

PHYSICS and SOCIETY

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PHYSICS AND SOCIETY is a quarterly newsletter of the Forum on Physics and Society, a division of the American Physical Society. The newsletter is distributed free to members of the Forum and also to physics libraries upon request. It presents news of the Forum and of the American Physical Society and provides a medium for Forum members to exchange ideas. PHYSICS AND SOCIETY also presents articles and letters on the scientific and economic health of the physics community; on the relations of physics and the physics community to government and to society, and the social responsibilities of scientists. Contributions should be sent to the Editor: John Dowling, Physics Department, Mansfield State College, Mansfield, PA 16933, 717-662-4275.

Forum on Physics & Society
Physics Department
Mansfield State College
Mansfield, PA 16933

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An Invitation to AAPT Members

The officers of the American Association of Physics Teachers have graciously donated most of the funds to pay for sending this issue of PHYSICS AND SOCIETY to all AAPT members. PHYSICS AND SOCIETY is the newsletter of the Forum on Physics and Society, of the American Physical Society. This issue is being sent to AAPT members because there are many common interests shared by the Forum and AAPT members. The Executive Committees of both the Forum and AAPT wish to encourage their respective members to join both organizations and to promote their mutual interests. AAPT members who are currently APS members may join the Forum simply by filling out the form below and returning it to Dietrich Schroeer. Dietrich will inform the APS office and you will become a Forum member and receive the newsletter. Both are free to APS members. If you are an AAPT but not an APS member you may subscribe to the newsletter by filling out the form below and returning it to Dietrich Schroeer with your check. We apologize for the increased subscription costs for non U.S. residents, but newsletters mailed outside the U.S. have to be sent first class and enclosed in envelopes. The Executive Committee of the Forum would like to invite AAPT members to subscribe to Physics and Society and to attend Forum sessions at the meetings.

Please check one:

_____ I am currently an APS member (but on a Forum member) and wish to join the Forum and receive the newsletter.

_____ I am not an APS member but wish to subscribe to PHYSICS AND SOCIETY (subscription costs; U.S. \$3, Mexico and Canada \$4, all others \$5). Please enclose your check, payable to Forum on Physics and Society.

Name _____

Address _____

Mail this form to: Dietrich Schroeer
Physics Department
University of North Carolina
Chapel Hill, NC 27514

AAPT COMMITTEE ON WOMEN IN PHYSICS:

By Betty Windham, Physics Dept., William Rainey Harper College, Palatine, IL 60067.

The Committee on Women in Physics of the American Association of Physics Teachers established in 1980 is charged with the implementation of actions to alleviate barriers to the entry of women into the physical sciences and mathematics. Recognizing that these barriers are complex and involve all aspects of our society, as well as our homes and schools, such actions must of necessity be diverse and include among others:

1. investigations of the cultural, sociological, and economic barriers to the study of the physical sciences and mathematics
2. the education and employment of physics teachers
3. educational reentry
4. the establishment of liaisons with other appropriate professional organizations and societies.

One of the most important liaisons which the Committee maintains is with the APS Committee on the Status of Women in Physics (CSWP). While no attempt will be made to duplicate projects already undertaken by CSWP, we will cooperate with them on projects and activities that can benefit both societies. During the past year the APS Committee published a packet of materials, Wanted: More Women in Science and Technology, designed to assist junior and senior high school counselors and teachers in advising and encouraging young women to enter science careers. This packet has been made available for purchase by AAPT members and will be utilized by our committee in projects involving high school teachers and counselors.

To provide a source of contact among women physics teachers from all levels, our Committee will continue to hold an "Open House" at the national meetings and provide the service through the Announcer whereby women AAPT members interested in sharing a room at national meetings can contact other women members and thereby reduce travel expenses. From their Roster on Women in Physics, CSWP has made available to us entries who indicated undergraduate, graduate, or secondary school teaching as one of their top four activities. Entries for a roster of women teaching physics at all levels and other APS and AAPT members interested in receiving news of the work of the AAPT Committee on Women in Physics are being solicited in this newsletter (see page 3) and by a mailing to all AAPT members. The Committee wishes to publicize groups that encourage young women to enter careers in the physical sciences, that train women reentering the scientific job market, or that promote the careers of those already in science teaching. A network of ideas will be generated which should prove a valuable asset to AAPT, APS, and the country as a whole.

