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ECONOMICS, POLITICS AND THE ENVIRONMENT

by

RON JOSEPH MANDELBAUM

A master's thesis submitted to the Graduate Faculty in Political Science in partial fulfillment of the requirements for the degree of Master of Arts, The City University of New York

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This manuscript has been read and accepted by the Graduate Faculty in Political Science in satisfaction of the thesis requirement for the degree of Master of Arts

Date

Christa Altenstetter

Thesis Advisor

Date

Alyson Cole

Executive Officer

THE CITY UNIVERSITY OF NEW YORK

Abstract

Economics, Politics and the Environment

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Ron Joseph Mandelbaum

Advisor: Christa Altenstetter

Classical economists were interested in macroeconomic issues, i.e. how the economy worked as a whole and how it grew over time. This is opposed to neo-classical economists, which focus on decision-making processes of individuals and individual firms. This thesis sets out to examine how that change occurred and what it means for the way that economics studies the environment. In order to provide a partial answer to this question, this paper describes the different outlooks between classical and neo-classical economists regarding value. It also examines and contrasts the economic approaches of Marx and Mill, whose way of thinking about social phenomena is still very relevant today. It also highlights the changes in scientific thought that occurred at the turn of the 20th century and how they affected economics.

When these disparate aspects of economic thought and their development are considered together it becomes clearer why and how the environment is treated when economic analyses is applied to it. This is the case both in terms of explaining phenomena and in terms of the policy tools that economic theory and its application offer. It also becomes more clear how analysis of the environment developed over the last couple of centuries and that each development was based on previous modes of thought.

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Introduction

How does economics study the environment? This paper will attempt to answer this question; at least partially so. In order to do so it will explain the distinct ways in which classical and neo-classical economists consider value and it will contrast the economic approaches of Marx and Mill, both of whose way of thinking about social phenomena can still be discerned in today's social science. It will also highlight the changes in scientific thought that occurred at the turn of the 20th century and show how all of these, when considered together, can provide helpful context to answering the question above.

Background

The birth of Economics as a separate discipline is usually dated to 1776 when Adam Smith published "The Wealth of Nations". In Smith's "The Wealth of Nations", various methods of reasoning are used. For instance, Chapter I: "Of the Division of Labor", could be seen as an early utilization of comparative statics whereas Chapter III: "Of the Origin and Use of Money", is more in line with a historical method.

Ricardo, another highly influential figure in classical economics, writing in the beginning of the 19th century, departed from Smith in his method as he focused on analytical construction. While Smith's procedure was comprised of a combination between analytic methods, enclosed within a framework of historical analysis, Ricardo focused his work on constructing an analytical structure based on logical rigor and precision, discarding anything from the analysis considered not directly relevant to the problem at hand. This also led him to focus on a less general topic, namely surplus rents and profits, as opposed to Smith who concentrated on the evolution of the economic system as a whole (Roncaglia, 2001).

While questions regarding economic methodology existed, specific treatment of these questions did not arise until the decade following Ricardo's death in 1823. Nassau William Senior's "Introductory Lecture on Political Economy", which discussed economic methodology, was published in 1826. In 1836, an updated version of Senior's original work titled "Outline of the Science of Political Economy" was published as well as John Stuart Mill's essay "On the Definition of Political Economy; and on the Method of Investigation Proper to It".¹

One of the main characteristics of this era of economic literature was that economists began to interpret themselves, to rationalize their own aims and procedures

¹ The fact that these are the first methodological texts referred to posits that earlier economists did not state them explicitly (Blaug, 1992).

- perhaps a sign of the growth of economics into an established science, and, as such, interested in questions of both method and scope (Schumpeter, 1994).

Senior was the first to make the distinction between a science (theoretical) and an art (practical) of economics. In his 1826 essay, "Introductory Lecture on Political Economy", Senior states that the

"...theoretic branch, that which explains the nature, production, and distribution of wealth, will be found to rest on a very few general propositions, which are the result of observation, or consciousness, and which almost every man, as soon as he hears them, admits, as familiar to his thoughts, or at least, as included in his previous knowledge... Many of its premises [the practical branch], indeed, rest on the same evidence as those of the first branch; for they are the conclusion of that branch: - but it has many which depend on induction from phenomena, numerous, difficult of enumeration, and of which the real sequence often differs widely from the apparent one." (Senior quoted in Bowley, 1937).

Senior goes on to state that there are four basic tenets to the theoretic branch: every person desires to obtain as much wealth as possible, with as little sacrifice as possible; population tends to grow faster than the means of subsistence; capital and labor together could produce a positive net product; and "That agricultural skill remaining the same, additional Labor employed on the land within a given district produces in general a less proportionate return, or, in other words, that though, with every increase of the labor bestowed, the aggregate return is increased, the increase of the return is not in proportion to the increase in labor" (Ibid.). Senior derives his tenets by deduction - the first two mirror "human nature" and the latter two are based on empirical observation.

In both Smith and Ricardo, there are no real references to environmental issues although they do allude to the problem of the supply of public goods. For example, Adam Smith understood that there were limits to markets as

"...erecting and maintaining certain publick works and certain public institutions which it can never be for the interest of any individual, or small number of individuals to erect or maintain; because the profit would never repay the expense to

any individual or small number of individuals, though it may frequently do much more than repay it to a great society.” (Smith, 2003).

Clear definitions of market failure and potential remediating policies would not come until later. While these economists were interested in the limits of growth, the driving force of their approach was population growth affecting economic consequences through redistribution of economic returns. Absolute resource constraints were unnecessary for their approach/theory (Spash, 1999). Malthus, a member of the classical school, was concerned with such issues. Per his theory of population, population increases exponentially while agriculture had decreasing returns (see last Senior tenet above). Thus, per Malthus, a reciprocal relationship between man and environment exists and population growth would bring about forces that would inevitably hold it in check (Sandmo, 2014).

To summarize, and generalize, classical economists were interested in macroeconomic issues, i.e. how the economy worked as a whole and how it grew over time. This is opposed to neo-classical economics, which focuses on decision-making processes of individuals and individual firms (Lumby, 2007). How did that change occur and what does it mean for the way that economics studies the environment?

