin roots. *Factum* is something done; *factus* is done; *facere* is to do.) Sometimes data may be considered as facts. Facts alone do not tell us much. It is the organization of those facts into patterns that provides information. The recognition of patterns is aided by the way in which facts are ordered. Categorization (taxonomy) of facts is necessary to establish the relevant patterns and relationships. Information may also include the communication of those facts. Knowledge implies an understanding of the nature of relationships (system of causation) among the facts and information. Wisdom is more complicated and suggests a system of values and the judgment to evaluate and apply knowledge. Wisdom requires a system of ethics. The definitions of facts, information, knowledge and wisdom used here are superficial and subject the reader's interpretation.

HYPOTHESES, THEORIES, LAWS AND MODELS

A hypothesis is a set of provisional propositions or premises used as an attempt to explain a class of phenomena

A ***hypothesis*** is a proposition or set of propositions that is an attempt to explain an event or class of phenomena. It is usually thought of as provisional and a guide to further investigation. Hypotheses can be tested but never proven. Hypothesis testing requires the analyst to try to disprove the hypothesis. If it can be shown to be false, then it can be rejected. If it cannot be shown to be false then it is accepted as not yet proven false and may be retained until proven false. It is possible to reject a true hypothesis as false; this is a Type I error. It is also possible that a hypothesis is retained as probably true even when it is false; this is a Type II error. It is not possible to reduce these errors to zero.

A theory is a coherent group of general propositions used as principles to explain class of phenomena.

A ***theory*** is an explanation about a class of phenomena. Webster's Dictionary defines a theory as a "*as a coherent group of general propositions used as principles for explaining a class of phenomena*." Usually a theory is considered as more reliable than a hypothesis. Theories are used to establish relevant patterns in data and to explain the relationships within those patterns. Newton's theory of gravity or Einstein's theory of relativity are examples of explanations of relationships between masses or the relationships between energy and matter. Theories are used to make sense out of data and information. "Without theory facts are meaningless." (Alfred Marshall)

A law is a widely accepted theory

The term ***law*** is used to represent a widely accepted premise or theory about a particular causal relationship. It is more widely accepted than a theory. In economics some writers refer to a "law of demand." (The belief that demand functions are inverse relationships between price and quantity that will be bought at each price, individuals buy more of a good at lower prices.)

Models are an abstraction and act as a guide to the interpretation of data and facts.

In economics, a ***model*** is a simplification of various relationships among economic variables and is used to explain or predict economic phenomena. It is a way to represent or call attention to a relevant order or pattern in a set of data. It is of necessity an abstraction and includes only the most important aspects of a relationship.

The nature of a model is dependent on the elements it is constructed of and the purposes it's anticipated use. If two groups are given the task of making a model airplane but one of the groups is given paper and the other clay, their models will not look alike. Both models will be abstractions from reality. The elements of reality that are modeled may be different. The shape of a wing to give lift is an important feature. The color of the insignia on the rudder may not be significant (unless you are trying to demonstrate how air craft are identified by different insignia). Which model is "best?" A paper model of an airplane may be useful to demonstrate the idea of flight to a third grade class. A clay model might be best in a wind tunnel to test aerodynamics of a 750 mph wind. In economics, models built using individuals may not be useful in describing the economic behavior of multinational corporations. Models using land, labour and capital may not ask and answer the same questions as models that are built with energy, matter, time and technology.

Models may take many forms; narrative, visual/graphic, tabular, mathematical, Cartesian graphs are some of the forms that may be used to present models.

FOUNDATIONS OF "SCIENCE"

Jacob Bronowski contends there are three creative ideas central to science. These are the ideas of:

Three basic ideas in science are
Order
Causes
Chance

1) order,

2) causes and

3) chance. (Bronowski 1978)

ORDER

Bronowski states that, "*Science is not an impersonal construction*." (Bronowski. p 13) This human construction of knowledge begins ordering of things and events or phenomena. Aristotle saw order in the "nature of things." Things fall to the earth because it is in their nature to do so. Bronowski mentions that one of the contributions made by the philosophers of the Middle Ages is that there is a hierarchy to the system of order. (Ibid. p 23)

Three basic ideas in science are
Order
Causes
Chance

The notion of order is implicit in the classification of phenomena. Taxonomy (the art and/or science of identification, naming and categorization of phenomena) is fundamental to the process of science and the acquisition of knowledge. To classify events or things requires the recognition of the way in which things are alike or different. Taxonomy implies observation of the phenomena and some recognition of specific characteristics.

