

THE COST OF CAPITAL TO
CORPORATIONS IN JAPAN AND THE U.S.A.

by

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1. Introduction

This paper represents an attempt to measure and compare the cost of capital in Japan and the U.S.A. for the period 1962-1984, including the costs of debt and equity as well as the combined cost of capital. In view of problems associated with data availability and time constraints, our efforts are directed mainly at the average cost of capital, but some consideration will also be given to the differences between the two countries in the marginal cost of capital. The main difference between the average and the marginal costs of capital for investment of given risk results from the investment tax credits and accelerated depreciation which, where they exist, are applicable to new but not to all existing investment.¹

There have been a number of other recent attempts to estimate the comparative costs of capital to corporations in Japan and the U.S.A, to determine whether any significant differences exist and to determine the reasons for such differences.² These estimates have varied widely in their results and have been subject to a common deficiency -- the use of an unduly restrictive approach to the estimation of the cost of equity or the overall cost of capital for debt and equity combined. The Ando-Auerbach paper relies heavily on an economic earnings to stock price ratio as a measure of the cost of equity and on a corresponding measure for the overall cost of capital (but does present the realized market rate of return on stock as an alternative measure). The problem with this expected earnings measure is that it implicitly assumes the absence of corporate investment opportunities at rates of return above the cost of capital, which hardly seems justified for a high-growth economy. Brazel et.al., who assert that tax factors are the major reason for the differences in the cost of capital between Japan and the U.S.A., are primarily concerned with estimating what the cost of capital in the U.S.A. would be if the Japanese tax system were applicable to the U.S.A. The Hatsopoulos paper

uses the cost of debt in Japan as the estimate of the overall cost of capital in that country, which seems highly questionable, but uses the more conceptually correct weighted average of the costs of equity and debt for the U.S.A.

The principal problem in deriving the cost of capital -- which may be regarded as a weighted average of the costs of debt and equity -- is the estimation of the cost of equity. The cost of equity is the discount or "interest" rate which equates the expected future cash flows to investors to current market price. There is no way of estimating directly this "required" rate of return on equity so that it is necessary to use a number of alternative approaches to the approximation of the cost of equity. As will be obvious from the subsequent discussion in this paper, there is an uncomfortably large margin of uncertainty in the estimation of the cost of equity, and it is important that not only what are regarded as the best "point" estimates of equity and total capital costs be provided but also the different results obtained by alternative procedures.

The basic reason for interest in the cost of capital is its importance in determining the level of investment and, partly as a result, economic growth and international competitiveness. The higher rate of business investment, economic growth, and international competitiveness in Japan than in the U.S.A. in recent years has frequently been attributed, at least in part, to lower costs of capital³ which in turn have been generally ascribed to lower taxes and higher savings.

The rest of this paper will develop estimates of the cost of debt, the cost of equity and the combined cost of capital for Japan and the U.S.A. and then will assess the possible reasons for differences in capital costs between the two countries.

2. Cost of debt

Table 1 presents estimates of the average cost of long-term and short-term debt incurred by corporations in Japan and the U.S.A. over the 1962-1984 period. The weighted overall nominal and real costs of debt to corporations are also presented, with weights of long-term and short-term debt based on the actual importance of the two components of debt in the capital structure.

The real cost of debt in Japan over the 1962-1984 period as a whole was only moderately lower than in the U.S.A. The weighted real cost of debt was on the average 80 basis points lower in Japan. The difference was substantially larger in the second half of this period, averaging 170 basis points for the years 1970-1984. These estimated differences in debt costs between the two countries are important not only for their relevance to the comparative cost of senior money but also because debt costs can serve as one basis for estimating equity costs and hence the overall cost of capital. Estimates for debt costs unlike those for equities are not subject to a large margin of error. Theoretically, equity costs are closely related to the cost of debt and are simply the sum of a "pure" or riskless interest rate plus a required risk differential. This differential is determined in large part by the riskiness of the equity and the risk aversion of investors. The required differential between the cost of equity and the cost of corporate debt instruments would normally be expected to be somewhat lower than the differential between equity and the "riskfree" rate usually taken to be that on a short-term government issue.

The second part of Table 1 (Background Data) provides the quantitative background data which might be expected to be reflected in the differences between the cost of debt in the two countries. The lower cost of debt in Japan probably cannot be explained by differences in the riskiness of such instruments as measured by the standard deviation of market returns on cor-

porate debt.⁴ Thus, the rate of return on nominally "riskfree" rates of return was significantly lower in Japan than in the U.S.A. and a similar statement can be made about the corresponding real rates. (The average annual rate paid on three-month savings deposits was 4.08% in Japan during this period while the average rate on three-month U.S. Treasury bills⁵ was 6.62%; the corresponding average inflation rates were 5.70% and 5.58%.) The standard deviation of real market rates on debt instruments was very little different in Japan than in the U.S.A. in spite of the higher capital structure leverage in Japan. Personal and national saving ratios were higher in Japan, and this may have served to lower interest rates. However, investment demand also appeared higher in Japan than in the U.S.A., and it is difficult to assess the relative pressure of the supply of saving and the demand for investment on interest rates in the two countries. The lower personal tax rates on interest receipts may also help to explain the lower (before personal tax) real return on debt required in Japan, but it should be noted that institutional investors hold a very high proportion of corporate debt both in Japan and the U.S.A. and are in large part untaxed in both countries but especially in the U.S.A.⁶ Though savings and tax differences between the two countries may explain part of the lower interest rates in Japan, perhaps an even more important part may be attributable to the much greater control of the Japanese government over the level of interest rates and the attempts by that government in most of the post-World War II period to maintain low rates to stimulate investment.⁷

3. Cost of equity

Table 2 indicates the uncomfortable dispersion in the estimates obtained in both Japan and the U.S.A. by the different procedures used in measuring the cost of equity for the period 1962-1984. However, the disparities in the different estimates for the same country were particularly pronounced in Japan

The estimates for the U.S.A. are somewhat more satisfactory not only because of the smaller dispersion but also because there is a much greater wealth of both ex post and, to a more limited extent, ex ante data for checking purposes. Thus, reliable ex post data both on aggregate realized stock market returns and on the realized risk differentials between returns on corporate stock and high-grade corporate bonds go back to the mid-1920s for the U.S.A., and on a less satisfactory basis back to the early 1900s.⁸ For Japan, such data are available only for years subsequent to the early 1950s. Equally important in the U.S.A., it has been possible to obtain in a number of post-World War II years the ex ante risk differential between corporate stock and bond returns implied both by the long-run expected rate of return on a large sample of stocks listed on the New York Stock Exchange reported by most of the 50 largest institutional equity investors and the estimated cost of equity reported by over 30 of the largest corporations listed on that exchange.⁹ The average ex ante equity return differentials of 0.04 to 0.05 over high-grade corporate debt for these post-war years can be compared to an average ex post differential of 0.06 to 0.07 for the period since the early 1900s and a somewhat higher figure since the mid-1920s.