The second significant charge given to the Committee is to oversee the writing of proposals and/or the establishment of programs aimed specifically toward the education of women in the physical sciences and mathematics. We are currently seeking funding for the establishment of a pilot project at three regional sites to encourage the participation of high school women in the physical sciences and mathematics.

The project to be implemented at three postsecondary institutions will focus preliminarily on an audience of eighth grade girls. Eight to ten workshops will be developed and conducted at each site for the young women during the fall of eighth grade. These will emphasize hands-on activities designed to foster an interest in the physical sciences and confidence in their ability to use simple tools as well as the more sophisticated equipment found in college/university laboratories. Discussions with women scientists and engineers concerning career opportunities and the type of preparation required during high school and college for such careers, as well as field trips to the industrial complexes or research laboratories where these adult role models work, will also be an integral part of the program.

During the spring semester when the young women will be preparing to make high school curriculum choices, each site will conduct a mini-workshop for their parents and the counselors and science and math teachers from the high schools the girls will be attending. This will be used to stress ways in which these groups can assist the young women in making course selections appropriate to their scientific interests, and positive attitudes that adults must possess if they are to be a source of encouragement to young women desiring to pursue a so-called nontraditional career in science or technology.

The program at each site will culminate with a meeting during the fall semester when the young women will be high school freshmen. This will provide an opportunity for the girls to renew friendships they formed during the course of the workshops. The staff will be able to reinforce ideas brought out in the workshops and conduct an in-depth evaluation of their program.

Aware that sex-role stereotypes are often transmitted consciously or unconsciously by counselors, teachers, and parents, the Committee is also discussing the possibility of producing mini-workshop modules that could be used with these groups. These would utilize research similar to that employed in the development of the AAPT Workshop "The Development of Student Confidence in Physics". The purpose would be to decrease sex-role stereotyping and increase the sensitivity of the participants to the problems faced by women students in the sciences and mathematics.

As its second year of operation begins the Committee looks forward to establishing a firm communication link with all women physics teachers and its other friends in AAPT and APS. Only by a fruitful interchange of ideas that reflect the concerns of our joint memberships can we hope to design programs and activities that will have maximum impact upon the education and involvement of women in the physical sciences.

I would like to be included on the mailing list of the AAPT Committee on Women in Physics to receive information regarding their activities and those of other groups attempting to facilitate the entry of young women into careers in the physical sciences, to train women desiring to re-enter such careers, or to promote the careers of those already engaged in the teaching of the physical sciences. This information will not be made available to commercial or political organizations as a mailing list. Information regarding women on the list will be used to compile demographic data on women teaching in the physical sciences and to ascertain their needs and concerns.

NAME: _____
 (last) (first) (middle)

 optional: (maiden)

On the following line, please enter your full name and title of address as it should appear on the mailing label.

ADDRESS: _____

 (city) (state) (zip)

COMMENTS REGARDING YOUR CONCERNS AND SUGGESTIONS FOR ACTIVITIES THE COMMITTEE SHOULD ADDRESS:

Thank you for your interest and participation. Please return the questionnaire to:

Prof. Betty M. Windham
Physics Department
William Rainey Harper College
Palatine, IL 60067

 *
 * **THE FORUM AT SAN FRANCISCO** Don't just leave *
 * your heart in San Francisco, leave your whole *
 * body there from Sunday morning until Thursday *
 * afternoon. The **Forum**, as usual, has lots going *
 * on. Don't come all the way to San Francisco and *
 * then leave early and miss the very important *
 * Thursday session **Disarmament, Cold War or** *
 * **Nuclear War**. Here is a summary of what is hap- *
 * pening with the **Forum** at San Francisco: *
 *

Short Course on the Arms Race (with AAPT) 10 am to 5 pm, Sunday, 24 January 1982 Continental Parlors, Hilton.