Value in the Classical Era

According to Schumpeter “the problem of Value must always hold the pivotal position, as the chief tool of analysis in any pure theory that works with a rational schema.” (Schumpeter, 1994). Given that economics, and its theories, is the discipline that concentrates on how rational agents make rational decisions it makes sense to explore the building block of these theories, i.e. value. This section will be followed by two sections about classical political economists, Mill and Marx. While both based their respective approaches to social science / economics on value, they advanced very different interpretations of these phenomena.

Classical political economists were not all agreed on how to measure value. However², they distinguished between a market and natural price. They maintained that subjective desires and scarcity are important factors in determining *market* (or temporary or short-run) prices, but they also insisted that the *natural* (or equilibrium or long-run) prices were determined solely by relative costs of production (usually, relative labor costs). Furthermore, they made the distinction between reproducible and non-reproducible goods with the focus of theory being on reproducible goods.

Heertje (2006), elaborates on Ricardo's distinction between reproducible and non-reproducible goods. Non-reproducible goods, like a Rembrandt painting, have a unique characteristic - they cannot be replicated. According to Ricardo, demand cannot explain their prices for it is unpredictable. On the other hand, reproducible goods have a natural price determined by their reproduction costs. When comparing this perspective to the utility theory of value, which is the base of neo-classical economic theory, it is interesting to think about the environment as being a non-reproducible good.

²Based on Sowell (1974), however, this is a simplification.

Although classical economists differed in their interpretation of how to best measure value, they agreed on how to define it. The price of competitively sold commodities produced at constant cost was determined by their cost of production, while commodities produced at increasing cost were sold at marginal cost. Commodities which were sold in noncompetitive markets and those that were in fixed supply (non-reproducible for instance) were sold at prices determined by supply and demand (Sowell, 1974.). Supply and demand was the “general mechanism through which any particular determinant of value operated”. Thus, supply and demand was *the* regulating mechanism of price (Ibid.).

Classical economists considered supply and demand as a causally neutral mechanism, similar in its neutrality to money, through which *other* variables determined value (Ibid.). According to Smith

"The word value, it is to be observed, has two different meanings, and sometimes expresses the utility of some particular object, and sometimes the power of purchasing other goods which the possession of that object conveys. The one may be called 'value in use'; the other, 'value in exchange'. The things which have the greatest value in use have frequently little or no value in exchange; and on the contrary, those which have the greatest value in exchange have frequently little or no value in use. Nothing is more useful than water: but it will purchase scarce anything; scarce anything can be had in exchange for it. A diamond, on the contrary, has scarce any value in use; but a very great quantity of other goods may frequently be had in exchange for it." (Smith, 2003).

To Smith "The value of any commodity... to the person who possesses it, and who means not to use or consume it himself, but to exchange it for other commodities, is equal to the quantity of labor which it enables him to purchase or command. Labor, therefore, is the real measure of the exchangeable value of all commodities" (Smith, 2003).

Mill, also reasoning according to such a labor theory of value, focused his attention on exchange value, for to Mill, “Value in use, or as Mr. De Quincey calls it,

teleologic value, is the extreme limit of value in exchange... The word Value, when used without adjunct, always means, in political economy, value in exchange... By the price of a thing, therefore we shall henceforth understand its value in money; by the value, or exchange value of a thing, its general power of purchasing; the command which its possession gives over purchasable commodities in general.” (Mill, 2004). Mill emphasized that for economic theory the term value was essentially relative and that it meant only the exchange ratio between any two commodities or services. Price signified the exchange ratio between the (arbitrary) unit of any commodity and the good selected for money. According to Mill: “...the mere introduction of a particular mode of exchanging things for one another, by first exchanging a thing for money, and then exchanging the money for something else, makes no difference in the essential character of transactions... The relations of commodities to one another remain unaltered by money... Money is a commodity, and its value is determined like that of other commodities, temporarily by demand and supply, permanently and on the average by cost of production.” (Ibid.).

Mill's Political Economy

Mill, in his paper "On the Definition of Political Economy; and on the Method of Investigation Proper to It" (Mill, 1968), maintains that economics is a branch of the science of speculative politics. As such, it does not treat the whole of man's nature as modified by the social state or of the conduct of man within society. Political Economy is based on a narrow perspective; knowingly it creates "fictional man" who is conceptualized

"solely as a being who desires to possess wealth, and who is capable of judging of the comparative efficacy of means for obtaining that end... It makes entire abstraction of every other human passion or motive; except those which may be regarded as perpetually antagonizing principles to the desire of wealth, namely, aversion to labor, and desire of the present enjoyment of costly indulgences... The science then proceeds to investigate the laws which govern these several operations." (Ibid).

Mill adds the following caveat: "Not that any political economist was ever so absurd as to suppose that mankind are really thus constituted, but because this is the mode that in which science must necessarily proceed" (Ibid.).

In his discussion of methodology, Mill³ introduces the deductive or method *a priori*. This method would dominate economic thought with regard to theory appraisal and practice until the beginning of the twentieth century, when the Vienna Circle started to influence scientific thought (Blaug, 1992). In many ways, however, Mill's influence is still very much felt today. Mill distinguishes between two types of "reasoners" and between two inductive methods. The first are termed practical and the second theorists though both consult experience. The difference between the two is that:

"those who are called practical men require *specific* experience, and argue wholly *upwards* from particular facts to a general conclusion; while those who are called theorists aim at embracing a wider field of experience, and, having argued upwards from particular facts to a general principle including a much wider range than that of the question under discussion, then argue *downwards* from that general principle to a variety of specific conclusions." (Mill, 1968).

³ Mill's "Principles of Political Economy" would become the standard economics textbook until the turn of the century when Marshall's "Principles of Economics" replaced it.

The first method of induction is the method *a posteriori* while the second is the method *a priori*. In order to arrive at a conclusion using the method *a posteriori* one needs not merely experience, but a specific experience. On the other hand, for the method *a priori*, one needs an hypothesis; this, to Mill, is “the essence of all science which admits to general reasoning at all” (Ibid.). Therefore, according to Mill: “Political economy reasons from assumed premises...premises which might be totally without foundation in fact ... The conclusions of Political Economy, consequently, like those of geometry, are only true...*in the abstract*; that is, they are only true under certain suppositions...” (Ibid.).

