

NBER WORKING PAPERS SERIES

DIMINISHED EXPECTATIONS OF NUCLEAR WAR AND INCREASED
PERSONAL SAVINGS: EVIDENCE FROM INDIVIDUAL SURVEY DATA

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Working Paper No. 4031

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
March 1992

We are grateful to the National Science Foundation (Grant # SES-8921176) for support of this research, to Rebecca London, Jonathan Parker, and Alec Rodney for invaluable research assistance, and to Donald Green for helpful comments on an earlier draft. This paper is part of NBER's research programs in Economic Fluctuations and Public Economics . Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

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ABSTRACT

At the end of 1983 Gallup polls showed that 52 percent of Americans thought that the probability of a world war in the next 10 years was 50% or higher; by 1989 the percentage had dropped to 29%. Fear of war of this pervasiveness is bound to have an effect on decisions about present versus uncertain future consumption.

This paper investigates the cross-sectional relationship between saving and fear of war using responses to telephone surveys conducted during April and October of 1990. The analysis shows that an individual's professed level of fear about the likelihood of nuclear war was significantly negatively related to the probability of being a saver rather than a dissaver, to changes in actual saving, and to saving plans relative to actual savings. Fear of war had an independent effect controlling for many demographic, economic and psychological characteristics.

These results are broadly consistent with other evidence on the relationship between aggregate saving and fear of war over time and across countries.

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1. Why Saving may be affected by fear of war

Individuals' decisions about present versus future consumption depend not only on the perceived future benefits obtainable from foregoing present consumption, but also on the perceived probability of actually receiving the future benefit. That probability in turn is composed of both the probability that the future benefit will be available, and that the intended beneficiary will be alive to receive it. Thus, individuals' decisions on what part (if any) of their income to save will depend at least partially on their expectations of longevity and, if bequests are intended, on the expected longevity of their heirs.

Among the primary motivations for individual saving are to provide security in retirement and to leave a bequest. Both of these considerations obviously are subject to evaluations of the probability that the intended benefit actually will be received. Someone who believes that a "world" or "nuclear" war is likely to occur within the next ten years or so would be expected to have a much higher discount rate for benefits in that time period than is someone who believes war is unlikely: the person typically does not expect to survive the war. (By 1963 a majority of

Americans thought their chances of surviving a nuclear war would be poor, and that percentage has continued to rise somewhat. See Kramer et al. 1983.)

In this article we report new empirical evidence which supports this reasoning. The economic implications could be profound and extend beyond the usual "costs of defense" debate: to the degree that Americans, or people of other nations, have reduced their savings because of expectations of war, national savings pools available to support investment are smaller than otherwise. The implications for the United States are especially ominous because of its low national rate of savings and, at the same time, very high national expectation of war. Alternatively, diminished fears of war might imply, through enhanced savings, an unanticipated "peace dividend." (Gramlich 1991 discusses the policy implications of this prospect.)

At the end of 1983 (the era of the Freeze movement, "The Day After," The Catholic bishops' Letter, and Reagan administration rhetoric about a "window of vulnerability") Gallup polls showed that 52 percent of Americans thought that the probability of a world war in the next 10 years was 50% or higher. This compared with 32 percent in European Community countries and 29 percent in Japan. By the end of 1989 the U.S. percentage had dropped to 29, but that still remained far above the level in Europe and Japan (11 and 12 percent, respectively). While the level of war expectation varies over time, the gap between high American expectations

of war and much lower expectations in other countries is persistent. Expectations of war typically also have been much higher among the public than among U.S. national security policy experts (Nye, Allison, and Carnesale, 1985). Experts and public may differ in part because, implicitly at least, the experts' time horizon is relatively short--5 to 10 years--while members of the general public have an implicit horizon of their own lifetimes and those of their children. If so, our hypothesis that fears of the public may affect their savings behavior is all the more plausible. A common scholarly viewpoint, traceable to Stouffer (1955), is that for most people politics is a sideshow to everyday life; that most people fail to draw much of a link from the outside world to their everyday lives. We shall present strong evidence that, at least in the realm of expectations of nuclear war, Americans do make the linkages.

2. Previous Research

As a matter of theory, it is straightforward to show that increased fear of a nuclear war is likely to decrease saving. One model that yields such a result is presented in Slemrod (1983). What is at issue is whether changes in fear across time, across individuals, and across countries have a quantitatively significant effect on the propensity to save.

Previous efforts to determine the empirical importance of this hypothesized effect have been encouraging, if not yet conclusive. Holding other determinants of saving constant, Slemrod (1986) found that two separate indices of

fear of war show a statistically significant negative correlation with the United States net private saving rate between 1948 and 1984. Figure 1 shows the time series since 1948 of the saving rate and one measure of the perceived threat of nuclear war. The measure of fear is the "doomsday clock" set monthly by the Editorial Board of the Bulletin of the Atomic Scientists as an index of their assessment of the state of international tensions. The closer it is set to midnight, the more dangerous is the state of tensions in the Board's assessment, so that the hypothesis that fear depresses savings would be reflected in a positive association between the two series. In fact, the two series are remarkably closely correlated, particularly since 1960. Especially unusual for time series is the matching of the turning points of the two series, including the concurrent increase in the saving rate beginning in 1988 and the decline in the perceived threat of war (reflected in a movement of the clock from three to six minutes to midnight in January of 1988). Current work (Slemrod, 1991) shows that a similar close association also occurs for other major Western economies.

This initial finding prompted other research on the subject. Hendershott and Peek (1985, 1987), using several alternative definitions of saving and investigating other influences on saving, also find that increased fear has tended to reduce saving in the post-World War II American economy, and in recent work (1989) they find that the

unprecedentedly high real interest rates of the early 1980s can in part be explained by abnormally high fear of war among Americans. Finally, Slemrod (1990) finds a negative relation between the average expectation of war and the net private savings rate across 19 industrialized (OECD) countries in the early 1980s. This relationship holds when other influences on saving--such as the age structure of the population, labor participation rate of men 65 or older, and social security benefits--are controlled. It is worthwhile to note that in the 1980's U.S. residents professed the greatest fear of nuclear war and had the next to lowest saving rate, while the Japanese professed one of the lowest fears and had the highest saving rate.

