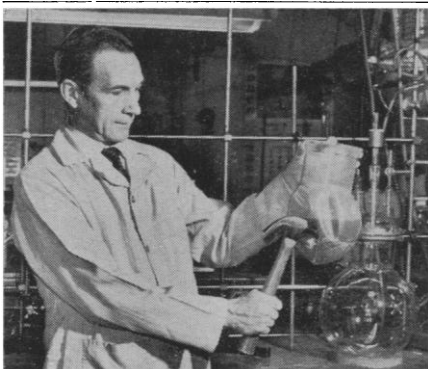




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use his knowledge to create new avenues in which his ability could be expanded and take new growth." She offers the following suggestions.

1) The present retirement age limit of scientists and engineers could be raised, provided the potential retiree desired it.

2) Libraries could establish or enlarge scientific departments in which retired scientists could serve to make a knowledge of science more easily and readily available to the public.

3) The various communication media (newspapers, magazines, and radio and television stations) which have potential for useful instruction could engage retired scientists either to teach or to assist others in teaching science to nonscientists.

4) Scientists having their own businesses could employ scientists of retirement age on an equal footing, or could form partnerships to expand such businesses.

NATHANIEL TISCHLER

Monroe School Lane,
Jamesburg, New Jersey

The Cost of Credit

It is alarming to me that Reavis Cox [*Science* 135, 48 (1962)] overlooked entirely the basis upon which the editor wrote in support of the Douglas "Truth in Lending Act" (S. 1740) [*Science* 134, 913 (1961)]. The editorial concludes: "The statement of simple annual interest rate would permit a customer to compare the true costs of different forms of credit and to act rationally on that basis. *On balance, we favor any step that encourages rational decisions* [*italics mine*]." Although the bill requires disclosure of both the dollar cost and the simple rate, the editor selected the latter aspect to be "the main feature of the bill." This is the most controversial and significant feature of the bill. Therefore, one conversant with the subject would have appreciated why the editorial was headed "Tricks with numbers," and why the subject was introduced with the theme that a comparison of absolute numbers instead of rates may lead to fallacious conclusions.

But instead of arguing the promotion-of-rational-decisions issue, Cox chose to argue the absolute-number-versus-rate issue, and said that the editor "claimed too much." How did Cox prove that rate information is not needed? He reduced the simple formula $I = Prt$ to an



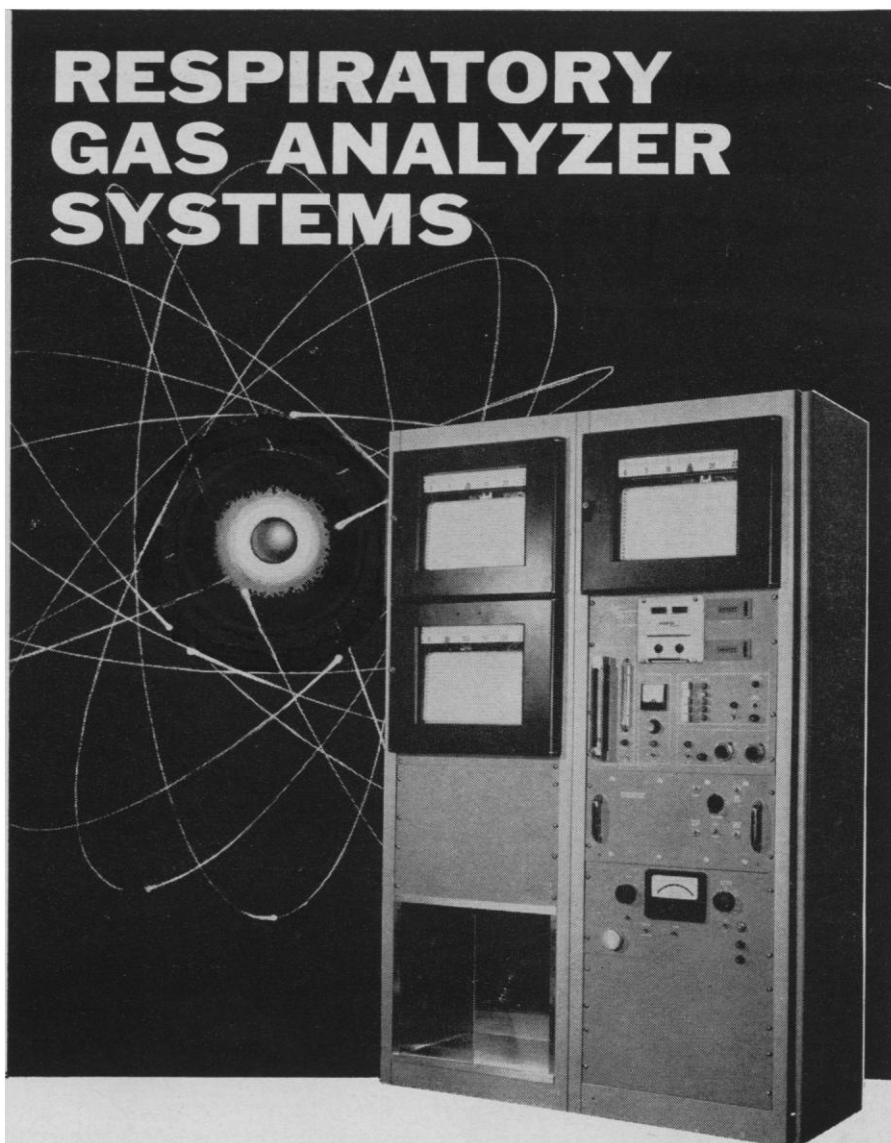
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$I = r$ (constant) equation by fixing P (principle) at \$100 and t (time) at 6 months. Of course, a contract with a greater I would also have a greater r , so he is correct in concluding that no further information than dollar costs is needed in order to decide who offers the buyer the better bargain. But such a simple case inadequately supports his conclusion that the government need require disclosure of only the absolute dollar amounts and not the rates.