The recognition of patterns may be the result of the way data is organized.

Science looks for order or regularities among sets of facts. Order or regularities are patterns that are repeated in data or facts. Facts or data are usually collected by empirical methods. Observation is a typical method of collection. If we watch a "magician" or a group of witnesses to a crime testify, we understand that what we observe is not always what is. It is important to be very careful about what we see as facts. Different sets of "facts" can lead to very different questions and conclusions. Different "facts" or data can be collected about the same set of events. The taxonomy or the categorization of

The recognition of patterns may be the result of the way data is organized.

facts may lead to the recognition or belief that these facts are related in particular ways. A different taxonomy may result in the perception of different patterns When inputs are categorized as land, labour, capital and entrepreneurial ability, the order recognized may be different to a set of inputs categorized as energy, matter, time and technology. Depending on the patterns (order) perceived within the data, different questions may be asked.

CAUSES

Bronowski argues that both da Vinci and Newton were great inventors and mechanics. They both recognized patterns of order in the universe and were able to describe these patterns. The difference, according to Bronowski, is that while da Vinci was interested in variety and infinite adaptability, Newton was focused on unity and the singleness of nature. (Bronowski, p 24) Bronowski comments;

"*We could say that the Middle Ages saw nature as striving towards its own inner order: and that the Scientific Revolution overthrew this order and put in its place the mechanism of causes. … On the one hand, all science, and indeed all thinking starts from and rests upon the notions of order; what marks the Middle Ages is that their order was always a hierarchy. And on the other hand what marks the scientific view is not that it turned to the mechanism of causes, but that it saw the world as a mechanism at all – a machine of events.*" (Bronowski, p 25)

Causation is recognized through the perception of patterns and regularities.

Understanding how one fact is related to another fact is the recognition of causes. The recognition of order, regularities or patterns in a set of fact, raises the question as to the nature of the patterns. There are at least five possibilities:

1) event A may be caused by event B; $\mathbf{A = f_a(B)}$

2) event B may be caused by event A; $\mathbf{B = f_b(A)}$

3) events A and B may be caused by some (unobserved event C);

$$\mathbf{B = f_{bc}(C)} \text{ and } \mathbf{A = f_{ac}(C)}$$

4) event A may be caused by some interaction between events B and C;

$$\mathbf{A = f_h(B, C)}$$

5) events A and B may be the result of coincidence

Statistical tools show correlation not causation..

Statistical analysis is the typical method used to manipulate and analyze data. Many technical tools can be used to describe and relate the facts in data sets. Averages, median, mode, range, domain, variance, standard deviation and other measures are descriptive statistics. Correlation, analysis of variance and regression can be used to relate different aspects (variables) in the data set. The strength of the relationships that are recognized in the data set can the tested using t-scores, F-ratios, Chi Square and other methods. At the end of the day, none of these methods can prove causation; they can only show correlation. The concept of causation depends on a theory (or hypothesis) about the relationship between the variables. Statistical methods allow a test of the hypothesis or theory. The hypothesis cannot be proven it can only be disproven and the hypothesis rejected. Statistics can be used as evidence to support or reject a perception of causation.

CHANCE

If the world of events were truly a machine subject to the law of causes, events

Probability aids in the recognition of causes.

would be deterministic. Bronowski argues that the recognition of the law of chance is central to the method of science. It adds "*statistical law"* to the concept of "*causal law*." (Bronowski,. p 82) Causal law states that event B is caused by event A and therefore, event B will follow event A 100 time out of 100 occurrences of event A. Statistical law is based on the notion that event B will "*probably*" follow event A. The process is described as one where;

> *"We look for a trend or systematic difference. But the line of this trend will itself be blurred by the unsteady hand of chance or random fluctuation. We cannot get rid of this random scrawl. But we can from it determine a measure of random variation, and use that to draw round the trend an area of uncertainty. If the area is small enough by standards which are agreed between us, then the trend is established, and we know the limits within which it is likely to lie.* (Bronowski, p 92)

The concept of probability provides the method by which observations of an extraordinarily complex world can be interpreted. It gives us information and knowledge that may not be "true" but is useful.

