SOCIAL SECURITY AND HOUSEHOLD SAVINGS: ASIAN EXPERIENCE

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I. INTRODUCTION

SOCIAL security institutions have become increasingly important in developing countries as instruments through which household savings are mobilized.[1] Given the presumption that investments of social security funds can be guided by policy makers into channels with high social productivity, this form of savings appears extremely attractive. However, this attractiveness is tempered by the extent to which noncompulsory savings are affected by increases in social security or compulsory savings. If increases in compulsory savings take place at the cost of equivalent or, worse still, greater reductions in noncompulsory savings, such that the impact on the aggregate savings ratio is not positive, then the wisdom of expanding compulsory savings schemes is called into question. This is an area where empirical knowledge is sparse in the context of the developing countries. Data for five Asian countries, viz., Singapore, Malaysia, India, Sri Lanka, and the Philippines over a period of approximately fifteen years between 1960 to 1974, are analyzed in this paper in order to derive substitution elasticities between compulsory savings and noncompulsory savings. It is hoped that the experience of these countries will help policy makers in other developing countries with nascent social security schemes become aware of the potentials of this instrument in increasing overall household savings.

More work has been attempted on the impact of social security institutions on household savings for developed, compared to developing countries.[2] Other more specific studies have been completed for the United States.[3]

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[1] A growing trend is evident in the coverage of the social security schemes. This is not necessarily accompanied by an increase in overall savings or in the ratio of savings to household income. It is partly the purpose of the present paper to examine the latter issue.

[2] See for example, OECD, *Capital Markets Study: General Report* (Paris: OECD, Committee for Invisible Transactions, 1967); idem, *Capital Markets Study: Formation of Savings* (Paris: OECD, Committee for Invisible Transactions, 1968); S. E. Harris, *Economics of Social Security* (Westport, Conn.: Greenwood Press, 1970); and S. Jenkins, ed., *Social Security in International Perspective* (New York: Columbia University Press, 1969).

[3] See for example, R. J. Barro [1]; M. Feldstein [3] [4]; idem, "The Optimal Financing of Social Security," Discussion Paper (Cambridge, Mass.: Harvard Institute of Economic Research, 1974); idem, "Seven Principles of Social Insurance," *Challenge,* Vol. 19, No. 5

Some general studies on social security institutions in developing countries exist.[4] These are descriptive studies which emphasize the problems with the mechanics and administrative aspects of the schemes rather than study their economic ramifications in any significant detail. A study covering a wide number of developing countries on the impact of social security institutions on savings was attempted by F. Reviglio.[5] While laying the foundation for further studies and initiating interest in this area of research, the work was mainly institutional in scope.

Recently, Kopits and Gotur have estimated the overall savings ratio as a function of the old age pension rate and other benefits together with numerous exogenous variables [6]. However, their sample of developing countries includes Finland, Greece, Ireland, Israel, and Portugal, countries which by most criteria are classified as developed.[6] Their sample also includes countries which are very heterogeneous (Libya, Niger, and Burma), both from the point of view of per capita income as well as the nature of the social security system.

Country-specific studies on the effects of social security on savings have been attempted by C. Park for Korea, and P. Shome and K. A. Saito for Malaysia; and on investment, by Shome and Saito for the Philippines and Singapore, and for India and Sri Lanka.[7]

In what follows, Section II discusses the characteristics of social security institutions as well as individual behavior patterns that may affect savings mobilization. In Section III, the effects of social security institutions on household financial savings are presented using a simple Keynesian model. Section IV improves upon the model used in Section III, adding more explanatory variables and correcting for econometric complications. Section V presents a summary and conclusions.

(December 1976); A. Munnell [7] [8] [9]; idem, *The Future of Social Security* (Washington, D.C.: Brookings Institution, 1977); P. Cagan [2]; G. Catona [5]; and P. P. Harbrecht, *Pension Funds and Economic Power* (New York: Twentieth Century Fund, 1959).

[4] See M. A. Odle, *Pension Funds in Labour Surplus Economies* (Jamaica: Institute of Social and Economic Research, University of West Indies, 1974) on Caribbean countries; P. Mouton, *Social Security in Africa* (Geneva: ILO, 1975) on African countries; R. F. Emery, *The Financial Institutions of South East Asia* (New York: Praeger, 1970); and ILO, *Social Security in Asia: Trends and Problems* (Geneva, 1968) on Asia.

[5] See F. Reviglio, "Social Security: A Means of Savings Mobilization for Economic Development," *International Monetary Fund Staff Papers*, Vol. 15, No. 2 (July 1967) and "The Social Security Sector and Its Financing in Developing Countries," *International Monetary Fund Staff Papers*, Vol. 15, No. 3 (November 1967).

[6] Singapore in our study can be also considered developed on a per capita income basis. However, we feel it fits into the context of neighboring Asian countries.

[7] See C. Park, *Social Security in Korea* (Seoul: Korean Development Institute, 1975); P. Shome and K. A. Saito, "The Impact of Contractual Savings on Resource Mobilization and Allocation: The Experience of Malaysia," *Malayan Economic Review*, Vol. 23, No. 1 (April 1978); idem, "Social Security Funds in Singapore and the Philippines: Ramifications of Investment Policies," *Labor and Society*, Vol. 5, No. 1 (January 1980); idem, "Investments of Social Security Funds in India and Sri Lanka: Legislation and Experience," *Indian Journal of Economics*, Vol. 60, Part 3, No. 238 (January 1980).