Russett and Lackey (1987) tried to replicate these results without much success at this aggregate level. Their analysis of quarterly economic data and survey data on war expectation over a 12-year period found no relationship---but this short time period during which fully comparable quarterly survey data were available eliminates much of the variance in both war expectation and saving that was available in Slemrod's much longer annual series. In a new paper with revised and improved semi-annual survey data from 1948 to 1962, Russett, Cowden, and Murray (1991) did replicate Slemrod's finding of a negative relationship between war expectation and savings. Russett and Lackey also, however, failed to replicate Slemrod's finding in a 25-year series in the United Kingdom, and in a pooled time-

series analysis of selected industrial countries. Here too the failure is not surprising, given the short-time span in the pooled time-series analysis and the fact that expectations of war are and have been much lower in Europe than in the United States and thus, even with fluctuations over a long time, should be a less important variable in affecting savings decisions.

The hypothesis should apply also at the individual level, rather than just at the aggregate one (nation as unit of analysis) as in the studies so far reported. We must establish whether individual consumers base their savings decisions in part on their perceptions of the likelihood of war. Many psychologists have maintained that because of the nuclear threat both American adults and children are unwilling to postpone gratification or to make long-term personal commitments (American Psychiatric Association, 1982; Mack and Snow, 1986; Chivian et al. 1985). Due to methodological problems in interviewing (sampling, inability to separate causal connections from rationalization, the tendency to anticipate the interviewer's apparent wishes), however, these studies are not fully reliable.

Some analysts (e.g., Schuman, Ludwig, and Krosnick, 1986) contend that even though Americans may say nuclear war is likely, fear of it has rarely been either very important or salient as a concern to most of them. In support they cite the rarity with which nuclear war has been mentioned in response to a question asking them to identify "the most

important problem facing the country today." But that question is ill-suited to identify long-term (i.e., war within "the next ten years") concerns as compared with those for "today," or to tap strong fears of an event (war) over which the individual has little control. Such fears may well be repressed rather than expressed openly, and any connection between fear of war and saving would be highly resistant to overt questioning. Our hypothesis does not demand that people consciously and explicitly make the connection between nuclear war and savings; a preconscious or subconscious connection could have much the same effect as a conscious one, and is perhaps more likely for a strongly fear-arousing topic like nuclear war. Therefore we need a non-intrusive method--separate questions about war expectations and about savings behavior, permitting one to look for a correlation in the answers--to detect the hypothesized behavior.¹

Russett and Lackey therefore moved from aggregate analysis to the individual level in those few surveys where questions about expectation of world (or nuclear) war happened to appear on the same instrument as questions of savings behavior or intention. The Gallup organization in Britain conducted five such surveys between 1957 and 1968, asking whether respondents expected to save more, less, or about the same as in the past year. Standard demographic controls--age, sex, unemployment, and social status--were available, as were data on individuals' expectations of

economic conditions (prosperity, unemployment, inflation). The last is important, because if expectation of war were merely one aspect of a generalized dimension of pessimism, it might be erroneous to attribute savings intentions primarily to the war expectation aspect. But even with these other expectations controlled, in four out of five of the surveys individuals who expected "a troubled year with much international discord" were significantly less likely to plan an increase in their savings. Other European surveys, though lacking questions on savings, also contain enough questions on other aspects of optimism/pessimism to suggest that attributing an independent influence to war expectation is reasonable.

The best set of data until now have been from the National Election Survey (NES) of 1984, analyzed by Russett and Lackey. It includes the usual demographic controls, and in a two-step process first identifies individuals who had no savings or had to draw on those savings in the previous year, and then, of those with some opportunity to save, asks whether they in fact did so. The war question, furthermore, specifically asks about expectations of nuclear war. The result is a statistically highly significant negative relationship between war expectation and changes in savings behavior.

These results importantly support the hypothesis, although they cannot be considered conclusive. The NES survey did not include other relevant questions about

expectations and satisfaction, and in neither the NES nor the British surveys is the relationship strong enough to account for a great deal of variance in savings. Until now we have had few surveys to work with, and furthermore have been forced to use survey data where questions on savings and war expectation have appeared in the same instrument purely by coincidence. To be convincing, the analysis must be continued with the right set of questions specifically designed for this purpose. The research described below does exactly this.

3. Data

The data we analyze are responses to questions to surveys conducted during April and October of 1990 by the Survey Research Center (SRC) at The University of Michigan, as riders to its monthly Survey of Consumer Attitudes and Behavior. This is a monthly survey of a national sample of American households, conducted by telephone. Each survey contains approximately 25 core questions, covering attitudes and expectations concerning personal finances, business conditions, and buying conditions. Overall assessments of past and expected changes in personal finances are supplemented by measures of the expected change in nominal family income, as well as expected real income changes.

To the core questions we added questions first about saving behavior and then about the likelihood and behavioral impact of a nuclear war. The questions discussed here, and the distribution of responses, are listed in Table 1. Many

of the questions had already been asked as standard items by the SRC or other national organizations such as the Gallup organization or the National Opinion Research Center (NORC), with some modifications suggested by our pre-test.

The survey opened with standard SRC items on consumer financial behavior and expectations, including expectations about prices, employment, and economic conditions for themselves and for the economy in general. For our dependent variable we then asked several questions about savings. The first was whether the respondent (family) had saved, in net, in 1989 by putting more into savings and reserve funds than she/he took out. We also asked about changes in savings behavior, specifically whether the respondent had saved more in 1989 than in 1988. Note that the questions refer to "savings and reserve funds" in general, rather than to specific components. It would be very difficult to aggregate various components (e.g., savings accounts, CDs, stocks and bonds, IRAs. etc.). We doubt that it is possible to obtain reliable information in the standard telephone survey format. Furthermore, much of savings takes the form of repetitive payments made virtually automatically and without much deliberation or even awareness; e.g., mortgage and other debt payments, pension fund contributions. Thus whereas the measure of reported savings is doubtless an imperfect measure of some elements of actual savings, it seems a valid and appropriate measure of whether people have made more or less deliberate

decisions to save. And it is decisions to save that we anticipate will be affected by perceptions of the likelihood of war.

