

KOBE ECONOMIC & BUSINESS REVIEW

39th
ANNUAL REPORT



RESEARCH INSTITUTE FOR ECONOMICS
AND BUSINESS ADMINISTRATION
KOBE UNIVERSITY

1994

KOBE ECONOMIC & BUSINESS REVIEW

39th

ANNUAL REPORT



**RESEARCH INSTITUTE FOR ECONOMICS
AND BUSINESS ADMINISTRATION
KOBE UNIVERSITY**

1994

CONTENTS

	Page
Labour Unions and Nominal Prices Kazuo SHIMOMURA	1
An International Perspective on Japanese Corporate Finance Kenji KOJIMA	11
Measuring Natural Resource Rents and their Macroeconomic Significance for Developing Countries, with Reference to Latin American Sugar Producers... Robert K.McCleery	61
The Influence of Product Development Strategy on Inter-Project Learning Kentaro NOBEOKA	87
A Comparison of Japanese and UK Welfare Stephen J Davies	111

LABOUR UNIONS AND NOMINAL PRICES

Kazuo SHIMOMURA

1. Introduction

It is widely believed that labour unions tend to inflate nominal prices. However the reason does not seem to be quite clear. Rational labour unions may or may not demand high wage, depending on their observation of the state of economy. Thus, the above commonsense belief can be justified from the point of view of economic analysis only if we find certain conditions which make unions choose aggressive behaviour. The purpose of this note is to give a theoretical support to an intuition that one of such conditions is concerned with the distribution of monetary assets over workers and capitalists.

To attain this purpose, it is necessary to incorporate, in some way or another, 'money' into the union-ridden equilibrium model. One of the standard ways of doing so is to add the real money balance to the variables which directly affect the utility of individual households. Based on this treatment of money, we shall derive here two theoretical results.

One of them, which is derived in Section 2, is that if capitalists exclusively hold money then union behaviour gives rise to nominal prices higher than those in the economy without labour unions. The other, which is in Section 3, is that if, on the contrary, workers alone hold money then there is a theoretical possibility such that unionization lowers nominal prices. Those results suggest that the unevenness of the distribution of monetary assets can be one of the causes of so-called cost-push inflation.

2. The Case in Which Capitalists Exclusively Hold Money

Consider the one-sector economy such as argued in Shimomura (1990a). It is assumed in this section that the utility function of the typical capitalist is described as follows.

$$u^c = u^c(c_r, M/p) \quad (1)$$

where c_r is the amount of consumption made by the capitalist, M the nominal (desired) money balance and p the nominal price of the output. This utility function is assumed to be increasing, strictly quasi-concave and homogeneous of degree one in both independent variables. Making use of a unit-expenditure function, the budget constraint of the capitalist is expressed as

$$e^c(p, p)u^c = \bar{M} + \pi \quad (2)$$

where

$$e^c(p_1, p_2) \equiv \min_{c_r, x} p_1 c_r + p_2 x \quad \text{subject to } 1 < u^c(c_r, x),$$

$\bar{M}$ is the stock of money held by the capitalist and π the profit defined as

$$\pi \equiv pf(L) - \omega L \quad (3)$$

where $f(\cdot)$ is the increasing and strictly concave production function, L the total labour hours demanded by firms and ω the nominal wage per hour.

Denote the utility function of each homogeneous worker by

$$u^w = u^w(c_w, 1 - q) \quad (4)$$

where the maximum supply of labour hours of each worker is measured as one hour.

This utility function is also assumed to be increasing, strictly quasi-concave and homogeneous of degree one in c_w and $1 - q$. Then, resorting to the argument made in Shimomura(1990a,b), the union's utility function is described as

$$u^w = u^w(\omega q/p, 1 - q) \quad (5)$$

where $q \equiv L/N$ and N is the number of workers.

Now let us obtain the union-ridden equilibrium condition. Since firms are competitive, we have a familiar equality

$$w/p = f'(L) = f'(qN) \quad (6)$$

Substituting (6) to (5) and differentiating (5) with q , we have, as the equilibrium condition,

$$\phi(q) \equiv u_c^w(qf'(qN), 1-q) [f'(qN) + qNf''(qN)] - u_h^w(qf'(qN), 1-q) = 0 \quad (7)$$

where $u_c^w(c_w, h) \equiv \partial u^w / \partial c_w$ and $u_h^w(c_w, h) \equiv \partial u^w / \partial h$

In what follows, it is assumed that the equation (7) has an internal solution at which $\phi'(q) < 0$, which implies that the union-ridden equilibrium uniquely exists. Denote the equilibrium hours of labour by q^U . Then we see that the hours of labour per worker in the union-free equilibrium, say q^F , must be greater than q^U . For,

$$\phi(q^F) = u_c^w(q^F f'(q^F N), 1-q^F) q^F N f''(q^F N) < 0$$

Now let us consider the monetary aspect in the present model. Considering the properties of expenditure function, it may be obvious that the market-clearing condition for the money market is

$$p e_2'(p, p) u^r = \bar{M} \quad (8)$$

where $e_2'(p_1, p_2) \equiv \partial e(p_1, p_2) / \partial p_2$. Considering (2), (3) and (8), together, we have

$$\frac{e_2'(1, 1)}{e^r(1, 1)} = \frac{\bar{M}}{\bar{M} + \pi}$$

or

$$p = \left[\frac{e^r(1, 1) - e_2'(1, 1)}{e_2'(1, 1)} \right] \frac{\bar{M}}{[f(qN) - qNf'(qN)]} \quad (9)$$

$$\equiv p(q)$$

Obviously, $p'(q) < 0$. Therefore, $q^U < q^F$ implies that

$$p(q^U) > p(q^F) \quad (10)$$

which is the first result in this note.

3. The Case in Which Workers Exclusively Hold Money

In this section we deal with an opposite case. To make the analysis sharper, the utility function of the typical worker is specified as follows.

$$u^w = u^w(v(c, x), 1-q) \quad (4')$$

where both $u^w(v, 1-q)$ and $v(c, x)$ are assumed to be increasing, strictly quasi-concave and homogeneous of degree one in $(v, 1-q)$ and (c, x) , respectively, and x is the real money balance which is to be formulated in what follows.

Now let us consider in what way real money balance must be formulated in the present model. Usually, it is defined as the stock of money divided by a price index. To properly accomodate the real money balance here into this definition, we have to choose the most appropriate price index. Obviously, Laspeyres or Paasche price index is not the best one. It seems that so-called constant-utility price index (See Allen (Chapter 2, 1975).) is better. We shall use this as the deflator in what follows. Now we can formulate the real money balance in the present model. Consider a system of equations

$$G(p, Q, 1, h) = Q \quad (11a)$$

$$\frac{\partial}{\partial h} G(p, Q, 1, h) + w = 0 \quad (11b)$$

where

$$G(p, Q, u^w, h) \equiv \min_{c, x} pc + Qx \text{ subject to } u^w \leq u^w(v(c, x), h) \quad (12)$$

Regarding Q and h as the unknowns to the system of equations (11), Q is nothing but the constant-utility price index. Therefore, the real money balance is formulated as M/Q .

We are ready for presenting the union's problem. From the definition of $G(p, Q, u^w, h)$ and (11), we see

$$G(p, Q, u^w, 1-q) = (1-q)z^w(p, Q) \delta(u^w/(1-q)) \quad (13)$$

where

$$z^w(p, Q) \equiv \min_{c, x} pc + Qx \quad \text{subject to } 1 \leq v(c, x)$$

and $\delta(u^w/(1-q))$, whose shape completely depends on that of $u^w(\cdot)$, has the following properties; $\delta(0) = 0$, $\delta' > 0$ and $\delta'' > 0$, if $u^w(0, 1)$ is assumed to be zero. Considering (13), the union's problem is

$$\max v$$

subject to

$$hz^w(p, Q) \delta(1/h) = Q \quad (11'a)$$

$$z^w(p, Q) \{ \delta(1/h) - \delta'(1/h)/h \} + w = 0 \quad (11'b)$$

$$w/p = f(qN) \quad (6)$$

$$N(1-q)z^w(p, Q) \delta(u^w/(1-q)) = \bar{M} + wqN \quad (14)$$

$$NQ z_q^w(p, Q)(1-q) \delta(u^w/(1-q)) = \bar{M} \quad (15)$$

where $z_q^w(p, Q) \equiv \partial z^w(p, Q) / \partial Q$. Notice that (14) is the budget constraint of workers and (15) describes the market-clearing condition with respect to money.

In what follows, we draw attention to the special case in which each of the functions, $z^w(1, b)$, $\delta(1/h)$ and $f(qN)$, has a constant elasticity, i.e.,

$$\theta_b \equiv b z_q^w(1, b) / z^w(1, b), \quad b \equiv Q/p$$

$$\theta_s \equiv h \delta(1/h) / \delta'(1/h)$$

and

$$\theta \equiv q N f'(qN) / f(qN)$$

are all constant and take on some values between zero and one. Since the purpose of the present section is to exemplify a theoretical possibility that the union behaviour lowers nominal prices, this specification may be justified in view of this purpose.

Now let us derive the union-ridden equilibrium condition. Denoting w/p by R , (6) and (12) are rewritten in the form

$$R = f'(qN) \quad (6')$$

$$h z''(1, b) \delta(1/h) = b \quad (12a'')$$

$$z''(1, b)(1/\theta_s - 1) \delta(1/h) = R \quad (12b'')$$

From (14) and (15), we have

$$(1-q)(1-\theta_s z''(1, b) \delta(u''/(1-q)) = Rq \quad (16)$$

Differentiating (6), (12'') and (16) with b , h , R , q and u'' and setting du'' equal to zero, we obtain the union-ridden equilibrium condition

$$\frac{q}{1-q} = \frac{\theta_s \{ \theta(1-\theta_s) + \theta_s(1-\theta_s) \}}{(1-\theta_s)(1-\theta_s \theta_s)} \quad (17)$$

which obviously determine a unique q , say q^u

On the other hand, the union-free equilibrium is described by (6'), (12), (16) and

$$(1/\theta_s - 1) z''(1, b) \delta(u''/(1-q)) = R, \quad (18)$$

which is derived by differentiating (14) with q and u_w and setting du_w equal to zero. From these equations, we have

$$\frac{q}{1-q} = \frac{(1-\theta_b)\theta_s}{1-\theta_s} \quad (19)$$

Let us denote by q^F the hours of labour per worker satisfying (19).

Now let us compare q^U with q^F . Subtracting (19) from (17), we see

$$(17)-(19) = \frac{\eta(\theta_b)}{1-\theta_b\theta_s} \quad (20)$$

where

$$\eta(\theta_b) \equiv -\theta_b^2\theta_s + (2-\theta)\theta_b - (1-\theta)$$

Since $\eta(0) = -(1-\theta) < 0$ and $\eta(1) = 1-\theta_s > 0$, there exists a unique θ_b , say θ_b^* , between zero and one such that if $0 < \theta_b < \theta_b^*$ (resp. $\theta_b^* < \theta_b < 1$) then $\eta(\theta_b) < 0$ (resp. > 0). It follows that

$$q^U \begin{cases} \geq \\ \leq \end{cases} q^F \text{ according as } \theta_b \begin{cases} \leq \\ \geq \end{cases} \theta_b^* \quad (21)$$

On the other hand, from (14) and (15), we have

$$\theta_b = \frac{\bar{M}}{\bar{M} + \theta pf(qN)}$$

or

$$p = \frac{1-\theta_b}{\theta_b\theta f(qN)} \equiv \tilde{p}(q)$$

Since $\tilde{p}(q)$ is a decreasing function of q , we see from (21) that

$$\tilde{p}(q^U) \begin{cases} \leq \\ \geq \end{cases} \tilde{p}(q^F) \text{ according as } \theta_b \begin{cases} \geq \\ \leq \end{cases} \theta_b^* \quad (22)$$

Therefore, if θ_b is greater than θ_b^* , unionization gives rise to the nominal price which is lower than the one prevailing at the union-free equilibrium. Note that from (6') $q^U > q^F$ means that the real wage rate R is smaller in the union-ridden equilibrium than in the union-free equilibrium. Therefore, if $\theta_b > \theta_b^*$ then the nominal wage rate must

be also smaller in the union-ridden equilibrium than in the union-free equilibrium.

4. A Concluding Remark

The foregoing argument is easily extended to see the relationship between union behaviour and the exchange rate in a small open economy. Let us show here that under the distribution of monetary assets assumed in the previous section it is theoretically possible that labour unions can make the domestic currency more valuable than in the union-free equilibrium.

Suppose that there are two tradeable goods, the first and second goods, and that the economy is completely specialized to the production of the first good. Denoting the international prices measured in the foreign currency and the exchange rate defined to be the price of the foreign currency in terms of the domestic currency by p_i , $i = 1, 2$, and E , respectively, the union's optimal problem is described as follows:

$$\max u^w$$

subject to

$$he^w(p_i^*, p_i^*, \tilde{Q}) \delta(1/h) = \tilde{Q}$$

$$e^w(p_i^*, p_i^*, Q) \{ \delta(1/h) - \delta'(1/h)/h \} + \tilde{R} = 0$$

$$N(1-q)e^w(p_i^*, p_i^*, \tilde{Q}) \delta(u^w/(1-q)) = \bar{M}/E + \tilde{R}qN$$

$$N\tilde{Q}e_q^w(p_i^*, p_i^*, \tilde{Q})(1-q) \delta(u^w/(1-q)) = \bar{M}/E$$

$$\tilde{R} = p_i^*, f(qN)$$

where $\tilde{Q} \equiv Q/E$ and $\tilde{R} \equiv w/E$. Then, from the first-order conditions with regard to this optimization problem, we can derive the following relationship.

$$E^u \leq E^F \text{ according as } \theta_s \leq \tilde{\theta}_s^*$$

where E^u (resp. E^f) is the exchange rate in the union-ridden (resp. - free) equilibrium. That is, if θ_b is greater (resp. smaller) than $\tilde{\theta}_b^*$ then unionization enhances (resp. reduces) the value of the domestic currency.

References

- [1] Allen, R.G.D., *Index Numbers in Theory and Practice*, Macmillan. 1975.
- [2] Shimomura K., "A Simple Union-Ridden General Equilibrium Model", *Kobe Economic & Business Review* Vol. 35. 1990a.
- [3] Shimomura K., "A Further Note on Union Power in the Long-Run", *Scandinavian Journal of Economics* 92, pp. 599-604. 1990b.

AN INTERNATIONAL PERSPECTIVE ON JAPANESE CORPORATE FINANCE *

Kenji KOJIMA

This paper presents major characteristics of Japanese corporate finance in an internationally comparative perspective. The corporate finance in Japan appears different from those in the United States. The paper attempts to identify important features of corporate finance in Japan, to provide economic rationale for those, and to develop insights concerning the effects of such differences on the relationship between corporate finance and capital market. The different features can be due to differing institutional and regulatory structures. The ongoing financial liberalization has caused structural shifts of Japanese corporate finance over the last decade.

1. Introduction

As capital and product markets have become more integrated, national differences in corporate behaviors have been drawn into sharp relief. Since behaviors and performances of firms substantially depend on institutional and regulatory environments where firms operate, peculiar patterns of behaviors turn out to be the rational economic responses to those environments. One of the major differences in corporate behaviors among different countries can be financing patterns, particularly the relationships between the capital market and non-financial corporations. Corporate financial structures and practices in Japan appear distinctive, particularly in comparison with those in the United States. Specifically, it is commonly observed that financial institutions in Japan tend to have much closer and longer-term relationships with their industrial clients than do their counterparts in the United States. In large part, these differences are due to

*Financial supports from Ministry of Education in Japan and the Japan Securities Scholarship Foundation are gratefully acknowledged. This research started when the author was a visiting scholar at Department of Economics, Harvard University in 1993. He is deeply indebted to W. Carl Kester on the subject of this paper.

institutional and regulatory structures.

To the extent that the institutional and regulatory constraints vary systematically across countries, so may corporate finance. While legal and historical considerations help to explain why corporate behaviors in each country have followed distinctive trajectories, we need to explain the difference of patterns across the countries as well as the similarity within each country and their sustainability with providing economic rationale under specific structures of constraints. The key to unlocking answers to these questions is comprehensive understanding of the corporate finance with a comparative study, identifying the underlying structure of constraints. Consequently, this paper is as much an exposition of the economic rationale that underlies that system as it is an explanation of different patterns in corporate finance.

This paper presents major characteristics of Japanese corporate finance in an internationally comparative perspectives. This paper examines the corporate finance in Japan compared with those in Germany and the United States, three of whose manufacturing sectors are highly competitive each other. The primary purpose of the study is threefold: to identify important features of corporate finance in Japan, to provide economic rationale for similarity among firms in Japan and these differences from other countries, particularly Germany and the United States, and to develop insights concerning the effects of such differences on the relationship between corporate finance and capital market.

This paper is organized as follows. The next section presents the major characteristics of financial policies of Japanese firms and discusses the underlying economic rationale, comparing with the counterparts in Germany and the United States. Section 3 discusses recent structural shifts in corporate financial policies, and capital and credit markets in Japan. Finally, section 4 presents concluding remarks.

2. Major Characteristics of Financial Policies

2.1 Lower Return Standard

Return on investments(hereafter, ROIs) of Japanese firms are considerably lower than those of the U.S. firms. As shown in Table 1, returns on assets have been consistently higher in the United States

than in Japan since 1960. Brown, Soybel, and Stinckney (1994) compare the operating performance of Japanese and U.S. firms using financial statement data restated to a similar reporting basis during the period of 1985-88. The results show that neither country appears to generate systematically higher profit margin, but that U.S. firms have higher turnover assets and therefore higher rates of return on assets. Although financial statement ratios of Japanese and U.S. firms are not directly comparable because of the use of different accounting principles, their results suggest that alternative accounting principles do not seriously distort the comparability of financial statement data in both countries.¹ Return on assets of U.S. firms are significantly higher than those of the Japanese for the year 1985 to 1988, primarily because turnover rate of assets are higher for U.S. firms.

Table 1
Profitability of Manufacturing Firms in Germany, Japan, and the United States
Five-Year Average
(Percentage)

		Germany	Japan	U.S.A
Return on Assets	1960-64	3.00	3.19	6.28
	1965-69	3.07	3.31	6.94
	1970-74	1.87	2.60	5.92
	1975-79	1.80	1.39	7.21
	1980-84	0.97	2.16	5.68
	1985-89	2.51	2.46	5.24
	1990-91	2.23	2.56	3.39
Return on Sales	1970-74	1.49	2.94	4.53
	1975-79	1.29	1.37	5.20
	1980-84	0.65	1.92	4.34
	1985-89	1.82	2.40	4.66
	1990-91	1.61	2.63	3.22

Source: The Bank of Japan, *Comparative Economic and Financial Statistics: Japan and Other Countries*, 1974, 1978, 1986, 1993, 1994.

Source Note: Statistisches Bundesamt, *Unternehmen und Arbeitsstätten*, The Bank of Japan, *Shuyokigyo Keieibunseki* (Business Analysis on Main Enterprises in Japan), The U.S. Department of Commerce, *Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations*.

Note: Book values of assets in Japanese firms differs greatly from current values because face values are much lower than market values.

1 Brown, Soybel, Stinckney (1993) develop a method to restate financial statement data of Japanese and U.S. firms to a comparable reporting basis. Previous studies which investigate the disparity of price-earning ratios (PERs) conclude that different accounting principles explain substantially the difference between Japanese and U.S. PERs. In contrast, they show that adjusting for different accounting principles explains only a small portion of the difference, using samples of Japanese and U.S. firms for the years 1985 through 1988.

These findings suggest that Japanese firms are much less profitable than their U.S. counterparts. The relatively low returns of Japanese firms have been attributed to differences in accounting practices, corporate tax rates, and exchange rates, capital structure, and cost of capital.² Blaine (1993) observes profitability of Japanese and U.S. large firms in thirteen major industries over the 1985-89 period. He finds a number of interesting observations about the profitability of Japanese and U.S. firms in the latter half of the 1980s. The most important of these are that in almost every industry, Japanese firms are consistently less profitable than their U.S. counterparts. Even after adjusting for differences in tax rates, accounting practices, and debt levels between the two countries, Japanese firms in most industries have consistently lower operating margin and return on assets than equivalent U.S. firms. The operating margin provides the most fundamental measure of profitability since it is not affected by taxes, interest earnings and expenses, and extraordinary gains and losses. Japanese firms appear to be consistently less profitable than their U.S. counterparts. He also concludes that it is very unlikely that accounting practices explain more than a small portion of the observed differences in profitability between Japanese and U.S. firms. Based on the results of those studies, it can be concluded that there appears to have been a real difference in the profitability of firm in both countries.

A lower acceptable return on investment allows Japanese managers

2 The financial statement ratios such as return on assets, return on equity, and operating margin are a function of the specific legal framework and accounting standards used to generate the firm's income statement and balance sheet. Among the most important are: the tax rate and the presence or absence of specific tax and investment credits; the accepted method of accounting for income statement and balance sheet items, particularly depreciation, research and development spending, minority investment, lease, goodwill, and currency translations; and the effect of capital structure. Thus, each of the three most widely used profitability ratios is subject to certain limitations that make the accurate assessment of firm performance very complex and difficult task.

Blaine (1993) draws several conclusions about the effects of differences in accounting standards on the measured profitability of Japanese and U.S. firms. First, Japanese firms should exhibit more consistent operating results due to their ability to control reported income through the use of general reserve funds and by deterring foreign currency gains and losses, and through transaction with related firms. Second, the use of accelerated depreciation in Japan should result in somewhat lower reported income and lower assets for Japanese firms relative identical U.S. firms. As a result, all three profitability measures may be somewhat lower for Japanese firm than identical U.S. firms.

undertake investments that U.S. firms would find unacceptable. Table 2 shows that investments in plants and equipment to gross domestic products have been consistently higher in Japan than in German and the U.S. since 1976. The capital structure policies and return objectives of Japanese firms usually enhance their long-term corporate growth by allowing the savings from lower capital costs and return standards to be reinvested in cost reduction, capacity expansion, and product development. U.S. firms are caught between the need to compete against Japanese firms that are willing to invest capital at lower returns, and the need to provide returns to shareholders that meet the required level of return in the capital market. The U.S. managers impose higher return standards on their investment decisions than the Japanese counterparts. Furthermore, executives of the U.S. firms finance with much less debt, which produces a serious cost of capital disadvantage, reduces the growth rate that can be financially sustained, and creates capital structure that reinforces the disparity in corporate goals and ROI objectives between U.S. firms and their foreign rivals.

U.S. firms rely heavily on cost-of-capital calculations to guide investment decisions, and those firms that do not earn a sufficient return on capital to satisfy the investors will fail. But for Japanese firms, investment decisions are not made on a discounted cash flow basis. Japanese managers usually view the cost of equity as the firm's expense to service this source of capital, that is, dividends. With this view of cost-of-capital, it is easy to see why the market price of their stock has little impact on investment decisions of Japanese firms. Rather, barring market-imposed capital constraints, Japanese managers' investment decisions are guided by what they believe the cost of capital by what is quite different from prevalent financial theories in the U.S. Japanese managers care about borrowing costs and they push their banks and securities firms to get the best terms. The most important criteria of Japanese firms is long-term goal of maintaining and enhancing their positions in the Japanese industry. Serious considerations of ROI and capital costs thus play only a minor role in investment decisions of Japanese firms. If an investment is necessary to keep up with a competitors or offers an opportunity to grow, then the investment may be made. While a U.S. managers might first determine the cost of capital and proceed to look for investments that offer returns in excess of that cost, the Japanese managers may

first make the investment decision and then worry about how to finance it.³

Table 2
Investments in Equipment and Research and Development
in Germany, Japan, and the United States
Five-Year Average
(Percentage)

		Germany	Japan	U.S.A.
Real Investments in Plants and Equipment to GDP in Manufacturing Firms	1967-69	5.1	7.7	3.8
	1970-74	5.3	7.5	3.5
	1975-79	4.3	4.7	3.5
	1980-84	5.3	5.1	3.5
	1985-89	5.3	6.0	3.4
	1990-92	5.4	7.6	3.5
Real Investment in Plants and Equipment to GDP in Non-Manufacturing Firms	1967-69	7.7	7.9	6.5
	1970-74	8.3	9.7	6.3
	1975-79	7.4	9.0	5.7
	1980-84	6.7	8.8	5.7
	1985-89	7.2	10.9	6.1
	1990-92	8.4	13.1	6.7
Real Investments in Research and Development to GDP in Private Industrial Sector	1970-74	1.3	1.0	1.7
	1975-79	1.6	1.1	1.5
	1980-84	1.6	1.4	1.7
	1985-89	1.6	2.0	2.0
	1990-92	1.6	2.4	2.0

Source: The Bank of Japan, *Comparative Economic and Financial Statistics: Japan and Other Countries*, 1982, 1987, 1994.

Source Notes: Statistisches Bundesamt, *Statistisches Jahrbuch*, Economic Planning Agency in Japan, *Minkan Kigyo Shihon Sutoku Sokuhou* (Preliminary Issue of Corporate Capital Stock), Management and Coordination Agency in Japan, *Kagakugijyutu Kenkyu Chousa Houkoku* (Report on the Survey of Research and Development), Science and Technology Agency in Japan, *Kagakugijyutu Hakusho*, (White Paper on Science and Technology), Department of Commerce in the U.S., *Survey of Current Business*.

³ Evidences are available from comparative data provided in a questionnaire survey of Japanese, European and the U.S. firms (Keizai Doyukai, 1988). The three sets of managers show notable differences when asked to choose the three most important corporate goals they place on twelve preselected ones. The leading goals of managers in Japan is improving firm's ratios of new products and businesses, followed by gaining market share and improving ROI. Capital gains for shareholders ranks at the bottom of the list and is cited by almost none of the managers in Japan as an important goals for their companies. In the United States, in contrast, far most important goals is improving ROI, followed by capital gains for shareholders and gaining market share. European managers show improving ROI, gaining market share, and reformulation of international strategies as three important goals. Capital gains for shareholders is placed tenth on their list.

Hodder and Tschoegl (1992) suggest that discounted cash flow techniques such as net present value and internal rate of return are not widely used within Japanese firms. A more typical approach is to include an imputed interest charge in an investment's projected cash flows. This interest charge is based on the amount of funds the firm has invested and effectively incorporates the time value of money into an investment project's evaluation. Managers with considerable experiences using such a procedure can get a sense of the proposed project's anticipated profitability. Many investments in research and development, manufacturing and marketing are characterized by cash flow estimate which are vague and highly uncertain. Under such circumstances, focusing discussion on the underlying cash flow assumptions may be far more productive than refining the return calculation. This indeed seems to be the emphasis in investment evaluation at most Japanese firms.⁴ Furthermore, they suggest that the difference between typical U.S. discount rates and Japanese implicit interest charges is primarily due to a differing treatment of risk. U.S. discount rates are generally risk adjusted whereas the Japanese implicit interest charges are not adjusted for risk. Japanese managers do consider risk but in a qualitative manner rather than attempting quantitative adjustments to their financial calculations. The Japanese approach avoids the potential problem of discount rates which over-adjustment for risk and may, consequently, explain a large part of Japanese firms' greater willingness to undertake seemingly risky projects.

The U.S. investors are less supportive of investment overall because of its sensitivity to current returns for many established firms' goals that stress current stock price over long-term corporate value.

4 Hodder and Tschoegl (1992) also point out organizational concerns on investment decisions in Japanese firms. Discussion regarding sales forecasts, production cost projections, possible competitor responses, government actions, and so on involve managers from a wide range of functional areas. For major investment, competitor actions are a major concern with this aspects of the analysis having a defensive flavor. The emphasis is on verbal discussions rather than building quantitative models to analyze these issues. Meaningful participation in these discussions by a wide range of managers essentially requires analytical calculations to be relatively simple and clearly understood by all. There is often an inherent tradeoff between the use of sophisticated analytical techniques and the participation level of individuals from diverse backgrounds. Japanese firms have clearly opted for increased participation, except in situation where analytical precision is critical.