II. HOW SOCIAL SECURITY AFFECTS SAVINGS

A. *Characteristics of Social Security Institutions*

Savings through social security schemes may be influenced by the method of their financing as well as other characteristics pertaining to their coverage, such as the proportion of working population covered, the rates of contribution, the plan of benefit payments, and the time during which they have operated.

The two basic methods of financing are the so-called "funded" and "pay-as-you-go" principles. In the funded system, "the actuarial value of retirement benefits equals contributions (saving during employment and the return on that saving) for each person. That is, retirement is financed by a fully-funded insurance system. There is no intergeneration redistribution of income...nor is there an intrageneration transfer" [10, p. 158]. Private life insurance is financed this way and is, therefore, often included in the term "social security" in a comparison of major financial instruments.[8] In the pay-as-you-go system, "mechanisms for retirement operate by taxing the working population to provide income to the retired population...there is no necessary link between the amount of consumption foregone during one's working years and the amount of one's retirement income" [10, p. 158]. Since in the pay-as-you-go system, benefits are paid from the annual revenue, usually with no prior reserve formation other than an occasional precautionary fund, it has been widely believed that the funded method has a greater capacity to generate surpluses due to the creation of reserves.

The Employee Provident Fund (EPF, begun in 1958) of Sri Lanka is based on a pay-as-you-go system. The Social Security System (SSS, 1954) of the Philippines, for private employees, is pay-as-you-go, while the Government Service Insurance System (GSIS, 1936), for public employees, is funded. The EPF's of both Malaysia (1952) and India (1952) are funded as is the Central Provident Fund (CPF, 1955) of Singapore.

Since the coverage of the system expands but benefits due to be paid are small, when the system is young, the accumulated funds increase rapidly. In other words, the social security system during the early stage of development has the relatively high income elasticity of fund generation than at a later stage when the system is well-established. To the degree that benefits are controlled and the retirement age is not early, such accumulated funds will persist. If it is difficult for employees to borrow on the basis of their contributions or, if employers do not get back all of their contributions when an enterprise is liquidated, then again the potential for resource mobilization is high.

B. *Effects of Social Security on Savings Behavior*

The question of whether participation in a compulsory savings scheme would

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[8] See V. V. Bhatt and J. Meerman, "Resource Mobilization in Developing Countries: Financial Institutions and Policies," *World Development,* Vol. 6, No. 1 (January 1978).

discourage or encourage other forms of saving has been much debated but the issue has remained inconclusive. Cross-sectional studies for the United States by Cagan [2] and Katona [5] show that private pension benefits stimulate savings by providing a base on which to build an appropriate income for retirement. More recent studies by Munnell [7] [8] [9] and Feldstein [3] [4] dispute these findings arguing that individuals have reduced their savings in response to the guaranteed benefits by social security schemes. The debate has continued between Barro and Feldstein. Barro [1] reexamined Feldstein's aggregate time series data between 1929 and 1971, but concludes that his body of evidence is unwarranted since the negative impact of social security on saving is eliminated fully by private, voluntary intergenerational transfers.[9]

These researchers have explained the possibility of a positive impact of compulsory savings on noncompulsory savings in different ways. A quotation from Feldstein, though rather long, aptly summarized the different explanations for the effect on noncompulsory savings of compulsory contributions:

> The apparent paradox of the finding by George Katona (1965) and Phillip Cagan (1965) [is] that persons covered by private pensions do not save less directly and may save more than those persons who are not covered by pensions. Cagan explained his surprising results in terms of a "recognition effect": When an individual is forced to participate in a pension plan, he recognizes for the first time the importance of saving for his old age. Participation in a pension plan has an educational effect: more formally, it changes the individual's utility function as he perceives it ex ante during his working years. Katona added to this a second explanation: the "goal-gradient" hypothesis borrowed from psychological research on the forming of aspirations. According to this theory, "effort is intensified the closer one is to one's goal." In more conventional economic terms, this would imply that individual preferences are themselves a function of the opportunity set or of the initial position, a dramatic departure from the usual assumption of economic analysis.
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> The extended life cycle model explains the findings of Cagan and Katona without invoking a recognition effect or a model of changing preferences. Workers who are covered by pensions have an incentive to retire earlier than they otherwise would. The pension therefore has two effects on direct personal savings: (1) It reduces personal saving because it substitutes for household assets, but (2) it also increases personal saving because it lengthens the period of retirement over which accumulated assets will be spread. Since the net effect of the pension depends on the relative strength of these two forces, there is no paradox in the empirical finding that private pension coverage does not reduce direct personal saving. [4, p. 81]

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[9] Indeed, both Feldstein and Barro's measures of social security wealth (SS) are subject to deficiencies. Feldstein, by assuming the constancy of anticipated ratio of benefits per recipient to per capita disposable income ignores a potential source of time-series variations in the social security variable. On the other hand, Barro's alternative measure of social security wealth ignores the changing age and sex structure of the labor force, disregards the changing importance of dependents' benefits, and omits the whole process of actuarial discounting. Also there is no reason to constrain the constant term in the savings function as both have done.