If Cox had allowed in his example for variations in time t or in principle P , his case would have been realistic and less useful for his policy position. For example, one loan might have been repaid in monthly payments and not in a lump sum at the end of 6 months. Or perhaps one loan might have been for 7 months. He might have varied the amounts of the loans, with one for \$100 and the other for \$99.45. Or, one loan might have required that the first payment include the total credit charge or payment of the finance charges at the beginning rather than during or at the end of the contract period. Had these or many of the other variations experienced in real life been recognized in Cox's case, he might have been less ready to suggest that mere comparison of absolute numbers is sufficient for judging which of two alternatives is a better bargain. I doubt that savings and investment decisions or decisions made by lenders are based on comparison of absolute dollars alone! If rate comparisons are useful in making many financial decisions, why a double standard for borrowers and lenders as to facts needed for decision making?

At no time does Cox debate the editor's statement "a customer [of consumer credit] usually has no way to determine what his true credit rates are and no standard by which to compare different schemes." In fact, he gives additional examples of confusion. Yet, he rejects the Douglas bill on the grounds that "the bill seems to assume that simplified formulas borrowed from the austere world of pure arithmetic can be applied literally to the complex and disorderly world of commerce." Support for his deprecation of the usefulness of that formula, which many of us find so useful, appears in the March 1962 monthly letter of the First National City Bank (p. 33): "But, in the business world, simple interest is little more than something once learned in school; it is not used in millions of credit transactions consummated each day. . . . Simple interest is too compli-



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cated." Evidently the world of commerce makes the borrower's education obsolete.

What does Cox propose? The situation, he says, calls for further study. And only after such study would it be appropriate to prescribe remedies, if any are required. I emphasize the last four words, "if any are required"; this indicates his failure to understand the rationale for the editorial! Cox seems to assume that disorderliness is to be expected and that need for corrective action to standardize the terms of trade for more intelligent action by borrowers and lenders is not obvious. That the system is too complex for the consumer to make rational choices efficiently evidently does not concern Cox sufficiently for him to recognize the essence of the editorial.

Why the difference in attitude between the editor and Cox? Can it be attributed to a social lag between the physical and social sciences? I think not. Cox, as a student of marketing, shows interest in a description of events, "of what really happens, with what consequences, to how many people." He wants to know how many win and lose or are affected by present practices. He is not interested in whether the market system respects rationality or whether facts are disclosed so that lenders will then compete in a market for borrowers who are armed with essential facts. I dare say he reflects a professional interest in marketing but not in evaluating marketing in the context of progressive public policy (except to defend the status quo). The editor of *Science*, however, reflects a professional interest in rationality. He has taken a very defensible stand from the viewpoint of the scientist, it seems to me. In effect, he says: "How can we expect respect for science on the part of a public which is nurtured in a system which decries the application of even the simple interest formula to everyday credit transactions?" Surely an economy which stimulates competitive deception, discredits the application of intelligence to everyday decisions, and makes thoughtful action costly encourages ridicule of learning and rationality. For example, is there a science teacher who would not find his teaching job less complicated if students had been raised in families which computed prices per pound when buying, or rates of charge when shopping for credit? And how much simpler science teaching might be if students had previous experience with the decimal metric system in the mar-

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ket? Scientists do have a direct interest in the social environment. It seems to me that the editor has taken a very responsible position with respect to the scientific community. For his breadth of view I wish to commend him.

