

Savings in Taiwan:

An Empirical Investigation**

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The capacity of the Taiwanese economy to generate savings has always been intriguing to students of comparative economic development. Over the last 30 years, we have witnessed a dramatic rise in the savings rate from 5% to the current level of around 30%. Not only has this figure far surpassed Rostow's 'take-off stage' criterion, but exceeds even Japan's and makes Taiwan today the nation with the highest savings rate in the world.

Table 1 presents data on the average savings rate for 36 selected countries for the period 1970-1978. Taiwan stands out as the one with the highest ratio, about 30.5% of its net national product being saved. Next in line is Japan with a 26.3% rate, followed by Greece, 24.4%. At the lower end of the spectrum lies the U.K. with a rate of 10.6%, and the U.S., with only 7.6%. Why has Taiwan been able to attain such a high savings ratio compared to other countries? What are the important factors affecting savings behaviour in Taiwan? These are the questions this paper will address.

Naturally, there has been some past research done on the subject. Nevertheless, a number of good reasons exist to embark on another broad empirical effort. First, most previous works con-

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sidered only one particular aspect of the savings function. For example, Hui-lin Wu (1976) studied the effect of population on savings, Tien-ming Wu (1978) examined interest rates and savings, and Chinn-ping Fan (1981), financial intermediaries and savings. They have each used a different sample period, measurement method, and estimating technique. There is much to be said for attacking the substantial range of issues in a homogeneous and consistent manner.

Table I

RATIOS OF NET SAVING TO NET NATIONAL PRODUCT
FOR 36 SELECTED COUNTRIES
(AVERAGE FOR 1970-1978: PER CENT)

Taiwan	30.5	Finland	17.6
Japan	26.3	Korea (Rep. of)	17.5
Greece	24.4	South Africa	16.4
Switzerland	22.8	Italy	15.9
Malta	22.8	Norway	15.7
Australia	22.3	Sweden	14.4
Brazil	21.0	Canada	14.1
Netherlands	20.7	Panama	13.9
New Zealand	20.0	Colombia	13.9
Portugal	19.6	Uruguay	11.4
Ireland	18.8	Jamaica	10.7
France	18.8	United Kingdom	10.6
Denmark	18.6	Honduras	10.4
Germany (Fed. Rep. of)	18.5	Costa Rica	9.6
Philippines	18.1	Peru	8.0
Ecuador	18.0	United States	7.6
Spain	17.9	Ghana	6.1
Belgium	17.8	Chile	4.9

Sources: (1) United Nations, *Yearbook of National Accounts Statistics, 1979*.

(2) *National Income of the Republic of China, 1980*.

Secondly, Japan has often been acknowledged for its high rate of savings, and indeed much has been written concerning the Japanese case, but with little agreement on why the rate should be so high, for references see *Blumenthal, (1970)*. Now that Taiwan has surpassed Japan in savings performance (Table 2), it is especial-

ly interesting to engage in similar investigations and see whether we can elucidate concrete explanations for the Taiwanese case.

Table 2
HISTORICAL DATA ON RATIOS OF NET SAVING TO
NET NATIONAL PRODUCT IN TAIWAN AND JAPAN, 1953-1980

Year	Taiwan	Japan	Year	Taiwan	Japan
1953	5.0	16.0	1967	20.1	29.8
1954	3.3	16.2	1968	19.8	32.0
1955	4.9	17.5	1969	22.1	32.7
1956	4.8	19.8	1970	23.8	33.0
1957	5.9	24.9	1971	27.6	29.4
1958	5.0	20.3	1972	31.6	28.9
1959	5.0	23.5	1973	35.0	30.9
1960	7.6	27.9	1974	31.5	26.7
1961	8.0	31.2	1975	25.3	22.7
1962	7.6	28.1	1976	32.2	22.2
1963	13.4	25.9	1977	32.3	21.5
1964	16.3	27.1	1978	35.2	21.0
1965	16.5	24.5	1979	34.9	—
1966	19.0	25.7	1980	33.0	—

Sources: (1) *Blumenthal* (1970: p. 10).

(2) United Nations, *Yearbook of National Accounts Statistics, 1979*.

(3) *National Income of the Republic of China, 1980*.

