FEAR OF NUCLEAR WAR AND
INTERCOUNTRY DIFFERENCES IN THE RATE OF SAVING

Joel Slemrod

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ABSTRACT

This paper demonstrates that a survey-based measure of the perceived
likelihood of nuclear war in a country is negatively correlated with the
country's rate of net private saving, holding other determinants of saving
constant. This result is established using data on twenty OECD countries for
the period 1981-4. The measure of the perceived likelihood of nuclear war is
calculated from surveys conducted in each country by the Gallup International
Research Institutes. The magnitude of the estimated effect is large,
suggesting that an increase of 10 percent in the fraction of the population
that believes a world war is likely is associated with a decline of 4.1
percentage points in the net private saving rate.

This finding is consistent with other evidence based on U.S. aggregate
time series and cross-individual data suggesting that fear of nuclear war
decreases savings. That proposition has profound implications for the
interpretation of the performance of the post-nuclear world economy.

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1. Introduction

This paper investigates the hypothesis that an increased fear of a cata-
strophic nuclear war, by reducing the expected horizon, reduces the rate of
saving. This hypothesis, first proposed in Slemrod (1982), is consistent with
U.S. postwar saving behavior. Holding other determinants of saving constant,
two separate indices of fear of nuclear war have a statistically significant
negative correlation with the U.S. net private saving rate since 1948 (Slemrod,
1986). Hendershott and Peek (1985, 1987), using several alternative definition,
of saving and investigating other influences on saving, also find that increased
fear has tended to reduce saving in the postwar U.S. economy. Russett and
Lackey (1985) find no consistent relationship between savings and fear of war
at the aggregate level for several advanced countries. However, using individ-
ual data from the U.S. National Election Survey, they find that, for individ-
uals who did some saving, actual saving is negatively related to fear of nu-
clear war to a statistically significant extent. Russett and Lackey conclude
that the most appropriate data set is consistent with the hypothesis that fear
of nuclear war reduces saving.[1]

Can differences in the perceived likelihood of nuclear war also explain
intercountry differences in saving behavior? The analysis presented in this
paper, based on a recent international survey of attitudes concerning the like-
lihood of world war, suggests that the answer to this question is yes. Holding

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[1]Stewart and Venieris (1985) find empirical support for a related hypothesis,
that sociopolitical instability reduces the saving rate of developing
countries.

other determinants of saving constant, a country's saving rate is lower the

greater is the fraction of its population that believes a world war is imminent.

2. Data and Results

In recent years the Gallup International Research Institutes has annually

conducted a poll in as many as thirty-three countries concerning attitudes

about the likelihood of world war.[2] The poll in each country asks a random

sample of individuals to assess on a 0 to 10 scale the likelihood of a world

war breaking out in the next ten years.[3]

Table 1 ranks the countries surveyed in 1986 according to the fraction of

respondents who felt that the chance of world war was 50 percent of greater

within the next ten years. Most striking to a student of saving behavior is

that the U.S. stands at the top of the list, with 49 percent of the respondents

indicating at least a 50-50 chance of a world war occurring within ten years.

Also of special interest is that Japan, which has had exceptionally high saving

rates, is near the bottom of the list with only 15 percent of those interviewed

professing to a high fear of world war.

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[2] At least for Americans, the interpretation of the term "world war" as a cata-
strophic nuclear exchange is not in doubt. According to survey evidence,
throughout the postwar period over 60 percent of Americans believed that a
world war would involve nuclear weapons, and as many as 60 percent viewed
their chances of surviving such a nuclear exchange as poor. See Slemrod
(1986). The interpretation of the term "world war" may, however, vary by
country, especially considering the difficulty of precise translation into
other languages. To the extent that the interpretation varies across coun-
tries, the survey results measure with error the perception of a war of con-
stant magnitude.

[3] The precise wording of the question was: "I'd like your opinion of the
chances of a world war breaking out in the next 10 years. If 10 means it is
absolutely certain that a world war will break out and zero means that there
is no chance of a world war breaking out, where on this scale of 10 to zero
would you rate the chances of world war breaking out in the next ten years?"