In addition, we asked whether the respondent expected to save more in 1990 than in 1989. We preferred the formulations about reported past savings to the question about anticipated savings, since the latter is more subjective and likely to be volatile in response to temporary changes in needs and circumstances, but included the anticipation version to pick up any possible effects of war expectations on expected savings.

It is possible that pessimistic expectations about international peace primarily reflect individuals' general pessimism or basic dissatisfaction with conditions of life, and likewise that general unhappiness may produce a generalized sense that saving for the long-term has little utility (or, conceivably, their savings may be increased as a hedge against their generally pessimistic expectations). To control for this we also included a standard NORC question about the individual's happiness "in general," and one about recent changes in that degree of happiness. (These are virtually unrelated to war expectations and changes in war expectations, with $r = .06$ or below.)

Another question, slightly adapted from a standard NORC item intended to measure "anomie," asked whether the respondent felt that "it hardly seems fair to bring a child into this world with the way things look for the future."

Our hypothesis was that some of the same motivations for savings apply to decisions to have children. Many psychologists have suggested this is the case, and it is consistent with the "new home economics" which treats a child as a product (investment) as well as a consumer good, and therefore fertility as the result of rational economic choice within the household. (Birdsall, 1977: 83) If attitudes toward savings are affected by the prospect of war, so too may be those toward having children. This inference is supported by new work by Gwartney-Gibbs and Lach (1991). NORC results consistently show a significant correlation (NORC GSS 1976, 1985, 1988, r about .25, $p = .999$) between answers to this "bring a child" question and expectations of world war, a correlation higher than between it and mere expectations of war in general or between it and the measure of general happiness. The higher correlation for "world war" than simply "war" (evident in a 1976 split sample) fits with the image of world war as more destructive (and for the past few decades implicitly nuclear) and hence with greater effects on one's expectations of future conditions.

Only after these questions did we ask about expectations of nuclear war during the next ten years, and about recent (during the past year) changes in war expectation. Previous research has shown some relation between savings behavior and current probability estimates of war; here we also wanted to know whether changes in

expectations of war affected changes in actual or anticipated savings behavior. Note that even under the much-improved international conditions of April 1990,² 18 percent of the sample thought a nuclear war was likely or very likely in the next ten years, and 13 percent actually thought the chances had greatly or slightly increased during the past year (62 percent thought they had decreased).³

By asking the questions in both April and October 1990 we were able to provide a longitudinal aspect to the design: the October sample size of 503 included 191 people of the 504 who had been interviewed in April. In addition, between April and October 1990 the crisis in the Persian Gulf undoubtedly changed some peoples' perceptions about the likelihood of a nuclear conflict, affording us a promising opportunity to observe the effect on saving behavior of these attitudes. Similarly, national economic conditions declined during the year, providing a somewhat different set of recognized economic influences on savings behavior; control for these economic expectations will be included.

The survey thus provides evidence about several aspects of individuals' saving behavior, including (i) whether in 1989 there was positive, zero, or negative net saving, (ii) whether saving increased in 1989 compared to 1988, (iii) whether saving planned for 1990 exceeded, equalled, or fell short of saving in 1989, and (iv) whether planned saving for 1990 changed between April and October of 1990.

4. Theoretical Framework

As a guide to the empirical investigation that follows, consider the model, first posed by Yaari (1965), of a forward-looking consumer faced with an uncertain lifetime. Yaari shows that an (assumed) constant conditional probability of death enters the first-order condition for optimal consumption in a way equivalent to the subjective discount rate. Assuming isoelastic utility and an unchanging pure utility discount rate ρ applies, that at each point in time,

$$(1) \Delta c_t = \sigma[r_t - \rho - \delta_t]$$

where Δc_t is the rate of change of consumption, σ is the intertemporal elasticity of substitution, r_t is the real interest rate, and δ_t is the instantaneous probability of death at time t .

At an optimum these first-order conditions will be satisfied subject to the condition that, in expectation, the present value of consumption equals initial wealth plus the present value of the stream of present and future labor income, assumed to be exogenous. These conditions imply that, other things equal, a higher value of δ_t is associated with a lower growth of consumption and a higher level of initial consumption which corresponds to, for given income, lower saving.

The model of saving can be written as

$$(2) S_t = Y_t - C_t(W_t, \delta_t)$$

where S_t is desired saving period t , Y_t is exogenous income in period t , and C_t is desired consumption in period t , an

age-dependent function presumed to depend positively on W_t and δ_t , the index of fear. We associate differences across individuals' values of δ_t with differences in their professed assessment of the likelihood of nuclear war. In what follows we make use of an inverse measure of fear, denoted SAFE, so that higher professed likelihood of war goes with lower values of SAFE, and thus lower saving.

Linearizing the dependence of C_t on W_t , age (AGE_t) and $SAFE_t$ yields

$$(3) S_t = Y_t - \alpha_0 W_t - \alpha_1 AGE_t + \alpha_2 SAFE_t$$

Because wealth and income cannot be precisely measured, we investigate the relationship of S_t to measured income, demographic proxies for W_t , age, and $SAFE_t$ as follows:

$$(4) S_t = \beta_0 Y_t + \beta_1 Z_t + \beta_2 AGE_t + \beta_3 SAFE_t + u_t,$$

where Z_t is a vector of proxyvariables for wealth and preferences. By estimating regression coefficients of this form we hope to isolate the partial effect of $SAFE_t$ on S_t , hypothesized to be of positive sign.

In the above formulation, saving depends only on the concurrent value of SAFE. For at least two reasons it might also depend on past values of SAFE, and therefore also on measures of the recent change in attitudes toward nuclear war, denoted DSAFE below. If there are costs to changing saving, then current saving will depend positively on both current and lagged values of SAFE as follows:

$$(5) S_t = \beta_0 Y_t + \beta_1 Z_t + \beta_2 AGE_t + \beta_3 SAFE_t + \beta_4 SAFE_{t-1} + u_t,$$

or, expressed in terms of DSAFE:

$$(6) S_t = \beta_0 Y_t + \beta_1 Z_t + \beta_2 AGE_t + (\beta_3 + \beta_4) SAFE_t - \beta_4 SAFE_{t-1} + u_t,$$

where $DSAFE_t = SAFE_t - SAFE_{t-1}$.

