Transfer and Life Cycle Wealth in Japan, 1974-1984

by

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ABSTRACT

In this paper I measure using the cumulation of life cycle saving method the contribution of transfers to total wealth accumulation over the 1974 to 1984 period among worker households in Japan. I find that under either the Modigliani or Kotlikoff and Summers definitions of transfer wealth capital accumulation for these households is largely the result of life cycle saving. This study differs from earlier papers on this topic, which drew similar conclusions, by its close application of the two definitions of transfer wealth and by its extensive use of simulation analysis.

1. INTRODUCTION

There has been great interest in the United States and elsewhere since the landmark Kotlikoff and Summers (1981) article in quantifying the importance of life cycle saving in the wealth accumulation process (for surveys, see Modigliani (1988) and Kessler and Masson (1989)). I find in this paper that for worker households in Japan over the 1974 to 1984 period accumulated transfer wealth under either the Modigliani or Kotlikoff and Summers definitions (Cf., Campbell (1991b), Modigliani (1988), and Kotlikoff (1988)) was only a small component of total accumulated wealth. For most Japanese households (worker households comprised 59.S percent of total households in 1984) then capital accumulation springs from life cycle saving. However since worker households only held about half of total household wealth in 1954, it is premature to conclude that life cycle saving dominates the wealth accumulation process in Japan.'

The methodology used is the now well established cumulation of life cycle saving approach, applied to the 40 to 49 and 50 to 59 year-old cohorts. Given the likelihood of measurement error as well as error due to the scope and complexity of the estimation procedures, elaborate attention was paid to simulation analysis. The resulting estimates of the aggregate transfer to wealth ratio appear to be highly reliable upper bounds of the true figures.

Hayashi (1986) and Dekle (1989) had also found that transfer wealth has played a minor role in the wealth accumulation of worker households in Japan.[2,3] However the credibility of these studies was called sharply into question by Campbell (1991b), which documented major deficiencies in their definitions of transfer

wealth, estimation of accumulated wealth, and estimation of life cycle saving.

This paper is organized as follows. Section 2 explains the methodology of my estimation of transfer wealth. Section 3 addresses the issue of whether the data used here is consistent with **NIA** data, and Section 4 describes the simulation analysis employed. Section 5 concludes.

2. METHODOLOGY OF THE ESTIMATION OF TRANSFER WEALTH

Kotliltoff and Summers transfer wealth for the four groups-nuclear and extended households whose heads were 40 to 49 and 50 to 59 in 1984—were estimated using equation **1:**

$$TW_s = AW_s - LCW_s \tag{1}$$

where TW_s is K–S transfer wealth accumulated over the period by group s, AW_s is total wealth accumulated over the period by group s, and LCW_s is K-S life cycle wealth accumulated over the period by group s. Life cycle wealth was computed by:

$$LCW_s = \sum_{i=1975}^{1984} LCS_{s,i}(1 + r_s)^{1984-i}. \tag{2}$$

where $LCS_{,,;}$ is the life cycle saving of group s in period i and r_s is the weighted rate of return for group s where the weights are the shares of the various assets in the accumulated wealth of group s. The expression for accumulated wealth of group s is:

$$AW_s = FW_s - [INIT.LAND_s(1 + r_L)^{10} + INIT.HOUS._s(1 + r_H)^{10} + INIT.GFA_s(1 + r_{GFA})^{10} - INIT.LIAB._s(1 + r_{LIAB})^{10}]. \quad (3)$$

FW_s is final wealth of group s, INIT. $LAND_s$, INIT. $HOUS._s$, INIT. ***GFA,*** and INIT. $LIAB._s$ are the initial values of land, housing structure, gross financial assets and financial liabilities held by group s, and the r's are the rates of return associated with each type of asset. Substituting (2) and (3) into (1), K–S transfer wealth was directly calculated.