In a complex world, there may be many reasons for a lack of certainty in causes. There may be other hidden or unrecognized forces that influence the relationship between event A and event B. If event A results in event B 90% of the time we may believe that A "causes" B. If the occurrence of A results in event B 30% of the time, other "causes" of B may be more important. Probability is a key idea in the understanding of causes. Statistics provides the means to state that with 95% confidence (or some other percentage) event A is correlated with event B.

USEFULNESS AND "TRUTH"

Knowledge that is not "true" may be useful.

Knowledge held at any time may be "true" or "not true." Knowledge that is true may or may not be useful. Knowledge may be useful whether it is "true" or not. Before the Copernican Revolution, a common belief was that the Earth was a stationary center of the universe. This was the Ptolemaic system attributed to Claudius Ptolemy [127-151 AD], a Greek mathematician and astronomer who lived in Egypt. In this system, the sun, stars, planets and moon circled the Earth in repeated patterns. Complex models were constructed to explain and predict the paths of the objects. These models worked with reasonable accuracy and were useful to plan for seasons, planting of crops, and to prepare for floods. The models were useful, but "wrong." New information obtained through observation and measurement showed there were simpler explanations for the paths of the celestial bodies. The Copernican or heliocentric view gained dominance. Galileo [1564-1642] verified the Copernican system with a new technology (the telescope). Johann Kepler [1571-1630] improved on Galileo's findings and calculated equations to explain the elliptical orbits of the planets about the sun. As we accept "new knowledge" about the cosmos and subatomic matter, we replace old truths with new truths.

EXPLANATION, PREDICTION AND STORYTELLING

The goals of science are **Explanation** **Prediction** and **Story telling**

Explanation and prediction are two of major objectives of science. These two goals are not symmetrical; it is possible to explain an event or phenomenon without being able to predict the probability of its occurrence; at the same time, it is possible to predict an event without being able to explain its nature or causes. Mark Blaug identifies two problems that arise from the "Symmetry Thesis." First is the problem; "*the history of science contains a number of theories which appear to explain natural phenomena, without however*

predicting them even in a statistical sense." (Blaug, 1986, p 274) Darwin's theory of evolution is cited as an example.

Explanation and prediction are not symmetrical.

Second is the problem; "*...science, and particularly social science, abound in rules-of-thumb that yield highly accurate predictions about both natural and social events despite the fact that we may have absolutely no idea why these rules-of-thumb work as well as they do.* (Ibid.)

Whether explaining or predicting, science places value on precision and rigor of the process. However, one should avoid using the same criteria to evaluate scientific models with different objectives. It is also necessary to avoid attempts at precision and rigor that are not possible. Thomas Mayer cautions economists (the warning applies to all disciplines):

> *"...we should draw a much sharper distinction that is usually done between two types of economic theory. One, formalist theory is abstract theory that is concerned with high-level generalization and looks towards axiomization. The other, empirical science theory focuses on explaining past observations and predicting future ones. While both are perfectly legitimate, applying the criteria appropriate to one to evaluate the other generates confusion and misunderstanding. (Mayer's book)...is a plea for a more modest economics that recognizes the inherent difficulty of making precise and indubitable statements about the actual world, accepts that there is a trade-off between rigor and relevance. I certainly agree that one should be as rigorous as one can be: I just oppose trying to be as rigorous as one can not be."* (Mayer, p 7)

An emphasis on rigor and precision may result in attempts to develop theories or models that are esoteric and of little interest to anyone other than the scientist-author.

Stories of science transmit and communicate values.

In addition to explanation and prediction, science and the stories of science also create, shape and transmit individual and social values. Often this is an unintended effect rather than a conscious objective. The study of the evolution of methods in a discipline, such as economics, will hopefully create a greater awareness of this role and a greater understanding of one of the important effects.

LOGIC

Logic is a study of the principles of reasoning.

Several processes can be used in the discovery, creation and justification of knowledge. Instinct, intuition, abduction, deduction, induction and authority are examples of sources of knowledge. Appeals to authority as a justification for acceptance of knowledge is common but is not a reliable source. Instinct, intuition and introspection were once of great importance, but are not often seen as credible as "science" when seeking justifications for "knowledge" in Western, industrial societies. Research in the cognitive sciences and behavioral economics has recently been investigating intuition as a means of decision-making. Daniel Kahneman (a psychologist) received the Nobel in economics for work in cognitive processes and intuition in economic decisions. However, most discussions of methods in science place primary emphasis on inductive and deductive processes.

