Explaining Japan's Saving:
A Review of Recent Literature

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This paper reviews recent literature on Japan's saving and identifies the following as key stylized facts: Japan's national saving rate is not as high as commonly supposed, though it was indeed quite high during the high growth era; at the micro level, the accumulation of wealth by Japanese households starts very early in the life-cycle but is not fully consumed but left as bequests; some, but not all, of bequests can be interpreted as late payments to children who provided non-market services to parents; and available evidence does not reject the notion that the bulk of intergenerational transfers are altruistically motivated.

I. Introduction

Over the last several years, Japan has been the major provider of capital to the rest of the world. Whether Japan will continue to serve the same role is a major policy issue that deserves careful analysis. Such analysis must address the issue why Japan's saving rate has been so high and whether it will remain high. The purpose of this paper is to review recent work on this important subject and thereby to gain a better understanding of Japan's saving.

I will only examine recent literature because my previous survey article (Hayashi, 1986) contains a fairly comprehensive coverage of literature up until then and also because, as I emphasize in this article, stylized facts that need to be explained have not been elucidated until very recently. I will focus on studies that are directly relevant to explaining such stylized facts. Horioka's (1991) recent article provides an encyclopedic catalog of recent literature on saving in Japan, and this paper complements it.

The paper is organized as follows. In section II, I will discuss conceptual issues concerning the definition of aggregate saving and how it can be decomposed into saving by age cohort. Section III will collect macro stylized facts about Japan's aggregate saving rates. Section IV has a detailed discussion of how micro data from household surveys should be organized to obtain useful information regarding the allocation of saving across age cohorts. In the same section I will present micro facts. Section V examines models of saving that are designed to explain the facts identified in this paper. Section VI contains summary and conclusions.

II. Which Saving Rate?

Although household saving is the concept that usually attracts most attention in the press and even in Japanese academic literature, this article takes the view that distinguishing between household saving and corporate saving is largely meaningless and all comments in the literature on an aggregate household saving rate are ignored here. One yen saved in the corporate sector will eventually be paid out as a dividend to the household sector, so households naturally regard corporate saving as part of their saving, just like saving in personal accounts, i.e., corporate saving represents an increase in a claim by the household sector on the corporate sector, so that a reduction in household disposable income due to a cut in dividends will be exactly offset by an increase in the household sector's claim on the corporate sector. Whether government saving can be treated in the same way depends on the validity of the Ricardian equivalence doctrine.[1] This article does not take a stand on this issue and simply looks at both private and national saving.

Since both macro and micro evidence are examined, it is useful, from the viewpoint of accounting, how aggregate saving (private or national) is related to saving at the micro (cohort) level. If the aggregate measure of saving is household saving, then the relation is simple: the sum of household savings (defined as disposable income less consumption) for each age cohort in the economy is aggregate household saving. If the aggregate measure is private saving, then for each age cohort one has to allocate corporate saving as accrued income in the form of increased value of claims on corporations, so that the sum of adjusted saving (adjusted income less consumption) across cohorts equals private saving. This allocation of corporate saving among cohorts is possible if data regarding the distribution of corporate ownership among age cohorts is available. Doing the same for national saving is more difficult. Each cohort has an (invisible) claim on the government, which is the present value of government transfers less taxes. Evaluating this claim requires a projection of future transfers to the cohort and taxes to be levied on the cohort. This requires a set of assumptions about future fiscal policy, but nevertheless can be done.[2] The sum of the change in the value of this claim across cohorts is government saving and, accordingly, if income for each cohort is adjusted to include this change in the value of the claim on the government, national saving can be consistently decomposed so that the sum of implied saving across cohorts equals national saving. One important item included in this measure of saving for the cohort is social security contributions less benefits.

There has been no work to date to carry out this sort of generational accounting for

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[1] The doctrine states that a budget surplus is viewed by households a reduction in future tax liabilities and thus an increase in claims on the government.

[2] This has been done for the U.S. See Auerbach *et al.* (1990).

Japan. This way of looking at saving for each age cohort is related to, but does not presuppose, the Ricardian doctrine of taxes and deficits. Under it, households (that comprise cohorts) are aware of the claim on the government and take it into account to make consumption/saving decisions. That is, accrued income in the form of increased claims on the government is behaviorally relevant for saving. If the doctrine is completely false, an increase in government saving is not offset by a decrease in private saving and thereby raises national saving. The generational accounting for this case is still useful because it would indicate exactly which age cohorts contributed to the increase in national saving.

