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Abstract

Since value and utility are the highest profile abstractions that underlie an epoch's intellectual climate and ethical principles, their evolution reflects the transformation of socioeconomic conditions and institutions. The "Classical Phase" flourished during the first global system, *laissez-faire/metal money/zero multilateralism* (GS1); the second, "Subjective/Utilitarian" phase marked the long transition to the current epoch of "Modern Subjectivism/General Equilibrium," tied to the second and extant global system, *mixed economy/minimum reserve banking/weak multilateralism* (GS2). History has witnessed the material de-essentialization of value and substantialization of utility. But now the two concepts face a thorough transvaluation as the world's combined demographic and economic expansion encounters ecological/physical limitations. An extended macrohistoric implosion may lead to a third form of global self-organization: *two-level economy/maximum bank reserve money/strong multilateralism* (GS3). If history unfolds along the suggested path, not only economics, but also thinking about economics would change. It would be considered an evolving *hermeneutic* of the human condition expressed through global-system-specific *texts*. The implied critical alteration, with the recognition of the entropy law's importance as its focal point, matches the prediction of Swiss thinker Jean Gebser (1905-1973) about the impending mutation of human consciousness into its integral/arational structure. Such extrapolations form the context in which the fourth historical phase of value and utility is hypothesized, leading to the material re-essentialization of value and de-substantialization of utility.

Contents

1. Introduction/Summary (p. 2)
2. Historical De-essentialization of Value and Substantialization of Utility (p. 6)
 - 2.1. The Classical Phase (p. 7)
 - 2.2. The Subjective/Utilitarian Phase (p. 8)
 - 2.3. The Phase of Modern Subjectivism in the Framework of General Equilibrium (p. 9)
3. Utopian Extrapolations of Conservative Economics; *Homo Faber* Getting Hoisted by his Own Thermodynamic Petard (p. 12)
4. New Historical Materialism, the Ultimate Integrum – GLOPPE (p.14)
5. New Economic Epistemology Based on GLOPPE and Thermodynamic Reality; the Five Essentials (p. 20)
6. Toward a New *Text* (p. 23)
7. Arational Approach to Value and Utility (p. 29)
8. Concluding Remarks (p. 31)
9. References (p. 32)

1. Introduction/Summary

If, after the pattern of “holier-than-thou,” there were a competitive relationship among general, abstract concepts that vie for being the ultimate basis of economic inquiry, utility and value could claim that “we are more ontological-than-thou.” Between the two, utility is more basic than value.¹

Utility is the quality in things, events, and circumstances (beyond the problematic of its quantification) that can impart satisfaction and felicity. Although this quality is biologically and socially determined, one may say that at any given moment, the potency for such experiences is rooted in the individual. In contrast, value is a complex condition that represents a compromise between internally registered needs and wants and the economy’s actual ability to satisfy them. As is well known, abundance can reduce the value of a good to near free status even if it is indispensable for existence, viz., it may be characterized as a carrier of infinite utility.

This paper identifies three major phases in the evolution of thinking about value and utility and relates them to “new historical materialism” (NHM).²

NHM considers human evolution a thermodynamic phenomenon in which the combined substance of the human biomass and objects created through the economic process represents the central variable, called GLOPPE -- *global population plus economy*. GLOPPE is a dissipative material entity, which, as a result of its growth over the eons, demanded global-scale self-organization towards the end of the 18th century.

As has been observed in many natural phenomena and demonstrated in physics and mathematics, dissipative material entities undergo alternating phases of relative (dynamic) steady states and chaotic transitions as they expand.³ The parameters or control variables of a given level of self-organization allow their growth only to a certain point. When they get in the way, the system breaks down (“bifurcates”) and the search for a new set of growth-accommodating parameters/control variables begins. Transition from one form of self-organization to another is chaotic *per force* since conflicting alternatives compete to become the new system’s “blueprint.”

World history reflects this pattern. The first form of GLOPPE’s self-organization, *laissez-faire/metal money/zero multilateralism* (GS1), broke down in 1914 and a chaotic transition led to its second (and current) form, *mixed economy/minimum reserve banking/weak multilateralism* (GS2). The world is now facing a crisis because GLOPPE behaves as if the terrestrial sphere, which it dissipates as it grows, were an open thermodynamic system when, in reality, it is a closed system.

¹ In the modern era, value preceded utility in theoretical development. Therefore, when the two concepts are mentioned together in a historical context (as in the title), it is “value and utility,” but when reference to them subsumes a descending scale of abstraction, it is “utility and value.”

² For details, see Pogany (2006).

³ See, Kondepundi and Prigogine (1998), Yates (1987), and “dissipative structures” under “Index” in Prigogine (1997).

If humanity passes its first collective test of cosmic intelligence, the impending chaotic transition ought to lead to a form of self-organization that takes this physical fact into consideration. Emergence of a new global system, *two-level economy/maximum bank reserve money/strong multilateralism* (GS3) is highly probable. It would be equivalent to GLOPPE's acquisition of an effective central nervous system.

Each global system has its *text*, the summary of its basic operating principles with a quasi-theological status during the system's lifetime. As the system approaches its end, the *text* becomes obsolete. Exhaustion of its epistemic capacity renders it less and less adequate to explain actual conditions and to recommend solutions for current problems.⁴

The comprehensive transformation of individual behavior and socioeconomic conditions implied by GS3 jibes with the impending mutation of consciousness into its integral-rational form as foreseen by Jean Gebser (1905-1973)⁵ Leaning on Gebserian insights, this paper argues that the emerging new, basic comprehension of the species' condition will integrate natural and other social sciences, as well as the humanities into economics, and that thinking about value and utility will see its fourth historic phase.

First, let us remove the "useless" sticker from the two concepts.

Perhaps no other author has expressed a more profound skepticism about them than one of the 20th century's most influential economic philosopher, Joan Robinson (1903-1983). Value, she said "has no operational content. It is just a word" (Robinson, 1962, p. 47). In the third chapter of *Economic Philosophy* (Robinson, 1962, pp. 48-74), she characterized utility as a metaphysical term of impregnable circularity. Utility is the attribute of a commodity that generates its value and we value commodities because "they have utility."

Robinson's uniquely caustic, refreshing analysis, which often left paradoxes hanging in the air, never allowing thinking to come to a full stop, leads exactly to the comprehensive perspective embraced in this paper. As she pointed out, while they may have no practical significance (e.g., in investment decisions, or in making or justifying policies), value and utility do carry moral significance, and, consequently, they express ethical principles. Indeed, could they do this without being metaphysical?

⁴ The obsolescence of GS2's *text* is perfectly demonstrated by the political stalemate over budget deficits in some of the most advanced economies. These deficits have reached the level where the credibility of sovereign debt is questioned (i.e., they should not be increased). At the same time, the *text* is clear on the dangers of increasing taxes and/or reducing spending when economic performance is sluggish. The much lampooned deadlock in U.S. governance over the federal deficit seems to be the only logical answer to this problem, unsolvable as it is through rational maneuvering within GS2's policy space.

⁵ A brief descriptions of Gebser may be found in Combs (1996) and Feuerstein (1987); for a thumbnail sketch see http://mpr.aub.uni-muenchen.de/27221/1/MPRA_paper_27221.pdf. The reader is invited to consult the ultimate sources: Gebser (1975) and Gebser (1984) -- *The Ever-Present Origin* -- in the brilliant translation of Noel Barstad and Algis Mickunas.

Each global system has its inseparable, inalienably characteristic moral platform. The two have a common fate since none could exist without the other. GS2's ethical principles (i.e., the norms that guide moral behavior and intentionality) are very different from those that had prevailed when GS1 represented the world order. From this perspective, it is hardly surprising that value and utility are subject to transformation over historical time.

The shift of emphasis from value to utility during GS1 signaled the emergence of the consumer as the central focus of the economic process. Theory became socially more comprehensive. Whereas the classical doctrine did not consider wages part of the national income, utilitarian thought during the second half of the 19th century did. Labor became recognized as a sacrifice (i.e., real wages compensate for the disutility of work), paving the way for GS2's mass production/mass consumption, unimaginable without collective bargaining. GS2's real prices, opportunity costs, and marginal utility ratios tending towards equality with the whole ("well-behaved") algebra of consumer behavior are indispensable for the current *text's* assertions about the market economy's inherent tendency toward general equilibrium.

The structure of understanding reality does not currently enjoy ontological definitiveness, transparency. But this does not change the fact that such structure exists. Commonplace theories and conceptualizations are built on more fundamental ideas that underlie the theologization, theorization, empirification, and vulgarization of thinking under a prevalent global system. Therefore, as metaphysical manifestations of the system's ethical deep pulse, value and utility have certainly (use) value and utility. Their ethical pith, in profound immediacy with the system's ideology, is mediated through concrete concepts and theories.

Gödel's *incompleteness theorem* comes to mind. Applying it to GS2, the system of neoclassical fundamentals constitutes a coherent, closed algebra of the loftiest rigor (as general equilibrium models demonstrate it) but it needs to import universal structuring principles in the form of ethically-charged concepts (such value and utility) in order to be complete. Only so can economics appear not as a compendium of ideas about reality but reality itself, and only so can ideological and institutional stability reify socioeconomic conditions, making them appear as part of the natural environment. And it is exactly this ahistorical rationality that this paper intends to disprove. When it comes to the history of global self-organization, the second law of thermodynamics is vested with a greater direct relevance than the conservation law, or symbolically; Heraclites trumps Parmenides. Concern about the unfolding global crisis motivates dealing with value and utility historically.