DEDUCTIVE REASONING

Aristotle (384-322BCE) is usually credited with formalizing syllogistic or deductive reasoning. Deductive reasoning is a process that starts with a set of premises

Deductive logic is reasoning from a general premise to a specific conclusion:

(or *a priori* truths) or general principles and through rules of logic, "deduces" a conclusion about a specific case. There are usually two premises: a major premise and a minor premise. If the general principle or major premise were that all the water in the lake was safe to drink, then deductive reasoning would conclude that a specific glass of water from the lake (the minor premise is the water is from the lake) is safe to drink. The internal logic could be correct but if either of the premises were false, correct deductive logic would not yield true conclusions.

INDUCTIVE REASONING

Francis Bacon (1561-1626) is credited with formalizing inductive reasoning. J.E. Creighton argues that Bacon's *Novum Organum* was to replace Aristotle as the preeminent guide to the process of acquiring knowledge.

Inductive logic reasons from a set of observations to a specific conclusion.

> *"Bacon did for inductive logic what Aristotle did for the theory of the syllogism. It is of course, incorrect to say, as has sometimes been said, that Bacon invented the inductive method of reasoning. … What Bacon endeavored to do was to analyze the inductive procedure, and to show what conditions must be fulfilled in order that truth may be reached in this way."* (Bacon, pps vii-viii)

Inductive reasoning is the process of inferring information from empirical observations. If several glasses of water were taken from a lake and each glass of water was shown to be safe to drink, it might be "inferred" that the water in the lake is safe to drink. Because all the water in the lake was not (and possibly could not) be tested there is some probability that all the water in the lake is not safe to drink. Empiricism is rooted in the inductive process and is based on empirical observations. Statistical inference is an application of the inductive method.

While inductive methods are useful, there are pitfalls to avoid. Observations might be incomplete or the interpretation of the observation(s) could be incorrect. The selection of which phenomena to observe and the sequencing of the "facts" can alter the conclusions reached. The application of inference and inductive methods requires judgment and caution in the interpretation of data.

ABDUCTIVE REASONING

Abductive reasoning is a creative process that is less rigorous than induction.

Abduction is a creative process from which hypotheses arise. Abduction is similar to induction. The differences are that abduction is less formal process that consists of a combination of intuition, experience, observation, deductive reasoning and generates hypotheses which could be wrong. Abduction is the insight that occurs with less conscious formal reasoning than either induction or deduction.

It is the purpose of inductive and deductive reasoning to test the hypotheses that emerge from the process of abduction.

II Epistemology and Economic Methodology

Epistemology is the study of the nature and limits of knowledge

Epistemology is the study of the nature and limits of knowing. Economists are confronted with an ocean of facts and data that are reputed to support a plethora of theories and laws that purport to be the "truth" about economic behavior. Any discipline, whether it is economics, physics, biology or …, advances because someone questions the received wisdom; both extensions of ideas and new ideas that are created as reactions against result from questions about the received wisdom. If a scientist, economist or practitioner of any

discipline has the "truth," their only task is to make sure others accept that "truth." A bit of humility about what one thinks they know is not a bad thing. A quick survey of some of the basic ideas in epistemology provides an enlightened humility.

A TAXONOMY OF KNOWLEDGE

Joel Mokyr describes knowledge as propositional and prescriptive

Joel Mokyr classifies knowledge as propositional and prescriptive knowledge. Mokyr, an economic historian, relates the problem of human knowledge to economic growth and the economic problem. Propositional knowledge is "*..knowledge (that is to say beliefs) about natural phenomena and regularities*." (Mokyr, p 4) Prescriptive knowledge is instructional or knowledge about techniques about how to do something. (ibid)

PROPOSITIONAL KNOWLEDGE

In Mokyr's taxonomy, propositional knowledge (Ω) can take two forms. He describes these as (1) "*the observation, classification, measurement, and cataloging of natural phenomena*." And (2) "*the establishment of regularities, principles and 'natural laws' that govern these phenomena and allow us to make sense of them.*" Mokyr's characterization of propositional knowledge is;

***Propositional knowledge** is knowledge about the fundamental nature of the natural order of things. It is knowledge about patterns and regularities.*

