While monetarism dies

by Lyndon H. LaRouche, Jr.

Mr. LaRouche wrote this preface to the Chinese translation of his economics text, So, You Wish to Learn All About Economics? *on Oct. 9, 1996.*

The publication of the author's 1984 textbook in Chinese could not have come at a more ironical moment of world history.

During the September 28-October 1 meeting of the combined International Monetary Fund (IMF) and World Bank, here, in Washington, D.C., Managing Director, Michel Camdessus, of the International Monetary Fund, warned, for the second time this year, of an onrushing, systemic, chain-reaction collapse of the world's banking system. Camdessus had delivered a similar warning earlier, at an event held in the setting of the Lyons, France G-7 meeting.[1]

There is no exaggeration in Michel Camdessus' expressed fears. Already, virtually all among the world's banking systems are, each, in an advanced stage of financial bankruptcy. The infection of the world's financial system with the same madness typified by financiers operating out of London, Singapore, and Hong Kong, has put the entire banking systems of Germany, France, Italy, Spain, Russia, Japan, and every nation of the Americas, including the U.S.A. itself, into implicit bankruptcy.

The "derivatives"-driven, continuing bankruptcy of the world's financial system, is something which has already occurred. It has been fully under way for four years. What is new, is the IMF's open recognition of the immediate, high degree of risk, that the simultaneous collapse of one or two key banks, such as France's already bankrupt Crédit Lyonnais, might set off a chain-reaction implosion of the financial institutions of virtually every nation, including Japan, as well as all of Europe and the Americas. Were such a systemic chain-reaction to begin, the entire system of banking and finance could be turned into dead dust within as short a time as forty-eight to seventy-two hours: in many parts of the world, money itself would become almost non-negotiable.

The Managing Director did not exaggerate the danger. The problem is, the IMF's proposed cures are worse than the disease.

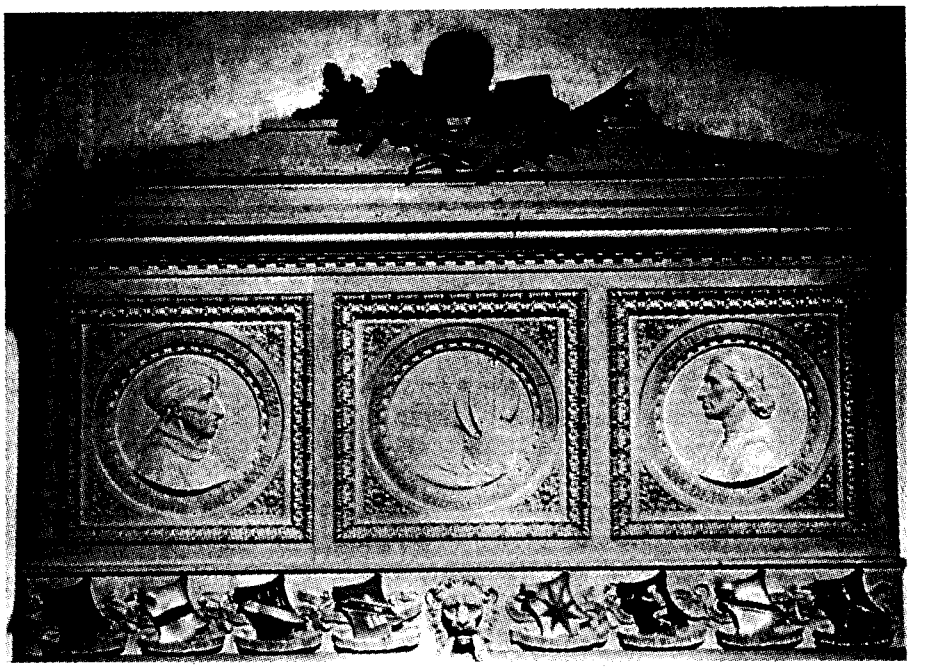
The LaRouche forecasts

The author of the textbook presented here, gave his first long-range warning of the risk of such a world-wide collapse, more than thirty-five years ago. That forecast, then, and as it has been updated over later decades, has earned unique authority in today's crisis.[2]

This writer's first, 1959-1961, warnings of the danger of a trend in this present direction, had been based on a study of trends in the combined U.S.A. and western European economies, over the period 1946-1959, showing the causes for the deep and stubborn U.S. recession of 1957-1959. That 1959-1961 study warned, that if the world's ruling economic authorities continued to apply the axioms adducibly underlying 1946-1960 trends in the shaping of both economic and financial policies, we must expect a series of international monetary crises during the second half of the 1960s, leading into breakdown of the Bretton Woods system of relatively fixed parities of currencies. The forecast indicated such a break-

1. John Hoefle, "IMF Admits Global Banking Crisis Is Out of Control," ***Executive Intelligence Review (EIR),*** Oct. 11, 1996. Also, ***EIR,*** July 19, 1996.

2. ***The Coming Disintegration of The Financial Markets: LaRouche's Ninth Forecast*** (Leesburg, VA: New Federalist, August 1994). "The LaRouche Record," ***Executive Intelligence Review*** March 15, 1996. pp. 14-43.