The U.S. investors favor those forms of investment for which returns are most readily measurable, reflecting the importance of financial returns and the valuation methods used by investors and managers. This explains why the U.S. firms tend to underinvest in intangible assets, where returns are more difficult to measure. On the other hand, Japanese firms can make continued investment to upgrade capabilities and increase productivity in existing businesses, and enter into new businesses. These qualities, however, also burden on Japan firms. For example, these systems create their own tendency to overinvest in capacity, to proliferate products, and to maintain unprofitable businesses in the name of corporate long-term growth. They also exhibit a slow tendency to redeploy capital out of sluggish businesses and an inability to enter emerging fields rapidly, particularly through startups.

2.2 Lower Cost of Capital

The cost of capital is the return investors expect to receive on a project with uncertain future cash flows. If investors demand this rate, managers must demand the same rate on a given project if they are to serve the investors' best interests. In general, investors will demand a return for a given project equal to the return they could receive on an alternative set of cash flows that carry the same risk. Because stocks traded in capital market represent alternative, easily accessible investment opportunities, prevailing capital market returns are a logical foundation on which to construct an estimate of the cost of capital. Most managers do this by determining how much debt a project can support and, by implication, how much equity capital must be invested. Then the yield to be paid on the debt and the required rate of return on the equity can be combined to estimate the cost of capital.

Although there is a general agreement that the cost of capital should be viewed as an opportunity cost, there are still alternative ways to define it. In general, the proper definition of the cost of capital depends on which of a project's expected cash flows are included among those to be discounted. A common practice in corporate finance is to include all cash flows except tax shields generated by interest deductions, which are determined not by the project, but by how it is financed. The weighted average cost of capital (hereafter, WACC), calculated using the after-tax cost of debt, is designed to capture the

value of these shields in the discount rate rather than in the cash flows.

In the structural explanation for lower return standard of Japanese firms, managers and the stock market in Japan are seen as facing an abundance of promising investment opportunities and acting according by funding them. One reason for the relatively low rate of return has been that Japanese investors enjoy lower costs of capital, making even less promising investment opportunities viable. Lower returns can be accepted because they are still sufficient to cover original capital costs. Since the commonly cited studies employ various definitions of the costs of capital and alternative estimation procedures, it is not possible to compare them perfectly. The common observations indicate that there is less than 2% to over 6% of difference in cost of capital between Japan and the U.S., depending on the definition adopted and the period examined.⁵ Nevertheless, there is no convincing evidence that cost of capital in the U.S. is significantly higher than those in other countries, particularly in Japan during the period 1970 through 1989. Kester and Luehrman (1991) review and evaluate previous studies of cost of capital differences. They conclude that there is no convincing evidence that cost of capital is higher in the U.S. than elsewhere during the 1970s and 80s. More sophisticated studies also reported differences in average cost of capital across countries, but

5 Those studies include Ando and Auerbach (1988a, 1988b, 1990), Bernheim and Shoven (1989), Friend and Tokutsu (1987), Malkiel (1992), McCauley and Zimmer (1989).

Several different approaches are taken to estimate cost of equity. One approach is to capitalize expected future dividends. Friend and Tokutsu (1987) measure and compare the cost of capital in Japan and the U.S. They conclude that the average cost of capital for the period 1962-84 is likely to be lower in Japan than in the U.S., but it is not necessarily the case that the marginal cost differs between them. The combined tax impact on the average cost of capital does not seem to have been markedly different in the two countries.

The other approach bases cost of equity estimate on realized market return, including capital gains as well as dividends. The third approach is to use earnings to price per share ratios as the basis for their cost of equity estimates. This includes Ando and Auerbach (1988, 1990), Bernheim and Shoven (1989), and McCauley and Zimmer (1989).

Ando and Auerbach (1988) use financial statement data for large sample of Japanese and U.S. firms to estimate the return to capital for the period 1967-83. Interpreting these as measure of the cost of capital, they find that the before-tax cost of corporate capital is higher in the U.S. than in Japan. However, market returns in the two countries are much closer during that period. They reject certain factors of explanation for the difference in return, including differences in corporate taxation, differences in borrowing and assets mix.

most still suffer from the following shortcomings: Failure to recognize the interdependency among costs of debt, cost of equity, and capital structure; Inadequate treatment of risk; Country-level measurement errors; Noisy, heteroscedastic data.

As an alternative to the weighted average cost of capital, firms can discount expected future nominal cash flows at a rate that reflects the return on a nominally riskless security and a premium for the riskiness of the cash flows. The first component of the cost of capital, the riskless return, can be compared across countries fairly simply. There is no problem controlling for risk because of comparing riskless securities. There is no mismatch problem and no country-level accounting differences because corporate data is not needed. The nominal riskless rate can be decomposed into a real riskless rate plus a premium for expected inflation. Kester and Luehrman (1989) demonstrate the tendency for real rates to across countries to equalize over time. Using monthly observations from 1976 to 1985, they reject the hypothesis that Japanese rates were consistently lower than the U.S. rates. In their sample, the difference in real riskless rates favors one country as often as the other, and by equal order of magnitude. They conclude that real interest rates and corporate capital cost can differ across countries. However, differences in real rates, regardless of their source, have not been nearly persistent enough to explain consistently lower capital cost in Japan.

The second component of the cost of capital is the premium demanded by investors to compensate them for bearing risk. Differences in the premium demanded by investors in different countries is another potential source of sustained capital cost differences. Studies which have the possibility that the different equity markets do not represent portfolios of comparable risk are problematic. Since financial leverage differs quite significantly across countries, the riskiness of the two samples as selected is likely no well matched. The another factor in capital costs that is reflected in the weighted average cost of capital is the tax advantage associated with corporate borrowing. It should be noted that the tax advantage of borrowing alone could not possibly account for differences in the cost of capital unless the differences in leverage across countries is significant. The value of interest tax shields can not be that large when reflected in the WACC. Hence, even significant differences in corporate leverage are

unlikely to translate into significant differences in capital costs. Since there is significant cross-sectional variation in leverage within both countries, it is quite misleading to employ highly aggregate estimates of leverage to compute WACC for entire manufacturing sectors.⁶ As a consequence, consideration on various factors including real rate, risk premium, and leverage can not support the notion that costs of capital systematically and persistently differ between Japan and the U.S.

Hodder (1991) also emphasizes the special characteristics of the financing practices in Japan. After concluding his review of cost of capital studies by noting the lack of evidence for a consistent systematic advantage for Japanese firms in their risk-adjusted cost of funds from the capital markets, he discusses the nature of the relationship that exists between capital suppliers and users. Hodder argues that the extent of risk in leveraged Japanese firms is overstated because Japanese banks are well positioned to monitor and control their corporate clients as a result of the close and long-term financial relationships that have evolved over time. Even though firms that are able to finance their investment plans through internal capital may be better off in the short run doing so, it can still be sensible over the long run to build reliable relationships with particular financial institutions for those occasions when internal cash flow is no longer sufficient.

Some aspects of the relationship between Japanese banks and its clients have the potential to lower borrowing costs. Most Japanese non-financial firms, maintain main-bank relationships, that is, a long-term relationship with one or two banks characterized by cross-shareholding arrangements, board representation, and alert intervention in the event of financial distress. The bank has extensive, reliable information about the firms and has the capacity to become actively involved if problems arise. This makes it safer to provide capital, which makes it possible to charge less for it. Japanese firms, however, explicitly pay for the benefits provided by their main banks. They

6 Kester (1986) asserts that it can not be generally supportive that Japanese firms are substantially more reliant on debt than the U.S. counterparts. Reliance on book-value, country-wide average capital structure is a serious source of measurement error. Unadjusted accounting data tends to cause measurement error that bias estimate of WACC of Japanese firms downward relative to that of the U.S. The leverage gap close when debt ratios are adjusted for cash, reserves, and differences between market and book values of equity.

consistently award them the largest share of their banking business, and they pay a premium for the loans and services provided by main banks - all of which drives up the cost of what originally appeared to be a cheap loan. In addition to their main-bank relationships, Japanese firms tend to maintain on-going business relationship with other commercial stakeholder such as major customers, suppliers, and so forth. They hold shares of business partners each other and can be viewed in the United States as patient investors who supply cheap capital.

In sum, it is not clear whether Japanese firms enjoy a capital cost advantage over U.S. firms. Several recent trends suggest that whatever advantages may have existed are of declining importance. Financial liberalization, as discussed later, has opened foreign capital markets to Japanese non-financial firms. That many firms are now availing themselves of these opportunities suggests that financial markets are now sufficiently global to have at least partially eliminated national origin as a consideration in direct capital costs. The recent move by Japanese firms toward diversifying sources of funds is also difficult to explain that higher leverage are still a major source of capital cost advantage.

2.3 Long-term Investment Horizon

The theory of efficient markets indicates that, in the absence of private information, stock prices represent the best available estimate of its true value. Market prices incorporate all current public information about future cash flows and the value of individual assets in an unbiased way. Stock prices change in response to new information about individual assets. In fact, the stock price change is the best measure of the managers decision's future impact on the corporation. Nevertheless, to understand investment horizon of firms, one must identify relationships between investors and managers in terms of behavior and incentives that are not captured by the efficient market. Many managers would be in the business of maximizing long-term shareholder wealth as an appropriate goal for corporate management. Yet there seems to be a notable distinction drawn between the goals of maximizing current as opposed to long-term stock prices. Such a distinction probably stems from outside investors not being able to understand certain aspects of the firm as well as managers. Without asymmetric information between investors and

managers, the efficient markets theory suggests that short-and long-term stock price maximization would be one and the same. Any actions of manager that are efficient for long-term value would have an immediate positive effect on the stock price; conversely, any manager's actions that reduce long-run value would have an immediate negative effect on the stock price.

Stock prices cannot reflect perfectly the discounted present value of a firm's estimated future earnings potential because investors must base their decisions on information that managers of firms abridge, fabricate and relay to stock markets. In the presence of informational asymmetry, the goals of maximizing short-run and long-run stock prices can be inconsistent with one another. Managers may be able to raise current stock prices by undertaking certain actions that will reduce long-run value. In such a case, manager faces the dilemma of which shareholders to serve: those who do not plan to hold the stock for the long run versus those who do. As shareholder horizons shorten, it can become more difficult to focus exclusively on maximizing long-term value.

From their better-informed perspective, the investment increases long-term value. On the other hand, because investors are not as well-informed, the investment may lead to a short-run decline in the stock price. The investment decision will therefore depend on how intensely manager is concerned with current stock prices as opposed to long-run value. The conditions can be considered to influence underinvestment caused by stock prices: Managers place some emphasis on current stock prices when evaluating investments; The investment expenditure in question suffers from an informational asymmetry - that is, shareholders are less able than manager to distinguish an expenditure that will yield future returns from one that will not. Stock prices are sensitive to current measures of profitability that are reduced by the investment expenditure in question. When manager is better informed than outside stockholders, it may be able to increase current stock prices by reducing certain invisible investments. This is because less-informed outsiders will interpret the resulting increase in reported earnings as good news about firm profitability (Froot, Perold, and Stein, 1992).

Managers' preferences for short-term vs. long-term stock price maximization are likely to be shaped directly by the preferences of their shareholders. One can imagine that if majority of shareholders in

a given firm are planning to sell their stock in quite short-term, they will be more concerned with near-term price performance, and will do their best to communicate the concern to managers. To the extent manager is responsive to shareholders, it too will become more oriented towards the short-term. Because of the agency relationship between money managers and the beneficial owners of the stock, there can be a distinction between the length of the actual holding period and the length of the performance horizon. Clearly, if an individual investor plans on selling his stock in the short period of time, he will be more interested in the stock price being maximized over that period. But money manager who is subject to quarterly performance evaluation may be much more interested in the stock's movement over the nearer term, even if he is also planning on holding them for that length of period. Thus, even though money managers do not appear to trade much more frequently than the average investors, their interests as agents may be more skewed toward short-term stock price performance. Hence, agency problems may lead money managers to be particularly concerned with short-term stock-price performance.

Table 3
Major Stock Exchanges in Germany, Japan, and the United States

		Frankfurt	New York	Tokyo
Number of Listed Companies	1984	381	1,543	1,455
	1986	404	1,575	1,551
	1988	457	1,681	1,683
	1990	743	1,774	1,752
	1992	766	2,089	1,770
Total Market Value of Stocks (Billion Dollars)	1984	72	1,529	644
	1986	234	2,129	1,794
	1988	222	2,366	3,789
	1990	341	2,692	2,822
	1992	321	3,877	2,320
Trading Value of Stocks (Billion Dollars)	1984	14	764	271
	1986	65	1,374	955
	1988	71	1,356	2,234
	1990	349	1,325	1,303
	1992	300	1,745	475
Turnover Ratios of Stocks (Percentage)	1984	17.2	50.1	47.1
	1986	32.6	68.5	67.2
	1988	32.0	58.0	70.2
	1990	103.7	47.4	38.1
	1992	87.8	45.1	18.0

Note: Dollar amount is computed on the basis of respective foreign exchange rate as of the end of the years.

Source: Tokyo Stock Exchange, *Annual Securities Statistics*, 1985, 1987, 1989, 1991, 1993

Institutional investors now dominate the capital market in the U.S. The investors that make the market are increasingly motivated by short-term considerations, as the high turnover rate of stock indicates. Professional portfolio managers and brokers receive severe pressure to outperform the average and one another in the short term. Motivated by intense short-term performance pressure and by the uncertainty associated with long-term projections, many security analysts and money managers base their decisions on more predictable short-term earnings. The high turnover rate for shares in the market shows the growing influence of short-term forces on the market. The short-term focus of many institutional fund managers worsen this problem. Because of increasing difficulty to predict future corporate performance, fund managers have an understandable tendency to emphasize short-term performance in making investment decisions. In this environment, the market overvalues short-term profits and undervalues the cost of long-term competitive declines. It is difficult to provide statistical evidences to support the notion that institutional investors in the U.S. influence more intense short horizon preferences to corporate managers than do individuals. Probably most relevant for international comparisons, however, is not the distinction between individuals and institutions in the U.S., but rather the fact that no influential U.S. investors exhibit the stable shareholding practices in Germany and Japan. As shown in Table 3, turnover ratios of stock in Japan is comparable to that in the U.S., while the turnover in Germany is substantially higher in 1990s. But it does not suggest that managers in Germany and Japan is subject to the same investors' pressures as the U.S. managers. The distribution of share ownership in Japan is highly concentrated on a large group of stable long-term shareholders like financial institutions and business firms as shown in Table 4 and 5. The average turnover ratios encompass a relatively small group of extremely active traders.⁷

⁷ Germany managers also take a long-term view for several reasons. First, they share the German value which emphasize the firm's enduring importance. Also, they are employed with multi-year contracts usually at the longer end of the legally allowed spectrum-four or five years. This provides them with the time to make longer-term investments and to see them pay out. Of course, it helps managers to be patient when shareholders are also patient. In Germany there are no quarterly reports of earnings and no security analysts. With owners, managers, and other employees all committed to the long term, it is hardly surprising that German directors who represent them also share this time horizon. Directors use their most important power, that is, to grant management contracts creating the longest arrangements allowed by law-up to five years.

Table 4
Stable Shareholding of Public Corporations in Japan
in 1993
(Percentage)

Less than 10%	2.2
10-20%	0.3
20-30%	1.0
30-40%	3.8
40-50%	8.7
50-60%	25.9
60-70%	34.3
70-80%	17.1
More than 80%	6.7

Note: Ratio stands numbers of shares owned by stable shareholders divided by total outstanding shares.

Source: Fuji Research Institute Corporation, *Kigyouzaimu Kenzenka-sokushin Chosakenkyu-Meinbanku-sisutemu ni kansuru Chosa*, (Research on Promotion of Sound Corporate Finance: A Survey of Main Bank System), 1993.

Table 5
Share Ownership of All Listed Firms by Type of Investors in Japan
Five-Year Average
(Percentage of Listed Shares)

	1970-74	1975-79	1980-84	1985-89	1990-92
Government	0.2	0.2	0.2	0.8	0.6
Financial Institutions	34.4	37.6	39.0	44.4	44.8
Banks	n.a.	n.a.	17.7	21.0	21.8
Investment Trusts	1.4	1.8	1.2	2.5	3.3
Annuity Trusts	n.a.	n.a.	0.4	0.9	1.0
Life Insurance	11.2	12.0	12.6	13.2	13.1
Other Insurance	4.6	4.8	4.9	4.3	4.0
Other Institutions	1.8	1.9	2.2	2.4	1.6
Business Corporations	25.6	26.3	26.0	24.6	24.7
Securities Companies	1.4	1.6	1.8	2.3	1.5
Individual & Others	35.2	31.9	27.7	23.5	23.4
Foreigners	3.2	2.4	5.2	4.4	5.0

Source: Zengoku Shoken Torihikisho Kyogikai (The National Conference of Stock Exchanges), *Kabushiki Bunpu Jyokyocho* (Survey on Stock Distribution), 1983, 1986, 1992.

Another influence on manager's horizons for maximizing stock prices is the threat of hostile takeover. The incidence of hostile takeovers differs dramatically between the U.S., and Germany and Japan. The presence of the large groups of stable shareholders is likely to provide less pressure on managers in Germany and Japan to maximize short-term stock prices. Even if takeover pressure really have an adverse impact on certain types of investment, one definitely cannot

conclude that takeovers are harmful on efficiency of firm management. Seen in a broader context, hostile takeovers are one of possible mechanisms of corporate governance. It can be argued that the prominence of hostile takeovers in the U.S. reflects a fundamental failing of other governance mechanisms. Without an active market for corporate control, there might be few restraints on reduction of shareholders' value by managers. Similarly, a lack of takeovers in other countries will be beneficial only to the extent that alternative mechanisms of governance can be effective in exerting a measure of discipline and control over managers (Kojima, 1993).

Stein (1988) examines the above argument that takeover pressure can be damaging because it leads managers to sacrifice long-term wealth in order to boost near-term earnings. If stockholders are imperfectly informed, temporary low earnings may cause the stock to become undervalued, increasing the likelihood of a takeover at an unfavorable price. Hence, managers are concerned with current performance. Takeover pressure and the accompanying threat of being bought out at an undervalued price leads managers to focus more heavily on short-term profits rather than on long-term objectives. If stockholders observe everything that managers do, any policy that management knows is not in the best long-run interest of the firm would lower the stock price. If, on the other hand, stockholders cannot observe management of the firm perfectly and must rely on some imperfect summary statistic such as reported earnings, there is room for the type of costly signalling. Managers might be able to boost the stock price by selling off productive assets whose value shareholders are unable to measure properly. If left unsold, the assets may have little effect on current earnings and may be undervalued by shareholders. Consequently, their sale, which has an immediate impact on the earnings, may cause an upward revaluation of the firm's stock. In the absence of short-term pressure, there is no strong motivation for managers to devote resources to making sure that their stock is never undervalued. After all, the productive assets will eventually start to yield earnings so that the undervaluation will be transient.

If managers attempt to drive up current earnings so as to avoid takeovers at undervalued prices, one must look not only at the extent of takeover pressure but also at the factors that may cause stocks to be undervalued in the first place. Relatively patient stockholders may

not be discouraged by a low earnings report; they may attribute it to a policy of long-term investment by the firm. If patient shareholders are prevailing, low earnings will not lead to a large undervaluation of the stock, and managers will not need to be overly concerned. Impatient shareholders, on the other hand, may become very distressed by low earnings reports and may try to dispose of stocks as soon as such a report is released. If such impatience is widespread, managers will be more fearful of undervaluation and the accompanying possibility of takeover. Hence manager's efforts to boost current earning will be more intense (Stein 1988).

Even if there is considerable pressure on managers to maximize short-term share prices, the view of asymmetric information does not imply that all types of assets will suffer from an underinvestment problem. Bubchuk and Stole (1993) show that observable investments that show up clearly on a balance sheet of firm such as expenditures on new equipment and plants are the least likely to be sacrificed in the quest for higher stock prices. In contrast, the unobservable investments like enhancing human capital and gaining market shares are most likely to under-investment and do not show up in accounting data.⁸ Laffont and Tirole (1988) work in optimal incentive contracts for encouraging managers to work diligently over time. They argue that if investment is invisible, high investment lowering current earnings will be mistaken for low managerial efforts. In order to encourage both efforts and investment in invisible assets, managers is entitled to claim earnings over the period when the outcome of investment realizes in earnings. Hence, it might be optimal to raise barriers to takeovers in order to encourage managers to be long-term stockholders, thereby restraining myopic behavior.

Jacobson and Aaker (1993) find that the Japanese stock market incorporates information earlier than does the U.S. stock market. The finding supports the hypothesis that Japanese investors, who tend to

8 Paul (1993) shows that the strength of the firm's incentive to behave myopically depends on the degree to which the stock market's information about near-term cash flows is a better predictor of the firm's total payoffs than its information about the firm's long-term cash flows. The better the market's information about near-term cash flows is relative to distant cash flows in predicting total firm payoffs, the stronger the firm's incentive to behave myopically. Similarly, when the market's information about the firm's long-term cash flows is better than its information about short-term cash flows in predicting the firm's total payoffs, the firm will overemphasize long-term cash flows.

have close business relationships with the firm they invest in, are better informed than their U.S. counterparts. Greater asymmetry of information with respect to long-term performance induce investors in U.S. stock market to attach greater importance to current performance than Japanese counterparts. This, in turn, induces incentives for U.S. managers to have a short horizon. On the other hand, investors in Japan and Germany may be better informed of long-term business prospects than those in the U.S. and, therefore, place less emphasis on short-term performance.

Stein (1989) shows that in the presence of asymmetric information, managers can end up having a higher discount rate than justified by cost of capital and so unduly lower the value of investments with long-term returns. Since stock market uses current performance as indicators of future ones, managers typically have incentives to artificially accentuate current-term results in order to enhance current stock price. An important factor giving rise to short-term horizon on managers involves the ability of managers to shift earnings from a future period without being noticed by outside investors. The greater the information gaps between managers and outside investors, the greater the opportunity for managers to raise current stock price by artificially accentuating current results at the expense of long-term performance.

Jacobson and Aaker (1993) find that the ratio of the effect of future-term to current-term performance on stock returns is greater for the Japanese stock market than for the U.S. one. Then, this is consistent with the hypothesis that Japanese investors are better informed than their U.S. counterparts. This result may be attributed to the fact that a significant proportion of investors in Japanese stock market have close and long-term business relationship with the firm they invest in, which may facilitate them to access to information that makes them more aware of long-term business prospects than their U.S. counterparts. As a result, Japanese stock prices incorporate information about long-term performance earlier than do U.S. stock prices. U.S. stock price tend to react more to current results because, lacking of information about future prospects, this information has not already been incorporated into the stock price.

Table 6
Cross-shareholdings of Major Keiretsu in Japan
(Percentage)

	1970	1975	1981	1985	1989	1992
Mitsui	21.32	21.17	23.13	21.61	19.46	19.29
Mitsubishi	26.78	30.26	36.93	36.94	35.45	38.21
Sumitomo	28.94	29.58	36.57	29.68	27.46	27.95
Fuyo	16.04	18.28	18.80	17.36	16.39	16.88
Sanwa	12.50	20.30	19.95	18.03	16.45	16.68
Dai-ichi Kangin	24.51	23.77	17.50	16.78	14.60	14.24

Note: Ratio stands average ratio of the group, which is numbers of shares owned by firms in the group divided by total outstanding shares.

Source: Fair Trade Commission, *Kigyo-syudan no Jittai ni tuite*, (A Survey on Corporate Groups), 1992, 1994.

Table 7
Dispatched Directors of Major Keiretsu in Japan
(Percentage)

	1977	1981	1987	1989	1992
Mitsui	47.83 (47.83)	47.83 (39.13)	45.83 (41.66)	41.66 (37.50)	34.62 (26.92)
Mitsubishi	92.86 (71.43)	96.55 (85.71)	96.55 (86.21)	96.55 (75.86)	100.0 (79.31)
Sumitomo	66.67 (52.38)	71.43 (52.38)	50.00 (40.00)	50.00 (35.00)	50.00 (20.00)
Fuyo	58.62 (51.72)	62.07 (55.17)	68.97 (58.62)	44.83 (37.93)	48.28 (37.93)
Sanwa	61.11 (41.67)	67.50 (50.00)	68.18 (50.00)	68.18 (54.54)	70.45 (52.27)
Dai-ichi Kangin	57.78 (51.11)	73.33 (68.89)	76.60 (70.21)	72.34 (63.83)	56.25 (31.25)

Note: Ratio stands numbers of firms which have directors dispatched from the belonged group divided by the total numbers of firms in the group. The ratio in the parenthesis stands numbers of firms which have dispatched directors from the bank in the group divided by the total numbers of firms in the group.

Source: Fair Trade Commission, *Kigyo-syudan no Jittai ni tuite*, (A Survey on Corporate Groups), 1992.

For Japanese firms cross-shareholdings and access to information is particularly prevalent among firms in *keiretsu*. As shown Table 6, the firms in the six Japanese major keiretsu hold 14% to 38% of the total shares in the group. Table 7 indicates that large proportion of keiretsu firms have directors on their board dispatched from the belonged group, particularly banks. Moreover, they have close trade

relationships with firms in the group as shown in Table 8. Cross-shareholdings, interlocking directors, and intragroup trade relationships which strengthen the relationships in keiretsu facilitate the firm in the group to access and exchange information about the performances of firms. These consideration suggest that Japanese managers will be less inclined to undertake myopic behaviors designed to enhance current performance. Since Japanese investors are more aware of the long-term implications of current manager's actions, Japanese managers will find it more difficult to take advantage of information over market investors by inflating current earnings. Investors in Japan are in a better position to distinguish between earnings increases coming at the expense of future profits from those truly depicting increased future profits. Therefore, Japanese managers will be more reluctant to take myopic behavior than their U.S. counterparts.

Table 8
Intragroup Trade Relationships of Major Keiretsu in Japan
(Percentage)

	1989	1992
Mitsui	45.26	44.16
Mitsubishi	51.33	51.67
Sumitomo	64.17	60.83
Fuyo	30.83	29.33
Sanwa	30.91	27.63
Dai-ichi Kangin	34.45	32.84

Note: Ratio stands numbers of firms which have trade relationships with firms in the group divided by the total number of firms which are possible to have those in the group.

Source: Fair Trade Commission, *Kigyo-syudan no Jittai ni tuite*, (A Survey on Corporate Groups), 1994.

The greater conflict between shareholders and debtholders, the higher may be the required interest payment, and the higher will be the firm's cost of capital. With a higher cost of capital, total investment will be less, and the firm's investment horizon will be shorter. Thus, a firm with a greater disparity of shareholder and debtor interests, and therefore a greater potential equity and debtholder conflict, may be in

a short-term horizon. Debtholder-shareholder conflicts may also affect the composition of firm's funding, since they will raise the marginal cost of external funds to the corporation relative to internally generated funds. Thus, firms with a greater capacity to generate funds internally will have a lower cost of capital and can be expected to invest more than would firms with less access to internal funds. Consequently, such firms will also be more willing to undertake longer-term investment projects. In addition, firms that must rely more on external funds may prefer to obtain these funds from financial intermediaries: financial intermediaries utilize more efficient methods to monitor managers, which makes the cost of funds relatively lower. The relationship between Japanese banks and their client firms have the effects on investment horizons. Most Japanese industrial firms maintain main bank relationships.⁹ The bank has extensive, reliable information about the client firms and, further, has the capacity to become actively involved when problems arise. This makes it safer to provide capital, which makes it possible to change less for it.