In our model, we postulate the impact of compulsory savings on non-compulsory savings to depend on the relative strengths of three effects which we find to be pertinent in the context of developing countries. They are the *substitution effect*, that is the extent to which a saver regards his social security contributions as a form of saving which is substitutable for other forms, the *education effect*, which familiarizes the saver with the idea of long-term financial planning, and the *forced-saving effect*, that is the impact of introducing a compulsory savings scheme which forces an increase in household savings to the extent that there is coverage of non-savers. Below we explain each of these effects and argue that the substitution effect is always negative, the forced saving effect is always positive, and the education effect can be either. The final effect of compulsory or discretionary saving depends, of course, on the relative magnitudes of all three effects.

The substitution effect measures the degree to which compulsory savings can perform the same functions as noncompulsory savings. Compulsory savings can only be used for restricted purposes and consequently are not worth, per se, the equivalent amount of purely noncompulsory savings. Consequently, the substitution effect is always negative. The magnitude of the substitution effect depends, of course, on the degree of availability of a particular form of saving for different uses. One would presume that the more are the restrictions on the use of saving by households in a compulsory saving scheme, the lower is the degree of substitutability. For example, saving through provident or pension funds satisfies only motives of bequest and of provision for old age or invalidity. Such saving does not satisfy other motives, for example, children's education, dowry provision, purchase of equipment or a house, or for everyday contingencies.

The forced saving effect is the impact of compulsory savings on overall savings through the coverage of those who would not otherwise save, and is always positive. Contributors of low income, or low savers of higher incomes, would be forced to save more than they would in the absence of a social security scheme. Consequently their participation in the schemes would raise the savings rate. In those developing countries where social security schemes are specifically directed towards those of lower incomes, such forced saving is likely to be pronounced.[10]

The education effect measures the impact of the familiarization of the idea of saving brought about by compulsory saving. This is likely to be positive in its impact on noncompulsory savings by familiarizing the saver with the idea of long-term financial planning. In many developing countries, these schemes are of relatively recent origin, and their introduction could accustom households and small firms to budgeting with a longer time horizon. Thus the behavioral

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[10] A study of the Indian experience by Ezekiel opines that, as a result of the provident funds operation in India, the average saving-income ratio of covered workers is much higher than the national saving ratio. See E. H. Ezekiel, "Second India Series: An Overview," report to the Ford Foundation (New Delhi, 1977).

response of the saver to participation in contractual schemes could exert a positive impact on total household savings. A positive or non-negative impact may also emerge from a lack of confidence in the eventual receipt of benefits due to unfamiliarity with the scheme. Not having witnessed earlier generations participating in and receiving benefits from the scheme, participants may have doubts about its operation, and so would be unlikely to substitute other forms of saving by compulsory contributions. Thus, this perverse, "lack-of-education" effect may also be a non-negative influence on noncompulsory saving. The education effect may, however, be reversed in the sense that it may "educate" the saver regarding the futility of saving in an unstable political situation or if the administration perennially fails to control inflation, thereby affecting the trade-off between future versus present consumption adversely. The impact on non-compulsory saving may then tend to be negative. The overall education effect, incorporating all these tendencies, may be either positive or negative.

Kopits and Gotur cover the above three effects under the rubric "wealth effect" [6]. They distinguish two further influences of compulsory savings on non-compulsory savings. These are the income effect and the retirement effect. The income effect relates to the fact that social security benefits are financed through taxes. Consequently, an increase in social security savings implies a change in disposable income and, possibly, a change in the degree of income inequality, depending on the progressivity of the taxes. The retirement effect refers to individuals' plans regarding retirement. A social security pension may induce an individual to take early retirement and lead him to save more, voluntarily, to provide for a longer retirement period.

III. A KEYNESIAN SAVINGS FUNCTION

Below we present an econometric model, incorporating the three effects defined above, and studying the impact of compulsory saving on noncompulsory saving. The evidence from the model supports the conclusion that social security systems have not lead significantly to a decrease in household financial savings in the Asian countries under study.

We begin with the substitution effect, that is from the premise that household savings are not homogeneous. One aspect of heterogeneity is the degree of availability of a particular form of saving. Assuming that the higher is its availability, the higher is the marginal utility from $1 of that form of saving, one can postulate that different forms of saving can be combined by giving different weights to different types of savings. For our purpose it will suffice if we categorize savings into compulsory (CS) and noncompulsory (NCS) savings.[11] One can say that, in the perception of the saver, $1 of noncompulsory saving will comprise one unit of homogeneous savings, whereas $1 of compulsory saving, restricted for use under defined contingencies, will comprize γ units of homo-

[11] The argument will, of course, carry through even if there is a spectrum of savings with different degrees of availability.

geneous savings, where $0 \leq \gamma \leq 1$.[12] This may be explained in terms of the savings in question, since "tied-up" savings, restricted in use, may not have a one-to-one correspondence in value to savings which can be removed and used at the savers' will.

Savings, in the perception of the saver, then become

$$S = NCS + \gamma CS . \tag{1}$$

Substituting (1) into the Keynesian saving function, $S = -\alpha + \beta Y$, where Y is personal disposable income, we obtain

$$NCS + \gamma CS = -\alpha + \beta Y , \tag{2}$$

or

$$NCS = -\alpha + \beta Y - \gamma CS . \tag{3}$$

Equation (3) can be estimated from available (or computed) household sector savings data. The value of the coefficient, γ, can be interpreted as the substitution effect between NCS and CS.[13] Say $\gamma = 0.24$. This implies that the households consider \$1.00 of compulsory contributions as \$0.24 of savings in other forms and, therefore, for every \$1.00 of CS, they will decrease their NCS, \$0.24.