The plan of the paper is as follows. Section I examines the empirical relationship between savings and income using Taiwan's data. We begin with the simple Keynesian savings function and proceed to the more sophisticated theories developed in the post-Keynesian period. Section II considers three other determinants of savings frequently mentioned in the development literature, viz., income distribution, interest rates and inflationary expectations. The conclusion from these two sections is that although these factors all have statistically significant effects on savings in Taiwan, none of them provide a satisfactory explanation as to why the savings rate here is the highest in the world. Section III suggests that the high savings rate can be attributed to three factors: the role of the governments, the relatively underdeveloped social security system, and frugality stemming from Chinese customs and tradi-

tion. Section IV contains some concluding remarks.

I. Income and Savings

Most of the recent empirical work on the savings function has taken income to be the main explanatory variable. Generally speaking, this type of analysis has used one of two different approaches. First, Keynesian economics, in analyzing aggregate effective demand, produced what may be termed the 'absolute income hypotheses.' The two fundamental propositions of this hypothesis are: (i) Saving is a function of income, the higher the level of income, the higher the level of savings; (ii) the marginal propensity to save (MPS) is greater than the average propensity to save (APS), so that, as income increases over a period of time, the APS will rise as well. Thus, regardless of whether we take the aggregate level of savings or the savings rate (i.e. the APS) as the dependent variable, the crucial determinant is the 'absolute' level of income.

The second more sophisticated approach began with Kuznets' observation that in the U.S. whereas cross-section data showed that savings as a proportion of income increases with the level of income, annual time-series showed a nearly constant savings rate in spite of a secular rise in the level of income. Most post-Keynesian theories in consumption and savings have arisen as attempts to reconcile this seemingly contradictory behaviour. The most notable ones are the hypotheses of Dusenberry (relative income hypothesis), Ando-Modigliani-Brumberg (life-cycle hypothesis), Friedman (permanent income hypothesis) and Houthakker (dynamic savings function). Despite differences in their underlying mechanisms, all these theories conclude that the growth rate of income (rather than the absolute level of income) is the chief explanatory variable. Intuitively, this is because a rapid income growth alters relative income and life-time consumption patterns and increases transitory income in relation to permanent income.¹

Although the two approaches have different implications as to what should be the main explanatory variable, there is nothing in

1. For discussions on the equivalence of these theories, see Swamy, 1968; Houthakker and Taylor, 1970

the logic of the theories that renders them mutually exclusive. We can include both the level of income and the growth rate of income as explanatory variable in a multiple regression equation. In this section, we shall first try the simple Keynesian savings function, and then add the growth rate of income to the model. Our purpose here is to see whether or not, and to what extent, these basic theories can explain the high savings ratio in Taiwan.

(A) The Keynesian Savings Function

The Keynesian savings function, in its most commonly used form, is linear with a constant marginal propensity to save,

$$S = a_0 + a_1 Y$$

where S is gross domestic savings, Y is gross national product, and a_1 is the constant MPS. It is hypothesized that $a_0 < 0$ and $0 < a_1 < 1$ such that as the level of income rises the APS will also increase. Following this format, we have estimated the following regression, using the Hildreth-Lu search procedure to adjust for serial correlation (the number in parentheses here and in following equations are t-statistics):

$$(1) S = -14,647.12 + 0.3483 Y$$

$$(4.61) \quad (58.89)$$

$$R^2 = 0.9928; \text{ S.E.E.} = 8654.48;$$

$$\text{D.W.} = 1.79; \rho = 0.31;$$

sample period = annual data 1953-1980.

We begin with 1953 because this year marked the end of the Korean War and was also the beginning of the first 4-year economic planning in Taiwan. As can be seen, the R^2 is quite high, and a_0 is negative and significantly different from zero. This confirms the absolute income hypothesis that the MPS is greater than the APS. Prominent is the magnitude of the MPS, 0.3483, which is considerably higher than of most other countries.² Mikesell and Zinser (1973) ran the same regression for 18 Latin American countries and found the average value of the MPS to be only 0.132.

2. Equation (1) uses aggregate of GNP and gross domestic savings. We also tried the same regression with three alternative specifications: (i) aggregate real form, (ii) per capita nominal form, (iii) per capita real form. The resulting estimates of the MPS are very similar.

