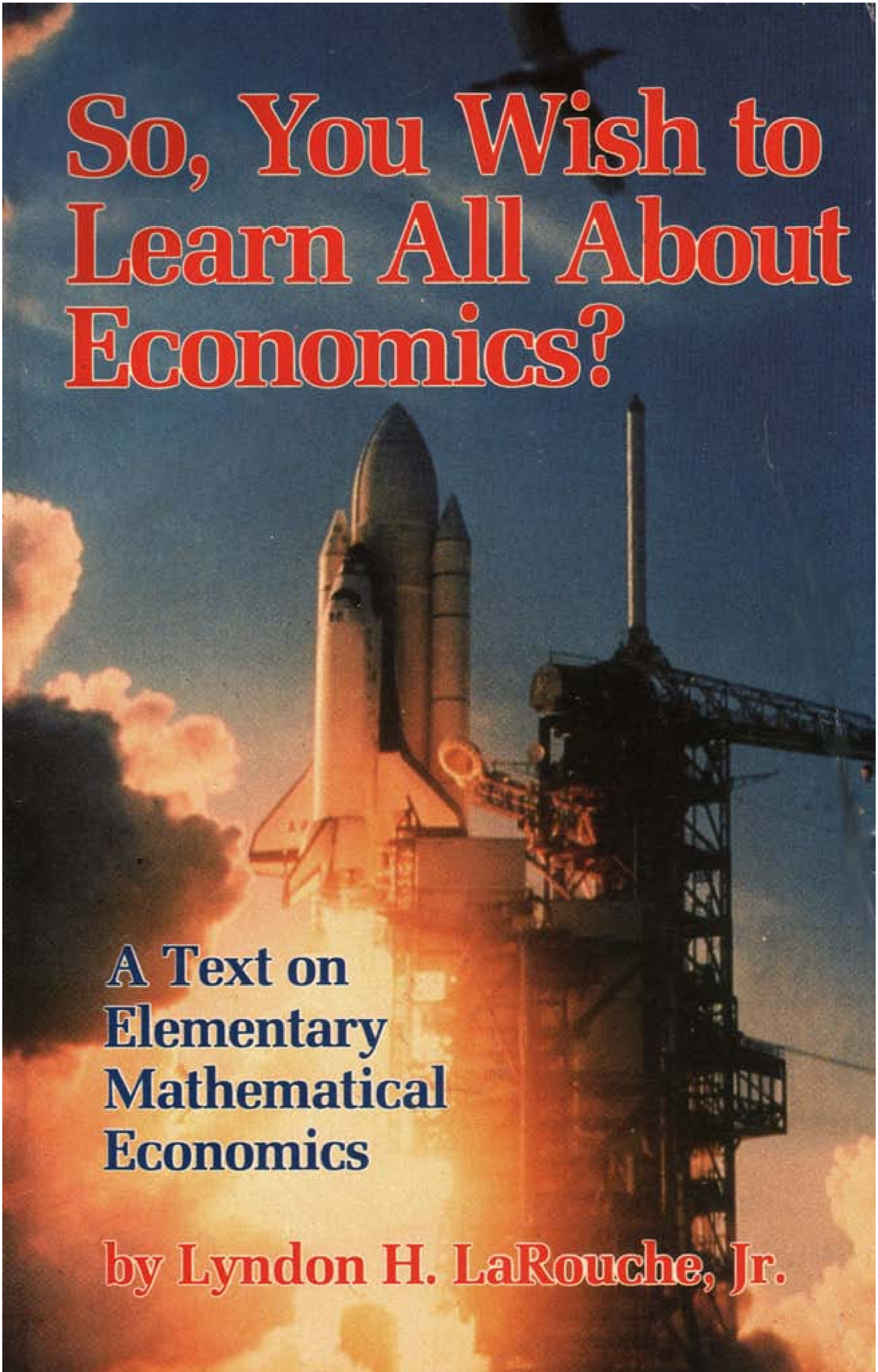
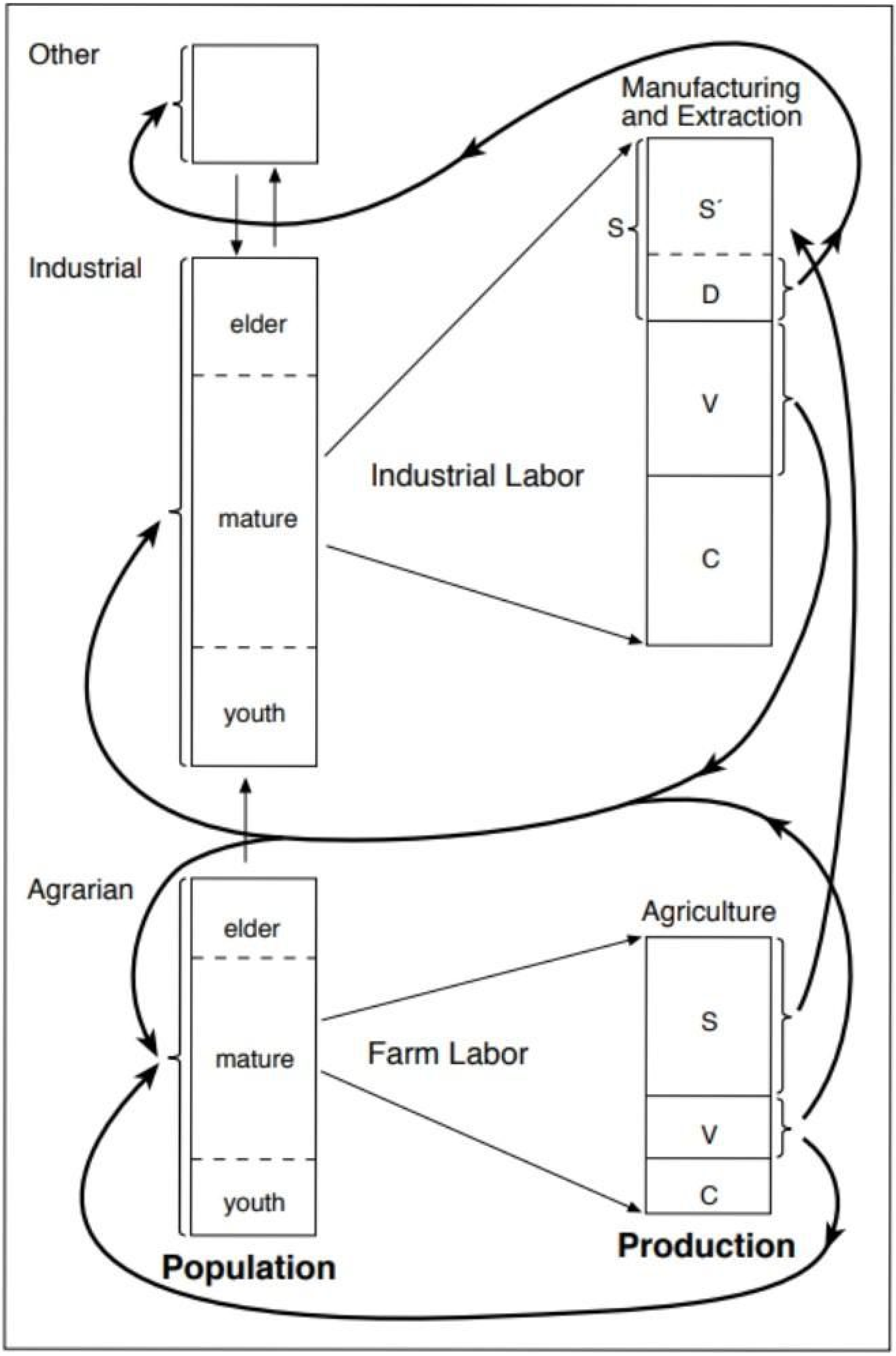