Specification as in Equation (3) does not, however, take into account the forced saving effect or the education effect due to the introduction of CS. This can be incorporated within the structure of the model by recognizing that these forces, as a result of the introduction of CS, may shift the savings function: $-\alpha$ moves to, say, $-\alpha'$. In other words, the intercept of the voluntary savings function varies with CS: $-\alpha' + \alpha_1 CS$.

The new savings function, after introduction of compulsory savings, thus becomes $S = -\alpha' + \beta Y$ which, on substitution for S and $-\alpha'$ yields

$$NCS + \gamma CS = -\alpha + \alpha_1 CS + \beta Y , \tag{4}$$

or

$$NCS = -\alpha + \beta Y + (\alpha_1 - \gamma)CS . \tag{5}$$

The coefficient, $(\alpha_1 - \gamma)$, for CS, is not restricted any longer between zero and unity. It is now the algebraic difference between γ, the substitution effect, and α_1, the extent of the shift in the savings function due to the introduction of CS, that is, the combination of the forced saving and education effects. Thus the coefficient of CS, in equation (5), can be positive or negative.

The limitations of data must, to some extent, constrain the analysis since no data are available on personal disposable income except for India. Thus, we

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[12] For $\gamma = 1$, social security savings are equivalent to voluntary savings and there is complete substitution between compulsory and voluntary savings; for $\gamma = 0$, the contributions are merely considered to be a tax and there is no substitution between the two; and for values, in between, social security savings will be partially available for other uses. The proportion γ, thus, can be expressed as a measure of the substitution effect between CS and NCS.

[13] Note that γ is always preceded by a negative sign, as is expected for a substitution effect.

TABLE I

REGRESSION ESTIMATES OF EQUATION (5) (ORDINARY LEAST SQUARES)

	$-\alpha$	β	$(\alpha_1 - \gamma)$	
Malaysia	$-1,078.20$	0.31	-0.24	$R^2=0.99$
(1961 to 1975)		(0.03)	(1.46)	$DW=2.96$
The Philippines	-428.32	0.09	-0.35	$R^2=0.97$
(1951 to 1973)		(0.01)	(0.48)	$DW=2.40$
India	14.19	0.017	2.08	$R^2=0.96$
(1954/55 to 1971/72)		(0.012)	(0.85)	$DW=1.66$
Sri Lanka	-112.18	0.02	0.91	$R^2=0.87$
(1958 to 1974)		(0.01)	(0.48)	$DW=1.79$
Singapore	-83.13	0.09	0.97	$R^2=0.96$
(1961 to 1976)		(0.05)	(0.40)	$DW=2.01$

Note: Figures in parentheses are standard errors.

have used personal disposable income for India only.[14] For all other countries we have used private disposable income, obtained by adding private consumption and gross private savings. They are available from *World Tables* published by the World Bank. As far as savings data are concerned, we have household financial savings data for all the countries except Malaysia, for which we have used gross private savings (see Appendix).

Since provident funds and pension contributions are basically of a compulsory nature while life insurance is not, we have only included the former in *CS*, while life insurance has been included in *NCS*, with all other forms of savings. The exception to this is the Philippines where membership in the Government Service Insurance Scheme (GSIS) is compulsory for all government employees. Life insurance savings, through GSIS, therefore, has been included in *CS*. Finally we have used annual time series data for the different countries, for the years specified for each country in Tables I and II.

Table I presents the regression coefficients using ordinary least squares (OLS) estimates. From the coefficient $(\alpha_1 - \gamma)$, of *CS*, it can broadly be concluded that *CS* could not have had a significantly negative impact on the volume of noncompulsory savings, *NCS*. In the cases of India, Sri Lanka, and Singapore, the impact seems to have been positive. For Malaysia and the Philippines, the coefficients turn out to be negative, but they are insignificant at the 5 per cent level of significance. For these two countries, therefore, it may be concluded that compulsory savings did not have a significantly negative impact on non-compulsory savings of households.

The problem with the OLS estimates, however, is that *CS* itself is a dependent variable for more people come under social security coverage, as incomes Y and other variables such as population increase on a trend basis. We, therefore, used two-stage least squares (2SLS) to reestimate equation (5). To satisfy conditions of identification, we estimated *CS* as $\hat{CS} = -a + bY + cT$, where the new

[14] Actually, even for India, where the percentage of working population covered by social security is the least compared to the other countries, income by industry of origin would be more appropriate than using personal disposable income.

TABLE II

REGRESSION ESTIMATES OF EQUATION (5) (TWO STAGE LEAST SQUARES)

	$-\alpha$	β	$(\alpha_1 - \gamma)$	
Malaysia	$-1,114.99$	0.34	-1.66	$R^2=0.98$
(1961 to 1975)		(0.11)	(5.65)	$DW=2.95$
The Philippines	-437.82	0.11	-1.08	$R^2=0.96$
(1951 to 1973)		(0.02)	(1.37)	$DW=2.37$
India	-826.40	0.16	-8.08	$R^2=0.24$
(1954/55 to 1971/72)		(0.25)	(17.4)	$DW=1.63$
Sri Lanka	-111.07	0.019	1.05	$R^2=0.78$
(1958 to 1974)		(0.018)	(0.72)	$DW=2.22$
Singapore	-134.16	0.12	0.64	$R^2=0.95$
(1961 to 1976)		(0.06)	(0.58)	$DW=2.05$

Note: Figures in parentheses are standard errors.

variable T, time, stands for a trend variable. We then used $\hat{CS}$ for estimating equation (5). These results are presented in Table II.