The course is intended to supply information to physicists who either plan to teach about the arms race or who want to study the issue of the arms race more deeply. The talks will cover technical aspects of such topics as the effects of the nuclear arms race, the MX missile, the neutron bomb, and electromagnetic pulse problems. Resource materials on the arms race will be made available. There will be a \$25 fee to cover the cost of materials, the room, speaker expenses, and coffee. Please pre-register by writing Dietrich Schroeer, Physics Dept., Univ. of North Carolina, Chapel Hill, NC 27514.

- 10:00 Nina Byers (UCLA) Intro and Welcome
- 10:10 Henry Kelly (OTA), The Effects of Nuclear War
- 11:05 Robin Staffin (UC/LL), MX Technology and the OTA MX Basing Study
- 12:00 Kosta Tsipis (MIT) New Technology : e.g. Laser/Particle Beam Weapons
- 2:00 Gloria Duffy (Stanford), Arms Control: The Political Context
- 3:00 David Hafemeister (Cal Poly), Numerical Estimates on Armaments
- 3:35 John Dowling (Mansfield State), Media Resources for Arms Race Courses
- 4:00 Dietrich Schroeer (U. N. Carolina), Arms Race Courses for Nonscientists
- 4:45 Marvin Goldberger (Cal Tech), Summarizing Remarks

Nuclear Energy, Nuclear Weapons Proliferation, and the Arms Race, 7:30 pm, Tuesday, 26 January 1982, Continental Ballroom 5, Hilton

Presiding: Jack M. Hollander, U. of California, Berkeley, CA 94720

- 7:30 Nuclear Power and Nuclear Weapons Proliferation: How Close Is the Connection? Part I (John P. Holdren, Dept. of Energy Resources, University of California, Berkeley)
- 7:50 Nuclear Power and Nuclear Weapons Proliferation: How Close Is the Connection? Part II (Bernard I. Spinrad, Dept. of Nuclear

- Engineering, Oregon State Univ.)
- 8:10 Nuclear Power and Nuclear Weapons Proliferation: Horizontal Proliferation (Gene I. Rochlin, Senior Researcher, Institute for Governmental Studies, University of California, Berkeley)
- 8:30 Nuclear Power and Nuclear Weapons Proliferation: Vertical Proliferation (Jeremy J. Stone, Director, Federation of American Scientists)
- 8:50 Discussion

The Potential for an Efficient Energy Future - The SERI Solar-Conservation Study, 7:30 pm, Wednesday, 27 January 1982, Continental Ballroom 5, Hilton

Presiding: Robert J. Budnitz, Future Resources Associates, Inc., Alameda, CA 94707

- 7:30 The SERI Solar-Conservation Study: The Utilities Sector (Henry Kelly, Office of Technology Assessment, U.S. Congress)
- 8:00 The SERI Solar-Conservation Study: The Buildings Sector (Arthur H. Rosenfeld, Lawrence Berkeley Laboratory)
- 8:30 The SERI Solar-Conservation Study: The Industrial Sector (Marc Ross, University of Michigan)
- 9:00 The SERI Solar-Conservation Study: The Transportation Sector (Charles Gray, U.S. Environmental Protection Agency)

Disarmament, Cold War, or Nuclear War 1:30 pm, Thursday, 28 January 1982, Continental Ballroom 5, Hilton

Presiding: W. Chinowsky, University of California, Berkeley, CA 94720

- 1:30 Negotiating with the Soviets: Personal Experience (H.F. York, University of California, San Diego)
- 2:00 The Soviet Approach to Arms Control (G. Breslauer, University of California, Berkeley)
- 2:30 Physicists, Politics, and Nuclear War (C.L. Schwartz, University of California, Berkeley)
- 3:00 Arms Control and Weapons Decisions for the Eighties (S.D. Drell, Stanford Linear Accelerator Center)
- 3:30 Discussion

Executive Committee Meeting will take place on Monday, 25 January 1982 at 4:00 pm in the Whitney Room of the Hilton. Forum Members are invited to attend. The Agenda will include the following:

- 1) review of the Short Course on Arms Control and Disarmament, and discussion of future short courses.
- 2) discussion of future publications, including possibly a future Journal on Physics and Society.

- 3) consideration of **Forum-POPA** links.
- 4) review of **Forum-AAPT** links.
- 5) general discussion: what else should the **Forum** be doing?

you wish to volunteer your services or to find out what is being planned for your community you may contact Ground Zero at their Washington office, 806 15th Street NW, Suite 421, Washington, DC 20005, 202-638-7402.