The difference between the method *a priori* and the method *a posteriori* is that the method *a priori* is an indirect inductive method. One first determines the laws governing individual causal factors.⁴ Having then determined the laws of the individual causes, one investigates their combined consequences deductively, each one on its own and then together. The last step is verifying the combined consequences. This testing serves as an indicator of whether any disturbing causes were not accounted for. This is where the method *a posteriori* comes in, it serves to verify. (Stanford Encyclopedia of Philosophy, 2012). Mill defines disturbing causes as follows: given that assumptions (reached by a deductive method of introspection utilizing psychological premises and abstracting from all noneconomic behavior (Blaug, 1992)) of a theory are correct, and correct conclusions are deduced from these assumptions, then these “would be as true in the abstract as those of mathematics; and would be as near an approximation as abstract truth can ever be...” (Mill, 1968). However, disturbing causes may exist and

⁴The "laws" that one finds in Classical Political Economy are "Tendency Laws". According to Mill, a tendency is "a power acting with a certain intensity" in a certain "direction" (Mill, 1968). For an elaborate explanation of "Tendency Laws" see (Blaug, 1992) p. 59. Two of Marx's main arguments relied on assumptions related to tendencies: Marx, in both the analytical and historical sense, states that the increasing misery of the proletariat is brought about because the workers' share of the output declines; Marx also postulates the analytical tendency of the falling of the rate of profits (Sowell, 1974).

may not have fallen under the cognizance of the researcher. The political economist at this point must take them into account, “the disturbing causes ... like *friction* in mechanics, to which they have often been compared... have their laws, as the cause which are thereby disturbed have theirs; and from the laws of the disturbing causes, the nature and amount of the disturbance may be predicted *a priori*... The effect of the special causes is then to be added to, or subtracted from, the effect of the general ones.” (Ibid.). The disturbing causes are, according to Mill, the only element of uncertainty in the process “an uncertainty inherent to the nature of these complex phenomena, and arising from the impossibility of being quite sure that all the circumstances of the particular case are known to us sufficiently in detail...” (Ibid.). Mill likens disturbing causes to friction in mechanics and they too can be predicted *a priori*. Because these effects are measurable, one may add or subtract them from the general ones. Mill maintains that we can never be assured that we have taken all factors into account, for “If the knowledge what are the particular causes operating in any given instance were revealed to us by infallible authority, then, if our abstract science were perfect, we should become prophets. But the causes are not so revealed: they are to be collected by observation; and observation in circumstances of complexity is apt to be imperfect.” (Ibid.).

With regard to verifying theory, Mill maintains that:

"The discrepancy between our anticipations and the actual fact is often the only circumstance which would have drawn our attention to some important disturbing cause which we had overlooked. Nay, it often discloses to us errors in thought, still more serious than the omission of what can with any propriety be termed a disturbing cause. It often reveals to us that the basis itself of our whole argument is insufficient; that the data, from which we had reasoned, comprise only a part, and not always the important part, of the circumstances by which the result is really determined." (Ibid.)

Mill advances verification of theory but he is not positing that a failure to verify a prediction should lead to a refutation of the underlying theory (Blaug, 1992). Given such an occurrence, a theory should not be discarded; it is only "insufficient".

Mill then states the method of the practical philosopher that consists of two processes: the first analytical, the second synthetic. The practical philosopher must analyze society's elements. Then, they must discern the different laws and their natural effects, each separately. Then, they must collect them to determine the effect of all the causes acting at once. Mill stresses the fact that this cannot be done completely because "mankind can never predict with absolute certainty, but only with a less or greater degree of probability." (Mill, 1968).

In his book "A System of Logic, Ratiocinative and Inductive" (Mill, 2006), Mill discerns between two kinds of sociological inquiry. The first one (as elaborated upon above) deals with phenomena examined through cause and effect. The second inquiry has to do with "...the laws which determine those general circumstances themselves... what are the causes which produce, and the phenomena which characterize, States of Society generally." (Ibid.). For Mill, the study of society is concerned with "intellectual and moral culture, existing in the community, and in every class of it; the state of industry, of wealth and its distribution; the habitual occupations of the community; their division into classes, and the relations of those classes to one another..." (Ibid.). Mill goes on to critically discuss a method of philosophizing in the social sciences which has "been of late years erected", and that attempts "by a study and analysis of the general facts of history, to discover, (what these philosophers term), the laws of progress: which law, once ascertained, must according to them enable us to predict future events..." (Ibid.). However, Mill charges these philosophers with "a fundamental misconception of the true method of the social philosophy. The misconception consists

in supposing that the order of succession which we may be able to trace amount the different states of society and civilization which history presents to us... could ever amount to a law of nature. It can only be an empirical law.” (Ibid.).

According to Blaug (Blaug, 1992), classical economists believed that true assumptions result in true conclusions, whereas simplified assumptions – as Mill knowingly makes with regard to economic man for example – lead to simplified conclusions and predictions. Disturbing causes are in fact substantive to the explanation of phenomena. Testing the application of theory determines whether enough of the disturbing causes are taken into account in the theory. Validity of a theory is irrelevant because the theory is true by virtue of being based on aspects of human behavior – which in turn is true by virtue of assumptions that are based on self-evident facts of human experience (Ibid.).

One can offer critique to the *a priori* method on both logical and practical grounds. The logical criticism is aimed at the notion of *ceteris paribus* which Mill does not call by name but adopts. Scientifically, such a notion is vague and untestable, or not completely refutable by empirical testing. The practical criticism alleges that by regarding apparent disconfirmations as the result of a disturbing cause, the *a priori* method will end up justifying theories that have no practical use while in order to conduct policy one needs to know what will happen, not what would happen if there were no disturbing causes (Ibid.).

According to Mill, the method one should utilize in social sciences is similar to the method used in mechanics. For instance, if one has a three-body system, it can be divided into three two-body systems. The forces affecting the two body systems, once aggregated, make it possible to ascertain knowledge of the way the three-body system

operates. Inference of the joint effects of the laws involves what Mill terms “ratiocination”. However, Mill does not take into account the fact that there may exist relations and correlations between the laws in the more complex system that are not the sum of those that operate in the simpler system. This means that the deduction of the law in the complex system also relies on an assumption relating to both the laws of the simpler system and to their relational structure that constitutes the complex system, as an aggregation of the simpler systems. This neglects the causal role of the relations that constitute the whole of the parts, or not taking into account social relations as relevant factors (SEP, 2012).

To sum up Mill: the basic premises of political economy are deduced through introspective observation (wealth is desired as opposed to work) and/or through empirical observation ("law" of diminishing returns). Then, laws stating how specific causal factors operate are established. Classical economists know the major causes of economic phenomena but they are also aware that disturbing causes exist. The essence of classical political economy is to ascertain the correctness and confirmation of its basic premises - "laws". Finally, while a Science of Society also exists, it can only strive to formulate empirical laws, which differ from laws of nature.

