

**NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VA 22230**

JUL 14 1999

Dr. Ray Martin
Department of Management & Economics
Alamo Community College
8711 Sicily Isle
University City, TX 78148

SES-9976040

Dear Dr. Martin:

I regret to inform you that the National Science Foundation is unable to support your proposal entitled "Internal Rate of Return in Environmental Decision-Making."

Several factors are considered in evaluating each proposal submitted to the Foundation. Of these, scientific merit is the most important. Other factors of importance include the relation of the proposed research to other research in the Division of Social, Behavioral and Economics Research. Many meritorious proposals cannot be funded simply because of the limited amount of money available for the support of research.

If you would like further information concerning the scientific evaluation of your proposal, please contact the program officer whose name, telephone number, and e-mail address are given on the enclosed information sheet. Copies of reviews solicited from experts in this field are enclosed. These are for your personal use and are not made available by the Foundation to anyone else. They may be helpful to you in understanding the Foundation's action and also in preparing future proposals.

Although we are unable to support this proposal, we would be pleased to consider any future proposals you may wish to submit.

Sincerely yours,

(Original Signed)

William P. Butz
Director
Division of Social & Economic
Sciences

Enclosures

Copy To: Robert Ramsay Chancellor

**EPA-NSF Partnership
Decision Making and Valuation for Environmental Policy
Panel Summary.**

9976040

**Martin, Ray
Alamo Community College District
Internal Rate of Return in Environmental Decision-Making**

This proposal was one of 93 reviewed during the 1999 Decision Making and Valuation for Environmental Policy review cycle. Proposals were reviewed by DMVEP panelists at a meeting April 15-16, 1999. At the panel meeting, DMVEP panelists were briefed on relevant NSF policies regarding confidentiality and conflict-of-interest. Each proposal was then discussed and evaluated individually. The panelists assigned each proposal to one of four categories: (a) must fund; (b) should fund, if resources permit; (c) could fund, if resources permit; and (d) do not fund.

The overriding objective of this research is to determine the extent to which a relevant or revisited internal rate of return (RIRR) could enhance current and upcoming EPA programs and analyses.

Given the overall low evaluations of this proposal by reviewers and the fact that weaknesses in it were thoroughly discussed in the reviews, the DMVEP panel recommended against funding this proposal and chose not to discuss it further.

Do not fund.

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PROPOSAL REVIEW FORM

OMB NO: 3145-0060
NSF FORM 1 (10/97)

PROPOSAL NO: 9976040	INSTITUTION: Alamo Community College District Central Office
PRINCIPAL INVESTIGATOR: Ray Martin	NSF/EPA DMVEP Program
PROPOSAL TITLE: IIA. Internal Rate of Return in Environmental Decision-Making	
<p>* Criterion 1: What is the intellectual merit of the proposed activity?</p> <p>* Criterion 2: What are the broader impacts of the proposed activity?</p> <p>Please attach a separate sheet(s) with your evaluation of this proposal with respect to each of the above criteria per instructions on the previous page. Your specific comments on the proposal's strengths and weaknesses are critical. Do not share, copy, quote or otherwise use or disclose material from this proposal. Destroy it after you complete your review.</p> <p>Summary Statement: (Include comments on the relative importance of the two criteria in assigning your rating. Continue on an additional page, if necessary.)</p> <p>Please see attached.</p>	
<p>Overall Rating (check one):</p> <p><input type="checkbox"/> Excellent: Outstanding proposal in all respects; deserves highest priority for support.</p> <p><input type="checkbox"/> Very Good: High quality proposal in nearly all respects; should be supported if at all possible.</p> <p><input type="checkbox"/> Good: A quality proposal worthy of support.</p> <p><input checked="" type="checkbox"/> Fair: Proposal lacking in one or more critical aspects; key issues need to be addressed.</p> <p><input type="checkbox"/> Poor: Proposal has serious deficiencies.</p>	

NSF Proposal 9976040

PI: Martin

Title: Internal Rate of Return in Environmental Decision Making

Rating: Fair

Summary

The main portion of this proposal is a defense of the Internal Rate of Return (IRR) against a series of criticisms. The author proposes using a Relevant measure of IRR (RIRR) to analyze cost benefit analysis reported in external and internal EPA documents. The comparison will show that RIRR is a useful measure for project analysis, and that it serves as a measure that is complementary to the more widespread traditional net present value discounting method.