Another dimension in the definition of saving is the scope of assets. Ideally, saving should cover all types of assets, including human capital and R&D. It is logically possible that a country with low saving in terms of conventional assets is actually a high saving society investing substantially in human capital. However, unless there is a substantial difference in the relative tax treatment of returns from assets, a country with a high saving rate conventionally measured is most likely to invest in other assets more or less proportionately. If so, conventional measures of saving would reflect movements in the broader measure of saving. Moreover, calculating the corresponding net saving rate requires measurement of the stock of human capital and R&D and how they depreciate, but no comprehensive accounts covering human capital and R&D are available in Japan.

Yet another conceptual issue is the treatment of capital gains. Since depreciation represents a loss of value due to obsolescence and physical decay, the conventional measures of (net) saving already incorporate a portion of capital gains and losses. Then, why not fully include changes in market prices as part of saving? One reasonable view is that the price change should be included as saving if the asset price fully reflects fundamentals.[3] However, very often asset prices, particularly land prices, appear to contain bubbles whose variation far exceed those of fundamentals. Since there is no reliable way of identifying the bubble component of asset price, this review will not comment on measures of saving that include market price changes.
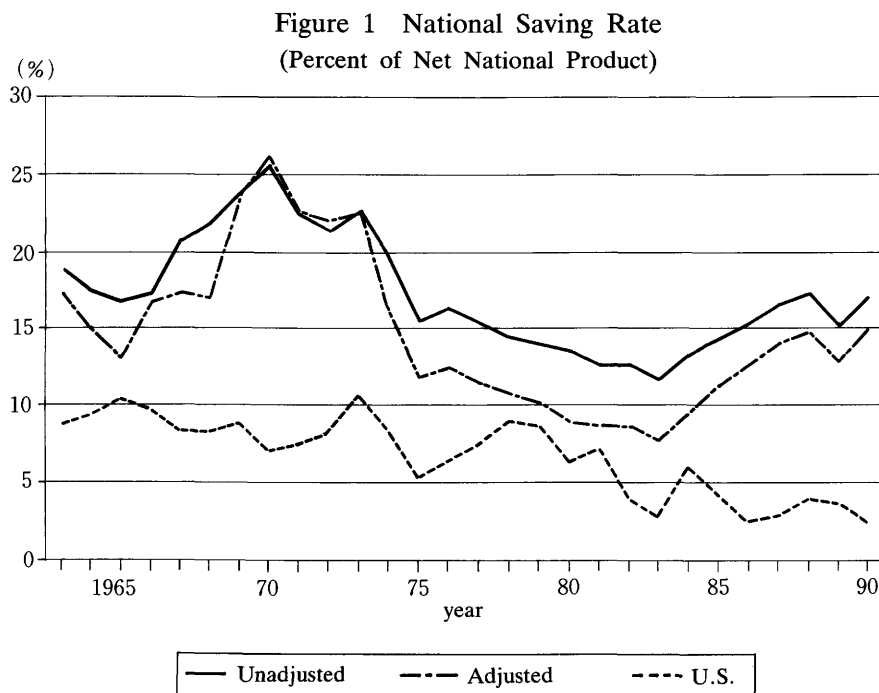
III. Macro Facts

The Japanese National Income Accounts (hereafter NIA), the main source of aggregate time series data, conform to the System of National Accounts (SNA) which is a set of accounting rules agreed upon by a number of nations. It is a complete accounting frame in that both income/expenditure and capital accounts are included. NIA, however, has one major shortcoming, which is that depreciation is at historical cost. Of course the economically correct measure of depreciation is replacement cost but an official estimate of it has never been published. To my knowledge, a measure of net saving based

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[3]For a most recent discussion on capital gains, see Bradford (1991).

on replacement cost depreciation was not calculated until an earlier survey (Hayashi, 1986) of mine. My calculation procedure exploits the fact that the capital stock measure in NIA capital accounts is at replacement cost. By combining it with gross investment series in the income/expenditure accounts one can derive the implied value of replacement cost depreciation. For the sake of brevity I will not go into more detail or issues related to the calculation procedure. The reader is referred to Hayashi (1986, 1991).

Figure 1 shows the national saving rate including an update of my calculation to include the most recent year (1990) for which NIA data is available.[4] National saving here does *not* include government capital formation so as to make it comparable to the U.S. saving rate, also plotted in the figure. As clear from comparing the adjusted series (based on replacement cost depreciation) and the unadjusted, official series (based on historical depreciation), the adjustment makes a difference of as much as 4-5% of NNP. Figure 2 shows a decomposition of national saving into household, corporate, and government saving for Japan. Here again, government capital formation is excluded so government saving equals the government budget surplus. The stylized facts emerging from these figures are as follows:

Figure 1   National Saving Rate
(Percent of Net National Product)

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[4]Data for 1955-62 is not shown in the figure because the adjusted series exhibit very erratic movement. For a possible explanation of this, see Hayashi (1989).