Marx's Political Economy

In *Capital*⁵, Marx focuses his attention on analyzing the system of production at the current time in history – capitalism. The unique feature of capitalism is production, enabled and based on division of labor. Production is the creation of commodities with the aim of selling commodities on the market. Thus, for Marx, the building block of capitalism is the commodity.

Marx⁶ begins *Capital* by defining value. In the first chapter of *Capital*, Marx discerns between use value and exchange value. Use value “is conditioned by the physical properties of the commodity...” (Marx, 1990) and “is independent of the amount of labor required to appropriate its useful qualities.” (Ibid.). Exchange value is a quantitative relation or proportion “in which use values of one kind exchange for use values of another kind.” (Ibid.). For Marx, commodities are the “material bearers” of exchange value. Marx also maintains that quantitative and qualitative features of commodities commensurate to use and exchange values: “As use values, commodities differ above all in quality, while as exchange values they can only differ in quantity, and therefore do not contain an atom of use value.” (Ibid.).

Marx, reasoning dialectically, makes several more definitions in the first chapter of *Capital* – for instance, from labor time, abstract labor and concrete labor are developed and defined. Abstract labor, or social labor, is the homogeneous mass of society's labor rationed out in varying quantities in order to produce different commodities. The specific forms, such as carpentry, tailoring etc. are termed concrete labor (Sowell, 1985). For Marx, there existed an optimal amount of labor, which would

⁵ The following discussion of Marx's definition of value is based on his writings in *Capital*.

⁶ Even though it is a crucial part for understanding Marx's economics, I shall not go into the problem of transformation of values into prices. For analysis see (Hollander, 2008) p. 17-22 and (Roncaglia, 2003), chapter (16): Sraffa. I shall also not elaborate on Marx's “Equalization of the General Rate of Profit through Competition” (Chapter 10, *Capital III*) which perhaps is almost as important for understanding competition and the market, although a brief sketch of what the market embodied to Marx appears below. For analysis see (Hollander, 2008), p. 31-38.

produce a price at equilibrium, termed by Marx as “socially necessary labor”.⁷ Socially necessary labor is comprised of two distinct components - one technological and the other economic (Ibid.). The technological component - “The labor time socially necessary is that required to produce an article under the normal conditions of production, and with the average degree of skill and intensity prevalent at the time.” The second component, the economic, defines necessary labor as “only the labor time which is required for the satisfaction of the social need (the demand).”(Ibid.). According to Marx, and opposing the classical economist’s conception, commodities did not necessarily exchange proportionally to their labor cost: “Average prices do not directly coincide with the values of the commodities, as Adam Smith, Ricardo, and others believe.” (Marx, 1990). Abstract and concrete labor, which flow into exchange value, develop into relative and equivalent value, which both flow into money - the universal equivalent.⁸ Marx’s constructions are building blocks for his analysis and, like the classical economists, he did not conceive of them as something that could be proved or disproved (Sowell, 1985).

Marx’s discussion of value derives from his basic definition of the commodity, whereas the logical developments he makes are developed as dialectical relations - one definition flows into opposites that flow and form the base for the next set of oppositions etc. Marx is aware of the fact that different tasks demand different qualities from those that perform them. Per Marx: “more complex labor counts only as intensified, or rather multiplied simple labor... In the interests of simplification, we shall henceforth view every form of labor power as simple labor power; by doing this we shall simply be saving ourselves the trouble of making the reduction.” (Marx, 1990).

⁷ For an explanation on the importance of this part of Marx’s analysis see (Hollander, 2008) p. 36.

⁸ For an explanation on Money, Marx’s universal equivalent, see (Ishikura, 2004) p. 89.

Thus, and similar to Mill, Marx knowingly makes abstractions, though they are different from Mills' natural laws.

Marx continues: "commodities possess an objective character as values only in so far as they are expressions of an identical social substance, human labor, that their objective character as value is therefore purely social." (Ibid.). In the end of Chapter 1, The Fetishism of the Commodity and its Secret, Marx states "... the labor of the private individual manifests itself as an element of the total labor of society only through the relations which the act of exchange establishes between the products... they appear as material relations between persons and social relations between things." (Ibid.).

According to Marx, "value "lies hidden behind" exchange value" (Sowell, 1985). Marx makes several charges against classical economists, and against capitalism as the current mode of production: they fail to grasp "the hidden relations between value and its form, exchange value" (Ibid.); they confuse "the form of value with value itself"; and they fail to discover specifically how "value becomes exchange value." (Marx in Sowell, 1985).

Exploitation is another feature of capitalism. In order to "prove" exploitation, Marx discerns between labor and labor power. Labor is similar to concrete labor (a specific productive activity) whereas labor power is the worker as a person, incorporating the potential to exercise a productive activity (Roncaglia, 2001). The laborer sells their labor power as a commodity and the capitalist pays for it at its value. The costs correspond to the means of subsistence that are required to keep the worker alive. If an economic system produces a surplus, it follows that the amount of labor supplied by the laborers is higher than what they are paid in the form of subsistence wages. Thus, two parts emerge – necessary labor, the labor necessary to produce the means of subsistence for all the workers in the economy and surplus labor. The surplus

labor is the difference between total social labor and necessary labor (Ibid.). For Marx, exploitation is structurally built into a system with an economic surplus because workers work more than what they receive, as embodied in their wages - exploitation can exist even if workers receive higher wages than subsistence wages (Roemer, 2005).

One outcome of such a discrepancy is the accumulation of capital resulting from unpaid labor. The “law of accumulation” is Marx’s exposition of the cause that leads to the eventual collapse of capitalism. With the increase in aggregate capital, a change also occurs in its technological composition where the “constant” capital (equipment and raw materials) increase disproportionately to the “variable” capital (wages). This is followed by the enactment of labor saving devices that, in turn, result in a saving of labor accumulated in the form of unwanted laborers that comprise an “industrial reserve army”. Combining these developments with demographic postulations of an increasing population, it follows that the purchasing power of the laborers falls and that the market is subject to a glut of overproduction and thus to commercial crises and depressions. This is followed by the inevitable development and arrival of socialism by way of a conscious class movement (Veblen, 1906).