Weisskopf's (1970) study for other LDC's also reported an MPS of 0.13.

Equation (1) encompasses the entire nation. We can also look at the household sector individually:

$$(2) S_H = -4,991.48 + 0.1953 Y_H$$

(2.54) (31.57)

$R^2 = 0.9765$; S.E.E. = 4804.78;
D.W. = 1.52; $\rho = 0.35$;

where S_H represents household savings; and Y_H , household disposable income. Comparing (1) and (2), we see that the MPS of the household sector is much lower than that of the nation — an indication that a substantial amount of savings has actually been done through the government sector. We shall return to the question of government savings in Section III. For the moment, notice that the MPS of the household sector, 0.1953, is still quite high, requiring further investigation. Thus, this sort of simple regression can only give us a feeling for the magnitude of the MPS. It does not provide an explanation for that magnitude. We must go one step further and introduce additional factors into the picture.

(B) Savings and the Growth Rate of Income

As mentioned earlier, post-Keynesian theories of consumption and savings essentially advocate the growth rate of income as an important explanatory variable. There are several ways of estimating a savings function utilizing both income and the growth rate of income as explanatory variables. In the empirical literature, a commonly used functional form is [Singh, 1975]

$$APS = m_0 + m_1 g + m_2 \ln y,$$

where APS is the savings rate expressed in percentage points; g represents the growth rate of real GNP, and y , the per capita real GNP. Here we have taken the average rate of savings (rather than the aggregate level of savings) as the dependent variable so that the coefficient for g will allow straightforward interpretation. Because the mathematical magnitude of y is substantially larger than both APS and g , researchers generally use $\ln y$ rather than y in their regressions [Singh, 1975: pp. 134-35].³

3. My experiments also indicate that this is the form that yields the best fit with Taiwanese data.

Using this format, we have estimated the following two regressions, first without, and then with g :

$$(3) \text{ APS} = -164.15 + 18.41 \ln y$$

$$(8.84) \quad (10.31)$$

$$R^2 = 0.8036; \text{ S.E.E.} = 1.7800;$$

$$\text{D.W.} = 1.75; \rho = 0.63.$$

$$(4) \text{ APS} = -162.13 + 0.26 g + 17.99 \ln y$$

$$(10.55) \quad (2.51) \quad (11.68)$$

$$R^2 = 0.8668; \text{ S.E.E.} = 1.6191;$$

$$\text{D.W.} = 1.88; \rho = 0.59.$$

Notice that the coefficient of $\ln y$ is significant in both equations, indicating that the Keynesian absolute income hypothesis is valid in the Taiwanese case. In contrast to Kuznets' findings for the U.S., the savings rate in Taiwan did rise with income. In fact, equation (3) shows that approximately 80% of the variation in the APS can be explained by per capita income alone. On the other hand, when we add g to the regression, we also obtain a significant coefficient for g and increase the explanatory power of the equation to 86.68%. This confirms that the savings rate is influenced by the growth rate of income, whatever the underlying theory may be.

Thus, as far as the determinants of the savings ratio are concerned, much of the variation in the APS can be attributed to per capita income and the growth rate of income. But, these two variables do not adequately explain why Taiwan's savings ratio is the highest in the world. The reasons for this are twofold.

(a) Sun (1982: pp. 207-14) and others have suggested that the high growth rate of income be chiefly responsible for Taiwan's high savings rate because this represents a phenomenon that has set Taiwan (and Japan) apart from other nations over the past 30 years. A closer look at equation (4), however, reveals that the coefficient for g is only 0.26. In other words, if the growth rate of real GNP increases by 5% (say, a change from 4% to 9% steady-state growth), then the APS will increase by only 1.3% — a relatively small figure considering the fact that Taiwan's APS has risen from 5% to around 30% over the sample period. Hence, the high savings ratio cannot be explained by those theories advocating the growth rate of income as the chief determinant of savings.