> *"Science, as John Ziman has emphasized, is the quintessential form of public knowledge, but propositional knowledge is much more: the practical informal knowledge about nature such as the properties of materials, heat, motion, plants and animals; and intuitive grasp of basic mechanics (including the six 'basic machines of classical antiquity: the lever, pulley, screw, balance, wedge and wheel); regularities of the ocean currents and the weather; and folk wisdom in the 'apple-a-day-keeps-the-doctor-away' tradition. Geography is very much a part of it: knowing were things are is logically prior to the instructions of how to go from here to there."* (Mokyr, p 5)

He argues that for the economic historian what matters is the collective knowledge of what society, as a whole, knows (the union of all statements of such knowledge). Confidence and consensus about knowledge as well as access to and transmittal of that knowledge is of great importance to how propositional knowledge is used. Mokyr characterizes the development of new propositional knowledge as "*discovery, the unearthing of a fact of natural law that existed all along but was unknown to anyone in society.*" (Mokyr,, p 10)

PRESCRIPTIVE KNOWLEDGE

***Prescriptive knowledge** is knowledge about how to do things. It is the instructional knowledge about how the regularities in propositional knowledge can be used to achieve objectives..*

Prescriptive knowledge (λ) is the knowledge about how to do something; it is technique or instructional knowledge. This prescriptive knowledge is defined as "*sets of executable instructions or recipes for how to manipulate nature.*" (Mokyr,, p 10) The addition to this prescriptive knowledge is called an "*invention*." Prescriptive knowledge is not right or wrong it is successful or unsuccessful. Mokyr argues that the industrial revolution and the associated economic growth began when prescriptive knowledge came to be based on proportional knowledge. Individuals can learn to do things without knowing why they work. Once you know why techniques (prescriptive knowledge) work, (propositional knowledge), it is easier to invent improvements to old techniques and develop of new ones.

AN EXAMPLE

Knowledge about baking includes an understanding of the effects of altitude, leavening, moisture, temperature, gluten and a host of other phenomena on

cakes. This knowledge is propositional knowledge. A cake can be baked by someone in San Francisco with a recipe (prescriptive knowledge) and no knowledge about the effects of altitude on cakes. The recipe will work as long as person doesn't try to bake a cake in Santa Fe, NM (elevation 7200 feet). To modify the recipe so it will work at the new elevation requires propositional knowledge. The development of new recipes (λ) requires some propositional knowledge (Ω).

BRIEF SURVEY OF EPISTEMOLOGY

Karl Popper uses falsification as a method of acquiring knowledge

Karl Popper [1902-1994] is the primary architect of falsification as a method of science. In his *The Logic of Scientific Discovery*, 1934, he outlines the basic approach taken in what is called the scientific method. He proposes that scientific knowledge grows through a process of making hypotheses abut the nature of problems and the falsification or testing of those hypotheses. Popper argues that it is the duty of every scientist to try to disprove or reject his or her hypotheses. If a hypothesis cannot be rejected by empirical evidence, it may be retained as "probably true." All knowledge then is probabilistic; it has not yet been falsified. The process is subject to what statisticians call Type I and II (or alpha and beta) errors. Type II errors occur when a false hypothesis is accepted as "true." When a "true" hypothesis is rejected as false a Type I error has occurred.

Popper's approach makes Knowledge probabilistic, it is probably true that . . .

Thomas Kuhn [*The Structure of Scientific Revolutions*, 2cd ed, 1962,1970] offers another explanation for the evolution and change of scientific thought in the "hard sciences." His explanation is often applied to economics and social sciences. Kuhn used the concept of "paradigms" and paradigm shifts to explain the process. The term, paradigm, is often used and abused in discussions.

Kuhn sees knowledge as paradigms.

Kuhn's approach is essentially a "truth by consensus" which is contained in the paradigm. This paradigm (and its associated "truth by consensus") is practiced until there are "anomalies" or problems that the existing paradigm cannot explain. Then an alternative paradigm with greater explanatory powers replaces it. He argues that a science operates within a paradigm. This paradigm is characterized by,

Knowledge is a form of consensus

- the "community structure of science'
- or the "disciplinary matrix" which consists of symbolic generalizations (deployed without question),
- shared commitments to a set of beliefs and a set of values.

If a paradigm cannot resolve "too" many anomalies, a new paradigm emerges.

The members of the science use this paradigm to resolve anomalies. When an anomaly of major significance or a large number of anomalies cannot be explained, the paradigm must be questioned and a new paradigm for that science developed. In this manner "science progresses."