Left: statue of Christopher Columbus overlooking New York's Central Park. Right: monument to Italian explorers in the Santa Croce Church in Florence. The relief on the left shows Paolo Toscanelli; Amerigo Vespucci is on the right. LaRouche underlines one of the most crucial principles of economics: "It was Columbus, and he alone, who acted to effect the discovery of the Americas; but, he could not have succeeded without the ships and crew."

down as likely to occur, by approximately the end of the 1960s or beginning of the 1970s.[3] It was the present writer's repeated warning of an accelerating threat to the pre-1971 monetary agreements on stable parities, which established the influence he has gained since the events of August 15-16, 1971.[4]

At the time of the August 1971 crash of the U.S. dollar, this writer supplied an updated forecast for the decade ahead. He warned, that if the 1946-1971 trends in the shaping of economic and financial policy-making were continued, the leading policy-shaping institutions would turn more and more to the kinds of austerity programs of Nazi Economics Minister Hjalmar Schacht, with global social and political effects matching the 1922-1945 results of the policies of fascist economists such as Venice's Volpi di Misurata and the London-backed Hjalmar Schacht.[5]

The 1971-1972 collapse of the Bretton Woods system, was the result of both 1946-1966 trends toward radical monetarism, and the long-simmering, neo-Malthusian, so-called "post-industrial" dogmas which came to the surface during the 1964-1966 interval.[6] The world-wide monetary catastro-

3. ibid. The study was developed in two phases. During 1955-1956, the author conducted a 1946-1956 study, out of which he forecast a deep and prolonged economic recession to break out during early 1957. The actual outbreak of that recession during February-March 1957, encouraged this writer to extend the same method, to produce the long-range forecasts of 1959-1961: forecasting a series of international monetary crises during the late 1960s, leading into a breakdown of the then-existing international monetary agreements.

4. Virtually every popular university textbook, such as Nobel Prize winner Paul Samuelson's ***Economics*** (101), had argued, that, under the existing regulatory mechanisms, such a crisis would not be allowed to happen.

5. This was the subject of a celebrated, December 2, 1971, public debate between the author and Professor Abba Lerner, the then-influential, leading U.S. Keynesian of that period. In the end of the debate, Lerner defended Hjalmar Schacht's policies, arguing that if the German Social-Democracy had supported Schacht, "Hitler would not have been necessary."

6. The "post-industrial" utopianism, which took over international policy-shaping during the second half of the 1960s, was the accumulated result of long preparatory work, in academic and related circles, by institutions such as the London Tavistock Centre and the networks which had been built up, after the Versailles Treaty, by the circles of Bertrand Russell and H.G. Wells. The pivot of the Russell-Wells policy was the fostering of the development of nuclear weapons by the Anglo-Americans, with the intent to make general warfare so awful, that, as Russell explained in locations such as the September 1946 edition of ***The Bulletin of the Atomic Scientists,*** nations will be willing to give up their sovereignties to the kind of "world government" which Russell proposed the United Nations Organization (UNO) must become. Russell proposed that the Anglo-Americans launch a "preventive" nuclear attack upon the Soviet Union, to bring about such establishment of "world government." The economic and social doctrines of present-day, neo-Malthusian "utopianism," have been developed as designs for the post-nation-state world which Russell and his co-thinkers sought to bring about through a nuclear-weapons diplomacy. Thus, it was the "détente" agreements struck between the Anglo-Americans and the N.S. Khrushchev government, in the aftermath of the 1962 Caribbean "missiles crisis," which set the stage for the unleashing of "neo-Malthusian" forms of utopianism, during the second half of the 1960s.

phe, and general economic depression, fully under way today, is not an accident produced by some lowly clerk in Barings' Singapore office. It is a catastrophe built into the generally accepted monetarist and neo-Malthusian axioms of policy-shaping currently guiding nearly every leading academic, governmental, financial, and monetary institution of today's world.

The best hope for civilization today, is that the U.S.A. might use its leading position, to eradicate that combination of radical "free trade" and "neo-Malthusian" monetarism, to return to the successful methods of such economists as the founder of economic science, Gottfried Leibniz, Benjamin Franklin, U.S. Treasury Secretary Alexander Hamilton, the American Careys, and Friedrich List.

Presently, the only chance to avoid the world's plunge into a "new dark age," is to reverse the policy-trends of the past thirty-odd years, especially the past twenty-five years of the "floating exchange-rate system." If we do not return to the only successful modern model of economy, that of Leibniz and the famous "American System" of Franklin, Hamilton, et al., we must prepare our children to receive, very soon, the kind of prolonged, global "new dark age" of all mankind, which a chain-reaction collapse would inaugurate: a "dark age" resulting from the collapse of nation-state systems into global anarchy.

The best estimate for the effects of such a "new dark age," is that, during a period of approximately two generations, the population of the planet would be collapsed rapidly to a new quasi-equilibrium-level, of perhaps less than a billion individuals, with life-expectancies falling to levels of barbarism. That "shock wave" of economic and demographic collapse would feature famine, disease, and violence, beyond anything seen on this planet during recent centuries.

For those who have mastered the existing evidence respecting the great economic and financial crises of modern European history, the alternative to the presently accelerating global financial and economic chaos, is elementary.

First, a group of governments, representing a plurality of nations, must agree in concert, to put the existing, bankrupt financial institutions of the world, into foreclosure proceedings, into reorganization in bankruptcy. Second, these governments must agree on establishing a new system of relatively fixed parities among reorganized currencies of their nations, and a new system of credit and tariffs. Third, these measures must be combined with commitment to a set of great infrastructure-building projects, which will set into motion a general recovery of the physical economies of one and all participating nations. Fourth, it is essential that those governments also identify accurately the wrong-headed, but unfortunately popular economics teachings, the which have caused this global financial catastrophe. Those governments must resolve, that never again shall the philosophy of the opium-trafficking British East India Company's "free trade" policies, or its like, be tolerated among nations which wish to be regarded as civilized.