In countries with more developed capital markets, like the United States, shareholders and debtholders often have even less of a long-term commitment to firms because it is relatively inexpensive for them to dispose of their claims in highly liquid capital asset markets. In the United States the control costs associated with widely dispersed ownership and debtholdings would be expected to be relatively high. This, together with the existence of highly liquid capital assets markets, may increase the information asymmetry that exists between managers, and debtholders and shareholders. This view leads naturally to the conclusion that corporate myopia would be reduced if ownership of firms were more concentrated. Huddart (1993) shows that only concentrated share ownership will be able to induce shareholders to monitor. Effective monitoring of management by shareholders is a public good whose costs are privately incurred. Underinvestment in monitoring results from the inability to locate the costs and benefits of supervision in a single individual. A shareholder who owns more than a threshold amount of stock has an incentive to monitor the manager. Shareholders who owns less than the threshold choose to delegate the

9 The large scale questionnaire survey provide the evidence that more than 98 percents of public corporations in Japan have main bank relationships (Fuji Research Institute Corporation, 1993).

tasks of monitoring and setting managerial compensation to the major shareholder. When the major shareholder controls both the manager's compensation and the intensity of monitoring, incentives imposed on the manager increase in the concentration of share ownership influences the value of a corporation. It predicts that stock prices increase in the concentration of stock ownership. Hence, large stockholders would have a greater incentive to obtain relevant information, and the cost of acquiring such information would be less. The benefits of having better information also would be more concentrated. In addition, disposing of large blocks of claims in stock markets would be more costly, so that there would be tendency toward attempting to influence management directly, rather than simply selling the firm's stock (Edwards and Eisenbeis 1991). The distribution of share ownership in Japan is highly concentrated on a large group of stable long-term shareholders like financial institutions and business firms as shown previously in Table 4 and 5. Large shareholders have incentives to collect information about firms they own through close and on-going business relationships.

2.4 Highly Leveraged Capital Structure

A frequently mentioned characteristic of Japanese firms is a high degree of financial leverage. This characterization is supported the figures in Table 9, where the debt-equity ratios for Japanese firms are higher than those for the U.S. Japanese firms have relied substantially more on debt than either U.S. or German counterparts, especially during the rapid growth period of the Japanese economy. External funding of Japanese firms also comes more from short-term credit, primarily from banks, than does German and U.S. firms. Debt-equity ratios for Japanese firms are calculated on reported book values for shareholders' equity. Frequently, book values dramatically understate the true equity value for Japanese firms because of "unrealized assets." There are also differences in accounting practices between the U.S. and Japan. In terms of unrealized assets, land as well as shareholdings in other firms are evaluated at acquisition value rather than current market value; for many Japanese firms, the difference is very large. Several studies adjusting for the difference, suggest that Japanese firms have been substantially less levered than indicated by book value ratios, but remains higher leverage at market value than

that in the U.S.¹⁰ Furthermore, the studies confirm that leverage has been declining dramatically.

Table 9
Capital Structure: Debt-Equity Ratio of
Manufacturing Firms in Germany, Japan, and the United States
Five-Year Average
(Percentage)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-91
Germany	139.48	152.84	196.94	226.08	238.41	248.25	259.79
Japan	236.36	309.91	409.74	460.37	310.72	204.70	172.51
U.S.A.	55.76	73.45	88.24	90.56	105.13	133.62	149.08

Source: The Bank of Japan, *Comparative Economic and Financial Statistics: Japan and Other Countries*, 1974, 1978, 1986, 1993, 1994.

Source Note: Statistisches Bundesamt, *Unternehmen und Arbeitsstätten*, The Bank of Japan, *Syuyokigyo Keieibunseki* (Business Analysis on Main Enterprises in Japan), The U.S. Department of Commerce, *Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations*.

Note: Book values of assets in Japanese firms differs greatly from current values because face values are much lower than market values.

This highly leveraged capital structure gives Japanese firms several important advantages. First, by substituting debt for higher cost equity, it lowers the after-tax cost of capital. Second, as financial leverage grows, a firm's net income spreads over a relatively smaller equity base, thus increasing the return on equity assuming the return on total capital is greater than the after-tax interest rate on debt. The more leveraged a firm is, the lower the return on total capital it needs to yield a given return on equity. Third, the higher a firm's financial leverage, the faster the rate of growth it can finance at a given return-on-investment level. More debt not only directly adds to capital but

10 Borio (1990) compares leverage and financial patterns for the Group of Seven with several ways of estimation. The overall distinction between high and low-leverage countries is essentially confirmed by estimates of gross leverage at market value. Leverage at market value is significantly lower than at book value in Japan. Leverage in Japan remains higher at market value than that in the U.S. Kester (1986) finds no significant country difference in leverage when equity was measured on a market-value basis and company-specific factors such as growth, profitability, risk, size, and industry are considered. Significantly higher leverage of Japanese firms are found when equity is measured on a book-value basis. However, stratifying the sample by industry reveals that even this result is concentrated among mature, capital-intensive industries.

also supports a higher rate of sustained growth because each dollar of income retained creates a proportionally larger debt capacity. So Japanese manufacturer can grow faster than its U.S. counterparts at lower operating margins. Of course, these advantages are not without costs. Increasing financial leverage raises the cyclical volatility of earnings. And unless management compensates by reducing operating risk, the firm's total risk will rise. But Japanese firms reduce the risks of high leverage through close relationships with their banks (Ellsworth 1985).

However, financial leverage has changed dramatically for firms in both the U.S. and Japan over the 1980s. In the U.S., there has been a notable decline in shareholders' equity as a percentage of total assets largely due to debt-equity substitution through leveraged buy-outs, mergers and share repurchases. In contrast, the equity-asset ratio for Japanese firms has grown substantially in the late 1980s, the leverage has decreased. As Japan has moved into a period of slower growth, reliance on external funding sources, particularly bank loans has declined relative to internal funding. Although loans continued to fund a very large fraction of assets growth after the mid-1970s, the dramatic slowing of that growth meant a weakened demand for bank loans. This trend toward lessened dependence on the banking loans gained further momentum during the 1985-1989 period as market-based funding began to play a larger role in Japanese corporate finance.

Another notable characteristic of Japanese firms can be observed in Table 10 that the relatively heavy reliance on financing by short-term debt and account payable. The percentage of short-term debt has declined but still is higher than those of Germany and the U.S. Furthermore, short-term debt plus trade payable has been more than the long-term debt for Japanese firms. The situation for U.S. manufactures is basically the reverse, with much greater reliance on long-term and a relatively modest dependence on trade payable. In other words, Japanese firms have not only tended to borrow more but have also relied much more heavily on short-term funding sources such as bank loans than their U.S. counterparts. German manufacturing firms depend on account payable and long-term debt than short-term debt. Particularly, the percentage of account payable is much higher than those in other two countries. Most of the short-term debt of Japanese firms is supplied by banks in the form of promissory notes with ninety to one-hundreds twenty days maturity. These notes are generally

Table 10
Balance Sheets of Manufacturing Firms in Germany, Japan, and the United States
Five-Year Average
(Percentage)

Germany							
	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-91
Assets							
Cash and Equivalents	11.0	10.4	10.5	13.5	13.3	16.9	13.9
Account Receivables	16.4	17.6	20.2	21.3	22.8	24.3	24.8
Inventories	22.6	21.0	22.4	25.2	26.3	23.6	23.6
Tangible Fixed Assets	41.7	39.0	32.8	26.1	22.7	21.1	20.5
Liabilities	58.2	61.0	67.2	69.3	70.7	71.2	72.2
Account Payables	22.9	24.0	26.6	29.2	30.0	28.6	28.8
Short-Term Debt	3.3	4.0	4.0	2.9	3.6	4.3	4.7
Long-Term Debt	23.2	24.7	26.3	25.7	23.7	20.9	19.9
Stockholder's Equity	41.8	39.0	32.8	30.7	29.3	28.8	27.8
Stock	21.6	20.3	16.7	14.8	13.3	12.0	11.3
Japan							
	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-91
Assets							
Cash and Equivalents	10.7	12.8	13.8	14.8	15.3	19.3	17.7
Account Receivables	19.3	25.3	23.4	22.7	23.1	21.7	21.6
Inventories	17.7	15.5	16.7	18.3	18.9	13.6	12.4
Tangible Fixed Assets	34.6	37.4	30.2	26.8	25.1	25.7	25.7
Liabilities	70.2	75.5	80.2	82.1	75.4	67.0	63.3
Account Payables	16.2	18.5	19.0	18.7	19.7	16.3	15.6
Short-Term Debt	18.5	18.7	16.8	18.0	17.0	14.0	9.7
Long-Term Debt	22.3	26.0	28.8	27.7	21.9	22.0	23.6
Stockholder's Equity	29.8	24.5	19.8	17.9	24.6	33.0	36.7
Stock	16.8	13.6	8.6	6.7	6.0	7.5	8.5
U.S.A.							
	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-91
Assets							
Cash and Equivalents	10.2	7.1	5.8	6.9	5.5	5.7	4.6
Account Receivables	16.7	17.6	17.6	16.4	15.5	14.8	13.6
Inventories	23.3	23.7	22.7	20.9	18.3	15.5	14.1
Tangible Fixed Assets	38.7	39.5	38.1	35.2	38.2	35.1	33.6
Liabilities	35.8	42.3	46.9	47.5	51.2	57.1	59.9
Account Payables	9.2	9.7	9.4	9.1	9.2	8.2	7.8
Short-Term Debt	2.8	3.8	4.3	3.3	3.7	3.8	4.2
Long-Term Debt	14.3	18.3	22.2	22.9	25.1	31.0	34.4
Stockholder's Equity	64.2	57.7	53.1	52.5	48.8	42.8	40.2
Stock	25.3	20.1	17.5	15.0	12.5	12.0	12.1

Source: The Bank of Japan, *Comparative Economic and Financial Statistics: Japan and Other Countries*, 1974, 1978, 1986, 1993, 1994.

Source Note: Statistisches Bundesamt, *Unternehmen und Arbeitsstätten*, The Bank of Japan, *Syuyokigyo Keieibunseki* (Business Analysis on Main Enterprises in Japan), The U.S. Department of Commerce, *Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations*

Note: Book values of assets in Japanese firms differs greatly from current values because face values are much lower than market values.

rolled over continually for a period of years.

Borio (1990) examines the effects of tax factors on capital structure in several countries. The relevance of the tax system can in principle be measured by considering what is the after-tax income stream that investors receives depending on the form of distribution, that is capital gains, dividends, or interest payments. On the basis of representative statutory income tax rates, there is not significant differences in ranking of sources of funds among those countries in the period considered. Borrowing is superior to all equity forms and retained earnings dominates new stock issues. Germany is exceptional, because for income tax reasons alone investors would be indifferent between borrowing and new issues while retained earnings would be inferior to both. Neither of these findings is consistent with the relatively heavy reliance on retained earnings in all countries.¹¹ He concludes that on balance tax factors alone are not the overriding element accounting for choice of financial patterns.

The institutional impediments to external financing in countries with high leverage can be an important factor to explain. Disclosure standards and insider-trading registration have generally been less stringent in Japan and Germany than the U.S. Similarly, traditional institutional investors like pension funds have not been present in Germany. Although it is appealing, this explanation can only be a partial one. The combination of relatively inactive capital markets with the predominant role of financial institutions in high leverage countries may go some way towards explaining their comparatively higher debt capacity. He points out that concentration of debt can favor leverage in at least two ways. First, it may help to resolve financial distress as it tends to limit free-riding opportunities. Individual bond holders would have little incentive to accept a reduction in their contractual claims

11 Myer (1984) argues for the pecking order theory of capital structure. He suggests that capital structure has a dynamic feature driven by a firm's need for external funds and their relative cost. According to this theory, firms prefer to finance investment projects with internal funds. When external funds are needed, additional borrowing is preferred to new equity issues as long as the default premium implicit in interest rates on added debt is not too great. The pecking order theory treats equity issues as an expensive funding source because of an asymmetric information problem. One interpretation is that managers view selling equity as unattractive when they feel shares are underpriced and vice versa when they feel shares are overpriced. Although an equity issue could be promoted by a need to fund desirable investment projects, potential purchasers have difficulty identifying the true motivation for stock issues and will seek to protect themselves against overpriced issues. Consequently, shares which are issued to finance desirable new investment projects will tend to be undervalued and represent a relatively expensive funding source.

because the outcome of the negotiations would tend to be perceived as independent of their individual decisions while organizing joint action would be costly. Debt concentration may therefore reduce the expected costs of financial distress. Second, high concentration, particularly in non-marketable claims, tends to promote longer-term relationships between borrower and lender which, by enhancing information flows, can make the financial institutions more tolerant of leverage. Evidence from Japan suggests that debt concentration has been relatively high with main bank providing substantial proportion of loans. Debt concentration and long-term relationships in favoring debt capacity is particularly notable in the case of smaller firm which are generally more leveraged. And these are precisely the firm which, as a lack of information, cannot normally have access to capital markets and tend to rely on loans from financial intermediaries, while well-established firms with good reputation can borrow from bond markets at a lower cost than from financial institutions.

Financial institutions may hold equity and debt at the same time. Besides strengthening the long-term relationship between the financial institutions and the firm, the simultaneous holding of debt and equity clearly reduces the scope for conflict between stockholders and debtholders over the choice of policies, particularly in situation of financial distress. Therefore, it facilitates more leverage. In Germany and Japan, banks own a significant proportion of client firm's equity. In Germany banks directly own substantial proportion of non-financial firm's equity. Moreover, over majority of total shares are held in their custody and they may exercise proxies at the shareholder's meeting with the consent of real stockholders. On the other hand, the U.S. banks are prohibited from owning equity and are almost impossible to make any coordinating effort to reconcile conflict between stockholders and debtholders.

It is also instructive to examine figures on funding sources for Germany, Japan, the U.S. Table 11 presents comparative data on net sources of funds for manufacturing firms in each country during the period of 1975 through 1990. Japanese firms relied, on the net, more on internal funding sources such as depreciation and retained earnings than their U.S. counterparts during that period. This fact could not be consistent with the view that Japanese firms depend more on external financing, the most of which has come in the form of bank loans.

Table 11
Net Sources of Funds for
Manufacturing Firms in Germany, Japan, and the United States
Five-Year Average
(Percentage)

	Germany			
	1975-79	1980-84	1985-89	1990
Internal Funds	80.4	92.3	97.4	78.1
Retained Profits	26.5	31.3	40.3	23.6
Depreciation	50.4	56.3	55.8	51.6
Stock Issues	n.a.	4.7	1.2	3.0
Debts	19.6	7.7	2.6	21.9
Bonds	n.a.	-1.0	0.1	-0.1
Loans	4.9	4.4	-1.8	0.8
Trade Payable	n.a.	6.3	-3.0	12.3
Others	13.2	2.5	7.4	9.0
	Japan			
	1975-79	1980-84	1985-89	1990-91
Internal Funds	68.8	71.7	103.3	69.0
Retained Profits	15.8	17.7	22.8	20.0
Depreciation	44.7	40.0	58.4	43.7
Stock Issues	8.3	11.9	22.1	5.3
Debts	31.2	28.3	-3.3	31.1
Bonds	4.0	6.7	24.8	19.7
Loans	9.7	6.3	-18.5	11.5
Trade Payable	11.5	7.8	-9.7	-1.4
Others				
	U.S.A.			
	1975-79	1980-84	1985-89	1990-91
Internal Funds	62.8	64.5	53.3	73.6
Retained Profits	25.9	16.5	3.1	2.7
Depreciation	31.8	39.6	45.5	57.3
Stock Issues	5.1	8.3	4.7	13.7
Debts	37.2	35.5	46.7	26.4
Bonds	10.1	7.6	17.2	6.6
Loans	2.0	6.9	12.1	3.4
Trade Payable	7.4	3.2	2.2	2.1
Others	17.7	17.7	15.2	14.4

Source: The Bank of Japan, *Comparative Economic and Financial Statistics: Japan and Other Countries*, 1978, 1986, 1990, 1993, 1994.

Source Note: Statistisches Bundesamt, *Unternehmen und Arbeitsstätten*, The Bank of Japan, *Syuyokigyo Keieibunseki* (Business Analysis on Main Enterprises in Japan), The U.S. Department of Commerce, *Quarterly Financial Report for Manufacturing, Mining, and Trade Corporations*.

Furthermore, proportion of stock issues for Japanese firms have risen and is higher than those in Germany and the U.S. These figures are average ones and some firms, particularly, large firms with superior market access have obtained a substantially larger fraction of their funding in recent years from bonds and stock issues as shown in Table 12. Consequently, these large firms have recently become much less dependent on bank loans than their smaller counterparts. In contrast, small and medium size firms rely heavily on bank loans for source of funds.

Table 12
External Sources of Funds by Size of Firm in Japan
(Percentage)

	1975	1980	1985	1990
Loans				
Large Firms	73.6	69.8	21.4	67.2
Small and Medium Firms	91.2	89.2	97.1	94.2
Bonds				
Large Firms	16.3	6.3	38.6	13.1
Small and Medium Firms	0.1	0.1	0.2	0.3
Stock Issues				
Large Firms	10.1	23.9	40.0	19.7
Small and Medium Firms	8.8	10.8	2.7	5.5

Source: Economic Planning Agency, *Keizai Hakusho*, 1992 (Economic Survey of Japan, 1992).

Source Note: Ministry of Finance, *Houjinkigyō Toukei Nenpō* (Annual Statistics of Corporations), 1975, 1980, 1985, 1990.

Note: Size of firms is based on their stocks. Large firms have more than 1 billion yen value of stocks.

Historical dependence on bank loan for external funding in Japanese firms has been due to regulatory constraints. During the period of 1970s, government restrictions on corporate borrowing and equity offerings abroad were severe. Japanese firms were restricted to domestic funding sources with limited exceptions. At the same time, the banks tightly controlled access to the corporate bond market and imposed cumbersome and relatively expensive insurance procedures. The commercial paper market did not exist until 1987, and equity issues were not generally attractive for a variety of reasons. As the government relaxed restrictions during the 1980s on offshore funding, bond floatation, commercial paper issuance, and so forth, Japanese firms progressively shifted towards market funding sources as shown in Table 13 and 14. Substantial amount of funds is financed through convertible bonds and warrant bonds both in domestic and offshore markets through 1985 to 1993.

Table 13
Direct Financing of Public Firms in Japan
Five-Year Average
(Billion yen)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-93
Stock Issues							
No. of Cases	3,014	1,366	2,342	1,623	1,227	2,106	1,356
Amounts	2,673	1,352	3,743	4,463	6,173	18,376	5,843
Straight Bonds							
Domestic							
No. of Cases	1,689	2,172	1,304	884	427	171	287
Amounts	953	2,187	3,598	6,152	4,275	3,478	10,721
Overseas							
No. of Cases	8	8	10	155	240	455	754
Amounts	17	109	55	988	1,848	5,785	11,775
Convertible Bonds							
Domestic							
No. of Cases	3	3	237	153	272	1,227	317
Amounts	1	15	1,106	1,246	2,951	23,360	5,923
Overseas							
No. of Cases	15	9	9	230	575	529	156
Amounts	61	52	46	1,456	4,364	5,311	1,761
Warrants Bonds							
Domestic							
No. of Cases	n.a.	n.a.	n.a.	n.a.	16	26	35
Amounts	n.a.	n.a.	n.a.	n.a.	87	544	1,307
Overseas							
No. of Cases	n.a.	n.a.	n.a.	n.a.	81	983	704
Amounts	n.a.	n.a.	n.a.	n.a.	678	18,934	10,377
Sub-Total of Bonds							
Domestic							
No. of Cases	1,692	2,175	1,541	1,037	715	1,424	639
Amounts	954	2,202	4,704	7,397	7,763	27,382	17,950
Overseas							
No. of Cases	23	17	19	385	896	1,967	1,614
Amounts	78	160	101	2,444	6,890	30,030	23,913
Grand Total							
No. of Cases	4,729	3,558	3,902	3,045	2,838	5,497	3,609
Amounts	3,704	3,715	8,548	14,303	20,826	75,788	47,705

Sources: Tokyo Stock Exchange, *Annual Securities Statistics*, 1993.

3. Structural Shifts

3.1 Financial Emancipation

Table 10 indicates that liquidity in the form of cash and marketable securities for Japanese firms has been increasing. Furthermore, Japanese firms have almost 4 times more cash and equivalents than U.S. firms. Historically, a substantial portion of cash

positions at Japanese firms represented compensation balances on commercial loans. However, the use of compensation balances has decreased during the 1980s as Japanese lenders have moved toward market-rate loans and fee-based services. Much of this liquidity increase occurred during the second half of the 1980s in parallel with expansion of money supply, lower interest rates, rising real estates prices in Japan.

Paralleling the liberalization of Japanese corporate finance has been a dramatic buildup of financial slack on Japanese corporate balance sheets. During the high-growth period, Japanese firms were confronted with a volume of attractive investment opportunities that vastly exceeded their cash flow and the amount of funds most firms could reasonably expect to raise externally. Throughout this period, Japanese firms raised the cash necessary to fund the approved projects securing a sufficient volume of external finance. Minimizing capital costs was a distant secondary concern to most of them. For all practical purposes, there are only two major sources of external funds: collateralized loans and trade credit. These, in turn, were supplied by essentially the same institutions-banks and major suppliers-stakeholder that were also major shareholders in their firms. These stakeholder monitored client firms closely, even to the point of occasionally injecting new management to ensure an efficient deployment of scarce funds. Thus high growth, the rigors of competition at home and abroad, the heavy use of debt and trade credit, and the ownership of these claims by institutional shareholders that monitored performance closely were sufficient to ensure the deployment of cash in a pattern consistent with the priorities of the suppliers of capital.

Although double-digit real growth in Japan had begun to wane even prior to 1973, the oil shock produced a sudden and dramatic reduction in Japanese economic growth. The joint effect of investment reduction and cost improvement was to lessen gradually the external capital needs of the firms. Large Japanese firms were using their enormous cash flow during this period to repay debt and build up liquid assets on the balance sheet rather than to increase dividends for shareholders. As a consequence, Japanese firms have accumulated considerable financial slack in the form of unused debt capacity and temporary investments in marketable securities. The net debt-equity ratio of Japanese large firms has declined more or less steadily since

1980. The buildup of financial slack on balance sheets, the persistence of excess cash flow throughout the 1980s, and gradual financial deregulation have led to a kind of financial emancipation of Japanese non-financial firms from their traditional lenders.

Close and stable relationships between non-financial firms and banks have been essential elements of Japanese corporate finance. As such, they have contributed significantly to the mitigation of takeover activity in Japanese capital market. Today, however, this stability is being shaken by two major changes in the world of finance: the buildup of financial slacks on balance sheets in Japanese firms and the globalization and deregulation of the Japanese financial system. The former change is altering the nature of business that banks execute with their major industrial clients and generally weakening bank control over these firms. Concurrently, the latter change is causing banks and other institutional owners of equity to demand greater returns on their holdings of client-firm stock. Together these trends are evoking a creeping instability in close financial relationships (Kester 1991).

Japanese firms, particularly large firms have been in abundance of liquidity found on most of their balance sheets in recent years. It is no more coincidence that this period of abundance has also been accompanied by weakening firm-bank relationships. The increased availability of internally generated cash to fund projects has reduced the need to raise funds externally, thus diminishing the financial dependence of non-financial firms on bank. In addition, the growth and gradual deregulation of capital markets at home and the opening of capital markets abroad have distanced Japanese non-financial firms still further from banks. There is a hidden cost to the financial emancipation of past success, however. In the absence of the discipline exerted by capital market, Japanese managers now find themselves with far greater discretion in the allocation of corporate resources than ever before. Since firms are unwilling to breach long-standing implicit contracts with key stakeholder, especially long-term employment relationships, and unable to execute past strategies of simply growing themselves out of their current situations, they hold the direction to sustain marginal businesses and retain unrelated diversification. Thus, the free cash flow of these corporations may be reallocated from shareholders to other stakeholder, primarily

employees. Despite the low priority traditionally accorded to shareholders in Japan, it is unlikely this trend can continue for long. One byproduct of the increasingly global market in which Japanese financial institutions must compete, and of their weakening relationship with industrial clients, has been a growing concern for obtaining higher direct returns on their equity investments.

Japanese firms moved quickly to raise capital outside Japan as soon as Japan's Foreign Exchange Control Law was relaxed in 1980. Total funds raised by Japanese firms in overseas markets leaped from an average of about 2 trillion yen per year in the period of 1975 through 1979 to 30 trillion yen per year in that of 1985 through 1989 (see Table 13). Most of the funds raised outside of Japan were used to repay domestic borrowing. Thus by the late 1980s, Japanese firms had already dramatically restructured their liabilities, substituting cheaper foreign capital for local financing.¹²

Although borrowing continued shrink as a significant proportion of total funds raised, bank loans have continued to dominate security financing in domestic markets. Moreover, lending practices began to change in the wake of overseas financing by Japanese firms and the continued relaxation of domestic financial market regulation. Continued growth in the certificate deposits market and the introduction of large-denomination money market certificated in 1985 contributed to greater variability in banks' cost of funds. The introduction of a commercial paper market in 1987 provided another viable alternative for large firms in search of short-term funds and further reduced the dependence of corporation on banks. For all practical purposes, lending to large firms has ceased to be growth business for Japan's major banks.

Over the past two decades, capital market liberalization in Japan has made available financial instruments not previously available to

12 Financial regulations in Japan skewed finance into banks, by suppressing a bond market through collateralization and insurance standards, holding down deposit interest rates so that banks could lend at low rate and still profit, and suppressing competing financial sources such as equity issuance, thereby channeling saving into bank. Today, when firms place debt securities, they usually need banks as their bond trustees.

Post-war Japan had two offsetting regulatory sets. One set segmented finance, but not as severely as in the U.S.; bank could be large and active, but could not have securities, insurance or very large blockholding activities. But another set channelled finance through banks: depositors had few options other than banks, and large corporate borrowers had few non-bank financing sources.

corporate borrowers. Firms are now free to raise investment funds through a variety of equity, bond, and hybrid instruments, and in both domestic and overseas markets. Many large Japanese firms have taken advantage of these opportunities, and the results has been a substantial decline in the proportion of external corporate capital coming from traditional sources such as long-term debt. With the decreasing proportion of total capital allocation channeled through the traditional prime rate system, the Ministry of Finance and the Bank of Japan are no longer able to exercise the same degree of control over financial markets that they once could. It is also true that, with the new reliance on securities-based finance, major securities firms are now more important in financial markets than in the past. Furthermore, even as banks and other financial institutions account for an increasing share of securities-based capital, the ability of highly profitable non-financial firms to fund their investments through retained earnings has reduced their overall external capital dependency and shifted the balance of bargaining power with financial institutions in their direction.

Whereas most non-financial firms indicated that their corporate plans and investments were closely examined by banks during the 1950-80 period, none reported being subjected to such scrutiny today. Although meeting with banks are still held semiannually or at least annually to discuss performance, these have apparently evolved into largely perfunctory presentations of past performance rather than substantive discussions of future capital investment. Banks are now more interested in tracking the overall return earned on their total investment in client firms rather than monitoring and influencing managerial decision making. The exchange of information historically fostered by placing retiring bank officers in senior management positions at client firms also appears to be waning. Major banks have begun to experience difficulties in placing retiring employees in second careers.

As constraints on corporate finance relax and capital and financial markets deregulate in Japan, competition among banks has further weakened traditional firm-bank relationships. The securitization of Japanese corporate finance had made financing increasingly price-sensitive transactions in which past relationships count for little. A firm's main bank may win a mandate to lead-manage a deal, but only if it offers a better idea or a competitive quote. Nonetheless, although

Japanese non-financial corporations may be distancing themselves from banks, Japanese banks and other financial institutions still own considerable fractions of these firms' outstanding shares. However diminished the need by industrial corporations for a close banking relationship, Japanese banks will maintain that strong relationships with their industrial clients which are still central to the success of their institutions. Even though large industrial firms no longer rely heavily on intermediated credit to meet financing needs, financial institutions still look to these firms for access to affiliated middle-market firms of commercial lending, access to employees for retail banking and insurance underwriting, and as customers for new products and service offered on a fee basis (Kester 1991).

