Letters

Economic Forecasting

I burst into laughter when I read that John Reed, chairman of Citicorp, was looking to a marriage of physics and mathematical economics to improve economic forecasting to help prevent additional billions in losses from bad loans to Third World nations (Research News, 18 Aug., p. 700). Chairman Reed would do better if he turned to those of us who study deception, betrayal, chicanery (scientific, economic, and otherwise), organizational irrationalities, unrestrained self-interest, fraud, waste, and corruption. Those bad loans were not made because economists forgot that cartels are unstable, or because they never knew that marginally prosperous and impoverished nations are a bad risk. They were made because rascals in high places created social definitions of situations that labeled such loans "economically rational," most likely with the help of quantitative analysis. I'd love to examine the documents justifying those loans. I'd especially appreciate seeing the memo from the Cassandra (there's usually one in every organization, poor fellow or gal) who warned of the dire consequences that were likely to follow.

I do not know the details of the reasons for those bad loans, but I do know the domains of social inquiry that will enlighten us about them; and those domains are not physics and mathematical economics. The people who can tell us how the bad loans came to be made are those who study politics and government, bureaucratic organization, international relations, bribery, corruption, irresponsible self-interest, etcetera, etcetera. And these are not dirty words to me and my ilk. They are grist for our intellectual mills, human foibles without which life would hardly be worth studying. And we need not fear they will soon be in short supply. I await with relaxed breath the next reports of billions in bad loans, here and there, mathematical models and all.

Congratulations and best wishes to Philip Anderson and Kenneth Arrow for an interesting intellectual endeavor; but let no one think they will reduce Citicorp's bad loans in the future. Be of good cheer!

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To those of us—including people rigorously trained as "engineers," "philosophers," "theologians," "biologists," "historians," "physicists," "anthropologists," yes, and even a few "economists"—who have been struggling for years, mostly in isolation, to integrate knowledge from many disciplines, to challenge underlying disciplinary assumptions, and above all, to make sense for our students of what is going on in a world undergoing phenomenal upheaval, Robert Pool's description of the "meeting of minds" of physicists and mainline economists at the Santa Fe Institute was mildly amusing for several reasons.

First is the notion that the best place to go for better theory regarding complex human behavior is to physicists. For some reason, physics is considered the only legitimate yardstick by which all other human thought, especially that of the sort dubbed "scientific," is to be judged. Is there some intelligible reason why the behavior of particles, atoms, and molecules is a good place to look for models of social behavior?

Second is the notion that those who have been trained in modern "economics" actually deal with economic realities. In fact, they deal primarily with that minuscule section of economic activity where monetary exchange goes on, ignoring most of the unpaid economic production and services of the world's women, of volunteers, and of nature herself. They appear more interested in something as artificial and peripheral to true, human economic concerns as the stock market; they knowingly cling to such assumptions as that man [sic] acts rationally in "his" own best interests, disregarding cultural norms, artificial persuasion, and a multitude of other factors; and they persist in labeling as economic "growth" both the commoditization of once free services, such as child care, and the costs of paying people to clean up environmental and social messes that a thoughtless society has created.

Only when "economists" begin to rethink the social and human basis of their subject matter and understand its ecological underpinnings, will any real progress be made in solving the paired global problems of human inequality and planetary decay.

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Indirect Costs

The News briefings of 18 August (p. 705) include a commentary on a congressional action to cap indirect costs on Department of Agriculture grants ("Congress caps grant overhead charge").

Indirect costs are essential to the support of environments that permit the effective conduct of research at universities and are a continuing source of fractious relationships among faculty investigators, university administrators, grant-making agencies, and the Office of Management and Budget (OMB). Given this fact, it is surely not helpful to employ a news report to exacerbate these tensions through inflammatory language and inaccuracies.

Specifically, the phrase describing indirect costs as "the amount of money institutions *rake off* from researchers' hard-won awards" (emphasis added) misrepresents the purpose of those costs, which are essential to the conduct of research—such as space operation and maintenance, financial and personnel operations, libraries, and administration—but which are difficult to allocate directly to specific projects.

And the assertion that "overhead charges gobble as much as 77% of a grant" is surely a gross exaggeration. Indirect costs are distributed by using a rate applied to a base of modified total direct costs (MTDC), from which are excluded major equipment purchases and subcontracts, as defined by an OMB circular. The indirect cost rates at a sample of major private research universities average 66%, according to an American Association of Universities study completed in 1988 (the Pings report). Rates at similar public research universities average 49% principally because state funds are used to help underwrite the costs of infrastructure.

A 66% indirect cost rate applied to a grant or contract in which all direct costs are included in the MTDC base causes about 40% of the total allocation to be used for costs allocated indirectly (0.66 divided by 1.66 = 0.40).