Past values of SAFE may also matter because they are correlated with wealth, which is imperfectly accounted for by the Z vector. For example, a person who had until the current period felt nuclear war to be quite likely would not have accumulated as much wealth as an otherwise identical person. If such a person's expectations of war were revised downward this period, he would consume less, and therefore save more, than the person whose views he now shared. If wealth was measured imperfectly, then it is possible that a regression of saving on current and lagged values of SAFE would produce a positive coefficient on the latter. This implies that in a regression with $SAFE_t$ and $DSAFE_t$ the estimated coefficient on the latter could be positive, reflecting the fact that for a given value of $SAFE_t$, a higher value of $DSAFE_t$ corresponds to a lower value of $SAFE_{t-1}$, and therefore less wealth.

Thus the impact of $DSAFE$ on saving is theoretically indeterminate. Complicating the matter further is the fact that the time periods referred to in the survey questions are not as precisely aligned as suggested by this theoretical framework. While the saving questions refer to total savings during calendar years 1990 or 1989, the questions concerning the chances of war refer either to the time of the survey (either April or October of 1990) or to changes over the year preceding the survey date. For this

reason it is not possible to relate the estimated regression coefficients precisely to the coefficients in the model laid out above. The regression results should be interpreted instead as evidence of empirical regularities. The caveat applies especially to the regression analyses of the change in saving, for which subtle differences in the alignment of the variables--and the interpretation of the time frame of the question--are critical to the structural interpretation of the regression coefficients.

5. Results

The Level of Saving

Columns 1, 4, and 7 of Table 2 show the results of our basic regression analyses that explain the level of saving in 1989. Three variations of the dependent variable were studied. The first, denoted SAVE, is a polychotomous variable with the three settings of positive net saving, zero net saving, and negative net saving. The other two variations each compress one side of the possible variation in SAVE. The variable DOSAVE is "on" if there was positive net saving, and "off" otherwise. The variable DISSAVE is "on" if there was negative saving, and "off" otherwise.⁴ Probit analysis is utilized. For SAVE, with three possible settings, we employ the polychotomous probit procedure of McKelvey and Zavoina (1975). The independent variables included are the subjective probability of nuclear war (SAFE) and other conventional determinants of saving propensity -- education level (EDU), age (AGE) (and, to test

for nonlinearity) the square of age (AGE2), direction of change in the individual's financial affairs (DFINPOS), an index of happiness (HAPPY), and income (INCOME). We also include the index of personal happiness (HAPPY) to be sure that expectations of war are exerting an independent psychological effect. These regressions utilize only data from the April 1990 survey, in order to closely match the period over which savings decisions were made and attitudes held during that period.⁵

In all cases the partial effect of the perceived likelihood of a nuclear war has an estimated coefficient with a sign consistent with the hypothesis. The war likelihood variable, SAFE, is positively associated with the probability of saving (DOSAVE) and negatively related to the propensity to dissaving (DISSAVE). Not surprisingly, it is also positively related to the trinary variable SAVE. The estimated association with SAVE and DOSAVE is significantly different from zero at the 95% confidence level, while the estimated association with DISSAVE is significant at the 90% confidence level.⁶

The magnitude of the estimated impact of the perceived likelihood of war is also large. A change from an answer to question #9 of "very likely" (SAFE = 1) to "very unlikely" (SAFE = 4) is associated with an increase of 0.197 in the probability of saving and a decrease of 0.122 in the probability of dissaving, when evaluated at the mean.

Notice also from Table 2 that the other independent variables are, with one exception, related to saving in the expected direction. A positive change in the family's financial position,⁷ education, and subjective happiness are each positively related to the probability of having positive net saving and negatively related to the probability of dissaving. The estimated influence of age is consistent with the life-cycle model of positive saving until a certain age followed by dissaving. The estimated turning point occurs at $-(b_4/2b_5)$, where b_4 and b_5 are the estimated coefficients of AGE and AGE², respectively. This occurs at 41.5 years for DOSAVE and 58.2 years of DISSAVE. Somewhat surprisingly, income does not add any additional explanatory power to the explanation of saving.⁸

As mentioned above, a change in the perceived likelihood of war, in addition to the level of perceived likelihood, could also influence saving. Columns 2, 5, and 8 of Table 2 show that a decline in the perceived likelihood of war (denoted DSAFE) is positively associated with the tendency to have saved in 1989 and negatively associated with dissaving, although the associations are not as strong as for SAFE. When both SAFE and DSAFE are entered as independent variables, (in columns 3, 6, and 9) the effect of SAFE dominates.

Changes in the Level of Saving

A change in the level of saving can be the result of fully anticipated differences between income and consumption

or can be the result of an unanticipated change in income that is perceived to be permanent or (with greater effect because consumption will not change much) temporary. A change in saving may also be caused by a change in the rate of interest or the rate of discount applied to future consumption. Revised expectations of the likelihood of a nuclear war fall into the last category.

The survey provides two different measures of the expected change in saving in 1990--one relative to 1989 and the other relative to previously formed plans about 1990. The first is the response to question #3, concerning whether saving in 1990 is expected to be higher, lower, or about the same as in 1989. This can be related to changes over the past year in fear of war, happiness, and financial position. Both April and October responses are relevant here.

Table 3 presents the results of a series of regression equations that explain whether saving was expected to increase, decrease, or stay the same between 1989 and 1990 as a function of nuclear fear variables as well as the change in the family's financial position (DFINPOS), age (proxied by AGE and AGE2) and change in happiness (DHAPPY). As in Table 2, we present results both for a trinary polychotomous probit model (denoted SAVE90), where the possible responses are saved more, saved about the same, and saved less, plus also two versions which focus on the choice of whether to increase saving or not (SAVEMORE90) and on the choice of whether to save less in 1990 or not (SAVELESS90).