Figure 2   Breadkown of National Saving
(Percent of Net National Product)
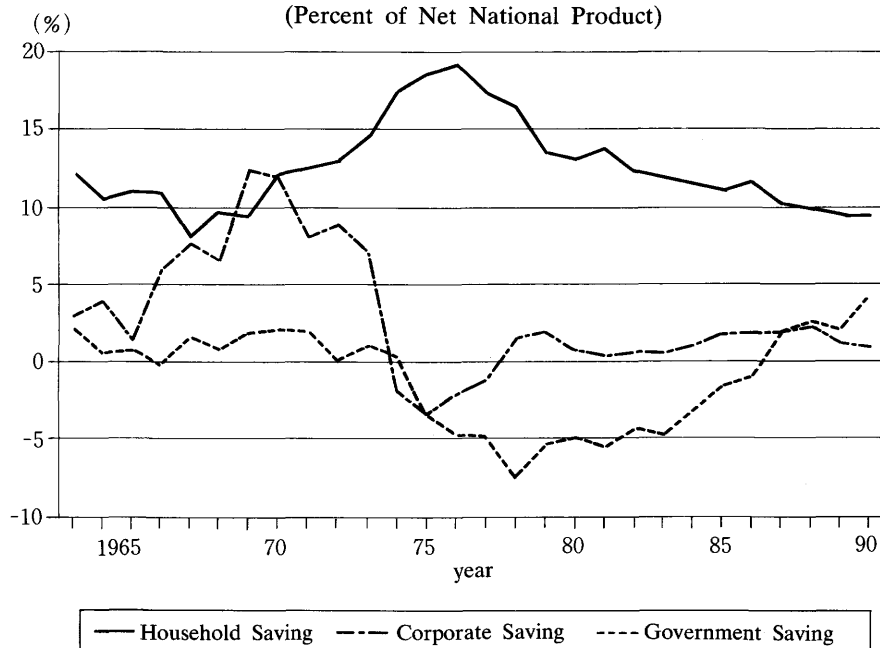
Macro Fact #1 :   Japan's national saving rate is not as high as commonly thought, but is still substantially higher than the U.S. rate except in the late 1970s.

Macro Fact #2 :   Japan's national saving rate peaked around 1970 and thereafter declined rather quickly until 1984.

Macro Fact #3 :   The upward trend since 1984 coincides with the rapid improvement in the government budget balance.

These features of the data, however, are limited to the postwar era. The so-called Ohkawa estimate for the prewar period (Ohkawa *et al.* (1979)) reveals the following:

Macro Fact #4 :   The prewar saving rate, about 5-10% of NNP, is not high by international standards. Thus the phenomenon of an extremely high saving rate is limited to the 10 to 15 years around 1970.

IV. Micro Facts

As mentioned in Section II, aggregate saving can be allocated consistently between age cohorts so that the sum of saving across cohorts equals aggregate saving. Because of the lack of generational accounting for Japan, the consistent decomposition of aggregate

saving can be effected only for household saving. This section presents micro facts about household saving by individual age cohort, but when interpreting them it should be remembered that the cohort saving measure does not include the respective cohort's share of aggregate corporate and government saving.

Since the definition of saving typically adopted in household surveys differs from that of household saving in NIA, the consistent decomposition of aggregate NIA household saving, although easier than the decomposition for private or national saving, requires that the measure of saving in household surveys be adjusted to conform to the NIA definition. The adjustment involves a series of steps, of which the following are most important:[5]

(a)   Imputed rent from owner-occupied housing should be part of income and consumption, while depreciation on housing should be subtracted from income and saving. (The same applies to consumer durables if they are to be treated as assets.)

(b)   Government transfers in kind should be included in income and consumption. This is important for Japan where education is heavily subsidized and where there is a large national medical insurance system.