3.2 Financial Liberalization and Debt Issuing

It is clear that the ongoing financial liberalization in Japan has been important effects on corporate financing practices. In some respects, financial liberalization has been taking place since the 1960s; however, the process accelerated dramatically in the 1980s. The revised Foreign Exchange and Foreign Trade Control Law in 1980 removed major impediments to offshore financing by Japanese firms and improved access by foreigners to Japanese financial markets. Beginning around 1984, the liberalization process accelerated with a number of regulatory changes which were at least partially in response to external pressure for greater openness of Japanese financial markets. Since then a stream of regulatory changes have eliminated a variety of interest rate restrictions, allowed trading in new types of securities, relaxed controls on both domestic and foreign financial institutions, and generally promoted freer and more flexible financial markets. However, some regulations and practices which cause distortions and result in unusual financing patterns still remain. The elimination of one restrictive regulation results in a "regulatory arbitrage" opportunity with market participants using their increased freedom to profitably exploit another, still-existing regulation. This continues until the consequent pressure on the second restriction forces its elimination or modification. Consequently, the liberalization process tends to produce windows of opportunity permitting firms to earn additional profits by exploiting regulatory differences (Hodder and Tschoegl, 1992).

Table 14
Direct Financing of Public Firms in Japan
Five-Year Average
(Percentage)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-93
Stock Issues							
No. of Cases	63.7	38.4	60.0	53.3	43.2	38.3	37.6
Amounts	72.2	36.4	43.8	31.2	29.6	24.3	12.2
Straight Bonds							
Domestic							
No. of Cases	35.7	61.0	33.4	29.0	15.0	3.1	7.9
Amounts	25.7	58.9	42.1	43.0	22.7	4.6	22.5
Overseas							
No. of Cases	0.2	0.2	0.3	5.1	8.4	8.3	20.9
Amounts	0.4	2.9	0.7	6.9	8.9	7.6	24.7
Convertible Bonds							
Domestic							
No. of Cases	0.1	0.1	6.1	5.0	9.6	22.3	8.8
Amounts	0.1	0.4	12.9	8.7	14.2	30.8	12.4
Overseas							
No. of Cases	0.3	0.3	0.2	7.6	20.3	9.6	4.3
Amounts	1.6	1.4	0.5	10.2	21.0	7.0	3.7
Warrants Bonds							
Domestic							
No. of Cases	n.a.	n.a.	n.a.	n.a.	0.6	0.5	1.0
Amounts	n.a.	n.a.	n.a.	n.a.	0.4	0.7	2.7
Overseas							
No. of Cases	n.a.	n.a.	n.a.	n.a.	2.9	17.9	19.5
Amounts	n.a.	n.a.	n.a.	n.a.	3.2	25.0	21.8

Sources: Tokyo Stock Exchange, *Annual Securities Statistics*, 1993.

There have been several dramatic shifts in funding patterns which can be traced to regulatory changes. It is also important to understand that the government's own financing needs have been an important influence on market regulations as well as the general character of the domestic bond market. Indeed, that market has been dominated by government issues since the mid-1970s with corporate issues representing a relatively small fraction of the total market. For example, during the 1985-1989 period, straight corporate debt issues accounted for just 3% of total bond issues in Japan. Table 14 indicates additional data on domestic bond issues by Japanese firms during 1960-1993. In recent years, other Japanese firms have essentially forsaken the domestic straight debt market in favor of other funding sources, including offshore bond issues. This striking aversion to domestic issues has produced enormous pressure for regulatory and procedural changes.

To a large extent, the underlying problems for domestic corporate

bond issues have related with who determines issue terms and collateral requirements. It was only after 1979 that Japanese firms were allowed to issue unsecured bonds for the first time since the 1930s. Initially, only two firms were eligible to make unsecured issues. This situation continued until 1983, when the restrictions on convertible bonds were further relaxed so that some 30 firms become eligible to issue such bonds without collateral. Subsequently, restrictions for both convertibles and straight bonds were relaxed in stage until several hundred firms were eligible for unsecured issues as of 1988. The official logic for a collateral requirement has been the protection of investors. However, this restriction has also made bond issuance in Japan relatively unattractive. Not only did corporate issuers have to pay management fees and underwriting commissions, but they also had to compensate a trustee for a variety of services which substantially increased issue costs. Firms also has to obtain approval on the terms and timing of issues from a committee dominated by a group of large banks. This procedure is cumbersome and lacks flexibility regarding issue terms. This bond issuing procedure endowed the Japanese banks with considerable control over industrial firms' access to debt markets. Under the main bank lending system, such control was important for dealing with highly levered clients. In recent years, financially healthy firms have naturally tended to view this process as an expensive nuisance. Consequently, offshore issues have been attractive as a way around cumbersome and expensive procedures in the domestic market.

Table 13 illustrates the rapid growth in offshore bond issues by Japanese firms over the last decade. It was not until the early 1980s that Japanese firms were no longer required to get a permission of Ministry of Finance to participate in the offshore market. Total corporate issues during the 1985-1993 period were greater in the offshore market than domestically. In the domestic market, convertible bonds have dominated straight issues since 1985. There seem to be several reasons for this. First, collateral requirements have been relaxed more rapidly on convertible resulting in lower effective issue costs for more firms. Second, issuing terms on straight corporate debt have been tied to government bond yields in ways which made many corporate issues relatively unattractive for initial purchasers. In contrast, terms on convertibles were more easily adjusted to make them attractive for purchasers. Third, the lower coupon rate on a convertible

coupled with the generally low dividend yield on shares after conversion implies a lower cash flow drain relative to issuing straight debt. Fourth, historically, a firm could not issue bonds in excess of its paid in capital plus reserves. The revision of the Commercial Code in 1990 roughly doubled the limit; but even this relaxed constraint can be binding for a rapidly growing firm needing external funds. A convertible issue provided immediate funding but, as it was converted into shares, enhanced a firm's ability to issue additional bonds in the future.

Overall, the main concern for corporate bond issues during the last decade has been the shift to issuing overseas. This is clearly due to reduced regulatory constraints on access to offshore markets where there is greater flexibility and lower costs. The rise of the offshore primary market has, however, seriously undermined the domestic primary market. Consequently, efforts are currently underway to reform domestic bond issuance procedures and make them more competitive with offshore markets. This will presumably require more flexibility with regard to pricing and issue terms as well as largely eliminating the additional costs imposed by the commissioned bank system (Hodder and Tschoegl, 1992).

Diamond (1984) shows that direct financing from individual investors is inefficient either because monitoring costs are needlessly duplicated among individual lenders; or monitoring is a public good which no one has an incentive to provide. Diamond (1991) builds on the idea that banks are the most efficient corporate monitor. His model predicts that young firms, and older ones that have done poorly, should borrow from banks, while older, more successful firms should issue public debt. The reason is that older, successful firms have more "reputational capital" at stake; bank monitoring is unnecessary because they have more to lose from being inefficient. By contrast, younger firms have not yet developed a reputation, and older, less successful firms have no reputation to lose. These firms need to be monitored.

Hoshi, Kashyap, and Scharfstein (1993) build on the idea that managers and shareholders may not completely agree about what kinds of investments should be taken. If managers place a lot of weight on shareholder concerns, then they show that firms with more attractive investment opportunities will be more prone to use public debt to finance investment. The idea is that the managers of firms with very attractive investment opportunities will find it very costly to

forego these opportunities in order to take a pet project. As a result, they do not need to be monitored to ensure efficient project selection. The model therefore predicts that when managers are closely following shareholders' wishes, firms with high Tobin's Q will issue public debt, while those with low Tobin's Q will issue bank debt. The model also implies that firms with high net worth—those with valuable assets in place or low leverage—will use the public debt markets. Because they risk this net worth when they invest, the managers of these firms have a greater incentive to invest efficiently. Thus, the model predicts that firms with good performance, valuable investment opportunities, or valuable assets are more prone to use public debt, while other firms will rely more heavily on bank financing. They find that high net worth firms are more prone to use public debt financing. In addition, firms in keiretsu have responded to deregulation in different ways: the more successful firms have accessed the public debt markets, while the less successful firms continue to rely more heavily on bank loans financing. As firms reduce their dependence on bank financing, they might lose some of the benefits of relationship-based borrowing. They may have a less ready source of financing, and creditors may be less willing to help during the time of financial difficulty. Interestingly, the financing pattern of large Japanese firms are beginning to resemble the more arms-length financing patterns observed in the U.S.

The securitization and globalization of Japanese corporate finance dramatically changed the business of major banks in Japan. With lending non-financial firms waning, they have aggressively sought to offer product-oriented, fee-based banking services such as currency and interest swaps, leveraged lease arrangement, and M & A advisory work. The rapid growth and low profitability of Japanese banks has led to concern about their capital adequacy. Foreign banks have sought protection from the onslaught of Japanese competition by calling for Japanese banks to operate with capital ratios comparable to those required in the United States and Europe. Japanese banks are watching their financial performance carefully. In contrast to the low-margin, volume-oriented banking practices, Japanese banks are now restraining growth and carefully tracking the profitability of their relationships with industrial clients. Increasingly, clients are being ranked by banks according to the profitability of the relationship with them. Just as industrial clients are now short listing the banks with which they do

business, banks are now beginning to identify and terminate relationships with clients that do not provide them with sufficiently attractive rates of return. The shifting patterns of Japanese corporate finance, and the competitive and regulatory pressures on Japanese financial institutions to increase their return on assets, are collectively resulting in a gradual unbundling of claims held against industrial corporations. Rather than being key shareholders, lead lenders, and primary vendors of financial services in long-term relationships with clients, Japanese banks are now being reduced to the position of minority shareholders that must compete fiercely for a client's business on a transaction-by-transaction basis.

Table 15
Profit Performances of Commercial Banks in Germany, Japan, and the United States
Five-Year Average
(Percentage)

		Germany	Japan	U.S.A.
Gross Profit Margin	1980-84	2.24	1.75	1.99
	1985-89	2.21	1.35	3.47
	1990-92	2.06	1.18	3.27
Per-tax Return on Assets	1980-84	0.54	0.53	0.90
	1985-89	0.70	0.58	0.78
	1990-92	0.54	0.33	0.93
Equity to Assets	1980-84	5.89	3.69	6.19
	1985-89	6.84	3.64	6.50
	1990-92	8.56	4.15	6.75
Return on Equity	1980-84	14.06	14.43	15.34
	1985-89	12.11	16.41	11.13
	1990-92	8.87	7.96	12.52

Source: The Bank of Japan, *Comparative Economic and Financial Statistics: Japan and Other Countries*, 1986, 1990, 1992, 1994.

Source Note: Deutsche Bundesbank, *Monthly Report of the Deutsche Bundesbank*, Bank of Japan, *Economic Statistics Annual*, Board of Governors of the Federal Reserve System, *Federal Reserve Bulletin*.

4. Conclusions

Corporate financial patterns and practices in Japan appear quite different, particularly in comparison with those in the United States. In large part, these differences are due to differing institutional and regulatory structures. Frequently, a peculiar financing pattern turns out to be the rational economic response to a constraining regulation.

The key to understanding such patterns is identifying the underlying structure of constraints.

Return on investments of Japanese firms are considerably lower than those of the U.S. firms. Based on the results of empirical studies, it can be concluded that there appears to have been a real difference in the profitability of firm in both countries. A lower acceptable return on investment allows Japanese managers undertake investments that U.S. firms would find unacceptable. The capital structure policies and return objectives of Japanese firms usually enhance their long-term corporate growth by allowing the savings from lower capital costs and return standards to be reinvested in cost reduction, capacity expansion, and product development.

U.S. firms rely heavily on cost-of-capital calculations to guide investment decisions, and those firms that do not earn a sufficient return on capital to satisfy the investors will fail. But for Japanese firms, investment decisions are not made on a discounted cash flow basis. Japanese managers usually view the cost of equity as the firm's expense to service this source of capital, that is, dividends. With this view of cost-of-capital, it is easy to see why the market price of their stock has little impact on investment decisions of Japanese firms. Rather, barring market-imposed capital constraints, Japanese managers' investment decisions are guided by what they believe the cost of capital by what is quite different from prevalent financial theories in the U.S.

The U.S. investors are less supportive of investment overall because of its sensitivity to current returns for many established firms' goals that stress current stock price over long-term corporate value. The U.S. investors favor those forms of investment for which returns are most readily measurable, reflecting the importance of financial returns and the valuation methods used by investors and managers. This explains why the U.S. firms tend to underinvest in intangible assets, where returns are more difficult to measure. On the other hand, Japanese firms can make continued investment to upgrade capabilities and increase productivity in existing businesses, and enter into new businesses. These systems create their own tendency to overinvest in capacity, to proliferate products, and to maintain unprofitable businesses in the name of corporate long-term growth. They also exhibit a slow tendency to redeploy capital out of sluggish businesses.

In the structural explanation for lower return standard of Japanese firms, managers and the stock market in Japan are seen as facing an abundance of promising investment opportunities and acting according by funding them. One reason for the relatively low rate of return has been that Japanese investors enjoy lower costs of capital, making even less promising investment opportunities viable. Lower returns can be accepted because they are still sufficient to cover original capital costs. Since the commonly cited studies employ various definitions of the costs of capital and alternative estimation procedures, it is not possible to compare them perfectly. There is no convincing evidence that cost of capital in the U.S. is significantly higher than those in other countries, particularly in Japan during the period 1970 through 1989. As a consequence, consideration on various factors including real rate, risk premium, and leverage can not support the notion that costs of capital systematically and persistently differ between Japan and the U.S.

The extent of risk in leveraged Japanese firms is overstated because Japanese banks are well positioned to monitor and control their corporate clients as a result of the close and long-term financial relationships that have evolved over time. Even though firms that are able to finance their investment plans through internal capital may be better off in the short run doing so, it can still be sensible over the long run to build reliable relationships with particular financial institutions for those occasions when internal cash flow is no longer sufficient. Some aspects of the relationship between Japanese banks and its clients have the potential to lower borrowing costs. Most Japanese non-financial firms maintain main-bank relationships. The main bank has extensive, reliable information about the firms and has the capacity to become actively involved if problems arise. In addition to their main-bank relationships, Japanese firms tend to maintain ongoing business relationship with other commercial stakeholder such as major customers, suppliers, and so forth. They hold shares of business partners each other and can be viewed as patient investors who supply cheap capital. Cross-shareholdings, interlocking directors and intragroup trade relationships which strengthen the relationships facilitate the firm in the group to access and exchange information about the performances of firms. These consideration suggest that Japanese managers will be less inclined to undertake myopic behaviors designed

to enhance current performance. Since Japanese investors are more aware of the long-term implications of current manager's actions, Japanese managers will find it more difficult to take advantage of information over market investors by inflating current earnings. Investors in Japan are in a better position to distinguish between earnings increases coming at the expense of future profits from those truly depicting increased future profits. Therefore, Japanese managers will be more reluctant to take myopic behavior than their U.S. counterparts.

A frequently mentioned characteristic of Japanese firms is a high degree of financial leverage. The debt-equity ratios for Japanese firms are higher than those for the U.S. Japanese firms have relied substantially more on debt than either U.S. or German counterparts, especially during the rapid growth period of the Japanese economy. External funding of Japanese firms also comes more from short-term credit, primarily from banks, than does German and U.S. firms. However, financial leverage has changed dramatically for firms in both the U.S. and Japan over the 1980s. In the U.S. there has been a notable decline in shareholders' equity as a percentage of total assets largely due to debt-equity substitution through leveraged buy-outs, mergers and share repurchases. In contrast, the equity-asset ratio for Japanese firms has grown substantially in the late 1980s, the leverage has decreased. As Japan has moved into a period of slower growth, reliance on external funding sources, particularly bank loans has declined relative to internal funding. Although loans continued to fund a very large fraction of assets growth after the mid-1970s, the dramatic slowing of that growth meant a weakened demand for bank loans. This trend toward lessened dependence on the banking loans gained further momentum during the 1985-1989 period as market-based funding began to play a larger role in Japanese corporate finance.

Paralleling the liberalization of Japanese corporate finance has been a dramatic buildup of financial slack on Japanese corporate balance sheets. Although double-digit real growth in Japan had begun to wane even prior to 1973, the oil shock produced a sudden and dramatic reduction in Japanese economic growth. The joint effect of investment reduction and cost improvement was to lessen gradually the external capital needs of the firms. Large Japanese firms were using their enormous cash flow during this period to repay debt and build up

liquid assets on the balance sheet rather than to increase dividends for shareholders. As a consequence, Japanese firms have accumulated considerable financial slack in the form of unused debt capacity and temporary investments in marketable securities. The net debt-equity ratio of Japanese large firms has declined more or less steadily since 1980. The buildup of financial slack on balance sheets, the persistence of excess cash flow throughout the 1980s, and gradual financial deregulation have led to a kind of financial emancipation of Japanese non-financial firms from their traditional lenders. Close and stable relationships between non-financial firms and banks have been essential elements of Japanese corporate finance. As such, they have contributed significantly to the mitigation of takeover activity in Japanese capital market. Today, however, this stability is being shaken by two major changes in the world of finance: the buildup of financial slacks on balance sheets in Japanese firms and the globalization and deregulation of the Japanese financial system. The former change is altering the nature of business that banks execute with their major industrial clients and generally weakening bank control over these firms. Concurrently, the latter change is causing banks and other institutional owners of equity to demand greater returns on their holdings of client-firm stock. Together these trends are evoking a creeping instability in close financial relationships.

Japanese firms, particularly large firms have been in abundance of liquidity found on most of their balance sheets in recent years. It is no mere coincidence that this period of abundance has also been accompanied by weakening firm-bank relationships. The increased availability of internally generated cash to fund projects has reduced the need to raise funds externally, thus diminishing the financial dependence of non-financial firms on banks. In addition, the growth and gradual deregulation of capital markets at home and the opening of capital markets abroad have distanced Japanese non-financial firms still further from banks. There is a hidden cost to the financial emancipation of past success, however. In the absence of the discipline exerted by capital market, Japanese managers now finds themselves with far greater discretion in the allocation of corporate resources than ever before. Since firms are unwilling to breach long-standing implicit contracts with key stakeholder, especially long-term employment relationships, and unable to execute past strategies of

simply growing themselves out of their current situations, they hold the direction to sustain marginal businesses and retain unrelated diversification. Thus, the free cash flow of these corporations may be reallocated from shareholders to other stakeholder, primarily employees. Despite the low priority traditionally accorded to shareholders in Japan, it is unlikely this trend can continue for long. One by-product of the increasingly global market in which Japanese financial institutions must compete, and of their weakening relationship with industrial clients, has been a growing concern for obtaining higher direct returns on their equity investments.

Traditionally, much of corporate finance in Japan have evolved around the main bank relationship. This is changing for many firms. Indeed, financial liberalization has created serious difficulties for the main bank system. Nevertheless, that system seems likely to adapt and continue to provide valuable supports for growing firms. Exactly how this will come about is not yet clear; however, there are substantial incentives for preserving the system's advantages. More generally, the effects of financial liberalization over roughly the last decades have been enormous. The process of change will continue, both because of continuing liberalization and because some financial patterns change sluggishly. Increasing financial sophistication and capability to exploit opportunities arising from regulatory changes will also continue to alter corporate finance. It is reasonable to expect that the role of offshore financing will not decline.

There is some evidence that the financial systems are converging; that Japanese system is moving toward the U.S. Japanese banks may be forced to liquidate some of their equity holdings to maintain adequate cash balance. Yet these changes are modest if Japanese investors are forced to sell their nonpermanent shares that are actively traded and have little influence on corporate behavior. Although securitization of debt and retained earnings in Japan undermine bank influence as a creditor, it has not yet undermined the equity-based influence.

References

- Ando, A. and A.J.Auerbach (1988), "The Corporate Cost of Capital in Japan and the United States: A Comparison," in J.B.Shoven, ed., *Government Policy towards Industry in the United States and Japan*, Cambridge University Press, 21-50.
- Ando, A. and A.J.Auerbach (1988), "The Cost of Capital in the United States and Japan: A Comparison," *Journal of the Japanese and International Economies*, 2, 134-158.
- Ando, A. and A.J.Auerbach (1990), "The Cost of Capital in Japan: Evidence and Further Results," *Journal of the Japanese and International Economies*, 4, 323-350.
- Bank of Japan, *Comparative Economic and Financial Statistics: Japan and Other Countries*, 1974, 1978, 1986, 1993, 1994.
- Bebchuk.L.A. and L.A.Stole (1993), "Do Short-Term Objectives Leads to Under-or Overinvestment in Long-Term Projects?" *Journal of Finance*, 48, 719-730.
- Bernheim, B.D. and J.B.Shoven (1989), "Comparison of the Cost of Capital in the U.S. and Japan: The Roles of Risk and Taxes," mimeo., Stanford University.
- Blaine, M.(1993), "Profitability and Competitiveness: Lessons from Japanese and American Firms in the 1980s," *California Management Review*, 36, Fall, 48-74.
- Borio, C.E.V. (1990), "Leverage and Financing of Non-Financial Companies: An International Perspective," BIS Economic Paper, No.27, Bank for International Settlements.
- Brown.P.R.,V.E.Soybel, and C.P.Stickney (1994), "Achieving Comparability of U.S. and Japanese Financial Statement Data," *Japan and the World Economy*, 5, 51-72.
- Brown,P.R.,V.E.Soybel, and C.P.Stickney (1994), "Comparing U.S. and Japanese Corporate-Level Operating Performance Using Financial Statement Data," *Strategic Management Journal*, 15, 75-83.
- Diamond, D.W. (1984), "Financial Intermediation and Delegated Monitoring," *Review of Economic Studies*, 51, 393-414.
- Diamond, D.W. (1991), "Monitoring and Reputation: The Choice between Bank Loans and Directly Placed Debt," *Journal of Political Economy*, 99, 689-721.
- Economic Planning Agency (1992), *Keizai Hakusho, 1992* (Economic Survey of Japan, 1992).
- Edwards, F.R. and R.A.Eisenbeis (1991), "Financial Institutions and Corporate Investment Horizons: An International Perspective," mimeo, Columbia University.
- Ellsworth,R.R. (1985), "Capital Markets and Competitive Decline," *Harvard Business Review*, 63, (September-October), 171-183.
- Friend,I. and I.Tokutsu (1987), "The Cost of Capital to Corporations in Japan and the U.S.A.," *Journal of Banking and Finance*, 11, 313-327.
- Froot,K.A.,A.F.Perold, and J.C.Stein (1992), "Shareholder Trading Practices and Corporate Investment Horizons," *Journal of Applied Corporate Finance*, 5, Summer, 42-58.
- Fuji Research Institute Corporation (1993), *Kigyozaimu Kenzenka-sokushin Chosakenkyu-Meinbanku-sisutemu ni kansuru Chosa*, (Research on Promotion

- of Sound Corporate Finance: A Survey of Main Bank System).
- Hodder, J.E. (1991), "Is the Cost of Capital Lower in Japan,?" *Journal of the Japanese and International Economies*, 5, 86-100.
- Hodder, J.E. and A.E. Tschoegl (1992), "Corporate Finance in Japan," discussion paper, Center for Economic Policy Research, Stanford University.
- Hoshi, T., A. Kashyap, and D. Scharfstein (1993), "The Choice between Public and Private Debt: An Analysis of Post-Deregulation Corporate Financing in Japan," mimeo, University of California, San Diego.
- Huddart, S. (1993), "The Effect of a Large Shareholder on Corporate Value," *Management Science*, 39, 1407-1421.
- Jacobson, R. and D. Aaker (1993), "Myopic Management Behavior with Efficient, but Imperfect, Financial Markets: A Comparison of Information Asymmetries in the U.S. and Japan," *Journal of Accounting and Economics*, 16, 383-405.
- Keizai Doyukai (1985), *Kigyo Hakusho, 1985: Saika no Jidai* (Report on Japanese Firms, 1985: The Age of Differentiation).
- Kester, W.C. (1986), "Capital and Ownership Structure: A Comparison of United States and Japanese Manufacturing Corporations," *Financial Management*, (Spring), 5-16.
- Kester, W.C. (1991), *Japanese Takeover: The Global Contest for Corporate Control*, Harvard Business School Press.
- Kester, W.C. (1992), "Banks in the Board Room: The American versus Japanese and German Experiences," mimeo., Harvard Business School.
- Kester, W.C. and T.A. Luehrman (1989), "Real Interest Rates and the Cost of Capital: A Comparison of the United States and Japan," *Japan and the World Economy*, 1, 279-301.
- Kester, W.C. and T.A. Luehrman (1992), "The Myth of Japan's Low Cost of Capital," *Harvard Business Review*, 70, (May-June), 130-138.
- Kester, W.C. and T.A. Luehrman (1992), "Cross-Country Differences in the Cost of Capital: A Survey and Evaluation of Recent Empirical Studies," mimeo., Harvard Business School.
- Kojima, K. (1993), "Corporate Governance in Germany, Japan, and the United States: A Comparative Study," *Kobe Economic and Business Review*, No.38, 171-243.
- Laffont, J.-J. and J. Tirole (1988), "Repeated Auctions of Incentive Contracts, Investment, and Bidding Parity with an Application to Takeovers," *Rand Journal of Economics*, 19, 516-537.
- Malkiel, B.G. (1992), "The Influence of Conditions in Financial Markets on the Time Horizons of Business Managers: An International Comparison," mimeo., Princeton University.
- McCauley, R.N. and S.A. Zimmer (1989), "Explaining International Differences in the Cost of Capital," *Federal Reserve Bank of New York Quarterly Review*, 13, Summer, 7-28.
- Myers, S.C. (1984), "The Capital Structure Puzzle," *Journal of Finance*, 39, 575-592.
- Paul, J.M. (1993), "Managerial Myopia and the Observability of Future Cash Flows," mimeo., University of Michigan.
- Stein, J. (1988), "Takeover Threats and Managerial Myopia," *Journal of Political Economy*, 96, 61-80.

- Stein, J. (1989), "Efficient Capital Markets, Inefficient Firms: A Model of Myopic Corporate Behavior," *Quarterly Journal of Economics*, 104, 655-669.
- Tokyo Stock Exchange (1993), *Annual Securities Statistics*.

MEASURING NATURAL RESOURCE RENTS AND THEIR MACROECONOMIC SIGNIFICANCE FOR DEVELOPING COUNTRIES, WITH REFERENCE TO LATIN AMERICAN SUGAR PRODUCERS

Robert K. McCLEERY¹

1. Introduction

This paper attempts to provide a description and analytical framework for the estimation of natural resource rents in an economy, and some evidence of the impact of rents on the macroeconomy of rent-dependent economies. Some countries have been successful in channeling rents from abundant natural resources into investment for industrialization and economic growth, while other countries have failed. A look at the small, sugar dependent economies of the Caribbean could prove instructive into the development processes and problems of resource rich countries in general.

From their initial formulation and usage in seminal works by Ricardo, Shumpater, and others, modern neoclassical economics has largely defined rents out of existence. In neoclassical formulations, if entry is possible, new firms enter the market, bidding away scarce (and mobile) resources, which pushes the supply curve out (lowering price and marginal revenue) and raising marginal costs. The process proceeds (in the absence of risk) until all profits are dissipated, not just for the final entrant, but with mobile factors and markets that clear, for the industry as a whole. Thus empirically observed profits are inherently transitory, unless some clear market failure is identified, and thus not a suitable topic for analysis.

Yet profits do persist, and there are theoretical and empirical reasons for believing that they affect a country's political economy in

1 Associate Professor, Research Institute for Economics and Business, Kobe University. Many of the concepts and methods of analysis employed here are derived from earlier joint work with Professor Clark Reynolds of Stanford University, to whom I acknowledge a tremendous intellectual debt.

a manner distinct from factor payments. Reasons for the persistence of profits range from the obvious (the use of market power when a resource is largely controlled by a few owners, such as OPEC and the diamond cartel) to the subtle (limits on land suitable for the production of certain crops, whether they are real or created by advertising-induced preferences, such as the demand for Colombian coffee). Lags between investment and output, such as in citrus and other tree crops, can also lead to rents that persist for some time. Risk aversion, imperfect capital markets, and other market imperfections can also lead to the persistence of rents that could otherwise be diluted by entry. Finally, industries characterized by economies of scale or large amounts of "knowledge capital" may earn profits for as long as the technologies can be kept proprietary or entry can be forestalled.