Another concept introduced by Marx is profit upon alienation which is represented by the following scheme: $M - C - M'$, with M indicating money, C indicating commodities and M' indicating a larger amount of money compared to M, thus violating the rule of exchange of equals.⁹

For Marx, the market, while constituting a necessary place for the connection of workers, operates in such a way that commodities become fetishes. In capitalism, the market is necessary as it allows for the allocation of both the means of production and the means of subsistence. These are crucial to the survival and reproduction of both

⁹ This will be elaborated upon when discussing the Marginal Revolution.

individuals and for the system as a whole. Each worker contributes to the social product with their activity, and hence to the welfare of society. However, Marx maintains that these benevolent traits are obscured and hidden for they are diverted from their true end by commodity fetishism. Marx's conclusion is based on his postulation that in capitalism the market makes it *appear* as though the ultimate end of every individual is ownership of exchange values. However, society suffers from social stratification because the productive processes are controlled by capitalists, as opposed to belonging to society as a whole (Roncaglia, 2001).

According to Mill's typology of the sociological sciences, the reciprocal relation between Marx's study of society and investigation of capitalism are intertwined, thus they cross the borders of what he defined as two distinct modes of political speculation. Mill claimed that laws could only be discerned in political economy, whereas in the study of society only empirical regularities could be arrived at. Laws had tendencies, but these were correct only insofar as they were laws of nature. Empirical regularities were not laws, thus, repeating Mill's quote, a "misconception consists in supposing that the order of succession which we may be able to trace amount the different states of society and civilization which history presents to us... could ever amount to a law of nature" (Mill, 2006). Marx combines his theory's laws into the study of society. Marx would disregard Mill's critique as Marx could claim that his postulates merely serve him as a starting point in his analysis of the first approximation in *Capital* and, as such, they were not conceived of as a theory that could be proved or disproved.

The Marginal Revolution

In 1875, John Elliot Cairnes would sum up the essence of classical political economy in his "Character and Logical Method of Political Economy". This is fifty years after the death of Ricardo but the basic tenets on which classical political economy rested remained intact. In his book, Cairnes concludes that "[Economic laws] can be refuted only by showing either that the principles and conditions assumed do not exist, or that the tendency which the law affirms does not follow as a necessary consequence from this assumption" (Cairnes as quoted in Blaug, 1992). In Senior, in Mill, in Cairnes and in Jevons, verification does not mean testing the validity of a theory. Verification is only a method of establishing a boundary to the application of a theory deemed true. The only reason to conduct an *a posteriori* test is in order to discover whether disturbing causes exist. If they do, then the theory was applied wrongly but the theory itself is true. An even stronger statement can be made about the perception of economic science at the time: the question of whether there was any way of showing a logically consistent theory to be false was never even contemplated (Ibid.).

This period also represents the beginning of the "marginal revolution".¹⁰ The marginal revolution would set the stage for shifting the focus of economics from macro to micro. For example, economists became more interested in analyzing firm behavior in competition as opposed to trying to understand the economy as a whole. This was made possible by combining Utilitarianism and mathematics. So, while Mill, and other classical economists, knew about and acknowledged market failures they did not have rigorous enough tools to develop their thoughts. Working around the turn of the century, Marshal would introduce a more rigorous discussion of externalities based on marginal utility because by that time he had the tools to do so. Externalities can be positive or

¹⁰Similar to the "industrial revolution", it took about sixty years for the revolution to fully materialize.

negative, and they represent repercussions of decisions made by individuals or firms that are not taken into account when decisions are made. Pigou, Marshall's successor at Cambridge, would lay the groundwork for the modern field of environmental economics in the 1920's by formalizing the concept of externalities in consumption. Pigou distinguished between private and social marginal net products. Practically speaking, this means that a factory that emits smoke and harms consumers imposes a social marginal cost on the community in excess of its private marginal cost (Sandmo, 2014). To fix this, one may impose a tax on polluting that would affect the incentives that the firm faces. This, in turn, may lead the firm to recalculate how much harm it causes because it now must take into account higher production costs. Another way to think about this is to think about driving. Cars need gas but cars also harm the environment. By applying a tax on gas, an individual consumer must consider a higher cost when using their car, which, under certain assumptions about behavior, will lead them to use it less. Such a policy instrument is known as a Pigouvian tax.

The marginal revolution was so important that it warranted a new name for classical economics - neo-classical economics. One way to understand neo-classical economics is to think of it as the "science of exchange". This means that it addresses all economic phenomena in the same manner: it reduces the problem to one of exchange, and it then searches for the equilibrium exchange ratio. Neo-classical economics represents the utility theory of value supplanting the labor theory of value. It also meant that a purely subjective perception of value was introduced into economics and it allowed for a broadening of the scope of economics for it was no longer bound to the parsimonious labor theory of value. However, it also ushered in an alteration in the metaphysical perception of both things and activity, which influenced and changed economics, and society, deeply.

According to Mickle¹¹ (Maki, 2001), the English language has been penetrated by economic or market conceptions. “Things” are naturally occurring entities or artifacts, which persist through change and whose identities are bound to a continuous path that can be traced through time (Ibid.). Value in use is a notion that served as a base in the work of Smith, Ricardo and Marx. As such, it was commensurate with the idea of an artifact or of a useful thing. Mill, as quoted earlier, started to obscure the distinction between value in use and value in exchange, and Jevons later shifted the focus of value from usefulness in consumption to usefulness in buying and selling (Ibid.). Eventually, the notion of value in use was replaced by the notion of utility.

These shifts also mirror the developments in scientific thought that were occurring at the time (to be elaborated upon below). Jevons thought that the presence of qualitative notions in economics was wrong and that they stood in the way of quantification. Thus, he introduced utility as *the* notion of usefulness. However, utility is severed from the idea of a thing or artifact and it is generic and uncategorized. Usefulness and utility are an economic construct and they can be common to all things. Usefulness becomes uniform and homogenous, just like money or exchange value - usefulness in use is subordinated to usefulness in exchange, or buying and selling (Ibid.).

Marshall, at the turn of the century, asserts that:

“The word value says Adam Smith has two different meanings, and sometimes expresses the utility of some particular object and sometimes the power of purchasing other goods which the possession of that object conveys. But experience has shown that it is not well to use the word in the former sense. The value, that is the exchange value, of one thing in terms of another at any place and time, is the amount of that second thing which can be got there and then in exchange for the first. Thus the term value is relative, and expresses the relation between two things at a particular place and time”. (Ibid.).