The present textbook, originally written and published, in English, in 1984, provides an introduction to those principles of physical economy which must inform policies aimed at bringing about a general economic recovery from the disasters which the British East India Company's "free trade" dogmas have, once again, brought upon this planet.

How to understand the banking collapse

Like any original discovery of a valid physical principle, as in experimental physics, the birth of competence in economic science occurs with posing a relevant, seemingly insolvable paradox. In today's crisis, the relevant expression of that paradox is: *How might economists* ***measure the performance of economic processes,*** *when the existing system of money has just recently gone out of existence?* What is the alternative to measuring in terms of money-prices? The following textbook centers the problem of economic science on that issue.

For those who have studied the problems of economic planning during successive phases of the Soviet Union's administrative practices, this is a familiar question. The problem was not original to the Soviet Union. Prior to mid-Sixteenth-

Century western Europe, the same problem, how to measure economic performance in non-money terms, prevailed in nearly all economies of the world. Until the present writer's discoveries in economic science, that problem was sometimes circumvented in practice, but never solved as a matter of principle. The same problem, of discovering a scientific alternative for measuring economic performance in physical terms, rather than money-prices, exploded to the surface during the hyperinflationary period of 1922-1923 Germany. The same question has erupted, world-wide, since the world's monetary system spun out of control, beginning 1971-1972.

What should nations do, at the time all monetary and banking systems are shattered by the bursting of the present world-wide bubble of financial speculation?

The alternative is to be found in physical economy, a branch of physical science first developed by Gottfried Leibniz, during the years 1671-1716. Leibniz's discovery of economic science, combined with his persisting attacks upon the poisonous influence of John Locke, was the basis for the principles of the U.S. ***Declaration of Independence*** and the principle of law expressed by the Preamble of the U.S. Federal ***Constitution*** of 1789.[7] Leibniz's principles of physical economy were incorporated in what was known as the "American System of political-economy," under the leadership of influential American patriots, such as Benjamin Franklin, U.S. Treasury Secretary Alexander Hamilton, Henry C. Carey, and also by Friedrich List, and Russia's great minister Count Sergei Witte.

The American System of political-economy, of Hamilton, the Careys, and List, was the policy and practice of the U.S.A. under early U.S. Presidents, such as George Washington, James Monroe, John Quincy Adams, Abraham Lincoln, Rutherford Hayes, and William McKinley. During the Nineteenth Century, defense of the American System, or "protectionist" policy, against the British "free trade" system, was always the policy of the patriotic factions of the U.S.A. These were the Washington-Hamilton Federalists, the Whig Party of the Careys and Henry Clay, and the Lincoln-Carey faction of the Republican Party. Only the factions of the Confederate slave-owners and the Yankee opium-traders, supported British "free trade."

Admittedly, under leadership of Presidents Thomas Jefferson, Dolley Madison's husband, James Madison, Andrew Jackson, Martin van Buren, Polk, and the traitors Franklin Pierce and James Buchanan, the philosophy of Locke and the British East India Company's Adam Smith predominated. Nonetheless, despite the influence of British philosophy in high places, throughout the Nineteenth Century, the patriotic, Hamiltonian economic tradition of the U.S. Federal Constitution continued under Henry Clay's Whigs, and Presidents such as James Monroe, John Quincy Adams, Abraham Lincoln, Hayes, and McKinley.

The dominant trend toward moral degeneration of U.S. foreign policy came during the Twentieth Century, with the 1901 assassination of the patriotic President McKinley, and McKinley's replacement by rabid Anglophile Theodore Roosevelt, a representative of the Confederacy faction. Rabid Anglophile and racist Woodrow Wilson, who was elected U.S. President with help of former President Theodore Roosevelt, was another Confederacy sympathizer, whose policies are typified by the fact that he used his influence as President, in 1915, to promote the revival of the racialist Ku Klux Klan. President Calvin Coolidge, a product of the Yankee opium-trader families, was allied with the pro-Confederacy tradition of Theodore Roosevelt and Woodrow Wilson. During the present century, the only Presidents who have clearly represented the patriotic tradition of the American System have been Franklin Delano Roosevelt and John F. Kennedy. The policy-making of Truman, and Carter, and Bush, was in the tradition of the Confederacy, and Presidents Eisenhower, Johnson, Ford, and Reagan were of a mixed quality, under pressure of powerful factions which represented pro-Confederacy, financier-oligarchy influences.

The economics tradition of the United States Constitution generated none of the world's troubles during this century. Since the 1901 assassination of President McKinley, until the 1992 election of the current President, William Clinton, the most crucial problem suffered by the world as a whole, has been the strategic alliance among the powerful New York-Boston-centered financier oligarchy of the U.S.A. with the aggregately more powerful financier oligarchies of the British Empire and Commonwealth, the Netherlands, and France. The assembled financier-oligarchy families of these and other nations, is the supranational core of the so-called "Anglo-American" financier oligarchy.[8] Until 1992, only the U.S.