In the absence of SAFE, (cols. 2, 5, and 8) the estimated coefficient on DSAFE has the sign predicted by the hypothesis. However, only for SAVEMORE90 is the estimated coefficient different from zero with 90% confidence. The effect of a change in financial position and a change in happiness are both very strong. Interestingly, increased age is related to a higher likelihood of having decreased saving. Note that the level of perceived safety (SAFE, cols. 1, 3, 4, 6, 7, 9) does have a strong positive effect on the expected change in saving, as it did on the level of saving, and dominates the effect of DSAFE when both are included in the set of independent variables. As expression (1) shows, in a perfectly specified model a higher value of SAFE should correspond to increased consumption growth, and a declining probability of saving, but differences in planned consumption are undoubtedly overwhelmed by imperfectly measured shocks to wealth and/or discount rates.

Also performed, but not reported here, were the regressions of Table 3 with the set of explanatory variables extended to include a dummy variable equal to one for October responses only and similar interactive dummy variables for the variables measuring fear of nuclear war. The estimated coefficients on the dummy variables were generally not significantly different from zero. Moreover, including these variables did not materially affect the qualitative or quantitative conclusions to be drawn about the effect of nuclear fear on the propensity to save. This

is encouraging because the relationship between fear and saving is apparently robust to important changes in the economic and political climate between April and October, changes which cannot be completely captured by the explanatory variables that are included in the regression analyses.

A second measure of change in saving focuses on those individuals who were surveyed in both April and October. For these people we have, by comparing their responses to question #3 in these months, a direct measure of whether their expected 1990 saving, relative to 1989, changed between April and October. For these people we also have, by comparing their responses to question #8, a direct measure of how their perceived likelihood of a nuclear war changed.⁹ Table 4 shows that this measure of change in fear is not successful in explaining the professed change in savings plans for 1990, although note that the number of individuals for whom this analysis was possible is small (less than one-fifth that in Table 3). Note, however, that the explanatory power of other variables in Table 4 is surprisingly low. Only DFINPOS is statistically significant--not AGE, AGE2, or DHAPPY--despite the fact that these variables were often significant in the analysis of Table 3. Some of the problem may be due to the fact that only a small proportion of respondents changed attitudes on saving, thus making it difficult to explain so little variance.

The survey also provides a measure of actual 1989 saving relative to 1988--the response to question 2. The regression results reported in Table 5 (analyzed as in Tables 2 and 3) show that this response is positively related to the professed level of fear, and also separately to the change in the level of fear.¹⁰ Note, that contrary to the results of Tables 2 and 3, when both SAFE and DSAFE are included as explanatory variables, DSAFE dominates SAFE. This suggests that respondents aligned changes in the likelihood of war "during the past year" most closely with changes in saving between year-end 1988 and year-end 1989, and therefore felt that these changes in the likelihood of war were "old news" as concerned changes in saving planned for 1990; this characterization is especially plausible for the April 1990 respondents.

Children as Investments

Responses to the statement, "It hardly seems fair to bring a child into the world" also measure an individual's expectation of future conditions, and we hypothesize it to be affected partially by expectations of nuclear war. Table 6 shows the results. Disagreement with the statement increases with happiness, of course, and with income level and education--not surprisingly, people with higher status in the society are less likely to take such a negative view of its prospects. But the strongest relationship is with expectations of nuclear war. Those who feel most fearful tend to be those who would hesitate to bring a child in to

the world. We cannot fully trace out a causal relationship here, but this result is certainly consistent with the claim that expectations of war have wide and pervasive effects on individuals' readiness to plan for and "invest" in the future.

6. Conclusions

Our analysis shows that the level of fear about the likelihood of nuclear war was significantly related to various manifestations of savings behavior: to the probability of being a saver rather than a dissaver in 1989, to changes in actual savings from 1988 to 1989, and to 1990 savings plans relative to actual savings in 1989. This finding is reasonably consistent despite the likelihood of substantial random reporting error about savings behavior measurement--error that should attenuate the observed relationships. Fear of war had an independent effect when many individual demographic, economic, and psychological characteristics were controlled.

The basic finding was confirmed in two separate surveys conducted under rather different national economic conditions and expectations of international peace. In a panel design which could control for other characteristics, individuals' changes in their expectations of war between the two surveys were not related to changes in their expected savings. Outside of the panel design, however, changes in fear showed the expected sign of relationship to changes in planned savings, but were not statistically

significant quite as often as was the level of fear. Fear of war was also strongly negatively related to attitudes toward having children. By extending the model of rational savings behavior beyond the variables normally considered by economists, to include the effects of expectations of war, we retain all the power of the earlier model and add new explanatory content.

These findings are broadly consistent with other evidence on the behavior of aggregate saving over time and across countries. Indeed, finding these relationships at the individual level, in a specially-designed survey that controlled for individuals' economic conditions and general feelings of happiness, strongly confirms the inferences previously drawn from theory and the aggregate analyses. They suggest that a generally-unanticipated kind of "peace dividend"--higher levels of personal saving and therefore funds available for national investment--may emerge from the end of the Cold War. Some of this kind of peace dividend, however, was probably forfeited to fears arising from the Persian Gulf crisis. With the end of the Gulf war, Americans' expectation of nuclear war dropped again, though not immediately to the low levels of early 1990. It remains to be seen whether, with the further decrease in international tensions, Americans will consequently once again increase their readiness to save.