The differential we have used in one of our estimates of the cost of equity for the 1962-1984 period is 0.05 or 5%. For the U.S.A., this is slightly higher than that implied by the ex ante data available, but is moderately lower than the average ex post differential for the period since the turn of the century. For Japan, we do not have as firm a basis for using the same differential to estimate the cost of equity. However, since under reasonable assumptions the risk differential between the cost of equity and the cost of debt (or at least the riskfree rate) can be expressed as the product of the variance of equity return, the ratio of risky assets to the national

Arrow measure of relative risk aversion, we can approximate or at least place limits in the ex ante risk differential for Japan so long as we can relate the risk aversion of investors in Japan to that in the U.S.A. (where the Pratt-Arrow measure of relative risk aversion seems to be somewhat over two).¹⁰ The variance of equity returns and the complement of the effective tax rate on equities¹¹ are both somewhat higher in Japan (Table 2), but the ratio of risky assets to household net worth is much smaller.¹²

As for the comparative measures of risk aversion in the two countries, there are several reasons, including saving behavior, for believing that risk aversion among stockholders in Japan may be higher than in the U.S.A. The Pratt-Arrow measure of relative risk aversion in Japan, however, would have to be more than 50% higher than in the U.S.A. to imply a higher required risk differential than that in the U.S.A. If we were to assume that investors in Japan were only as risk averse as in the U.S.A., the implied risk differential would be substantially lower in Japan. Thus, assuming as we do that the required risk differential in Japan approximates 0.05, the same as the U.S.A., we are implicitly assuming a much greater degree of risk aversion in Japan than in the U.S.A. and we may be overstating the cost of equity in Japan. Using the same 0.05 risk differential for the two countries, the cost of equity in Japan, like the cost of debt, would be moderately lower than in the U.S.A.

A second approach to estimating the cost of equity is to compute the sum of the dividend yield (adjusted for the growth trend) plus the long-run growth rate in dividends per share as a proxy for the long-run expected growth rate in the future. Separate surveys of U.S. and Japanese corporations indicate that this is the single most common approach used by management in both coun-

estimated cost of equity in Japan again lower than in the U.S.A.¹⁴ Adding the long-run growth rate in earnings per share to the dividend yield provides still another approach to estimating the cost of equity, but this was feasible over the 1962-1984 period only for the U.S.A., where it provides an estimate intermediate between the first two. Even for the U.S.A., it was possible to estimate only the growth rate in book earnings per share and not the growth rate in economic earnings. For the 1976-1984 period, where it was possible to estimate the growth in book earnings per share for both countries, the cost of equity implied by this approach is again higher for the U.S.A. than for Japan.¹⁵

Finally, estimating the cost of equity as the average of realized market returns is the only one of these approaches which provides a higher estimate for Japan than for the U.S.A. However, while over very long periods of time, the use of ex post returns as a proxy for ex ante returns may be justified in lieu of satisfactory alternatives, the high variability of market equity returns in the shorter run makes this approach more questionable.

The use of a simple average of the three measures of the cost of equity available for both countries would point to a somewhat higher cost of equity in Japan. However, two of the three measures would point to the opposite conclusion. A similar conclusion would be drawn from the fourth measure of the cost of equity available for Japan only over the 1976-1984 period. We believe that for the 1962-1984 period the real cost of equity like the real cost of debt in Japan is likely to have been somewhat lower than in the U.S.A., but the evidence is far from conclusive and even the direction of the difference is not certain from the statistics provided.

As for differences in the economic factors affecting the cost of equity, the standard deviations of real market returns on equity in Japan is somewhat

tial in Japan. The average personal tax rate on income from stock is lower in Japan, and this might also be associated with a higher required risk differential.¹⁶ The corporate tax rate on corporate income before taxes is higher in Japan, and this would also be expected to be associated with a higher required risk differential.¹⁷ Combining corporate and personal tax rates applicable to corporate income before taxes, the combined tax rate is only slightly higher in the U.S.A. than in Japan. However, more important than difference in risk or in taxation in yielding insights into differences in the cost of equity in the two countries is a very much lower ratio of risky to riskless assets in Japan than in the United States. This marked difference in the relative importance of risky assets implies that unless risk aversion in Japan is very much greater than in the U.S.A. (a Pratt-Arrow measure of relative risk aversion greatly in excess of 3 instead of the somewhat over 2 estimated for the U.S.A.), the required risk differential in Japan would not exceed that in the U.S.A.

4. Cost of capital

Combining the estimates of the cost of debt and the cost of equity, most of the resulting evidence suggests the overall real cost of capital in the 1962-1984 period was lower in Japan than in the U.S.A. (Table 3). A sample survey of Japanese businessmen early in 1986, reported in Gultekin and Taga and referred to earlier, pointed to an average after-corporate tax cost of capital of 6.3% and a before-corporate tax cost of capital of 10.9%, both somewhat lower than the average cost of capital for Japan estimated here. However, the evidence is not altogether conclusive though considerably stronger than is true for the cost of equity. The only estimate of the real cost of capital which does not conform to a lower cost of capital in Japan is

weights in combining the two types of return. The basic reason why the cost of capital in Japan compares more favorably with the cost of capital in the U.S.A. than is true of the cost of equity is the much greater weight of debt in the capital structure of Japanese corporations.¹⁸

While the estimates presented in the tables and the discussion so far have related to the average cost of capital, we can draw some qualitative conclusions about the comparative marginal costs of capital in the two countries. It is the marginal cost of capital, of course, which is relevant to the investment decision.

As noted above, the aggregate average cost of capital in Japan for the 1962-1984 period was probably below the corresponding cost in the U.S.A., especially in the 1970-1984 years. However, given the diversity of results obtained by the different approaches and the margin of error involved in the resulting estimates, it is possible though not likely that the aggregate average cost of capital did not differ significantly between the two countries for the period as a whole. On the other hand, the aggregate marginal cost of capital in Japan may not have been much different from and may have been above the marginal cost in the U.S.A. for two reasons: the absence of investment tax credits in Japan over this period contrasted with their availability and use for new investment in the U.S.A.; and the more generous depreciation policy for tax purposes available for new investment in the U.S.A.