Criterion 1: Intellectual Merit

RIRR is never really defined in the proposal. Is it just that one ignores the nonsensical results of IRR analysis? For example, the proposal provides an example where two different discount rates may set net present value equal to zero (p. 8.), but the author argues that only one (the 25% rate) is reasonable, whereas the other answer (400%) is unreasonable. In this example it may well be easy to say that 400% is unreasonable, but what happens when the two rates are fairly close to one another? But the author uses the terms RIRR and IRR interchangeably throughout the proposal, so it is difficult to isolate exactly what makes RIRR different from IRR. Further, the proposal never outlines exactly how RIRR and Net Present Value are complementary: what does one give you that the other does not? When do they differ and why? The author also cites the number of hits on a web publication as evidence of interest in the paper, but it is not clear that his arguments have been subjected to formal peer review.

Criterion 2: Broader Impacts of the Study

The proposal is based on the idea that mainstream project analysis based solely on net present value has got it wrong. The author of the proposal may or may not be on to something, but the proposal is written in such a way as to obscure his arguments. If the RIRR arguments stand up to external peer review, then the proposed research could be quite valuable.

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PROPOSAL REVIEW FORM

**OMB NO: 3145-0060
NSF FORM 1 (10/97)**

PROPOSAL NO: 9976040	INSTITUTION: Alamo Community College District Central Office
PRINCIPAL INVESTIGATOR: Ray Martin	NSF/EPA DMVEP Program
PROPOSAL TITLE: Internal Rate of Return in Environmental Decision Making	
<p style="text-align: center;"> * Criterion 1: What is the intellectual merit of the proposed activity? * Criterion 2: What are the broader impacts of the proposed activity? </p> <p>Please attach a separate sheet(s) with your evaluation of this proposal with respect to each of the above criteria per instructions on the previous page. Your specific comments on the proposal's strengths and weaknesses are critical. Do not share, copy, quote or otherwise use or disclose material from this proposal. Destroy it after you complete your review.</p> <p>Summary Statement: (Include comments on the relative importance of the two criteria in assigning your rating. Continue on an additional page, if necessary.)</p> <p>While the proposal tries to make the case that the IRR method should replace net present value considerations in environmental decision making, it also (correctly) observes that the two methods are equivalent. Thus, it is not clear why the IRR method should be used instead of net present value for policy purposes.</p> <p>The intellectual merit and broader impacts of the project were weighted equally in assessing the overall merits of this project.</p> <p>Overall Rating (check one):</p> <p> <input type="checkbox"/> Excellent: Outstanding proposal in all respects; deserves highest priority for support. <input type="checkbox"/> Very Good: High quality proposal in nearly all respects; should be supported if at all possible. <input type="checkbox"/> Good: A quality proposal worthy of support. <input type="checkbox"/> Fair: Proposal lacking in one or more critical aspects; key issues need to be addressed. <input checked="" type="checkbox"/> Poor: Proposal has serious deficiencies. </p>	

Martin 9976040

Intellectual merit:

This project intends to determine the extent to which the use of a "relevant" or "revisited" internal rate of return (RIRR) might enhance environmental decision making (EPA programs and analyses in particular). The underlying hypothesis is that the use of the RIRR method is preferable to the use of net present value (NPV). NPV can lead to inappropriate policies because it "includes potentially contentious assumptions and calculations." The IRR method will be used in the EPA *Cleaner Technologies Substitutes Assessment Guide* to evaluate selected historical programs.

The use of IRR and NPV are both predicated on the same underlying assumptions: they are simply alternative ways of determining whether a given investment (or program) is worthwhile. Thus, it is not clear why the use of IRR would be more appropriate than NPV (or any other method) in comparing cash flows over time. It is not clear why the use of IRR would enhance receptiveness of time value of money considerations compared to NPV.

The PT has numerous publications on the IRR method and has been promoting an understanding of its potential for public decision making for more than two decades.

Impact of the proposed activity:

The proposal states that this project "could change the way costs are analyzed at all levels of government." Not quite. While it has the potential of encouraging environmental decision-makers to consider an alternative method for determining a project's effectiveness, it need not change how project costs are measured or analyzed.

The first phase of the project will familiarize EPA analysts and managers with the IRR technique, after which the RTRR method will be applied to selected EPA programs. Plans for disseminating results of the project to a wider audience are not explained, but it is likely that CD-ROM and on-line formats will be employed.

There are no collaborators on the proposed project.

NSF 9976040

PI: Ray Martin
Institution: Alamo Community College
Title: Internal Rate of Return in Environmental Decision-Making
Amount: \$279,079

Summary:

Determine the extent to which a "Relevant" or "Revisited" Internal Rate of Return might enhance EPA analyses.

I don't find this proposal to be intellectually interesting.