7. Throughout the Eighteenth Century, both in the English colonies, and in the United States, the division of North American opinion between anti-British American patriots, and British sympathizers, conformed precisely to the opposition of Leibniz to Locke. The phrase "life, liberty, and the pursuit of happiness," in the 1776 U.S. Declaration of Independence from the British Empire, is Leibniz's formulation, in specific rejection of Locke's "life, liberty, and property." The argument that "property right," rather than the right of the human individual, must be the law, was the core of the legal-philosophical defense of slavery and racialism in the writings of racist Thomas Jefferson, and the argument for slavery by the treasonous British agents who headed up the slave-holders' Confederacy. Locke's philosophy is still the basis for the Anglophile U.S. financier oligarchy and its lackeys today.

8. Since its 1961 founding, the neo-Malthusian World Wildlife Fund, under the co-sponsorship of Britain's Prince Philip and the Netherlands' Prince Bernhard, has expressed the policy-interest of those financier-oligarchy families and their lackeys, the which have backed the neo-Malthusian operations of that Fund (since renamed "The Worldwide Fund for Nature"). The core of this supranational cabal is the famous "Club of the Isles," the league of powerful oligarchical families of the British Empire brought together under the Prince of Wales, Albert Edward, who became King Edward VII. Today, that "Club of the Isles" reaches outside the limits of British Commonwealth

Presidencies of Franklin Roosevelt and John Kennedy had interrupted this Twentieth-Century trend; from the 1963 assassination of President Kennedy, until the defeat of President George Bush's reelection-campaign, in 1992, the combined power of that Anglo-American financier oligarchy has dominated the world's economic and related policy-shaping. Under the 1989-1991 leadership of Britain's Prime Minister Thatcher and U.S. President George Bush, that Anglo-American oligarchy began its present, shameless use of the United Nations Organization (UNO), as an instrument of de facto Anglo-American "world government," thus virtually destroying the sovereignty of the United States itself.

So, in the wake of the 1963 assassination of President Kennedy, this Anglo-American oligarchy introduced economically catastrophic changes in policy. Centered around what is often termed the "cultural paradigm shift" introduced through the youth-counter-culture of the 1966-1972 interval, the policies of the OECD and other nations were shifted, rapidly, away from traditional U.S. policies of fostering investment in scientific and technological advancement of the physical productive powers of labor, into a perverse blend of "neo-Malthusian" cults and "post-industrial" utopianisms.

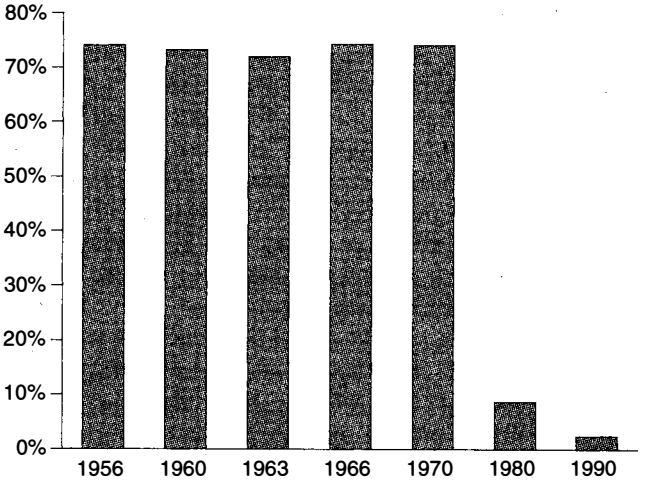
As a result of this "cultural paradigm-shift," there was a rapid contraction of the U.S. economy during the 1966-1970 interval, leading into the August 1971 break-up of the Bretton Woods system of relatively fixed parities among currencies. With the still more radical measures introduced under President Jimmy Carter's regime, 1977-1981, the world economy's destruction became almost irreversible. Over the eleven years, 1982-1992, the world's economic system was transformed into the wildest, most lunatic bubble of purely parasitical speculation in history.

1956-1966 trends in U.S. foreign-exchange turnover reflect the problem. If we examine those statistics, against the background of current estimates of growth in "derivatives" speculation, the kernel of the present banking-crisis is clearer.

During the approximately fifteen-year interval, 1956-1970, approximately 70% of total U.S. foreign exchange was accounted for by merchandise trade in exports and imports. Under the world's 1971 change to "floating exchange-rate" system, and the Kissinger-orchestrated petroleum-price hoax of 1973-1975, by 1975-1976 merchandise trade accounted for only 23% of foreign-exchange turnover. After President Carter, merchandise trade had collapsed to 5% of foreign-exchange turnover, about 2% by 1990, and an estimated 0.5% more recently (see **Figure 1**).[9]

The post-1976 destruction of the U.S. part of the world's financial system is marked by three phases: the measures introduced, beginning October 1979, by President Carter's appointment of Paul A. Volcker as Chairman of the U.S. Federal Reserve System, which doomed U.S. agriculture and industry; the "junk bond" era, 1982-1988, which destroyed the integrity of the U.S. banking system; and, the replacement of the form of financial "piracy" known as "junk bonds," by the sheer lunacy of what Nobel Prize winner Maurice Allais has aptly described as an international "casino" economy, the 1989-1996 "derivatives" bubble.[10]

FIGURE 1
Mercantile trade as percent of foreign exchange



The result is what this writer has described in terms of a "Triple Collapse Function" (**Figure 2**). The growth of the speculative bubble of financial aggregates would collapse, in an implosive chain-reaction, but for leveraging of growing volumes of money into the speculative market-mechanisms. This required growth of money-influxes into the bubble is generated through increased debt of government, and looting of capital and incomes of households and enterprises. As a result, the relevant financial aggregates increase hyperbolically, while an increased rate of net contraction dominates the base being looted. This is the situation throughout the world taken as a whole.