Lakatos and scientific research programmes in the development of knowledge

Imre Lakatos' method is expressed in his book, *Proofs and Refutations*, [Cambridge University Press: Cambridge, 1976]. Lakatos' approach, while in the tradition of one of his teachers, Karl Popper, is critical of both Popper and Kuhn. He advocated a more sophisticated form of falsification of "groups of theories" and combined it with "scientific research programmes (SRP's)" which were more specific than paradigms. Lakatos' SRP consists of two elements, the "hard core, protective belt" and the "positive heuristic." (Pheby, John, *Methodology and Economics; a Critical Introduction*, M.E.Sharpe, 1988,, p 56) The hard core is constructed of "basic axioms and hypotheses" that are accepted without question and is used as a defense mechanism. The positive heuristic is the

body of theories and problems that drive the research programmes. (Pheby, p 56)

Kuhn's approach can be contrasted with that of Karl Popper and Imre Lakatos. Popper saw the advancement of knowledge as the result of the falsification of testable hypotheses. Those hypotheses that were not disproved were accepted as "probably true." Lakatos took the middle ground. Rather than falsifying a hypothesis or the whole paradigm, he felt that the process was based on "scientific research programs." A school of economic thought may represent a paradigm (in a Kuhnian sense) or a scientific research program (in a Lakatian sense).

Feyerabend takes a more pragmatic approach to the process of knowing. Knowledge is interpreted as human interpretation of patterns.

A more extreme view is expressed in Paul Feyerabend's book, *Against Method* (Verso: London, 1988, originally published by New Left Books, 1975). He advocates an approach to science that has been called "theoretical anarchism." Feyerabend argues that the "success of science cannot be used as an argument for treating yet unsolved problems in a standardized way" and scientific achievements can "be judged only after the event." (Feyerabend, p 2) Feyerabend's approach to the methodology of science is radically different because of his objectives. He claims his purpose is "humanitarian not intellectual" in that he wants "to support people not advance knowledge." He is "against ideologies that use the name of science for cultural murder." (Feyerabend, p 4]) While he does not disavow the title of "theoretical anarchist," he does provide insights into the evolution of science and knowledge. Feyerabend summarizes some of his insights:

> *"Neither science nor rationality are universal measures of excellence. They are particular traditions, unaware of their historical grounding."* (Feyerabend, p 231)
>
> *"Yet it is possible to evaluate standards of rationality and to improve them. The principles of improvement are neither above tradition nor beyond change and it is impossible to nail them down."* (Feyerabend, p 248)
>
> *"Science is a tradition among many and a provider of truth only for those who have made the appropriate cultural choice."* (Feyerabend, p 256)
>
> *"The entities postulated by science are not found, and they do not constitute an 'objective' stage for all cultures and all of history. They are shaped by special groups, cultures, civilizations; and they are shaped from a material which depending on its treatment, provides us with gods, spirits, a nature that is a partner of humans rather than a laboratory for their experiments, or with quarks, fields, molecules, tectonic plate. Social monotony thus implies cosmic monotony - or 'objectivity,' as the latter is called today."* (Feyerabend, p 260)

Science and economics are not free from Ideology

Science (and economics) is not free from ideology. It is necessary to understand the prevailing ideology in a culture, society, group or corporation in order to interpret one's own perspective. Imagine a luxury train, the Orient Express. You find your way to the club car and find a billiard table. You shoot the cue ball down the table (parallel to the tracks) in the direction the train is coming from at the same speed the train is traveling. You perceive that the ball is rolling toward the other end of the table. To some one observing the train pass by, as they peer into the window they perceive that the cue ball is stationary and that the table, you and the train are moving away from the point where the ball is fixed. Your perspective determines your interpretation of the event.

MILTON FRIEDMAN

Friedman argues that there are positive and normative aspects to economics.

Milton Friedman [1912-] is one of the best-known economists of the 20th century. His article, "The Methodology of Positive Economics" in *Essays in Positive Economics* [1953] was one of the most important influences on economic thought. In this important piece, Friedman sets the standards for *normative* and *positive* economics as well as influencing several generations of economists. He argues that positive economics is "*independent of any ethical position"* and its task is to provide "a *system of generalizations that can be used to make predictions about the consequences of any change in circumstances;"* it is deals with "*what is."* (Friedman, p 4) Normative economics is dependent on positive economics and deals with "*what ought to be*."