"Properly calculated and used, RIRR gives identical decisions to NPV." But then why is it needed? I believe that the argument about mutually exclusive options is not correctly interpreted. Suppose that you use a single piece of property *either* for project 1, which has an internal rate of return of 25% *or* for project 2, which has an internal rate of return of 24%, but not both. IRR can't generally be used for selecting among the projects. If project 2 is larger than project 1, it may be more desirable to invest in project two. For example, if project 1 requires an investment of exactly \$10 (can't be re-scaled), and project 2 requires an investment of \$1,000 (and can't be rescaled), project 2 will be more desirable since it results in a larger return if 24% is greater than the opportunity cost of capital. It wouldn't make sense to forgo a return of \$240 dollars per year (24% of \$1,000) to obtain a return of \$2.50 (25% of \$10).

If you know the net present value, you don't also need to know the IRR in order to make a decision. For most cases the two results are identical, so we don't need both methods. If the two measures are not consistent, NPV is the better approach to use.

Rating: Poor

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FOUNDATION

PROPOSAL REVIEW FORM

OMB NO: 3145-0060
NSF FORM 1 (10/97)

PROPOSAL NO: <i>9976040</i>	INSTITUTION: <i>ALAMO COMMUNITY COLLEGE DISTRICT CENTRAL OFFICE</i>
PRINCIPAL INVESTIGATOR: <i>MARTIN</i>	<i>NSF/EPA DMVEP Program</i>
PROPOSAL TITLE: <i>INTERNAL RATE OF RETURN IN ENVIRONMENTAL DECISIONMAKING</i>	
<p>* Criterion 1: What is the intellectual merit of the proposed activity?</p> <p>* Criterion 2: What are the broader impacts of the proposed activity?</p> <p>Please attach a separate sheet(s) with your evaluation of this proposal with respect to each of the above criteria per instructions on the previous page. Your specific comments on the proposal's strengths and weaknesses are critical. Do not share, copy, quote or otherwise use or disclose material from this proposal. Destroy it after you complete your review.</p> <p>Summary Statement: (Include comments on the relative importance of the two criteria in assigning your rating. Continue on an additional page, if necessary.)</p>	
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Review for Proposal Entitled:

Internal Rate of Return in Environmental Decision-Making

The stated objective of the proposed project is to determine whether the evaluation and prioritization of EPA programs and "investments" can be improved through the use of a revised internal rate of return (RIRR) concept. This would serve as an alternative to the more traditional net present value (NPV) concept more commonly used in cost-benefit analysis. The PI indicates that he has already developed and disseminated (through the worldwide web) the conceptual basis for relying on this alternative evaluation paradigm; therefore, the purpose of the project would be to communicate these ideas specifically to an EPA audience and apply them to specific EPA programs.

Although the fundamental assertion - that RIRR should receive more attention as an evaluation tool - has some merit, the project, as it is proposed, has several important deficiencies which should make it a low priority for funding

Intellectual Merit

1. Although the proposal discusses in general terms why RIRR can be viewed as a useful alternative to NPV for evaluating private investments, it does not show a good understanding or provide a good explanation of why this would be specifically useful for EPA programs. The proposal mentions a few programs, such as Energy Star, and indicates that such programs would, in effect, serve as useful project case studies for demonstrating the application of RIRR; however, it does not provide any specifics about why these programs would be appropriate candidates for RIRR. The proposal indicates that because RIRR is "not a monetary value" it circumvents problems of placing a monetary value on benefits; however, this does not appear to be a valid claim - calculation of RIRR *requires* monetary estimates of future streams of costs and benefits. Furthermore, RIRR may well be appropriate for evaluating future cash flows, but this is not the problem usually faced by the Agency because such a large portion of the benefits of its programs are non-pecuniary in nature.
2. The PI does not demonstrate exceptionally strong qualifications for conducting the project either in the form of previous grant experience or in terms of peer-reviewed publications. This is somewhat mitigated by the fact a primary objective of the proposal is to communicate and educate EPA regarding RIRR (rather than to conduct innovative research). Even so, despite the fact that the proposal is generally well-organized, the written discussion generally lacks clarity, which casts some doubt on the PI's effectiveness as a communicator.
3. There is an important inconsistency in the stated objective of the research. On the one hand the PI wishes to "make no value judgments or advocate particular choices" regarding RIRR v. NPV. On the other, the PI states clearly "The current goal is to promote RIRR rather than simply inform." This does not inspire confidence in the objectivity of the proposed research.
4. The proposed budget seems excessive -- about \$90K in each year, all for the PI. Given that it proposes to expand completed research, the tasks and corresponding budget should be better defined and justified to merit this amount of funding.

Broader Imacts

1. In accordance with the objectives stated in the NSF/EPA proposal solicitation, the project does propose to significantly advance understanding through training and educating EPA (through various media) about the potential applications of RIRR. Unfortunately, the proposal does not provide a very strong justification for why this is an important issue for EPA.
2. The proposal does not include a very strong description of how the results of the analysis would be disseminated beyond the EPA audience.