To compute Modigliani transfer wealth I first write K–S transfer wealth as:

$$TW_s = ANR_s + (1 + \frac{r_s}{2}) \sum_{i=1975}^{1984} (1 + r_s)^{1984-i} T_{s_{s,i}} \quad (4)$$

ANR, is group s' accumulated net remittances, transfers that were used for consumption capitalized at the rate of total nominal return. $T_{s_{s,i}}$ are net transfers received in period i by group s that were saved (i.e., these are non-capitalized Modigliani transfers). While ANR_s is observed the T_s's are not, and hence a time path of these transfers was specified in order to solve equation 4 for them. The equation used was:[4]

$$T_{s_{s,i+K}} = T_{s_{s,i}}(1 + r_s)^K \quad (5)$$

Finally the set of derived $T_{s_{s,i}}$'s ***was*** substituted into the following equation to obtain Modigliani transfer wealth:

$$TW_s(M) = \sum_{i=1975}^{1984} Ts_{s,i}(1 + \frac{\pi}{2})(1 + \pi)^{1984-i} \quad (6)$$

where π is the geometric mean of the annual inflation rates over the period of private final consumption expenditures.

As a glance at equations 4 and 6 reveals, the differences between the Kotlikoff and Summers and Modigliani definitions of transfer wealth are that the K-S definition includes transfers that are used for consumption and that it capitalizes transfers at the rate of total nominal return rather than simply maintaining the real value of transfers over time. In the rest of this section I explain briefly the most important techniques and data sources used to estimate K–S life cycle saving and accumulated wealth. A complete treatment is presented in Campbell (1991a).

2.1 K–S Life Cycle Saving

Kotlikoff-Summers life cycle saving for a group was due to data limitations set equal to the life cycle saving of the synthetic cohort of the same age and family composition and was defined to be aftertax labor income including government transfers minus consumption.[5] All components of life cycle saving were taken directly from the consumer surveys used with the exception of lump sum pensions and imputed rent on residential land and housing structure held at the beginning of the period, which were computed separately. The entries from the surveys were unremarkable in nature though net remittances sent were netted out from consumption because I identified these with transfers used for consumption.[6]

The chief data sources were the **Monthly** (and **Annual) Report on the Family Income and Expenditure Survey** and the **National Survey of Family Income and Expenditure.** While the **National Survey** is thought to be the most accurate source of Japanese household saving data (see, for instance, Hayashi, Ando, and Ferris (December 1988)), it is only conducted every five years, and the sample period is restricted to the September-November quarter of the survey year. I therefore decided to use the **Annual Reports** as the primary source of saving data, and then to adjust that data to the extent possible so that it would

be consistent with the **National Surveys.** I describe the procedure I used for nuclear families below.

The approach taken was to first compute for 1974, 1979, and 1984 the ratio of life cycle saving net of lump sum pensions and imputed rent (hereafter, life cycle saving*) for all worker households in the **National Survey** to the three-month average (September through November) of life cycle saving* for all worker households in the **Monthly Reports.** Then linear interpolation was used to generate values for the ratio for 1975-78 and 1980–83. Finally the ratio for a year was multiplied by the amount of life cycle saving* computed from the **Annual Report** for that year to arrive at the amount of estimated **National Survey** life cycle saving* for the year.

2.2 Accumulated Wealth

It was possible to estimate final wealth of the groups, but, as with life cycle saving, baseline initial wealth of a group was taken to be the 1974 wealth of the synthetic cohort of the same age and family composition. Wealth was defined as gross financial assets minus liabilities plus the value of housing structure, residential land, and rental properties. Consumer durables and second homes were excluded from wealth.

Initial and final wealth were estimated in the same way. The amounts of gross financial assets and liabilities for each group were taken directly from the **National Survey of Family Income and Expenditure.** Takayama's (1989) results were used to estimate the market value of rental properties. Following closely, with one important exception explained below, Appendix 1 of Hayashi, Ando, and Ferris (December 1988), the market value of residential land and the replacement cost less depreciation of housing structure were calculated using the

National Survey, the **Housing Survey of Japan,** and the **Annual Report on Construction Statistics.**