So, You Wish to Learn All About Economics?

A Text on Elementary Mathematical Economics

by Lyndon H. LaRouche, Jr.

Physical Economics Flowchart



4 The Definition of Economic Value

Our adopted mathematical function shows that a society (economy) becomes entropic unless there is technological progress to the effect of increasing the potential relative population-density. Hence, for the society (economy) as a whole, *economic value* is restricted to that quality of activities within a society which increases the potential relative population-density through the mediation of technological progress. In other words, *economic value* properly defined measures the *negentropy of the economic process.*

> *Economic value,* so defined, and *work* have the same meaning.

It is not the quantity of effort applied, nor even the quantity of effort of a specific quality (e.g., skill-level, Marx's misdefinition of labor power, etc.) which defines work, nor is work measured by the quantity of physical-goods output, the price of labor, the price of the goods sold, and so forth and so on. No *scalar* measure of work is competent; no conception which might be expressed in terms of linear functions could possibly be competent. *Work* is irreducibly a non-linear magnitude, expressed by an irreducible function of a complex variable.

We may appear to differ with Leibniz on this point. In outward appearances, that is true; in method of approach, no. Discussion affords clarity in this matter. Recall our earlier description of Leibniz's use of the term *work*.

For purposes of initial approximation, Leibniz assumed that a certain variety of physical goods produced was useful, to the point that more of the same was urgently wanted by society. On that account, the level of output of such goods by an operative served as an acceptable standard of comparison. In such terms of reference, the economy of labor accomplished by aid of a heat-powered machine is negentropic. It is not the amount of output of physical goods which measures work; *work* is measured in such a study as the *economy of labor accomplished*. It is the *economy of labor* as such which is the "micro-economic" empirical correlative of economic value.

Up to that point, the writer's definition of economic value does not differ either with Leibniz's, or the leading American System economists, nor with a principle understood and more or less efficiently served by most production managers with either an engineering background or an acquired equivalent sense of the production process. Every competent production manager the writer knew from his experience in management consulting and other encounters, agreed with the policy of practice of upgrading the workforce employed, while advancing technology along a capital-intensity pathway of investments. If contrary policies predominate in corporations with a competent production-management cadre, such contrary policies emanate from "Wall Street" financial interests and "Harvard Business school" types.[1]

The difference between Leibniz's treatment of the term *work* and the formulations of this text is merely one of refinement. The work of Gauss, Riemann, et al., as referenced in the preceding section, made possible a deeper insight into the principles of technology than Leibniz himself apparently supplied.[2] We may assume that Leibniz would endorse our refinement as fully consistent with his own direction of thinking on the matter. We are able today, to explore the deeper meaning of the term *work* to a degree not feasible under the conditions of development of science existing in Leibniz's time.

Before we elaborate some of the leading implications of this non-linear definition of *economic value* in the terms of reference of the hypothetical, consolidated agro-industrial enterprise, it is time to identify some aspects of the importance of introducing and applying this "more sophisticated" conception.

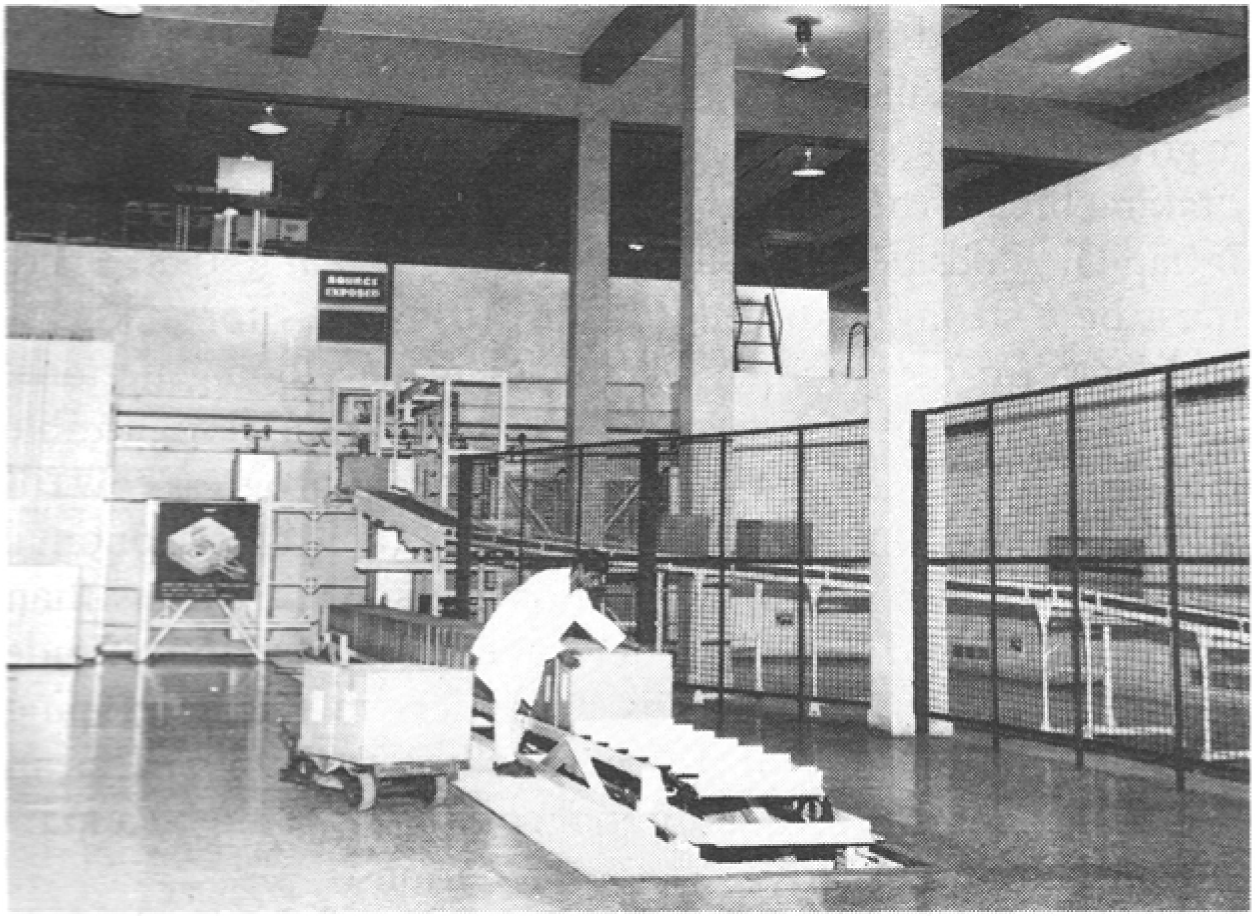
By successive degrees of approximation thus far, we have repeatedly stressed the unity of technology, as the central fact of economic science, and technology from the standpoint of the fundamentals of mathematical physics, a unity underscored in the practice of leading circles of the École Polytechnique over the interval 1794-1815. If we desire to secure the optimal rate of advance of the economy of labor, we must define this not merely as a matter of investment policies, but a matter of what technologies are available for investment purchases. So, informed investment policies must become a science-investment policy, a policy governing allotments to investment in science as such. It happens to be the case, as will become increasingly clear in the remainder of this text, that the principles of technology, as we identify them here, bear directly upon the most fundamental features of scientific research. Consequently, the most intelligent investment policies center around not merely policies of investment in science, but policies of investments which promote specific areas of discovery bearing upon fundamental questions of mathematical physics, for example, accessible to inquiry during the immediate decades ahead.