Table 1

Fraction of Respondents Saying in 1986 that the Chance of World War
Within Ten Years is 50 Percent or Greater, by Country

United States	49	Italy	22
South Africa (blacks)	49	Spain	22
Ecuador	45	Norway	21
Chile	43	Austria	20
Colombia	42	Great Britian	20
Australia	38	South Korea	19
Uruguay	38	Denmark	18
Brazil	34	Greece	18
Canada	34	Luxembourg	18
South Africa (whites)	33	Switzerland	18
India	32	West Germany	18
Argentina	30	Finland	17
Philippines	27	Hong Kong	17
Ireland	25	Japan	15
Portugal	25	Sweden	15
Belgium	24	Turkey	15
France	24	Netherlands	14

Source: The Gallup Poll, released January 11, 1987.

The analysis that follows compares the survey responses concerning the likelihood of a world war to average saving rates in twenty of the thirty-three countries listed in Table 1 over the period 1981 to 1984. These twenty are the OECD (Organization of Economic Cooperation and Development) member countries both covered by the Gallup survey and for which data on net private savings are available.[4] The sample was restricted to OECD member countries because standardized and relatively reliable national income data are available, and because of the difficulty in comparing the characteristics of countries in radically different stages of development. The sample period of 1981 to 1984 was chosen because it is the most recent period for which both saving and survey data are available. It is appropriate to consider data averaged over several years because it minimizes the importance of cyclical factors irrelevant to the hypothesis being studied.

Table 2 presents the average net private saving rate and the index of the perceived likelihood of world war over the period 1981 to 1984 for these twenty countries,[5] and Figure 1 graphs these data. The points corresponding to the six largest countries in the sample are highlighted. The data for these six countries, in particular, seem to indicate a negative association between the net private saving rate and the index of fear of war.

This apparent association is confirmed in a weighted least-squares regression explaining the average net private saving rate expressed as a percentage,

[4] OECD member countries New Zealand, Portugal, Turkey, and Yugoslavia were omitted because of the unavailability of data on net private savings. Iceland was not included in the Gallup survey.

[5] Table 2 and all subsequent regression results define the index of likelihood of war to be the fraction of respondents who registered an opinion that said that the chance of war was 50-50 or greater. All the regressions were also run with an alternative index, the average percentage chance of war indicated by those who registered an opinion. None of the conclusions discussed in the text depend on which index is chosen.

Table 2

Average Net Private Saving Rate and the Index of Perceived
Likelihood of Nuclear War for Twenty OECD Countries, 1981-1984