The reasons to believe that rents and profits may have economic impacts distinct from factor payments relate both to the distribution of rents (normally closely held by a few individuals or the government) and the observed difference in consumption patterns out of "normal" and "windfall" income. In certain rare situations, rents are not closely held by individuals or governments; for instance, considerable rents accrued to small landholders in Malaysia and Indonesia from palm oil and rubber in the 1970s. These rents may have quite a different impact on the macroeconomy than did oil rents accruing to governments during the same period. While rents may boost growth rates, especially in the short run, a two-part problem emerges in the medium run, particularly where rents are captured by governments.

Whereas an individual will treat rents as windfall profits, saving a large percentage either to expand production in the same sector, or expanding production in other sectors through financial intermediation, governments tend to expand spending across the board. Furthermore, to the extent that lenders perceive the rents to be permanent (or face a surplus to recycle), available credit will increase. Borrowing heavily at a time of high rents exacerbates the problems associated with the "Dutch disease," and also inflation, if the limits to domestic absorption are reached. This leads to a relative if not absolute contraction in the traded goods sector, and thus the inability to service the growing debt in the future. Furthermore, if the increase in rents was indeed transitory (or is dissipated through rent-seeking or other behavior),

then the country will be faced simultaneously with a crisis in the balance of payments and in the fiscal balance. Lastly, rents may spill over into wages, not just in the sector generating the rents, but throughout the economy, due to linkages between sectors.

Recently a great deal of attention has been focused on rents, in the form of the burgeoning literature on rent-seeking behavior (also known as directly unproductive profit-seeking behavior, or DUP).² Yet this literature and much of the development literature treat rents as a bad, with prominent researchers writing about the "Curse of natural resources," tracing the contrast in development performance between Asia and Latin America and Africa in the 1980s to the presence or absence of natural resources.³ Instead, the approach taken here is to acknowledge that natural resource rents increase the "degrees of freedom" or the "political-economic policy space" of a country, and that additional "freedom" or "space" can be used either for good or ill.

One reason for a negative view toward rents is the so-called "Dutch Disease." The Dutch Disease literature stemmed from the observation that large resource discoveries set in motion a process of deindustrialization in the affected economy. Simply put, the economy is endowed with additional wealth, which translates into an increased demand for goods and services. A country operating on the frontier of its production possibilities curve cannot increase its production of all types of goods in response to demand pressures, so imports grow to service tradeable good demand, and resources are shifted from the production of tradeables to non-tradeable goods and services. In the short run labor and prices adjust to equilibrate markets, but in the longer run investment and attendant technological progress are concentrated in the non-tradeable sector, while the tradeables sector, including manufacturing, stagnates. In addition to the difference in rates of return to capital that provokes this investment pattern, domestic rates of return may be high by international standard, inducing capital inflows. These inflows, however, will usually go to inward-oriented activities which produce for the home market and repatriate profits abroad.

² Krueger 1974, Bhagwati 1982, etc.

³ See Ranis 1987 and 1992, and Urrutia and Yukawa 1988 for the empirical side and Matsuyama 1991 for a theoretical approach.

Development policies do have some scope for affecting a resource-rich country's long term equilibrium growth path even in this restrictive setting. If the country runs a current account surplus over the adjustment period, reflecting the transitory nature of non-renewable resource rents, the long term capital stock position and growth path are higher. But if the country borrows against future rents to prop up a sagging social pact, using consumption subsidies and supporting an unrealistic exchange rate, the long term growth rate may actually be lower than what would have occurred in the absence of the discovery.

A natural resource discovery in an advanced, industrial country clearly reduces the size and competitiveness of the country's manufacturing sector. How serious this effect is depends both on government policies of taxation and redistribution and on the behavior of firms and households toward the increase in income. If the increase is viewed as transitory, we would expect a high proportion of it to be saved, while if the government convinces itself and its people that a new age has dawned, the rise might be treated as permanent and consumed like ordinary income.

The above analysis holds for developed countries, but what of developing countries, where capacity constraints are not so binding? Might there be more scope for policies designed to expand industrial production, using the resource rents to ease capital and human resource development constraints?

This paper estimates the magnitude and analyzes the impact of sugar rents on economic growth in several sugar dependent countries in the Caribbean Basin. The wide fluctuations in sugar prices from 1960 to 1991 led to large but transitory rents in these small economies, which may prove to be an interesting empirical test of the theoretical impact of resource rents on economic growth described above.

The rest of the paper is arranged as follows. Section II provides a brief introduction to the production process for sugar and the world sugar market. In section III, estimates of the rents from sugar production are given for 17 countries for selected years, 1958 through 1991. Section IV contains a description of the economies of some of the more sugar dependent countries in the region and some preliminary estimates of the impact of sugar rents on their economic development. Some concluding thoughts are presented in section V.

2. Sugar Production and the World Sugar Market

Sugar is unique among commodities for two major reasons. It is produced in all major developing regions and in many developed countries as well, with cane sugar being produced in the tropics and Southern Hemisphere countries like South Africa and Australia, while the United States, France, and other European countries produce a considerable amount of beet sugar. Also sugar is notable for having perhaps the most severely distorted market structure of any product traded internationally. As a result of restrictions, tariffs, and controls in both developed and developing countries, the "free" sugar market is thin and subject to wide fluctuation in price.

Production

Any country with sufficient water, sunshine, and low cost labor can produce sugar. Although the Caribbean basin has an excellent climate for sugar, it produces only about 12-15 percent of the world's sugar output, roughly the same fraction as the EC. South America accounts for another 10-12 percent, with Brazil one of the largest and lowest cost producers. Asia recorded the most rapid production increase in the 1970s and 80s, and now produces more than 20-25 percent of the world total.

Growing sugar cane is a labor-intensive process. Although increased use of pesticides and mechanization of the harvesting process to different degrees in different countries has somewhat reduced the labor input, the cost advantage from low cost labor is still a significant factor in international competitiveness. The size of farms is extremely variable as well. The smaller island economies like Jamaica and Trinidad and Tobago naturally have smaller average farm size than Brazil, Australia, or South Africa, by 20 times or more. But even within the island economies there is considerable variance in the size of plots, with roughly half of production taking place on *Latifundios*, or large farms, and the other half on smaller plots. Although the smaller plots tend to be hillside or other marginal lands, which are tougher to mechanize, they are often more intensively cultivated and may have higher yields than the big plantations.

In countries that have not mechanized the harvesting process, getting cane cut at the peak of sweetness depends on a supply of

unskilled labor. Thus there is a seasonal demand for domestic labor or possibly migrant labor. For instance, the Dominican Republic relied for many years on cane cutters from neighboring, lower income Haiti. Cane loses its sweetness in a day or two after being cut, so mills must be located close to the fields and/or good transportation systems must exist. This process is quite capital and energy intensive. The next stage of the production process is refining, which is even more capital intensive, but because it does not have the same time pressure as milling, it is generally done in developed countries.

Factors of sugar production, particularly the field machinery, milling machinery and the land itself, are quite crop-specific. Sugar itself is a perennial, yielding about eight crops before replanting is necessary (in tropical and sub-tropical conditions). Thus it is quite costly to switch crops in response to international prices. These technical problems are compounded by government policies, as described in the next section.

One final technical point is that considerable substitutability exists on the consumption side. Both artificial sweeteners and high fructose corn syrup (HFCS) have made inroads against traditional uses of sugar, like soft drinks. In developing countries, one can consider raw sugar and refined sugar (usually exported and reimported) as substitutes for some purposes.

Market Characteristics

The world sugar market is extremely segmented. The EC, United States, and Japan all protect domestic producers, while government intervention in production, distribution, marketing, and trade policies in developing countries further distorts markets.

Looking first at developed country protection, the United States as the world's largest consumer has the largest impact on prices. Sugar's price is artificially high in the United States as a result of a combination of tariffs and quotas on sugar and protection to HFCS producers. HFCS and artificial sweeteners have reduced sugar's share of the U.S. sweetener market from 79 percent in 1970 to 41 percent in 1988.⁴ The accompanying decline in U.S. sugar imports has both depressed prices and increased price variance in the world market. It is estimated that

4 Borrell and Duncan 1992.

sugar prices were 9 percent lower on average over a 20 year period due to U.S. sugar policies, with a peak impact of over 40 percent.⁵ Because the impact is greatest at low points in the sugar price cycle, the coefficient of variation is larger as well, by 8-12 percent.⁶

The EC policies are a complex web of support prices, quotas, and trade restrictions that were introduced after the 1975 price rise with the express purpose of making the EC self-sufficient in sugar.⁷ Indeed they have gone well beyond that point. Annual output rose from 9 to 16 million tons between 1974/75 and 1981/82, moving the ratio of production to consumption from about 80 percent to 150 percent. The impact of EC policies on world prices is also considerable, with the long term price depressed by 5-12 percent as a result of intervention.⁸ Variability is increased, especially as the support prices result in higher protection at low points in the world price cycle, insulating EC producers from lower world prices, with peak impacts of 30 to 35 percent.

Japan has a small but highly protected sugar market. It is estimated that Japan's sugar policies reduce domestic demand by 50 percent, which lowers the world price by 2-5 percent on average and raises the coefficient of variation on prices by 11 percent.⁹

The combined effect of policies in these three developed regions was estimated to reduce prices by 33 percent on average and increase price variation by 28 percent.¹⁰ Furthermore, no reliable estimates exist of the considerable distortionary impact of the policies of the CMEA bloc (the Soviet Union and partner countries) during the cold war. Various sugar price stabilization plans have been attempted by the International Sugar Organization (ISO), with no success, possibly because of the large number and geographical dispersion of sugar producers.

Developing countries have also contributed to price distortions in the world sugar market. Sugar producers often have high tariffs on refined sugar, in an attempt to save foreign exchange by forcing domestic consumers to use raw sugar rather than reimported white

5 Sudaryanto 1987, and Sturgiss, Field and Young 1990.

6 Borrell, Sturgiss and Wong 1987.

7 For details, see Abbott 1990.

8 Anderson and Tyers 1986, and Bureau of Agricultural Economics (Australia) 1985.

9 Sturgiss, Connell, and Tobler 1988.

10 Wong, Sturgiss and Borrell 1989.

sugar whenever possible. Other developing countries, particularly in Africa, started or promoted domestic production through enhanced protection as a means of saving or generating foreign exchange during the sugar booms of 1975 and 1980. Now they are stuck with high cost producers who need protection to even cover their variable costs in bad years. Low sugar prices and high oil prices in 1977-79 and 1981-85 led some large producers, most notably Brazil, to start large-scale, subsidized production of gasohol in order to save foreign exchange, rather than cutting back production. Nationalization of production, milling, or distribution also leads to a dulling of economic incentives and slower supply responses to market signals, which increases the severity and duration of cyclical downturns.

The end result of policies in developed and developing countries is to create a volatile "free" market in which prices are generally too low, coexisting with segmented, protected markets with prices that are well above world prices. Analyzing the production incentives in this context is difficult, even if one ignores the important political dimensions of production in many Caribbean countries. But it should still be possible to analyze the impact of those production decisions and price movements on individual countries by estimating the "resource rent" component of sugar export revenues and the impact of these revenues on the macroeconomy of the countries.

3. Estimating Sugar Rents

Data on export revenues and volumes are taken from two sources, United Nations Trade Statistics Yearbook and FAO Commodity Trade Statistics. The UN data have a longer, consistent time series, but the FAO data are calibrated for "raw sugar equivalent," and thus are better for countries that do considerable sugar refining for export, such as Nicaragua, Costa Rica, and Panama.

Data on costs are taken from several different sources for selected years. The few hard data points (Conell, Rice and Sugar Co. Inc. for 1974-75; International Sugar Organization for 1981; Landell Mills for 1979-80 to 1982-83; and Borrell and Duncan for 1985) are interpolated and extrapolated to make a time series from 1958 to 1991. Perez-Lopez (1991) presents a cost breakdown for Cuba in 1984, indicating that imported inputs (including energy) and capital costs

(including maintenance and depreciation) are the two most important elements of mill costs, while labor is a large part of the cost of cane production. Thus the following three variables are used to proxy for changes in the costs of production: the index of import unit values, a five year moving average of LIBOR, and industrial wages, or when unavailable, real gross domestic product as a proxy for real wage growth (all variables taken from IMF, International Financial Statistics Yearbook and data tapes).

Rent estimates are presented in Table 1. Note first that rents are negative for many countries and years. If rents are a surplus, why are they negative? Does a negative measure of rents mean that production should not have taken place? Several caveats are presented below, but there is no basic contradiction inherent in the concept of negative rents, particularly in a commodity like sugar.

All agricultural markets are characterized by considerable variability in prices, but the sugar market is particularly volatile. Market price at harvest is a random variable at the time planting decisions are made. Thus poor outcomes may easily lead to losses in some years, despite profit maximizing decisions. Secondly, debtor countries with exchange controls may have an internal "shadow price" of foreign exchange that is well above the official exchange rate, thus what appear to be losses, when all costs and revenues are expressed in dollars, are really profits in the home currency.¹¹ Several of the countries in the sample have fixed nominal exchange rates in dollar terms for much of the period, despite bouts of high inflation, indicating some form of exchange controls. Third, perhaps most importantly, are the high fixed costs of sugar production. Variable costs, especially in low wage countries, are estimated at only 3 to 4 cents per pound, which "helps to provide an answer to one of the great paradoxes of the recent behavior of the sugar market. This is the willingness of producers to continue to grow beet or sugar to supply sugar to the free market, even when prices have fallen to the 3c/lb

11 This point can be easily seen in a simple example. Suppose that 1/3 of costs and 90 percent of revenues are denominated in dollars. Converting domestic costs to dollars at the official (overvalued) exchange rate overstates those costs, and may indicate losses. Conversely, if the exporter can circumvent exchange controls to convert most of export revenues into domestic currency at market rates, those dollars could yield as much as twice the domestic currency units as would conversion at the official exchange rate, making a profit in domestic currency terms.

range.”¹² Fourth, there is a potential source of bias in the costs estimates used that might bias the rents estimates downward. The available cost estimates are primarily for years of high prices. All companies, but particularly government owned or controlled firms, tend to expand costs when output price is high, and cut costs in lean years. To the extent that good years are overrepresented in the actual costs data, the projections may overstate actual costs in years of lower product prices by neglecting the possibility of significant cost reductions.¹³ Finally, sugar production was nationalized in some Caribbean countries, and nationalized producers pursue multiple goals, including minimizing the social costs of labor relocation, rather than merely profit maximization.¹⁴

There is also one major omission in the rents estimates that biases the results downwards. The value of by-products is apparently not taken into account in formulating the estimates. Sugar production from cane generates a number of useful by-products. Bagasse (cane fibers) are the largest by volume, and can be used for fuel (generally at the plant, which may be accounted for in the cost estimates), particle board, paper, animal feed, etc. Molasses can be made into rum, cattle feed, and fertilizers, as well as other miscellaneous uses. For reference, the sale of by-products reduced costs for Cuban sugar producers by 18 percent in 1984.¹⁵ Applying this ratio to 1985 cost estimates of 20 cents per pound indicate that net costs are actually about 16.5 cents per pound, with similar adjustments necessary for other years. A second possibility would be to take into account the fact that Cuba is a low costs producer, with a cost level about three-quarters of the world average, and subtract a constant equal to 0.75•

12 “3c./lb.” is an abbreviation for 3 cents per pound. Landell Mills Commodities Studies, 1985.

13 Rising output in years of high prices has an ambiguous effect on costs. One might expect that marginal lands would be brought into cultivation, which would raise average costs. But if there are economies of scale at the mill level, a larger crop would better utilize milling capacity, reducing average costs. To the extent that high prices and outputs lead to the building of new capacity, the subsequent fall in prices and output can lead to a rise in unit costs. Data limitations prevent the consideration of any of these effects in Table 1.

14 Between 1972 and 1976, the government of Trinidad and Tobago took over 100 percent ownership of all cane processing. Jamaica obtained the lands of the three largest sugar producers in 1971 and turned them into co-ops, an experiment that was abandoned in 1981. Guyana nationalized its sugar industry in 1976. For further details, see Abbott 1990.

15 Perez-Lopez 1991.

Table 1- Rents From Sugar Exports

Year	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974
Brazil	-7.24	-11.31	-11.04	-6.10	39.08	22.23	8.26	-18.16	-22.34	-40.70	-30.08	-12.18	-10.19	-6.44	60.38	130.25	884.93
Dominican Rep.	-11.94	-18.89	-26.43	-19.66	1.61	16.65	12.87	-2.53	5.39	3.65	8.09	5.72	1.58	-5.31	-3.05	18.40	145.15
Guyana			-0.01	-3.74	-5.55	-3.26	-3.19	-14.30	-17.02	-28.80	-40.22	-20.53	-22.09	-20.46	-17.39	-9.54	33.70
Jamaica	-17.53	-15.53	-19.50	-21.63	-24.38	-7.65	-12.86	-34.58	-27.33	-28.68	-32.43	-30.88	-36.46	-34.53	-27.80	-24.42	44.75
Belize	-7.03	-8.25	-11.28	-11.75	-12.27	3.19	-6.83	-20.55	-17.24	-14.65	-22.22	-17.15	-19.33	-1.14	-12.59	-17.55	15.83
Argentina	-0.20	-1.17	-0.16	-0.64	-0.69	-0.05	-0.80	-1.04	-1.97	-2.97	-3.88	-2.35	-3.47	-2.90	-2.50	-2.33	15.15
Trinidad Tobago	-8.63	19.53	-10.16	-13.64	-16.84	-15.00	-13.50	-17.11	-17.60	-14.22	-22.02	-14.19	-22.76	-20.90	-6.83	-9.24	-10.47
Barbados	-31.98	-49.85	-49.81	-46.84	-34.13	-31.15	-20.16	-37.33	-44.19	-49.22	-49.39	-25.31	-43.18	-43.20	-38.43	-41.47	27.62
Guatemala	-2.29	-3.48	-2.66	-3.76	-4.35	-1.26	-3.36	-5.42	-5.14	-7.33	-8.23	-7.13	-8.75	-8.62	-3.78	-6.17	5.61
Honduras			-0.02	-0.14	-1.66	-0.34	-2.11	-2.18	-1.83	-0.44	-0.80	-0.91	-0.55	-1.83	-0.43	-2.60	22.44
El Salvador							-1.73	-1.21	-1.58	-0.33	-0.40	-0.06	-0.43	-0.08	-0.15	0.01	2.95
Mexico	0.25	0.47	0.27	0.06	-0.39	-0.27	-0.20	-0.22	-0.94	-0.64	-4.22	-5.08	-2.97	-4.43	-8.99		8.72
St.Kitts-et-Nevis	-17.20	0.23	1.29	5.34	4.09	15.15	16.55	-2.68	-0.18	-0.41	4.83	-14.03	11.73	14.02	17.60	20.15	119.91
Costa Rica	-1.50		-2.34	-2.12	-2.35	-2.41	-2.13			-2.20							
Nicaragua	-0.04	-0.46	-1.20	-1.19	-0.90	-0.36	-0.97	-1.80	-2.58	-2.78	-2.72	-2.80	-3.05	-3.77	-2.65	9.27	30.99
Panama			-4.38	-2.97	-3.54	-2.92	-4.92	-4.56	-1.79	-4.96	-4.65	-7.15	-8.56	-9.12	-12.12	-10.46	-8.65
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Brazil	711.80	57.59	-16.91	-40.32	-22.84	468.96	206.08	-85.87	-99.40	-129.09	-175.90	-157.69	-151.52	-99.84	-9.68	69.12	-16.79
Dominican Rep.	380.22	64.46	0.04	-15.83	-32.66	86.76	286.61	35.47	6.16	35.46	-32.49	0.20	-40.82	-33.07	8.45	37.90	37.50
Guyana	33.00	-3.13	-2.04	-23.21	-50.44	45.01	-3.44	-92.00	-74.74	-52.48	-109.01	-70.01	-18.53	-67.21	-83.95	-99.46	-39.13
Jamaica	96.26	11.69	6.84	-1.51	3.35	32.69	7.81	-9.19	-17.46	-13.57	-28.06	-10.04	10.67	9.54	12.27	79.42	58.28
Belize	89.15	3.07	18.16	9.15	-0.20	10.87	3.44	-0.84	3.24	3.25	-16.56	5.98	19.77	29.33	8.85	73.67	87.00
Argentina	26.05	3.67	3.01	7.55	7.33	19.20	7.41	1.64	-1.28	1.38	-7.83	-2.63	3.41	7.02	7.17	11.62	10.08
Trinidad Tobago	1.82	-6.14	-9.18	-2.55	-10.93	-6.63	-8.25	-19.05	-14.39	-18.25	-12.28	-21.14	-0.93	-15.24	-10.38	-5.07	-10.39
Barbados	166.56	-0.75	-58.10	-41.11	-43.91	-8.94	-0.05	-45.60	-1.54	-0.52	-4.93	-1.34	-0.28	-2.59	-2.56	1.74	20.65
Guatemala	30.21	3.56	0.25	2.91	5.87	20.34	7.32	2.93	1.56	0.09	0.02	-2.10	6.66	5.82	5.85	11.66	10.19
Honduras	73.44	38.54	15.58	9.34	14.59	13.30	23.83	-6.17	-1.14	-5.48	-7.81	-50.36	-49.63	-56.91	-177.54	-19.13	-81.75
El Salvador	4.74	0.72	-0.80	-0.01	-1.37	4.99	16.65	-6.31	-6.97	-4.36	-19.35	-8.81	-15.48	-10.31	0.83	-3.83	16.71
Mexico	49.16	8.40	-8.04	-12.00	-17.80	-3.39	-0.88	-3.19	6.50	0.79	0.40	9.82	-7.84	-12.76	1.39	-3.04	-12.50
St.Kitts-et-Nevis	89.25	0.16		0.08	1.75				3.73		-16.11	-19.35	-49.34	-75.19	-15.72	0.89	40.88
Costa Rica					-2.07		9.60	-3.25	13.40	4.00	7.10	-4.24	8.50	-2.71	10.30	9.20	13.40
Nicaragua		6.03	-2.35	-3.07	-3.35	16.40	16.14	-6.68	-3.21	-3.54	-3.76	-22.18	-18.72	-6.90	-2.48	1.05	-13.14
Panama	13.88	4.94	-5.52	-14.87	-12.77	-6.05	2.83	-9.36	-21.29	-23.51	-12.66	-18.23	-11.05	-12.25	-15.88	-83.46	-24.18

0.18•0.20 or 2.7 cents/lb from all cost estimates in 1985, then adjust the adjustment factor for changes in the world average costs for other years.

Making any linear adjustment to all years to reflect the value of by-products would not have a significant impact on the coefficients estimated in the next section. The problem would be if the adjustment factor was not constant across countries and time periods. Since all of the producers in the sample make cane sugar and use relatively similar technologies, the adjustment should be strictly proportional to production levels across countries, but two factors determine the consistency of the adjustment factor over time. On one hand, supply of by-products is directly related to sugar supply, thus prices should be closely related. But on the demand side, many other influences exist, such as the prices of substitute cattle feeds and other competing products. Unfortunately, detailed data on the production, export, and non-market transactions (such as use of bagasse as fuel in the sugar mill) is not available for any of the countries in the study, so no adjustment is made to the cost data.

Rents peak in the four years of sugar price peaks (1963, 1975, 1980, and 1990). One might ask, why not just use price or revenue data in the estimations instead? First, as mentioned above, rents as a residual will be much more volatile than prices or revenues. Second, as a surplus, they may well have quite a different impact on personal and government spending than regular wages or the normal return to capital. Thirdly, the author has found in earlier work that rents, measured in this way, do have a strong and differential impact on macroeconomic variables in the cases of Malaysia, Indonesia, Mexico, and Venezuela.¹⁶ Thus despite the difficulties in properly measuring rents, the effort has a clear potential payoff in better understanding macroeconomic adjustments in resource-rich economies.

4. The Impact of Rents on the Macroeconomy of Small, Latin American Sugar Producers

In this section I look at the impact of rents on a number of

¹⁶ McCleery 1989.

macroeconomic variables in five sugar-dependent Caribbean economies: Barbados, Belize, the Dominican Republic, Guyana and Jamaica. The impacts are similar but certainly not identical, indicating that the economic structure and policy environment under which rents are obtained influence how those rents influence macroeconomic variables.

In each case the impact of rents on economic growth was estimated, then various channels by which that impact might be explained were explored. Monetary (capital inflows, reserves, inflation, and money supply growth), budgetary (revenues, expenditures, and the government deficit), and real (savings, investment, and the balance of trade) are the three main channels explored (see figure 1).

Estimation Equations

The primary channel of impact of rents on output growth is expected to be through investment. Consider this simple growth function for a Cobb-Douglas economy:

$$\dot{Y}/Y = a \cdot \dot{L}/L + b \cdot \dot{K}/K + c$$

Let $\dot{K} = I_T$ (total investment) and $I^T = S^T$ (total savings). S^T can be decomposed into $S^P + S^F + S^G$ (private, foreign, and government savings). Thus for each country we will test the impact of changes in rents on private savings, foreign capital inflows, and government savings (revenues minus expenditures). Investment is not the only way rents can affect growth, however. Rents may indirectly affect the efficiency of investment (parameter b above) through government policies or alter the equilibrium wage rate and thus labor force growth (through participation rates) and efficient utilization of labor (a). Increased imports of foreign capital may even raise the technological level of the economy.

One way to proceed would be to try to estimate one sector production functions for each of the five countries then assume that rents affect all countries in the same way and have either a cross-sectional regression with five observations or attempt to fit the productions function separately for high and low rent periods. This does not seem like an efficient way to use the available data, so it was decided instead to estimate a direct link between rents and growth, to capture the impact of indirect factors, as well as directly estimating the

impact on the components of investment. See figure 1 for a diagram of potential channels of impact from rents to growth.

Since the rent series peak in 1974-75 and 1980, it would seem that some of the effects attributed to rents, particularly in terms of increases in inflation and drops in reserves, might be due instead to the oil price shocks that occurred in those same years. But oil price dummies were not significant when introduced, and did not substantively change the estimated coefficients on rents, except in the case of Barbados as described below.

A number of caveats should be made initially. Data for these small economies are quite limited and of uneven quality. Only international data are used, to ensure comparability. All macroeconomic data are drawn from International Financial Statistics data tapes and International Financial Statistics Yearbook, 1993 and selected years. The number of observations in the estimations below varies from less than 15 to 30, precluding the specification of macroeconomic models relating the variables to each other through systems of behavioral equations and identities, or a thorough investigation of lag structures.¹⁷ Thus while point estimates and significance levels are mentioned throughout the following discussion the numbers should be viewed as indicative, rather than predictive. True economic significance rests only with the entire exercise, viewed as a whole. Below, significant point estimates are denoted in the narrative by stars, with * indicating significance at the 10 percent level, ** at the 5 percent level, and *** at the one percent level. All estimates were derived using ordinary least squares, corrected for autocorrelation where indicated below by "AR1," utilizing the MICROTSP program.

In all equations below, rents were entered in contemporaneous fashion and with lags of one, two, and three years. Insignificant lags were then dropped, unless their presence either significantly altered the values of other coefficients or improved the F-statistic or log of the likelihood function of the regression.

17 The speed of impact of rents on macroeconomic variables may be different for different variables and countries, and there is little theory to appeal to for guidance. Thus contemporaneous rents and three lags were tried for each regression, but insignificant lags were dropped, if their removal increased the explanatory power of the regression (both the F-statistic and the adjusted R^2), in order to increase the precision of the other estimates.