Contrary to common presuppositions, however, the lower average after-tax cost of capital in Japan does not appear to any significant degree to reflect more favorable tax rates on corporate income before tax. While it is true that the effective personal tax rates on interest, dividend income and capital gains are lower in Japan, this is offset by the considerably higher effective corporate tax rate on corporate income before tax (Background Data, Tables 1

higher corporate taxes on returns from risky investments increase the before-tax cost of capital, this is not true of personal income taxes with a symmetric tax treatment of gains and losses.¹⁹

The lower overall cost of capital to corporations in Japan in the 1962-1984 period seems to have reflected a somewhat lower risk of the combined capital structure (as measured by the weighted standard deviation of required returns on debt and equity) and, more importantly, a lower level of real interest rates perhaps reflecting higher personal savings but also reflecting deliberate government policy and the much greater reliance on debt by corporations in Japan to take advantage of the exemption from corporate taxation of interest payments. The greater reliance on debt by corporations in Japan can be attributed to some extent to the differences in the standard deviation of returns on the overall capital structure. Perhaps more important is a feeling of Japanese management that differences in the institutional structure and in government policy make a given level of debt less risky in Japan than in the U.S.A.

5. Further details on cost of capital

There are two additional details on the comparative cost of capital in Japan and the U.S.A. which are of considerable interest, one dealing with other concepts of the cost of capital, the other with a breakdown of the period estimates into annual estimates. First, the estimates of the cost of capital discussed so far relate to the customarily used market cost of capital after corporate taxes. There is, however, interest in two other concepts of the cost of capital: the cost of capital before corporate taxes, and the "cost of capital" after personal taxes. The cost of capital before corporate taxes indicates the before-tax returns corporations must earn to warrant the

taxes indicates the after-tax return required by investors in the company's capital structure (Table 5). A comparison of the corresponding estimates for Japan and the U.S.A. again suggests lower capital costs for Japan, with the difference somewhat smaller before corporate taxes and somewhat larger after personal taxes.

Annual estimates of the real cost of capital after corporate taxes for Japan and the U.S.A., presented in Table 3 for the 1962-1984 period as a whole, are provided in Charts 1 and 2. These annual estimates are subject to an even larger margin of error than those for the period as a whole. The annual estimates like those for the period as a whole show a somewhat wider dispersion in the results obtained from the different approaches for Japan than those for the U.S.A. This dispersion in estimates for Japan is largely attributable to the estimates for the cost of capital based on a dividend yield plus growth in dividends approach to the cost of equity. This approach, it should be observed, seems to give an unusually low estimate of the cost of capital (and of course the cost of equity) in the latter part of the 1962-1984 period but not in the earlier years. All approaches point to extremely small real costs of capital for Japan in the 1974-1975 period reflecting the extremely high estimates of expected inflation rates (estimated at 10% in 1974 as against an actual inflation rate of over 20%)

Technical details on the sources of information and procedures used to estimate the cost of capital and related data, including tax incidence, are provided in an Appendix to this paper which is available upon request.

6. Concluding comments

While the average cost of capital was probably lower in Japan than in the U.S.A. over the 1962-1984 period, this was not necessarily true of the mar-

been large enough to explain the much higher rate of investment and the more virgorous growth of the Japanese economy. Nor does the combined impact of personal and corporate taxes on the average cost of capital seem to have been markedly different in the two countries and even the direction of the differential effect on the marginal cost of capital is not clear. The apparently lower average cost of capital in Japan was attributable in large part to a lower level of real interest rates, reflecting deliberate government policy, and to the much greater reliance on debt by Japanese corporations.

FOOTNOTES

- ¹ The effect of a change in tax policy on the cost of capital is estimated in this paper as the change in the required rate of return necessary to offset (in a present value sense) the incremental cash flows associated with the tax change.
- ² Ando, Albert and Auerbach, Alan, "The Corporate Cost of Capital in Japan and the U.S.: A Comparison", NBER Working Paper No. 1762, 1985; Brazell, David, et.al., "The Cost of Corporate Capital in the United States and Japan", The Institute For Political Economy, 1985; and Hatsopoulos, G., High Cost of Capital: America's Industrial Handicap, 1983.
- ³ The Ando-Auerbach paper, unlike the other studies, does not find a lower cost of capital in Japan.
- ⁴ The beta coefficients of market return on corporate bonds or debt instruments on stocks or on stocks and debt combined are extremely small in both countries.
- ⁵ There are no corresponding Government issues in Japan available to the general public.
- ⁶ For the 1962-1984 period as a whole, institutions owned 61% of corporate bonds in Japan; individuals owned 32%, mainly bank debentures. In the U.S.A., the corresponding figures were 87% and 13%. For corporate stock, institutions (including corporations) owned well over half of the amount outstanding in Japan, but well under half in the U.S.A. See Flow of Funds Accounts, The Bank of Japan, and Flow of Funds Accounts, Board of Governors of Federal Reserve System.
- ⁷ Kuroda, Akio, Nippon no Kinri Kozo (Tokyo: Toyo Keizai Shinposha, 1982); Suzuki, Yoshio, Gendai Nippon Kin'yu-ron (Tokyo: Toyo Keizai Shinposha, 1974).
- ⁸ Irwin Friend and Marshall E. Blume, "The Demand for Risky Assets," American Economic Review, December 1975, p. 916.
- ⁹ For a brief description of the institutional data in the U.S.A., see Irwin Friend, Randolph Westerfield and Michael Granito, "New Evidence on the Capital Asset Pricing Model," Journal of Finance, June 1978; the data obtained directly from U.S.A. corporations, are described in Marshall E. Blume, Irwin Friend and Randolph Westerfield, Impediments to Capital Formation, Rodney L. White Center for Financial Research, December 1980. One of the most useful steps that could be taken to improve the data is to

FOOTNOTES (cont.)

- 10 Friend and Blume, op. cit.
- 11 This complement is the weighted harmonic mean of $(1-t_k)$, where t_k is the tax rate applicable to returns on equity held by the k th investor. See Friend and Blume, op. cit.
- 12 See Friend and Blume, op. cit., for breakdown of household assets in the U.S.A; and 1984 Family Saving Survey, (Statistics Bureau of Management and Coordination Agency, Government of Japan), 1985, for corresponding data in Japan.
- 13 For U.S. corporations, see Blume, Friend and Westerfield, op. cit. For Japanese corporations, see Bulent Gultekin and Toshiaki Taga, "Practices of Financial Management in Japanese Corporations," University of Pennsylvania mimeo, 1986. The statement made in the text is strictly true only for the United States since for Japan there was an equally common approach, viz. the accounting return on equity.
- 14 The aggregate dividends data in Japan are somewhat downward biased because stock dividends are valued on the basis of their face rather than market value. We have adjusted these data to correct for this bias.
- 15 Ando and Auerbach, op. cit., find a higher earnings/price (E/P) ratio in Japan than in the U.S.A. for the period 1966-1981, both when earnings are measured on a book basis and even more so when earnings are measured on an economic basis. However, their findings are based on a small sample of corporations (21 for Japan and 19 for the U.S.A.) and as noted earlier the E/P ratio is an unsatisfactory measure of the cost of equity or capital.
- 16 Zhu Yu and Irwin Friend, "The Effects of Different Taxes on Risky and Riskfree Investment and on the Cost of Capital," Journal of Finance, March 1986. The marginal personal tax rate on income from stock may have been fully as high in Japan as in the U.S.A.
- 17 The reason for the different effects of corporate and personal taxes on the stock returns required by investors is discussed in Zhu and Friend, op. cit.
- 18 As a result of this difference in capital structure, the earnings/price approach followed by Ando and Auerbach point to a lower overall cost of capital in Japan than in the U.S.A., unlike their results for equity.