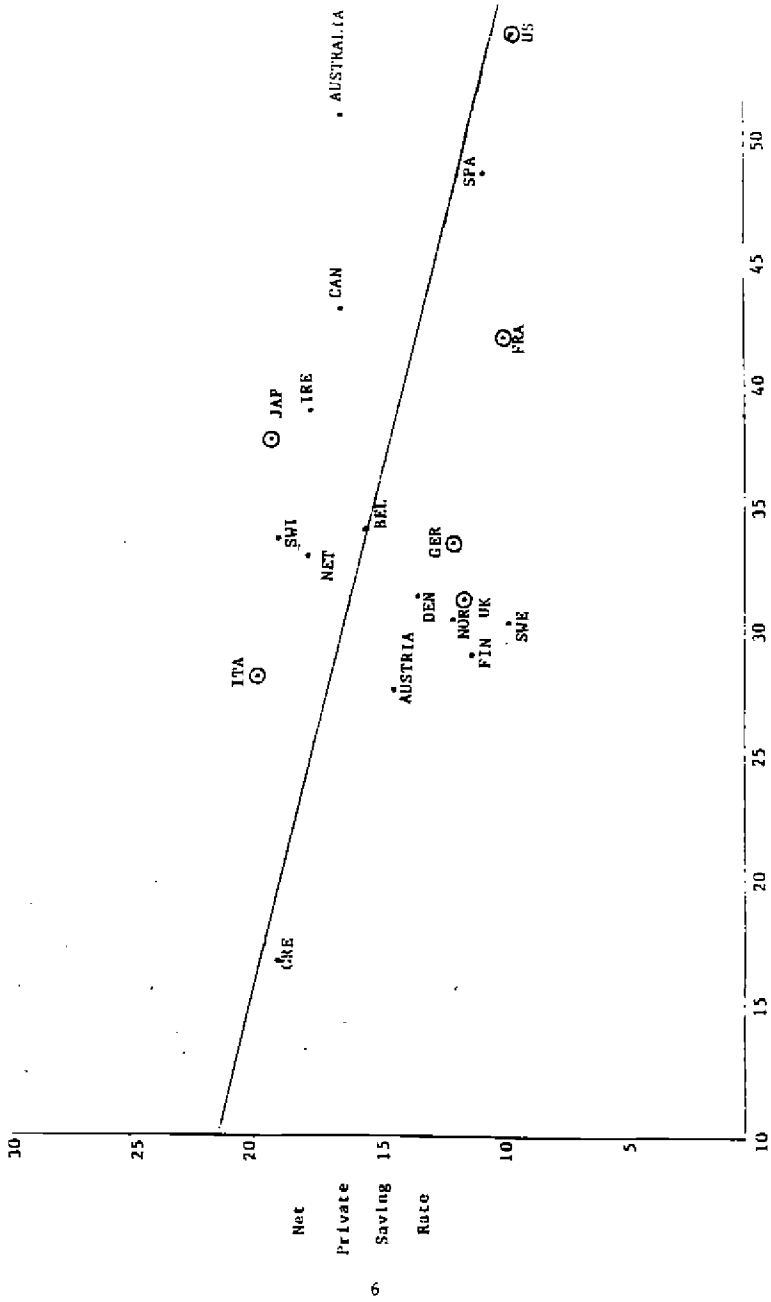| Country	Average Net Private Saving Rate*	Index of Perceived Likelihood of World War**
Australia	16.6	52.3
Austria	14.2	27.8
Belgium	15.4	34.2
Canada	16.3	43.0
Denmark	13.4	31.9
Finland	11.2	29.3
France	9.8	42.2
Germany, F.R. of	11.7	33.8
Greece	18.9	18.2
Ireland	17.6	39.0
Italy	19.5	28.4
Japan	19.3	38.0
Luxembourg	34.5	36.4
Netherlands	17.7	33.2
Norway	11.8	30.7
Spain	10.4	48.7
Sweden	9.5	30.3
Switzerland	18.9	33.9
United Kingdom	11.4	31.7
United States	9.6	54.5

*Complete data for 1984 was unavailable for Ireland, Luxembourg, and the
United States, and was available for 1983 for Luxembourg and Spain. Averages
for these countries were computed over a subset of the four years.

**Data for 1981 is unavailable for Finland and Norway, and is unavailable for
1982 and 1984 for Austria. The 1981-1984 averages for these countries are
calculated using extrapolated figures based on overall annual trends.

Source: OECD (1986) and Gallup International Research Institute (various
years).

Figure 1

. LUX

. AUSTRALIA

⊙ US

. SPA

. CAN

⊙ FRA

⊙ JAP
. IRE

. SWI
. NET
. BEL
GER ⊙
DEN
AUSTRIA
NOR⊙
. FIN UK
. SWE
ITA ⊙
GRE

Net
Private
Saving
Rate

30
25
20
15
10
5

10   15   20   25   30   35   40   45   50

Index of Perceived Likelihood of Nuclear War

S/Y, with a constant and the index of the likelihood of war, denoted WAR. The observations are weighted by the square root of the country's population.[6] This procedure yields

(1) $(S/Y)_t = 23.9 - 0.252 \text{ WAR}_t$
              (3.3) (0.076)

          $\bar{R}^2 = .831$

where standard errors are in parentheses below the estimated coefficients, and the value of $\bar{R}^2$ is based on the weighted residuals.

As Figure 1 suggests, there is a statistically significant negative correlation between the net private saving rate and the likelihood of war index. The regression line corresponding to equation (1) is shown in Figure 1. The magnitude of the estimated coefficient indicates that a decline of ten points . in the likelihood of war index would increase the net private saving rate by about two and a half percentage points.