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Correction

In our report "Amplification and molecular cloning of HTLV-I sequences from DNA of multiple sclerosis patients" [E. P. Reddy, M. Sandberg-Wollheim, R. V. Mettus, P. E. Ray, E. DeFreitas, H. Koprowski, *Science* **243**, 529 (1989)], reference 16, which described the sequence and position of primers in the published HTLV-I sequence of Seiki *et al.*, contained three errors. (i) In the sequence given for one of the *gag* primers, a "C" was omitted. The actual sequence of the primer is 5′-CGACCGCCCCGGGGGCTGGCCGCT-3′. The miss-

ing "C" in the published report is underlined. (ii) A second error occurred in the description of the position of the primers used for amplification of envelope sequences. The text should have read, "These primers would be expected to amplify the region between nucleotides 5662 to 6129 instead of 5684 to 6151." This confusion in numbering arose because the Los Alamos computer database on human retroviruses used a different numbering system, which we inadvertently used in describing the position of the primers and probes. (iii) In describing the reaction conditions, we inadvertently described the enzyme assay conditions provided by the manufacturer instead of the reaction conditions used for amplifications. The following restatement of reference 16 is correct.

16. The primers were derived from the *gag* and *env* regions of HTLV-I. The two *gag* primers were 5′-CGACCGCCCCGGGGGCTGGCCGCT-3′ and 5′-GGTACTGCAGGAGGTCTTGGAGG-3′. These primers would be expected to amplify the region between nucleotides 842 and 1375 of the sequence described by Seiki *et al.* [M. Seiki, V. Hattori, M. Yoshida, *Proc. Natl. Acad. Sci. U.S.A.* **80**, 3618 (1983)]. This region corresponds to the region between nucleotides 863 and 1397 of the same sequence reported in the Los Alamos computer data base for human retroviruses (accession numbers J02029,K02722, J02028, J02030, J02031, and J02032). The oligonucleotide probe was 5′-GATCCCGTCCCGTCCCGCGCCA-3′, which spans the region between nucleotides 1080 and 1101 of the published HTLV-I sequence (corresponding to 1102 and 1123 of the data base). The two *env* primers were 5′-CTCCCTTCTAGTCGACGCTCCAGG-3′ and 5′-GCCACCGGTACCGCTCGGCGGGAG-3′. These primers would be expected to amplify the region between nucleotides 5662 and 6129 of Seiki *et al.* (corresponding to nucleotides 5684 and 6151 of the database). The oligonucleotide probe was 5′-GCCTCTCCACTTGGCACGTCC-3′, from nucleotides 5877 and 5897 (corresponding to nucleotides 5899 to 5919 of the data base). In some instances a nick-translated probe derived from the HTLV-I proviral genome that spanned the amplified region was used instead of the oligonucleotide probe. Amplification of the DNA was performed with the Geneamp kit provided by Perkin-Elmer Cetus Corp. (Norwalk, CT). The reactions were carried out with 2 μg of DNA and 1.0 μmol of the primers under conditions modified from those specified by the manufacturer. The reaction mixtures contained 10 m*M* tris-HCl, *p*H 8.3; 50 m*M* KCl, 1.5 m*M* $MgCl_2$, 0.01% gelatin, 200 μ*M* each of dATP, dGTP, TTP, and dCTP in a final volume of 100 μl. 2.5 units of *Taq* polymerase were used for each assay. Typically, for each cycle of amplification, the mixture was denatured at 94°C for 2 min, annealed at 55°C for 1 min, and then extended at 70°C for 2 min. From 36 to 40 cycles of amplification were performed and fresh enzyme (2 to 5 units) was added to each tube at the end of every tenth cycle."

In the text of the same paper, the fourth sentence of the fourth paragraph should have read, "These were 23–24 bases long and rich in G–C content to allow stable hybridization."

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Erratum: In the News & Comment "Ethics and science" feature "Science advisers need advice" by Eliot Marshall (7 July, p. 20), Dinoseb is described as "a fungicide made by Uniroyal." Dinoseb is registered as both a fungicide and a herbicide. It was primarily used as a herbicide. It was manufactured by Uniroyal and by several other companies, but Uniroyal was not involved in the litigation mentioned in the article.

Erratum: In Mark Crawford's News & Comment article "Lab report puts SSC magnets in limbo" (25 Aug., p. 809), it was said that the Bush Administration could request $900 million in funding in for the Superconducting Super Collider for fiscal year 1991. That number is wrong. The correct estimate for project funding is $593 million.

Erratum: The photograph accompanying the News & Comment article "Jet Propulsion Lab looks to life after Voyager" by M. Mitchell Waldrop (8 Sept., p. 1037) was generated on a VAX with a photoclinometry program developed by Randy Kirk of the U.S. Geological Survey in Flagstaff, Arizona. The Jet Propulsion Laboratory's hypercube computer was not used to generate the panorama shown, as stated in the caption.