THE FORUM AT DALLAS

Science, Technology, and War: Issues for the 80s, 9 March 1982, 7:30 p.m., Chaired by Esther Conwell, Speakers are Lloyd Davis, Peter Zimmerman, Richard Garwin, and George Millburn.

Opportunities for Minorities, 11 March 1982, 2 p.m. Chaired by Walter Massey, Speakers are Carl Spight, John Slaughter, James Rutherford, and Debra Jackson.

ANNOUNCEMENTS

FORUM AWARDS The Forum is proud to announce that W.K.H. Panofsky is the 1982 Szilard Award recipient and Philip Morrison is the 1982 Forum Award recipient. The formal presentation of the awards will be at the Washington APS Meeting. The Awards Committee consisted of Joel Lebowitz (Chairperson), Dietrich Schroerer and Mary Beth Stearns.

Helsinki Watch Calendar The U.S. Helsinki Watch Committee announces the publication of their 1982 Helsinki Prisoners Watch Calendar. It is a 24" x 36" poster which gives information on Helsinki Monitors currently in prison. One copy (folded) will be sent free upon request. Rolled copies (for hanging) will be sent at \$5/poster to anyone you request. Write: Helsinki Watch, 205 E. 42nd St., New York, NY 10017.

The Forum is always in need of people to serve on committees and to coordinate activities. If you wish to serve on the executive, awards, or nominating committee please contact Nina Byers, Dept. of Physics, U. of California at Los Angeles, Los Angeles, CA 90024 (213-835-3588).

Ground Zero Update by Leo Sartori, Physics Department, University of Nebraska, Lincoln, Nebraska 68588

In previous issues I reported on the formation of Ground Zero, an organization dedicated to raising public awareness and stimulating discussions on the danger of nuclear war and its consequences. Ground Zero will conduct a week long program of educational activities both local and national in scope on April 18-25, 1982. Because of delays in setting up Ground Zero organizational structure the Forum has decided not to ask APS to affiliate formally, however there will be ample opportunities for Forum members to participate individually in Ground Zero activities. Local groups are being formed throughout the country. If

Committee on Opportunities in Physics: A Report by Earl Callen, Physics Department, American University, Washington, DC 20016.

The COPS (nee Professional Concerns) met on 14 November 1981 and discussed the following items:

Accreditation: The Professional Concerns Committee of the American Association of Physics Teachers is considering the issue of accreditation of physics departments. Is there a minimum size PhD program? How does one evaluate for BS, MS and PhD programs? The COPS will ask the AAPT committee to keep us and the APS Education Committee up to date on their progress.

Pentagon Fellowships: DoD will institute a new, high-stipened fellowship program, to stimulate the production of PhD's in technical fields important to the DoD. Plenty of Forum members will fear such a shaping of the scientific enterprise. But ONR has been shaping physics and mathematics for about 35 years now. Research funding is taking a clobbering from the Reagan Administration. It is estimated that Argonne, Brookhaven, Los Alamos and the National Bureau of Standards will each be dropping some 500 employees. Let us hope that the DoD fellowships are handled with the same breadth of view and long term sense of mission that has characterized ONR. This may be the only good news around; don't spoil it.

Public Education: The COPS resolved to urge the new POPA Subcommittee on National Scientific Affairs to consider the desirability of a joint voice for science in Washington. (**The Forum** urged that on the APS Council long ago.)

Employment: I mentioned above that some 2000 persons are likely to be dropped by the national labs. The COPS will suggest to the AIP manpower service that their mailings to industry could point out the availability of this large pool of highly skilled personnel soon coming onto the employment market.

Engineering and Applied Physics: Because of the job market and the salaries, good students who once went into physics are now going into engineering. Are there faculty jobs in engineering schools for physicists who know applied physics, and understand what goes on in industry? Can physics departments prepare students for industry? What should we be teaching? Would a short course be useful, to teach ourselves what we have to know, and what materials are

available to learn it? How do we get over the snob values we inculcate (quantum is better than classical; pure research is better than applied; college is better than industry)? The COPS will consort with the Committee on Education to field a short course for physicists.