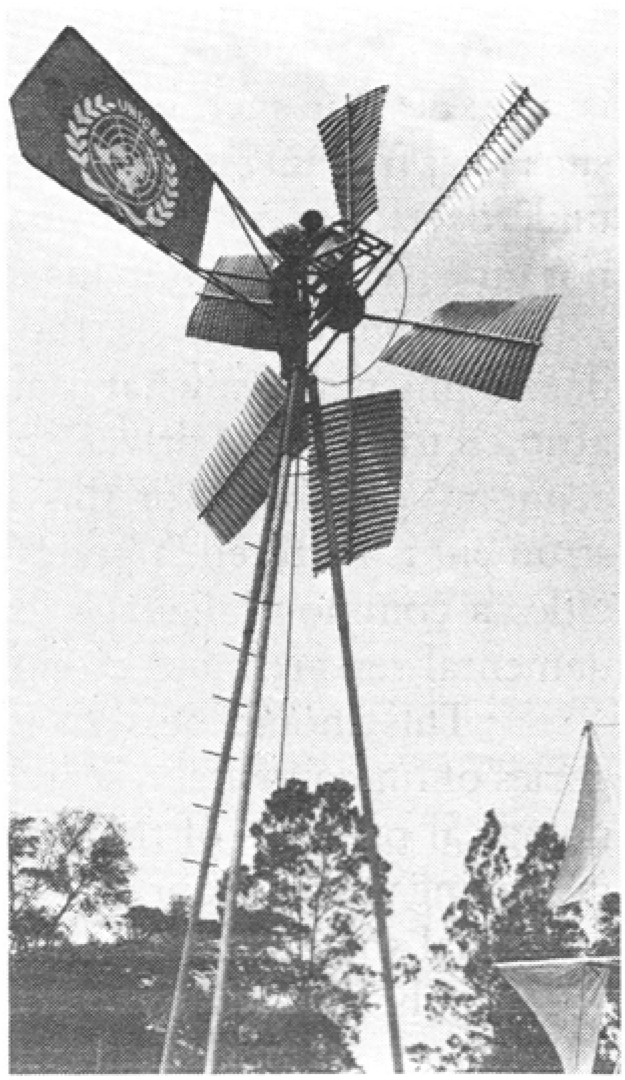
On that account, a rigorous definition of economic value is required. To integrate the making of long-range decisions on investment in science with “return on investment” decisions in the production of physical goods, we require a measure of economic value equally applicable to scientific research and to the production process as such. That measure must address the fundamental principles of mathematical physics, for example, and measure at the same time and in the same way the fundamental determinants of economy of labor in the production process.

To provide a very practical demonstration of the point just made: Among so-called developing nations today, the best version of prevailing policies recommended to such nations by OECD nations, etc., is that the developing nations ought to adopt policies for “gradually overtaking” the levels of technology already established in leading OECD nations, for example. This implies that, at best, developing nations should ease slowly away from a colonial policy[3] of being predominantly raw-materials exporters, by opening their customs gateways to rations of hand-me-down industrial technology, with emphasis upon “import substitutions” in categories of consumer-goods production. The results of such policies have been wretched, especially for the developing nations. It is clear, for reasons to be defined in this text, that the leading edge of a development policy must be a commitment to leapfrogging some of the most advanced technologies currently in use in the United States, Europe, and Japan.

This requires the developing nation to select areas of scientific research in which it commits itself to become a world leader, as a matter of medium-term and long-range national commitment. It must parallel the development of laboratories, university departments, and scientific cadres to such ends, with a development of an industrial base for assimilating the products of scientific work. This latter must include emphasis on developing a relevant sort of tool-making industrial sector. The development of the science base and of the tool-making and other industrial-base elements must efficiently converge to the point of dovetailing within a generation or less.

The allotment of scarce national resources to this growing germ of future technological excellence must be balanced against and integrated with a more commonplace, but nonetheless urgent development of rural production, and so forth. For political reasons, and other practical reasons, the combined effort must show credible progress to the population generally, to most strata of the population as well as the majority of the population as a whole.





The underdeveloped nations must "leapfrog" the scientific and technological level of the industrialized sector. Above: nuclear energy is used to sterilize medical products at India's Babha Atomic Research Center in Trombay. At right: United Nations-sponsored "appropriate technology" in Kenya.

It should not be difficult to imagine the case of some anarcho-syndicalist demagogue howling imprecations against a government and business community which are allegedly "taking bread from the mouths of children" with investments in capital-goods development, or something akin to that. There must be a strong and well-informed consensus for medium to long-term developmental policies in developing nations. To maintain that consensus, there must be a recognizable correlation between projected and achieved progress toward adopted goals. On that account, it is desirable that economic policy-making in developing nations be more rigorous than might be required for a more developed economy: the latitude to endure serious mistakes is much less in the developing nations. The mistake of a degree which to us might mean postponement of a few additional comforts, would be a margin of suffering in most developing nations.