The nature and seriousness of this crisis was well expressed by Hans-Georg Gadamer (1900-2002), a philosopher of foundational significance in 20th century hermeneutics. In 1986, he said:

"In our contemporary situation, faced as we are with an increasingly widespread anxiety about the future of mankind, the issue is the suspicion slowly seeping into the consciousness of all that, if we go on this way, if we pursue industrialization, think of work only in terms of profit, and turn our earth into one vast factory as we are doing at the moment, then we threaten the conditions of

human life in both the biological sense and in the sense of our own ideals for being human, even to the extreme of self-destruction.” (Gadamer 2003, 542)⁶

GLOPPE’s encounter with its limits is revealed through emerging resource shortages, environmental degradation, and the dysfunction of GS2’s “accelerate or collapse” economic organization, financial-monetary order. “Peak Oil” is nature’s first eloquent “cool it” message to humanity’s untutored belief that there can be infinite growth in a closed thermodynamic system.⁷ It is manifest in a so far largely unrecognized back-and-forth between growth and oil prices. Growth raises oil prices, which then disables growth. The disabled growth pushes down oil prices, rekindling growth.

The impasse is complete and persistent. The level of oil prices that would facilitate effective substitution is too high to maintain the robust aggregate economic performance that would be needed to encourage significant amounts of private investment in alternative energy sources.

The omnipresence of oil in the economy makes the entire substitution process dependent on oil prices. Moreover, divergent corporate interests in the oil industry and the special perspectives of oil exporter countries have created an opaque dynamism that is beyond the reach of rational maneuvering through national or multilateral policies.⁸

After a transitional age of unknown length and intensity, a new world order (e.g., GS3) is expected to be the response to the adaptive pressure now beginning to be exerted on *homo sapiens*. This proposition ought not to be regarded either as moral advocacy or as a conviction of historical necessity. It represents an optimistic outcome. Nonetheless, any lasting equilibrium between GLOPPE and the terrestrial sphere’s ability to support the human enterprise seems unimaginable without integral-rational individual consciousness on a mass scale. And it is exactly this mutation that would bring about the material re-essentialization of value and de-substantialization of utility.

⁶ The knee-jerk reaction of orthodox economics to the complaint that potential over-industrialization will ruin the planet is that “demographic transition,” accompanied by “economic transition” toward services and a nonresource-intensive knowledge economy will save the world. These arguments are patently artless. Generalizing developed country living standards (enjoyed by one-fifth of the world population) even for the current ca. seven billion people is impossible without provoking severe resource shortages and ruining the environment beyond repair. Making the same calculations with ten billions (the projected level of global population by the end of the century) yields a tragic incongruity. Reaching the enormous fixed cost that comes with successful industrialization presupposes major increases in the throughput of material resources. Real estate services, web page design, marriage counseling, and consultancy on interior decoration are no substitutes for metals, minerals, timber, and energy carriers needed to create developed-country-living conditions for billions of slum dwellers.

⁷ For a clear account of the world’s oil predicament, see Deffeyes (2010).

⁸ When it comes to oil, traditional thinking about orderly depletion along the lines of the *Hotelling Rule* no longer applies. The marginal user cost, a crucial component of the price (in addition to the marginal cost of extraction), is dependent on the discount rate, which is linked to the market rate of interest in practical calculations. However, given oil’s preeminent role in overall economic performance, its price indirectly and significantly influences interest rates. A closely related, nonnegligible phenomenon is that claims on oil as a physical commodity have acquired the characteristics of financial assets. See, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1499099

2. Historical De-essentialization of Value and Substantialization of Utility

Do goods have intrinsic, absolute, natural values that differ from their exchange values and exist independently from the satisfaction (i.e., the utility) their consumption provides? If yes, can its cause be pinned down, can its magnitude be measured, and if not would arguments about it match the merit of deciding how many angels can frolic on the tip of a needle? From Plato (5th century BCE) and Aristotle (4th century BCE) to the present, economic thought has tried to come to terms with this problem. But every time someone cried “Eureka, I got it; period, end of story,” some new development upset what may (at least in retrospect) be regarded as a shaky consensus.

During the past two and a half centuries, efforts to interpret value as an objective numerically expressible absolute that exists as an essence independent of consciousness petered out. This is what is meant by the word de-essentialization.

The implied historical transformation may be broken down into three major phases: classical theories (committed to one form or another of an objective/absolute magnitude); subjective theories (built around the utilitarian view of consumption), and the contemporary (“modern”) subjective approach, which through “gestalt mathematics,⁹” using only some of the logical features and patterns (“consistency postulates”) of early subjective/utilitarian tenets, has seemingly eliminated the need for any further theorizing about value.

It is important to underscore that characteristic thinking about value during each of the three phases also represents characteristic thinking about utility. In the end, the positivist trend that has come to dominate social sciences since the beginning of the 20th century has eliminated the difficulty of grasping the subjective, qualitative sensation attached to satisfaction derived from goods.

Utility in contemporary models has been equated with the level of consumption (“ $p \times q$ ”). This is what “substantiation of utility” means.

After briefly reviewing the three phases, it will be shown that the current satisfaction among mainstream economists that the problems of value and utility have been solved

⁹ “Gestalt mathematics” was invented by Hermann Friedmann during World War II (Gebser, 1984, p. 389, n. 25). It deploys features of the whole to identify characteristics of the parts that are neither readily deducible by inspection nor obtainable by summation. “Gestalt” in the word’s broadest sense, appropriately describes the competitive free market system. It refers to a social organization with basic features and potentialities that cannot be deduced from the simple inspection and/or summation of the parts. That is, an invisible transmission mechanism turns myopic strivings (individual biological energy) into the satisfaction of social needs; permitting the process to preserve its relative steadiness without the requirement that the parts be in equilibrium. Perhaps Gerard Debreu expressed the gestalt nature of contemporary general equilibrium mathematics most succinctly when he summed up the change in mathematical economics from traditional differential calculus to making use of the envisaged model’s “convexity and topological properties” (Debreu, 1959, p. x).

once and for all is based on a puerile, anthropocentric reduction of humanity's thermodynamic reality.

2.1. The Classical Phase

Adam Smith (1723-1790) telescoped and expanded the work of several major thinkers before him to formulate his labor theory of value (LTV); expand it to a rudimentary "cost of production" approach, casting light on the importance of relative values. David Ricardo (1772-1823) made definitive changes on all these accounts. He pointed out the significance of the relative amounts of labor in determining exchange rates among commodities (i.e., their real prices); elaborated the "cost of production" approach, and applied the principle of diminishing returns -- attributed to Robert Malthus (1776-1834) - to value determination.

John Stuart Mill (1806-1873) developed his own cost-of-production theory of value (wages accounting for the disutility of labor plus profits stemming from the abstinence of capitalists) and further underscored the significance of relative values, the importance of supply and demand relations.¹⁰ He sighed with great satisfaction in 1848: "Happily, there is nothing in the laws of value which remains for the present or any future writer to clear up; the theory of the subject is complete" (Marshall, 1967, p.119).

In his *magnum opus*, the first volume of *Das Kapital* (1867), Karl Marx (1818-1883) forcefully criticized all previous formulations of LTV as erroneous, insufficient, or apologetic of capitalist exploitation. The special features of Marxian LTV are (a) shifting emphasis from the role of the margin (as in Ricardo's theory) to the average, to the so-called "socially necessary abstract labor time;" (b) reducing value-determining factors to labor;¹¹ and (c) categorically divorcing the forces that shape absolute (or immanent) value from those that determine prices.

One may say that by concentrating on the cost (supply) side of the market, the classics (including Mill) searched for the same thing as the Greek philosophers and medieval scholastics;¹² that is, for some essence in commodity values, which, by being "natural" and objective, is independent from the infinite variety of contingent circumstances; the vagaries of individual judgment.

Utility and value remained understandably disjointed concepts during the first phase. While value was regarded quantitatively proportional to the exertion of human effort in the process of production, the founder of utilitarianism, Jeremy Bentham (1748-1832), considered utility a complicated psychological phenomenon that emerges in the process of consumption. Value could be measured at least in principle, but dwelling in the

¹⁰ See, Schumpeter (1954), pp. 189, 530, 589, 603, 604. Mill, who had a great deal to say about utility, almost completely ignored it as a determinant of value (Marshall, 1967, p. 119).

¹¹ Marx was particularly contemptuous of the "abstinence theory" of profit (Marx, 1906, pp. 648-656).

¹² Saint Thomas of Aquinas (1225-1274) elaborated on the concept of "just price," already known to ancient Greeks.

Platonic realm of inaccessible ideas, utility could be recognized only through introspection and self-observation.

In contrast, the second phase thrived on connecting value and utility.

2.2. The Subjective/Utilitarian Phase

A breakthrough in the search for the meaning of value occurred toward the end of the 19th century when analysis began to focus on utility as a quantitative phenomenon. The concept of marginal utility was born.¹³ The understanding of value based on it revolves around the satisfaction derived from consuming the last unit of a commodity. The approach was ostensibly demand-oriented but, contrary to the often heard opinion, it did not ignore production costs. (See, Schumpeter, 1954, pp. 921-924). Marginal utilitarianism did recognize the “supply side” but considered it subordinate to demand, a view that, in many respects, is quite close to the prevalent conviction that the material desires of sovereign consumers indirectly guide the allocation of resources with profound implications for the costs of production in a free-market, competitive economy.

If a single word had to be chosen to characterize the operating principle behind the marginal utilitarian view, it ought to be *scarcity*. When a good is scarce, its marginal utility is high, but as it becomes increasingly abundant, its marginal utility declines. That is, value is determined on the margin.

Thoughts about general equilibrium (GE) logically followed from this view, with further consequences regarding “value.” Early elaborators of GE, Leon Walras (1834-1910), and (to a lesser extent) Alfred Marshall (1842-1924), had reconnected value with price but in very tentative ways. Although Walras claimed that interrelated markets would engage in *tâtonnement* toward equilibrium prices, which, by imputation, would reflect the immanent values of commodities; and Marshall considered equilibrium across markets approximating “normal prices” (production costs) theoretically acceptable, both men were keenly aware that the chances of such ideal conditions becoming reality were practically zero.

