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CHRISTIAN C. STARCK

INTERNATIONAL DIFFERENCES IN SOCIAL SECURITY AND SAVING: A NOTE

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CHRISTIAN C. STARCK

INTERNATIONAL DIFFERENCES IN SOCIAL SECURITY AND SAVING: A NOTE*

Abstract

This note demonstrates that Feldstein's (1980) conclusion that social security significantly reduces private saving is not warranted by Feldstein's (1980) data.

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INFORMATION: Seija Määttä, tel. 183 2519.

1. INTRODUCTION

It is commonly believed that the social security system serves to depress the level of private savings because an individual who expects to receive social security benefits will reduce his personal saving. Recent theoretical research has, however, suggested that the relationship is a priori ambiguous; by inducing changes in retirement and/or intergenerational transfers social security can either increase or decrease aggregate private saving. Thus this important question ultimately must be settled by empirical evidence.

Since Martin Feldstein (1974) presented time series evidence from the U.S. indicating that the social security system has depressed private saving, a great number of empirical studies have been done on the subject. Unfortunately, both cross-section and time series evidence from single countries and cross-country evidence is quite mixed.[1] In this note we will argue that some of the evidence may be even inconclusive. More specifically, the purpose of this note is to emphasize the potential (and in this particular case very real) dangers of the use of ad hoc specifications and proxy variables in applied econometric work with small samples. This point will be demonstrated by using the data of one particular, famous, and "conclusive" study - the study by Feldstein (1980).

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[1] See Feldstein (1974, 1977, 1980, 1982), Munnell (1974), Upton (1975), Ettlin (1976), Munnel (1976), Barro (1978), Barro & MacDonald (1979), Darby (1979), Feldstein & Pellechio (1979), von Furstenburg (1979), Kopits & Gotur (1980), Ståhlberg (1980), Auerbach & Kotlikoff (1981), Blinder et al. (1981), Palmer (1981), King & Dicks-Mireaux (1982), Leimer & Lesnoy (1982), Ram (1982), Bentzel & Berg (1983), Berg (1983), Koskela & Virén (1983a, b), Diamond & Hausman (1984), Kurz (1985), Briden & Zedella (1986), Hubbard (1986) and Koskela & Virén (1986a, b).

2. FELDSTEIN'S DATA AND ANALYSIS

The theoretical framework in Feldstein (1980) is the formulation of the life cycle hypothesis proposed by Houthakker (1961) and Modigliani (1970) and extended by Feldstein (1977) to account for endogenous retirement age. According to this hypothesis the private saving rate depends positively on the growth rate of total private income, negatively on various demographic variables while the sign of the effect of social security is a priori ambiguous. Feldstein's basic savings function (p. 229, equation (1)) is

$$(1) \qquad (S/Y) = a_0 + a_1 G + a_2 AGE + a_3 DEP + a_4 (B/E) + a_5 LPAGED + e$$

where (S/Y) is the private saving rate, G is the growth rate of total private income, AGE is the ratio of the number of retirees over the age of 65 to the population aged 20 to 65, DEP is the ratio of the number of younger dependents to the working age population, (B/E) is the "new retiree replacement ratio" (the social security variable), LPAGED is the labor force participation rate of the aged and e is a white noise error term.[2] The a_i:s, i=0,1,...,5, are regression coefficients with the following expected signs; a_0, $a_1 > 0$, $a_2, a_3, a_5 < 0$ an $a_4 \gtrless 0$. For a detailed discussion of the model, the data and the variables see Feldstein (1980).

Feldstein fits model (1) to cross-country data from 12 countries (the data are listed in Feldstein (1980), p. 233, Table 1).[3] He estimates (1) by weighted two-stage least squares (2SLS) where each observation is weighted by the country's population, and concludes that "the new estimates do support ... the conclusions ... that

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[2]The error term is not mentioned by Feldstein although it, of course, is a feature of the model.

[3]The countries are Austria, Canada, Denmark, France, Germany, Italy, the Netherlands, Norway, Sweden, Switzerland, the United Kingdom and the United States. Feldstein does not display the population figures, but these were obtained from the OECD Labour Force Statistics. Population is averaged over 1969 to 1975 as in Feldstein's study.

indicate ... the negative impact of social security benefits on private saving" (p. 238).