The exception was the estimation of the market price of residential land. The procedure I adopted was to estimate the national average of the market price of residential land for 1974 and 1984 (these prices were then applied to the amounts of residential land held by a group in 1974 and 1984 to derive the market value of its residential land in each year)[7]. There do not appear to exist, at least presently, generally accepted estimates of the average price of a square meter of residential land in Japan. However, the national income accounts do present estimates of the market value of total land owned by the household sector, which includes private unincorporated non-financia.1 enterprises. Further these estimates are subdivided into four categories of land: primary use, cultivated, other and forests. Primary use land includes residential landas well as commercial, industrial and village land. The value of primary use land listed in the national accounts (for 1985, Economic Planning Agency (1987), Part II, Table IV-3; for 1975, Economic Planning Agency (1986), v. 2, Part 5, Table IV-3) was divided by an estimate of the total amount of primary use land held by the household sector to arrive at the national average of the price of one square meter of primary use land. The amount of primary use land over the statutory tax exemption limit that is held by the household sector is listed in a Ministry of Home Affairs publication (Ministry of Home Affairs (1974, 1984), Table 3). This amount was adjusted by the ratio of total primary use land held by the private sector (households plus corporations) to primary use land over the statutory tax exemption limit held by the private sector in order to account for primary use land owned by the household sector which is under the statutory tax exemption limit (same publication as above, Table 2).

Finally to compute the price of one square meter of residential land, the price of a square meter of primary use land was multiplied by the ratio of the unit price of residential land (over the statutory tax limit) to the unit price of primary use land (over the statutory tax limit) as estimated by the Tax Bureau (Ministry of Home Affairs (1974, 1984), Table 4).

3. CONSISTENCY WITH **NIA** FIGURES

On the stock side, I believe my estimation of rental properties, housing structure, and residential land captured the market value of these assets, and no adjustments were made to the original estimates. However gross financial assets and liabilities, which were simply taken direcly from the **National Survey,** were changed so that the implied aggregate numbers from the **National Survey** matched the **NIA** numbers.[8] Turning to the flow side, consumption expenditures from the **National Survey** represent an approximate fifteen percent underestimation of the **NIA** figures.[9] However since there appear to exist no reliable estimates comparing implied aggregate **National Survey** income with **NIA** income, no adjustment of my life cycle saving estimates on the basis of maintaining consistency with the **NIA** was warranted.

In the rest of this section I examine how do the estimates derived from the **National Survey** of the aggregate values of residential land and housing structure owned by the household sector compare with other estimates of these items. I first present in Table 1 the available evidence for 1984 for residential land. (Ando (1985), Chapter III, Part D compares implied aggregate income, expenditure, assets and liabilities from the 1979 **National Survey** to other 1979 aggregate

estimates. However this part of his 1985 study is not mentioned further here since it was clearly superceded by Hayashi et *al.*(1988).) The first and third estimates, as the notes to the table explain, were computed from the 1984 **National Survey,** are roughly comparable, and represent the value of residential land on which owner-occupied homes are sited, for households of two or more persons. One can think of the value of residential land owned by the household sector as being comprised of owner-occupied land and rented land. The first and third estimates are approximations to the value of the former since they exclude owner-occupied land held by one-person households and since they assume that all those who live in owner-occupied homes own the property on which their homes are sited. In any case one is struck by the large difference in the two estimates given that the methods used to compute them were at least superfically similar (see Takayama et *al.*(1989), p. 91 for a brief analysis of this issue.)

As for comparisons with other aggregate estimates, neither the **SNA** nor (I believe) Ministry of Home Affairs (1984) list the value of owner-occupied land held by the household sector. In addition since it appears impossible to compute the value of rented residential land owned by the household sector from the **National Survey,** it is impossible to generate from the **National Survey** estimates of the value of total residential land owned by the household sector (see Hayashi et *al.* (1988), Appendix 1 for a discussion of this point). In fact even if such estimates were available, there appear to be no widely accepted alternate estimates. For instance while the **SNA** number listed in Table 1 is taken by Takayama et *al.* (1989) to represent the value of total residential land owned by the household sector, Hayashi et *al. (1985,* Appendix 1, p. **6)** indicate that this may be a misreading of the **National Accounts.** Summing up then the available estimates from the **National Survey** of owner-occupied land held by the household sector

vary widely, and a comparison of these estimates with data from other sources does not appear to be currently feasible.