It should also be pointed out that the coefficient, 0.26, is much

lower than that found in other studies done on other nations. Singh (1975), for example obtained a figure of 1.4, Houthakker (1965), 1.36, Houthakker and Taylor (1970), 1.54, Modigliani (1965), 1.42, and Swamy (1968), 1.46. One possible explanation for the low coefficient here is that Taiwan's growth rate has been consistently high. Between 1953 and 1960, the average g was 7.57%, from 1961 to 1970, it was 9.63%, and from 1971 to 1980, again, 9.63%. When the growth rate of real GNP persists at such a high level over a long period of time, people tend to take it for granted and adjust their consumption pattern accordingly. The amount of extra savings derived from 'unexpected' (or transitory) income is naturally limited.⁴

(b) Although our time series regressions indicate that a large portion of the rise in APS can be 'explained' by the rise in income from 1953 to 1980, they cannot explain why Taiwan's APS is higher than of other countries. It is not possible to explain the high level of the savings ratio in one country *relative* to others by using a time series model which elucidates savings behaviour *within* that one nation. Time series analysts can explain variations in the observed data, but not why the level of that data is higher or lower than the same set of data in another country.

Thus, we need to separate and distinguish between two sets of issues: (i) the determinants of the savings ratio in Taiwan; and (ii) why the savings ratio is higher in Taiwan than in other countries. To understand why Taiwan's savings ratio is the highest in the world, we need a cross section study using international data. This,

4. One interesting experiment that may lend support to this conjecture is to fit Friedman's permanent income hypothesis equation directly with Taiwan's data. The results are as follows:

$$S = -13.681.17 + 0.3184 Y_p + 0.4953 Y_T$$

(4.21) (12.17) (3.95)

$$R^2 = 0.9929; \text{S.E.E.} = 8591.40;$$

$$\text{D.W.} = 1.71; \rho = 0.33;$$

where Y_p , Y_T are permanent income and transitory income respectively. To maintain large degrees of freedom, we employ three-year moving averages of income to represent permanent income, a practice commonly used in time series studies of LDC's see, for example, *Williamson, 1968*. Notice that the MPS from transitory income (0.4953) is larger than that from permanent income (0.3184). This is not surprising because transitory income is in a sense 'unanticipated' and tends to be saved according to Friedman's theory. However, the MPS from the permanent income component is still quite substantial compared to other countries. It is really the magnitude of this MPS that puzzles researchers and ought to be studied.

however, would require the compilation of huge amounts of data and is beyond the scope of the present paper. The question, then, is: within the scope of a time series analysis of Taiwan's data, can we find other factors that may, on the one hand, increase the explanatory power of the equation and, at the same time, shed some light on the second issue as well? Can we by thus doing (which, strictly speaking, is only relevant to the first issue) find some clues and hence stimulate further research on a larger scale? This is what I propose to do in the next section. In particular, I shall examine separately three factors frequently mentioned in the development literature: income distribution, interest rates, and inflationary expectations.

II. Other Possible Determinants of Savings in Taiwan

(A) *Income Distribution*

An uneven income distribution is generally believed to lead to a higher savings rate than would an even one. This is especially true if income distribution is skewed toward the entrepreneurial group. Entrepreneurs tend to save more than nonentrepreneurs because they need to maintain their capital stock; they prefer internal to external sources of funds for investments; and they have better information about investment opportunities (*Lim, 1980*). Entrepreneurs may also save more because of cultural factors, or may simply have 'what it takes' to abstain from current consumption.

To determine the effect of income distribution on the savings rate, we return equation (4) adding a variable to represent entrepreneurs' share of total disposable income. This estimation procedure yields:

$$(5) \text{ APS} = -188.31 + 0.24 g + 20.21 \ln y + 0.102 \lambda$$

$$(10.51) \quad (2.33) \quad (12.20) \quad (1.94)$$

$$R^2 = 0.9140; \text{ S.E.E.} = 1.5391;$$

$$\text{D.W.} = 1.97; \rho = 0.51.$$

Here λ stands for the ratio of income from property and entrepreneurship to total disposable income. From equation (5), we see that λ does have a significantly positive effect on the savings rate. Furthermore, by adding λ to the equation, we have raised R^2 from 0.8668 to 0.9140.

We can also break up the household sector into two parts and run the following regression:

$$(6) S_H = -6,784.52 + 0.1317 L + 0.3326 E$$

(3.16) (2.17) (2.58)

$$R^2 = 0.9874; \text{ S.E.E.} = 5019.77;$$

$$\text{D.W.} = 1.24; \rho = 0;$$

where S_H , as defined earlier, is household savings; L represents compensation of employees and other transfers, and E , income from property and entrepreneurship. As expected, the MPS out of entrepreneurs' income (0.3326) is much larger than that out of wage income (0.1317). Recall that the MPS for the household sector as a whole is 0.1953.