Barbados

Barbados sets the common theme, but in many cases the coefficients are not significant. Thus the results will be reported more in narrative form than as a list of equations with regression coefficients. This is somewhat surprising, as Barbados is one of the more sugar-dependent economies in the sample, with a ratio of sugar exports to total exports that peaked at 44 percent, and sugar exports peaking a 13 percent of GDP. Barbados is a rather high cost producer, the second highest in the five country sample and about third in the sample of 17.

The evidence below is interesting but weak, with rents positive but insignificant in the initial period, and negative* with a two period lag.¹⁸ But notice that the oil dummy is positive and highly significant. We cannot rule out the possibility that, for an oil importing country like Barbados, the oil dummy is picking up some effect of the sugar price rise not captured in the rents estimates.

$$GROWTH = 0.077 + 0.095 \cdot R/GDP - 0.564 \cdot R/GDP(-2) + 0.129 \cdot OILDUM$$

(t-stat) (5.5)*** (0.2) (-1.8)* (4.4)***

$$R^2 = 0.63, \text{ adj}R^2 = 0.56, D.W. = 1.8, F = 8.98, N = 20.$$

Savings and investment appears to be the main channel for the impact of rents on growth. Below, one of two alternative formulations of the relationship between the savings rate (1-consumption) and rents is shown, the relationship with the rent share of GDP. The pattern is similar for the basic rents data, but the interpretation of coefficients is more straightforward in the regression below. The basic pattern of a contemporaneous increase in savings (decrease in consumption) of an insignificant magnitude, followed by significant declines in savings with lags of two and three years, holds whether rents are specified in dollar terms or as a share of GDP.

$$C/GDP = 0.813 - 0.566 \cdot R/GDP + 0.930 \cdot R/GDP(-2) + 1.153 \cdot R/GDP(-3)$$

(t-stat) (21.7)***(-1.3) (2.5)** (4.0)***

¹⁸ Lags are indicated by the negative number in parenthesis after the variable.

$$R^2=0.86, \text{ adj}R^2=0.82, D.W.=2.0, AR(1)=0.77 (9.8), F=20.00, N=18.$$

A one percentage point increase in the rent share of GDP would initially raise the savings rate slightly, but would reduce it by about a full percentage point both two and three years hence. Investment follows the opposite pattern, falling initially by half a percentage point in the year of the one percentage point rent increase, but rising the following year to partially offset the decline. This unique pattern suggests that domestic savings may have left the country as capital flight (or merely financial savings recycled abroad by multinational banks) in high rents years, rather than contributing to domestic investment. Note that both capital inflows and growth figure prominently in the determination of the investment rate, thus the rents have secondary impacts to the extent that they influence those variables, as detailed above and immediately below.

$$I/GDP = 0.177 - 0.528 \cdot R/GDP + 0.321 \cdot R/GDP(-1) + 0.21 \cdot GROWTH + 0.514 \cdot CAP/GDP$$

$$(t\text{-stat})(16.1)^{***}(-2.4)^* \quad (1.8) \quad (3.1)^{**} \quad (3.6)^{***}$$

$$R^2=0.77, \text{ adj}R^2=0.66, D.W.=1.85, F=7.43, N=14.$$

Belize

Belize is another small, sugar-dependent economy that should be a good test of the impact of rents on the macroeconomy. The peak ratios of sugar in total exports and sugar revenues to GDP were 65 percent and 12 percent, respectively. Its ratio of trade to GDP places it in the middle of the sample.

Growth is impacted somewhat differently by sugar rents in Belize. The initial impact is strongly positive, and that positive impact is reduced but not reversed by a fall in the following year.

$$GROWTH = 0.098 + 0.008 \cdot RENTS - 0.006 \cdot RENTS(-1) + 0.036 \cdot OILDUM$$

$$(t\text{-stat}) \quad (8.2)^{***} \quad (4.5)^{***} \quad (-4.0)^{***} \quad (1.2)$$

$$R^2=0.74, \text{ adj}R^2=0.68, D.W.=2.4, F=12.97, N=18.$$

Two other strong relationships are found in the data, but neither adequately explains the impact of rents on growth. Rents and lagged

rents both appear to spur import demand, over and above a strong relationship with the level of GDP. But care must be taken in interpreting the coefficients, since rents have both a direct impact (given by the estimated coefficients) and an indirect impact, that can be approximated from the coefficient on growth above and the coefficient on GDP below, when the mean of the growth and GDP series are known. In the absence of a consistent model, let us just say that the true impact of rents on imports is higher contemporaneously and lower with a lag than the estimates shown here. The highly significant coefficient on GDP is interesting, as it indicates that imports are positively related to the square of GDP. There are two possible explanations. If imports are largely luxury goods and demand is of the Stone-Geary type (income above that needed for subsistence levels of consumption of food, clothing, housing, etc. is spent in fixed proportions on all goods available, including imports), then naturally the marginal propensity to import out of increases in per capital income would be much higher than the average propensity to import, making the squared income term positive and significant. A second possibility is that GDP is a proxy for time, technological progress (especially in transportation, making imports relatively cheaper), and openness (the Caribbean countries, along with the rest of Latin America, liberalized their trade regimes in the 1980s).

$$IMP/GDP = 16.455 + 0.456 \cdot R/GDP + 0.713 \cdot R/GDP(-1) + 0.573 \cdot GDP$$

(t-stat) (1.0) (1.1) (1.7) (11.5)***

$$R^2 = 0.96, \text{ adj}R^2 = 0.95, D.W. = 1.8, AR(1) = 0.71 \text{ (3.5)}, F = 83.93, N = 18.$$

Rents also appear to be anti-inflationary, once the effects of growth, money supply, and reserves are taken into account. Again, the direct impact in the first period is augmented by a secondary effect through growth, which can be estimated at 10 to 15 percent of the direct effect, making the total impact marginally significant.

$$CPI = 85.66 - 0.398 \cdot RNTS - 0.765 \cdot RNTS(-2) + 0.111 \cdot M2 - 56.35 \cdot GROWTH + 0.17 \cdot RES$$

(t-stat) (41.2)*** (-1.9) (-4.4)*** (4.0)*** (-2.6)** (2.8)**

$$R^2 = 0.98, \text{ adj}R^2 = 0.97, D.W. = 2.0, F = 72.28, N = 12.$$

Dominican Republic

The Dominican Republic also recorded a high ratio of sugar exports in total exports (64%), although its peak ratio of sugar revenues to GDP is a representative 10 percent. This reflects the fact that its economy is larger and less open than the previous two, but still rather dependent on sugar. Few coefficients are significant, and the results will be presented in narrative form.

Total reserves seem unaffected by rents, and only a slight positive correlation between consumer prices and rents (with a one period lag) is observed in the data. Capital inflows do increase sharply with rents, however, with the 64 cent/dollar contemporaneous increase only slightly eroded by negative lagged effects, leaving a net increase of 50 cents/dollar.

The strongest contemporaneous correlation between rents and revenues is found in the Dominican Republic data. Perhaps the government is extremely effective in capturing those rents. The coefficient is 0.92^{***} to 0.98^{***} , indicating that revenues rise virtually dollar for dollar with rents. Expenditures rise more slowly, allowing the deficit to fall by about 30 cents on the dollar. A year later, there is no impact on the deficit.

Investment and savings are not significantly affected by rents, although the signs of the coefficients are consistent with the evidence for other countries. Investment rises contemporaneously, then falls in the two subsequent years. The savings rate increases slightly, then falls. There is no indication of a direct impact of rents on GDP or growth.

Guyana

With a total GDP of under \$400 million, Guyana is the smallest of the economies studied here. It is an active trader, however, and the sum of its imports and exports varies considerably between one and two times its GDP. Guyana is the most sugar-dependent country in the sample in terms of peak ratio of sugar revenue to GDP (35%). As it is an extremely small, open economy, even by the standards of the countries in this sample, the peak ratio of sugar in exports is only slightly higher, at 48 percent. Sugar rents strongly impact its macroeconomy, as detailed below, although often with a lag. In fact, Guyana's economy grew with sugar through 1976, then collapsed with

the subsequent nationalization and price decline. GDP shrank by 37 percent in real domestic currency terms and by much more in dollar terms between 1976 and 1990, and inflation skyrocketed after 1980.

Two regression equations showing the relationship between rents and economic growth are presented, as the functional form seems to affect the magnitude of the coefficients, although not the basic pattern. It is clear that contemporaneous rents have a strong positive relation to growth, and the impact of lagged rents is negative, although whether the negative terms are significant and whether the lagged negative effects are larger or smaller than the initial positive relationship cannot be determined. Note that the nationalization dummy in the second equation (NDM) is negative and significant; it appears that the impact of nationalization was to reduce the average growth rate by 4.6 percentage points (i.e. from an average of 3.1 percent to -1.5 percent!). There is also weak evidence that the nationalization made the economy more sensitive to rents; when the second equation is run with a "slope dummy" (NDM•RNTS), the coefficient is positive but not significant.

$$GROWTH = -0.004 + 0.409 \cdot R/GDP - 0.289 \cdot R/GDP(-2) - 0.190 \cdot R/GDP(-3)$$

(t-stat) (0.2) (3.4)*** (-2.5)** (-1.54)

$$R^2 = 0.58, \text{ adj}R^2 = 0.49, \text{ AR1} = 0.46 \text{ (2.3)}, \text{ D.W.} = 1.8, \text{ F} = 6.87, \text{ N} = 25.$$

$$GROWTH = 0.031 + 0.001 \cdot RNTS - 0.00025 \cdot RNTS(-2) - 0.00037 \cdot RNTS(-3) - 0.046 \cdot NDM$$

(t-stat) (1.6) (4.4)*** (-0.9) (-1.4) (-1.8)*

$$R^2 = 0.63, \text{ adj}R^2 = 0.55, \text{ AR1} = 0.27 \text{ (1.4)}, \text{ D.W.} = 2.3, \text{ F} = 7.29, \text{ N} = 25.$$

Rents, together with GDP growth, are important in explaining both capital inflows and changes in reserves. Rents boost capital inflows by about 60 cents*** per dollar of rents contemporaneously, but capital inflows then fall by about 50 cents** with a three year lag. Lagged growth is positively related to loan inflows. Reserves increase by 27 cents** per dollar of rents initially, and by another 15 cents with a one period lag, after correcting for the affects of growth and the exchange rate.

Another potential channel for the impact of rents on growth is public finance. As shown in the three equations below, rents have a

strong negative correlation with both expenditures and revenues in Guyana, but the net effect of rents is a negative correlation with the deficit. This is consistent with Guyana's strong economic performance during the period of rising rents and disastrous performance as rents fell in the 1980s. Note also that nationalization increased both expenditures and revenues (increased the size of government), but the net affect was to substantially increase the deficit. The negative partial correlation between GDP and expenditure is quite rare, indicating a strong countercyclical tendency in spending.

$$SPND = 423.1 - 2.07 \cdot RNTS - 2.07 \cdot RNTS(-1) - 3.01 \cdot RNTS(-2) + 687.0 \cdot NDM - 0.178 \cdot GDP$$

$$(t-stat) \quad (1.2) \quad (-6.2)^{***} \quad (-5.1)^{***} \quad (-4.2)^{***} \quad (2.7)^{**} \quad (-3.6)^{***}$$

$$R^2 = 0.99, \text{ adj}R^2 = 0.99, AR1 = 0.76 \text{ (3.7)}, D.W. = 1.43, F = 479.4, N = 26.$$

$$REVEN = -0.64 \cdot RENTS - 1.21 \cdot RENTS(-2) + 227.7 \cdot NDM + 0.179 \cdot GDP$$

$$(t-stat) \quad (-8.0)^{***} \quad (-4.9)^{***} \quad (4.3)^{***} \quad (8.8)^{***}$$

$$R^2 = 0.99, \text{ adj}R^2 = 0.99, D.W. = 2.1, F = 3601.5, N = 27.$$

$$DEF = 146 - 1.04 \cdot RNT - 1.96 \cdot RNT(-1) - 2.43 \cdot RNT(-2) - 1.38 \cdot RNT(-3) + 588 \cdot NDM - 0.37 \cdot GDP$$

$$(t-stat) \quad (1.6) \quad (-5.7)^{***} \quad (-8.7)^{***} \quad (-6.9)^{***} \quad (-3.8)^{***} \quad (4.3)^{***} \quad (-15.4)^{***}$$

$$R^2 = 0.97, \text{ adj}R^2 = 0.95, AR1 = 1.06(5.1), AR2 = -0.62(-3), D.W. = 2.0, F = 54.4, N = 24.$$

Guyana follows the normal pattern for the impact of rents on savings, although both the contemporaneous savings increase and the larger lagged decline are statistically insignificant, once the impact of public savings (the deficit) on total savings is taken into account. Rents first improve then reduce the trade balance, by approximately equal amounts. GDP has the expected negative sign, as exogenous increases in income increase the demand for imports and reduce the exportable surplus.

$$TRADEB = 47.3 + 0.44 \cdot RENTS - 0.41 \cdot RENTS(-1) - 0.095 \cdot GDP$$

$$(t-stat) \quad (1.8)^* \quad (2.8)^{**} \quad (-2.4)^{**} \quad (-3.6)^{***}$$

$$R^2 = 0.60, \text{ adj}R^2 = 0.51, AR1 = -.037 (-1.65) D.W. = 2.36, F = 6.45, N = 22.$$

Jamaica

Jamaica is the second largest economy in the sample, with a GDP of \$3.5 billion. As such, its macroeconomic data is more reliable and complete than those of the countries with smaller economies. But unlike the largest economy, the Dominican Republic, it is very open to trade, with a trade share of GDP [(exports+imports)/GDP] of about 0.75. Sugar is moderately important to the Jamaican economy, with peak shares of exports of 18 percent and GDP of five percent.

Again, two equations are given for the impact of rents on growth. The first covers the period from 1975 to 1985 only, while the second covers the years from 1966 to 1989. In the first, the positive coefficient on contemporaneous rents is similar in absolute value to the negative lagged coefficient. But over the entire period, the absolute value of the lagged negative effect is more than twice as large as the initial positive impact. The other difference between the two equations is that the government deficit shows a weak positive correlation with growth for the few years that data are available. The surprising negative partial correlation coefficient between capital inflows and growth is discussed below.

$$GROWTH = -0.445 + 0.123 \cdot R/GDP - 0.146 \cdot R/GDP(-3) - 0.0012 \cdot CAP + 0.0005 \cdot DEF$$

(t-stat) (-2.0)* (1.2) (-2.2)* (2.9)** (-1.6)

$$R^2 = 0.69, \text{ adj}R^2 = 0.49, D.W. = 1.54, F = 3.36, N = 11.$$

$$GROWTH = -0.076 + 0.036 \cdot R/GDP - 0.087 \cdot R/GDP(-2) - 0.0009 \cdot CAP$$

(t-stat) (-1.2) (1.2) (-3.0)*** (-2.8)**

$$R^2 = 0.40, \text{ adj}R^2 = 0.32, D.W. = 1.6, F = 4.53, N = 24.$$

The data for Jamaica illustrate an interesting point. Although private capital flows follow private profitability, official lending for stabilization or balance of payments support ("bail-out" loans that are proportional to the magnitude of the macroeconomic problems) cause the coefficient of GDP on overall capital inflows to be negative, although a bit smaller than the coefficient on "other capital flows" (primarily lending) given below. With obvious restrictions on investment in the rent generating sector due to nationalization, rents

are more strongly related to lending as well, as an indicator of repayment potential.

$$\begin{aligned} OTHERCAP = & 34.7 + 1.83 \cdot RENTS - 2.52 \cdot RENTS(-3) - 367.5 \cdot GROWTH \\ (t-stat) & \quad (1.3) \quad (2.4)^{**} \quad (-2.9)^{***} \quad (-4.0)^{***} \\ R^2 = & 0.50, \text{ adj}R^2 = 0.43, D.W. = 2.0, F = 7.22, N = 26. \end{aligned}$$

In an exception to the completeness of the data for Jamaica, only 10 years of government finance and spending data are available, not enough to draw even the most tentative conclusions. Partial correlation coefficients between rents and the consumer price index indicate a reduction in consumer prices initially** and with a two year lag*, but there is a rise after three years**.

$$\begin{aligned} CPI = & 81.8 - 0.048 \cdot RNTS - 0.043 \cdot RNTS(-2) + 0.055 \cdot RNTS(-3) + 0.012 \cdot M2 - 0.0034 \cdot RGDP \\ (t-stat) & (1.3) \quad (-2.5)^{**} \quad (-1.8)^* \quad (2.2)^{**} \quad (4.1)^{***} \quad (-1.7) \\ R^2 = & 0.99, \text{ adj}R^2 = 0.99, AR1 = 0.94 \quad (5.8), D.W. = 2.3, F = 488.9, N = 23. \end{aligned}$$

5. Conclusions

The empirical results presented above are highly suggestive but clearly incomplete and inconclusive. Lack of data, especially on public finance and capital flows, and possibly poor quality data severely hampers the attempt to measure subtle and often indirect effects. Yet a few consistent patterns are found in the estimates above. Rents generally drive growth in the short run, by increasing the savings rate and drawing in private and official capital flows. They may also improve the trade balance initially, further contributing to economic expansion and/or the accumulation of foreign reserves. The initial impact on public finances is likely to be positive as well. But with a lag of between one and three years, most of the positive impacts of rents are diminished or even reversed. Consumption, government expenditure, and imports rise, while capital inflows fall, leading to a negative impact on growth. These findings are consistent with other work by the author on Latin American rents, but curiously in many instances the impacts on these small, sugar dependent economies are not as strong as those on the larger, resource rich countries of Latin America. One possible explanation is that their small size and relative

openness worked in their favor, making infeasible the inward-looking import substitution policies to which oil and other resource rents were channelled in much of Latin America.

Resource rents can be an important source of foreign exchange, savings for public and private sector investment in and outside the rent generating sector, and DFI, with attendant technology transfers. On the other hand, they can lead to deindustrialization, improper sequencing of industrial development, overborrowing, relative expansion of the public sector (especially in spending, but also in terms of its role in the production of goods and services), inflation, overvaluation of the currency, distortions in the relative price of labor to capital, unrealistic expectations and resultant political pressures from producers and consumers, social stratification and rigidities, income and wealth inequality, conspicuous consumption, particularly through imports and travel, etc. In summary I refer again to figure 1 as an attempt to trace some of the important economic linkages from rents to growth through various macroeconomic variables, as indicated by the regression results above. Further research, both in economics and perhaps other fields such as sociology and psychology, is necessary to fully explain both the formation and impact of government policies in resource-rich countries, and their relatively poor economic performance over the past two decades.

TABLE 2
IMPACT OF RENTS ON GDP GROWTH--SUMMARY

COUNTRY		RENTS	RENTS-1	RENTS-2	RENTS-3
BARBADOS	(R/GDP)	+0.095	_____	-0.564	_____
BELIZE	(RENTS)	+0.008	-0.006	_____	_____
DOM. REP.		_____	_____	_____	_____
GUYANA	(R/GDP)	+0.409	_____	-0.289	-0.190
	(RNTS)	+0.001	_____	-0.00025	-0.00037
JAMAICA					
(1975-85)	(R/GDP)	+0.123	_____	_____	-0.146
(1966-89)	(R/GDP)	+0.036	_____	-0.087	_____

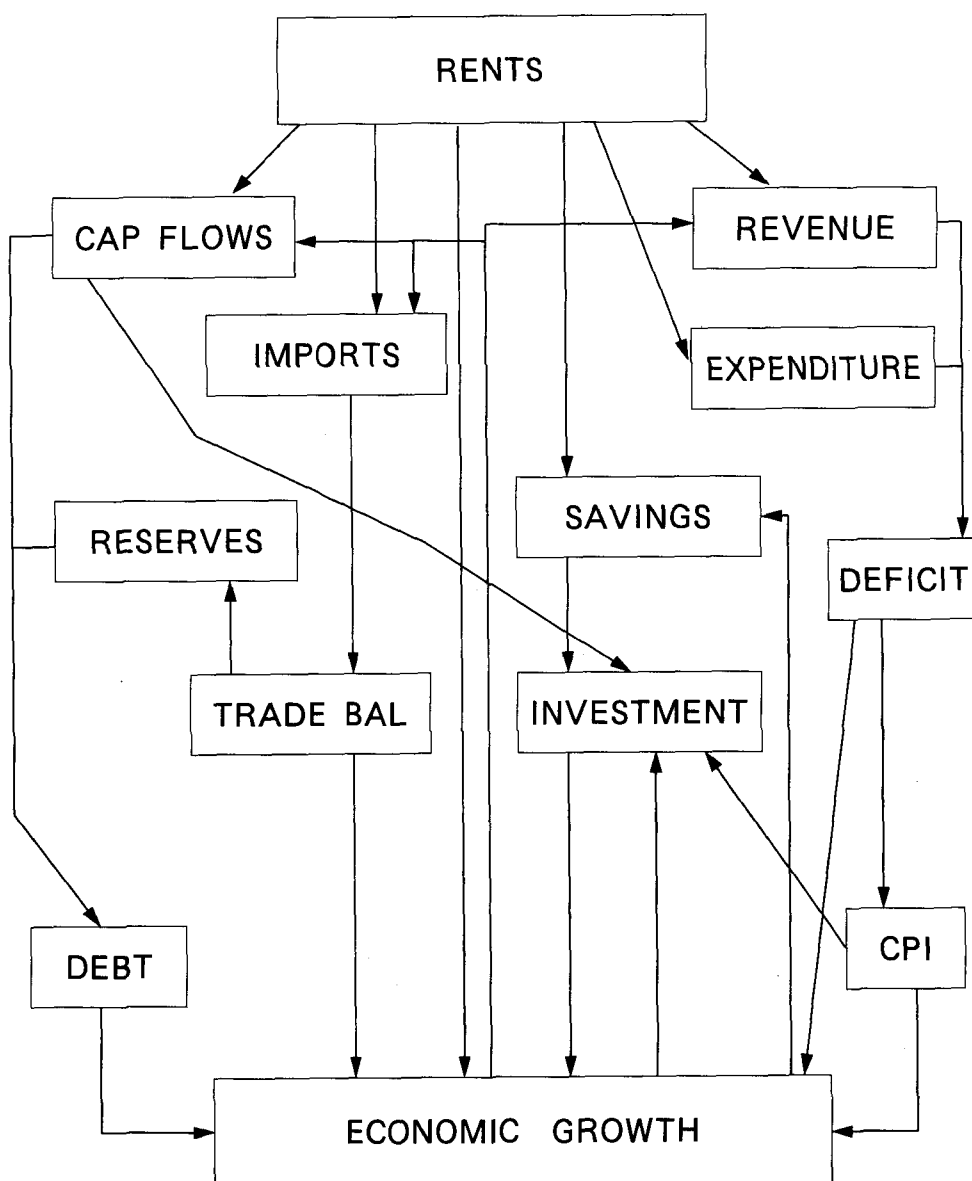


FIGURE 1

References

- [1] Abbott, George, *Sugar*, New York, NY: Routledge, 1990.
- [2] Anderson, Kym, and Rod Tyers, "Agricultural Policies of Industrial Countries and Their Effects on Traditional Food Exporters," *Economic Record*, 62, Dec. 1986: pp. 385-99.
- [3] Bhagwati, Jagdish, "Directly Unproductive, Profit-seeking (DUP) Activities," *Journal of Political Economy*, 90(5), Oct. 1982.
- [4] Borrell, Brent and Ronald Duncan, "A Survey of the Costs of World Sugar Policies," *The World Bank Research Observer*, 7(2), July 1992: pp. 171-94
- [5] Borrell, Brent, Robert Sturgiss, and Gordon Wong, "Global Effects of the U.S. Sugar Policy," BAE Discussion Paper 87.3, Canberra: Australian Government Publishing Service, 1987.
- [6] Bureau of Agricultural Economics, *Agricultural Policies in the European Community: Their Origin, Nature and Effects on Production and Trade*, Policy Monograph 2, Canberra: Australian Government Publishing Service, 1985.
- [7] Connell, Rice and Sugar Co. Inc., *World Sugar: Capacity, Cost and Policy*, New Jersey, 1977.
- [8] Food and Agriculture Organization, "FAO Trade Yearbook," Rome: FAO of the UN, volumes 16-45, 1963-1992.
- [9] International Monetary Fund, "International Financial Statistics Yearbook 1993," Washington D.C.: IMF, 1993 and selected years.
- [10] International Sugar Organization, "Sugar Production Costs: A Summary," Mimeo, London: ISO, (undated).
- [11] Krueger, Anne, "The Political Economy of the Rent-seeking Society," *American Economic Review*, 64(3), June 1974: pp. 291-303.
- [12] Landell Mills Commodity Studies, *World Sugar Trade and U.S. Sugar Policy*, Washington D.C.: Congressional Research Service, 1985.
- [13] Matsuyama, Kiminori, "Productivity, Comparative Advantage and Economic Growth," NBER Working Paper #3606, 1991.
- [14] McCleery, Robert, "Resource Rents in Economic Development: Boon or Bane?," Mimeo, East-West Center, Honolulu, HI, 1989.
- [15] Perez-Lopez, Jorge, *The Economics of Cuban Sugar*, Pittsburgh, PA: University of Pittsburgh Press, 1991.
- [16] Ranis, Gustav, "Towards a Model of Development for the Natural Resource Poor Economy," Yale Economic Growth Center Discussion Paper #529, Feb. 1987.
- [17] ———, "East and Southeast Asia: Comparative Development Experience," *Bangladesh Development Studies*, 20(2-3), June-Sept. 1992: pp. 69-88.
- [18] Sturgiss, Robert, Heather Field, and Linda Young, "1990 and U.S. Sugar Policy Reform," ABARE Discussion Paper 90.4, Canberra: Australian Government Publishing Service, 1990.
- [19] ———, Peter Connell, and Peter Tobler, "Japanese Sugar Policy and its Effects on World Markets," ABARE Occasional Paper 104, Canberra: Australian Government Publishing Service, 1988.
- [20] Sudaryanto, Tahlim, "The Potential Impacts of Liberalized Trade Policies in

- the United States and the European Community in International Markets for Sugar," Ph.D. thesis, North Carolina State University, Raleigh, 1987.
- [21] United Nations, "International Trade Statistics Yearbook," New York, NY: UN, selected years 1960-1992.
- [22] Urrutia, Miguel, and Setsuko Yukawa, eds., *Economic Development Policies in Resource-Rich Countries*, Tokyo: United Nations University, 1988.
- [23] Wong, Gordon, Robert Sturgiss, and Brent Borrell, "The Economic Consequences of International Sugar Trade Reform," ABARE Discussion Paper 89.7, Canberra: Australian Government Publishing Service, 1989.

THE INFLUENCE OF PRODUCT DEVELOPMENT STRATEGY ON INTER-PROJECT LEARNING

Kentaro NOBEOKA

1. Introduction

Large manufacturers usually have at least several product lines and constantly undertake multiple development projects to add new product lines or to replace existing products. The ultimate goal of these firms is not only to develop a single product effectively and efficiently, but to develop a successful stream of new products over many years. Therefore, it is an important issue for firms to gain technical knowledge in a new product development project and to transfer and utilize it effectively in other subsequent projects. In order to facilitate effective learning among multiple projects over time, firms need the appropriate strategy and organization. This study explores one aspect of this broad range of issues in inter-project learning by focusing on two different learning strategies with respect to linkages between pairs of related product development projects.

This paper explores two different design and knowledge transfer strategies, each of which provides a unique learning setting: "concurrent design transfer" and "sequential design transfer" strategies. In the concurrent design transfer strategy, a new project transfers technical knowledge that is being developed in another ongoing project within the firm, while these two projects coordinate through actual interactions. On the other hand, in the sequential design transfer strategy, a new product development project utilizes technical knowledge that has already been accumulated in past projects. This paper discusses the advantages of the first strategy, the concurrent design transfer strategy, in learning and transferring technical knowledge within the firm.