¹¹This part, until Keynes's quote, including the quotes as they appear within, is almost completely based on Mickle, Scott, “Quality and Quantity in Economics: the Metaphysical Construction of the Economic Realm”, in (Maki, 2001).

Marx, as mentioned, made the distinction between the qualitative and quantitative features of the commodity (value in use versus value in exchange). However, Wicksteed argued that the concept of utility has made such discernment redundant: “What we really have to do is to put out of consideration the concrete and specific qualitative utilities in which they [useful things] differ, leaving only the abstract and general quantitative utility in which they are exchanged.” (Ibid.)

This alteration in notions changes the framing of questions. For instance, what is the end of the market economy? Marx and John Maynard Keynes held that the end of the market system is the accumulation of money as opposed to the accumulation of things (Ibid.). If utility is the only end then such a distinction, even if wrong, cannot be made within its framework. For example, Keynes wrote that the national dividend “measures the volume of current output or real income and not the value of output or money income.” It depends on net output and “on the net addition... to the resources of the community available for consumption.” (Ibid.).

Keynes was also concerned with wealth as money:

“The distinction between a cooperative economy and an entrepreneur economy bears some resemblance to a pregnant observation made by Karl Marx, - though the subsequent use to which he put this observation was highly illogical. He pointed out that the nature of production in the actual world is not, as economists seem to suppose, a case of $C - M - C'$, i.e. of exchanging commodity (or effort) for money in order to obtain another commodity (or effort). That may be the standpoint of the private consumer. But it is not the attitude of business, which is a case of $M - C - M'$, i.e. of parting with money for commodity (or effort) in order to obtain more money.” (Ibid).

Marx borrowed that distinction from Aristotle who made it the basis of his analysis of the market economy. According to Aristotle, actions are defined by their ends, thus if two activities have different ends they are different activities. $C - M - C'$ aims at getting useful things whereas $M - C - M'$ is pursued for the sake of money. The second behavior has no natural end. There is no difference of quality between one sum of money and another, the only difference is that of quantity. To Aristotle, the second

mode means that: “there is no limit to the end it seeks... the end it seeks is the mere acquisition of money.” (Ibid.) Through this lens, there is no ability to discern between reproducible or non-reproducible goods, all fall into one category usurped by utility.

John Neville Keynes's "The Scope and Method of Political Economy" (1891) was also published during this era. In it, he makes the distinction between a positive and a normative study of economics. This distinction is important in order to understand the way that neo-classical economists perceive economic science and themselves. In order to do so he gives the following example:

"Thus, in regard to the payment of interest, we have, first, the positive inquiries why, under certain conditions of industry, interest is paid at all, and what determines the rate paid. We have, secondly, the inquiries whether interest ought to be paid, and, if it ought, what constitutes a fair rate of interest... Intimate as are the connexions between the above kinds of inquiry, they are in themselves distinct in character, and belong to different departments in the classification of knowledge. The first belongs to positive science, the second to normative or regulative science... As the terms here are used, a positive science may be defined as a body of systematized knowledge concerning what is; a normative or regulative science as a body of systematized knowledge relating to criteria of what ought to be, and concerned therefore with the ideal as distinguished from the actual; an art as a system of rules for the attainment of a given end." (Keynes, 1917).

The developments above, together with developments in scientific thought, set the stage for understanding the evolution of environmental economics as we know it today.

Developments in Scientific Thought and Their Effect on Economic Thought

Important developments in scientific thought are also occurring at the turn of the 20th century. Three developments that would influence economic thought are those of Mach, Duhem and Hempel.

According to Mach, the purpose of science is to give the most economical description of nature as possible, for the goal of science is to provide conceptions which can help one better orient oneself to the world: "in short a world picture of the greatest possible stability." (SEP, 2012). Mach asserted that all scientific theories and hypotheses are condensed descriptions of natural events, neither true nor false in themselves but simply conventions for storing empirical information (Blaug, 1992). Duhem maintained that: "The analysis we have given of experiments in physics shows fact to be completely interpenetrated by theoretical interpretation, to the point where it becomes impossible to express fact in isolation from theory." (SEP, 2012). Duhem posited that no individual scientific hypothesis is conclusively falsifiable for one cannot separate the particular hypothesis from its auxiliary statements (Blaug, 1992). This argument is known as the Duhem-Quine thesis. Popper's scientific method, introduced into economics by Hutchison, combined with the hypothetico-deductive method (HD) (explanation follows) of scientific explanation was formulated in order to deal with this problem.

Hempel was the first to formalize the HD model for the testing of scientific theories. Hempel and Oppenheim stated that all truly scientific explanations have a logical structure: they involve at least one universal law plus a statement of relevant initial or boundary conditions that constitute the *explanans* or premises from which the *explanandum* – a statement about an event, whose explanation one is seeking - is deduced with the rules of deductive logic. Moreover, from the common logical structure

of scientific explanation, it follows that the operation called explanation involves the same rules of logical inference as the operation of prediction - the difference being the relative time of the event, with regard to the time of the hypothesis. In other words, citing a particular cause as an explanation of an event simply demands placing the event in question under some universal law. In the case of prediction, one starts with a universal law plus a set of initial conditions, from them one deduces a statement about an unknown event. The prediction is used in order to see whether the universal law is in fact upheld. According to this approach, explanation is prediction written backwards. This is also known as the symmetry thesis or the covering law model of explanation (Blaug, 1992).

Another major change in scientific thought occurred with regard to the way the scientific method should proceed. As mentioned, Mill's method *a priori* rested on laws deduced from introspection. The HD method came to replace this older notion and introduced a new commitment to empiricism. Mill's method only utilized the method *a posteriori* in order to verify that all disturbing causes had been taken into account whereas the HD method demands empirical confirmation or non-confirmation of an hypothesis.

The first step in the HD method is to formulate an hypothesis. The second is to deduce a "prediction" or observable claim conjoined with other statements. These statements should include descriptions of initial conditions, other theories and *ceteris paribus* clauses. Following, one tests by experimentation or by observation. Finally, one must judge if the hypothesis is confirmed or disconfirmed. This is dependent on whether the initial prediction is true or false. "Confirmed" does not mean "proven" or "true" and "disconfirmed" does not mean "disproven" or "false". This method preceded

the logical positivists but came to be a central feature of their program (Hausman, 1992).