Turning to the amount of housing structure owned by the household sector in 1984, only one estimate derived from the **National Survey** appears to be available, Takayama's 90 trillion yen figure (Takayama et al. (1989), Table 1.2.1 and Takayama et *al.* (1988), Table A.3.1), which is the value of owner-occupied housing structure for households of two or more people. The only other aggregate estimate for 1954 which has been published in this subliterature is the Ministry of Home Affairs' (1984) estimate of 108.5 trillion yen (cited in Takayama et al. (1989), p. 60), which presumably incorporates all owner-occupied housing structure (including that of one-person households) as well as rental housing structure owned by the household sector.

4. SIMULATION ANALYSIS

In my estimation there is measurement error as well as error resulting from the inadequacies of the methodology chosen. For the latter the chief source of error is the assumption that both baseline initial wealth and life cycle saving of a group are equal to those of the synthetic cohort of the same age and family composition. This error was deemed larger the greater were the flows into and out of the synthetic cohort. I addressed this problem by first identifying in detail these flows for each of the groups and then setting bounds on initial wealth for each group whose ranges varied directly depending on the sizes of these flows.

An illustration of the first procedure is given in Table 2, which lists the compositional breakdown of 40 to 49 year-old nuclear families. The bounds in this

case were calculated in the following way. Since it was likely that the incidence of death Or divorce was spread evenly through the wealth distribution of 30-39 year-old nuclear families, I made the simplifying assumption that category l's 1974 wealth was equal to the average for these households (i.e., baseline initial wealth). For categories 2, 3, 4 and 5, I simply posted lower and upper bounds for their 1974 wealth. The lower (upper) bound was .5 (1.5) times the wealth of 30-39 nuclear households. Given the above, the computation of the maximum and minimum values of the 1974 wealth of nuclear families aged 40-49 in 1984 was straightforward.

The ranges on initial wealth were in all cases large in absolute terms given the sizes of the flows, and they resulted in widely disparate estimates of accumulated wealth and transfer to wealth ratios.

Finally one other adjustment to the methodology was made. Life cycle saving* was arbitrarily rcduccd by 16 percent for each group and year. This of course substantially rcduccd life cycle wealth for the groups.

5. RESULTS AND CONCLUSION

The results for the cohorts by family composition are presented in Table 3. Accumulated net remittances (transfers used for consumption capitalized at the rate of total nominal return) is listed to facilitate the comparison of transfer wealth under the Mocligliani and Kotlikoff–Summers definitions; as remarked earlier the only other difference between the two is the rate at which transfers are capitalized at. The fourth column of the table represents estimates unadjusted for inter-spousal transfers of the transfer wealth–accumulated wealth ratio for each of the

groups. The fifth column adjusts for these interspousal transfers assuming that all Modigliani transfers of the extended households are interspousal."

In my estimation one major group of 40 to 49 and 50 to 59 year-olds has been left out: those 50 to 59 year-olds who over the 1974 to 1984 period went from nuclear to extended with their children heading the household." Assuming that this group was identical in its accumulation behavior to 50 to 59 nuclear households, I show below that the data in Table 1 is sufficient to capture all transfer wealth of worker households. The total amount of transfers in the form of bequests is closely approximated by those received by the 40 to 49 and 50 to 59 cohorts, and these have been fully accounted for. Other nuclear households were too young or too old to have received substantial bequests. Other extended households' bequests were small and are assumed to have been interspousal. Similarly the aggregate amount of other Modigliani transfers (largely gifts for the purchase of homes and major marriage gifts) are captured by my estimation." Finally it can be shown that aggregated accumulated net remittances are equal to zero, and hence in column 6 of the table these are netted out.[13]