There have been many studies focusing on the efficient and effective management of new product development projects (Cohen, et al., 1979; Quinn and Mueller 1982; Imai et al., 1985; Gold, 1987; Gomory

1989; Gupta and Wilemon, 1990; Womack et al., 1990; Clark and Fujimoto, 1991; Cusumano, 1991; Cordero, 1991; McDonough III and Barczak, 1991; von Braun, 1991; Leonald-Barton and Sinha 1991; Crawford, 1992). Most of these studies have focused on the importance of cross-functional coordination to achieve high productivity, speed, and design quality of a development project. One common finding across these studies is that, in order to shorten the development lead time and to achieve high productivity, a relatively project-oriented organization with strong cross-functional coordination is essential. Even though this approach enhances cross-functional learning within a project, it may not necessarily be appropriate for inter-project learning. There have been few studies that have explored the importance of the management of the inter-project linkages for effective learning among multiple development projects.

The management of inter-project knowledge transfer and learning has become critical for many manufacturers in recent years. Various studies have reported that leading manufacturers in many industries, particularly Japanese manufacturers, tend to develop new products faster and more frequently than competitors. This capability results in shorter product life cycles and a corporate ability to broaden product lines if desired (Abegglen and Stalk, 1985; Dertouzos et al., 1988; Womack et al., 1990; Stalk and Hout, 1990; Peters, 1992). The primary focus of these studies has been the speed and the frequency of new product introductions at the corporate level, rather than the efficiency and the productivity of individual projects. These studies have argued that this difference in the frequency and the effectiveness of completing multiple projects has been one of the major reasons, along with manufacturing skills, for the growth of Japanese manufacturers in global markets. In recent years, however, even Japanese manufacturers have become more concerned with efficiency in developing an accelerating flow of new products. They have faced severe profitability problems that are related at least in part to the high costs of developing and manufacturing so many new products or product variations in markets such as automobiles and consumer electronics. In most primary markets for these goods, demand has slowed or even declined. Firms are vigorously trying to improve their efficiency at developing multiple new products while maintaining both a high frequency of new product introductions and high design quality

across individual projects. The effective inter-project learning among a stream of new product projects is essential to achieve this goal.

High levels of engineering productivity in individual projects alone may contribute to making a firm more effective in product development. But, effective transfers of technologies and knowledge from one project to others should increase the efficiency of completing multiple projects and should decrease component costs for individual projects through inter-project synergy. The project-oriented approach alone has not provided insights into the management of the inter-project learning within the firm. Research that explicitly focuses on the effective management of inter-project learning among multiple new product development projects is needed. Because of increasingly intense international competition, this perspective has become a critical issue for competition in many industries (Fujimoto et al., 1992; Meyer and Utterback, 1993).

In addition, a body of studies have argued that effective management of a firm's special competencies or resources is one of the primary sources of a firm's competitiveness (Wernerfelt, 1984; Prahalad and Hamel, 1990). With respect to new product development, it is important for a firm to accumulate their unique competencies and quickly leverage these in other development projects. In order to implement this approach, appropriate inter-project learning strategy and organization is required.

In this study, we first propose a framework for two types of inter-project learning strategies. Using this framework, we hypothesize the relationship between these strategies and the efficiency of inter-project learning. This study measures learning efficiency using a productivity performance of a project that learns and utilizes technical knowledge from other projects. After we discuss the sample and measurements for the questionnaire survey in Section 3, Section 4 provides an evidence that concurrent design transfer strategy has a significant advantage in engineering hours, which indicates the superiority of the strategy as an inter-project learning setting. Section 5 discusses strategic and organizational implications from the survey results and from our field study.

2. Framework and Hypotheses

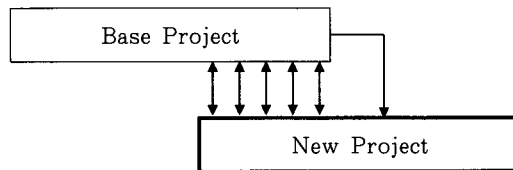
Multiple product development projects within a firm often have technological linkages or interdependencies with other past or on-going projects. It is important to manage the linkages appropriately to reuse or transfer technical knowledge acquired in one project to other projects within the firm. The management of these linkages is closely related to the inter-project learning capabilities of manufacturers.

There are two types of inter-project linkages that affect the mode of inter-project learning, as shown in Figure 1. In the first type, *concurrent design transfer strategy*, a new project begins to transfer technical knowledge and a design from a base project before the base project has completed its design engineering. In these two projects, the new project and the base project, inter-project learning activities could take place through direct communications and interactions, because the development efforts overlap chronologically. The second type, *sequential design transfer strategy*, transfers a design from a base project to a new project after the base model's development is finished¹. This type of project basically reuses an existing design that is "off-the-shelf." It may not be efficient or effective, compared to concurrent design transfer, because direct communications or interactions, design task sharing and mutual adjustments are not possible between the two projects². In addition, when a new project uses the technologies and design in this manner the design being transferred is already relatively old compared to designs which are transferred as a base model is being developed, as in concurrent design transfer.

1 The sequential design transfer strategy includes two different types. One is design transfer from one product line to another, and the other is that between a new generation of a product line and its previous generation.

2 This discussion of hypothetical differences between concurrent and sequential design transfer is partially based on Thompson's distinction between "intensive technology" and "long-linked technology," where the former also enables mutual adjustments and direct interactions. See Thompson, 1967.

(1) Concurrent Design Transfer Strategy



(2) Sequential Design Transfer Strategy

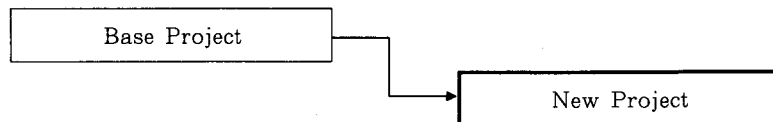


Figure 1 A Framework for Different Modes of Inter-Project Learning

For data analyses, we will focus on the transfer of technical knowledge and design of new platform design in new vehicle development projects, because it is a core system centrally located in automobile design and because it is difficult to transfer. We believe that the same framework can be applied to major components of most system products. A platform primarily consists of floor panels, a suspension system, a firewall and rocker panels. It defines the architecture of the automobile because the platform significantly affects the basic characteristics of the rest of the vehicle's components including the body structure, drive-train type and engine/transmission size. Platform design, from this perspective, is considered to be a "core" sub-system. This notion of the platform as the core sub-system of the automobile is widely shared by people in the industry, as well as by researchers studying the industry. The selection of a specific platform design determines the general level of design functionality and sophistication of the entire product. In addition, platform technology is one of the key areas in which most automobile manufacturers compete as they introduce newer designs and a higher level of performance. Not surprisingly, more financial and engineering resources are required to develop a new platform design than to develop most other components. Therefore, it is critically important for firms to transfer and utilize a newly developed platform design among multiple product development projects.

We hypothesize that projects utilizing concurrent design transfer

strategy may require fewer engineering hours than those utilizing sequential design transfer strategy. We believe that this measurement is one indicator of effective and efficient inter-project learning. Only through concurrent design transfer can knowledge be learned and transferred from a base project to a new project with mutual interactions and communication between the two on-going projects. Concurrent design transfer strategy facilitates effective task sharing and mutual adjustments between a base project and a new project, which we argue enhances an effective inter-project learning.

There are no differences in the effectiveness of design transfer and learning when the platform design of a base project is re-used without any modification, when it does not affect any other components within the new vehicle design. However, even when a new vehicle development project uses a preceding or an existing platform design as a base, first, it needs to modify the design to adjust to the requirements of a new development project. In order to modify the design, engineers in the new project must know the design processes through which engineers in the base project have reached the particular platform design, as well as design outputs such as design drawings. Engineers cannot easily modify designs through design drawings alone that have been created by some other people. This type of knowledge can be efficiently learned only from actual design and engineering activities while the base project is still active, unless there are comprehensive records of the design processes, which are usually not likely or possible.

Second, a new project also needs to develop new proprietary components for other parts of the new product's design. Linking technologies between the platform design and other components are complicated and differ between the base and the new projects. Therefore, it is likely that many potential problems are only identified after the new car project starts. Without overlaps among the base project and the new project, it is difficult to learn how the new project can avoid or solve problems that are related to the platform design being transferred. In the concurrent design transfer strategy, the platform design for the base project can even be modified according to the requirements for the new project, so that the design is suited for both projects and the efficiency of design transfer can be improved.

In addition, transferring and reusing an old design in a new project may not be efficient, particularly when engineers apply the old

design in developing the new project that targets new market competition and new customer needs. For example, Cusumano (1991) has argued that reusing existing designs in new software development without appropriate planning may have a negative impact on development productivity and quality. When there is a long time lag between a base project and a new project that transfers a design from the base project, it is less likely that there are specific plans for this design transfer during the base project.

Conceptually related to this discussion, numerous studies have provided evidence that mutual adjustments and interactions lead to greater efficiency and effectiveness in transferring technology from upstream functions to downstream functions (e.g., Cohen, et al. 1979; Quinn and Mueller 1982; Imai, et al., 1985; Leonard-Barton, 1988; Gomory 1989; Leonard-Barton and Sinha 1991; Tyre, 1991; Clark and Fujimoto, 1991). These studies have also argued that mutual adjustments are implemented when there are overlapping and intensive communications among multiple functions. In this way, the downstream functions can learn effectively and efficiently what the upstream functions do. The same concept may be applied to the case of learning among multiple projects.

3. Sample Characteristics and Measurements

In order to explore the advantages of concurrent design transfer strategy in inter-project learning, we surveyed 103 project managers of new car and truck development projects at seven Japanese and three U.S. firms. This questionnaire survey was conducted in the spring of 1992, and most of the projects surveyed were completed between 1986 and 1992. Among 103 projects we surveyed, 78 projects transferred and utilized a platform design as a base from other projects within the firm. Among these, we were able to obtain complete answers for 58 new vehicle projects to examine the learning efficiency. Our method for calculating engineering hours is explained in Appendix. We did not find any systematic differences between the data for the 58 projects and the total sample. This sample included 41 Japanese and 17 U.S. projects.

Questionnaires were distributed by one central contact at each company to project managers. The actual number of questionnaires distributed and the selection of projects were decided primarily by

those contact persons. The only guideline for consistency was to distribute the questionnaires to at most 15 project managers in each firm who had recently worked on relatively large new product projects. In the questionnaire, product variations such as different body types and trim levels which are developed within a distinct project are defined as a single product. Questionnaires were pre-tested with three project managers. In particular, we discussed with several project managers and engineers the definitions and measurements of engineering hours which are described in Appendix. Throughout our research project, including our data analysis stage, we conducted in-depth interviews with approximately 130 engineers and 30 project managers at five Japanese, three U.S., and four European firms between September 1991 and May 1993³.

Design Transfer Strategy Type

One survey question asked whether the platform design each project developed was new to the firm or based on a preceding design. New projects that developed their platform design without any base design were eliminated from the sample, because this study focused on different inter-project learning strategies. New projects based on a platform design of their direct predecessors, which were to be replaced by these new projects, were automatically categorized as sequential design transfer. Those projects based on the platform design of other product lines were categorized as either type. The determination of which category depended on the answer to a question that asked if there were overlaps and interactions between the new project and the base project with respect to platform design development. Additionally, a project meets the definition of a concurrent design transfer only if the project managers of the base project and the new project are different.

Project Content and Control Variables

It is always critically important to control for differences in project complexity in order to accurately compare engineering hours

3 During this research project, the author lived in Boston. The author's field study included three trips to Japan, one to Europe, and several to Detroit, augmented by numerous interviews around Boston with MIT's International Motor Vehicle Program participants.

across different projects. First, design complexity and newness are measured by the ratio of new versus carried-over components in two separate areas, body/interior and engine/transmission. The automobile design consists of three primary component groups: body/interior, engine/transmission, and platform. Therefore, these new component ratio variables cover the rest of the automobile design not contained within the platform. Second, many components in new product projects are completely new yet do not impart any new technical features, and should be distinguished from components that incorporate technology new to the firm. Therefore, in addition to the new component ratio, we also measured the innovativeness of each project by asking whether the technology used in each component area brought new technical features to the firm (yes=1, no=0). The average of the answers in these two areas was calculated to create an innovativeness index, which ranges from 0 to 1. Third, price in the market and the number of body types for each new product were also measured, because these may also significantly affect project complexity⁴. Finally, a vehicle type variable denotes whether a project is for a car or a truck, because the other design complexity variables used did not capture the different design and market characteristics for these two kinds of vehicles. We felt that such differences might potentially have an impact on project performance.

4. Survey Results

Table 1 summarizes the raw data on project content, and engineering hours for each different design transfer strategy type. The set of projects studied are, in general, relatively major projects as opposed to minor facelift projects, as indicated by the average percentage of new design ratio for body and interior components (88%). In other words, while these projects transferred system knowledge related to the platform design, they also developed new proprietary designs to differentiate for and to adjust the new products to their own targets.

With respect to design transfer strategy applied to platform

⁴ Clark and Fujimoto (1991) also used all of these control variables in their study. Our study intentionally uses their set of variables for product characteristics.

design, 18 of 58 projects (31% of all projects) followed the concurrent design transfer strategy, in which a platform design was transferred from other projects in progress to the new projects. The remaining 40 projects followed the sequential design transfer strategy. The average time lag between the new project and the base project with respect to project completion was 15.0 months for concurrent design transfer strategy and 75.7 months for sequential design transfer strategy. The difference in lags led us to believe that this question served to distinguish adequately between these two.

One of the critical characteristics of the sample data that must be controlled in a regression analysis is the nationality of the projects. As Clark and Fujimoto (1991) have argued, there are fundamental differences in productivity embedded in each region. Fifteen of the 18 projects that utilized concurrent design transfer strategy were Japanese, and 26 of the 40 projects that utilized the sequential design transfer strategy were Japanese firms. Engineering hours for concurrent design transfer projects and sequential design transfer projects are, on average, 0.72 and 1.98 million hours, respectively. This large difference may be partially explained by the difference in the nationality of the project. Many more Japanese projects, which were generally superior in productivity, were categorized into concurrent design transfer strategy. There are also some differences in project content between the different design transfer strategies, which we controlled for to accurately compare the impact of the strategy type on the project performance or the learning efficiency. For example, the average number of body types for a concurrent design transfer project was 1.7, while that for a sequential design transfer was 1.9. This difference may also explain the difference in the engineering hours in Table 1, so we controlled for it in our regression analysis.

Table 1 Data on Project Content and Project Performance

	Concurrent Design Transfer	Sequential Design Transfer	Total
# of Projects	18	40	58
Japanese	15	26	41
US	3	14	17
Price(\$)	16390(7920)	15880(7310)	16030(7430)
# of Body Types	1.7(0.5)	1.9(0.9)	1.8(0.8)
Truck/Van	4	7	11
New Design Ratio(%)			
Engine/Transmission	63(39)	58(37)	60(37)
Body/Interior	89(22)	87(26)	88(24)
Innovativeness Index(0-1)	0.33(0.38)	0.14(0.25)	0.20(0.31)
Engineering Hours (million hours)	0.72(0.48)	1.98(2.22)	1.58(1.95)

(Standard deviations are in parenthesis.)

Table 2 lists the regression analysis for engineering hours as related to type of design. Model 1 uses only basic control variables, including nationality, price, and vehicle type. In addition to these variables, Model 2 contains task complexity variables, including the number of body types, new design ratios for engine/transmission and body/interior components, and the innovativeness index. Model 1 shows that Japanese projects required far fewer hours, but were not influenced by product price or vehicle type. In Model 2, the results show that in addition to the difference in nationality, projects that developed more body types required more engineering hours. After controlling for all of these variables, Model 3 supported our hypothesis that new projects which use the concurrent design transfer strategy required significantly fewer engineering hours than did those using sequential design transfer strategy. We believe that this result, at least partially, has provided evidence of the efficiency of the concurrent design transfer strategy with respect to inter-project learning. We will discuss the potential reasons for this result further in the next section.

Table 2 Regression Analyses for Engineering Hours

Independent Variables	Model 1	Model 2	Model 3
Constnt	0.00	0.00	0.00
Nation (US=1, Japan=0)	0.56 ***	0.55 ***	0.47 ***
Product's Price (\$ in ten thousands)	-0.08	-0.06	-0.05
Vehicle Type (Car=0, Truck=1)	-0.04	-0.02	0.01
Project Task Complexity			
Number of Body Types		0.43 ***	0.42 ***
New Design Ratio% (Engine/Transmission)		0.06	0.03
New Design Ratio% (Body/Interior Components)		0.07	0.07
Innovativeness Index (0-1)		0.11	0.20
Inter-project Strategy Type of Platform Design			
1. Concurrent Design Transfer			-0.22 **
2. Sequential Design Transfer			
Adjusted Squared Multiple R	0.25	0.43	0.46
Sample Size	58	58	58

Coefficients are standardized.

Statistically Significant at: **5% Level, ***1% Level

Additionally, because the engineering hour data were collected for only the concurrent design transfer projects, and not for combinations involving concurrent design transfer projects and their preceding base projects, there may be questions regarding negative impacts to the base project. If these impacts are severe enough, the usefulness of the concurrent design transfer strategy might become suspect. In order to test this criticism, a question in the survey asked whether there was another following concurrent project with which the respondent's project shared the platform design, and with which there was significant overlap and interaction. The results showed that these concurrent projects (i.e., other concurrent design transfer projects) did not significantly add engineering hours to the respondent's projects (see Nobeoka, 1993 for the actual analysis). This leads us to believe that a concurrent design transfer project would not significantly impede a preceding base project.

5. Discussions and Implications

This section discusses some implications of the survey results on the two different learning settings. First, we suggest potential reasons

for advantages of the concurrent design transfer strategy for the inter-project learning, based on extensive interviews with project managers and engineers from our field study in Japan, the U.S., and Europe. Then we discuss appropriate organizational structure to manage concurrent design transfer projects using some cases from our field study, which include a strong control above project managers and a new type of matrix organization.

5-1 Efficient Learning Setting: Concurrent Design Transfer

There are at least several reasons why a concurrent design transfer strategy provided a more efficient learning setting. This was supported by its requiring fewer engineering hours than a project using sequential design transfer strategy⁵. In a concurrent design transfer, engineers can learn and transfer a design from a preceding base project to a new project more efficiently than in a sequential design transfer. There are two basic factors that may contribute to this difference. First, the time lag between the completion of a base project and that of a new project is much shorter in a concurrent design transfer project. Second, there are overlaps between the preceding base project and the new project only in the concurrent design transfer strategy. These two factors create specific advantages and disadvantages in productivity and inter-project learning in the two design transfer strategies. The first factor, the time lag between completion of a base project and that of a new project, may affect the difficulty of advanced planning and of learning and incorporating old designs into a new design architecture. The second factor, the overlap between a preceding base project and a new project, may influence the feasibility and the efficiency of inter-project communication. These issues are categorized into the following four areas; planned learning vs. ad hoc learning, learning enhancement through mutual adjustments, task sharing, and joint design, transfer from a "fresh" project vs. "dated" project, and role of a general manager for multi-project management.

5 Program managers and engineers we interviewed basically agreed with our following interpretations. However, some of these are still only hypotheses that should be studied further in detail.

Planned Learning vs. Ad hoc Learning

When a new project transfers and uses a platform from a preceding project, the new project usually needs to modify the base platform design to adjust it to the new project's proprietary architecture. The difference in design requirements for the platform design between the two projects may be caused by many factors, including differing customer needs and market segments. In addition, the methods for linking technologies between the platform and other components of the automobile design such as the exterior body are often different between the base product and the new product. Because, in our sample, body designs are different between the two products, as shown earlier in Table 1, this difference alone often requires adjustments to the base platform design.

It may be more efficient if advanced plans are made during the base project regarding the way in which a future project might use the base project's platform design. The time lag between a base project and concurrent design transfer project, 15 months on average, was much shorter than that between a base project and sequential design transfer project, which was 75.7 months on average. These long time lags may reflect circumstances in which the base platform was designed without any plan or consideration for a potential transfer to other future projects. A question in this survey asked the program managers about the timing of decisions to make use of the base platform designs in the new projects. In only 33% of the projects following sequential design transfer strategy had a decision been made about the usage of the particular base platform design before the base project was completed. Planned learning should be more efficient than ad hoc learning. It is a reasonable assumption that the shorter the time lag is, the more likely planned learning exists.

Learning Enhancement through Mutual Adjustments and Task Sharing

Even when there is an advanced plan during the base project which describes how a future project will modify and use the base project's platform design, there are often unexpected adjustments required during the new project. It is almost impossible to make accurate plans to modify the course of the base platform design to transfer it to the new project when there is such a long time lag between these two projects. It is difficult for engineers in the base

project to predict problems a future project may encounter in using the old platform design. In particular, many potential problems with respect to the linking technologies become evident only after the new project starts, because these problems may become more obvious only after the design of other components begins. Under this circumstance, the effectiveness and the efficiency of inter-project learning should be improved by inter-project overlap.

There are three patterns of inter-project interactions, all of which should positively improve learning. First, whether or not there are such advanced plans, and partly because of interdependencies between component sub-systems, adjustment and learning processes are so complicated that they can be more efficiently done through multiple iterations of feedback between the two projects. Only in concurrent design transfer projects can the engineers designing components implement mutual adjustments with base projects through an extensive communication⁶.

Second, in addition to the mutual adjustments, because of the overlap and other interactions, these two projects also can effectively share engineering tasks and resources (task sharing). For example, in our interviews, some engineers explained that the same testing prototype can only be shared by multiple interrelated projects for data collection, when engineers in both projects cooperate closely. Third, in other cases, engineers from the two projects can jointly work on certain engineering tasks as a group (joint design). Mutual adjustments, task sharing and joint design with a base project, all of which can be appropriately implemented only in a concurrent design transfer project, may have contributed to the efficiency of inter-project learning.

In sequential design transfer projects, engineers in a new project must often learn technical knowhow and design from base projects through design drawings and specifications, because the base projects were already completed and the engineers for the base projects may have already started working on other projects. Some of these engineers may even have already left the firm. Therefore, it can be difficult for engineers on the new project to find and communicate with

6 By definition of our categorization scheme for the design transfer strategy types, explained earlier, only in concurrent design transfer projects did engineers have overlap and actual interactions with engineers on other projects from which platform designs were transferred.

engineers who worked on the old base platform design. It may not be convenient for engineers who designed the base platform design to help the engineers on the new project understand the base design. Moreover, engineers for the completed base project may not have enough motivation to cooperate with the engineers for the new project, particularly when they have already started working on other projects that have nothing to do with the new project. From these perspectives, inter-project learning may be difficult in the sequential design transfer strategy.

These issues are important because face-to-face learning is much more efficient than learning through specifications and drawings, particularly regarding some types of knowledge. Some engineers in our interviews mentioned that, in order to modify a base design, they often need more knowledge than that which could be found in standard drawings or in CAD data. For example, the relationship between modifications in design and consequent changes in functionality is not shown in the drawings. Only engineers who actually worked on the base design may have that kind of information in their minds or notes. Knowledge about the base design that engineers in the new project may need to modify and adjust the base design to fit the new project may also include other types of intangible or tacit understanding. It is difficult for them to learn that kind of knowledge without actual overlap and interactions with engineers familiar with the base platform design (Nonaka, 1990 ; von Hippel. 1990).

Transfer from "Fresh" Projects vs. "Dated" Projects

There are also fundamental problems with learning from a "dated" project. As mentioned earlier, in the projects using a platform design that has already been developed or is being developed as a base, other components such as body and interior components are often newly developed. This mixture may create some difficulties in linking the old platform design with new designs in other parts of the automobile. For example, over the past decade, the usage of CAD in design has become more extensive each year. The old designs might have been drawn on paper, instead of using a CAD tool, which has become common only in the last several years. One other example is the increasing use of plastic or aluminum materials for the body panels, which may not fit appropriately with older platform designs.

Some engineers in our interviews also commented that design requirements evolving from customer needs, market competition, or governmental regulations often change after the original design is completed, especially when the time lag between the completion of the base design and its transfer to the new project is long. In other words, engineers have to learn technical knowhow from relatively new projects in order to utilize it effectively. The sequential design transfer may not have been appropriate from this perspective, because the time lag was too long.

Role of a General Manager for Multi-Project Management

Finally, there is another organizational factor that may differentiate the learning effectiveness of concurrent design transfer from the sequential design transfer. There are usually general managers or vice presidents above the project managers responsible for product development. These higher-level general managers are sometimes called platform managers, and have responsibility for multiple new product projects. They are likely to be responsible for both a base project and a concurrent design transfer project, because the time lag between these projects is short. On the other hand, when the time lag is long, it is less likely that the same general manager is responsible for both a base project and a sequential design transfer project. This difference in leadership may affect the efficiency of learning between the two projects. For example, a general manager is likely to consider the total productivity of the base project and the concurrent design transfer project together, while such concern is less likely if he or she expects to move on before a related follow-on project begins. In other words, the shorter the time lag between multiple interrelated projects, the greater the potential benefit to a single strong general manager who might lead and manage the inter-project learning⁷.

As briefly discussed in Section 2, some of the perspectives in the discussions above about the efficiency of concurrent design transfer are analogous to efficiency in managing overlaps among different functions. Multiple functions, at least to some extent, have a sequential nature in

⁷ A similar argument could be made not only for general managers, but also for other key functional engineering personnel who are responsible for component engineering on multiple projects.

terms of tasking. Managing overlaps among multiple functions such as described by the term "simultaneous engineering" can lead to negative implications due to the necessarily sequential nature of some tasks. On the other hand, by managing the overlap among multiple projects, via "concurrent design transfer", a firm may avoid these types of negative influences, as long as these projects coordinate with each other and mutually adjust their designs. We believe that this lack of negative implications also at least partially explains why our results demonstrated a strong gain in project productivity or learning efficiency through concurrent design transfer.

5-2 Organizational Structure: Multi-Project Management

We have argued that in order to enhance inter-project learning, firms should effectively manage multiple concurrent projects. In order to achieve this goal, there should be an appropriate organizational structure. One of the critical issues related to organizations is that firms must not decrease the integrity of each project while they encourage inter-project learning. The importance of the cross-functional integrity within each project can never be underestimated, because of the system characteristics of the vehicle products. From this perspective, firms cannot adopt a traditional function-oriented organization to enhance inter-project learning. In our follow-up interviews, we found that some firms have actually introduced a few new concepts to their organizations to deal directly or indirectly with the inter-project learning.

First, we found that some manufacturers have been shifting their orientation from the management of a single project to multi-project management. Toyota's organizational evolution pattern shows an example of this trend. As Clark and Fujimoto (1991, pp. 276-280) discussed, by the late 1970s most Japanese companies had shifted from functionally-oriented organizations to project manager-based structures. By the mid 1980s, a few Japanese firms including Toyota had already shifted to relatively heavyweight project manager systems, or the "Shusa" system, which has been widely discussed (Ikari, 1985; Shiosawa, 1987). However, in 1992, Toyota created several chief engineers above shusas. Each of the chief engineers, by managing several shusas, is responsible for multiple concurrent projects. The person in this position assumes some of the authority that a powerful

leader for a single project, a shusa, used to have. One of the primary purposes of creating a position more powerful than the shusa is facilitating the inter-project learning, which should enhance the quick transfer and sharing of new designs among multiple projects.

In the past few years some other manufacturers in Japan, the U.S., and Europe have also introduced this type of organizational structure, so that multiple projects could also be managed by a strong control mechanism above project managers. One common mechanism for control is to divide the whole project portfolio into several groups and to place general managers above the individual project managers for individual projects. Although different manufacturers form their groupings differently, we were able to identify three categories from actual examples at nine manufacturers:

1. Design-oriented group (e.g., small vs. medium vs. large cars, front-wheel vs. rear-wheel drives.): Toyota, Ford, Chrysler, Fiat, Renault.
2. Plant-oriented group (e.g., products manufactured at plant A vs. plant B vs. plant C.): Honda.
3. Customer-oriented group (e.g., luxury vs. economical vs. sporty /leisure market segment.): Nissan, Mazda, Mitsubishi.