No longer is the coefficient $(\alpha_1 - \gamma)$, of CS, significant at the 5 per cent level in any of the five countries. But the signs of the coefficients continue to be the same, except for India where the sign of the coefficient $(\alpha_1 - \gamma)$ changes, and its magnitude changes markedly too. While the model does not seem, therefore, to explain the Indian data very well, it may be concluded, for the remaining countries, that CS could not have had a significantly negative impact on NCS, based on the limited number of explanatory variables in this model.

IV. A GENERAL SAVINGS FUNCTION

A. *Specification and Estimation*

In this section a more general econometric specification of the savings function is developed, which permits an estimation of the degree of substitutability between compulsory and voluntary savings. Indian data are not included and data for the remaining four countries are analyzed together, rather than individually, for 1965–74.

The noncompulsory savings ratio is taken to be a function of the compulsory savings ratio, the inverse of household income per capita (in constant prices), the proportion of the population between the ages fifteen and sixty-five to the total population (i.e., the labor force as a fraction of the population), and the rate of growth of productivity of the economy (i.e., the rate of change of GDP/ labor force). The compulsory savings ratio incorporates all the effects of compulsory savings on voluntary savings mentioned in Section II above. The inverse of household income measures the Keynesian impact of income on savings (normalized with respect to income, in order to prevent hetero-schedasticity in econometric estimation). The growth rate of productivity and the ratio of the labor force to the total population are relevant variables explaining the savings ratio in a life cycle hypothesis.

A number of other variables are likely candidates for inclusion as regressors in a savings function. The rate of interest, an index of the size distribution of income, and the rate of inflation are some which readily come to mind. Unfortunately, reliable data on the first two of these are not available for developing countries.[15] The rate of inflation was not considered a relevant variable since the four countries under consideration experienced only mild inflation during the period under review. Moreover, our model was unable to incorporate the retirement effect mentioned in Kopits and Gotur because of lack of data [6]. A priori reasoning suggests, however, that this effect must be very weak in low income countries.

While the ordinary least squares technique can be used to estimate the relation sketched above, it is liable to yield inconsistent estimates. This is because the inverse of income and compulsory savings are endogenous variables in the usual simultaneous model of income determination. A method which would yield consistent estimators is the two-stage least squares technique.

However, a preliminary estimate of the equation for noncompulsory savings, using both ordinary least squares and two-stage least squares for estimation, yielded very low Durbin-Watson statistics, indicating auto-correlation. This is not a surprising finding since the data are in the form of a series spread over ten years. The Cochran Orcutt correction for auto-correlation was applied, and yielded the following results.

(1) Ordinary least squares estimate:

$$NCOMPSAV = -84.26^* - 6.76(INVINC) + 0.59(COMPSAV)$$
$$+ 2.57^{**}(LAFORCE) + 0.73(GROWPR) .$$
$$R^2 = 0.31, DW = 1.674 .$$

$NCOMPSAV$ = noncompulsory savings ratio.

$INVINC$ = inverse of household income in U.S. dollars.

$LAFORCE$ = proportion of labor force to the total population.

$GROWPR$ = rate of growth of productivity (over a five year period).

$COMPSAV$ = compulsory savings ratio.

All the variables have been multiplied by 100. The single asterisk denotes significance at 5 per cent level and the double asterisks denote significance at the 1 per cent level.

(2) Two-stage least squares estimate:

$$NCOMPSAV = -69.64^* - 18.35(INVINC) + 0.09(COMPSAV)$$
$$+ 2.27^{**}(LAFORCE) + 0.79(GROWPR) .$$
$$R^2 = 0.35, DW = 1.62 .$$

$INVINC$ and $COMPSAV$ refer to the first stage estimates of $INVINC$ and $COMPSAV$.

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[15] Size distribution of income statistics are notoriously unreliable, primarily owing to non-homogeneity in the primary data base. Nor are annual observations available. Interest rates in developing countries refer only to the small, organized sector and are generally constrained by policy.

NCOMPSAV, *COMPSAV*, and *INVINC* are treated as endogenous variables. In the estimation of *INVINC* and *COMPSAV*, two additional endogenous variables: *AGE* = age of the social security system and *COVERAGE* = proportion of the population covered by the social security system, were utilized. Neither of these estimates yielded a negative relationship between noncompulsory savings and compulsory savings.[16]

B. *Comparison with Existing Studies*

The results derived here accord broadly with those in Section III. There the same data were used for the variables *NCOMPSAV*, *COMPSAV*, and *INVINC*. However, the specification of the model was different and it was estimated separately for five countries (those included in this section together with India). In the case of the two-stage least square estimate, compulsory savings was not significant for any country.

Kopits and Gotur have estimated the overall savings ratio as a function of the old age pension rate and other benefits together with numerous endogenous variables [6]. However, their model is estimated as a single equation only. Moreover, the sample of developing countries in the study includes Finland, Greece, Ireland, Israel, and Portugal, countries which by most criteria are classified as developed as pointed out earlier. The sample also includes countries which are very heterogeneous (Libya, Niger, and Burma), both from the point of view of per capita income as well as the nature of the social security system.