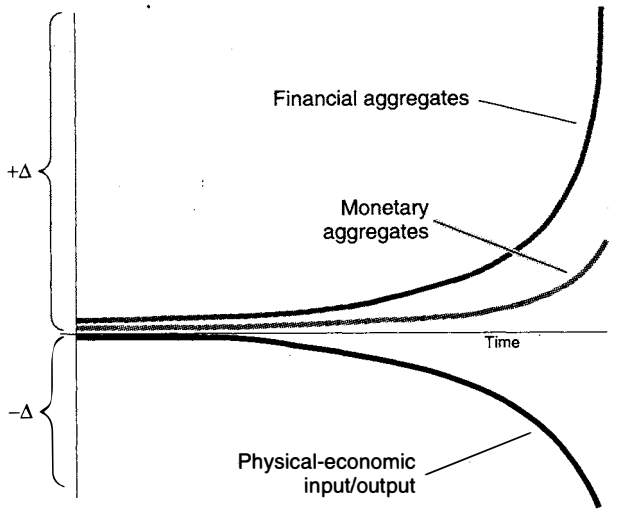
The resulting tension, between the hyperbolically expanding requirement for the monetary means to postpone the implosive collapse of the financial bubble, and the shrinking of the economic basis being looted to supply these means, is the key to understanding the ongoing doom of the world's

circles, to include wealthy families, and their lackeys, from Eurasia and the Americas generally.

9. See "Special Report," ***Executive Intelligence Review,*** January 1, 1996: pp. A1-A32.

10. Maurice Allais, "From Crash to Euphoria—The Plague of Credit" ***Le Figaro,*** June 27, 1989.

FIGURE 2
A typical collapse function



presently dominant monetary and financial institutions.

Consider the crucial ratio, of the nominal value of the fictitious financial assets tied up in the speculative bubble, and the nominal value of the productive base being looted to sustain the bubble. Consider as critical, the ratio of financial flows through derivatives and related "options," to the financial flows through merchandise-trading accounts. Ask: With the ratio soaring above 95% recently, what happens when the inevitable, early collapse of the bubble occurs? What happens to the banking systems, and monetary system, which can no longer reclaim their vast investment of money in the collapsed speculative bubble?

Only action by the governments of perfectly sovereign nation-states can deal with such problems; no market can, no IMF could. Considering the scale of the collapse, no one government of this planet could bring such a global crisis under sufficient control to protect its own nation. Only a concert of governments could act jointly to: 1) Put the bankrupt, global monetary and financial system into government-controlled bankruptcy-reorganization; 2) Simultaneously create a new world system of credit and money; 3) Throw aside all present tariff and trade agreements, and institutions currently in force, to create the new terms of tariff and trade needed to restart the world's economy. If a concert of governments does not succeed in finding the will to take precisely those measures, the resulting calamity will be off all scales of measurement: the immediate inauguration of a global "new dark age" must be the result of failing to take such actions.

Each nation of the world, thus requires a new mechanism of policy-shaping, which does not depend upon so-called "market prices." Leibniz's science of physical economy, is the only existing basis for mastering that challenge.

The LaRouche-Riemann 'model'

The present author, a student of Leibniz since adolescence, revived Leibniz's science of physical economy and the American System of political-economy. This revival is rooted in discoveries made during 1948-1952, as by-products of his work of refuting the absurdity central to the work of two students of the British aristocrat Bertrand Russell: the "information theory" of Norbert Wiener, and the "systems analysis" of John von Neumann. Those problems of mathematical application, the which had been posed by the present writer's 1948-1951 discoveries, were addressed, during 1952, with reference to, chiefly, the work of the physicist Bernhard Riemann and the mathematician Georg Cantor. For that reason, the 1979-1983 application of this method to computer applications, was known as the "LaRouche-Riemann Method," yielding the only accurate quarterly forecasts for the U.S. economy published during that period.[11]

The analysis of economy from the standpoint of production employs statistical tools such as bills of materials and process sheets. Each detail of the network of an economy's total production-cycle, from infrastructure to consumption of finished product, is mapped, as streams, into the junction-points where productive actions are performed. "Market-baskets" of required goods are accounted for, per capita of labor force, per unit of land-area, and per family household. Leibniz's approach to defining a necessary household market-basket is employed throughout, both for household consumption and for each branch of agriculture, industry, and infrastructure.[12] Allowances are made for sundry forms of administration, in a similar way.

This analysis of the production-stream faces the economist with the challenge of discovering some notion of functional relationship between variation in the physical contents of these market-baskets and variation in the productive power of labor, per capita, as Leibniz demanded the necessary in-

11. This series of quarterly reports was published by the ***Executive Intelligence Review,*** for each quarter beginning the first quarter of 1980, and concluding with the last quarter of 1983. The present writer devoted a half-hour nationwide network television broadcast of his 1984 campaign for the Democratic Party's U.S. Presidential nomination, to explaining the frauds by the U.S. Government and Federal Reserve System which had prompted him to terminate the series of quarterly forecasts. Beginning late 1983, the data supplied by the U.S. Government and Federal Reserve System was so wildly falsified, that since that time it has not been possible to make rational projections on the basis of official data. Not only are the quarterly reports fraudulent by convention, but the differences in method employed in each case tends to be capriciously irrelevant to that employed in the preceding instance. Pity that President of the U.S.A. who is lured into relying upon such dubious concoctions.