The maximum (minimum) aggregate transfer wealth to accumulated wealth ratios were computed by setting the transfer wealth of the 40 to 49 and 50 to 59 nuclear groups and the group of 50 to 59 year-olds who were non-heads of extended households to their maximum (minimum) values and setting the accumulated wealth of all worker households except for these three groups to zero. The Modigliani minimum and maximum rations were $-.003$ and .239, and the Kotlikoff–Summers ratios were $-.003$ and .286. These ratios did not significantly change even when it was assumed that 40 to 49 and 50 to 59 extended households received no interspousal transfers.[14]

Considering the calculation method used to compute these aggregate ratios and the reliability of the estimates of the ranges of the transfer to wealth ratios of the groups (Cf., Section 4), the maximum aggregate ratios are likely to be highly robust upper bounds of the true figures. I conclude that for Japanese worker households capital accumulation is largely the result of life cycle saving.[15]

NOTES

1. The percentage of worker households in Japan was computed from the 1984 Basic Survey for Welfare Administration (Table 1) and from the 1984 National Survey of Family Income and Expenditure (volume 1, part 1, pp. 656-658 and Table 1 of volumes 5 and 6). Takayama (1989), Table 1.2.1 estimates that among two-or-more person households, worker families accounted for 49 percent of 1984 wealth. His estimation however excluded 4.6 percent of two-or-more person households, all of whom were non-workers.

2. One should note however that Hayashi (1986), in spite of the force of evidence he provides, does claim that "bequests are probably the most important factor" in explaining the high household saving rate in Japan.

3. Hayashi, Ando, and Ferris (December 1988), which covers worker as well as non-worker households, is the only other published study on this topic. It draws no definitive conclusions on the importance of transfers to the wealth accumulation process.

4. I also tried a specification where the present discounted values of the $T_{s_{s,i}}$'s decreased by $(1 + r_s)^2$ each year. However the value of Modigliani transfer wealth differed very little under the two assumptions.

5. More precisely after tax labor income was defined as the sum of wages and salaries, business and homework income, social security benefits, other income, gifts, and lump sum pension minus the sum of the earned income tax, social security taxes, and other taxes. Consumption was defined as cash consumption expenditures minus net remittances given plus imputed rent on residential land and housing structure held at the beginning of the period net of property taxes.

6. Hence these were considered part of transfer wealth under the Kotlikoff–Summers definition. I did assume however that net support for consumption given to the old who died over the period and inter-vivos interspousal net support for consumption received from a deceased spouse to be subsumed under life cycle saving.

7. In contrast, since Hayashi, Ando and Ferris had detailed geographical distributions of landholdings of the groups they investigated, they were able to use local residential land prices, which are readily available.

8. For gross financial assets (liabilities) I determined that the revised figures for 1984 should be 2.252552 (2.121495) times the reported figures. The 1974 ratios

were calculated to be 2.122020 for assets and 2.568720 for liabilities. The method used was that employed by Hayashi, Ando, and Ferris (December 1988) in their computation of Table 1. For an assessment of the soundness of this technique and related issues see Appendix III of Campbell (1991a).

9. For complete details see Appendix III of Campbell (1991a).

10. There is little doubt that the vast bulk of Modigliani transfers to these households are from a member of the older generation of these households (i.e., a parent of the 40-49 or 50-59 generation) who died over the period. There is some question whether all these transfers go to the surviving spouse. To the extent they go to the younger generation, transfer wealth is underestimated. It turns out however that in the aggregate this underestimation is minor (Cf., footnote 14).

11. They numbered .629 million. This compares with 40-49 nuclear, 4.266; 40-49 extended, 1.174; 50-59 nuclear, 2.518; and 50-59 extended, .695 (Cf., Tables 6 and 8 of Campbell (1991a)).

12. Considering that in the aggregate the only transfers that matter are net transfers from those who died over the period to those still living at the end of the period, this statement immediately follows. However my estimation also picks up positive transfers for these purposes from those still alive to the groups in Table 1 and negative transfers from these groups to their adult children. I assume these last two categories of transfers cancel out.