Grievances: Is there a way our Society can be helpful in resolving personnel grievances? Do we need an ombudsman? What do other Societies do. (The chemists do plenty; they even blacklist employers who hire and fire too freely.) The COPS will gather information pursuant to looking into all this.

Ethical Guidelines and Travel of Government Employees: To avoid a conflict of interest, government employees are forbidden from receiving gifts from those they do business with. This has been interpreted by some agencies (NASA) in such a way as to make it exceedingly difficult for their employees to receive travel money from professional societies. Some NASA employees have been, in effect, kept from giving university colloquia, working on APS committees, and working jointly with fellow researchers at universities and non-profit research centers because NASA policies are unduly restrictive and time-consuming in execution. Since NASA policy seems to be the result of a uniquely and excessively stringent interpretation of guidelines which are government-wide, it may be possible to resolve the problem by talking to the right people at NASA.

Retired Physicists: There is a large pool of highly skilled, experienced retired persons, underutilized and often at a loss for what to do with their time. At UCLA, a highly successful program brings retired social scientists together to hear each other's research papers at regularly scheduled seminars. Another mode might be a broad based consulting group. The COPS are going to look around for a retired physicist to do a study for us on how retired physicists could be utilized. (Ed Edelsack of ONR stimulated this.)

"A SIMPLE ECONOMIC CATASTROPHE" - A PHYSICIST'S LOOK AT THE EFFECT OF OIL COST by Frederick J. Mayer and Thomas Speziale, 1417 Dicken Dr., Ann Arbor, MI 48103

Beginning last year the United States began experiencing an increased rate of devaluation of the dollar. Economists and government leaders caution that the inflationary pressures are many and that predictive modeling of our economic circumstances is quite difficult. It is an important approach, however, to attempt to construct simple model representations which contain the most important effects, leaving the

smaller terms for more detailed theories. We have entered an era of diminishing energy supplies and have watched the buying power of currency steadily dwindle. The rapidly rising cost of oil apparently adds to inflation. Rather than addressing the specific causes of inflation in detail it is illuminating to rely more on the data and include a minimum number of assumptions in an inflation model. It is our purpose in this letter to describe a quite simple model for the decreasing value of the U.S. dollar - inflation, driven by the continued dependence on imported oil. We call this model, "A Simple Economic Catastrophe", and we believe the U.S. economy is presently progressing directly along the model path.

Our model has two basic assumptions: 1) the value of the dollar decreases due to two effects - the underlying long-term inflation psychology (α -term) and the now important inflationary pressure of the cost of oil (β -term); 2) the OPEC oil price will be adjusted to maintain constant purchasing power. These two assumptions are the model and can be mathematically represented by the simple differential equations:

$$\dot{V} = -\alpha - \beta C \quad (1)$$

$$VC \approx m \quad (2)$$

where $V(t)$ is the value of the dollar in 1967 dollars, $C(t)$ is the cost of oil, and α , β , and m are constants. This set of equations can be simply integrated for arbitrary choices of α , β , and m . The most striking mathematical result of this system is that $V(t)$ goes through zero at some time t_c (which we call the collapse-time), not an asymptotically decreasing function as might be expected. In Figure 1, we have plotted the dollar's value, the data being taken from the Detroit Free Press of January 26, 1980. From the data during the period, 1967-1978, we can determine the constant $\alpha \approx (0.047/\text{years})$ and attach our simple model at 1979. The dollar value data itself is very interesting in that, 1) it shows a very linear decrease since 1967, not exponential as might be expected; 2) there was no abrupt slope change in 1973 when the oil price increase could have had an effect; 3) there was no strong change from 1978 to 1979 when large increases in oil prices occurred, which implied that the βC -term was, as of last year, still small compared with the α -term in the model; and perhaps most important, 4) the extrapolation of the linearly decreasing dollar value into the future shows that the dollar value goes through zero in 1988. The latter result, of course, assumes that the economy would proceed, somewhat unrealistically, along its course undisturbed by other economic or political forces.