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TABLE 1

Selected Estimates of Market Cost of Corporate Debt in
Japan and U.S.A. with Related Background Data
Arithmetic Average of Annual Data: 1962-1984

	Japan	U.S.A.
1. Corporate bond yield	0.082	0.082
2. Interest rate on corporate loans	0.076	0.085
3. Weighted nominal cost of debt to corporations	0.076	0.083
4. Weighted real cost of debt based on actual rate of inflation	0.019	0.027
5. Weighted real cost of debt based on estimated expected rate of inflation	0.019	0.027
<u>Background Data</u>		
6. Standard deviation of market returns on corporate bonds	0.008	0.030
7. Standard deviation of market returns on corporate debt as a whole	0.007	0.032
8. Standard deviation of real market returns on corporate bonds ¹	0.020	0.020
9. Standard deviation of real market returns on corporate debt as a whole ¹	0.020	0.022
10. Personal savings/income (after-tax) ratio ²	0.191	0.073
11. Corporate savings/income (after-tax) ratio ²	0.622	0.533
12. Government savings/income ratio ²	-0.094	-0.035
13. National savings/national income ²	0.174	0.082
14. Net private domestic investment/national income ²	0.167	0.080
15. Effective personal tax rate on interest received	0.114	0.250
16. Effective corporate tax rate on interest paid	0.000	0.000

1. Real market returns here are based on estimated expected rate of inflation.
2. Japan's data are with inventory valuation adjustment but without capital consumption adjustment.

TABLE 2

Selected Estimates of Market Cost of Corporate Equity in
Japan and U.S.A. with Related Background Data
Arithmetic Average of Annual Data: 1962-1984

	Japan	U.S.A.
<u>Nominal Cost of Equity</u>		
1. Cost of equity based on $(D_1/P_0) + g^d$, where g^d is arithmetic average growth rate in dividends per share over past 10 years	0.082	0.095
2. Cost of equity based on $(D_1/P_0) + g^e$, where g^e is average growth in earnings per share over past 10 years	N.A. ²	0.113 ²
3. Cost of equity based on average of realized market rates of return	0.161 ³	0.095 ³
4. Cost of equity based on weighted cost of corporate debt + .05	0.126	0.133
5. Average of (1) to (4)	0.123	0.109
<u>Real Cost of Equity</u>		
6. Cost of equity based on $(D_1/P_0) + g^d$, where g^d is arithmetic average growth rate in dividends per share over past 10 years	0.025	0.040
7. Cost of equity based on $(D_1/P_0) + g^e$, where g^e is average growth in earnings per share over past 10 years	N.A. ⁴	0.057 ⁴
8. Cost of equity based on average of realized market rates of return	0.104	0.039
9. Cost of equity based on weighted cost of corporate debt + .05	0.069	0.077
10. Average of (6) to (9)	0.066	0.053
<u>Background Data</u>		
11. Standard deviation of market return on corporate equity	0.171	0.166
12. Standard deviation of real market return on corporate equity	0.180	0.162
13. Effective personal tax rate on income from dividends	0.181	0.250 ⁵

TABLE 2 (cont.)

	Japan	U.S.A.
<u>Background Data (cont.)</u>		
14. Effective personal tax rate on income from stocks (t_{ps}) assuming half from dividends and half from capital gains for U.S.A. but two-thirds from capital gains for Japan ⁶	0.060	0.150 ⁵
15. Effective corporate tax rate on corporate income before taxes (t_c)	0.453	0.410
16. Combined corporate and personal tax rates applied to corporate income before taxes $[1 - (1 - t_c)(1 - t_{ps})]$	0.486	0.499 ⁵

- =====
- Earnings are book earnings and not adjusted for differences between book and economic earnings. The difference may be particularly substantial in inflationary periods.
 - The corresponding estimates for the 1976-1984 period are 0.098 for Japan and 0.139 for the United States.
 - Cost of equity based on $(D_1/P_0) + g^D$ (where g^D is average growth rate in price per share over past 10 years) would be somewhat lower.
 - The corresponding estimates for the 1976-1984 period are 0.050 for Japan and 0.068 for the United States.
 - This estimated personal tax rate on income from dividends, based on Irwin Friend and Marshall Puckett, "Dividends and Stock Price," American Economic Review LIV, 1964, would be raised to about 0.35 if based on E.J. Elton and M.J. Gruber, "Marginal Stockholder Tax Rates and the Clientele Effect," Review of Economics and Statistics, 1970. The estimates based on the 0.35 tax rate that correspond to items 13, 14 and 16 are 0.350, 0.200 and 0.528 respectively.
 - Effective capital gains tax in Japan is 0.00 and in U.S.A. estimated at 0.05.

TABLE 3

Selected Estimates of the Cost of Capital to Corporations
 After Corporate Taxes in Japan and U.S.A.
 Arithmetic Average of Annual Data: 1962-1984

	Japan		U.S.A.	
	Book Weight	Market Weight	Book Weight	Market Weight
<u>Nominal Cost of Capital</u> ¹				
1. Cost of equity based on $(D_1/P_0)+g^d$	0.055	0.058	0.078	0.081
2. Cost of equity based on $(D_1/P_0)+g^c$	N.A. ²	N.A. ²	0.088 ²	0.092 ²
3. Cost of equity based on average of realized market rates of return	0.078	0.091	0.078	0.082
4. Cost of equity based on weighted cost of corporate debt + .05	0.067	0.077	0.100	0.106
5. Average of (1) to (4)	0.067	0.075	0.086	0.090
<u>Real Cost of Capital</u>				
6. Cost of equity based on $(D_1/P_0)+g^d$	-0.002	0.001	0.022	0.025
7. Cost of equity based on $(D_1/P_0)+g^e$	N.A. ³	N.A. ³	0.032 ³	0.036 ³
8. Cost of equity based on average of realized market rates of return	0.021	0.034	0.022	0.026
9. Cost of equity based on weighted cost of corporate debt + .05	0.010	0.020	0.044	0.050
10. Average of (6) to (9)	0.010	0.018	0.030	0.034
<u>Background Data</u>				
11. Standard deviation of market return on capital structure (stock and corporate debt combined)	0.050	0.069	0.102	0.114
12. Standard deviation of real market rates on capital structure	0.061	0.079	0.097	0.110
13. Weight of debt in capital structure	0.693	0.583	0.397	0.320
14. Adjusted average of four measures of nominal cost of capital in U.S.A. (see Item 5) if capital structure weights in Japan are applied to U.S.A. costs of debt and equity ⁴			0.068	0.074

TABLE 3 (cont.)