Table 1 Survey Questions and Distribution of Responses

1. Considering all your savings and reserve funds, during 1989 did you put more money into your savings and reserve funds than you took out, or did you take out more money than you put in? (SAVE, DOSAVE, DISSAVE)

April/Oct.: 213/182 Put More In, 81/80 No Change, 176/219 Took More Out, 34/22 Unusable Responses

2. Compared to 1988, did you save more money in 1989, save less money in 1989, or save about the same amount? (SAVE89, SAVEMORE89, SAVELESS89)

April/Oct.: 149/142 Saved More in 1989, 193/220 About the Same Amount, 126/123 Saved Less, 36/18 Unusable Responses

3. Compared to 1989, do you expect to save more money in 1990, less money in 1990, or about the same amount?

(SAVE90, SAVEMORE90, SAVELESS90)

April/Oct.: 194/141 Save More in 1990, 186/191 Save About the Same Amount, 89/157 Save Less, 35/14 Unusable Responses

4. In general, would you say that you are very happy, pretty happy, or not too happy these days? (HAPPY)

April/Oct.: 172/153, Very Happy (1), 257/279, Pretty Happy (0), 55/58 Not Too Happy (-1) 20/13 Unusable Responses

5. Are you happier than you were a year ago, less happy than a year ago, or about the same? (DHAPPY)
 April/Oct.: 177/161 Happier (1), 260/280 About the Same (0), 52/54 Less Happy (-1), 15/8 Unusable Responses

6. Do you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the following statement: it hardly seems fair to bring a child into this world with the way things look for the future? (CHILD)
 April/Oct.: 69/62 Strongly Agree, 76/95 Somewhat Agree 118/109, Somewhat Disagree 199/193, Strongly Disagree, 42/44 Unusable Responses

7. How likely do you think it is that we will get into a nuclear war within the next ten years? Do you think it is very likely, somewhat likely, somewhat unlikely, or very unlikely? (SAFE)
 April/Oct.: 19/38, Very Likely (1) 73/110, Somewhat Likely (2) 147/147, Somewhat Unlikely (3) 242/185, Very Unlikely (4) 23/23, Unusable Responses

8. Do you think the chances of nuclear war have greatly increased during the past year, slightly increased, stayed about the same, slightly decreased, or greatly decreased? (DSAFE)
 April/Oct.: 16/51 Greatly Increased (1), 50/87 Slightly Increased (2), 105/119 Stayed the Same (3), 177/130,

Slightly Decreased (4), 135/94 Greatly Decreased (5), 21/22
Unusable Responses

Notes: Unusable Response signifies an answer of either Don't Know or Not Applicable for all questions. In addition, also deemed unusable were: Question 2 - No Savings Question 3 - Will Not Save. The mnemonic that follows certain questions in parentheses corresponds to the variable name used in the regression analyses described in Tables 2 through 6. In those cases where the answers were used as dummy explanatory variables, the variable value is listed in parentheses following each possible usable response.

Table 2: Explaining Levels of 1989 Saving
April Data Only

INDEPENDENT VARIABLES	SAVE		SAVE		SAVE		DOSAIVE		DOSAIVE		DOSAIVE		DOSAIVE		DISSAVE		DISSAVE	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
Estimation Technique	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	
SAFE	0.1310 [1.83]**		0.1271 [1.58]*	0.1686 [2.11]**	0.0522 [0.84]	0.1754 [1.96]**	-0.1146 [1.51]*		-0.1023 [1.19]									
DSAVE		0.0785 [1.33]*	0.0322 [0.49]			-0.0075 [0.11]			-0.0914 [1.48]*									
DFINPOS	0.3016 [4.10]***	0.2925 [4.00]***	0.2970 [4.03]***	0.2901 [3.51]***	0.2880 [3.49]***	0.2871 [3.47]***	-0.3069 [3.76]***		-0.2906 [3.58]***									
EDU	0.0581 [1.96]**	0.0616 [2.09]**	0.0570 [1.90]**	0.0756 [2.47]**	0.0777 [2.56]**	0.0743 [2.42]**	-0.0460 [1.59]*		-0.0506 [1.76]**									
AGE	0.0467 [2.14]**	0.0482 [2.22]**	0.0498 [2.27]**	0.0423 [1.77]**	0.0442 [1.86]**	0.0433 [1.81]**	-0.0570 [2.48]**		-0.0577 [2.53]**									
AGE2	-0.00046 [2.06]**	-0.00048 [2.14]**	-0.00050 [2.22]**	-0.00051 [2.09]**	-0.00053 [2.14]**	-0.00053 [2.14]**	0.00049 [2.14]**		0.00051 [2.18]**									
INCOME	0.4024 [0.21]	0.2863 [0.15]	0.0720 [0.04]	1.3779 [0.65]	1.6421 [0.77]	1.2707 [0.59]	0.6981 [0.32]		1.1596 [0.53]									
HAPPY	0.1281 [1.31]*	0.1333 [1.37]*	0.1377 [1.40]*	0.1766 [1.65]**	0.1770 [1.67]**	0.1727 [1.61]*	-0.1085 [1.06]		-0.1056 [1.03]									
CONSTANT	-2.0676 [3.58]***	-1.9992 [3.49]***	-2.2070 [3.73]***	-2.6014 [4.08]***	-2.3433 [3.75]***	-2.5888 [4.02]***	2.2028 [3.60]***		2.2100 [3.62]***									
Number of Observations	431	432	429	431	432	429	431	432	432	431	432	431	432	432	431	432	431	429

Notes: Absolute value of t-statistics in brackets.
Income measured in millions of dollars.