RICHARD L. D. MORSE
Department of Family Economics,
Kansas State University, Manhattan

If I understand Morse's argument correctly he has worked himself into the extraordinary position of asserting that anyone who urges Congress to find out the facts of a situation before trying to regulate it is attacking rationality! As I see it, the issue posed by the "Truth in Lending Act" (S. 1740) is not one of rationality versus irrationality but one of true rationality versus pseudorationality. In pure mathematics or logic the test of truth is consistency alone. In mathematics or logic applied to the real world we must add the test of relevance. It is not really rational to transfer principles bodily from mathematics into politics without assembling and analyzing whatever evidence we can obtain as to their relevance.

The merchants and consumers whom Senator Douglas would regulate are not intellectual constructs or systems of equations limited to a few arbitrarily chosen variables. They are flesh-and-blood people whose welfare is at stake. They differ widely in ability, shrewdness, diligence, integrity, intelligence, education, persistence, and purpose. The specific physical, social, and commercial environments in which they live are spread over a wide spectrum. I therefore have no apology to offer for saying that before Congress enacts this law it should do a better job than I believe it has done thus far in deciding what will happen to whom after it has acted. Nor do I see any real conflict between expressing concern as to "how many win and lose" and efforts to help consumers be more rational in their buying. Morse merely assumes that enactment of S. 1740 would be a "step that encourages rational decisions." Legislation should be based upon knowledge, not assumptions.

Morse is correct when he says that in my illustrations I have arbitrarily held P and t constant and so made r equal I in the formula $I = Prt$. He neglects to say, however, that I have done this only to point out that even in the world of pure logic the assumption that one must always compare rates in order to be rational is not valid. I do not know and I believe no one else

knows, as a matter of fact based upon empirical evidence, the proportion of purchases in which consumers would get from absolute numbers all the information they need for rational comparison of the bargains offered them by different sellers.

Morse apparently has no doubts as to his own knowledge of the facts. He says that introducing many variations of P and t would have made my case "realistic," more in accord with what is "experienced in real life." In practice, I suspect, most individual consumers when they make specific installment purchases have to choose not from all the mathematical possibilities but from quite narrow assortments of alternatives as to goods, sellers, and terms available in the markets open to them. Whether the system now used "is too complex for the consumer to make rational choices" is a question of fact that can be answered only by going into the field and seeing what consumers do. So is the question of whether working with formulas for "true" interest will increase or decrease the complexity of the problems faced by real consumers in the real world.

REAVIS COX
Wharton School of Finance and
Commerce, University of Pennsylvania

Ancient Agriculture in the Negev

The editor of *Science* has kindly consented to the publication of a letter not to exceed 600 words and focusing sharply on material introduced by Evenari *et al.* but not mentioned in my earlier communication (1). I have learned too late that the policy of *Science* allows only one letter of criticism and the author's rebuttal; hence I must reserve my detailed reply to Evenari *et al.* for another forum.

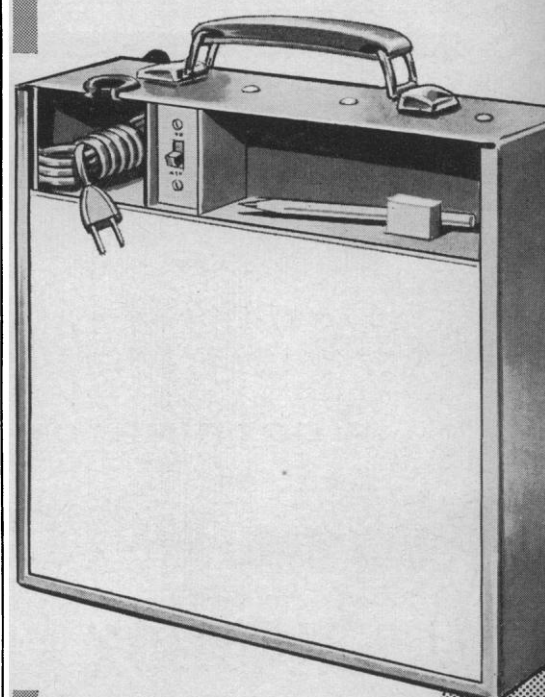
The present issue centers on the following statement by Evenari *et al.*: "Finally, in objecting to our theory Mayerson refers to unpublished information . . . of a series of experiments carried out by the Hebrew University (by us) and the Soil Conservation Service. These experiments, Mayerson maintains, showed that 'undisturbed hammada gave much more runoff than the adjoining piece of ground that was bared of its upper cover. The exact percentages have not been published, but they range from 100%-200%'. . . . This statement is false."

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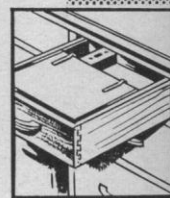
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