At the same time, it should not be thought that investment in technological leapfrogging by a developing nation is a luxury for such nations, a discardable option. Without such leapfrogging, those nations would never cease to be underdeveloped. It is an unavoidable course of action, but not an easy course to manage.

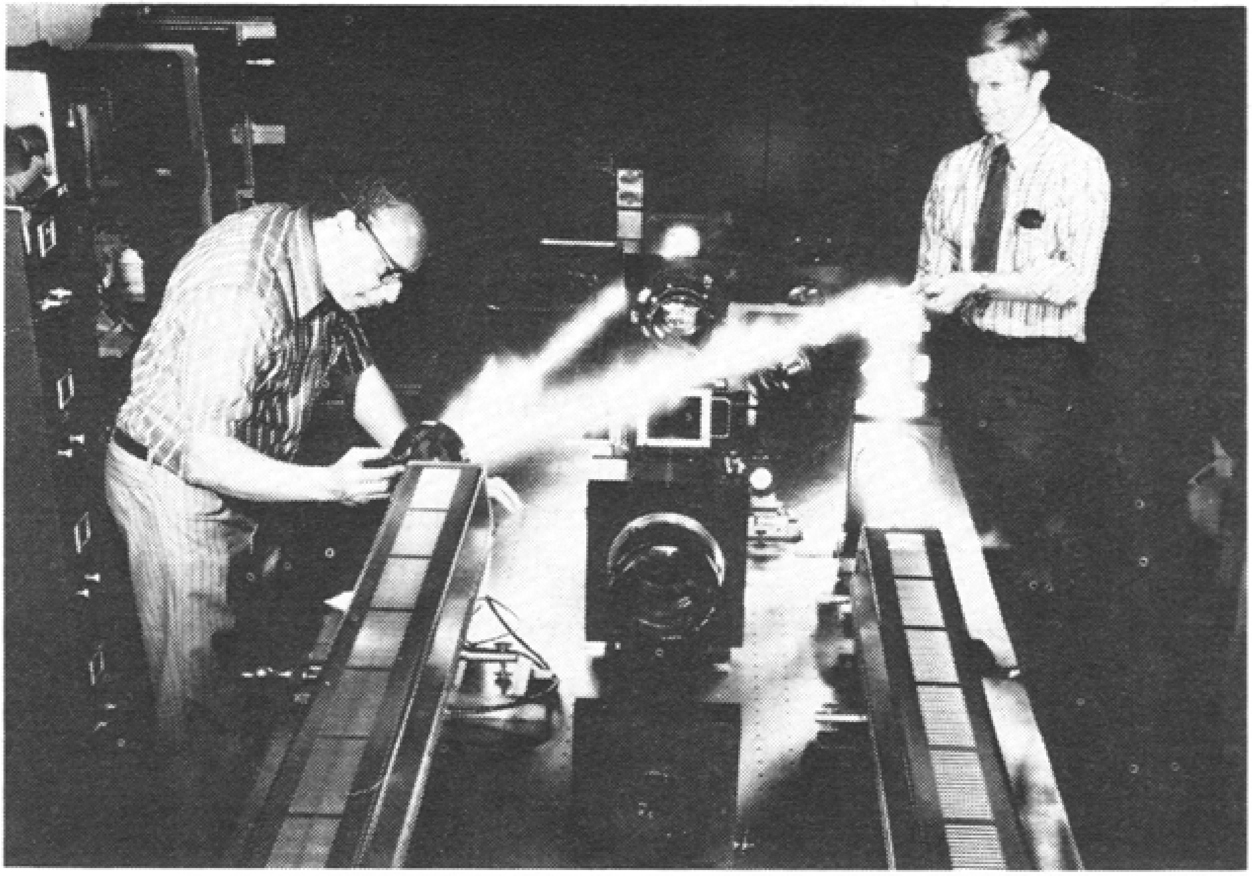
In both extremes, the most advanced and the poorer developing nations, what is needed today is economic policies attuned to "science-driver" practices of rapid increase in the economy of labor. For this an improved policy-making instrument is required, a policy-making instrument which provides a common language for the scientists engaged in fundamental research and economic management.

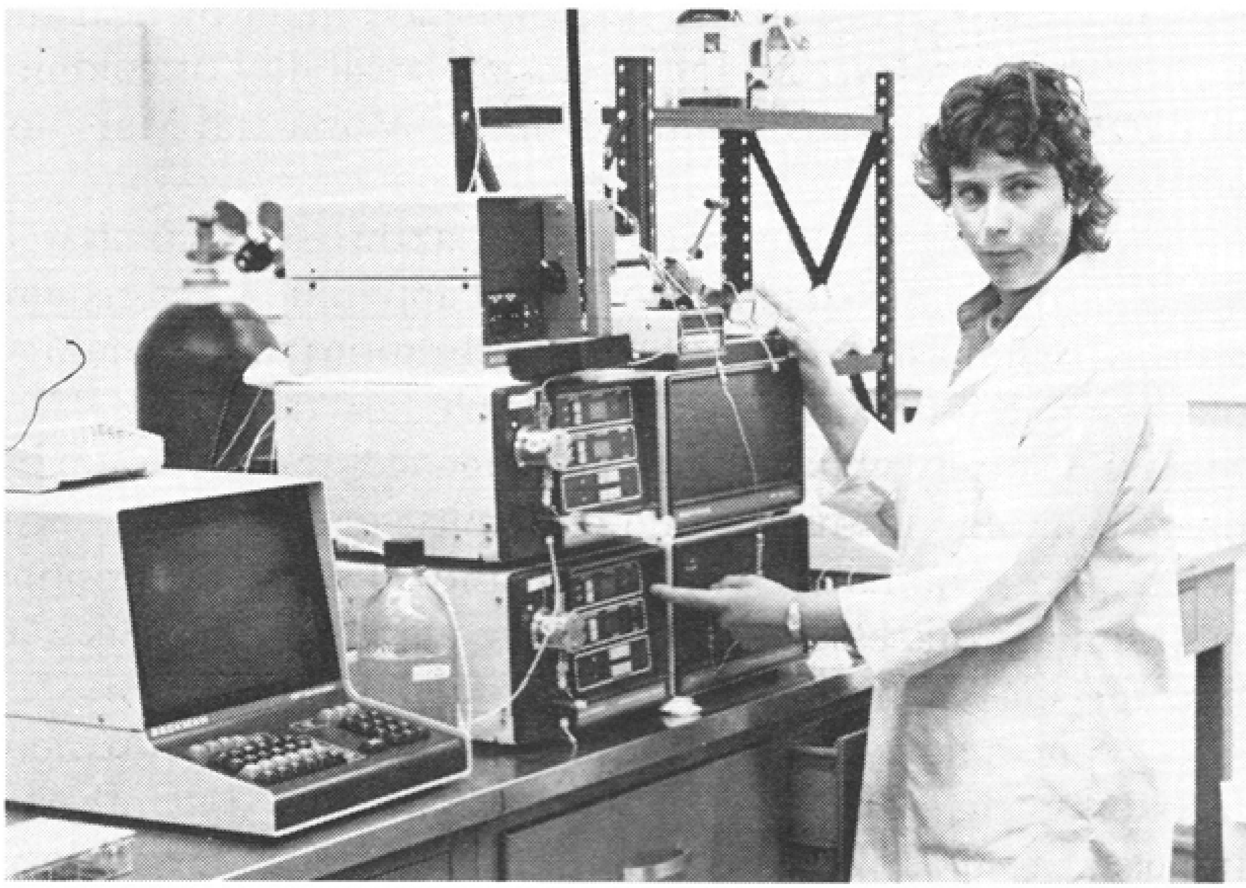
This should be seen in the context of the three categories of fundamental research in which all fundamental technological progress of the coming fifty years or so will occur (assuming we cease our drift into the "new dark age" of "post-industrial society"). The fundamental scientific propositions posed in the three areas converge, not an unusual arrangement in the history of science; the terms of reference upon which they converge are the same terms we have identified in this text.