Nonetheless, in the eyes of present-day neoclassical writers, both the marginal utility school (which included the first wave of “Austrians”) and the early predecessors of modern GE analysis (with Walras as an obvious overlap by virtue of occurring on both lists) share the credit for no longer thinking about value as an absolute but rather as a relative measure. According to this relativistic perspective, which received detailed elaboration and strong emphasis in Marshall’s work, value can have no meaning except in reference to a given quantity of another good, i.e., to its opportunity cost. Thus, by all appearances, the problem of finding an absolute, intrinsic measure of value had been

¹³ This breakthrough was credited to the contributions of Hermann Heinrich Gossen (1810-1858), William Stanley Jevons (1835-1882), Carl Menger (1840-1921), Friedrich Wieser (1851-1926), Eugen Böhm von Bawerk (1851-1914), John Bates Clark (1847-1938), Léon Walras (1834-1910), Vilfredo Pareto (1848-1923), and Knut Wicksell (1851-1926). Cf. Marshall (1967), Chapter IX.

eliminated through the emphasis of subjectivity (a touchstone of “Austrian” value theory) and measurement through other commodities rather than through the costs of production.

Value became a strictly subjective phenomenon that has meaning only in a relative sense; i.e., as the opportunity cost of consuming a good or employing a productive input, and only in the context of aggregate consumption and production. Although the concept had remained of central importance during the second phase, the locus of its determination gradually shifted to the entire system of interrelated markets. In the end, values became mutually determining moving targets; never self-standing and expressible only through the elusive (money-price-based) valuation of other commodities. This tendency culminated during the third phase.

2.3. The Phase of Modern Subjectivism in the Framework of General Equilibrium

John Richard Hicks (1904-1989), a scholar and a gentleman in an older tradition, often mingled praise with criticism. In his period-defining *Value and Capital* (Hicks, 1946), he attributed more error and sterility to Walras, whose program he pledged to continue, than to Marshall – whom he profoundly admired -- while breaking the ground under his edifice. Hicks considered quantitative utility, hence marginal utility (crucial during the Victorian period of the previous phase but still present in Marshall’s conceptualization of GE) arbitrary, dubious, and irrelevant (Hicks, 1946, pp. 17, 18, 19, and 24). Indifference maps -- the brainchild of Francis Ysidore Edgeworth (1845-1926) with major elaborations by Vilfredo Pareto (1848-1923) and Irving Fisher (1867-1947) -- as a source of information to analyze consumer preferences in developing a value theory did not fare much better.¹⁴ But all these preliminaries were necessary for Hicks to move thinking about value to the next level.

By seeing through the possibilities of “gestalt mathematics,” Hicks formulated a set of equations (testable for consistency and optimizability) in which unknowns could be calculated by relying on readily acceptable correspondences among unknowable variables and parameters. We may not be able to calculate marginal utilities but we can say something crucial about their relationship to prices in equilibrium. We may not know a single indifference curve (hyper-surface) but can reasonably characterize the slope of each curve and the movement along it over time. Then analog conceptualizations on the supply side for the representative firm (with institutional assumptions about the “generalized law of demand” and interest rates of a definitively Keynesian flavor) will result in a robustly consistent, static GE.

Prices (ratios) approach their equilibrium levels and this process may be expected to resume after a slight disturbance as long as parameters (defined by the optimization scheme’s internal algebra) remain within their specified range.

¹⁴ Pareto used such an approach, and although it was discarded, his work included the formulation of optimality conditions (“economic efficiency”) in a perfectly competitive economy, which (as may be seen by consulting any intermediary microeconomics textbook) is still crucial to mainstream economic thinking.

Thus, “natural value” of a commodity as a partial phenomenon, already substantially weakened by the marginal school, became explicitly subject to the influence of all interacting parts in Hick’s comprehensive multimarket algebra. Values, resulting from averaging out aggregated subjective preferences, expressed in terms of some arbitrary *numeraire*, have moved to the inaccessible realm of pure ideas. We see only their rudimentary, imperfect reflections on the cave wall, as in Plato’s famous parable.

The last two pages in the second edition (1946) of *Value and Capital* contain a kind of afterthought to afterthoughts. It bears the title “Professor Samuelson’s Dynamic Theory.” With unfailing insight into the foundational significance of Keynesian analysis and the potential of Paul Samuelson to turn it into a comprehensive system of fundamentals, Hicks may be regarded as the first neo-Keynesian (or neoclassical) synthesizer.

The work of Paul Anthony Samuelson (1915 – 2009) was a critical milestone in the development of the third, contemporary phase of de-essentializing value. His “Foundations of Economic Analysis” (Samuelson, 1948) laid the theoretical groundwork for turning “neoclassical synthesis” into GS2 economics. His introductory textbook with its cryptic, end-all title, “Economics,” was first published in the same year. Several editions of “Economics” have seen the daylight since then and it served as the boiler plate for competing efforts on the undergraduate textbook market. It became the prevalent global system’s *text*. More will be said about the social role of the *text* below. Suffice it to say here that one would not be mistaken by comparing it to a catechism, the corpus of information required for the practice of faith. It embodies the minimum standard knowledge that policymakers must either possess or must have immediate access to through appropriately trained staff members.

The de-essentialization of value, which moved into high gear with Hicks, intensified with Samuelson: “. . . many writers have ceased to believe in the existence of any introspective magnitude or quantity of a cardinal, numerical kind. With this skepticism has come the recognition that a cardinal measure of utility is, in any case, unnecessary: that only an *ordinal* preference, involving “more” or “less” but not “how much,” is required for the analysis of consumer’s behavior” (Samuelson, 1948, p. 91).

This does not mean the complete discarding of the utility (subjective value) school (dubbed “modern” to distinguish it from the classics in the first phase). The ultimate push to de-essentializing through gestalt-mathematics is built on it. Samuelson: “. . . modern utility theory with all its qualifications is not in a technical sense *meaningless*. It is a hypothesis which places definite restrictions upon demand functions and price-quantity data” (op. cit., p. 92).

The de-essentialization of value became complete through the “axiomatic analysis of economic equilibrium” (Debreu, 1959). In this penultimate step to building computable general equilibrium models for policy analysis, “value” no longer lingers even as a shadow: “The fact that the price of a commodity is positive, null, or negative is *not* an

intrinsic property of that commodity; it depends on the technology, the tastes, the resources . . .” (Debreu, 1959, p. 33.)¹⁵

Parallel with the disappearance of value in the swirling quagmire of “general equilibrium” topology; thinking about utility -- an elusive metaphysical-psychological concept since its inception -- had bifurcated. While one branch became etherized by moving in the direction of the Neumann-Morgenstern utility expectation model (a virtual savant, game-theoretical construct that has resisted valiant efforts to be put to any significant practical use), the other gained corporeity by becoming a continuous function that (“rational”) consumers want to maximize.

Economists linked the concept of utility to demand theory, thus to consumer behavior; struggling, of course, with the problem of social utility.¹⁶ The comprehensive work of Deaton and Muellbauer (1980), which has served as a basic reference for so much research in the field, attests to this transformation. The heavily algebraic and econometric treatment of the utility-consumer/utility-social welfare link masked this reduction. Preoccupation with testing and qualifying the additive and homothetic nature of “utility functions” (containing nothing but commodities and a budget constraint) made related research appear deep, rich, sophisticated, and even revolutionary by virtue of contradicting established conventions.¹⁷

Modern subjectivism does not attribute economic value to leisure time. Thus, income has only one component: real income.¹⁸ But, of course, the subject did not disappear from economic analysis. Leisure and income jointly appear in standard microeconomic algebra and introductory texts show the wage rate as the equilibrating factor between marginal preferences.¹⁹

In general, mathematical modeling in economics is both intellectually satisfying and prestigious. The unrecognized downside is the elimination of the space between comprehension and acceptance. Widespread absorption of meaningfully deployed

¹⁵ The development of computable (or applied) general equilibrium models was the result of a stupendous intellectual effort. Any attempt to list even only the principal contributors to this crowning success story of neoclassical economics is condemned to be lacking. Nonetheless, all such lists must include the names of Kenneth Arrow and Lionel McKenzie (1919-2010) along with Gerard Debreu. John von Neumann (1903-1957) and Shizuo Kakutani (1911- 2004) provided the crucial ingredient of a fixed point theorem. A list of those whose work assured topological consistency and a meaningful solvability of the pertinent equation system may be seen at Samuelson (1948, p. 170, n. 33).

¹⁶ Distributive fairness in the face of a systemically-ideologically encouraged materialistic aggrandizement bothered economists. Many remarkable works saw the daylight during the past decades but mostly in the framework of neoclassical fundamentals. Cf. Feldman and Kirman (1974).

¹⁷ Christensen, Jorgenson, and Lau (1975) is a telling example.

¹⁸ Indeed, our era tends to devalue free time. During the past 100 years, despite the huge overall increase in welfare, average per capita leisure has increased only 4-5 hours per week in the United States; cf. Ramey and Francis (2009).

¹⁹ By showing that moods and emotions have an impact on time preference, Ifcher and Zarghamee (2011) successfully disproves this simplification. But in light of this finding one wonders to what extent the indicated minor gain in leisure is the result of free choice, i.e., devoid of compulsive socioeconomic conditions and/or psychological conditioning that push the individual to prefer real income to leisure income.

mathematical methodology makes a theory or a proposition to be regarded as “knowledge,” especially if it comes from a first water academic source.²⁰

When all this is transcribed into applied general equilibrium calculations -- with apologies along the line that “there is nothing better out there for the moment” -- consumption approximates utility; and consequently, the maximization of global output (without the slightest thought about its scale limit) struts the stage in the role of an uncontested universal telos.²¹

To sum up, the conceptual “de-essentialization” of value has been accompanied by a crass materialistic “substantiation” of utility, from an imaginary quantity, determined by many different factors, including the enjoyment of leisure, to “hedonometry” (Edgeworth), viz., consumption, plain and simple. Although the two tendencies are each other’s exact opposites, their result is identical: value and utility have been removed from the agenda of economic theorizing. To see why this conclusion represents a false ending, we need to make an unparsimonious detour.

3. Utopian Extrapolations of Conservative Economics; *Homo Faber* Getting Hoisted by his Own Thermodynamic Petard.

Neoclassical economic writings do not let the bad taste caused by a cursory reference to the finiteness of natural resources and the severity of environmental problems linger. Soon the tendency toward eternal equilibrium brightens the sky and the colorful rainbow of forever-accelerating economic growth reappears on a flexibly receding horizon.