Effecting (a) above obviously requires data on housing and land values; and, while no household survey can provide the information needed for fulfilling (b) for each household in the sample, information for each age cohort based on extraneous data on medical and educational subsidies per person by age could be an appropriate substitute. Because of its large sample size and detailed information on household assets, the household survey most suitable for meeting these requirements is the National Survey of Family Income and Expenditures (hereafter NSFIE), which has been conducted by the government every five years since 1959. Hayashi *et al.* (1988) and Takayama *et al.* (1988), being able to utilize micro data tapes, are the only studies that carried out most of the required steps to calculate household saving for each household in the sample and by age cohort. The estimates in Takayama *et al.* (1988) are an improvement over those of Hayashi *et al.* (1988) in that government transfer payments for medical services are taken into account. However, their tabulations do not take into account the implication of extended families, which I will argue below is a serious flaw. For this reason my discussion of micro stylized facts will be based on the estimates from Hayashi *et al.* (1988).[6]

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[5]Other required steps include: employer social security contributions should be included under wage income and social security; employer private pension plan contributions should be included under wagae income and hence under saving; income in kind should be included under income and consumption; if taxes are not reported in the household survey, they must be estimated; interest and mortgage payments on loans should be part of saving, not consumption expenditures.

[6]Two further problems have to be dealt with to ensure that aggregate saving implied by the household survey equals the NIA counterpart. First, most income and expenditure items are under-reported in household surveys. Hayashi *et al.* (1988) reports for the NSFIE that the implied aggregate falls short of the corresponding NIA figure by 12% for total consumption and disposable income, and by about 50% for financial assets and

In addition to these definitional issues, there is one conceptual issue that is important in interpreting micro facts — the treatment of private transfers. A transfer given to someone outside the household could be a unilateral transfer, in which case the transfer should be excluded from income for the household and, accordingly, included in the recipient's income. Or, it could be an informal contractual payment, representing new lending, the repayment of past informally arranged loans, or insurance premiums as part of an informal risk-sharing arrangement. In this latter case the transfer is an increase in net (invisible) claims on others, so that it should be included in income and hence part of household saving. Or, a transfer could be a combination of both. Since the outside observer does not know what portion is an increase in claims, there is no single correct way of dealing with private transfers. In what follows, all private transfers are treated as an increase in claims on others, i.e., transfer payments are part of saving and transfer receipts are excluded from income.

Having disposed of all definitional and conceptual issues, micro data on income, consumption, saving, and wealth will next be examined. However, simply tabulating data by the age of each household head does not give a breakdown of household saving by age cohorts, because of the following fact related to Japan and which will be verified shortly:

Micro Fact #1 :   *About a quarter of households is extended families. The independent aged (who maintain an independent household) are, on average, wealthier than the dependent aged (who live with their children in the same household).*

This creates serious problems in interpreting micro evidence. Obviously, since only data for the household as a whole is available, separate information on those who live with their children cannot be obtained. Furthermore, the older the sample of independent aged, the more over-represented by wealthy households, because poorer independent aged are more likely to join their children's households. This implies that it is very hard to estimate average income, consumption, and saving for older age cohorts.

One way to avoid this is to give a separate tabulation for nuclear and extended families. Table 1, taken from Hayashi et al. (1988), provides such a tabulation.[7] The age in Panel B for extended families is that of the children.[8] Household income for extended families is divided between parents and children. Comparison of parents income in Panel

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debts. Second, samples covered by household surveys do not represent the population. Hayashi et al. (1988) finds that the NSFIE is not a representative sample — however, under-representation occurs at both ends of income distribution, so the consequent bias is not serious. The micro facts to be mentioned in the text are robust to under-reporting.

   [7]Income, consumption, and saving in the table incorporate all the required steps mentioned above and in footnote 5 except (b).

   [8]If one uses the age of the main income earner of the extended family as the age of the household, then it creates another source of misrepresentation of age cohorts, because, for example, the children in the 25-29 age bracket are already earning more than their parents and hence represent a high-income portion of the age cohort.

Table 1 Age Profile of Income, Expenditure and Asset Holdings by Family Type

Panel A: NUCLEAR (includes singles)

	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+	ALL
Number of households	3676	5061	5909	5538	4880	3667	2571	2013	1570	1144	599	159	37	36823
Family size	1.9	3.2	3.7	3.8	3.6	3.0	2.2	1.7	1.6	1.6	1.5	1.5	1.5	3.0
Disposable income	272	345	404	466	523	540	484	368	295	255	215	189	163	411
Consumption expenditure	249	319	364	405	444	428	391	312	258	232	206	194	180	356
Savings rate (%)	9	8	10	13	15	21	19	15	13	9	4	-3	-10	13
Wealth	402	1003	1623	2253	2773	3033	3399	3438	3364	3064	2829	2584	2056	2170
ypen+ybus								169	175	162	145	123	109	