3. SOME REMARKS ON FELDSTEIN'S ESTIMATES

Although Feldstein recognizes some of the difficulties with his empirical analysis (see e.g. p. 227 and p. 238) he nevertheless advocates his "social security depresses saving" proposition quite forcefully (see e.g. his Abstract). Nevertheless, several issues merit more attention than he has given them. Perhaps the most weakly motivated (and, as it turns out, most crucial) procedure is to report only estimates weighted by population.[4] Feldstein, however, claims that "when the equations were estimated without weights, none of the basic implications were altered" (p. 232). As the U.S. carries 12 times the weight of the median country and 53 times the weight of the smallest country, and as the theoretical justification for the weighting procedure is unclear checks for robustness with respect to weighting will be made.

The second main weak point in Feldstein's study is the use of an ad hoc specification without convincing evidence that the estimation results are robust to reasonable alternations of the model. Feldstein reports five (equally ad hoc) extensions of model (1), but in general the added variables are insignificant and the changes in the estimated coefficient of the social security variable are not exceedingly big (p. 235, Table 2). However, if relevant variables have been omitted we know that the estimated coefficients will be biased. Though 12 observations do not allow for many extensions to the model, we will consider estimation with Feldstein's alternative social security variable BPARA/y (definded as benefits per aged persons adjusted for a retirement test per average per capita income, and used in Feldstein (1977)) as well as with smaller specifications than (1). This not only documents the degree of

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[4]This has also been noted by Koskela & Virén (1983b).

robustness of Feldstein's results, but also will illustrate the dangers of data mining.

Finally, the quality of Feldstein's data merits comments. Feldstein tells us that the social security variable (B/E) "has significant problems" (p. 226), and that "all of these shortcomings can introduce substantial error in the measurement of expected social security benefits" (p. 227). The alternative social security variable BPARA/y is considered even less reliable (p. 226)! As it is apparent that we are dealing with very crude measures more caution in making inferences seems to be called for. Indeed, Krasker & Pratt (1986) have recently drawn attention to the quality of proxy variables, and have concluded that "the signs of the coefficients in a proxy regression need not coincide with the signs of the coefficients in the theoretically correct regression, even in large samples" (p. 654). Their main finding is that "the results of regression analyses may be more sensitive to the use of proxy variables than is commonly believed. To ensure that the signs of the coefficients coincide with the signs on the unobservable true variables, the proxies often must be of much higher quality than could be hoped for in the actual context" (p. 654).[5]

4. FELDSTEIN'S DATA REVISITED

Using Feldstein's data his saving ratio equation (1) was reestimated by ordinary least squares (OLS).[6] Estimation results with different

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[5]To reduce the effects of cyclical fluctuations, the income, saving and benefit variables are averaged over the period 1969 to 1975 in Feldstein's analysis. It, however, remains unclear why all 12 countries would have been in the same stage of the business cycle, and how sensitive the estimates are to the choice of this particular period.

[6]Unfortunately Feldstein does not report the data which would enable one to instrumentate the variable LPAGED as was done in Feldstein's analysis. Failure to estimate (1) by 2SLS, however, seems to be a problem of a minor order of magnitude given the sample size (2SLS has just an asymptotic justification) and the fact that OLS and 2SLS yield practically identical results (see Table 1, equations (1) and (2)).

weighting procedures and alternative definitions of the social security variable are presented in Table 1. We note that the reestimation yields results that are practically identical with Feldstein's basic estimate. Social security has a significant (at the 5 % level, but not at the 1 % level of significance according to a two-tailed t test), negative effect on the private saving ratio. If one uses the version of the social security variable that Feldstein "successfully" employed in his previous study on this topic (Feldstein (1977)) the conclusions, however, are completely reversed. The estimated parameter has - contrary to Feldstein's proposition - a positive sign; furthermore the parameter does not differ significantly from zero.[7]

Comparing weighted estimated with unweighted ones reveals the most important finding; the estimation results are not robust with respect to the procedure of weighting country observations by population size. The "new" social security variable (B/E) yields the expected positive sign, but one is, at all conventional levels of significance, unable to reject the hypothesis that the estimated parameter is equal to zero. Running a regression without the U.S. yields a coefficient for (B/E) that is not significant in either the weighted or the unweighted case. The other social security variable BPARA/y gives an even "worse" performance; we again find a positive sign. Furthermore, model (1) in the unweighted case performs poorly in terms of goodness of fit; one is, in fact, unable to reject the hypothesis that all coefficients of the explanatory variables are equal to zero.