By expanding the concept of capital to include what is in the human brain, the knowledge-cum-service economy (running on sunshine and man’s innovative genius) had been discovered, turning economic growth into an ultra-phenomenon whose end lies beyond articulated space and time.

Samuelson’s comparison of dynamic equilibrium in a free-market economy to the workings of the “Le Châtelier Principle²²” (known from thermodynamics and chemistry) reveals perhaps most eloquently the foreknowledge-like sophism underlying “GS2 ideology,” as it is reflected in its simplified transcript, the *text*.

By considering the economic process under *laissez faire* analogue to a chemical phenomenon discovered by French metallurgist and chemist Henry Le Châtelier (1850-1936), not less is achieved than imputing the timeless solidity of the physical order to

²⁰ Baumol (1985) gives a highly instructive, broad-horizon account on how economics changed from (what the present paper defined as) the second to the third phase.

²¹ Even the concept of communal total utility, hence the possibility of democratically pursued collective rationality via social welfare policies, came under attack by Kenneth Arrow’s ethical-relativism promoting “impossibility theorem” (Arrow, 1950). It speaks to the effectiveness and prestige of this wildly individualistic worldview -- with a definitive existentialist flavor of the mid-20th century -- that decades later, economists still argue against its implications. See, for example, Sen (1999).

²² Samuelson (1948), pp. 21, 36, 38 n, 81, 168.

human institutions, social goals and individual behavior. Just as according to the Le Châtelier Principle, a displacement of chemical equilibrium provokes forces that will oppose, minimize, and neutralize the change, the free market economy restores equilibrium after it is shocked (for instance by technical innovations); hence it ought to be considered naturally as robust as the Rock of Gibraltar.

The motivation of profit-seekers to increase production to satisfy the never-ending desire of consumers to increase consumption has been welded to axiomatic set- and function-theoretical assumptions that will guarantee economic equilibrium as would any other (simpler or more complicated) unfalsifiable circularity.

Thermodynamic innocence is nested deep in the penitralia of mainstream economics. It derives from the implicit assumption that, except for solar radiation (and re-radiation), our world as a process is isothermal (adiabatic) along a geological timescale. Since heat and work can be equated, the isothermal worldview implies that no ability to do work is lost as a result of demographic and economic expansion within the terrestrial sphere.

The consequences of man's vampire appetite for low entropy in the context of the second law's relevance to ingesting and extruding our ecological niche's limited supply of free (accessible) energy contained in structured matter ("congealed energy") has been left out of the "felicific calculus" (Jeremy Bentham) of Nobel-prize-caliber economic wisdom. Satisfaction derived from consumption ("ophelimity," to use Pareto's term) dominates economic consciousness.

The *text's* existential basis includes the unshakeable conviction that natural resources are infinite and that their significance tends to diminish with science-and-technology-driven economic development.

Although this fundamentally Newtonian worldview, masquerading as a thermodynamically supported, unassailable truth (linked to the pretension that only the first -- or conservation -- law is relevant to economic development) still rules the minds, it no longer does so without facing effective challenges. Awareness that what nature offers is not gratis; that human existence entails irrevocable qualitative changes in the environment has begun to penetrate collective consciousness.

The work of Georgescu-Roegen (1971) has proved to be a critical milestone in the long and painful struggle of extending the phenomenal domain of economic activities with its entropic consequences. Its virtually paradigmatic banishment, peppered with derisive recognition and sarcastic criticism on occasion, has showed that GS2 economics, with its characteristic narrow empiricism and sectorized rationality, is too parochial to recognize the thermodynamic absurdity of prevalent economic aspirations. Further progress toward transparency must entail the temporal analysis of the most inclusive macroscopic variable.

4. New Historical Materialism, the Ultimate Integrum -- GLOPPE

Dispensing entirely with anthropocentric narcissism, the human biomass and everything produced and manufactured by humans, plus all forms of life (plants and animals) in human service may be pictured as a restless, expanding clump of matter. Let us call this physical entity GLOPPE – *global population plus economy*.

GLOPPE is a “far-from-equilibrium, dissipative structure” with emergent properties. Such structures go through alternating phases of relative steady states and bifurcations, which we call *chaotic transitions* in the thermodynamic conceptualization of world history.²³

GLOPPE had grown without interruption during GS0, the era that extends from the completion of geological globalization (around 1500) to the outbreak of the French Revolution in 1789.²⁴ By the end of the 18th century it had reached the level at which it required global scale organization to continue growing.

Chaotic transition led to the establishment of the first, most primitive global order, *laissez-faire/metal money/zero multilateralism* (GS1). It lasted from 1789 until the symbolic year of 1834.²⁵ From the clash of extreme intentions, such as the creation of an egalitarian society through jacobinic despotism, territorial integration through imperial conquest, and aristocratic restoration, the triumphant bourgeoisie emerged. The new ruling class of entrepreneurial revolutionaries was, in a way, egalitarian; in a way, aristocratic, and yet, in another way, successful in integrating the world. By the 1830s it was strong and confident enough to push through legislation required for the free functioning of markets in commodities, labor, and money. Unobstructed entrepreneurship and free competition were on and the factory system could expand. GS1 spread quickly to the rest of Europe and to other continents, including the United States, which was born with a great penchant for GS1’s spirit of liberty and entrepreneurial creativity.

The main attribute that distinguished GS1 from GS0 was the recognition that national self-interest is best served by making allowances for similar ambitions in the rest of the world. GS1 had a pivot or epicenter or “world leader” -- Great Britain. It became the reference point against which other nations would measure their institutional arrangements, business and personal conduct: The closer to the British model, the better.

²³ “Far from equilibrium” means everything that has structure (including tornados and magnets) because equilibrium for the physicist is the homogenous dispersion of matter. The late Nobel Laureate Ilya Prigogine (1917-2003) is the *spiritus rector* of a school of physics called disequilibrium thermodynamics that focuses on the bifurcation-driven morphogenesis of far-from-equilibrium dissipative structures. For more details on applying this natural phenomenon to universal history, see Pogany (2006).

²⁴ References to historical levels of population and economic activity are based on *Estimating World GDP One Million B.C. – Present* by Professor Bradford DeLong (UC Berkeley). See: http://econ161.berkeley.edu/TCEH/1998_Draft/World_GDP/Estimating_World_GDP.html

²⁵ Britain had abolished the Speenhamland system, a comprehensive safety net for the country’s poor in 1834, making that year, as Karl Polanyi put it, to be “. . . the true birthday of the modern working class” (Polanyi, 1957, p. 101.)

In terms of institutions, national economic systems under GS1 were built on the doctrine of noninterference by the state in private economic activities (*laissez faire*) and on the mandatory exchange of national paper money for precious metals (mainly gold coins or bouillon) at bank windows. GS1 featured strong central state authority without the previous era's ambition to use it to hoard gold. The system's parameters reflected institutional harmonization that would overcome the state's "jealous fear" (David Hume's expression) over losing gold. Of course, actuality was very different from the ideal; nonetheless, GS1 may, in retrospect, be characterized by its confession.

Although history's first global system was born among pain and trauma, it gradually ended up raising living standards and led to the creation of the middle class. The following are quotes from the system's most radical opponents, Karl Marx and Friedrich Engels:

"The bourgeoisie, by the rapid improvement of all instruments of production, by the immensely facilitated means of communication, draws all, even the most barbarian nations into civilization. The cheap prices of commodities are the heavy artillery with which it batters down all Chinese walls, with which it forces the barbarians' intensely obstinate hatred of foreigners to capitulate. It compels all nations, on pain of extinction, to adopt the bourgeois mode of production; it compels them to introduce what it calls civilization into their midst, i.e., to become bourgeois themselves. In one word, it creates a world after its own image." (Marx K. and Engels F. , 1972)

.....

"Subjection of Nature's forces to man, machinery, application of chemistry to industry and agriculture, steam-navigation, railways, electric telegraphs, clearing of whole continents for cultivation, canalization of rivers, whole populations conjured out of the ground — what earlier century had even a presentiment that such productive forces slumbered in the lap of social labor?" (loc. cit.)

In retrospect, these lines, written in 1848, were only the flourish of the trumpet that announced GS1's future success. Despite financial panics and lasting, comprehensive economic dislocations during the 1870s and 1890s, per capita global output more than doubled between 1850 and 1900 while world population increased from 1.2 billion to 1.6 billion. Further acceleration in per capita income was recorded during the Edwardian period (the first decade of the 20th century). The world's population began to see elegance and luxury on levels it had never dreamed of. But the evolutionary clock was ticking toward the demise of GS1, which became increasingly unable to accommodate GLOPPE's further growth. The following were GS1's four most obvious limitations:

- Gold-dependence of money supply became a straightjacket to economic growth.
- Industrialization reached the point at which national economies were prone to accelerate and decelerate if left on their own. (The fiscal and monetary measures required to deal with this phenomenon through countercyclical government intervention were outside GS1's parameters).
- Lack of framework for labor/management bargaining prevented the move to mass production and consumption.

- Economic and financial interdependence called for concerted action among national governments. GS1 had no institutions or schemes for such international cooperation.

GS1 was blown to smithereens by the Guns of August.

The period 1914-1945 was the *chaotic transition* that ushered in the second and current global system: *mixed economy/minimum reserve banking/weak multilateralism* (GS2). As observed in thermodynamic processes, world history (the narrative version of GLOPPE's expansion) exhibited the signs of diverse and conflicting approaches to reestablishing the relative steady state.²⁶ These were the alternative macro-blueprints:

- Restoration of GS1 by attempting to bring back the gold standard.
- Communism: A new form of self-organization.
- Fascism: Territorial conquest through military aggression; winner takes all (i.e., semi-colonial or colonial status for the rest of the world).
- Mixed economy: A new relationship between public authority and the market, as well as between labor and capital.

As befits the physical and mathematical descriptions of chaos, these alternatives clashed in an experimental melee – a Darwinian showdown -- from which the mixed economy emerged victorious.

The mixed economy became the backbone of GS2's domestic economic organization. It implies private-ownership-based market economy with important roles assigned to the state in securing economic prosperity and social peace.