12. G. Leibniz, ***Society & Economy*** (1671).

come of the household of the laborer be studied.[13] We must do this for every branch of production and infrastructure, in addition to study of the required market-baskets of family households.

The immediate goal of such inquiries, is to determine the relationship between the expenditures and the variation in effective productive output of the society, per capita of the employed labor-force. No competent measurement of such a functional relationship can be made in money-prices; the correlation must be between physical inputs and physical productivity of labor. Only one exception to this rule should be permitted: to the degree quantity and quality of education, health-care, and science and technology services affects the potential physical productive powers of labor, those expenditures must be included in the market-baskets of consumption by labor, by infrastructural facilities, by agriculture, and industry.

By those empirical means, we attempt to determine what portion of the consumption by a society corresponds to "energy of the system." We correlate that consumption with a certain level of potential productive output. We assume that any of the non-wasted output, in excess of replacing that required consumption, is the "free energy" of the productive process. The economist must account for the role of reinvestment of some portion of that "free energy," both to expand the scale of the economy and its supporting infrastructure, and to increase the productivity of the productive process by emphasis on power-intensive, capital-intensive modes of investment in scientific and technological progress. The economist's goal, is to ensure that the ratio of "free energy" to "energy of the system" does not decline, even though the "energy of the system" per capita is being increased. The question is, how would changes in the patterns of consumption affect the potential productive powers of labor? How would changes affect the ratio of "free energy" to "energy of the system"?

The apparent cause for the failure of most attempts to understand the physical economy of an entire nation-state in those terms, is the error of assuming that we can measure the functional variation in relationship of input to output in such a way as to imply that we are measuring the "production of commodities by commodities," with the human individual serving only as vehicle for such functions. The unscientific character of Norbert Wiener's "information theory," and John von Neumann's attempts to apply his "systems analysis" to economic processes, is a related case. The work on input-output models by Professor Wassily Leontief, is useful, on condition we do not fall into the delusion, of assuming that, in such a configuration, we are studying the implied "production of commodities by commodities."

13. ibid.

The source of increase of the productive powers of labor is the quality of the typical newborn human individual, which sets all persons absolutely apart from, and above all lower forms of life. This distinction is most readily identified, in functional terms of reference, as that developable, but sovereign capability of each human individual mind, for making valid, revolutionary discoveries of physical principle. This applies both to experimentally valid original discoveries of principle, and to the student's reenactment of an original such act of discovery. The same principle of cognition central to fundamental scientific discovery, is the source of all of the masterworks of European Classical art-forms. The increase of the individual person's power over nature, in production and in design of products, is derived from the cultivation of those same cognitive powers from which we obtain advances in scientific and artistic knowledge.

We must think of products not as the cause of productivity of labor, but as the necessary circumstances of that productivity. Consider the case of Christopher Columbus' discovery of the Americas.[14]

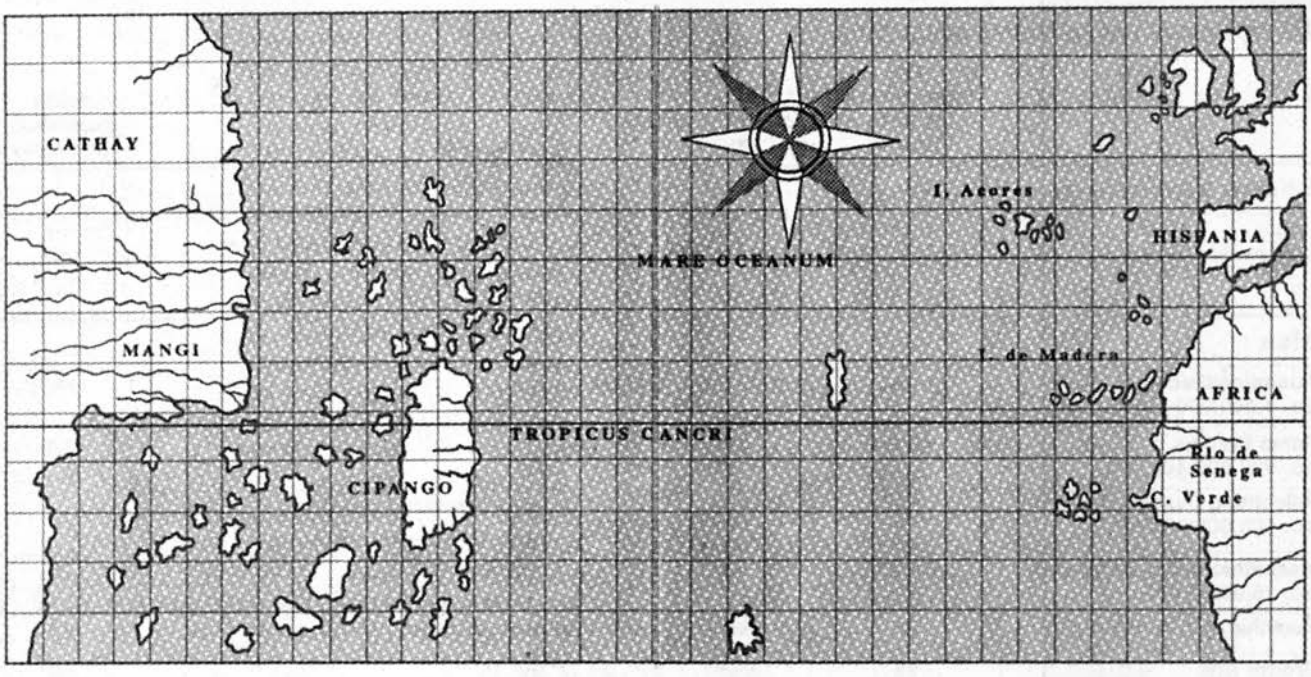
Columbus' discovery of the Americas began toward the close of the Third Century B.C., with the estimate of the Earth's curvature by the celebrated member of the Platonic Academy at Athens, Eratosthenes. Employing Eratosthenes and other ancient experiments as his guide, Paolo Toscanelli (A.D. 1397-1482), the leading astronomer of the Fifteenth Century, created the maps of the world which guided Columbus to his successful voyage.[15] Toscanelli's map had but one notable flaw; it was based upon a nearly accurate size of the Earth, as determined by astronomical observations of the Earth's curvature, but, it relied upon the highly exaggerated reports supplied by Venice, on the distances from Venice to China and Japan, placing Japan in the middle of today's United States!