Panel B: EXTENDED

	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+	ALL
Number of households	933	1309	1867	1703	1385	900	416	159	40	5	0	0	0	8717
Family size	4.0	5.2	5.5	5.4	5.1	4.4	3.6	3.1	2.9	3.0	n.a.	n.a.	n.a.	4.9
Number of parents	1.8	1.6	1.5	1.3	1.3	1.2	1.1	1.1	1.0	1.2	n.a.	n.a.	n.a.	1.4
Age of parents	57	63	67	71	74	78	81	85	87	88	n.a.	n.a.	n.a.	69
Disposable income	603	560	570	591	627	648	639	534	420	362	n.a.	n.a.	n.a.	595
Consumption expenditure	484	459	478	508	523	533	489	455	399	312	n.a.	n.a.	n.a.	494
Savings rate (%)	20	18	16	14	17	18	23	15	5	14	n.a.	n.a.	n.a.	17
Wealth	3845	3630	4166	4277	4520	4653	4898	5217	4276	4544	n.a.	n.a.	n.a.	4234
yparpen+yparbus	134	116	94	65	56	48	38	39	27	6	n.a.	n.a.	n.a.	69

Note: Income, expenditure and assets in units of 10,000 yen. Disposable income excludes transfers from outside households. Regular remittances to others are excluded from consumption and hence is part of saving. Wealth is net financial assets plus the value of housing and rental properties. The last row in Panel A for old age groups: "ypen" =household pension income: "ybus"=business income. They are comparable to the pension/business income of the dependent aged in Panel B labeled "yparpen" (the parents' pension income) and "yparbus" (the parents' business income). The sum of pension and business income is viewed here as an indicator of lifetime resources. The age of parents is the age of the parent if there is only one parent, and the age of the father if both father and mother are alive.

Source: Hayashi et al. (1988), Table IIIA.

B with that of the head of nuclear families similarly aged in Panel A, verifies fact #1 that the independent aged are wealthier. The saving rate of the independent aged declines with age and becomes negative starting with the 80-84 age group. But this trend is biased by the increasing degree of over-representation by the rich mentioned above if the saving rate depends on income or wealth. The saving behavior of the rest of the older cohort, who are in extended families, can be inferred from comparing Panel A and B. Note that for younger age groups, the saving rate for nuclear families is *lower* than that for extended families whose younger generations (children) are similarly aged,[9] i.e., the presence of the dependent aged raises the saving rate. This is true until the dependent aged are about 80-84 years old (see age of parents in Panel B). Thus, the next stylized fact is

Micro Fact #2 :   Both the independent and dependent aged save until they get very old (about 80-85).

It should be emphasized that this statement depends on the definition of income. Since private transfer receipts are excluded from income in this paper, the negative saving in micro fact #2 means that the very aged finance the excess of their consumption over their income by decumulating either conventional assets or net (invisible) claims on others (most likely their children) or both.[10] Suppose, for argument's sake, that the excess of their consumption over income is entirely financed by transfer receipts and that transfer receipts are included in their income. Then, the resulting measure of saving would show that their saving are zero, which would have completely obscured the fact that these very aged are decumulating assets in the sense explicitly mentioned above.

Micro fact #2 may appear inconsistent with the age profile of wealth (consisting of housing equity and net financial assets). For the independent aged (old nuclear families), wealth peaks in the 60-64 age group, not in the 80-84 age group, and declines thereafter. However, one cannot conclude from the declining wealth profile for the aged that they are dis-saving, for three reasons. First, one has to adjust for the cohort effect where, in a rapidly growing country like Japan, older cohorts will have lower lifetime resources and hence lower wealth. Thus, even if the aged just maintain their wealth constant over their lifetime, the (cross-sectional) age profile of wealth must be declining. Second, as mentioned above, the independent aged are not representative of all aged and the degree of misrepresentation increases with age. Third, and most importantly, if wealth is transferred to children while parents are still alive, then evidently wealth for the aged declines even if their saving are positive. The connection between saving and the age profile of wealth is very indirect.

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[9]Recall that transfers to parents are treated as savings. Thus the measure of saving in the table for nuclear families includes invisible savings in the form of increased claims on parents.

[10]If they also receive social security benefits, claims on the government are also decumulating.