The United Nations and its charter organizations represent *weak multilateralism*. Its flagship agencies in the economic and financial sphere are The World Bank, the International Monetary Fund (IMF), and the General Agreement on Tariffs and Trade (GATT), which became the World Trade Organization (WTO) in 1995. The United States took the role of epicenter or "world leader" from Great Britain, upgraded with the functions of system administrator. Although GS2's multilateralism is "weak" in the sense that its agencies have no authority over nation states, and multinational companies completely elude their jurisdiction, it has been successful. It has created enduring mechanisms of international cooperation and has avoided outright "beggar-thy-neighbor" policies on the level that would endanger global economic continuity.

GS2 outshined and outperformed GS1. It brought material welfare within the reach of billions. During the 50 years from 1950 to 2000, despite an increase in world population from 2.5 billion to 6.3 billion, per capita global output increased more than four-fold.

²⁶ Standard social science is far from regarding 1914-1945 in the suggested way. Standing on the height of historical and social-evolutionary insensitivity, neoclassical economists of the monetary bent go so far as to attribute the Great Depression to mistakes in monetary policy. Bernanke (1983) at least admits that institutions can malfunction also as a result of endogenous shocks, in general.

During the first decade of the 21st century, this crucial index of average planetary welfare has increased by a further 56 percent.²⁷

But now the clicking of the evolutionary time machine heralds the onset of a new transition. The reason is not, as Marx thought, that capitalism (now in its modern or reformed version) could not provide prosperity for the masses, or that it suffered from incurable limitations in ensuring economic expansion.²⁸ The reason is the exact opposite: GS2 cannot stop growing. Its existence is conditioned on the maximum growth achievable and, therefore, it is incompatible with a predominantly renewable-resource based global society in agreement about the use of scarce exhaustible resources and the environment.²⁹

Such is the structure of global history that best fits the thermodynamic conceptualization of the growing human presence on Earth. It could not have been discovered before the collapse of the Soviet Block.

While there was a socialist commonwealth, the world lived with the impression that it had two parallel, competing global systems. Planet-wide self-organization appeared to be bi-systemic. This view was uniform, except that the communists considered their system a promise to the world while everybody else regarded it as a menace.

In retrospect, Communism was not and could not have become a global system:

(a) Communist-controlled countries had to deal with the rest of the world in terms of GS2's multilateralism; (b) They represented only around five percent of global trade; (c) The communist system appealed only to a tiny minority and this circumstance disqualified it from becoming the foundation of a new world order, as no global system could exist against the will of national majorities; and (d) it did not develop a distinct socioeconomic behavior; it only suppressed and deformed GS2-typical behavior. (Populations in formerly communist-controlled countries snapped out from socialist institutions and immediately adopted multiparty, private entrepreneurship-based economic organizations roughly at their respective pre-communist level of social development.)

This is not to deny or even belittle the historic significance of Communism. Its early economic growth performance and proclaimed idealism presented the rest of the world with a major political challenge. It became (1) the "balance wheel" that helped define the mixed economy and (2) the socio-psychological, philosophical prop needed to recognize that the attributes of the actual hegemonic world order (i.e., those of GS2) were not manifestations of natural laws.

²⁷ Figure derived from CIA's *World Fact Book*.

²⁸ Marx predicted the fall of capitalism because he was convinced that "the bourgeois mode of production implies a limitation to the free development of the forces of production." From Marx's "Theorien über den Mehrwert" as quoted by Lukacs (1999), pp. 11 and 25.

²⁹ Diederer (2010) takes authoritative stock of the impending scarcity of global resources.

As a balance wheel, the communist threat pushed the balance in the “mix” in favor of public expenditures (e.g., military spending in the United States, social programs in Western Europe and Japan.) We can acknowledge this by observing that a restriction of public authority followed the collapse of communism. The era since 1991 has witnessed a forceful wave of deregulations and privatizations, a reradicalization of *laissez-faire*.

Given that communism was not a global system, we may conclude that, thus far, only the phase sequence “GS0→GS1→GS2→” corresponds to the disequilibrium thermodynamic process that underlies GLOPPE’s temporal progression.

Higher resource costs and environmental threats will stochastically reveal themselves as modern human history’s most powerful mutating factor. The next chaotic transition may lead to a third global system, *two-level economy/maximum bank reserve money/strong multilateralism* (GS3).

At one level, production in specific sectors (e.g., mining, manufacture of structural materials, certain heavily polluting industries) will have to be controlled and divvied up among nations or multinational producers; and some activities, such as space exploration, will have to be financed and organized jointly. At the second level, private enterprise and free markets would flourish under thoughtfully conceived quantitative constraints.

The monetary subsystem would reflect the need to control both the scale and structure of production/consumption. Maximum bank reserve would restrict the ability of banks to extend loans. Just as under the prevailing minimum reserve system some banks in some instances may keep no reserves at all, under the maximum reserve system some banks in some instances might be required to keep 100 percent reserves. While such an arrangement may not eliminate financial intermediation, it would certainly change its nature: The consent of depositors would be required to make loans.

GS3’s multilateralism would represent the democratically valid consent of the world’s population to a moral and legal authority to overrule national preferences in favor of long-term global interests.

Defending GS3 through contrast with Marxism

Making predictions about the future order of the world is at a serious discount. For complete dismissals of the feasibility and usefulness of historical prophesying, see Popper (1961) and Berlin (1954). Mickunas (1998) provides a concise and accessible philosophical critique of historical reason-based extrapolations.

The fate of Marxism is an eloquent object lesson.

In his dialectical materialism, Marx saw capitalism (bourgeois socioeconomic order) as the thesis that had to face its antithesis, the exploited, impoverished proletariat it had engendered. The anticipated synthesis was socialism, leading to communism. What really

happened? GS1, the thesis, prompted the Marxism-based revolutionary movement as its antithesis.³⁰ Military aggressions, at the heart of which was the intention to solve GS1's nationally experienced problems at the expense of everybody else, was the catalyst that brought the world to GS2 -- the synthesis -- at the conclusion of the shambolic era of 1914-1945.

While there is general agreement that the predictions of Marxism fell to the ground, it has been much less widely recognized that its method has also been confuted.

“Totality” is the backbone of Marxian methodology.³¹ And that failed too because when it is the center of analysis, voluntarist hopefulness (inspired by aspirations or indignation) could easily lead to a vision that a consistent system of rational arguments can endow with the adjective “inevitable.” Easily because aggregation to the maximum allows for a virtually infinite domain of subsidiary phenomena from which some may be singled out as representative of history's underlying mechanism, revealing its “objective rules.” Moreover, since the period of analysis is large by definition (macrohistory!), the guessing of actual future developments becomes next to impossible.

The Marxist experience has enriched historicism by demonstrating that “totality” is indispensable in explaining history *ex post*, but it is as unreliable a concept to predict its likely continuation *ex ante* as any other that nimble theoretical imagination may produce. Yet the temptation is understandable. Since the beginning of modernity there has been a forceful proclivity to picture the world as a totality in search of “progress.”

Where does all this leave GS3? It also seems to correspond to a teleological *non plus ultra* that contradicts the notion of history.

Two reasons are offered for not labeling GS3 just another transcendently finalist, “end of history” utopia. First, it is based on “real materialism,” (physics); and, second, it represents the optimal outcome, the achievement of which is by no means a “historic inevitability.”

“Real materialism” is different from the materialism of Marx and Engels. By declaring matter to be independent from our senses and minds, constituting a knowable objective reality, their basis for interpreting history was nothing more than the dualistic opposite of idealism. With minds formed by the 19th century's obsessively rationalist continuation of the Enlightenment tradition, Marx and Engels firmly believed in the human mastery of nature through endless scientific progress. True, they have correctly stated that the

³⁰ Thus, instead of saying that Marx had falsely predicted the immiseration of the proletariat, it seems more appropriate to say that immiseration did not happen because he predicted it.

³¹ Assume, suggested Georg Lukacs two decades before the collapse of the Soviet Block that “. . . recent research had proved once and for all that every one of Marx's theses was false. Even if this were proved every serious ‘orthodox’ Marxist would still be able to accept all such modern conclusions without reservation and hence dismiss every single one of Marx's theses -- without being compelled for a single minute to renounce his orthodoxy.” (Lukacs, 1999, pp. XXV/XXVI). Because, Lukacs argues, “. . . only the dialectical conception of totality can enable us to understand *reality as a social process*.” (Lukacs, 1999, p. 13).

driving force of history is independent from individual psychology and motivations, but they had remained strictly within the realm of political economy, except for references to natural sciences as a reminder of their materialism. They never invoked a single physical law that would affect humanity as a biological or physical phenomenon; i.e., when one pushes the material creed to its outermost limits, putting aside vitalist and spiritual objections.³²

In contrast to Marxian “scientific materialism,” NHM considers humanity along with its extrasomatic extensions (GLOPPE) a physical entity subject to physical laws, including the second law of thermodynamics. Consequently, *GS3 has not been derived from historical reasoning. Rather, it reflects (a) the fact that the excrescence of human enterprise has encountered an ecological mutating factor (with the depletion of cheap oil as its primary instance); (b) the conviction that price signals and the spontaneous mosaic of decentralized decisions will not lead global society to a sustainable relationship with the terrestrial sphere.*

In brief, GS3 is not posited as a historical inevitability. It is considered an optimal outcome given GLOPPE’s actual level, its élan, and the current state of knowledge and technology.

5. New Economic Epistemology Based on GLOPPE and Thermodynamic Reality; the Five Essentials

To ground a new epistemology of economic inquiry informed by thermodynamic realism, some, at present only vaguely-recognized, latent conditions will have to become precise and efficacious. In particular, attributing axiomatic strength to the following five comprehensive essentials ought to be considered the *fundamentum inconcussum* of a new integral thinking, hence the critical prolegomena to any sensible future.