These three categories of fundamental research are: 1) Organized plasmas of very high energy-flux density, typified by progress in development of controlled thermonuclear fusion as a primary energy source for mankind; 2) The related area, development of high-energy-flux-dense coherent radiation as a tool of production and other applications, typified by development of lasers and particle beams; 3) New directions of fundamental breakthrough in biology, for which the important developments in progress in the field of microbiotechnology is but a very important auxiliary feature.[4] In a reasonable scheme of things, significant breakthroughs in all three areas should be a "commercial" fact of life by about the turn of the century. Combined, these three mean the feasibility of powered, manned interplanetary flight by near the turn of the century, and increasing practicability of colonies in Earth-simulated environments on the Moon and Mars not long afterwards.

These areas of fundamental breakthroughs, compared with one of their exemplary, combined applications, all require a shift to emphasis in research and applications to Riemannian physics, to the standpoint of the "ontological transfinite." We require a society which thinks and manages the development of its economy in those same principled terms of reference. We require economists within each and all of the professions who radiate this essential knowledge among their peers and into the society at large.

The analysis of the social division of labor in society (economy), as developed by Henry C. Carey and others,[5] impels us to the following accounting procedures for analysis of the internal relations of production and consumption of our hypothetical, consolidated agro-industrial enterprise. To this end, we employ some of the same symbology made familiar by the Marxists and others; definitions of these symbols other than definitions of this text should be ignored as irrelevant.





Above: Experiment in laser fusion at Lawrence Livermore Laboratories in California; directed energy beams are used to trigger the nuclear reaction. Below: A facility at Alfacell, Biotechnology can curb disease, increase food production, and transform industrial and metallurgical processes.

Since we are measuring increase of potential relative population-density, we must begin with population. Since the unit of reproduction of the population is the household, we measure population first as a census of households, and count persons as members of households. We then define the labor force in terms of households, as labor-force members of households, as the labor force "produced" by households.

We define the labor force by means of analysis of the demographic composition of households. We analyze the population of the household first by age interval, and secondly by economic function.

Broadly, we assort the household population among three primary age groupings: 1) Below modal age for entry into the labor force, 2) Modal age range of the labor force, and 3) Above modal age range of the labor force. We subdivide the first among *infants, children under six years of age, preadolescents, and adolescents*. We subdivide the second primary age grouping approximately in decade-long age ranges. We subdivide the third primary age grouping by five-year age ranges (preferably, for actuarial reasons). We divide the second primary group into two functional categories: household and labor-force, obtaining an estimate such as ''65% of the labor-force age range are members of the labor force."

We assort all households into two primary categories of function, according to the primary labor force function of that household. The fact that two members of the same household may fall into different functional categories of labor- force employment, or that a person may shift from one to the other functional category is irrelevant, since it is *change in the relative magnitudes* of the two functional categories which is more significant for us than the small margin of statistical error incurred by choosing one good, consistent accounting procedure for ambiguous instances. This primary functional assortment of households is between the *operatives* and *overhead-expense* categories of modal employment of associated labor-force members of those households.

At this point our emphasis shifts to the operatives' component of the total labor force. All calculations performed are based on 100% of this segment of the total labor force. The operatives' segment is divided between agricultural production, as broadly defined (fishing, forestry, etc.), and industrial production broadly defined (manufacturing, construction, mining, transportation, energy production and distribution, communications, and operatives otherwise employed in maintenance of basic economic infrastructure).

The analysis of production proceeds principally as defined earlier in the text. The analysis begins with the distinction between the two market-baskets and the two subcategories of each's final commodities. The flow of production is traced backwards through intermediate products and raw materials to natural resources.

This analysis of production flows is cross-compared with the following analysis of production of physical-goods output as a whole: 100% of the operatives' component of the labor force is compared with 100% of the physical-goods output of the society (economy). This 100 % of physical-goods output is analyzed as follows.

Symbol V: The portion of total physical-goods output required by households of 100% of the operatives' segment. *Energy of the System.*

Symbol C: Capital goods consumed by production of physical goods, including costs of basic economic infrastructure of physical-goods production. This includes plant and machinery, maintenance of basic economic infrastructure, and a materials-in-progress inventory at the level required to maintain utilization of capacity. This includes only that portion of capital-goods output required as *Energy of the System*.

Symbol S: *Gross Operating Profit* (of the consolidated agro-industrial enterprise).

T [= total physical-goods output] - $(C + V) = S$.

Symbol D: *Total Overhead Expense*. This includes consumer goods (of households associated with overhead expense categories of employment of the labor force), plus capital-goods consumed by categories of overhead expense. *Energy of the System*.

Symbol S': *Net Operating Profit* margin of physical-goods output. $(S - D) = S'$. *Free Energy*.

If we reduce Overhead Expense (D) to a properly constructed economic-functional chart of accounts, there are elements of Services which must tend to increase with either increase of levels of physical-goods output or increase of productive powers of labor. For example: a function subsuming the notions of both level of technology in practice and rate of advancement of such technology specifies a required minimal level of culture of the labor force, which, in turn, subsumes educational requirements. Scientific and technical services to production and to maintenance of the productive powers of labor of members of households, are instances of the varieties of the accounting budgeter's Semi-Variable Expenses which have a clear functional relationship in magnitude to the maintenance and increase of the productive powers of labor. Large portions of Overhead Expense as a whole have no attributable functional determination of this sort; in a "post-industrial society" drift, the majority of all Overhead Expense allotments should not have been tolerated at all, or should have been savagely reduced in relative amount. For this reason, we must employ the parameter $S'/(C + V)$, rather than $S'/(C + V + D)$, as the correlative of the ratio of free energy of the system.