Columbus learned of Toscanelli's maps nearly two decades before his famous voyages of discovery. This included Columbus' access to the correspondence between Toscanelli and Lisbon's Fernão Martins, on the subject of exploration westward across the Atlantic Ocean for the Indies.[16] Columbus wrote to Toscanelli and became fully informed, in the last years of Toscanelli's life, of the collaboration which had been ongoing for decades before, and which had begun with the

14. In rebuttal of those who insist that "Columbus could not have discovered America," because there were already inhabitants of the Americas thousands of years earlier than A.D. 1492, one might mention the case of the wise woman who set a trap by means of which to *discover* another woman in her husband's bed. Columbus' discovery of the Americas was accomplished by the same methods of astrophysics used to discover planets, moons, and asteroids of the solar system.

15. Gustavo Uzielli, ***Paolo Toscanelli, Amerigo Vespucci and the Discovery of America.***

16. ibid.



A reconstruction of the map by Paolo Toscanelli, which Columbus used to discover the New World.

immediate Florentine circle of Nicolaus of Cusa during the years before the Council of Florence of 1439.[17] Columbus added to this scientific knowledge, his experience and knowledge as a navigator for the Portuguese, knowledge of ocean currents and prevailing winds, which clearly implied the probable location of, and route toward land on the other side of the Atlantic. His use of Toscanelli's map, indicates that his original goal were the islands of the Pacific far to the South of Japan. Columbus' discovery of the Americas was, thus, a "scientific discovery," in the strictest meaning of experimental physics.

This example of Columbus' discovery is cited here to illustrate one of the most crucial principles of economic science, a principle apparently unknown to the popular economics doctrines of today's universities. The relevant question is: *Was the discovery of the Americas accomplished by the three ships Columbus commanded, or the sailors on those ships?* Reports of Columbus' difficulties in securing those ships, and the reluctance of the crew, illuminate the twofold fact: *It was Columbus, and he alone, who acted to effect the discovery of the Americas; but, he could not have succeeded without the ships and crew.*

It is not the means of production, or even labor as such which produces those advances upon which progress in the condition of mankind is effected. It is the power of valid scientific and artistic discovery by the sovereign powers of the individual intellect, upon which all human progress depends. However, to advance, the discoverers, and their associates in labor, must be educated up to the level needed to make valid discoveries and put them into operation. Even those means will not succeed, unless the suitable tools and materials are provided to make effective the impulse of the creative individual intellect.

The ships did not cause the discovery of the Americas, but they were essential to that discovery. The material conditions of life do not generate human progress, but without such means to convey the work of the human intellect, progress is not possible. The point ought to be obvious, but most professed economists have been too fiercely gripped by the delusions demanded by their adopted ideologies, to recognize the right relations within the productive process.

The same word of caution must be applied to this textbook's treatment of the relations expressed in terms of the social division of physically productive labor. It is not the quantity of persons, or the amount of their labor-time employed, which generates productivity; it is the developed powers of the individual's human intellect, an intellectual power which could not be effective without associated development of basic economic infrastructure and means of production.

Thus, once we have accepted, as a matter of principle,

17. Paolo Emilio Taviani, ***Christopher Columbus: The Grand Design,*** (London: Orbis Press); Ricardo Olvera, "The Discovery of the Americas and the Renaissance Scientific Project," ***Executive Intelligence Review,*** Oct. 19, 1990.