Essential No. 1: *GLOPPE is an open thermodynamic system; it is autocatalytic and adapts to changing conditions.*

GLOPPE behaves like an open thermodynamic system because its constituent parts perceive themselves as open systems and because “weak multilateralism” does not add up to an effective central nervous system that would make humans conscious of an inexorable limiting condition to their existence. No system can grow indefinitely in a thermodynamically closed environment such as the terrestrial sphere (“closed” by virtue of its constant material endowment).

GLOPPE feeds on itself. The swelling population increases the economy and the increased economy accommodates the natural tendency of multiplication. But even if population stopped growing, the desire for higher living standards, the nature of GS2, along with its matching incentives for differential individual success, would tend to make world output accelerate.

³² In this regard, they did worse than the novelist Lev Tolstoy who, in his Second Epilogue to *War and Peace*, outlined a brilliant deterministic theory of history based on Newton’s laws of motion.

In the age of global systems, adaptation triggered by internal stimulus has been observed through the establishment of GS1 and its transformation into GS2. While GS1 laid the foundations for increasing human welfare through the industrial-scale production of extrasomatic objects, GS2 has made the broad availability of such objects possible, thus enabling GLOPPE's drastic postwar growth.

External stimulus that affects the entire world as a mutating factor is only now emerging for the first time. Ecological degradation and depletion of nonrenewable resources are forcing humanity toward a new pattern of cooperation from local communities to international institutions.

Essential No. 2: *The second law of thermodynamics guarantees that by increasing the share of bound energy within the total energy associated with the fixed supply of matter in the terrestrial sphere, GLOPPE irreversibly degrades its existential preconditions.*

The growth of GLOPPE augments global fixed assets (GFA). Comprising mainly physical capital and infrastructure, GFA has material substrates. It needs replacement even under the theoretical assumption that GLOPPE remains constant in size and structure. Even then Sisyphus could not rest. He would have to keep the rock from rolling down the hill. And the rock that global society must prevent from tumbling down is growing in size. Thus, while *homo sapiens* starring as *home faber* moves deeper and deeper into the wilderness of thermodynamic disequilibrium, conservative economics maintains the illusion that natural resources are of diminishing importance (“just look at the low percentage of energy and raw materials in developed country GDPs”³³) and consecrates the false dogma that our civilization tends toward equilibrium even as it expands (i.e., its equilibrium is rooted in infinite expansion).

Thus, when viewing the economic process as a throughput of matter from the environment back into the environment, as is being emphasized in introductory textbooks on ecological and natural resource economics,³⁴ it is important to remember that, in absolute terms, depreciation is a growing item of the Gross World Product (GWP), posing an increasing claim on material and energy resources. Corollary: Sustainability, as a broad social goal cannot eternalize human welfare at an arbitrarily high level. Even zero population growth combined with zero economic growth (“ZPG/ZEG,” widely believed to represent an endlessly reproducible steady state) incurs the conversion of free into bound energy (Georgescu-Roegen, 1975).

GLOPPE's growth (*homo sapiens* in its historical and current mode) implies a growing circulation of matter in the terrestrial sphere, made up of a somatic and an extrasomatic component. Arrivals to the human population absorb matter into their organisms while departures return it into the environment. This circulation must be mentally combined with the one represented by the decay and replacement of GFA as well as with the one entailed by the Net World Product (NWP).

³³ For a rebuttal of this *prima facie* absurdity, see <http://www.energybulletin.net/53380>.

³⁴ Cf. Common and Stagle, 2005; Daly and Farley, 2004; and, Pearce and Turner, 1990.

Essential No. 3: *GLOPPE is set to approach its limits with exponentially increasing force.*

The 3-percent annual expansion of the world economy, now considered the minimum required rate to maintain living standards for the planet's growing population, would double the global economy in approximately every 24 years. Thus, both the demographic and economic components of GLOPPE are in an accelerating mode.

According to Newton's second law, momentum equals mass times velocity. The growing mass of GLOPPE (m) multiplied by even a modest positive rate of growth -- the velocity (v) -- yields a growing force; i.e., $d(m.v) / dt$ increases over time. Since the maximization of economic growth prevails as the universally shared *telos*, one may say that GLOPPE's revealed intention is to run into its physical constraints with the maximum force it can muster.

Essential No. 4: *GLOPPE's élan faces stochastically manifest constraints.*

Nature has begun to apply breaks to the human enterprise. Since this phenomenon is both new and unacknowledged, its disclosure will have to entail events and processes that are impossible to predict *ex ante* and may well be considered the products of pure chance *ex post* (although of a limited variance by some coarse categorization of feasible scenarios). Thus, instead of "overshoot and collapse" or "overshoot and oscillate" (as elaborated in Meadows, Meadows, and Randers, 1992), this view suggests a macrohistorically significant interlude (a chaotic transition) with patterns becoming discernable only much later, along a condensed, macrohistoric timescale.

Global society's first ever test of cosmic intelligence is not an easy one. Fuzzy, on again, off again dots need to be connected. The incremental comprehension of negative experiences (from the seemingly diverse domains of resources, the environment, and growth-dependent institutions) will have to lead to a quantum jump in induction. Unfortunately, the examiner's clock is already ticking and the solution is not yet discernible; not in a critical mass.

Essential No 5: *GS2 lives on borrowed time; survival under dignified conditions demands a new global transformation.*

The mixed economy is acceleration-bound, especially in times when population increases. At the micro-level, competition generally translates into real capital growth. In macro terms, considering the "marginal propensity to consume" to be stable for long stretches of time, additional investment must fill the growing gap between aggregate income and aggregate consumption (Keynes, 1965, pp. 97, 98, et passim). Peak oil has effectively clogged this accelerate-or-perish system.

The actual and prospective world economic slowdown, along with tensions created by the continued accumulation of intra- and international imbalances, is apt to deepen the crisis

of GS2 institutions. As this phenomenon turns into a widely acknowledged unchangeable fact of history, search for a new global system will intensify. Although the implied chaotic transition is likely to lead to GS3, to foresee its duration, actual scenario, and intensity would require the faculties of a Cumaean Sybil.

Return of value and utility

The broadening and sharpening recognition of the essential phenomenology of physical constraints affecting GLOPPE ought to lead human survival instinct to the deconstruction of the extant *text* as the summary of an expired organon. The obvious difference between the old *text* and the expected new one capable of mediating needs and wants with the exigencies of the natural and social environment should reflect the drastic transformation of ethical principles underlying economic thought and behavior, thus announcing a new, historical phase of value and utility.

6. Toward a New *Text*

GS1's *text* comprised the core ideas found in Adam Smith's "The Wealth of Nations" and in David Hume's price-specie flow mechanism. These were made irresistibly compelling by many prominent writers who elaborated on the merits of *laissez faire capitalism* as a global order via the catholicity of metal money.

The *text* of the prevalent global system has already been described. It is worth mentioning that the defunct socialist order, which had aspired to become the global system after GS1, also had a text. It was "Dialectical and Historical Materialism," a pamphlet that appeared in the Soviet Union in 1938 and was attributed to Joseph Stalin.

Since the current "accelerate or collapse" economic system is incompatible with the emergent physical constraints to growth, a new chaotic transition is in the offing. After it settles into a new world order, approximating the description of GS3, the corresponding *text* is likely to have the following hypothetical attributes: Recognition of the second law's significance along with other fundamental principles of energy use; acceptance of the species' "thinghood;" accrued sense of historicity and self-understanding; emphasis on individual consciousness as the integrum of external and internal conditions; shift to an arational assessment of value and utility.

Recognition of the second law and other energy principles.

In agreement with Essential Numbers 1 and 2, the fundamental distinguishing feature of GS3's *text* will be the acknowledgement that the entropy law plays a crucial role in human destiny.

The new perspective will replace general equilibrium, the analytical oriflamme of GS2's standard economic framework.³⁵ Unidirectional (hence irreversible) transformations will

³⁵ General equilibrium has also been subject to widespread criticism in the nonsocialist literature since the 1970s. See, for example, Coddington (1975).

take their legitimate place along with relative motionlessness, cycling, self-correcting fluctuations, and automatic self-equilibration.

The new comprehension of the economic process could not rely on underscoring the consequences of the second law alone. It may well draw on other principles of energy use in order to create a coherent, formally closed structure of argumentation.

Special emphasis will certainly be made on (a) the maximum power principle, and (b) some behavioral aspects of individuals and organizations.

(a) The maximum power principle, widely applied in the interdisciplinary field of ecology, asserts a tradeoff between the rate of converting energy carriers and the efficiency of conversion (cf. Hall, 1995). Faster conversion entails diminished efficiency and vice versa. Competition among open systems (e.g., nations, business firms, and individuals) pushes them to maximize the amount and speed of power intake and transformation with relatively little regard to efficiency. The new era would be largely characterized by a reversal of emphasis.

(b) Concerning the behavior of individuals and organizations, education, along with other forms of conditioning individual and group activities, will reflect humanity's inescapable thermodynamic reality: In a closed thermodynamic system, the expansion of open subsystems (national economies and the growing number of individuals and firms) has a hard limit. Instead of glorifying it with the label "fallacy of composition," GS3's *text* will treat its predecessor's way of glossing over this simple physical fact with the disdain an absurd delusion or logical howler merits.

Giving quarters to our "thinghood"

The recognition that world history is the narrative version of a thermodynamic process will lead to the acknowledgement that Thou and I are not only persons with inalienable rights (or individuals of a species within the Animal Kingdom or perhaps spiritual beings) but also "things." Consideration of the human biomass as a material entity could very well exist as an analytical platform without endangering or competing with religious faith or vitalistic secular philosophies. Its usefulness and, on a more general level, the expected decline in alienation across society, should more than compensate for the implied sapping of anthropocentric narcissism.

Humanity's "thinghood" is not alien to intellectual history. For instance, Martin Heidegger (1889-1976) defined "Dasein's being" (the focus of his fundamental ontology) as "care." (Heidegger, 2006, p. 329; and, in greater detail, pp. 225-273). "Care," a variety of consciously pursued activities, evokes the image of Dasein as a thermodynamically open node that takes in and dispenses energy. Through his object-related concepts of "present-at-hand (vorhanden) and "ready-to-hand" (zuhanden), Heidegger reckons with Dasein's extrasomatic extensions.