For the dependent aged, while their age profile of wealth is not directly observable, it appears to be steeply declining — in Table 1, wealth for nuclear families in younger age groups rises much faster than that for extended families. But this inference is wrong if substantial wealth is transferred from parents to children. This is because for extended families, transfers from parents to children are internal while for nuclear families, transfers are net additions to their wealth. The steeply rising age profile of wealth for nuclear families is partly due to these external transfers.[11]

This evidence of the rapid accumulation of wealth by nuclear families and the evidence that the wealth of the independent aged is substantial even for the 80-84 age group, imply that intergenerational transfers, in the form of bequests and *inter vivos* gifts, must be substantial. One might imagine from the preceding discussion that it is possible to estimate the flow of transfers from cohort data on saving and wealth, however existing estimates differ greatly.[12] Perhaps a more convincing case for the prevalence of intergenerational transfers is the direct evidence provided by Barthold and Ito (1991), who found that taxable transfers directly available from tax records account for a substantial portion of existing wealth, and also that from public opinion surveys mentioned in Horioka (1991), where about one in two respondents plan to make bequests. This discussion on wealth can be summarized as

Micro Fact #3 :   A substantial portion of wealth held by the aged is eventually transferred to their children through gifts and bequests.

It is not useful to comment on the shape of the cross-section age profile of saving, without knowing how corporate and government saving are distributed across age cohorts through inclusion of changes in claims on the corporate and the government sector as part of income and without knowing whether households are aware of those claims. For example, the cross-section cohort age profile of saving depends critically on whether social security contributions, which represent an increase in claims on the government, are included in saving. For the very young, however, one can be confident that their share of government saving is positive (because they pay social security contributions) and that their share of corporate saving is negligible (because their share-holdings are small). Therefore, it is significant that saving in Table 1, which does not include government and corporate saving, are positive for the young.

This is part of a larger fact concerning the age profile of consumption. Figure 3 gives a cross-section age profile of consumption taken from published tabulations for the last seven waves of the NSFIE. Being derived from published tabulations, nuclear and extended families are mixed, so the age profile is flatter than it really is.[13] Also, adjust-
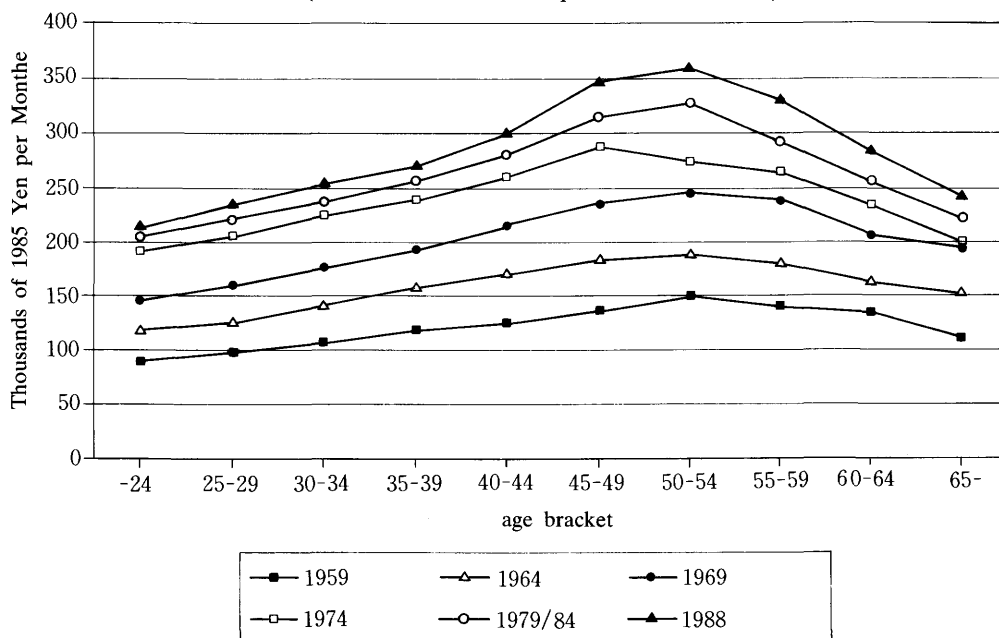
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[11]See Hayashi (1986), Hayashi *et al.* (1988) for more detailes.

[12]See the papers cited in Horioka (1991).

[13]Also, the age of household in official tabulations is that of the main income earner, which, as mentioned in footnote 8, is another source of the misrepresentation of age cohorts.