The HD method allows one to formulate the problems of theory assessment in economics. For instance, in order to test the economic hypothesis of the law of demand, which states that a change in the price of the commodity causes (*ceteris paribus*) a change in the quantity demanded in the opposite direction, then one could test this hypothesis on the price of gasoline by conducting an experiment and verifying that if the price of gasoline goes up people will demand less of it. This is based on (a) the law of demand (b) a statement describing a price change (c) *ceteris paribus* assumptions and (d) assumptions about the reliability of the statistical data one is using. Following, one observes whether the prediction is true. A major problem in economics arises with regard to the last step, deciding whether the evidence supports the hypothesis, for in economics various disturbing causes exist (Ibid.).

In 1938, Terence Hutchison published "The Significance and Basic Postulates of Economic Theory". With it came the explicit introduction into economics of Popper's methodological criterion of falsifiability. This meant that for an economic proposition to aspire to the status of "science" it must, at least conceivably, be put to an empirical test (Blaug, 1992). This came as a retort to the method *a priori*, which was still advanced by various economists including Mises and Robbins who continued to stress the importance of the method *a priori*. Robbins, in "An Essay on the Nature and Significance of Economic Science" argues that:

"The propositions of economic theory, like all scientific theory, are obviously deductions from a series of postulates... The main postulate of the theory of value is the fact that individuals can arrange their preferences in an order, and in fact do so... The main postulate of the theory of dynamics is the fact that we are not certain regarding future scarcities. These are not postulates the existence of whose counterpart in reality admits of extensive dispute once their nature is fully realized. We do not need controlled experiments to establish their validity: they are so much the stuff of our everyday

experience that they have only to be stated to be recognized as obvious" (Robbins, 1984).

At the center of Hutchison's argument is the notion that all economic propositions can and should be classified either into tautological propositions or into empirical ones. This goes hand in hand with the positivist's idea that all statements can be divided into logically necessary – "analytic" propositions, and logically indeterminate – "synthetic" ones. Hutchison's methodological prescription is that scientific economic enquiries should be confined to empirically testable statements. Given, he is vague on the question of whether the requirement of testability refers to the *assumptions* or to the *predictions* of economic theory (Blaug, 1992).

This is another key point in time in the transformation of the method and basic postulations of economics. Mill's method *a priori* is based on assumptions, or laws, and proving or disproving them is irrelevant to the basic premises that they are laws, therefore they are true. Empirical testing only highlights the fact that disturbing causes exist but serves as no basis for refuting or disproving the underlying theory. On the other hand, Hutchison is advocating a purely positivist demand on economics.

Reconciliation of economics with Popper's idea of falsification and with the HD method and with the Duhem-Quine thesis is brought about by one of the most important methodological statements written in economics,¹² Milton Friedman's essay "The Methodology of Positive Economics" (Friedman, 1966).

Prior to Friedman's essay, various economists tried to conduct empirical experiments to verify basic economic tenets. For instance, Lester tried to determine whether firms attempt to maximize expected returns. These tests attracted attention and

¹²According to Hausman, Friedman's essay, "The Methodology of Positive Economics" is by far the most influential methodological statement of this century. It is the only essay on methodology that a large number, perhaps a majority, of economists have ever read." (Hausman, 1992).

provoked angry responses. Friedman's essay appeared to offer a way out of such empirical difficulties and criticism (Hausman, 1992).

After distinguishing between positive and normative economics, as Keynes did, Friedman asserts that the role of a positive science is exclusively predictive, as opposed to the symmetry thesis, which views explanation as prediction and vice versa. Moreover, Friedman claims that economists seek significant and useable predictions, not understanding or explanation (Ibid.). Thus, for Friedman, economics as a science should be instrumental. A theory, which enables one to make a reliable prediction, is a good theory. According to Friedman, there is no other test of a theory. For example, it does not matter whether its "assumptions" are "unrealistic" (Hausman, 2008). When Friedman mentions assumptions, he means both fundamental assertions (consumers maximize utility) and additional premises (cigarettes of different brands are perfect substitutes). An unrealistic assumption could mean that the basic assertion may not be true, perhaps not even approximately true, with regard to the phenomena to which the theory is applied to. Friedman can then argue that researchers such as Lester are mistaken when they attempt to assess the assumptions of economic theory instead of its predictions. There is no point in examining assumptions of a theory if it is possible to do a "total" assessment of its performance with respect to the phenomena it was designed to explain (Ibid).¹³ Thus, by the 1950s, political economy, now called economics, completed a full turn. In one hundred years, it went from a method wishing to ascertain the correctness and confirmation of its basic premises - "laws", to a science of prediction.

Koopmans sums up these developments with regard to the assessment of theory:

¹³This perspective is problematic in many ways and as such it received much critique. For two critiques see Hausman, "Why Look Under the Hood?" and Simon, "Testability and Approximation", both in Hausman (2008).

"Whether the postulates are placed beyond doubt [Robbins], or whether doubts concerning their realism are suppressed by the assertion that verification can and should be confined to the hard-to-unravel more distant effects [Friedman] – in either case the argument surrounds and shields received economic theory with an appearance of invulnerability which is neither fully justified nor at all needed. The theories that have become dear to us can very well stand by themselves as an impressive and highly valuable system of deductive thought, erected on a few premises that seem to be well-chosen first approximations to a complicated reality. They exhibit in a striking manner the power of deductive reasoning in drawing conclusions which, to the extent one accepts their premises, are highly relevant to questions of economic policy. In many cases the knowledge these deductions yield is the best we have, either because better approximations have not been secured at the level of the premises, or because comparable reasoning from premises recognized as more realistic has not been completed or has not yet been found possible. Is any stronger defense needed, or even desirable?" (Koopmans, 1957).

Environmental and Ecological Economics

Mill's writing acknowledged the problem of supplying public goods as well as the importance of the environment. Per Mill:

“...is there the earth itself, its forests and waters, and all other natural riches, above and below the surface? These are the inheritance of the human race, and there must be regulations for the common enjoyment of it. What rights, and under what conditions, a person shall be allowed to exercise over any portion of this common inheritance cannot be left undecided. No function of government is less optional than the regulation of these things, or more completely involved in the idea of civilized society.” (Mill, 2004)

With that, as described earlier, it took quite a while from the time of his writing to develop the framework that enables economists to deal with environmental questions. In fact, economic literature, until the middle of the 20th century, had little to no concern for resource depletion or environmental issues (Spash, 1999). While it did develop ideas relating to conservation issues in agriculture and forestry, it considered those from a wise-use perspective as opposed to preservation. Agricultural economics developed during this period, and it produced, for example, work on soil conservation. Mainstream neo-classical economics, however, developed theories that assumed that economies could operate independently of natural resource constraints so environmental issues were marginalized (Ibid.).