Historicity and self-understanding.

After the establishment of the third global system, universal history will no longer be seen as a mass of events that can be deciphered in an infinite number of ways. More concretely, GS3's *text* will contain analytical elaborations on the previous point, viz., that the temporal dynamics of planet-wide self-organization has been the morphogenetic epiphenomenon of matter's self-organization on an expanding scale.

The insights of Hermann Haken (the founder of synergetics) concerning the relationship between slowly unfolding stochastic and quickly moving deterministic processes might help flesh out this basic conceptualization.³⁶

Applying Haken's theory in the current context, the establishment and transformation of global systems may be considered the stochastic process imposed on the deterministic growth of GLOPPE. When GS1 began to stifle GLOPPE, the latter "rebelled" (as it were) against the global system's order parameters (control variables), causing their bifurcation (in the sense of producing multiple solutions).

The new *text* will certainly underscore the important qualitative difference between the transformation of GS1 into GS2 and that of GS2 into GS3. Whereas GS1 became an obstacle to humanity's quantitative growth while simultaneously improving the quality of life of the average individual, GS2 became mired in crisis because its institutions, productive relations, typical behavior and expectations had entered into an irreconcilable conflict with the planet's physical endowments.

GS3's *text* is expected to account for the fact that interconnectedness among nations and shared responsibility for general well-being increased and intensified over time. From GS1's zero multilateralism the world had gone to GS2's weak multilateralism, and, as long as humanity retains its evolutionary potential and avoids lethal Malthusian traps, it will go to strong multilateralism.

The Enlightenment of the 18th century ("a coming to clarity" if not on a global scale, at least with global consequences) will be seen as the first of a series of Enlightenment because *ex post* "1914-1945" could also be characterized as "Enlightenment," and so will be the historical learning process that will link GS2 and GS3. Each chaotic transition brings "new truths," conveying the proposition that objectivity is not an absolute, but a time-dependent, socially constructed phenomenon.³⁷ On that account, GS3's *text*, lined up with its predecessors, ought to precipitate the induction that each *text* is a historically relevant *hermeneutic* with preeminent paradigmatic authority; inspiring an all-

³⁶ For a summary of Haken's theory, see J. Barkley Rosser Jr. (Rosser, 1991, pp. 212-214). As Rosser points out, Haken's "synergetic self-organization" conforms to Prigogine's notion concerning the evolution of far-from-equilibrium thermodynamic systems through the "steady-state--bifurcation--steady state" sequence. This view is also akin to "catastrophe theory" inasmuch as it perceives the world as essentially stable between bifurcations. In contrast, chaos theory implies permanent readiness to discontinuity (Rosser, 1991, p. 214).

³⁷ Philosophical reflection about the manifold ways in which culture and science (especially social science) are characteristic expressions of an epoch's mentality is a hefty-tome-claiming subject by itself. Kant had already criticized "objectivity," creating a trend that continued through the 19th and 20th centuries.

encompassing *hermeneutic* about universal history as a continuous process with structural coherence.

Hermeneutics, the science of interpreting texts, is a field of considerable importance in philosophy and, since the advent of postmodernism also in literary criticism. (For an introduction to hermeneutics, see Mickunas, 2007). In the present context, “text” refers to socioeconomic phenomenology in its totality (including, of course, institutions). Thus, the *text* is a verbal condensation of what is enduring in form and content in an era’s reality -- the text. And so, “economics,” as a phenomenon of experiential and intellectual contemporaneity, may be considered the self-encounter of a specific global system. It is not subject to falsification in the Popperian sense.

GS3 *text*’s reflections over *texts*, in general, will surely avoid the obvious error of reducing world history to a succession of neatly summarized doctrines and analytical descriptions. The history of successions hides humanity’s horrendous struggle with itself, ultimately (already in our times) because of unavoidable natural limits to GLOPPE’s expansion. To express this thought differently, the temporal sequence of *hermeneutics* stands for the whole’s hermetically endogenous movement through phases of self-organization without a universally recognized eschaton.

Looking closer at this process, the *meme* about the encounter between an immovable object and the unstoppable force comes to mind. Despite the huge variety of events and vicissitudes in the web of unfolding time, the strivings of particular interests of all descriptions; more or less cogent challenges from the moment of its inception, the *text* stands its ground in the battle of ideas. Rooted in culture, education, customs, and expectations, its influence extends even beyond the corresponding global system. (Witness, for example, attempts to restore the gold standard after World War I.) Even when a global system collapses, the only coherent knowledge and experience regarding global self-organization pertains to the defunct system; at least at the beginning of systemic interregnum; when the arduous process of demythologizing the expired and developing the new *hermeneutic* begins.³⁸

As philosophy, psycholinguistics, and modern literary criticism have amply demonstrated, words standing in as symbols for abstract terms are a phenomenal form of meanings that had been generated by coinciding and enduring events in the course of history. Or, as Hans-Georg Gadamer said: “Understanding must be conceived as a part of the event in which meaning occurs.” (Gadamer, 2003, p. 164). The global system as an extended temporal (macrohistoric) event is organically tied to the concepts its birth had engendered, making its comprehension an endless circling in a labyrinth of self-referential analysis, descriptions, and ideological reasoning.

The *text* as a *hermeneutic* is all encompassing. It appears to be robust certainty, absolute, ahistorical truth. Its staying power may be explained by (a) *rational expectations in the*

³⁸ Olszewski and Sandroni (2011) showed that it is possible to construct a complex theory that resists falsification no matter what data show.

aggregate, (b) collective hysteresis, and (c) adaptive pressures from the socioeconomic environment.

(a) Totality can relate only to itself. (There cannot be out-of-sample projections of a time series when the population is the sample, defined as the universe of socioeconomic phenomena.) This condition translates into a sense of stability and “theoretical calm” in typical individual consciousness, making only extant economic and social conditions, explicitly or implicitly present in the value-infused and value-setting *text*, appear to be rational. All available information and past experience automatically presume the continuation of the prevailing system. Rational decisions are defined within the implied space and remaining within this space reaffirms the system, allowing the proud vindication of rationality to all *text*-conforming actions, more or less explicit tropisms, and moments of foresight. And so, the irony of history reappears from time to time. Rationality claims to be ahistoric when, in essence, its temporal unrolling *is* history.³⁹

(b) The *text* begets fideism and fideism reinforces its creator. The reified system’s ever stronger moorings first dull the perception that reality, which the *text* mirrored relatively well for some time, had shifted. Later, entrenchment will significantly influence the perspective on the changed reality. No global system can ever be scrubbed from the collective mind, which is another way of saying that history is path dependent.

(c) The socioeconomic environment that coincides with a given *hermeneutic* demands adaptive behavior as a precondition for differential success. *Modus ponens* is enlarged and rewarded (the more indirectly the more useful it is to bolster the *text*); *modus tollens* is sidetracked as manifestation of nonadaptive (irrational) behavior. Or, as may often be observed in the everyday life of academia: “The tenure-seeking assistant professor rarely disagrees with the department chairman.” In the end Gleichschaltung prevails, making mainstream economists appear as the overlapping generational pupilage of a monopoly confessional school. (For the sociobiologist’s view on adaptation, see Wilson 2000, p. 577 *sic passim*.)

The acceptance that world history is a unidirectional thermodynamic process with a human face (integral awareness of our “thinghood” and “personhood”), that all *texts* are hermeneutic by nature, and that their combined history traces out the birth and subsequent strengthening of global society may be characterized as a decisive step towards humanity’s self-understanding.

Strong multilateralism presumes individual consciousness concerning the species vocation of survival. Therefore, the establishment of GS3 might be the zero hour for the “integral individual” who considers the species’ general interest inseparable from his or her wholeheartedly chosen behavior (i.e., one that is nurtured by subsidiarity rather than coerced by corporatism). Such profound change would make the Aristotelian *teleia philia*

³⁹ Guesnerie (1992) demonstrated how the existing economic system as an intersubjective network of mentality reinforces itself and remains robust to noise within the classical Muth model of the rational expectations hypothesis (Muth, 1961).

(“perfect friendship”) prevail in interpersonal relations across the planet and it presupposes an epochal mutation of consciousness, into its arational-integral structure as elaborated by Jean Gebser.

Consciousness

The oeuvre of Edmund Gustav Albrecht Husserl (1859-1938) represents the fulcrum of all reasoning and inference that relates the temporal unfolding of consciousness to macrohistory because (in a "phenomenological" vein) “. . . consciousness derives its meaning from the world, and the world derives its meaning from consciousness” (Stewart and Mickunas, 1990, p. 51).

Thus, the proposed integral approach disowns the categorical dualism that separates the individual’s internal life from its socioeconomic setting. (For a poignant critique of the dualistic tradition of Western thought, typified by the “mind-body” problem, see Mickunas, 2004.)⁴⁰

The validity of this starting point is confirmed by Gebser who maintained that consciousness is “the ability to survey those interconnections which constitute us” and it includes “a function which reacts to the visible course of events in reality (Gebser, 1984, pp. 203 and 204).⁴¹

Specifically, it is argued that the socioeconomic environment, with its ground rules and concrete demands toward intentionality-driven individual behavior, characterizes an epoch's global system-related consciousness.⁴² Consciousness is the arena in which adaptation to the socioeconomic environment is experienced through an essentially inseparable relationship between individual and society. Indeed, it is not difficult to see the circular relationship between the two. Individual consciousness, as a subject, studies society as an object and society as the subject “works” on the individual and shapes its consciousness as if it were an object.

⁴⁰ Several leading intellectuals of the 20th century expressed the inextricable unity between the socio-economic-cultural environment and individual thinking. To quote just a few examples, Ludwig Wittgenstein (1889-1951) said that rather than us speaking the language, language (the collectively constructed system of communication) speaks us. (We may say that “the *text* speaks the economist.”) Hans-Georg Gadamer argued that “all understanding is self-understanding” (Gadamer, 2003, p. 260). Joan Robinson: “It is the business of the economists, not to tell us what to do, but to show why what we are doing anyway is in accord with proper principles.” (Robinson, 1962, p. 21.) In his 1967 essay of foundational significance in postmodern literary criticism, “Death of the Author,” Roland Barthes (1915-1980) made a compelling case for considering texts to be tissues woven from uncountable cultural threads. His idea that the audience dictates what the author writes may be paraphrased for the current context as “the birth of a global-system means the death of the economist.”