Income distribution would thus appear as an important factor affecting the savings ratio in Taiwan, but we cannot regard it as a crucial factor explaining why Taiwan's savings rate is the highest in the world, because for over last 30 years the share of entrepreneurial income has actually declined! Statistics show that, in 1953, λ was 56.54%. Since then the ratio has steadily declined to 39.78% in 1980. Furthermore, the MPS out of L and E are both substantially higher than those of other countries. Houthakker (1965) used data from 28 countries to run a similar regression. He obtained an MPS from L of only 0.043, and an MPS from E of 0.120. The question remains why the savings propensities are so high in *both* income groups here.

(B) Interest Rates

The relationship between interest rates and aggregate savings is of special interest to policy makers in Taiwan today as much attention is now focused on whether the government should move the rate down to stimulate investment, or up to encourage savings. Unfortunately, we cannot tell *a priori* whether the effect of interest rate changes on savings is positive or negative. There has been much written on the subject (see, e.g., Miller, 1963; Birdsall and Goldstein, 1973; and Tsiang, 1973). Most scholars agree that this is an empirical matter, yet the empirical work tends to uncover contradictory evidence. Williamson (1968), in a study of six Asian countries, found that real rates of interest were negatively correlated with national savings, while Gupta (1970) studying India, and

Brown (1971) studying Korea obtained a positive relationship.

Using the data for Taiwan, we obtained the following results:

$$(7) \text{ APS} = -138.91 + 0.51 g + 15.62 \ln y - 0.231 r_T$$

$$(16.47) \quad (5.68) \quad (18.49) \quad (4.68)$$

$$R^2 = 0.9942; \text{ S.E.E.} = 1.2075;$$

$$\text{D.W.} = 1.53; \rho = 0.27.$$

$$(8) \text{ APS} = -120.86 + 0.46 g + 14.29 \ln y - 0.226 r_B$$

$$(18.53) \quad (7.31) \quad (23.53) \quad (8.56)$$

$$R^2 = 0.9914; \text{ S.E.E.} = 0.9436;$$

$$\text{D.W.} = 1.81; \rho = 0.$$

Here r_T is the time deposit rate, that is, the interest rate on one-year time deposits minus the rate of inflation and r_B is the real black market rate, the going rate (also corrected for inflation) in the unorganized credit market. As can be seen, regardless of whether we use the official rate or the black market rate, the coefficient for the interest rate is negative and highly significant. Moreover, the explanatory power of the equation increase substantially with R^2 now surpassing 99% in both regressions.

Although the data reveal a negative relationship between interest rates and savings, it is not necessary to conclude that the effect of interest rate changes on saving is negative, because there might be an identification problem here. Can it be assumed that interest rates are exogenous factors which influence savings rates, or might not causality be the other way around? Consider a scenario in which the level of savings increases, there by increasing the availability of loanable funds, and hence exerting downward pressure on the interest rate. If we assume that the level of savings affects the interest rate, then it is not surprising to observe a negative relation.

It is not clear what can be done to resolve this identification problem within the framework of a single equation model, to which the present work, like other studies of savings behaviour, is confined. Nevertheless, as far as the main purpose of this paper is concerned, it is safe to conclude that interest rates do not explain why the savings ratio should be so high in Taiwan. Over the past three decades, the level of interest rates has remained fairly constant while the savings rate has risen steadily from 5% to around

30%. A government policy of raising the interest rate may stimulate savings from time to time in the short run, but then again, it may not. To explain the long-run secular trend of the savings rate, we must look elsewhere for other factors.

(C) *Inflationary Expectations*

The effect of inflationary expectations on savings has recently received much attention in literature. Generally speaking, inflation can be expected to exert two separate influences on savings. First, inflation encourages the holding of real assets rather than assets of fixed nominal value. Secondly, inflation creates a feeling of uncertainty and pessimism about the future that is thought to encourage saving. The former effect is the familiar 'flight from currency' that would be reflected in a decrease in the measured savings rate to the extent that consumer goods are among the real assets substituted for nominal ones. The latter effect would, of course, increase the savings rate.