Positive economics** is "**what is.

***Normative economics** is "**what ought to be.**"*

Friedman argues that economics can be a positive science. The structure of this positive science, like all positive sciences, consists of two parts; first, is a language and second, is a "*body of substantive hypothesis designed to abstract essential features of complex reality.*" (Ibid. p 7) According to Friedman, language is a set of tautologies whose primary function is to organize and classify empirical material to facilitate our understanding. This language has no substantive content. This component or element in positive science may be evaluated by formal logic to determine if it is consistent and complete. Empirical or factual evidence and presumably the use of the language will reveal how well the analytical filing system functions. (Ibid.)

Friedman uses the accuracy of predictions to validate knowledge.

Assumptions do not have to be realistic

The body of "substantive hypotheses" or theory is primarily to yield "*valid and meaningful (i.e. not truistic) predictions about phenomena not yet observed*." (Ibid.) The only test of the validity of the hypotheses or theory is its "*predictive power for the class of phenomena it is intended to 'explain*.'" If there are alternative hypotheses that may be chosen, Friedman suggests two criteria; simplicity and fruitfulness. Simplicity is an echo of the work of William Ockham [1285-1347 (49?)] or Ockham's razor. Fruitfulness reflects the precision of predictions as well as their relevance for wider or more generalized applications. A more "fruitful" set of hypotheses would also suggest additional lines of research. The validity of a theory cannot be evaluated on the basis of the reality of the assumptions, rather a

> *"…hypothesis can be tested only by the conformity of its implications or predictions with observable phenomena; but it does render the task of testing hypotheses more difficult and gives greater scope for confusion about the methodological principles involved. More than other scientists, social scientists need to be conscious about their methodology."* (Friedman, p 40)

DEIRDRE MCCLOSKEY

McCloskey argues that rhetorical methods are the way in which knowledge is attained.

Of all the individuals whose views on methodology have been discussed, Friedman and McCloskey are the only writers who can be identified as "economists." McCloskey's book, *The Rhetoric of Economics*, (University of Wisconsin Press: Madison, 1985) has gained widespread attention among economists. McCloskey argues that the method economists claim to follow is not the method that they follow in practice. Most economists, as well as individuals in most other disciplines, claim to follow the "scientific method" of falsification (i.e. hypothesis testing), usually in the format expressed by some integration of Popper/Lakatos/Kuhn. McCloskey charges that as a result of attempts to create and follow a modern science, "modernism" has become a dominant theme. According to McCloskey, *modernism* is a "word that can be fully defined only in use." (McCloskey, 1985, p 5) She points out that modernism is not limited to

economics but is also present in philosophy, architecture, music, and politics. This list can be expanded to include management, accounting and a multitude of other fields. While it may not be possible to give a precise definition of modernism, it is possible to characterize its nature. Some of its characteristics are identified in the following quotes about modernism:

> *"knowledge is to be modeled on the early twentieth century's understanding of certain pieces of nineteenth-century and especially seventeenth-century physics."* (McCloskey, 1985, p 5) (Presumably, Comte, Descartes and Newton are the seventeenth century physicists in the reference.)
>
> It is the *"notion that we can know only what we cannot doubt and cannot really know what we can merely assent to."* (McCloskey, 1985, p 5)
>
> *It includes the belief that "only falsifiable hypotheses are meaningful; the evidence is consistent with the hypothesis; of tastes one ought not, of course, to quarrel."* (McCloskey, 1985, p 6)
>
> *"Modernism views science as axiomatic and mathematical and takes the realm of science to be separate from the realm of form, value, beauty, goodness, and all unmeasurable quantity."* (McCloskey, 1985, p 6)
>
> It is *"functionalist and given to social engineering and utilitarianism, the modernist is antihistorical, uninterested in cultural or intellectual traditions."* (McCloskey, 1985, p 6)

Rhetoric includes:

Facts

Logic

Metaphor, *and*

Stories

McCloskey advocates the use of classical rhetoric to advance economic theory through the same methods used in literary criticism. Rhetoric, which includes the use of fact, logic, metaphor and story, provides the criterion and framework that guides the development of science.