However, the results obtained by Kopits and Gotur are not too dissimilar from those obtained here. In their unweighted regression, neither type of social security benefit was significant. In a weighted regression, both types of benefits were significant. However, the elasticities were not very high. In the case of old age pensions it was less than 0.1. In the case of other benefits it was more substantial at minus 0.24. Since the greatest weights accrued to Latin American countries and India, the negative elasticity of other social security benefits might be a phenomenon relevant to those societies. In this context it may be of interest to note that the OLS estimate in Section III also yielded a negative coefficient for India, but the coefficient was not statistically significant at the 5 per cent level.

V. SUMMARY AND CONCLUSIONS

In this paper the substitutability of noncompulsory savings and compulsory savings was analyzed for five Asian countries. On an a priori basis, the relation between the two variables could be either positive or negative. It was found, through econometric estimation, using a two-stage least squares technique and

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[16] Among all our estimators only two-stage least squares without correction for auto-correlation yielded a significant negative relation between noncompulsory savings and compulsory savings. However, the Durbin-Watson statistic was too low for this result to have plausibility.

correcting for auto-correlation, that there was no significant relation between the two variables.

The results were broadly supported by the two studies attempted here, one based on individual time series estimates for five countries, and the second based on pooled data for four countries, leaving out India. The results also agreed with the unweighted regression results of a recent cross-section study by Kopits and Gotur. However, these authors obtained a significant impact of social security benefits on the overall savings ratio using weighted regression for a sample of developing countries. In our opinion, choice of sample countries together with the single equation estimation technique used, renders these results somewhat suspect.

Our results are of some interest to policy makers involved in promoting social security schemes in developing countries. Contrary to the experience of some developed countries, it was found that there was no significant relation between noncompulsory savings and compulsory savings in four Asian countries. If this experience is representative, then there is little danger of the private voluntary savings rate eroding as a consequence of the growth of social security, which has multi-faceted benefits.

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APPENDIX TABLE I

GENERATION OF GROSS HOUSEHOLD FINANCIAL SAVINGS DATA: MALAYSIA

(M$ million)

	Private Savings	Household Savings (Estimated)	Household Financial Savings (Estimated)	Household Saving through Life Insurance	Household Saving through EPF
1954	477	404	207	n.a.	n.a.
1955	648	521	278	n.a.	n.a.
1956	602	492	202	n.a.	n.a.
1957	309	203	−76	n.a.	n.a.
1958	474	415	237	n.a.	n.a.
1959	n.a.	n.a.	n.a.	n.a.	n.a.
1960	n.a.	n.a.	n.a.	n.a.	72.6
1961	649	519	189	n.a.	77.1
1962	734	587	213	n.a.	80.6
1963	750	600	218	n.a.	86.6
1964	874	699	254	n.a.	90.7
1965	1,172	932	340	19.0	99.2
1966	1,053	843	306	31.3	106.3
1967	1,057	846	307	18.7	111.2
1968	1,139	911	331	28.8	85.6
1969	1,469	1,175	427	30.9	78.3
1970	1,354	1,083	393	33.6	133.8
1971	1,389	1,111	404	37.3	182.9
1972	1,648	1,319	479	41.7	217.1
1973	2,586	2,069	751	92.7	211.8
1974	2,729	2,184	793	50.7	220.4
1975	3,279	2,624	953	81.6	275.8

Sources: For 1954–58 figures, "Saving of the Federation of Malaysia: A Preliminary Survey," *ECAFE Bulletin*, June 1962; for private savings, 1961–75, International Bank for Reconstruction and Development, *World Tables* (Baltimore: John Hopkins University Press, 1976); for life insurance savings, Director General of Insurance, *Annual Report*, 1970–75 (Kuala Lumpur); for EPF savings from Bank Negara Malaysia, *Quarterly Economic Bulletin*, 1970–75.

Note: Household savings and household financial savings, 1961–75 extrapolated using constant average ratio with private savings, 1954–58 (since this can only give an indication of the trends in the absence of available data, private savings, instead of household savings, was used in the econometric model).

APPENDIX

GENERATION OF GROSS HOUSEHOLD

	Cur-rency	Commercial Bank Deposits				Post Office Savings Deposits	Other Bank Deposits		
		Demand Depos-its	Savings Depos-its	Time Depos-its	Total		Savings Depos-its	Time Depos-its	Total
1951	−33.9	−37.6	−5.3	0.7	−42.2	—	0.2	0.3	0.5
1952	−15.8	4.9	15.7	1.5	22.1	0.7	1.4	−0.1	1.3
1953	32.3	−5.2	37.8	14.5	47.1	2.6	1.8	—	1.8
1954	9.3	4.1	−19.9	0.9	−14.9	0.8	4.0	0.4	4.4
1955	−6.1	14.4	2.6	47.4	64.4	1.5	6.9	0.2	7.1
1956	43.0	18.9	123.1	−33.8	108.2	3.1	8.1	0.6	8.7
1957	55.5	5.9	57.6	9.4	72.9	3.1	12.0	−0.1	11.9
1958	33.1	37.7	56.6	12.6	106.9	0.4	9.9	−0.2	9.7
1959	67.7	8.4	55.7	19.7	83.8	2.5	13.9	−0.1	13.8
1960	49.1	−16.8	67.7	29.5	80.4	1.5	16.2	0.2	16.4
1961	85.3	38.6	151.6	119.5	309.7	3.8	−9.4	0.8	−8.6
1962	108.8	36.4	78.4	190.9	305.7	9.3	21.1	1.3	22.4
1963	168.1	84.0	147.8	131.0	362.8	1.3	36.4	1.0	37.4
1964	−43.3	−25.6	125.5	−44.3	55.6	1.0	43.0	3.3	46.3
1965	139.9	33.9	74.4	8.7	117.0	5.0	53.3	8.9	62.2
1966	53.1	82.2	439.2	80.6	602.0	5.4	82.2	27.6	109.8
1967	187.3	72.8	445.3	100.8	618.9	1.2	84.8	47.3	132.1
1968	19.2	−32.3	257.5	−53.3	236.5	−0.7	50.5	−12.3	38.2
1969	301.4	177.9	307.3	−25.7	459.2	−1.4	122.4	−8.1	114.3
1970	256.7	30.9	528.7	105.4	665.0	−0.1	157.9	21.1	179.0
1971	211.8	147.7	547.9	210.0	905.6	−1.1	164.8	36.4	201.2
1972	692.3	185.5	218.6	334.7	738.8	−4.5	21.8	53.3	75.1
1973	15.7	253.9	1,844.3	242.6	2,340.8	−11.2	305.3	62.8	368.1
1974	757.7	369.9	1,189.2	494.0	2,053.1	−14.8	284.9	132.5	417.4