The tendency for inflation to increase savings can be explained in several ways. Perhaps the simplest is the hypothesis that inflation adversely affects consumer confidence and thus, in turn, leads to higher savings (*Katona, 1975*). A more elaborate explanation holds that inflation increases the variance of expected real income. Since, it is argued, households prefer unplanned additions to savings rather than unplanned withdrawals, the consumer will increase his savings rate in an inflationary period (*Juster and Wachtel, 1972*).

To examine the effect of this factor, we again take equation (4) as the basic equation and add a variable for inflation:

$$(9) \text{ APS} = -147.70 + 0.45g + 16.29 \ln y + 0.170 \pi$$

$$(11.93) \quad (5.05) \quad (13.22) \quad (4.14)$$

$$R^2 = 0.9201; \text{ S.E.E.} = 1.2121;$$

$$\text{D.W.} = 1.59; \rho = 0.60.$$

π here stands for the growth rate of the GNP deflator which, in annual data, is taken to be an approximation of anticipated inflation. Equation (9) thus provides a significantly positive effect of anticipated inflation on the savings rate. The same conclusion has also been reported by several other authors (*Juster and Wachtel,*

1972; Deaton, 1977; Howard, 1978; and Bulkley, 1981).

Although inflation exerts a positive influence on the savings rate and has perhaps been an important determinant of savings behaviour in the 1970's, it does not provide an adequate explanation for Taiwan's savings ratio in comparison with other countries. Going back to Table 2, we see that Taiwan's savings rate had already reached 31.6% in 1972 before the first oil shock! Nevertheless, the relationship between inflation and saving is an interesting and important subject that deserves further investigation.

III. Our Hypothesis to Explain Why Taiwan's Savings Ratio is the Highest in the World

In Sections I and II, we examined several standard hypotheses concerning savings in LDC's. Our time series analyses of Taiwan's data illustrate that, as far as the determinants of the savings ratio are concerned, these models work out quite well. Per capita income alone explains about 80% of the variation in the APS, and by adding other factors, such as the growth rate of income, income distribution, interest rates, inflationary expectations, etc., we are able to raise the explanatory power by various degrees. But the question remains: why is it that the rise in income could generate so much more savings in Taiwan than in other countries? In other words, why is Taiwan's MPS substantially higher than that of other countries? As was argued in the previous two sections, none of the various factors examined so far is able to adequately satisfy this question.

In this section, we propose the hypothesis that Taiwan's comparatively high savings ratio can be attributed to three factors: (i) the role of the government, (ii) a relatively underdeveloped social security system, and (iii) frugality stemming from Chinese customs and tradition. This section, which does not provide a comprehensive, international comparison, is inherently suggestive and does not purport to provide firm conclusions. It is hoped, however, that the preliminary findings here will stimulate further research along these same lines.

(A) Government Savings

To understand why the level of savings has been so high in

Taiwan, we first have to look behind the data. Saving originates both in the private and public sectors of the economy. The former consists of households, non-profit institutions, and private corporations; the latter of government and public enterprises. Table 3 lists the percentages of total savings attributed to each of these sectors over the past three decades. It is clear that government savings account for a large portion of total savings, almost always over 30% and in some cases even in excess of 50%. Thus a substantial amount of savings in Taiwan has actually been the result of policy decisions, and here the growth-oriented policies of the Taiwanese government must have played an important role in bringing about such a high level of government savings.

Table 3
DISTRIBUTION OF SAVINGS BY SECTOR IN TAIWAN
(AVERAGE: IN PERCENTAGE POINTS)

Period	Households and non-profit institutions	Private corporations	Government and public corporations
1953-1955	25.3	14.6	60.2
1956-1960	37.6	10.4	52.0
1961-1965	61.4	9.8	28.8
1966-1970	57.5	9.6	32.8
1971-1975	56.9	8.4	34.7
1976-1979	49.9	8.4	41.7

Source: National Income of the Republic of China, 1980.

For comparison, Table 4 presents the percentage distribution of savings by sector for 14 selected countries over the period 1970-78. Except for Korea and Honduras, the share of saving by the government is much smaller than that found in Taiwan. In some cases, it is even negative.