Figure 3   Age Profile of Consumption
(All Households <except 1959 and 1969>)

Note: The age profile for 1984 is very similar to that for 1979, and thus not shown separately. Consumption does not include imputed rent, income in kind, or government transfers. Single households are excluded. The profiles for 1959 and 1969 are for "worker households" (households whose head is working) only, since no tabulations by age are available for all households for those years.

ment (a) is incorporated but not (b). Nevertheless, I am reasonably confident that the point I am going to make will retain validity even after these problems are solved. One can create a longitudinal profile of consumption from Figure 3 by traversing cross-section profiles. For example, the longitudinal or lifetime profile for the 25-29 cohort in 1959 is the curve connecting the 25-29 node for 1959, the 30-34 node for 1964, and so forth. The point is that

Micro Fact #4 :   The lifetime profile of consumption is very steep. Consumption for young age groups is so low that the young save over and above their accumulation of social security wealth.

Comparison with U.S. data shows that the Japanese profile is much steeper than the longitudinal consumption profile for the U.S.[14]

This micro fact in and of itself does not account for the high aggregate saving rate in Japan, because low consumption when young means a higher level of consumption later

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[14]See Carroll and Summers (1990).

in the life-cycle than would otherwise be possible. It is the combination of micro facts #2, #3, and #4 that accounts for the high aggregate saving figure: a substantial portion of the various claims steadily accumulated until a very late stage of the life-cycle is not consumed and left to subsequent generations. In the next section I will examine *explanations*, as opposed to *accounting*, for the high saving rate in Japan.

V. Explanations

There are two standard theories of saving. In the *life-cycle model*, households, being selfish, intend to exhaust all their wealth by the time of death. The longevity risk (that the timing of death is unknown) and the risk of illness imply that households should hold all their wealth in the form of annuities and insurance policies covering medical expenditures. The alternative theory, called the *dynasty model*, posits that each generation is linked to the next by altruism. Since parents care about their children's welfare as recognized by the children themselves, there is no intergenerational conflict. So all generations act as if they form a single immortal dynasty with infinite horizon.

The micro stylized facts about the aged examined in the previous section are clearly at odds with the life-cycle model as just stated. In contrast, the dynasty model is fully consistent with the micro stylized facts (except micro fact #4 to which I will return below), although the model is consistent with, but does not explain, why some aged choose or choose not to live with their children. The failure of the pure life-cycle model has long been recognized and, in response, has been extended to include various factors.[15] These extensions are based on the presumption that some services (including insurance) are not available from markets. They include:

(a) *self insurance.*   For whatever reason, reasonably priced insurance policies (including annuities) are not supplied by the market. Parents are forced to use conventional assets to deal with longevity and other risks, which means most households will leave unintended bequests.

(b) *children as a provider of insurance.*   Children agree to provide insurance to their parents. When parents live too long or become ill, children provide financial help to finance parents consumption. Children must be compensated for doing this. Transfers from parents to children are premium payments in disguise.

(c) *children as a provider of attention otherwise unavailable to parents.*   Children are the sole supplier of attention to parents which is the service desired by parents. The price of the service is paid in the form of transfers.

Factor (a) can explain the existence of bequests (although it is not clear why children

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[15]See, e.g., Kotlikoff (1988). I will not mention the bequest-for-its-own sake model which assumes that parents derive utility from the amount of bequests *per se*. This does not explain why bequests almost always go to children. The model should be viewed as a reduced form expression of the dynasty model.

should receive bequests) but not the existence of *inter vivos* gifts. It can partially explain micro fact #2 (lack of wealth decumulation), although an extremely high degree of risk aversion would be needed to explain the lack of negative saving until as late in life as age 80. Factors (b) and (c) can explain the prevalence of extended families (micro fact #1) because co-residence is a vehicle whereby the service is provided to parents. They also explain the prevalence of transfers (micro fact #3) because transfers are (informal or implicit) contractual payments for the service delivered by children. If the payment occurs during or before the service, then it is an *inter vivos* gifts. If the payment is made after the service is delivered, it is a bequest. In either case, wealth, if broadly defined to include (implicitly) debts issued by parents when they received financial help or attention from children, is fully exhausted at death. With respect to micro fact #2, explanation (c) is a mis-measurement of consumption. Parents are really consuming their children's attention. Since the deferred payment for attention is by bequests, their saving are positive.[16] It is less easy to explain micro fact #2 by (b). Recall that I did not include transfers from children as part of parent income to define saving. Micro fact #2 says that parents rely on self insurance or on other sources of income to finance old age consumption until about age 80. It would be hard to explain the continued reliance on self insurance despite the alleged availability of insurance from children.

Thus, the life-cycle model, if augmented to encompass some or all factors listed as (a)-(c) above, is consistent with micro facts. Furthermore, recent studies document the use of bequests as a means of payment for services provided by children. The public opinion surveys mentioned in Horioka (1991) indicate that for a substantial number of respondents the intended amount of bequest is related to whether children support old age consumption. Regression results in Ohtake (1991) show that help from children, be it in the form of monetary transfers or co-residence, are positively related to bequeathable wealth but not to non-bequeathable wealth (i.e., pension wealth).