Sources: Annual reports of National Economic Development Authority, Government

TABLE II

FINANCIAL SAVINGS DATA: THE PHILIPPINES

(Million pesos)

Contractual Savings				Govern-ment Securi-ties	Corpo-rate Securi-ties	Invest-ment in Unincor-porated Enter-prises	Mutual Funds	Total
GSIS	SSS	Private Life Insurance Cos.	Total					
—	—	12.2	12.2	4.0	34.2	145.9	—	120.7
2.6	—	11.8	14.4	−1.0	37.0	119.4	—	178.1
11.9	—	15.0	26.9	22.0	39.0	153.5	—	325.2
22.1	—	17.4	39.5	2.0	38.6	130.2	—	209.9
32.4	—	17.5	49.9	19.0	27.5	85.8	—	249.1
42.7	—	17.4	60.1	16.0	63.9	95.7	—	398.7
54.9	6.6	21.3	82.8	−7.0	63.1	99.3	—	381.6
65.7	27.7	22.5	115.9	22.0	99.7	105.8	4.4	497.9
404.7	41.4	26.7	472.8	32.0	130.9	125.2	16.7	945.4
356.6	49.6	27.6	433.8	50.0	152.5	120.8	8.4	912.9
−16.9	65.2	34.8	83.1	27.0	241.3	136.1	—	877.7
49.9	73.8	38.6	162.3	40.0	172.4	172.8	—	993.7
122.5	87.5	41.6	251.6	52.0	239.4	197.2		1,309.8
148.0	102.7	46.6	297.3	40.0	243.0	206.6		846.5
160.1	117.9	50.9	382.9	77.0	286.3	203.5		1,219.8
171.3	143.3	41.4	356.0	37.0	353.1	234.0		1,750.4
197.2	160.4	66.1	423.7	94.0	404.1	223.7		2,085.0
216.2	182.0	62.2	460.4	104.0	497.7	254.2		1,609.5
218.5	205.3	74.2	498.0	236.0	503.8	227.1		2,338.7
223.2	236.3	89.1	548.7	316.0	615.9	226.4		2,807.6
267.8	283.3	101.8	652.9	151.0	659.6	369.1		3,150.1
287.1	328.0	112.5	727.6	1,117.0	779.0	323.7		4,449.0
270.2	513.2	136.6	920.0	−129.0	938.0	613.3		5,254.6
180.0	606.6	104.6	891.2	1,611.0	2,322.0	785.6		8,823.2

Service Insurance System, and Social Security System.

THE DEVELOPING ECONOMIES

APPENDIX TABLE III

GENERATION OF GROSS HOUSEHOLD FINANCIAL SAVINGS DATA: INDIA

(10 million rupees)

| | Currency | Demand Deposits with Banks* | Time Deposits with Banks | Securities† | Contractual Savings | | | Total |
					Through Life Insurance	Through Provident Funds	Total	
1951/52	−116.7	−30.8	4.7	149.2	15.2	34.1	49.3	55.7
1952/53	−21.0	−6.8	29.6	16.0	21.7	42.9	64.6	82.3
1953/54	24.5	0	14.4	4.9	25.1	78.0	103.1	146.9
1954/55	82.7	22.7	37.4	65.0	27.5	87.2	114.7	322.5
1955/56	193.7	49.3	42.0	179.7	27.0	86.2	113.2	577.3
1956/57	51.8	45.6	54.1	169.7	25.0	93.0	118.0	439.2
1957/58	54.7	49.9	64.3	84.3	22.2	102.8	125.0	378.2
1958/59	120.9	9.2	102.0	71.8	35.0	107.3	142.3	446.2
1959/60	132.1	97.9	56.7	94.8	45.5	112.3	158.1	539.6
1960/61	147.3	24.3	46.2	244.6	61.6	150.6	212.2	674.6
1961/62	99.4	89.9	117.5	155.8	72.9	115.1	188.0	650.6
1962/63	174.3	83.9	92.8	163.5	91.2	131.3	222.5	737.0
1963/64	216.7	236.6	56.6	261.8	93.6	161.3	254.9	1,026.6
1964/65	135.2	184.7	151.7	158.4	97.3	186.8	284.1	914.1
1965/66	287.4	148.0	215.7	149.6	89.7	201.0	291.1	1,091.8
1966/67	123.3	198.3	239.5	177.9	141.6	203.0	344.6	1,083.6
1967/68	163.1	207.1	201.0	197.4	149.9	262.0	411.9	1,180.5
1968/69	271.3	93.2	318.2	185.9	183.6	267.0	450.6	1,319.2
1969/70	335.9	282.3	265.8	77.2	189.4	358.2	547.6	1,508.8
1970/71	344.2	371.9	404.0	176.0	219.9	416.2	636.1	1,932.2
1971/72	404.0	466.5	557.4	121.6	251.2	513.1	764.3	2,313.8

Source: *Reserve Bank of India Bulletin,* various issues.
  * Includes deposits with non-credit societies.
  † Includes investments and loans and advances.