The analysis is next expanded to include other determinants of a country's saving rate. Several studies of intercountry differences in saving behavior exist, most notably Houthakker (1961, 1965), Modigliani (1970), Feldstein (1977, 1980), Barro and MacDonald (1979), Kopits and Gotur (1980), Modigliani and Sterling (1983), and Horioka (1986). Based on the life-cycle model of saving, they have examined the effect on saving of both demographic factors and government policies such as the social security program. These studies differ

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[6] This procedure is appropriate if the variance of the error term is proportional to the reciprocal of population, which would occur if each country's saving rate represented an average of independent units, with a homogenous variance at the unit level. Barro and MacDonald (1979) found that the error variance does decline with population, although not quite as rapidly as this weighting scheme implies. The sensitivity of the results to the weighting scheme is reported below.

in variable definitions, data sources, the sample of countries, time period, and specification, and the results are not entirely consistent across studies.

As a basis for studying the effect on saving of fear of nuclear war, I study an undated version of the savings function estimated by Feldstein (1980), which is representative of the other studies' methodology. I then investigate the effect of introducing into the equation the index of the perceived likeli-hood of war. Feldstein estimated the following equation on a sample of 12 OECD countries, using data from the 1950's:

$$(2) \qquad (S/Y)_t = \beta_0 + \beta_1 G_t + \beta_2 AGE_t + \beta_3 DEP_t + \beta_4 (B/E)_t + \beta_5 LPAGED_t + u_t,$$

where G is the growth rate of total real private national income, AGE is the ratio of the number of retirees aged 65 or over to the population aged 20 to 65, DEP is the ratio of the number of persons under 20 to the working age popu-lation, B/E is the benefit replacement ratio of the social security program, and LPAGED is the labor force participation rate of men 65 or order. Three principal changes were made to Feldstein's analysis. First, the data are up-dated to reflect more recent conditions. Second, due to data constraints, the measure of the generosity of social security is the ratio of public pension benefits per person over 65 to per capita private national income (denoted SOCSEC), instead of the benefit replacement ratio. Finally, the sample of countries studied is expanded from twelve to twenty.[7]

The results of estimating this saving equation with and without WAR as an explanatory variable are displayed in Table 3. The second column of Table 3 shows that, without WAR, the explanatory variables are not very successful in

[7]Another methodological difference is that Feldstein used two-stage least-squares to account for the endogeneity of LPAGED. The results, though, are not significantly different from those obtained with OLS. Finally, Feldstein weighted the observations by the country's population, rather than the square root of population.

Table 3

Weighted Ordinary Least-Squares Regressions
Explaining the Net Private Saving Rate (S/Y)
With and Without a Measure of Fear of War

Independent Variable	Equation 1	Equation 2
WAR	-.0410 (0.050)	
G	-74.4 (84.2)	-101.1 (201.0)
AGE	-89.6 (21.3)	-14.7 (46.0)
DEP	-1.4 (12.1)	-23.2 (28.2)
SOCSEC	-2.5 (2.9)	1.6 (6.7)
LPAGED	-6.4 (6.9)	15.4 (15.2)
CONSTANT	54.4 (10.6)	25.5 (24.0)
$\bar{R}^2$	.955	.741

Standard error terms in parentheses.

Observations are weighted by the square root of the country's population in
1980.

Definition of variables*:

    S/Y: Average net private saving rate, 1981-1984.
    WAR: Index of perceived likelihood of world war, 1981-1984.
      G: Growth in real private income per capita, 1976-1984.
    AGE: Ratio of population aged 65 or over to population aged 20-64,
          1980.
    DEP: Ratio of population 19 or under to population aged 20-64, 1980.
 SOCSEC: Public pension benefits per person over 65 as a ratio of per
          capita private national income, 1980.
 LPAGED: Labor-force participation rate of males aged 65 or over, 1975.