The striking result that the dollar value goes through zero does not depend strongly on the choice of the constants β and m . In fact, as shown in the figure, the different choices of the parameter $q = 0.5, 0.2, \text{ or } 0.1$, make only a few years difference in the time-to-collapse. Perhaps more importantly, we have examined our model with the inflationary pressure of oil proportional to the time rate of change of the oil price, \dot{C} rather than C (in Eq. 1), with qualitatively the same result. Similarly, a model employing $\dot{V} = (\beta + \gamma C)V$ may be formulated which ignores the data but more nearly resembles a traditional model of inflation. In that case, the β term plays a more dramatic role but the time scales do not differ appreciably from that of the present model. Of course, other factors such as re-evaluation of currency, wage and price controls, and large scale unemployment, etc., will ultimately come into play to keep the value of the dollar from actually becoming of zero value. It is important to realize that this model does not have any strong dependence on production or consumption of oil. However, the constants β, γ , and m , cannot be totally independent of oil production and consumption rates.

This economic catastrophe is both simple - in a model sense - and quantitative. As with any model it needs to be tested against accurate data. Since first constructing this model three months ago, there seems to have been a substantial increase in the rate of inflation. By itself, this adds no validity to the model, but the increased inflation rate does appear to be tied to the increased cost of oil. We expect within a year to be able to extract the value of the constant q from the inflation data.

In conclusion, we have constructed a simple model for the effect of the cost of oil on the value of the U.S. dollar. Our model indicates an inflationary instability, with the value of the dollar going to zero. As is usually the case, simple models such as the present one can be important learning tools. If they contain the correct phenomena they become more than tools, they become the basis for complete theories. If the model has validity, we must, as a nation, avoid this economic catastrophe by becoming a non-oil consuming nation in four to five years and eliminating previous (20 years) inflationary pressures. This is clearly a giant task - we sincerely hope our nation is up to the challenge.