Government saving then is our first explanation for the high savings ratio in Taiwan. It, however, cannot be regarded as the only explanation for two reasons. First, the proportion of private savings (defined as total savings minus government savings) to net national product is calculated as 19.5% (average for 1970-78), which is still very high compared to other nations. Secondly, it is

generally believed that there is a high degree of substitutability between government savings and private savings. The coefficient of substitution between these two types of savings was estimated by Singh (1975) as 0.57. In other words, an additional dollar of government savings implies a reduction of 57 cents in private savings. Had the government not used fiscal policy as a means of mobilizing savings to promote growth, private savings would have been much higher. Thus, we need further explanations for the high savings ratio in Taiwan beyond the role played by the government.

Table 4
DISTRIBUTION OF SAVINGS BY
SECTOR FOR 14 SELECTED COUNTRIES
(AVERAGE FOR 1970-1978)

	Households and non-profit institutions	Private corporations	Government and public corporations
Australia	60.6	15.1	26.3
Belgium	89.3	11.0	-0.3
Canada	55.6	43.7	13.9
France	73.3	7.5	19.0
Germany (Fed. Rep.)	64.7	13.3	22.1
Honduras	29.1	41.7	29.2
Japan	71.8	8.6	19.7
Korea (Rep. of)	40.8	20.6	34.9
Malta	62.1	30.6	7.3
Netherlands	61.0	15.1	24.3
Philippines	62.7	15.6	21.6
South Africa	54.5	26.0	21.8
United Kingdom	80.7	19.2	0.2
United States	90.8	23.5	-13.7

Source: United Nations, *Yearbook of National Accounts Statistics, 1979*.

(B) Relatively Underdeveloped Social Security System

A relatively less developed social security system is a feature that differentiates Taiwan (and Japan as well) from most Western

countries. Most people here must rely on their own savings and /or their children for support after retirement. In the United States, the ratio of social insurance taxes to net national product currently stands at 6.9%, while it is less than 1% in Taiwan.

Although we are not sure how to test this hypothesis empirically, we believe that the lack of a more comprehensive social security system is a very important factor accounting for the high level of savings in Taiwan. The following regression may be indicative of the magnitude of this effect:

$$(10) \text{ APS} = -171.66 + 0.28 g + 19.26 \ln y - 4.29 \delta$$

$$(24.97) \quad (2.37) \quad (26.15) \quad (1.88)$$

$$R^2 = 0.9734; \text{ S.E.E.} = 1.6636;$$

$$\text{D.W.} = 1.22; \rho = 0.$$

Here δ represents the ratio of government expenditure on social security benefits and public health to the gross national product expressed in percentage point. From this equation, we see that the coefficient for δ is significantly negative and its value is very substantial (4.29) — much larger than the same coefficients for income distribution (0.102), interest rates (0.231 and 0.226), and inflationary expectations (0.170). In other words, an increase of 1% in δ , which presently stands at about 0.87%, will reduced the savings rate by more than 4% ! Although a time series regression, as cautioned earlier is not relevant in explaining why Taiwan has a higher savings that the social security system factor warrants further attention.

(C) Frugality in Chinese Customs and Tradition

Chinese tradition stresses thriftness and indeed we consider it a nationwide characteristic that cannot be disregarded when explaining Taiwan's high rate of savings. In a paper entitled 'Familism and National Characteristics in China,' sociologies Tsin-Lo Chu (*Li and Yang, 1972: pp. 85-126*) viewed frugality as one of the three outstanding national characteristics of the Chinese people, which stem from traditionally strong family bonds. Anthropologist Cheng-Tung Wei ('Analysis of the Concept of an Ideal Person in Chinese Tradition' in *Li and Yang, 1972: pp. 1-46*) also considers frugality as one of the important virtues in Chinese concept of an 'ideal person.'

In fact, the emphasis on thrift as a virtue can be traced back to Confucian teachings. In an oft-quoted passage, Confucius thus praised his most beloved disciple, Hwuy:

Admirable indeed was the virtue of Hwuy! With a single bamboo dish of rice, a single gourd dish of drink, and living in his mean narrow lane, while others could not have endured the distress, he did not allow his joy to be affected by it. Admirable indeed was the virtue of Hwuy!