It is only in the last four decades that economics has shown interest in the reciprocal relationship between economic activity and the environment. Two categories of environmental issues have been at the center of environmental economics. The first is the depletion of natural resources and the second is pollution (Lumby, 2007).

Hotelling, in 1931, introduced his theory of the mine in which he described optimal non-renewable resource depletion (Spash, 1999). However, it would take several decades for Hotelling's approach to discounting to become accepted. The key concept in his theory is that depletion is defined as follows: the opportunity cost of what

you extract today is production at a future date. According to his model, if one assumes competition and if the social rate of discount equals the market rate of interest then there would not be over extraction of resources. Asking the question of what is the optimal rate of resource exploitation highlights two key economic concepts, common property and uncertainty (Lumby, 2007). Both are important because in the case of common property there will be a tendency to over extract, exacerbated by uncertainty regarding the future. When looking to policy instruments to curb over extraction, Pigouvian taxation, as elaborated upon earlier, is one method that can alter the calculations firms face.

Pollution is usually given as the classic example of negative externalities. As discussed earlier, rational polluters will not factor pollution into their production costs. Such a scenario is defined as a market failure because there is no market price mechanism that can assist in regulation. This problem arises in the supply of “public goods” more generally because everyone can enjoy them but without enforcement, no one will pay for them. Most economists would recommend applying Pigouvian taxation though practically speaking ascertaining the accurate amount of taxes to impose can be difficult (Ibid.).

Much criticism can be made when applying the economic worldview to social questions. However, Oates claims that economics actually provides useful insights relevant to environmental protection (Oates, 2005). The first is that economic analysis is quite clear about the fact that an unregulated market system will lead to excessive pollution. This happens because the market allows for “overuse” of the environment. It follows that an economic argument could be made for intervention through environmental regulation. Economics can also provide helpful tools to calculate possible answers to the question of how clean should the environment be. This is

possible because micro economic theory focuses on equalizing marginal benefits to marginal costs. In any case, even if marginal analysis is not used towards this end, economics can provide helpful insights into possible results of public policy (bid.).

Marx also considered the environment, albeit in a different way. Per Marx:

“Capitalist production...disturbs the metabolic interaction between man and the earth, i.e. prevents the return to the soil of its constituent elements consumed by man in the form of food and clothing; it therefore violates the conditions necessary to lasting fertility of the soil.... The social combination and organization of the labor processes is turned into an organized mode of crushing out the workman’s individual vitality, freedom and independence.... Moreover, all progress in capitalist agriculture is a progress in the art, not only of robbing the worker, but of robbing the soil; all progress in increasing the fertility of the soil for a given time is a progress towards ruining the more long-lasting sources of that fertility. The more a country starts its development on the foundation of modern industry, like the United States, for example, the more rapid is this process of destruction. Capitalist production, therefore, develops technology...only by sapping the original sources of all wealth—the soil and the worker.” (Marx, 1990)

An interesting connection can be between Marx’s critique of capitalism and the growth of ecological economics over the last few decades. According to Costanza (quoted in Lumby, 2007), ecological economics “is intended to be a new approach to both ecology and economics, that recognizes the need to make economics more cognizant of ecological impacts and dependencies, the need to make ecology more sensitive to economic forces, incentives and constraints, and the need to treat integrated economic-ecological systems with a common (but diverse) set of conceptual and analytical tools.”

While there are various strands within ecological economics, two tenets distinguish it from neo-classical economics. Ecological economics recognizes that humans and their social spheres, including the economy, are part of a larger natural ecosystem, the earth’s biosphere. This means that the environment is not a subset of the economy but that the economy is a subset of the global environment (Harris, quoted in Lumby, 2007). The second tenet that distinguishes it from neo-classical economics

relates to the question of whether unlimited economic growth is attainable, or whether the more achievable goal should be a “steady state” economy (Daly as quoted in Lumby, 2007).

Ecological economics could be characterized as a movement and less so a clear cut discipline because its interdisciplinary requirements make it difficult to define its core methodology. According to Holling et al (quoted in Spash, 1999), four key features are common to the structure of ecosystems that economists should take into account. These are:

- Change is episodic as opposed to continuous and gradual (i.e. hurricanes)
- Moving from micro to macro is not a linear process
- Ecosystems may have numerous equilibria, they may lack equilibria or they may be destabilized by forces that are far from equilibria.
- Due to these complexities, management and policies must be flexible

Additional features that ecological economics espouses are the importance that it assigns to incorporating moral values into the discussion. This includes debating the set of morally considerable entities, what rights do future generations have and how the poor should be treated (Spash, 1999). Applying economic analysis to such questions is difficult, but the moral and philosophical essence of economics, Utilitarianism, does provide a coherent outlook on such issues. However, many economists perceive of themselves as engineers who solve problems and do not necessarily take such considerations into account, nor do they think of the discipline as actually holding a moral position on such issues.

According to Lumby (2007), the emergence of ecological economics can be seen as a macro-economic complement to the helpful microeconomic foundations of

environmental economics. Ecological economics, which at its base is interdisciplinary, can also be seen as an attempt to collect different elements that share a common purpose and try to answer a similar question: what are the ways in which the demand of the modern economy can be combined with the bio-physical constraints that are inherent in the environment in which we live in?

Conclusion

This paper set out to try and answer the question of how does economics study the environment? In order to provide a partial answer to this question, it described the different outlook between classical and neo-classical economists regarding value. It also examined and contrasted the economic approaches of Marx and Mill, whose way of thinking about social phenomena is still very relevant today. It also highlighted the changes in scientific thought that occurred at the turn of the 20th century and how they affected economics.

When these disparate aspects of economic thought and their development are taken together it becomes clearer why and how the environment is considered when economic analyses is applied to it. This is the case both in terms of explaining phenomena and in terms of the policy tools that economic theory and application offer. It also becomes clearer how analysis of the environment developed over the last couple of centuries and that each development was based on previous modes of thought. There is surely much more that can be discerned about my question by further research and reading into the history of economic thought.

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