Some flavour of the robustness, with respect to the choice of model, of Feldstein's strong conclusion about the effect of social security on the saving ratio was generated by restricting one parameter of (1) in turn to zero. Only in the one case reported by Feldstein did the estimated effect of social security on the saving ratio differ

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[7]The correlation between the two measures of social security benefits is as low as 0.513.

Table 1

Estimation results with the saving function (1) $(S/Y) = a_0 + a_1 G + a_2 AGE + a_3 DEP + a_4 (B/E) + a_5 LPAGE + e$ and data of Feldstein (1980)

Equation	Constant	G	AGE	DEP	(B/E)	LPAGED	BPARA/y	$\bar{R}^2$	SEE	F
(1)	0.92	5.24 (1.33)	-1.21 (0.45)	-0.77 (0.20)	-0.37 (0.13)	-0.54 (0.27)		0.82	0.018	10.8
(2)	0.94 (0.23)	5.10 (1.38)	-1.24 (0.41)	-0.78 (0.20)	-0.37 (0.16)	-0.54 (0.23)		0.82	0.019	10.8
(3)	0.82 (0.35)	4.25 (2.37)	-1.14 (0.49)	-0.67 (0.39)	-0.27 (0.28)	-0.48 (0.27)		0.66	0.013	4.88
(4)	0.49 (0.26)	1.95 (1.24)	-0.78 (0.50)	-0.47 (0.24)		-0.28 (0.36)	0.08 0.11	0.67	0.016	5.47
(5)	0.89 (0.35)	5.44 (2.38)	-1.14 (0.49)	-0.77 (0.33)	-0.36 (0.28)	-0.47 (0.24)		0.46	0.038	2.90
(6)	0.83 (0.40)	4.87 (3.02)	-1.16 (0.53)	-0.70 (0.40)	-0.03 (0.34)	-0.40 (0.27)		0.38	0.004	2.23
(7)	0.52 (0.26)	2.66 (1.81)	-0.96 (0.53)	-0.45 (0.26)		-0.26 (0.24)	0.04 0.10	0.33	0.042	2.10

Standard errors are given in parentheses below each estimated coefficient. Equation (1) reproduces Feldstein's (1980) basic estimate (p.233), Equation (4); the standard error of the estimated constant is not reported) and the implied values for the squared multiple correlation coefficient adjusted for degrees of freedom $\bar{R}^2$ and a F test statistic F for the null hypothesis that all coefficients (except the constant) are equal to zero against the alternative hypothesis that they are not equal to zero. The critical values for the F statistic are F(5,6)=4.39 and F(5,5)=5.05 for the 5 % and F(5,6)=8.75 and F(5,5)=11.0 for the 1 % level of significance. The standard error of estimate is denoted SEE. All equations are estimated by ordinary least squares, and (1) - (4) are weighted by population whereas (5) - (7) are unweighted. The number of observations in all equations is 12, except in equations (3) and (6) which ignore data for the U.S.

significantly from zero (the effect furthermore having the sign expected by Feldstein). In terms of goodness of fit all modifications of model (1) were clearly inferior to the basic variant. As deleting one country observation - the U.S. - also changed the results markedly one possible reason for the fragile findings might be a problem with multicollinearity. The correlations between some of the demographic variables are moderately high (e.g. -0.698 between AGE and DEP and -0.505 between AGE and LPAGED). Indeed, the condition number of the data matrix is 157, which indicates that the multicollinearity problem is severe. This affects the power of all tests adversely and thus lessens the possibilities for making precise inferences.

5. CONCLUSION

In light of the mixed and fragile empirical evidence documented in this note, Feldstein's (1980) data do not enable one to infer that "social security significantly reduces private saving" or that "an increase of the benefit-to-earnings ratio by 10 percentage points reduces the saving rate by approximately 3 percentage points (Feldstein (1980), p. 225, Abstract). A generous amount of caution is needed because the relevant information content of this particular data is small. If empirical evidence is to guide us in search of an answer to the important question of the impact of social security on the private saving ratio sounder analyses than the one scrutinized in this note should be considered.

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