*p ≥ .90, one-tailed test
**p ≥ .95, one-tailed test
***p ≥ .99, one-tailed test

Table 3: Explaining Changes in Expected 1990 Saving, Relative to 1989

Estimation Technique	Dependent Variable								
	SAVE90 [1]	SAVE90 [2]	SAVE90 [3]	SAVEMORE90 [4]	SAVEMORE90 [5]	SAVEMORE90 [6]	SAVELESS90 [7]	SAVELESS90 [8]	SAVELESS90 [9]
INDEPENDENT VARIABLES	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Probit	Probit	Probit	Probit	Probit	Probit
SAFE	0.1063 [2.51]***		0.1101 [2.23]**	0.1393 [2.73]***		0.1454 [2.40]***	-0.0859 [1.67]**		-0.0892 [1.46]*
DSAFE		0.0381 [1.22]	-0.0074 [0.20]		0.0576 [1.52]*	-0.0035 [0.08]		-0.0204 [0.52]	0.0137 [0.29]
DFINPOS	0.4129 [8.96]***	0.4149 [9.00]***	0.4120 [8.92]***	0.3760 [6.68]***	0.3789 [6.74]***	0.3738 [6.62]***	-0.4352 [7.52]***	-0.4364 [7.53]***	-0.4349 [7.48]***
AGE	-0.0224 [1.61]*	-0.0205 [1.48]*	-0.0227 [1.63]*	-0.0027 [0.16]	0.0021 [0.13]	-0.0022 [0.13]	0.0288 [1.68]**	0.0287 [1.69]**	0.0298 [1.73]**
AGE2	0.00011 [0.80]	0.00010 [0.71]	0.00012 [0.81]	-0.00016 [0.91]	-0.00020 [1.19]	-0.00017 [0.96]	-0.00023 [1.36]*	-0.00024 [1.42]*	-0.00024 [1.41]*
DHAPPY	0.3361 [5.54]***	0.3362 [5.58]***	0.3337 [5.49]***	0.3337 [4.41]***	0.3293 [4.39]***	0.3347 [4.41]***	-0.3188 [4.07]***	-0.3216 [4.13]***	-0.3133 [4.00]***
CONSTANT	1.0278 [3.15]***	1.1775 [3.66]***	1.0500 [3.20]***	-0.5291 [1.37]*	-0.3981 [1.05]	-0.5411 [1.38]*	-1.1002 [2.66]***	-1.2751 [3.11]***	-1.1634 [2.77]***
Number of Observations	918	921	912	918	921	912	918	921	912

Notes: Absolute value of t-statistics in brackets.
Confidence levels as in Table 2.

TABLE 4: Explaining Changes in Expected 1990 Saving: Reinterview Cases

Estimation Technique	DEPENDENT VARIABLE			
	APRIL TO OCTOBER CHANGE IN RESPONSE TO QUESTION 3 ^a			
	Polychotomous Probit [1]	Polychotomous Probit [2]	Polychotomous Probit [3]	Polychotomous Probit [4]
Independent Variables				
APRIL TO OCTOBER CHANGE IN RESPONSE TO QUESTION 9 ^b	-0.0865 [0.75]	-0.0885 [0.61]	-0.1049 [0.84]	-0.0828 [0.56]
SAFE (October)		0.0030 [0.03]		-0.0433 [0.33]
DSAFE (October)			0.0343 [0.40]	0.0490 [0.54]
DFINPOS (October)	-0.2220 [1.95]**	-0.2221 [1.95]**	-0.2261 [1.93]**	0.2264 [1.94]**
AGE (October)	-0.0096 [0.30]	-0.0096 [0.30]	-0.0104 [0.33]	-0.0109 [0.34]
AGE2 (October)	-0.000035 [0.11]	-0.000036 [0.11]	-0.000027 [0.08]	-0.000019 [0.06]
DHAPPY (October)	0.0296 [0.18]	0.0298 [0.17]	0.0425 [0.23]	0.0448 [0.25]
CONSTANT	2.6094 [3.70]***	2.6055 [3.51]***	2.5578 [3.57]***	2.5886 [3.49]***
Number of Observations	167	167	166	166

Notes: Absolute value of t-statistics in brackets.
Confidence levels as in Table 2.

- a. Ranges from +2 (if respondent changed answer from save less in April to save more in October) to -2 (if changed from save more in April to save less in October).
- b. Ranges from +3 (if respondent changed answer from very likely in April to very unlikely in October) to -3 (if respondent changed answer from very unlikely in April to very likely in October).

Table 5: Explaining Changes in 1989 Saving, Relative to 1988

Estimation Technique	Dependent Variable								
	SAVER89 [1]	SAVER89 [2]	SAVER89 [3]	SAVEMORE89 [4]	SAVEMORE89 [5]	SAVEMORE89 [6]	SAVELESS89 [7]	SAVELESS89 [8]	SAVELESS89 [9]
	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit	Polychotomous Probit
<u>INDEPENDENT VARIABLES</u>									
SAFE	0.0613 [1.49]*	0.0335 [0.69]	0.0847 [1.67]**	0.0519 [0.86]	-0.0414 [0.83]	-0.0401 [1.06]	-0.0327 [0.72]	-0.0212 [0.36]	
DSAFE		0.0541 [1.76]**	0.0420 [1.15]	0.0644 [1.68]**	0.0455 [1.00]	-0.0401 [1.06]	-0.0327 [0.72]		
DFINPOS	0.4012 [9.07]**	0.4014 [9.07]**	0.4000 [8.99]**	0.3877 [6.81]**	0.3912 [6.86]**	0.3876 [6.79]**	-0.3950 [7.02]**	-0.3914 [6.93]**	
AGE	-0.0089 [0.67]	-0.0083 [0.64]	-0.0076 [0.57]	-0.0011 [0.07]	-0.00021 [0.01]	-0.0007 [0.04]	0.0086 [0.53]	0.0066 [0.41]	
AGEZ	0.00002 [0.13]	0.00015 [0.11]	0.00001 [0.05]	-0.00014 [0.87]	-0.00015 [0.89]	-0.00014 [0.88]	-0.0009 [0.53]	-0.00007 [0.41]	
DHAPPY	-0.0207 [0.35]	-0.0361 [0.62]	-0.0233 [0.40]	0.0297 [0.40]	0.0159 [0.22]	0.0243 [0.33]	0.0568 [0.75]	0.0578 [0.76]	
CONSTANT	0.7948 [2.61]**	0.7902 [2.61]**	0.7073 [2.30]**	-0.4955 [1.32]*	-0.4843 [1.30]*	-0.5631 [1.48]*	0.6831 [1.76]**	-0.6786 [1.77]*	-0.5928 [1.51]*
Number of Observations	913	916	907	913	916	907	913	916	907

Notes: Absolute value of t-statistics in brackets.
Confidence levels as in Table 2.