Japan		U.S.A.	
Book Weight	Market Weight	Book Weight	Market Weight

Background Data (cont.)

15. Adjusted average of four measures of real cost of capital in U.S.A. (see Item 10) if capital structure weights in Japan are applied to U.S.A. costs of debt and equity ⁴		0.012	0.019
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1. Total cost of capital, i_c , is equal to

$$i_c = W_e i_e + (1 - W_e) i_D (1 - t_c) \quad ,$$

where W_e = weight of equity, i_e = market cost of equity, i_D = market cost of debt, and t_c = corporate tax rate.

2. The corresponding estimates for the 1976-1984 period are 0.053 and 0.064 for Japan and 0.110 and 0.112 for the United States.
3. The corresponding estimates for the 1976-1984 period are 0.005 and 0.016 for Japan and 0.039 and 0.040 for the United States.
4. This results in some understatement of hypothesized cost of capital in U.S.A. if the capital structure were the same as in Japan.

TABLE 4

Selected Estimates of the Cost of Capital to Corporations
 Before Corporate Taxes in Japan and U.S.A.
 Arithmetic Average of Annual Data: 1962-1984

	Japan		U.S.A.	
	Book Weight	Market Weight	Book Weight	Market Weight
<u>Nominal Cost of Capital</u> ¹				
1. Cost of equity based on $(D_1/P_0)+g^d$	0.103	0.108	0.130	0.137
2. Cost of equity based on $(D_1/P_0)+g^e$	N.A. ²	N.A. ²	0.147 ²	0.156 ²
3. Cost of equity based on average of realized market rates of return	0.149	0.178	0.132	0.140
4. Cost of equity based on weighted cost of corporate debt + .05	0.129	0.150	0.167	0.178
5. Average of (1) to (4)	0.127	0.145	0.144	0.153
<u>Real Cost of Capital</u>				
6. Cost of equity based on $(D_1/P_0)+g^d$	0.046	0.051	0.075	0.081
7. Cost of equity based on $(D_1/P_0)+g^e$	N.A. ³	N.A. ³	0.091 ³	0.100 ³
8. Cost of equity based on average of realized market rates of return	0.092	0.121	0.076	0.084
9. Cost of equity based on weighted cost of corporate debt + .05	0.072	0.093	0.112	0.123
10. Average of (6) to (9)	0.070	0.088	0.088	0.097
<u>Background Data</u>				
11. Adjusted average of four measures of nominal cost of capital in U.S.A. (see Item 5) if capital structure weights in Japan are applied to U.S.A. costs of debt and equity ⁴			0.114	0.125
12. Adjusted average of four measures of real cost of capital in U.S.A. (see Item 10) if capital structure weights in Japan are applied to U.S.A. costs of debt and equity ⁴			0.059	0.069

TABLE 4 (cont.)

1. Total cost of capital before corporate taxes, i'_c , is equal to

$$i'_c = W_e i_e / (1 - t_c) + (1 - W_e) i_D ,$$

where W_e = weight of equity, i_e = market cost of equity, i_D = market cost of debt, and t_c = corporate tax rate.

2. The corresponding estimates for the 1976-1984 period are 0.110 and 0.133 for Japan and 0.174 and 0.177 for the United States.
3. The corresponding estimates for the 1976-1984 period are 0.062 and 0.085 for Japan and 0.103 and 0.105 for the United States.
4. This results in some understatement of hypothesized cost of capital in U.S.A. if the capital structure were the same as in Japan.

TABLE 5

Selected Estimates of the Cost of Capital to Corporations
 After Personal Taxes in Japan and U.S.A.
 Arithmetic Average of Annual Data: 1962-1984

	Japan		U.S.A.	
	Book Weight	Market Weight	Book Weight	Market Weight
<u>Nominal Cost of Capital</u> ¹				
1. Cost of equity based on $(D_1/P_0)+g^d$	0.050	0.053	0.064	0.067
2. Cost of equity based on $(D_1/P_0)+g^e$	N.A. ²	N.A. ²	0.072 ²	0.077 ²
3. Cost of equity based on average of realized market rates of return	0.072	0.084	0.064	0.068
4. Cost of equity based on weighted cost of corporate debt + .05	0.062	0.071	0.083	0.088
5. Average of (1) to (4)	0.061	0.069	0.071 (0.068) ³	0.075 (0.072) ³
<u>Real Cost of Capital</u>				
6. Cost of equity based on $(D_1/P_0)+g^d$	-0.007	-0.004	0.008	0.011
7. Cost of equity based on $(D_1/P_0)+g^e$	N.A. ⁴	N.A. ⁴	0.017 ⁴	0.021 ⁴
8. Cost of equity based on average of realized market rates of return	0.015	0.028	0.008	0.012
9. Cost of equity based on weighted cost of corporate debt + .05	0.005	0.014	0.027	0.032
10. Average of (6) to (9)	0.004	0.012	0.015 (0.012) ³	0.019 (0.016) ³
<u>Background Data</u>				
11. Adjusted average of four measures of nominal cost of capital in U.S.A. (see Item 5) if capital structure weights in Japan are applied to U.S.A. costs of debt and equity ⁵			0.054 (0.053) ³	0.060 (0.058) ³
12. Adjusted average of four measures of real cost of capital in U.S.A. (see Item 10) if capital structure weights in Japan are applied to U.S.A. costs of debt and equity ⁵			-0.001 (-0.003) ³	0.005 (0.002) ³

TABLE 5 (cont.)

1. Total "cost of capital" after personal taxes, i''_c , is equal to

$$i''_c = W_e i_e (1 - t_{ps}) + (1 - W_e) i_D (1 - t_c) (1 - t_{pb}) \quad ,$$

where W_e = weight of equity, i_e = market cost of equity, i_D = market cost of debt, t_c = corporate tax rate, t_{ps} = personal tax rate on income from stocks, and t_{pb} = personal tax rate on interest received.