Deirdre McCloskey argues that,

> *"(E)conomists do not follow the laws of inquiry their methodologies lay down."* (McCloskey, 1983, p 482)

Rather,

> *"Economists in fact argue on wider grounds and should. Their genuine workaday rhetoric, the way they argue inside their heads or their seminar rooms diverges from the official rhetoric."* (McCloskey, 1983, p 482)

McCloskey proposes that the development of "knowledge" about economic relationships and behavior is pushed forward by "rhetoric." The many dimensions of rhetoric emerge from quotes McCloskey chooses from Wayne Booth. Rhetoric is:

> *"the art of probing what men believe, rather than proving what is true according to abstract methods."*
>
> *"the art of discovering good reasons, finding what really warrant assent, because any reasonable person ought to be persuaded."*
>
> *"careful weighing of more-or-less good reasons to arrive at more-or less probable or plausible conclusions - none too secure but better than would be arrived at by chance or unthinking impulse."*
>
> *the "art of discovering warrantable beliefs and improving those beliefs*

in shared discourse."

not to "talk someone else into a preconceived view; rather it must be to engage in mutual inquiry." (McCloskey, 1983, pp. 482-483)

McCloskey argues that,

"Each step in economic reasoning, even the reasoning of the official rhetoric, is metaphor. The world is said to be 'like' a complex model, and its measurements are said to be like the easily measured proxy variable to hand." (McCloskey, 1983 p 502)

Even "...mathematical theorizing is metaphorical and literary." (McCloskey, 1983, p 505) In *If You're So Smart*, published in 1990, McCloskey argues that,

"Like other arts and sciences, that is, economics uses the whole rhetorical tetrad: fact, logic, metaphor, and story. Pieces of it are not enough. The allegedly scientific half of the tetrad, the fact and logic, falls short of an adequate economic science, or even a science of rocks or stars. The allegedly humanistic half falls short of an adequate art of economics, or even a criticism of form and color." (McCloskey, 1990, p 1)

To consider the rhetoric and storytelling of economics does not mean that economics is or should be without method. Rhetoric provides a framework and criterion that guides the development of economic theory. It is rhetoric that makes theory more relevant, identifies the ethical content and increases flexibility in the evolution of economic knowledge.

WHICH METHODOLOGY IS "CORRECT?"

Which of the methodological arguments is "correct" and should be followed? There is not a universally accepted answer in any academic discipline nor among those who study the philosophy of science. To understand and contribute to any field of knowledge, it is necessary to be aware of the methodology(ies) that have guided the development of accepted ideas, hypotheses, theories, concepts, tools, values and ideologies that are used within that discipline. Ignorance of methodology dooms an individual to perpetual training and re-training rather than opening the door to education.

Methodological problems apply to all knowledge including Newtonian mechanics, the theory of relativity and quantum mechanics as well as economics. In economics, the methods used and ideological preconceptions of individual economists and schools of thought help to explain many of the differences in explanations of problems and policies advocated.

Modern economic theory has a long tradition of following a "modernist" methodology characterized by a strong faith in empiricism and rationalism. Within modern economics, knowledge is believed to be advanced by inductive or empirical investigations that can verify (or fail to falsify) "positive" concepts, hypothesis, theories or models developed by deductive or rationalist logic. Normative economics (or the study of what "ought to be") is seen as distinctly separate from positive economics.

When economics is studied as a process of provisioning, normative and positive issues become interrelated.

The Standard View of the Scientific Method

The process by which knowledge is acquired is often called the "scientific method." There are several variations of the way in which the scientific method are characterized, but the steps usually are;

1) recognition of a problem
2) creation of a hypothesis about the nature of the problem
3) collect relevant data to test the hypothesis
4) propose a solution to the problem
5) act on the proposed solution or policy to solve the problem
6) monitor the results of the policy; collect and analyze data on the application of the policy
7) make adjustments in the hypothesis and solutions as needed.

The first step in the so-called scientific method requires an integration of positive and normative issues (normative and positive aspects of economics was discussed under the section on Milton Friedman). The recognition of a problem is a recognition of a deviation between what should be and what is. If my shoes do not hurt my feet (a positive statement), I probably don't think about my shoes. If my shoes hurt my feet (a positive statement) and I think they shouldn't hurt my feet (a normative statement), I recognize a problem. If there is unemployment (positive statement) and believe there should be unemployment (normative statement), a problem is not recognized. If there is unemployment and think that there should not be unemployment, a problem is recognized.