TABLE 6: Explaining the Willingness to Have Children

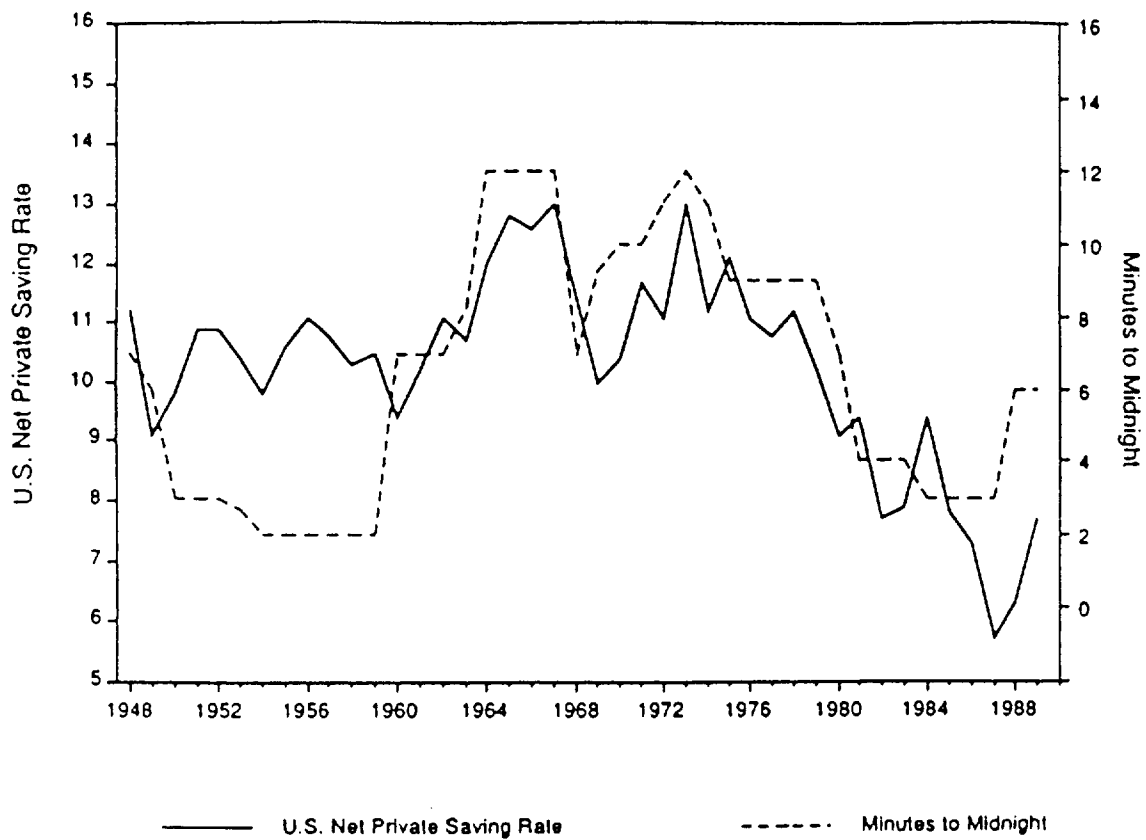
Estimation Technique	DEPENDENT VARIABLE	
	CHILD (April) Polychotomous Probit	CHILD (October) Polychotomous Probit
<u>INDEPENDENT VARIABLES</u>		
SAFE	0.3088 [4.79]***	0.3045 [5.40]***
DFINPOS	0.0282 [0.39]	0.0822 [1.18]
EDU	0.0523 [2.32]**	0.0491 [1.87]**
AGE	0.0065 [0.32]	0.0138 [0.67]
AGE2	-0.000093 [0.45]	-0.00019 [0.90]
INCOME	4.0949 [1.93]**	4.5523 [2.39]***
HAPPY	0.1934 [2.21]**	0.3164 [3.52]***
CONSTANT	-0.8460 [1.68]**	-0.6870 [1.24]
Number of Observations	423	416

Notes: Absolute value of t-statistics in brackets.
Confidence levels as in Table 2.

Income measured in millions of dollars.

FIGURE 1

SAVING AND THE FEAR OF NUCLEAR WAR



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NOTES

1 In our survey reported below we did ask such a direct question in the extreme form, "Have you ever felt that, given the chances for nuclear war, it is not worthwhile to save money for the future?" (Our hypothesis really relies only on certain individuals reducing their saving below what it would otherwise be, and not on some individuals abandoning savings entirely.) Not surprisingly, only 5 percent of respondents answered yes.

2 In this month the Editorial Board of the Bulletin of the Atomic Scientists moved the setting of their "doomsday clock" back from six to ten minutes before midnight.

3 For comparison, the average percentage giving such an answer in Gallup surveys during the 1980s was 43. The comparable Gallup percentage was 29 in November 1989 and 21 in May 1990, rising again to 49 in December 1990 just before the war with Iraq and then dropping to 28 by October 1991. (Reported in Gallup News Service Press Releases.)

4 Any saving in 1989 (SAVE) is correlated 0.43 with actually saving more in 1989 than in 1988 (DSAVE89) in the April survey, but unrelated (0.06) to expecting to save more in 1990 than was saved in 1989 (DSAVE90). Similarly, DSAVE89 and DSAVE90 are virtually unrelated (0.13).

5 It is worth noting, however, that analysis of the October data yields qualitatively similar results. Ideally one would prefer to have 1989 levels of fear explaining 1989 saving. To the extent that 1990 fear levels are an imperfect correlate of 1989 fear, the coefficient estimates will tend to be biased toward zero, increasing the likelihood that the hypothesis will be rejected.

6 All confidence levels are for one-tailed tests.

7 This is the SRC monthly survey's standard question: "We are interested in how people are getting along these days. Would you say that you (and your family living there) are better off or worse off financially than you were a year ago?" Coded on a three-point scale with "same" in the middle.

8 We initially tried other control variables, including gender and race, that had no effect.

9 We can partially assess the consistency of the responses concerning the change in fear of nuclear war by comparing the October response to question #8 to the difference in the October and April responses to question #7. Note, of course, that question #8 refers to change over the past year

and the time elapsed between April and October is six months.

10 Note that while SAFE and DSAFE can explain the polychotomous variable SAFE89 and the tendency to save more in 1989 than in 1988 (SAVEMORE89), they are not as successful in explaining the tendency to save less in 1989 compared to 1988 (SAVELESS89), although the direction of influence conforms to expectations.