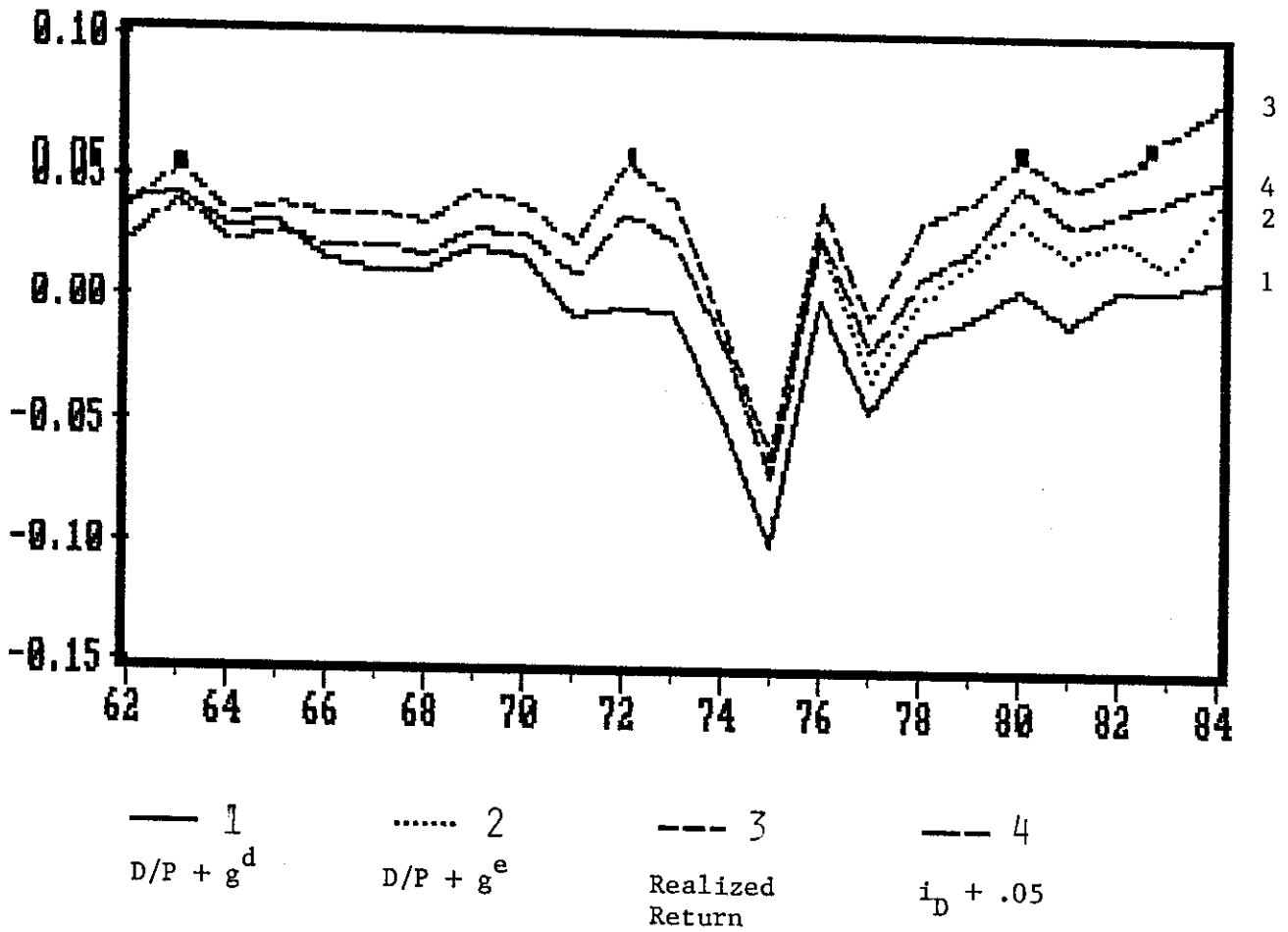
2. The corresponding estimates for the 1976-1984 period are 0.048 and 0.059 for Japan and 0.091 and 0.092 for the United States.
3. Parentheses indicate the estimates corresponding to a personal tax rate on dividends of 0.35 instead of 0.25.
4. The corresponding estimates for the 1976-1984 period are 0.001 and 0.011 for Japan and 0.019 and 0.021 for the United States.
5. This results in some understatement of hypothesized cost of capital in U.S.A. if the capital structure were the same as in Japan.

REAL COSTS OF CAPITAL BASED ON MARKET VALUE WEIGHTS

for JAPAN

1962-1984

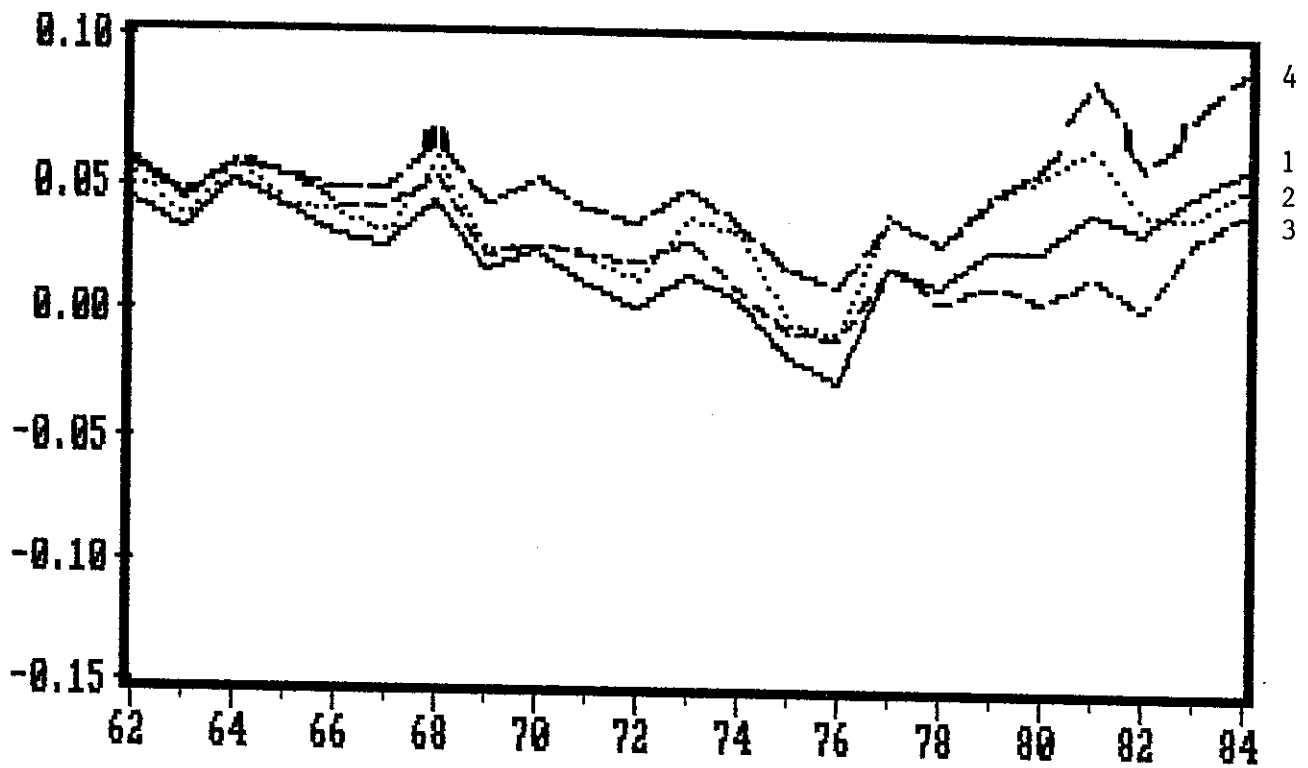
CHART 1.