However, this does *not* mean that the extended life-cycle model is better suited to explaining facts than the dynasty model, because factors (a)-(c) are also consistent with the dynasty model. Being altruistic to children does not prevent parents from employing children as a provider of insurance or attention otherwise unavailable from markets.[17] Furthermore, the non-altruistic bequest motives identified by (a)-(c) may not be enough to explain *aggregate* bequests and saving.[18] The amount of bequests motivated by (b) or (c) cannot be much greater than the value of services provided by children. Any reason-

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[16]This point is most easily understood if one imagines the following extreme case. The only consumption desired by parents is children's attention, to be paid for by bequests. Measured consumption is zero. Measured income is interest income from wealth. Thus the saving rate is 100% until death!

[17]In fact, the original statement of version (c) asumes parents are altruistic. See Bernheim *et al.* (1985). The altruism here, however, is paternalistic in that children's own preferences are not honored in parents' preferences, which results in intergenerational conflict. There is no such conflict in the standard dynasty model.

[18]Or, quantitative features of micro facts if they were stated in quantitative terms consistent with aggregate values.

able estimate of the value of non-altruistically motivated bequests may well be far less than the actual value of the aggregate flow of bequests. Similar comments apply to saving. Since bequests and gifts in (b) or (c) are payments, rather than unilateral transfers, to children, the value of bequests and gifts does not represent real saving by parents (in the sense of their own income excluding transfer receipts less consumption). I strongly doubt that the extended life-cycle model alone can explain aggregate saving and wealth; much more research is needed to settle this issue.

Finally, I will briefly comment on the explanation of micro fact #4. Both the life-cycle model and the dynasty model imply that households are willing to postpone consumption only if the return from saving is sufficiently attractive. However, for most households the relevant return is the real interest rate on time deposits, which has historically been very low, often times negative. Therefore, to explain the observed steep longitudinal age-consumption profile, one has to suppose (perhaps very realistically) that households in postwar Japan did not fully anticipate high income growth. They were continuously pleasantly surprised that their income grew as much as it did, resulting in a continuous upward revision of consumption plan. This unintended saving due to the too conservative income expectations must have contributed to high aggregate saving in the high growth era of the 1960s and the 1970s.

VI. Summary and Conclusions

After careful examination of data, this paper has identified a number of stylized facts at both the macro and micro level. The macro fact is that Japan's high saving rate is largely limited to the high growth era of the late 1960s and 1970s, with the recent rebound due mostly to the improvement in the government budget balance. The micro facts, not until recently elucidated due to the biases brought about by the prevalence of extended families, are that: i) the accumulation of wealth starts from the very start of the life-cycle and that ii) the aged leave as bequests a substantial portion of their accumulated wealth.

The prevalence of bequests can be interpreted as late payments to children for having provided non-market services to parents. It is not clear, however, whether the payments in the form of bequests can account for the size of the aggregate flow of bequests. Available evidence does not reject the notion that the bulk of bequests is altruistic. The failure of the young to consume as much as they could have is probably due to their income expectations that turned out to be far too conservative. This must be one important factor responsible for the high saving rate during the high growth era.

It is important to note that the dynasty model as well as the life-cycle model predicts aggregate saving will fall as the population ages. We do not know exactly to what extent saving and bequests are motivated by altruism, but we can be sure that the rapid aging of Japan's population will reduce national saving over the coming decades. Furthermore, today's young, fully aware of their future income growth in this era of stable growth, will

not contribute to national saving as much as yesterday's young did. Thus, barring any further rapid improvement in government saving, Japan's national saving will likely steadily decline.

Much research needs to be done to consolidate understanding of Japan's saving and an appropriate agenda should include:

- The micro-stylized facts given in this paper are qualitative statements — further examination of micro data from various sources should make it possible to make quantitative statements.
- Generational accounting that allocates claims on the government and on corporations across age cohorts is a useful tool for understanding the incidence of saving.
- We need a better estimate of the size of intergenerational transfers.
- No existing model is capable of explaining both macro and micro facts simultaneously. The ultimate goal should be to construct a fully articulated general equilibrium model, with or without altruism. Progress toward this goal would include a model of households that determines consumption and wealth given the interest rate and income growth.
- Models of existing household saving do not tell us how to treat extended families. It would be a theoretical innovation to provide a model in which household formation and resolution are endogenously determined.

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