⁴¹ Gebser goes to great lengths to show that consciousness is more than knowledge, recognition, or cognitive faculty.

⁴² Stewart and Mickunas (1990) telescopes phenomenology as a philosophical movement with emphasis on Husserl's groundbreaking contribution. Block, Flanagan, and Güzeldere (1998) gives a detailed summary of the intense multidisciplinary debate surrounding consciousness with concentration on the second part of the 20th century. In recent times, consciousness was "discovered" by authors who question the jejune abstractions that mainstream economics deploys concerning human nature (Dopfer, 2005).

Historically conditioned consciousness is not a simple phase-revealing, evolutive process, but a cumulative one in which dominance of a form of self-understanding will be overdetermined by a subsequent one.⁴³ The integral-arational consciousness, which, according to Gebser, is already attempting to come to awareness, subsumes manifestations of all previously dominant structures of consciousness (i.e., archaic, magic, mythical, and mental). But it does so in a balanced way that excludes their respective deficiencies, allowing all legitimate human inclinations and latent talents to flourish. At present, overestimated and overdriven rationality, which Gebser considers the deficient mode of the mental consciousness, is the reigning structure. Its money-metric materialism, its rigidly limited comprehension of the world (perfectly reflected in the economic thoughts of GS1 and GS2) has been appropriate under the transitorily tenable assumption that we exist in an open thermodynamic system.

It is not beyond the realm of possibilities that GS3's *text* will equate world history with humanity's struggle for consciousness. Therein lies the importance of Jean Gebser's insights into the dynamic phenomenology of consciousness, now tending towards its integral-arational mutation.

Arational-integral consciousness is presumed to render the current surfeit of militantly advocated, narrow causality-seeking disjointed reasons for everything under the sun appear to be an obstacle to mutual understanding. It will lead to the recognition that monadically sectored rationality, unchecked by a supervening, categorically imperative moral will, produces discords with a tendency toward despotism with bellicose sequels. Arational-integral consciousness may be presumed to be less inclined to rigid systematization and more tolerant toward non-*arithmomorphic* (Georgescu-Roegen) arguments in social sciences than presently customary. It ought to enlarge the concept of causality.

7. Arational Approach to Value and Utility

Without divinatory clairvoyance, it is impossible to know how a yet-to-emerge consciousness structure (with corresponding institutions and typical behavior in the socioeconomic sphere) will value goods and how the notion of utility will change. Therefore, what follows is admittedly a guess based on the core assumption that transformation in economic thinking will match the drastic mutation that the instauration of GS3 implies.

Entropy incurred in producing goods and providing services may well be regarded as the intrinsic, objective measure of their value, even if it slips through data for the obvious reason that the depletion of free energy associated with specific activities cannot be cardinally metered.⁴⁴ But there can hardly be any doubt that such well-founded principles

⁴³ For Gebser's definition of "overdetermination," see Gebser (1984), p. 38.

⁴⁴ While expressing skepticism about ever being able to quantify entropic degradation associated with productive activities, Georgescu-Roegen (1971, p. 283) gave a short summary of past efforts to use low entropy as a common denominator of economic value. Since his writing, further efforts have been made in

associated with the entropy law as “a material structure of a given level of entropy can serve only once;” and “all activities increase disorder in the terrestrial sphere in excess of the order created” will have long consequences for a perspective of value.

Thus, value faces material re-essentialization!

The division of the economic process into two levels by itself would lead to new conceptualizations of optimal resource use.

The controlled sector would focus on collective interests and the long run; the free market component would focus on consumption and the short run. The first would view the environment as a resource (in addition to biological, nonenergy, and energy resources) and regard the economic process as an irreversible drawdown of the aggregate sum of free (accessible) energy contained in material structures. The second could retain existing notions of resource economics with qualifications.

Existing models on valuing nonrenewable resources (e.g., the Hotelling Rule, long-term social shadow prices) rooted in GS2 will be abandoned or reformulated as economists shed their stone-deaf belief in infinite resource availability, seamless, market-price-guided substitution, inexhaustible, and just-in-time delivered scientific wonders. The image of the terrestrial sphere as an infinite source of fund services will vanish.

GS3's *text* is expected to spell out the difficulty of quantifying entropy-related economic problems. But it will probably demonstrate that it is better to be correctly oriented than ignoring orientation altogether because of the lack of precise data. Nonetheless, once the entropic theory of value crystallizes into a conceptual framework, it will be a respectable episteme rather than, as it now appears, a nonscientific derivation that hardly merits serious hearing.

Concerning utility, GS3-typical consciousness will recoil from such composite artifacts as the *economic man*, which reduces the individual as a producer to a commodity and as a consumer to a zombie with the brain of a pocket calculator.⁴⁵

Thus, utility faces material de-substantialization!

The idea of maximizing felicity derived from consumption subject to a budget constraint will survive (joy derived from consumption could still be differentiated as being “greater” or “lesser”) but this quantitative approach will have to share the spotlight with qualitative factors. Starting out from the old definition, namely that utility is grounded in pleasure

this direction. Especially noteworthy is the work of Jing Chen (2005). It introduces a whole new approach to the physics of economic value.

⁴⁵ For a critique of the neoclassical convention of treating labor as a commodity, see Bowles and Gintis (1975). In his “Evolutionary Economics: a theoretical framework,” Kurt Dopfer exposes the nonsensical rationality that haunts *Homo oeconomicus* (Dopfer, 2005). Georg Simmel (1858-1918) analyzed the difference between satisfaction derived from consumption and aesthetically motivated enjoyment. Cf. Simmel (2004, pp. 65-73).

(as disutility in pain), the essential tendency of integral consciousness towards seeking gratification in intellectual, artistic, and athletic exploits, away from wasteful consumption, will assume its rightful place in economic philosophy along with constructive entrepreneurial impulses. Integral consciousness will breed what Aristotle called *eudaemonism* – activities tantamount to full individual self-realization.

It is unlikely that guilt connected to understanding that an irreversible catabolization of the species' ecological "dowry" (Georgescu-Roegen) subtends human presence on the planet will reduce the enjoyment of materialistic pleasures. Ideally, trusting the world's collective wisdom deployed in global society's best long-term interest, the limits to material consumption ought to allow the carefree enjoyment of what is available.

Finally, if goods produced by local communities do not become commodities (i.e., they would be locally consumed), value and utility might see a wide variety of subjective differentiation, including completely new predications and the revitalization of earlier perceptions that socioeconomic conditions during the intervening era rendered meaningless. William Petty's famous "labor is the father . . . of wealth, as lands are the mother" would probably gain new pertinence. But what exactly will be the ethical climate of a self-sustaining economic canton, where harvest would have supra-individual utility but not a price, is not for us to answer. We can say with J.S. Mill: "There are many truths of which the full meaning cannot be realized until personal experience brought it home."

8. Concluding Remarks

A. The proposition that the postwar era is over and business-as-usual economics has outlived its relevance is equivalent to the assertion that growth is in a stalling mode. Accordingly, the long-term expansion of the global economy projected by multilateral agencies, private consultants, and most academic organizations is considered unrealistic.

B. "Historical inevitability" is a discredited notion. Yet when looking at the future, it is hard to see an alternative to a chain of events that latter-day macrohistorians are likely to periodize as "cataclysmic rupture," "long twilight," and "grand transformation." Given that human existence is a far-from-equilibrium thermodynamic process, transition from one structure and form of self-organization to the next is a nonlinear process that begins with bifurcation and ends with the selection of new systemic control variables (parameters). Universal history confirms this general protocol of systemic transition. Therefore, technocratic rationality exercised through reforms in the framework of conventional politics could not possibly lead from an accelerate-or-collapse economic system, in which competition has final authority, to one that draws its *raison d'être* from the global management of global resources, and from the prospect of improving the quality of individual life through ways other than ever-increasing consumption.

C. Searching for solutions by the parts will obscure the punctuation of the postwar stasis for an indeterminable length of time, handicapping the emergence of the real solution by the whole, for the whole. At this writing, the following phenomenological mirror image of this state of the world remains unrecognized: (i) decorrelation among basic coarse-

grained macroeconomic policy variables; e.g., between the rate of interest and income, between the marginal efficiency of capital and the rate of interest; (ii) disturbance in the histories of these variables; i.e., the tendency of an increasing order of integration in macroeconomic time series; (iii) the lost relevance of the mixed economies' IS/LM macro-equilibrium model; (iv) the consequent rampage of contradictory assessments and recommendations coming from first-rate economic policy advisers and commentators. Some say that more deficit spending is needed in order to grow out the debt; others advocate the exact opposite on pain of sovereign default. Some swear by more quantitative easing to stimulate growth, others firmly believe that such steps have already been excessive. Especially pernicious are politicians preaching reverse teleology; that is, going back to GS1 through the elimination of the social safety net, collective bargaining; and the laughable nonsense of bringing back the gold standard.

D. Only a clear comprehension that humanity has encountered an ecological mutating factor in terms of resources, climate, and form of self-organization can make the critical re-examination of economic fundamentals emanate signs of life. cursory references on the order of *obiter dicta* to the finiteness of natural resources will not suffice. The proposition that the terrestrial sphere is not and cannot be turned into an imperialized periphery of human civilization must be laid bare.

E. The subject “value and utility” represents a promising platform to discourse over the future – “post-thermodynamic enlightenment” – economics. The pair’s long history allows hypotheses to be essayed temporally through comparing and contrasting. Since each hypothesis has ethical implications, it *per force* compactly ontologizes associated thought systems with logically structured contents, thus catalyzing the search for a balance between pre-analytical moral instincts and natural virtues awakened by a new sense of reality and a relevant hermeneutic for an ecologically conscious world economy. It is always worth remembering that ethics and economics are interwoven historic phenomena.

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