REAL COSTS OF CAPITAL BASED ON MARKET VALUE WEIGHTS
for U.S.A.

1962-1984

CHART 2.



— 1
 $D/P + g^d$

..... 2
 $D/P + g^e$

--- 3
Realized
Return

-·-·- 4
 $i_D + .05$

The Cost of Capital to Corporations
in Japan and the U.S.A.

Appendix

This appendix describes the data sources and computational procedures used for the estimation of the costs of capital in Japan and the U.S.A. The primary sources of data are listed at the end of this appendix.

Weights of Equity and Debt

For Japan, the weights of equity and debt were estimated based on the Financial Statements of Incorporated Business [1]. This survey covers incorporated business capitalized at ¥ 10 million (before 1972, ¥ 2 million) or more except finance and insurance companies. The market value of equity was estimated by converting the capital stock [1] to the market value by the ratio of the total market value to the capital stock of all listed companies [2]. The market value of debt was assumed to be equal to the book value according to the generally-accepted assumption in Japan.¹ In addition, our definition of debt does not include the trade credit and short-term accruals.

For the U.S.A., the main data for the estimation of the weights is Balance Sheet and Income Statements of All Active Corporations by Major Industries except that we have to exclude the finance, insurance and real estate industries for comparison with the Japanese data [3]. Because of the unavailability of data after 1983, the weights of 1983 and 1984 were assumed to be equal to that of 1982. The market value of equity was estimated by the total market value of equity except mutual funds [4], which was adjusted to include only nonfinancial corporations on the basis of the ratio of the market value of equity of nonfinancial companies to the total market value of equity listed on the New York Stock Exchange [5]. The book value of debt was also converted to its market value by the ratio of the market value of listed bonds of total U.S. companies to the par value of listed bonds of total U.S. companies [5].

Cost of Debt

porate loans and corporate bond yield for both countries. For Japan, the definition of the cost of debt is

$$i_D = w_L i_L + (1 - w_L) i_B ,$$

where i_D equals the weighted cost of debt, i_L equals the average contracted interest rate on loans and discounts of all banks in [6], i_B equals the yield on industrial bonds listed on the Tokyo Stock Exchange in [2], and w_L equals the weight of corporate loans outstanding in total debt in [1]. The average contracted interest rate on loans and discounts of all banks, i_L , has already been adjusted to include both short- and long-term loans. Because in the 1963-1965 period the Tokyo Stock Exchange was closed for bonds except for telephone and telegraph bonds, we estimated industrial bond yields in this period by adjusting the yields on telephone and telegraph coupon bonds on the basis of the 1966 yields on both bonds.

For the U.S.A., the definition of the cost of debt is

$$i_D = w_S i_L + (1 - w_S) i_B ,$$

where i_L is equal to the prime rate charged by banks [7], i_B equals the high-grade corporate bond yield (Aaa) [7], and w_S equals the weight of short-term debt in total debt [3]. In the estimation of the weight of short-term debt, we assumed that 10% of the short-term debt [3] was actually the long-term debt due in one year.

Cost of Equity

As we said in the text, we estimated four kinds of costs of equity. The basic data for the estimation of costs of equity for Japan are:

D_0/P_0 = aggregate dividend yield of Tokyo Stock Exchange first section [2];

σ^d = arithmetic average

g^e = arithmetic average growth rate in earnings per share of NRI350 industrial stocks over past ten years [9]. These data have already been adjusted in the same manner as followed in the S&P 500 stock index²;

\bar{R}_m = arithmetic average of realized market rates of return on common stocks listed on Tokyo Stock Exchange first section in [8] during 1962-1984.

However, the aggregate dividends data in Japan are somewhat downward-biased because stock dividends are valued on the basis of their face rather than market value. We have adjusted this bias in the following way based on the individual corporation's data after 1971 [2]:

$$\Delta(D_0/P_0) = \sum_{k=1}^n M_k/M_V ((D_{0k}^m/P_{0k}) - (D_{0k}^f/P_{0k})) ,$$

where $\Delta(D_0/P_0)$ equals the bias caused by the valuation of stock dividends, n equals the number of companies which paid stock dividends, M_k equals the market value of the k th company which paid stock dividend, M_V equals the total market value of Tokyo Stock Exchange first section, D_{0k}^f/P_{0k} equals the dividend yield based on the face value of stock dividends of the k th company, and D_{0k}^m/P_{0k} equals the dividend yield based on the market value of stock dividends of the k th company. We estimated above two dividend yields of the k th company in the following way, based on cash dividends per share, stock dividends per share, the market price, and the face price per share of the k th company [2]:

$$D_{0k}^m/P_{0k} = \frac{D_{0k}^c + D_{0k}^{sf} \cdot (P_{0k}/P_{0k}^f)}{P_{0k}} ,$$

where D_{0k}^c equals the cash dividends per share, D_{0k}^{sf} equals the stock dividends per share based on face value, and P_{0k}^f equals the face price per share of the k th company.

We added the average of the estimated bias

estimated biases for the period.

For the U.S.A., the sources of data are:

D_0/P_0 = average dividend-price ratio of Standard & Poor's 500 stocks [7];

g^d = arithmetic average growth rate in dividends per share of Standard & Poor's 500 stocks [7] over the past ten years;

g^e = arithmetic average growth rate in earnings per share of Standard & Poor's 500 stocks [7] over the past ten years;

\bar{R}_m = arithmetic mean of $(P_0^n - P_{-1}^n)/P_{-1}^n + (D_0/P_{-1})$ over the past ten years, where P_0^n equals the closing stock price index of the New York Stock Exchange in [5] and D_0/P_{-1} equals the dividend-price ratio of Standard & Poor's 500 stocks [7] adjusted for growth trend in Standard & Poor's 500 composite price index [7].