For purposes of *National Income Accounting*, we employ:

Symbol S/ (C + V): *Productivity* (As distinct from "productive powers of labor").

Symbol D/(C + V): *Expense Ratio*.

Symbol C/V: *Capital-Intensity*.

Symbol S'/ (C + V): *Rate of Profit.*

These ratios require the conditions: 1) That the market-basket of consumer goods per capita, for households of the operatives' segment of the labor force, increases in relative magnitude and quality of content as capital-intensity (*C/V*) and productivity (*S/C + V)* increase. 2) That the social cost of producing this market-basket declines secularly, despite the required increase in magnitude and quality of its content. 3) That Productivity (*S/C + V*) increases more rapidly than the Expense Ratio (*D/C + V*).

The Chart of Accounts for National Income Accounting assorts Overhead Expense among three principal functional classifications of accounts: *Economic, Institutional*, and *Waste*. The distinctions are broadly as follows.

Economic: Services and Administrative functions essential to either *the process of production and physical distribution or the maintenance and development of households at levels consistent with the level and required rate of advancement of technology.*

Institutional: Expenses of Government's non-economic activities, including military, police, and essential administrative functions, for example. Expense of business and other non-governmental institutions, including selling expenses (as distinct from physical distribution costs), which are not Economic, but which are required as categories of expenditure dedicated to maintaining the existence of functions of the institution.

Waste: Expenses incurred by unemployment, expense to society of criminal activities, and expense to society incurred by activities which ought to be classified as immoral, if not explicitly criminal, including all forms of usury.

Classifications of services under the heading of *Economic* include:

Scientific Research: The physical sciences, including biology, economic science, and mathematics itself. History. Exploration. *But not:* psychology, sociology, anthropology, and kindred "ologies" of so-called "social science" as they are practiced today. Generally, Wilhelm von Humboldt's (1767-1835) policies for education define the competent forms of science and education.

Scientific, Engineering, and Related Technical Services either directly to the process of output of physical goods, or indirectly to the development and maintenance of elements of basic economic infrastructure which form part of the indispensable physical environment of production and physical distribution of such goods.

Medical and Related services to maintenance of the population.

Education based on principles consistent with those of Humboldt.

Other forms of services, especially "labor-intensive, unskilled or 'semi-skilled' services," are marginal, *Institutional*, or even *Waste*.

Classifications of administration under the heading of *Economic* include:

Direct Supervision of the employment of operatives.

Supervision of the economic functions of processes employing the labor of the operatives' segment of the labor force.

Excluded from *Economic* are items including:

Selling Expenses other than physical distribution of goods. (*Institutional*).

Finance Administration (including financial charges as such). Except for charges and administration of Usury (including Ground-Rent, Commodity-Price Speculation, etc.), which are classified under *Waste, Finance Administration* is an *Institutional* Expense.

Although Government is broadly classified under *Institutional* Expense, those activities of government which are Economic (production, maintenance of basic economic infrastructure, etc.) are classified as *Economic-Government*, and are analyzed in the same manner as private *Economic* functions.

Broadly, Overhead Expense is analyzed by asking the questions, "*In what way* is this Expense incurred?" And "*Why* is this Expense incurred, both as to category of expenditure, and relative amount of expenditure?" The students should develop complete Charts of Accounts of Overhead Expense for both sample business firms and entire economies, according to the policy specifications supplied here. This students' work, and other elaboration of Charts of Accounts of National Income Accounting, should be assigned at the phase of studies corresponding to completing study of the matters covered through this point of the present text. The students' work done to that effect at this point of the program should be retained for revision made at the completion of the program indicated by this text as a whole.

In the case of the scientific discoverer, for example, the individual's direct contribution to increase of the economy of labor is simple and clear. From this beginning point of reference, we must trace the pathways through which scientific and related discoveries are transmitted into and through the economic process as such, to the effect that operatives participate in transmitting negentropy to the society (economy) as a whole. It is this transmission of negentropy by the activity of operatives which is the "substance" of economic value. The preceding outline of the principal features of construction of a National Income Accounting's Chart of Accounts permits us to trace the connections chiefly to be considered.

Near the close of his essay, "In Defence of Poetry," Percy B. Shelley not inaccurately associates upsurges in quality and use of poetry with periods of history during which great upsurges in the struggle for civil and religious liberty have occurred. This is certainly the case for the republican movements of classical Greece, beginning about 599 B.C. with the constitutional reforms of Solon at Athens. It is the case for the fifteenth-century Golden Renaissance, and the work of Dante Alighieri (1265-1321) and his successor Petrarch (1304-1374) which organized the movement erupting as the

Golden Renaissance. It was the case during the late seventeenth-century's post-1653 developments in Mazarin's (1602- 1661) and Colbert's (1619-1683) rebuilding of France, in the developments associated with the Great Elector of Prussia and others in Germany. It was the case throughout Europe into the 1815 Congress of Vienna, under the influence of the great transatlantic conspiracy headed by Benjamin Franklin during the interval 1766-1789. Shelley himself echoed that 1766-1789 political and scientific upsurge.

In such periods there is, as Shelley puts the point, an increase in the capacity of populations for "imparting and receiving profound and impassioned conceptions respecting man and nature." In relatively modern centuries, beginning with Dante's *De Vulgari Eloquentia* and *Commedia*, non-Latin languages of Europe were developed into the highly literate classical languages they became in Italy, France, and England, for example, during the course of the late fifteenth into the close of the sixteenth centuries. The development of language, as Humboldt emphasizes, is a limitation upon the power of thinking, such that persons limited to a poor local dialect are condemned thus to be intellectually inferior in potential powers of judgment. Embedded within such functional implications of the degree of development of languages in use, there is a crucial feature which bears directly, and most practically, upon the question of economic science immediately before us here. The two variable qualities of speech which bear most significantly upon the speaker's power to think are the degree of emphasis placed upon ideas associated with transitive verbs, as opposed to nominalist emphasis on ideas peculiar to nouns, and the rigorous use of the subjunctive.[6] These functions of language bear implicitly and more or less directly also upon the level of development of the creative-mental processes within the individual and society.