APPENDIX TABLE IV

GENERATION OF GROSS HOUSEHOLD FINANCIAL SAVINGS DATA: SRI LANKA

(Million rupees)

	Currency	Bank Deposits*	Securities†	Life Insurance	Provident Funds	Total
1951	21.8	86.4	22.7	2.3		133.2
1952	−46.5	−36.5	10.3	3.1		−69.5
1953	−56.2	−31.9	20.8	2.3		−65.0
1954	18.5	92.8	31.8	3.4		146.5
1955	34.7	86.6	38.1	3.0		162.4
1956	79.1	−16.8	21.6	3.1		87.0
1957	−96.7	42.3	55.1	3.1		3.8
1958	9.1	13.4	−4.7	3.5	21.8	43.1
1959	39.3	61.3	18.2	2.3	45.1	166.2
1960	−6.9	57.2	45.7	4.0	83.8	183.8
1961	87.3	7.3	−43.0	6.3	94.7	152.6
1962	43.8	46.9	−0.8	7.9	113.6	211.4
1963	148.3	84.7	4.1	18.4	120.7	376.2
1964	63.9	129.0	7.8	21.9	271.4	494.0
1965	60.2	70.1	16.9	21.6	195.4	364.2
1966	−31.3	72.2	30.9	23.1	153.6	248.5
1967	136.9	80.3	41.9	18.7	261.9	539.7
1968	55.8	131.3	50.3	25.4	176.0	438.8
1969	−45.1	112.7	19.0	21.6	186.2	294.4
1970	−56.2	388.4	45.7	28.1	259.3	665.3
1971	214.7	214.9	55.5	34.8	308.7	828.6
1972	270.3	107.1	79.8	38.8	324.7	820.7
1973	230.7	361.4	88.1	48.9	312.0	1,041.1
1974	7.8	348.1	81.1	51.0	363.8	851.8

Source: K. Saito, *Household Savings: An Estimation for Sri Lanka,* Domestic Finance Studies No. 27 (Washington, D.C.: Public Finance Division, Development Economic Department, International Bank for Reconstruction and Development, 1976).

* Includes deposits held at commercial banks, savings banks, and long-term credit institutions.

† Includes government, corporate, and cooperative securities.

APPENDIX TABLE V

GENERATION OF GROSS HOUSEHOLD FINANCIAL SAVINGS DATA: SINGAPORE

(S$ million)

	Currency	Bank Deposits*	Deposits with P.O. Savings Banks	Securi-ties	Central Provident Fund	Life Insurance	Total
1961	39.6	63.9	20.1	n.a.	36.3	3.7	163.6
1962	53.6	86.1	21.5	n.a.	39.9	4.1	205.2
1963	22.9	36.8	21.6	n.a.	48.2	4.8	134.2
1964	35.0	64.2	18.0	n.a.	55.7	5.4	178.3
1965	30.0	61.8	17.6	0.4	62.6	26.4	198.8
1966	38.9	116.6	19.9	0.6	69.8	6.9	252.7
1967	−84.5	398.7	18.5	0.8	78.0	12.8	424.3
1968	78.1	335.6	22.9	0.2	93.1	17.2	547.1
1969	67.1	360.7	38.2	4.8	134.9	11.8	617.5
1970	113.3	313.4	45.1	1.9	191.1	19.6	684.4
1971	124.1	168.9	57.8	6.1	266.9	21.4	645.2
1972	198.8	646.4	87.3	10.6	386.1	35.2	1,364.4
1973	109.8	1,004.9	135.9	17.3	548.2	30.7	1,846.8
1974	192.0	943.1	221.3	−5.0	797.5	32.3	2,181.2
1975	331.3	732.8	558.8	25.0	1,038.2	53.0	2,739.1
1976	309.1	758.2	1,000.4	35.8	1,180.3	68.0	3,351.8

Source: Singapore, *Central Bank Annual Report,* various issues.
* Includes deposits with finance companies.

APPENDIX

OTHER DATA SOURCES AND USAGE

1. For data on labor force and population, ILO, *Labour Force Estimates and Projections, 1950–2000* (Geneva, 1977).

2. For data on GNP/GDP at constant prices, price deflators, and exchange rates, IMF, *International Financial Statistics,* various issues. Household income in each country was deflated by a price deflator, converted to U.S. dollars and divided by population in order to obtain per capita income. This procedure is open to criticism since income converted at current exchange rates does not reflect purchasing power correctly. However, no other way of constructing an annual income series was available. Given that all the countries in the study are developing Asian countries, the bias is probably not as great as would be found in a more heterogeneous mix of countries. The construction of all the other variables used in the estimation is self-explanatory, and involved no special assumptions.