FIGURE 3

Development of human population

	Life expectancy at birth (years)	Population density (per km²)	Comments	World population (millions)
Primate Comparison				
Gorilla		1/km²		.07
Chimpanzee		3-4/km²		1+
Man				
Australopithecines B.C. 4,000,000-1,000,000	**14-15**	**1/ 10 km²**	68% die by age 14	**.07-1**
Homo Erectus B.C. 900,000-400,000	**14-15**			**1.7**
Paleolithic (hunter-gatherers) B.C. 100,000-15,000	**18-20+**	**1/ 10 km²**	55% die by age 14; average age 23	
Mesolithic (proto-agricultural) B.C. 15,000-5,000	**20-27**			**4**
Neolithic, B.C. 10,000-3,000	**25**	**1/km²**	"Agricultural revolution"	**10**
Bronze Age B.C. 3,000-1,000	**28**	**10/km²**	50% die by age 14 Village dry-farming, Baluchistan, 5,000 B.C.: 9.61/km² Development of cities: Sumer, 2000 B.C.: 19.16/km² Early Bronze Age: Aegean, 3,000 B.C.: 7.5-13.8/km² Late Bronze Age: Aegean, 1,000 B.C.: 12.4-31.3/km² Shang Dynasty China, 1000 B.C.: 5/km²	**50**
Iron Age, B.C. 1,000-	**28**			**50**
Mediterranean Classical Period B.C. 500-A.D. 500	**25-28**	**15+/km²**	Classical Greece, Peloponnese: 35/km² Roman Empire: Greece: 11/km² Italy: 24/km² Asia: 30/km² Egypt: 179/km²* Han Dynasty China, B.C. 200-A.D. 200: 19.27/km² Shanxi: 28/km² Shaanxi: 24/km² Henan: 97/km²* Shandong: 118/km²* * Irrigated river-valley intensive agriculture	**100-190**
European Medieval Period A.D. 800-1300	**30+**	**20+/km²**	40% die by age 14 Italy, 1200: 24/km² Italy, 1340: 34/km² Tuscany, 1340: 85/km² Brabant, 1374: 35/km²	**220-360**
Europe, 17th Century	**32-36**		Italy, 1650: 37/km² France, 1650: 38/km² Belgium, 1650: 50/km²	**545**
Europe, 18th Century	**34-38**	**30+/km²**	"Industrial Revolution" Italy, 1750: 50/km² France, 1750: 44/km² Belgium, 1750: 108/km²	**720**
Massachusetts, 1840	41		Life expectancies: "Industrialized," right;	
United Kingdom, 1861	43	**90+/km²**	"Pre-industrialized," left	**1,200**
Guatemala, 1893	**24**			
European Russia, 1896	**32**			
Czechoslovakia, 1900	40			
Japan, 1899	44			
United States, 1900	48			
Sweden, 1903	53			
France, 1946	62			
India, 1950	**41**			**2,500**
Sweden, 1960	73			
1970		**1975**		**3,900**
United States	71	26/km²		
West Germany	70	248/km²		
Japan	73	297/km²		
China	**59**	**180/km²**		
India	**48**	183/km²		
Belgium		**333/km²**		

the need for certain preconditions of production, we must concentrate upon the development of the quality of the individual person within society. For example, the amount of time of the child freed for education, will affect the level of development of that child's knowledge and mental powers. To provide a suitable quality of education, even with the best teachers, would not be possible unless the economic standard of household life permitted the young to devote the greater portion of the many years of childhood and adolescence to such education. The health and longevity of the members of the households, is crucial for this. Those social relations and material conditions of family and community life, which are essential to the improved development of the individual personality's scientific and artistic powers, are essential material needs of the household and community, are essential features of the "energy of the system" required to perpetuate a specific, corresponding level of potential productive powers of labor.

Similarly, any society based upon a fixed productive technology, must decay into ruin from the accumulated effects of what we term "technological attrition." Without investment in scientific and technological progress, a society will degenerate. Yet, investment in scientific and technological progress requires increased investment in infrastructure, in improvements in nature, in water consumed per capita, in power consumed per capita, and in tools of production required per capita.

If we examine today's best estimates for the demographic characteristics of populations over the known span of history and pre-history, we see four raw characteristic features in all human progress: 1) Increase of the potential relative population-density, per square kilometer of relevant land-area; 2) Improvements in life-expectancy and health; 3) An increase in the required consumption, and output of the society, per capita, per household, and per unit of land-area, for all categories of existence and production; 4) An advance in science and technology (see **Figure 3**).

The demographic history, and pre-history of the human species shows us to be unique among all known existences in this universe. Only mankind has demonstrated to us the power to increase our species' increasing power over the universe. The essential fact, is that each valid revolutionary discovery of principle of science and Classical art-forms, if employed for practice, increases mankind's power to live in this universe. This is illustrated by the fact that the human population has not only increased, but that, if society is not ruled by fools, the conditions of longevity, health, and leisure for the cultural development of the individual and family are improved. Mankind has already embarked upon the exploration and colonization of space within our solar system; once we have mastered the secrets lurking within the already discovered reaction between matter and anti-matter, our species will have tapped the resource needed for exploration beyond our solar system. Whenever we obey the power for valid discovery of principle which is uniquely exhibited by the human individual, the evidence is, that the universe is so pre-designed, that it must obey the creative will of mankind. That is, and must be, the principle by which all constructions in economic science are governed.

In the author's teaching of physical economy, usually on the graduate level of university instruction, he found it necessary to focus on the way in which advancement of mankind, in terms of those four raw factors, may be seen through the eyes of a society consistent with the (pre-1966) modern industrialized nation-state form of society. For that introductory course, the emphasis is placed upon the social division of labor in the production of goods, as presented in this text. The notion of function is associated with the required changes in the division of labor, as the result may be described in terms of a set of simple inequalities.

However, the reader should not overlook the fact, that this textbook claims to offer no more than a necessary first step of introduction to economic science. Do not lose sight of what lies beyond this beginning: the role of the creative cognitive powers of the individual, as the source of the society's increase of its per-capita productive powers of labor. What lies beyond this introductory text, is the crucial role of the fundamental discovery of Bernhard Riemann, in making possible the mathematical and related representation of the principles set forth here.