The transmission of negentropy through the labor of operatives is the transmission of ideas, in Plato's sense of *species*.[7] Not "ideas" understood as description or explanation: *ideas as controllers of the actions of persons, practical actions to change nature to mankind's advantage*. We have assigned the systematic discussion of scientific ideas' internal characteristics to the following section of the text. At this stage of the present section, we are "borrowing" credit from that future part of the text to identify as much of the matter as is indispensable for stating what follows immediately here.

It is the creation, assimilation, transmission, and realization of those scientific and related discoveries whose practice represents *potential economy of labor*, which is the negentropic feature of the *social process of production of physical goods*. It is that aspect of the process of production which permits us to locate the economic value of the productive labor of individuals, *the aspect of individual activity which is immediately universal in its effects*.

It is a corollary of this, that the value of the output of a society (economy) cannot be determined by adding up the net prices (e.g., "value added") of the individual exchanges within the economy. If this error is perpetrated, we are led into the fallacy, the paradox, of Marx's "Internal Contradictions," in *Capital III*. Review of that paradox again, this time in terms of reference of National Income Accounting, aids us in isolating the empirical feature of the productive process in which the function of technological progress is most narrowly located.

Express the mathematical function of the changing ratio of free energy to energy of the system by substituting $S'/(C + V)$ for the free-energy ratio. Then, according to the set of constraints we specified above, the "re-investment" of S' increases the per capita magnitude of output represented by $(C + V)$. If the percentile of the labor force employed as operatives remains constant, without technological progress, the increased energy of the system per capita (*C* + *V*) reduces the ration of *S′* available for re-investment in the succeeding cycles. Thus, it might appear, as capital-intensity (*C/ V*) increases, the rate of profit *S′*/(*C* + *V*) must fall.

Assume the hypothetical case, that a modern economy at some point adopts the policy decision to halt the process of incorporating innovations into new designs of capital goods. For a time, the economy would continue to grow. This could occur because the replacement of older stocks of capital goods by newer stocks would represent advancement of technology of production (economy of labor). As the average level of technology of capital stocks employed approaches the technological level of the new stocks, the benefit of re-investment would begin to vanish, and the falling rate of profit would fall to the degree that the economic process became entropic.[8]

Examine this aspect of the process more closely.

"Re-investment" in capital stocks involves two elements of the Chart of Accounts: Net Operating Profit (*S′*) and the current energy-of-the-system cost of accumulated investment in capital stocks (*C*). So, total "re-investment" in capital stocks ought to be in the order of (*S′* + *C*), for the case the number of operatives employed remained constant over successive cycles.

We have measured these two magnitudes in terms of *the level of technology (economy of labor) at which current physical-goods output was produced*. However, what if the capital goods produced represent a higher level of technology (economy of labor) in their application than the level of technology employed to produce them? In here, this precise location, lies the secret of the paradox, and the substance of negentropy in the economic process. Let us assume, for example, that new capital stocks are 5% more efficient (represent a relative 5% economy of labor), by comparison with the capital stocks employed to produce them. Then, the portion of present output allotted to energy of the system of the production process is only 95% of the amount suggested by simple National Income Accounting projections. Thus, the free energy re-invested becomes (*S′*+ 0.05 *C*), rather than *S′*. The greater the ratio *C*/*V*, the greater the relative increase in free energy accomplished.

Negentropy in the economic process takes the form of changes in behavior of operatives in the production of physical-goods output, most emphatically capital-goods output. Hence, a high ratio of capital-goods to consumer-goods output is the more healthful circumstance of an economy undergoing technological progress. A highly skilled labor force of operatives, able to assimilate and employ those changes in behavior flowing from scientific discovery, is the optimal labor-force policy, and related general educational policy. The purpose of education for employment, as distinct from its other indispensable functions,[9] is as Humboldt required: rather than preparing pupils through secondary school for some specialized trade skill, *education must bring forth in the fullest possible degree the broadest potentialities of the child and youth, prior to specialist education to begin after the completion of secondary-school education*. The point is not to teach youth to behave in a fixed mode prescribed for them by standards of normal behavior developed up to the present time. The point is to develop the creative-mental potentialities of youth in the broadest possible scope, to supply them with rigorous methods for efficiently innovating (e.g., productive) behavior, assimilating those innovations into the form of fruitful transformations in day-to-day behavior (e.g., behavior in production).

The introduction of the heat-powered machine, or analogous capital-intensive changes in the technology of production, must be comprehended as an indispensable feature of *a change in human behavior, a change in mankind's practical relationship to nature as a whole*. The economy of labor, accomplished by this means, is a reflection of the fact that the scientific discovery generating such changes in behavior, embodies an increasing correspondence between the behavior of mankind and the lawful ordering of our universe. *The economy of labor in the productive process must be comprehended as the greatest of all scientific experiments:* the experiment which proves empirically, as nothing else can, those *principles of scientific discovery* upon which the authority of all scientific knowledge entirely depends.

No separation between fundamental scientific research and "applied science" will be tolerated by the people of a sensible nation. The object of fundamental scientific discovery is the changes in nature accomplished through the physical-goods output of the workshop, the changes in man's relationship to nature so accomplished. Physical Economy, economic science, is the principle of fundamental scientific discovery comprehended in these terms of reference; the scope of economic science, properly defined, extends from the final measure of scientific knowledge, at the end of the production line, backwards to the fundamental scientific discoveries upon whose continued proliferation the continuation of the process of production depends.

In that connection lies the location of the ultimate secret of economic value's determination: the principles of fundamental scientific discovery.

NOTES

1. During the second half of the 1950s, during the same general deliberations leading to adoption of Nuclear Deterrence, Flexible Response and Arms Control, leading circles in the "liberal Establishments" of London and the northeastern U.S.A. decided to push the world's economy into the direction of a "post-industrial" phase. "Back-channel" agreements with the Soviet government, reached through Bertrand Russell's and other channels during that period, persuaded these "liberal Establishments" that Nuclear Deterrence either precluded general warfare between the superpower alliances, or that if such a war began, it would cease at the point of completion of the opening barrages of "strategic" thermonuclear bombardments. Only "local wars," including perhaps "limited nuclear wars," each conducted within the guidelines of a flexible set of rules (Flexible Response), would be expected. Nuclear Deterrence was viewed, thus, as putting a cap on the military requirement for the in-depth logistical strength of a technologically progressive economy. The "post-industrial society" policy was advertised widely from the turn of the 1960s, and began to be put into operation as U.S. governmental policy during the middle 1960s, as typified by the coincidence between President Johnson's "Great Society" doctrine and the initial tearing down of the research-and-development commitments centered then around NASA.