Expected Inflation Rate

The data for the estimation of expected inflation rates are the implicit deflators of gross national expenditure (1980 = 100) in [10] for Japan and the implicit deflators of gross national product (1982 = 100) in [7] for the U.S.A. respectively. The expected inflation rates are estimated by an autoregressive model with 1, 2 and 3 lagged actual inflation rates for both countries. The estimated equations are:

$$\text{Japan: } \dot{P}^e = 0.0263 + 0.6260\dot{P}_{-1} - 0.1793\dot{P}_{-2} + 0.1664\dot{P}_{-3}$$

(1.13) (2.77) (0.68) (0.71)

$$\bar{R}^2 = 0.2181 \quad \text{D.W.} = 1.9038$$

$$\text{U.S.A.: } \dot{P}^e = 0.0132 + 0.9937\dot{P}_{-1} - 0.4285\dot{P}_{-2} + 0.2211\dot{P}_{-3}$$

(1.79) (4.54) (1.34) (0.98)

$$\bar{R}^2 = 0.6635 \quad \text{D.W.} = 2.0639$$

inflation rate. Values in parentheses are the t-statistic, \bar{R}^2 equals R^2 adjusted for degrees of freedom, and D.W. equals the Durbin-Watson statistic.

For both countries, second and third lagged variables do not have significant coefficients. However, because they contribute to the reduction of serial correlations, we did not eliminate the second and third lagged variables.

Corporate Tax Rate

For Japan, the effective tax rate on corporate income before tax was defined in [10] as the ratio of the direct taxes on income of private non-financial corporations to the income of private non-financial corporations before tax without inventory revaluation and capital consumption adjustment. (In Japan, the expected consumption adjustments are not available.) Before 1969, data were based on the old national accounts in [1].

For the U.S.A., the effective tax rate on corporate income before tax was defined as the ratio of corporate tax liabilities of the non-financial corporate sector to corporate profit before tax of that sector without stock valuation and capital consumption adjustments [7].

Personal Tax Rate on Interest and Stock Dividend Income

It is extremely difficult to estimate the personal tax rate on interest and stock dividend income in Japan. This is due to the various complicated tax exemptions and deductions on these kinds of income. In addition, these incomes are principally taxed on the basis of the aggregate amount of income.³ Our estimates of these tax rates are based on the data in [12]. First of all, concerning the interest income tax, we can divide total interest income into the following four parts (approximately) on the basis of data in [12].⁴

1. The amount of interest income corresponding to tax-free small-sum savings;
2. The amount of interest income which was not reported at the end of the fiscal year and therefore subject to the withholding tax rate;
3. The amount of interest income corresponding to separate taxation; and
4. The amount of interest income which was reported at the end of the fiscal year and subject to the tax rate on aggregate income.

We defined the effective tax rate on interest income as the weighted average of the statutory withholding tax rate on interest income, the statutory tax rate of separate taxation on interest income and the actual tax rate on reported aggregate income weighted by (2), (3) and (4).⁵ Because the interest income was subject to separate taxation before 1970 despite the earner's income level, we defined the effective tax rates on interest income before then as the statutory separate tax rate. In addition, because data in [12] are available only for the period 1973-1983, we assumed that the tax rates in the 1971-1972 period were equal to the tax rate in 1973 and that the tax rate in 1984 was equal to the tax rate in 1983. Concerning the validity of our estimates, it is possible to compare them with the Shoven-Tachibanaki's estimate for 1980.⁶ Our estimate, 0.136 for 1980, is somewhat higher, but very close to their estimate of 0.124.

The estimation procedure for the personal tax rate on dividend income is exactly the same as on interest income except for the treatment of tax-free small-sum savings. Concerning the personal tax rate on dividend income, we assumed that these rates were constant over the sample period and equal to the average of estimated rates for the 1974-1983 period due to the unavailability of data for separate years in [12]. Again comparing our estimate for 1980 to

For the U.S.A., the effective personal tax rate on interest and dividend income was estimated at 0.25 and assumed to be constant over the sample period. The estimated tax rate on interest income is somewhat less than 0.25,⁷ but the tax rate on dividend income would be expected to be somewhat higher since tax-free institutions are much more important holders of bonds than of stocks.

Savings and Investment Rates

All data for the estimation of savings and investment rates were drawn from [10] after 1970 and from [11] before 1969 for Japan, and from [7] for the U.S.A. Because sector classification and the account system of the government sector are somewhat different between two countries, we have adjusted them for those of the U.S.A.⁸ In addition, in the comparison of the figures between the two countries, it should be noted that Japan's gross national product data are without capital consumption adjustment, and before 1969 the data were based on the old national account system prior to the adoption of the United Nations system of national accounts in 1970.

FOOTNOTES

- 1 Komiya, Ryutaro and Iwata, Kikuo, Kigyo Kin'yu no Riron (Tokyo: Nippon Keizai Shinbunsha; 1973).
- 2 There were no earnings per share data of Tokyo Stock Exchange first section available before 1971. Because we used the NRI350 earnings per share data to obtain the growth rate, there should not be any serious bias caused by these data.
- 3 For a detailed description of the Japanese tax system, see J.A. Pechman and Keimei Kaizuka, "Taxation," in Asia's New Giant (chapter 5), H. Patric and H. Rosvosky (eds.), 1976, and An Outline of Japanese Taxes, yearly, (Ministry of Finance).
- 4 Because total interest income in [12] includes the interest received by corporations, we estimated the interest received by households by the household's holding ratio of deposits and bonds based on the data in [13].
- 5 For the detailed description of historical data on statutory tax rates, see the Ministry of Finance, op. cit.
- 6 J.B. Shoven and Toshiaki Tachibanaki, "The Taxation of Income from Capital in Japan," mimeo; presented at the Center for Economic Policy Research Conference on Government Policy Towards Industry in the United States and Japan, May 2-3, 1985.
- 7 Irwin Friend and Marshall Puckett, "Dividends and Stock Price," American Economic Review LIV, no. 5, September 1964.
- 8 In Japan, the government sector does not include the public enterprises, while in the U.S.A., these enterprises are included in the government sector. Government investment is included in the government outlay in the U.S.A., while it is not included in the government outlay in Japan.

PRIMARY SOURCES OF DATA

- [1] Ministry of Finance (Government of Japan), Survey of Corporate Business, quarterly.
- [2] Tokyo Stock Exchange, Annual Securities Statistics, yearly.
- [3] Internal Revenue Service (Department of the Treasury, U.S. Government), Statistics of Income (Corporate Income Tax Returns), yearly before 1982.
- [4] Board of Governors of the Federal Reserve System, Flow of Funds Accounts, 1985.
- [5] New York Stock Exchange, Fact Book, yearly.
- [6] Bank of Japan, Economic Statistics Monthly, monthly.
- [7] United States Government Printing Office, Economic Report of the President, 1986.
- [8] Japan Security Research Institute, Rate of Return on Common Stocks, 1985.
- [9] Nomura Research Institute, Nomura Stock Handbook, 1985.
- [10] Economic Planning Agency (Government of Japan), Annual Reports on Annual Account, 1982 and 1986.
- [11] Economic Planning Agency (Government of Japan), Annual Reports on Annual Income, 1976.
- [12] National Tax Bureau (Government of Japan), Annual Statistical Report on National Tax, yearly after 1970.
- [13] Bank of Japan, Flow of Funds Accounts yearly.