*A detailed data appendix specifying definitions and sources is available from
the author.

explaining intercountry differences in net private saving rates. The rate of income growth, G, is negatively associated with saving, in contrast to most previous studies, although its estimated coefficient is not significantly different than zero. Neither of the estimated coefficients on the variables reflecting the age structure of the population, AGE and DEP, are significantly different than zero. Most previous studies found both to be negatively associated with the saving rate. The estimated coefficient on the social security variable, SOCSEC, is close to zero. This finding is at odds with the negative coefficient found by Feldstein (1977, 1980), although neither Barro and MacDonald (1979) nor Modigliani and Sterling (1983) corroborated this result. The estimated coefficient on LPAGED is positive (though not significant), failing to support the prediction of the life-cycle theory and in contrast with earlier empirical results. In sum, while Feldstein (1980) fould all five coefficients to be statistically significant and consistent with the qualitative predictions of the extended life cycle model, these same conclusions do not follow from this updated and slightly revised version of the same model.[8]

When WAR is included in the regression equation, its estimated coefficient is negative and statistically significant, and is therefore consistent with the

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[8]It is difficult to pinpoint why the results reported in Table 3 differ so greatly from the results reported in Feldstein (1980). Merely updating the saving rates used by Feldstein does not substantially change the results, nor does the difference in the weighting scheme. However, updating G, AGE, and DEP, or changing B/E to an updated SOCSEC does change the results markedly. Furthermore, the results reported in Table 3 change drastically when the sample is restricted to the same twelve countries studied by Feldstein. Thus, any of a number of changes in the analysis is sufficient to cause the results to differ significantly. It is interesting to note that, in an appendix to Feldstein (1980), Charles Horioka concluded that the difference between the findings of Barro and MacDonald (1979) and Feldstein (1977) concerning the effect on saving of social security was caused in part by differences in specification, sample of countries, variable definitions, data sources, and time period.

hypothesis that increased fear of war reduces a country's rate of saving. The magnitude of the estimated effect is large, indicating that an increase of 10 percent in the fraction of the population that believes a world war is likely is associated with a decline of 4.1 percentage points in the net private saving rate. Including this variable also changes the sign of the estimated coefficients on LPAGED, from positive to the negative coefficient found by Feldstein and others. With WAR included, all of the estimated coefficients except that of G have the same sign as estimated by Feldstein, although only the coefficient on AGE is significantly different than zero at the 95% level of confidence.

Several variations of the basic estimation strategy were investigated to test the robustness of the finding with respect to changes in specification. Weighting the observations by population, as done by Feldstein (1977, 1980) and Horioka (1986), rather than the square root of population, increased the absolute magnitude of the coefficient on WAR to 0.44 and substantially decreased its standard error. The signs of the other estimated coefficients did not change, but coefficients except that on G became more than one and a half times their standard errors.[9] Estimating the equation with unweighted ordinary least-squares does weaken the qualitative conclusions. The estimated coefficient on the WAR variable becomes -0.219 with a standard error of 0.200. The negative relationship between S/Y and WAR also survives the addition of the several other potential influences on saving. One of special interest is the level of real national income which, in the absence of the WAR variable, has a significant negative association with the saving rate. When WAR is included, this association disappears and WAR retains a significant negative association.

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[9]Changing to weighting by population does not, though, rescue the equation without the WAR variable, which still has no estimated coefficient significantly different than zero and of the sign found by Feldstein.

Including as an explanatory variable the fraction of gross national product
devoted to military spending did not affect the main result, and it attracted a
negative sign not significantly different than zero. Finally, the analysis
was repeated excluding the U.S. from the sample. The estimated coefficient on
WAR was not much changed (-0.430), although the standard error increased to
0.097. The negative coefficient remained significantly different from zero.

3. Conclusion

   This paper establishes than an index of the perceived likelihood of nuclear
war in a country is negatively correlated with the country's rate of net pri-
vate saving, holding other determinants of saving constant. This finding is
thus consistent with other evidence based on U.S. aggregate time series and
cross-individual data suggesting that fear of nuclear war decreases saving.
That proposition has profound implications for our interpretation of the per-
formance of the post-nuclear world economy, and thus deserves further attention
and study by economists.

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