   Since the "liberal Establishment" elements adopting this perspective were spokesmen for circles of European and North American family interests, virtually Italian-style fondi which control the dominant banking and insurance complexes, the flow of credit and investment funds into, and out of, corporations began to reflect increasingly the "post-industrial" orientation of the mid-1960s "head of the Establishment" (according to John K. Galbraith), McGeorge Bundy (at the Ford Foundation). Zbigniew Brzezinski's "technetronic society" thesis is a reflection of this indicated connection between "utopian" strategic thinking and social-economic policy thinking. The tendency grew, as illustrated by the case of U.S. Steel, to use industrial corporations as money-generators for investments in non-industrial ventures, amounting to a policy of cannibalizing such firms being run into the ground through disinvestment in the production process.

The pressures for such policies of industrial corporations came not only in the form of direct pressures from Wall Street, including the corporate raiders lurking to asset-strip any corporation unable to defend its stock from such lurking wolves. It also came from changes in thinking from the inside of managements. The role of the "Harvard Business School type" within management, beginning with such types as Robert S. McNamara at Ford and the Pentagon, is at the center of this change in the philosophical outlook of industrial managements. This is aptly reflected by comparing the readership-sensitive *Wall Street Journal*'s issues from the 1950s and early 1960s with the neo-liberal mixed with neo-conservative philosophical outlook in recent editions.

Harvard Business School is merely a prototype of what now permeates graduate business schools world-wide. What is taught in such locations is predominantly an ideology. What passes for economic sophistication in such centers is merely old William Petty's seventeenth-century doctrine of *buying cheap and selling dear* mystified by a thick overlay of the late John von Neumann's doctrine of "mathematical economics." The magic phrase is "opportunity cost."

Although von Neumann was familiar with some of the algebraic description of Riemann's work, for example, his philosophical outlook was essentially that of Kronecker and Dedekind, or of Laplace, Clausius, Helmholtz, Boltzmann. This showed itself at its worst after Kurt Gödel's devastating attack on certain of von Neumann's leading assumptions, about 1932 (e.g., *Gödel's Proof*, which should be read from the standpoint of Cantor's 1871-1883 work). That worst was von Neumann's application of his theory of games to economic processes. His efforts to reduce economic analysis to solutions to systems of linear inequalities, and his adoption of the radical ontological assumptions of Viennese neo-positivist marginal utility, are exemplary of the reasons every system of econometric forecasting based upon von Neumann's assumptions has failed so miserably.

Von Neumann's specifications for mathematical economics require the assumption both that the economy is in a state of zero technological growth, and that changes downward in the level of technology may be ignored. This approach, which saturates all known computer-based economic forecasting practice excepting the LaRouche-Riemann forecasts today, is the approach most consistent with the "post-industrial" policy direction noted.

The virtual brainwashing of business-school graduates and other professionals in a dogma so situated, and the concurrence of dominant forces of Wall Street, London, Switzerland, and Venice's insurance complexes, has infected much of U.S. industrial management with a change in philosophy of management so sharp it must be fairly described as a "cultural paradigm-shift."

2. "Apparently" is supplied here out of awe for what has been unearthed from amid the unpublished Leibniz archive, as well as fresh examinations of parts of Leibniz's published work in light of archives materials. Cusa's writings, those of Leonardo da Vinci, and also the writings of Kepler and Gauss, are of this same awesome quality. One must be most cautious in presuming from what one has studied of Leibniz thus far that he did not have something more than a prescience of fundamental discoveries attributed to someone at a later time.

3. Adam Smith's explicit policy from his Wealth of Nations is referenced here. It was against the British economic policies which Smith defended in that book that the American Revolution was fought.

4. As Pacioli and Leonardo da Vinci appear first to have shown, living processes are distinguished from non-living by a morphology of growth and developed functions consistent with the Golden

Section. In other words, they are characteristically negentropic, as we have supplied the proper, synthetic-geometrical, Gaussian, definition of negentropy—rejecting the incompetent Wiener-Shannon “information theory” dogma. This signifies that organic chemistry per se is not a proper tool for determining the characteristic features of living processes; chemistry so narrowly considered has value for biology, of course, as the lessons of the dissecting table and pathologist’s laboratories provide information useful to physicians concerned with maintaining the healthy tissue of living persons. The elementary phenomenon of life must be geometrically congruent with the Golden Section, in terms of the discrete manifold, and must be of the form of negentropy as we have defined it here, in respect to the continuous manifold. If biology were to make this the *single empirical fact* upon which biology as a whole were reconstructed, the significance of chemistry would then be put into its proper perspective.

5. *Principles of Political Economy,* Vol; l, 1837, pp. 311-320, for Carey’s extended quotation from Senior; Vol. II (1840), *passim* (on population), with special attention to Chapter IX. It is of interest to compare this three-volume work of Carey’s and the other writings of Carey's known to Karl Marx, to see how bitterly Marx envied and hated Carey.

6. The putatively literate use of the English language had already fallen way below the quality of literate English during Shakespeare’s and Milton’s time during the 1950s, before the destructive impacts of Chomskyan linguistics and the argot of the rock-drug counterculture. The principal among the defects to be noted include the disuse of the subjunctive, and philosophical nominalism in manner of emphasis upon the noun as the natural unit of ideas. The first is the outgrowth of a steady campaign to eradicate the use of the subjunctive, by academics who recognized quite accurately the practical philosophical significance of the subjunctive as the medium for thinking in terms of scientific hypothesis. The emphasis upon the noun was also the fruit of campaigns on behalf of philosophical empiricism.

7. Criton Zoakos has pointed out that the word “Idea” is an improper and misleading translation; the best approximation in English is *species*. From the construction of Plato's arguments, there can be no reasonable doubt of the accuracy of Zoakos’s proposed correction. The significance of this will become clearer in the following section of the text.

8. The U.S. economy entered a *relatively* entropic phase over the period 1966-1974. The U.S. economy became absolutely entropic--absolutely “negative economic growth rates,” and operating below economic “breakeven”—within a few months after the policies jointly adopted by the Carter-Mondale Administration and Federal Reserve Chairman Paul Volcker during October 1979 went into effect.

9. *The function of citizenship* is the most general purpose of primary and secondary education. If members of the electorate cannot think, but can vote, what kind of elected government might we expect? Without rigorous training in rational thinking about any kind of topic on which a citizen might have to vote in choosing among candidates, what value does “public opinion” have hearing upon truth or determination of either national interests or the citizen’s own immediate interests?

5 How Technology Is Produced

The fundamental principles of fundamental scientific—and technological—breakthroughs are the same today as they were when Plato elaborated them more than 2,300 years ago. The matter permeates Plato’s dialogues as a whole, in his repeated references to the subject of *hypothesis*. Without hypothesis nothing truthful and fundamental respecting man’s relationship to the universe could be discovered. This was the method of Cusa,[1] Leonardo da Vinci,[2] Kepler, Leibniz, Gauss, Riemann, et al.