13. These are equal to zero since net support for consumption given by the middle-aged to the old who died over the period can best be considered loans or annuities not transfers (see Horioka (1991b) for a summary of the evidence on this point). The bias attributable to net support by the middle-aged households to those still living is eliminated by the netting out of all these payments. There is one complication however. The techniques used here can not discriminate between bequests and lump sum repayments of loans or annuities after death. Therefore aggregate transfers are overestimated.

14. The Modigliani ratios become .022 and .273, and the Kotlikoff–Summers ratios increase to .026 and .328.

15. I hesitate to make international comparisons of my results for two reasons: first, as I have made clear this paper does not cover the entire household sector, and, second, the studies that have been done are not typically strictly comparable since they use different methodologies and cover different time horizons.

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Table 1
Various Measures of the Value of Residential Land Owned
by the Household Sector (year-end 1984)

Hayashi et *al.*(1988), Appendix 1	596.5"
Takayama *et al.*(1989), Table 1.2.1	450[b]
Takayama *et al.* (1989); p. 64	474"
SNA	482[c]
Ministry of Home Affairs (1954)	344[d]

Units: trillions of yen

[a]Value of residential land on which owner-occupied homes are sited, for households of two or more persons. Estimates derived from 1984 **National Survey.**

[b]This figure apparently excludes the land associated with owner-occupied condominiums (see Takayama *et al.*(1989), p. 64). This number is also presented in Takayama *et al.*(1988), Table A.3.1.

[c]Value of what I have called primary use land owned by household sector as reported in the **Annual Report on National Accounts.**

[d]The value of residential land held by the household sector (or perhaps by the household and corporate sectors), computed by Takayama *et al.*(1989), p. **65** from the tax assessment figures in Ministry of Home Affairs (1984).

Table 2

Compositional Breakdown of Nuclear Families Aged 40-49 in 1984

	40-49 year-old nuclear families in 1984	4.266
	30-39 year-old nuclear families in 1974	4.117
(1)	minus attrition (death / divorce)	–.341
(2)	minus those who shifted to extended with the 30-39 year-old generation head of the extended family	–.187
	30-39 year-old nuclear families in 1974 that remained nuclear through 1984	3.589
(3)	plus those who shifted from extended headed by the 30-39 generation to nuclear	.083
(4)	plus those who shifted from extended headed by their parents to nuclear	.240
(5)	plus those who remarried or married for the first time and formed nuclear families	.354

Table 3
Life Cycle, Transfer, and Accumulated Wealth
by Cohort and Family Composition

s	LCW_s	TW_s	TW_s/AW_s	Adjusted[a] TW_s/AW_s	Adjusted* TW_s/AW_s	ANR,	AW_s
50-59N	13963	-3011	−.275	−.275	−.oso	-2131	10952
	11691	-739	−.067	−.067	−.067	-2131	10952
	14240	3712	.207	.207	.326	-2147	17952
	13067	4885	.272	.272	.272	-2147	17952
50-59E	14041	230s	.141	−.123	0.000	-2010	16349
	12760	3589	.220	0.000	0.000	-2010	16349
	14216	7061	.332	−.095	0.000	-2012	21277
	13744	7533	.354	0.000	0.000	-2012	21277
40–49N	9142	526	.054	.054	.102	-456	9668
	8848	820	.085	.085	.085	-456	9668
	9325	2212	.192	.192	.231	-456	11537
	9311	3336	.193	.193	.193	-456	11537
40-493	8743	-53	−.006	−.049	0.000	-427	8690
	8374	316	.036	0.000	0.000	-427	8690
	8994	7077	.440	−.027	0.000	-432	16071
	9828	6243	.388	0.000	0.000	-432	16071

Figures in thousands of 1984 yen.

LCW, TW, ANR, AW, N and E represent life cycle wealth, transfer wealth, accumulated net remittances, accumulated wealth, nuclear households and extended households.

The first (second) row for a. group presents K–S (Modigliani) estimates of the variables assuming minimum accumulated wealth for the group.

The third (fourth) row for a. group presents K–S (Modigliani) estimates of the variables assuming maximum accumulated wealth for the group.

“Adjusted for interspousal transfers.

‘Adjusted for purposes of aggregation.