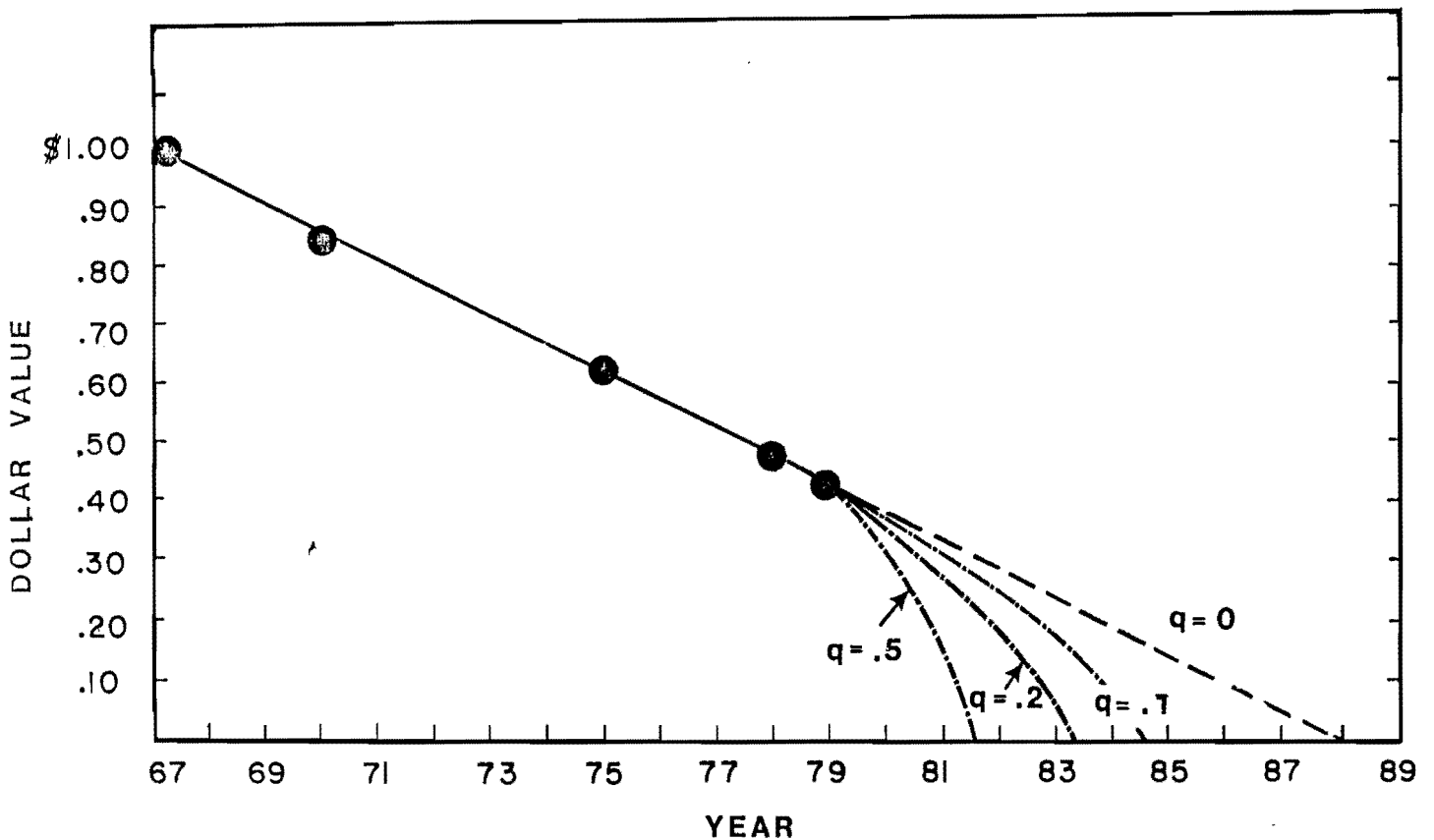


Fig. 1: The value of the U.S. dollar in constant 1967 dollars. The consumer price index data (circles) were taken from the Detroit Free Press of January 26, 1980. The $q = 0$ line is a simple extrapolation of the previous linear trend. Other curves are for $q = 0.1, 0.2, 0.5$ (see text).

FAS PETITION: OUR NATION OUGHT NOT BASE ITS POLICIES OR ITS WEAPON PROGRAMS ON THE BELIEF THAT IT CAN LIMIT, SURVIVE, OR WIN A NUCLEAR WAR.

Return Petitions to: Federation of American Scientists (FAS)
307 Mass. Ave. N.E., Washington, D.C. 20002

NUCLEAR WAR IS NATIONAL SUICIDE

NAME (Signature)	NAME (Print)	ADDRESS	CITY, STATE & ZIP
1). _____		_____	_____
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10). _____		_____	_____

ON THE FEDERATION OF AMERICAN SCIENTISTS (FAS) PETITION

The Federation of American Scientists, which was created in 1945, as the Federation of Atomic Scientists, knows as well as any organization the special danger posed by atomic and thermonuclear weapons. Most cities can be destroyed completely by a single such weapon, and every city can be destroyed by a relatively small number of such weapons. Each superpower has several thousand nuclear weapons at the ready, but only about 100 major cities. In particular, the Soviet Union has 6,000 one-megaton range warheads which can be compared with the fact that the United States has 60% of its population in the 300 largest metropolitan areas and only 2,000 cities and towns with populations of 10,000 citizens or more. The situation is similar with the U.S. having 10,000 nuclear warheads aimed at a country of about 100 large cities. After these weapons are fired, the question at issue will not be "How much was destroyed?" or even "How much of each country was left?" but "Can a united country be resurrected?"

Notwithstanding the starkness of this situation, a number of U.S. policies, actions, and tendencies are related to a failure to recognize fully these basic facts. Among these facts are:

- a). A belief that nuclear war can be limited.
- b). The buying of an ability to strike Soviet ICBMs.
- c). Talk of amending the ABM Treaty.
- d). The go-ahead on neutron bombs.
- e). Faith in Civil Defense.
- f). Degree of belligerence in foreign policy.
- g). Low priority given to the Arms Talks.
- h). The irrelevance of the debate over "who's ahead"

Some background on FAS views on this subject appear in the February, 1981 issue: "Nuclear War is National Suicide" and more copies of this newsletter can be secured by applying to our office \$1.00 for single copies and \$.20 for each additional copy. Decals asserting the view "Nuclear War is National Suicide" are also available. Persons willing to circulate this petition will be sent, while they last, some additional material for their background and free copies of the February issue. These can be used to persuade the uncommitted that nuclear war is indeed something that ought not be risked.