In another equally well-known passage, Confucius said of the legendary Emperor Yu:⁵

I can find no flaw in the character of Yu! He used himself coarse food and drink, but displayed the utmost finial piety towards spirits. His ordinary garments were poor, but he displayed the utmost elegance in his sacrificial cap and apron. He lived in a low mean house, but expended all his strength on the ditches and water-channels. I can find nothing like a flaw in Yu!

It is, of course, difficult to measure the effect of 'tradition' on savings. But in the course of this research, we have uncovered a very interesting piece of evidence which may shed some light on this. Leff (1969), in his influential paper, put forward the proposition that, a country's savings rate is lower, *ceteris paribus*, the more dependents there are in its population. The reason is simply that a high ratio of dependents to the working age population is expected to impose a constraint on a society's potential for savings. Using data from 47 less developed countries, 20 developed Western nations and 7 communist countries, he obtained the following equation:

$$\begin{aligned} \ln \text{APS} = & 7.34 + 0.025 \ln g + 0.1596 \ln y - 1.352 \ln D_1 \\ & (5.73) \quad (3.28) \quad (2.88) \quad (4.64) \\ & - 0.399 \ln D_2. \\ & (2.56) \end{aligned}$$

Here D_1 is the proportion of the population under 14, and D_2 is the proportion of the population over the age of 65. In other words, D_1 and D_2 represent dependency ratios, and the coefficients for these

5. There are several versions of the English translation of Confucius' *Analecfs*. The two quoted passages here are from *James Legge, 1861: p. 52 and p. 79.*

are significantly negative.

Leff thus showed that a high dependency ratio tended to depress savings. His main conclusion is that a high birth rate is among the important factors which account for the great difference in savings rates between developed and developing countries. The prospects for increased savings rates in developing countries will not be favorable unless birth rates are first reduced.

This conclusion is reasonable and important. Interestingly, when we take Taiwan's data and fit exactly the same regression, we obtain the following results:

$$(11) \ln APS = -23.20 + 0.01 \ln g + 1.97 \ln y + 2.16 \ln D_1 \\ (11.72) (0.40) \quad (6.96) \quad (3.06) \\ -1.65 \ln D_2 \\ (1.71)$$

$$R^2 = 0.9802; \text{ S.E.E.} = 0.0669;$$

$$\text{D.W.} = 1.87; \rho = 0.13.$$

The coefficient on D_2 is still negative, but surprisingly, the coefficient on D_1 is positive, highly significant, and quite large. This implies that the more dependents there are, the higher the level of savings is.

We can explain this positive relation between dependency ratios and savings rates as follows. Traditionally, Chinese family ties have been very strong and, as Chu observed, frugality is one national characteristic that stems from this tradition. Most parents in Taiwan feel that it is their responsibility not only to raise their children and to pay for their education, but also to help them start on their careers and at the same time acquire some property for them. If the child is a boy, it is customary for parents to save money to buy him a house; if it is a girl, parents also feel obligated to save money for her wedding; giving a dowry is still not an uncommon practice. Whereas in the 1950's, most people's incomes were not sufficient for such saving, now this is very common. Once they can afford it, everyone tends to set money aside in this fashion. Of course, this sort of behaviour can be found in other cultures as well, but not to the same extent. Here it is truly universal.

It is the particularity of the Chinese family then, in its structure

and behaviour that sets Taiwan apart from other countries and it is here that we find an important socio-economic feature which helps to explain why the savings rate in Taiwan is the highest in the world.

IV. Summary and Conclusion

Saving is a crucial component in modern theories of economic growth. In this paper, we undertook an empirical investigation of the savings function in Taiwan over the past three decades and searched for an explanation for the phenomenal rise in the savings rate during this period. The factors first examined were: the level of income, the growth rate of income, income distribution, interest rates and inflation. While each factor was able to exert a statistically significant effect on savings, none of them provide a satisfactory explanation for why Taiwan's savings ratio is the highest in the world. It was then suggested that the high savings ratio in Taiwan can be attributed to three factors: the role of the government, the relatively underdeveloped social security system and frugality stemming from Chinese culture and tradition.

It is hoped that the findings of this paper can contribute to a better understanding of the development process that has made Taiwan today a shining model for developing nations.

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