These differences may reflect each firm's priority for its inter-project learning strategy: either focusing on the efficiency of design, manufacturing or customer segment. The organizational processes in managing multiple projects may also be different. In order to explore these organizational issues, further studies including intensive interviews and internal document analyses are needed.

Second, in order to avoid a trade-off between cross-functional integrity and inter-project learning, some Japanese automobile firms have employed the idea of extensively differentiated mechanisms within a matrix organization. They are creating a variety of working structures to manage the development of different design tasks based on an explicit recognition of the degree of inter-project and cross-functional interdependencies. Figure 2 depicts an example of a *differentiated matrix* from one of the Japanese automobile firms. Depending on the nature of the interdependency and desired learning

orientation, there is flexibility in changing task partitioning and organizational structure.

For some particular components, learning may have to be mostly enhanced within a function, while knowledge regarding some other specific system components may have to be shared by two particular concurrent projects. In the example depicted in Figure 2, components like batteries and audio systems in the electronics design division tend to be developed by a pure component group, while platform components are developed by a multi-project team. Engineers working on some body components are totally devoted to a single project through a project-oriented group. The task partitioning strategy determines the locus of learning. Because the nature of both cross-functional and inter-project interdependencies, and learning orientation may change all the time depending on the combination of projects being developed, the structure should also be quickly and dynamically changed. In future research, we plan to study this concept of "dynamic" differentiated matrix structure both empirically and theoretically in order to explore an appropriate learning organization.

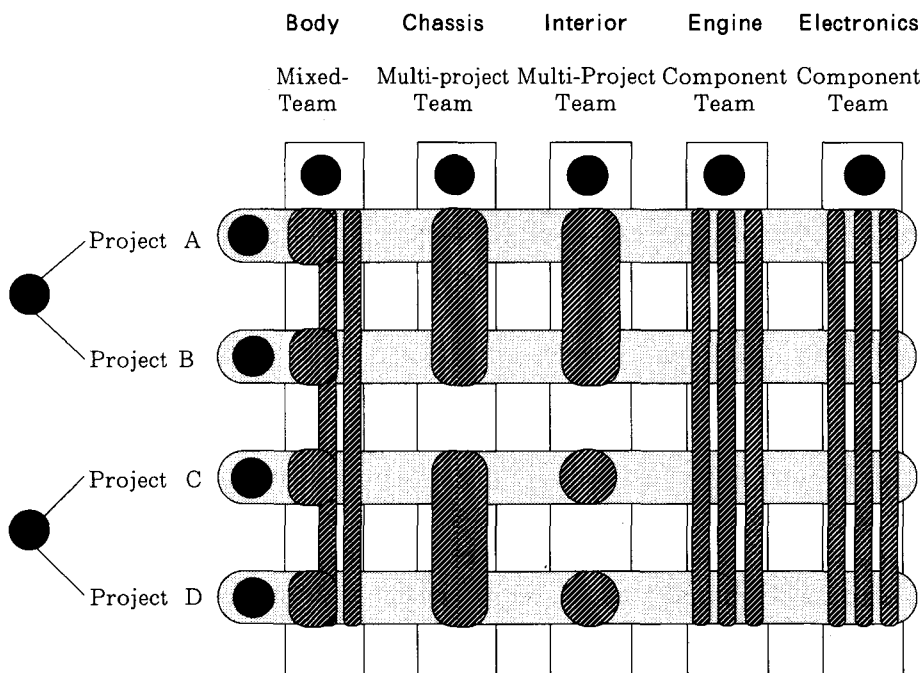


Figure 2 An Example of Differentiated Matrix Organization

6. Conclusions

This study has discussed, using survey results, the advantage of concurrent design transfer strategy in inter-project learning, which provides a more efficient learning setting than does sequential design transfer strategy. Based on our interviews with engineers and project managers, we also suggested several potential reasons for the efficiency of the concurrent design transfer strategy. Only through this strategy can knowledge be learned and transferred from a base project to a new project with actual interactions and communication between the two projects. In addition, it may often be difficult to learn technical knowledge from a relatively old project, as is the case with sequential design transfer. It is difficult to apply what engineers learn from an old project to new architecture and requirements of the new product. Organizations at both the management level and the engineering level cannot strongly support an inter-project learning when two or more projects are far apart from each other chronologically.

This paper also argued that organizational structures and processes that are appropriate for inter-project learning may not be a traditional functional approach, because of the system characteristics of the products. Rather, they should be aimed at achieving both cross-functional coordination and inter-project coordination simultaneously through the active coordination of multiple projects. This search for balance requires a multi-project management perspective, rather than a single-project management perspective. This approach maximizes the distinctiveness of product components essential to differentiate one product from another, but also improve the quantity and quality of inter-project learning. Companies may need either strong control above the matrix organization, or organizational structures and processes that enable system-level coordination across multiple projects. In addition, we also described a concept of a dynamic flexible differentiated matrix organization, which may deal with both cross-functional and inter-project learning depending of the nature of project and component developments at a certain point of time. However, because this study has primarily focused on the performance differences between two learning strategies, further studies need to examine these organizational issues both theoretically and empirically.

References

- [1] Abegglen, James C., and George Stalk, Jr.: 1985. *Kaisha: The Japanese Corporation*, New York, Basic Books.
- [2] Clark, Kim B., and Takahiro Fujimoto: 1991. *Product Development Performance: Strategy, Organization, and Management in the World Auto Industry*, Boston, MA, Harvard Business School Press.
- [3] Cohen, H., S. Keller and D. Streeter: 1979. "The Transfer of Technology from Research to Development." *Research Management*, (May): 11-16.
- [4] Cordero, Rene: 1991. Managing for Speed to Avoid Product Obsolescence: A Survey of Techniques , *Journal of Product Innovation Management*, 8, 283-294.
- [5] Crawford, C. Merle: 1992. The Hidden Costs of Accelerated Product Development", *Journal of Product Innovation Management*, 9, 188-199.
- [6] Cusumano, Michael A.: 1991. *Japan's Software Factories: A Challenge to U.S. Management*, New York, Oxford University Press.
- [7] Dertouzos, Michael L., Richard K.Lester, and Robert M. Solow: 1988. *Made in America*, Cambridge, MA, MIT Press.
- [8] Fujimoto, Takahiro, Kim B.Clark and Yaichi Aoshima: 1992. "Managing the Product Line: A Case of the Automobile Industry", Unpublished Working Paper, Harvard Business School, 92-067.
- [9] Gold, Bella: 1987. "Approaches to Accelerating Product and Process Development", *Journal of Product Innovation Management*, 4, 8, 1-8.
- [10] Gomory R.E.: 1989. "Moving IBM's Technology From Research to Development." *Research/Technology Management*, Nov.Dec.: 27-32.
- [11] Gupta, Ashok K. and David L. Wilemon: 1990. "Accelerating the Development of Technology-based New Products", *California Management Review*, Winter, 32(2), 24-44.
- [12] Ikari, Yoshiro: 1985. *Toyota tai Nissan: Shinsha Kaihatsu no Saizensen* (Toyota versus Nissan: The Front Line of New Car Development). Tokyo, Diamond.
- [13] Imai, K., I. Nonaka and H. Takeuchi: 1985. "Managing the New Product Development Process: How Japanese Learn and Unlearn," in K.B.Clark et al., ed., *The Uneasy Alliance: Managing the Productivity-Technology Dilemma* (Boston, MA, Harvard Business School Press).
- [14] Leonard-Barton, Dorothy: 1988. "Implementation as Mutual Adaptation of Technology and Organization", *Research Policy*, 17, 251-267.
- [15] Leonard-Barton, D.and D.K.Sinha. 1991. Exploring Development-User Interaction in Internal Technology Transfer. Working Paper No. 91-029. HBS.
- [16] McDonough III, Edward F. and Gloria Barczak: 1991. "Speeding Up New Product Development: The Effects of Leadership Style and Source of Technology", *Journal of Product Innovation Management*, 8, 203-211.
- [17] Meyer, Marc H. and James M. Utterback: 1993. "The Product Family and the Dynamics of Core Capability", *Sloan Management Review*, Spring, 29-47.
- [18] Nobeoka, Kentaro: 1993. "Multi-project Management: Strategy and Organization in Automobile Product Development", Unpublished Ph.D.

- Dissertation, MIT Sloan School of Management.
- [19] Nonaka, Ikujiro: 1990. *A Theory of Organizational Knowledge Creation*. Tokyo Japan, Nihon Keizai Shinbunsha.
 - [20] Peters, Tom: 1992. *Liberation Management*, New York, New York, Alfred A. Knopf.
 - [21] Prahalad, C.K. and G. Hamel: 1990. "The Core Competence of the Corporation", *Harvard Business Review*, 68 (3), 79-91.
 - [22] Quinn, J.B. and J.A. Mueller: 1982. "Transferring Research Results to Operations". in M.L.Tushman and W.L. Moore (Eds.), *Readings in the Management of Innovation*, Marshfield, MA: Pitman Books Limited.
 - [23] Shiosawa, Shigeru: 1987. *The Chief Engineer: Project Teams of Toyora*, Tokyo, Japan, Kodansha.
 - [24] Stalk, G. and T.M.Hout: 1990. *Competing Against Time: How Time-Based Competition is Reshaping Global Markets*. New York, New York, The Free Press.
 - [25] Thompson, James D: 1967. *Organizations in Action*, New York, McGraw-Hill.
 - [26] Tyre, M.J.: 1991. "Managing the Introduction of New Process Technology: International Differences in a Multi-Plant Network", *Research Policy*, 22, 57-76.
 - [27] von Braun, Christoph-Friendrich: 1991. "The Acceleration Trap in the Real World," *Sloan Management Review* (Summer), 43-52.
 - [28] von Hippel, Eric: 1990. "The Impact of Sticky Data" on Innovation and Problem-solving", Unpublished Working Paper, MIT.
 - [29] Wernerfelt, Birger: 1984. "A Resource-Based View of the Firm", *Strategic Management Journal*, 5, 171-180.
 - [30] Womack, James, Daniel Jones, and Daniel Roos: 1990. *The Machine that Changed the World*, New York, Rawson Associates.

Appendix Definitions and Measurements of Engineering Hours

Engineering hours (*EH*) for each project are estimated as follows.

$$EH = (FS + PS \cdot PR) \cdot LT \cdot WH / 2$$

FS : The number of engineers who worked on the project (full time).

PS : The number of engineers who worked on the project (part time).

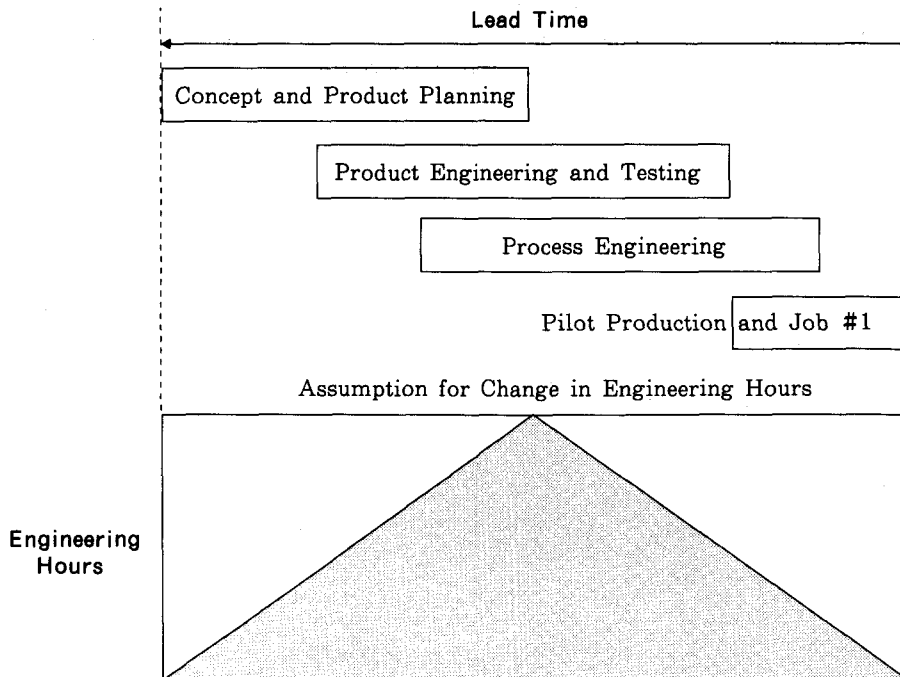
PR : Average percentage of time part time engineers spent on one project*.

LT : Lead time (months)

WH : Average monthly working hours per engineer*.

(*The corporate-level average, obtained from the questionnaire survey of design engineers, which was conducted in the same research project. The method of this survey is described in Nobeoka, 1993)

This estimation scheme is based on our interviews and discussions with engineers primarily at five Japanese firms. In this equation, the number is divided by two based on the assumption with respect to a typical pattern of changes in engineering hours throughout each project, as shown in the figure below. A project defined in this study contains a time period from the beginning of concept and product planning to job #1. This period includes primary development tasks including "concept and product planning", "product engineering and testing", "process engineering", and "pilot production".



A COMPARISON OF JAPANESE AND UK WELFARE

Stephen J DAVIES¹

1. Introduction

This paper can be thought of as a contribution to the literature in extended national accounts². It was in the early 1970s that academic interest in extending or modifying the statistics for GDP to obtain a measure of economic welfare was at its peak. That was the age of the "Club of Rome" report, and of widespread worries about the environmental effects of economic growth and the sustainability of an economic lifestyle that was depleting the world's resources. Nowhere were these concerns more widely felt than in Japan, which had, by the end of the 1960s, experienced a decade and a half of exceptionally fast growth, accompanied by increasingly grave problems of environmental pollution. (And perhaps nowhere were these concerns less keenly felt than in the UK, where the overriding worry was the failure of the economy to share adequately in the post-war "catch-up" of the other developed countries with the United States, rather than any untoward consequences of the limited growth that was actually achieved.)

The most important type of response by Japanese governments to these concerns was to implement a range of measures which addressed the pollution problems that a better off Japanese public was no longer willing to ignore. Another response was that the Japanese government's economic policy committee set up, in May 1971, a committee to develop the measurement of Net National Welfare. This committee published in March 1973 a report entitled "A new welfare index: NNW". The proposed index, which was closely related to the

1 Senior Economic Adviser, H.M.Treasury, Currently undertaking research at the Economics and Business Administration Research Institute, Kobe University. All views expressed in this paper are personal and do not represent the views of HM Treasury.

2 A survey of the literature is to be found in Robert Eisner *Extended Accounts for National Income and Product* The Journal of Economic Literature, Volume 26, No.4, December 1988.

Measure of Economic Welfare proposed for the United States by Nordhaus and Tobin³, does not appear to have been subsequently maintained and published along with the regular national accounts statistics, however. (In recent years, the Economic Planning Agency has published annually a range of indicators—New Social Indicators, People's Life Indicators—relevant to a measure of welfare that goes beyond GDP, without attempting to combine these indicators with GDP into a single measure of welfare.)

The NNW index was revisited by Japanese academics in 1977⁴. In this later study, which followed with a few modifications the earlier official work, NNW was computed as the sum of the following components:

- “NNW government consumption”, which excluded from the normal measure of government consumption expenditure on the law and the police;
- “NNW personal consumption”, which excluded spending on consumer durables;
 - services from the government capital stock;
 - services from the personal sector's capital stock;
 - the value of leisure time;
 - the value of non-market activities, i.e. housework;
 - the cost of environmental pollution, obviously taking a negative value in the summation;
- “losses accompanying urbanisation”.

The published results of the study were quite striking, and suggested that NNW grew significantly less fast than GDP over the period 1955 to 1970, but much faster than GDP between 1970 and 1975, reflecting a fall in various indicators of environmental pollution, as well as a sharp increase in leisure time, in the latter period:

³ William Nordhaus and James Tobin *Economic Growth*. NY:NBER. 1972.

⁴ Hisao Kanamori, Yuriko Takase, Kimio Uno, *Economic Growth and welfare*. Japan Economic Research Centre. Research Report No.41, September 1977 (in Japanese)

Growth rates of real GDP and NNW (per cent p.a.)				
	1955-1960	1960-1965	1965-1970	1970-1975
NNW	5.1	6.6	8.2	9.3
GDP	8.7	9.7	11.6	5.2

The present paper involves a cross-country comparison, rather than the estimation of a time series for a single country. In general, it concentrates on figures for 1990. The simplest possible comparison is perhaps to take GDP per capita for Japan and the UK, expressed at current prices and converted into a common currency using market exchange rates. As shown below, UK GDP per head of population in 1990 was only 71.6 per cent of the Japanese figure.

GDP per head of population ⁵ (in US\$, market exchange rates)		
	Japan	UK
1990	23734	16922

The first refinement to these figures is to take account of the relative price levels of the two countries. The use of Purchasing Power Parity statistics is discussed in more detail in the next section of the paper. At this stage, we just note that using the latest PPP benchmark estimates for 1990 published by the OECD, the gap between Japanese and UK GDP per head is narrowed considerably, with UK GDP per capita some 90 per cent of the Japanese level.

GDP per head of population (in US\$, PPPs)		
	Japan	UK
1990	17596	15888

The second type of adjustment that we need to consider is the exclusion of some components of GDP from the comparison, on the grounds that they do not contribute directly to welfare. This is discussed more fully later in the paper, but here we note the implication of dropping all investment (both domestic and overseas) from the comparison.

Although international comparisons of capital stocks are

5 Source: *OECD*, National Accounts 1960-1992

hampered by the widely differing assumptions about asset lives that are adopted in different countries' national accounts, it is fairly clear that the Japanese economy is considerably more capital intensive than the UK economy. One set of estimates⁶ that adjusts published national figures to a common set of assumptions shows a ratio of the gross capital stock (of nonresidential structures and machinery and equipment) to GDP of 2.8 in Japan compared with a UK figure of 2.0. Simply to maintain the existing capital/labour ratio (and thus maintain output per head in an economy with a growing population) a higher proportion of GDP needs to be devoted to gross investment in Japan than is the case in the UK. A correspondingly smaller proportion of GDP is available for consumption.

Some allowance clearly has to be made for this, and an extreme position—not one that is ultimately defended later in the paper—is to treat all investment spending as intermediate in nature and to consider only consumption (private consumption and government consumption) as contributing to welfare. If we look at consumption per head (using whole economy PPPs to convert to a common currency), we find that in 1990 while private consumption per head was a little higher in Japan, government consumption per head in the UK was around twice the Japanese level; and total consumption per head was some 13 per cent higher in the UK than in Japan.

Consumption per head of population (1990, US\$, PPPs)

	Private	Government	Total
Japan	10098	1608	11706
UK	9996	3267	13263

At the same time, GDP excludes some elements that may contribute to welfare. The most important class of these is the use of time other than in paid employment, principally in leisure activities or in non-marketed activities such as housework. As discussed in section 5, a higher proportion of the Japanese population than the UK population is in paid employment (labour force participation rates are similar, but unemployment is higher in the UK); while average annual hours worked per worker are substantially higher in Japan. Making

6 Angus Maddison *Dynamic Forces in Capitalist Development* OUP 1991

adjustment for leisure etc. therefore raises the estimate of UK welfare relative to that of Japan.

2. Comparisons of Japanese and UK prices

The comparisons of price levels in the OECD countries published by the OECD is a joint exercise by EUROSTAT (the statistical agency of the EC, which prepares annual PPP estimates for the EC member countries and Austria) and the OECD which handles the data for other countries. OECD benchmarks are calculated every 5 years (most recently for 1990) and can be interpolated to intervening years using time series of national price indices. Comparisons of market exchange rates and PPP exchange rates show that some countries are expensive to live in and other countries cheap. The UK has in recent years generally been a cheap country (as has the United States) while Japan is expensive. This position has been reinforced by the fall in sterling and rise in the yen over the last two years: in 1993, Japan was around 76 per cent more expensive than the UK, on the basis of the 1990 PPP benchmark, extrapolated using subsequent movements in Japanese and UK price indices.

This enormous estimated difference in prices raises the obvious question whether we can rely on the statistics; and there seem to be two ways of considering the answer to that question: firstly we can check the calculation against an alternative methodology, and secondly we can see if we can explain the reasons for the difference.

Checking the PPP estimates against an alternative methodology is most easily done for a comparison between the Japan and the United States; if the PPP comparisons pass that test it might be reasonable to give the Japan/UK comparisons the benefit of the doubt. Aggregate productivity estimates for Japan and the US derived using the 1990 PPP benchmark and Maddison's data for employment and hours worked are shown below.

Output per hour at current prices and PPPs (US\$)

	1987	1988	1989
US	24.49	25.94	27.26
Japan	13.83	15.00	16.26
Japan/US ratio (per cent)	56.5	57.8	59.6

Van Ark and Pilat⁷, using census of production data and the "industry-of-origin" approach, which is in principle completely independent of the PPP estimates, estimated relative Japanese/US prices and productivity for manufacturing industry. After adjusting to remove the effects of high Japanese food input prices on the output prices of the food manufacturing industry, they found that the exchange rate needed to equate average Japanese and US manufacturing prices in 1987 was ¥173.6 = \$1, compared with a market exchange rate of ¥144.6 = \$1. The associated estimates of value added per hour worked put Japanese manufacturing productivity at 67.5 per cent of the US level.

Estimates by the McKinsey Global Institute for various service industries⁸ show Japanese labour productivity (output per employee) in telecommunications at between 41 and 66 per cent of US levels, using as the output measure either the total number of calls—which gives the lower figure—or a 50-50 weighting for the number of calls and the number of access lines.

The same study puts Japanese productivity in general merchandise retailing at 44 per cent of the US level; however the measure used is "real value added per employee, using PPPs as deflators" and so obviously not an independent check on the validity of the PPP estimates. Productivity (real sales per full-time equivalent) in Japanese "multicategory stores" is very similar to US levels; but productivity in "single category" stores in Japan is only 31 per cent of US levels. At the same time there are twice as many employees in wholesaling for every retail employee as there are in the US.

Although no precise conclusions can be drawn from the comparison of the PPP estimates (and the productivity comparisons based on them) with the alternative estimates (which obviously do not cover the whole economy), the two sets of figures certainly do not look seriously out of line. The comparison does not establish a presumption that there is anything wrong with the PPPs.

7 Bart van Ark and Dirk Pilat, *Productivity levels in Germany, Japan and the United States: Differences and Causes*. Brookings Papers on Economic Activity, Microeconomics 2, 1993, pp.1-48

8 Reported in Martin Neil Bailey, *Competition, Regulation and Efficiency in Service Industries*. Brookings Papers on Economic Activity, Microeconomics 2, 1993, pp.71-130

Quality or price differences?

Before trying to understand the reasons why Japan is more expensive than the UK (or the US), we need to consider the possibility that the PPP figures may be picking up not a genuine difference in price, but a difference in quality (just as a part of what national price indices record as inflation is in fact an improvement in quality). Casual observation suggests that supermarket fruit and vegetables, for example, are of a more uniformly high standard in Japan than in the UK, and that this explains a part of the enormous price discrepancy between, say, apples which might retail at less than ¥20 per fruit in the UK, and at ¥100 or more in Japan. To take another example that is very familiar in the UK, Japanese cars are regularly shown in consumer surveys to be more reliable than cars produced in other countries. There is no reason to think that high Japanese manufacturing standards are confined to cars.

More generally, as one Japanese critic of his country's distribution system conceded: "Few will believe that the quality of distribution services is no higher in Japan than in the US...For example, liquor stores deliver beer to doorsteps in Japan. Presale demonstrations are more common. Courtesy is more prevalent"⁹. These remarks would apply a fortiori to a comparison between the UK and Japan. It may be that in some cases the high standards of services in Japan are the consequence of barriers to price competition. But that does not make them any less a potential source of bias in international price and output comparisons.

A somewhat different reason for suspecting the PPP comparisons is that they are almost certainly contaminated by deficiencies in the coverage of the Japanese retail price survey, which forms the basis of the Japanese consumer price index. The retail price survey, for example, specifically excludes special prices, such as those associated with "sales". And, although the coverage of the index has been updated to take more account of imported goods, the fact that such updating was felt to be necessary at the start of 1992, for example, suggests that earlier coverage was inadequate. Moreover, prices are

9 Kiyohiko Nishimura, *The Distribution System of Japan and the United States: A Comparative Study from the Viewpoint of Final Buyers*, Japan and the World Economy 5 (1993) No.3, pp.265-288

reported for the survey by designated shops—not by official shoppers, as in the UK—and the coverage of shops has not been changed to reflect the growing importance of “discount stores” which sell at relatively cheap prices: the official reason given for this inertia is that to include discounters would cause a break in the CPI series.

At the same time, one source of upward bias in the estimates of the UK price level used in the PPP estimates should be noted. The data used in the UK’s contribution to the EUROSTAT PPP exercise cover only London prices¹⁰. As the cost of living is relatively high in London, the PPP estimates overstate the UK price level and imply a corresponding understatement of real output. To summarise this discussion, there is certainly something in the view that apparent price differences between Japan and other countries (including the UK) in part reflect quality differences. But there is no obvious way of quantifying this component; the point just has to remain as a qualification to be born in mind when using the PPPs.

Explanations for Japan’s high prices

We now turn to possible explanations for Japan’s relatively high prices. Firstly, it is well known that there is a positive relationship between real exchange rates and GDP per capita (rich countries tend to be expensive); but since Japan’s GDP per capita is only a little higher than that of the UK (once PPPs rather than market exchange rates are used in the calculation), this cannot explain very much of the gap between UK and Japanese price levels. Again, the tax system may be an important influence; but the most striking feature of the Japanese system—the lack of a value added tax and the low rate of the general consumer tax that substitutes for it—should tend to reduce the relative domestic Japanese price level for any given level of international competitiveness.

One more promising explanation may lie in Japan’s low availability of usable land per head of population in comparison with the UK. The population of Japan (123.5 million in 1990) is some 115 percent larger than the UK’s (57.4 millions), while Japanese land area (377,000 square kilometres) is only 55 percent larger than the UK’s

¹⁰ Ian Davis *Rich or Poor? Purchasing Power Parities and International Comparisons*. CSO Economic Trends No.449, July 1994, pp.33-36

(244,157 square kilometres). Moreover, most Japanese land is too mountainous for residential, industrial or agricultural use: 67 per cent of Japan is forest.

The effect of land availability on the real exchange rate has been considered, in relation to the yen/dollar exchange rate, by Ito¹¹ who analyses the case where national price indices cover consumer goods (assumed to sell at world prices) and housing services. The intuition behind the result that countries with a relative shortage of land will have a high real exchange rate measured by national price indices as defined in this model is fairly obvious.

More generally if traded goods in such a country were less land intensive than non-traded goods, a shortage of land would mean a higher relative price of non-traded goods; so the domestic price level would be high relative to a country with ample land when compared at market exchange rates. It seems likely that non-traded goods would be relatively land intensive in a country with a shortage of land. That is because the price elasticity of demand for particular non-traded goods is likely to be lower than the price elasticity of demand for particular domestically produced traded goods, as the latter elasticity reflects not only the sensitivity of domestic demand but also the sensitivity of other countries' supply. A country with a shortage of land would specialise in particular traded goods that are not land intensive, but its pattern of non-traded goods production would be less affected by the shortage of land.

A further factor may be barriers to imports into Japan. Suppose, for the sake of argument, that in areas where there are no import restrictions the "law of one price" holds for Japanese exports, imports and import substitutes. If Japanese regulations restrict the flow of imported commodities in areas where Japanese domestic supply is not very elastic, that would tend to raise the domestic price level without any direct harmful effect on Japanese competitiveness; there would therefore not necessarily be any forces to bring the Japanese real exchange rate back down to PPP levels.

Another factor may be what might be described as comparative disadvantage in distribution, as illustrated by the figures for

11 Takatoshi Ito *The Land/Housing Problem in Japan: A Macroeconomic Approach*. Journal of the Japanese and International Economies, Volume 7, No.1, March 1993

productivity in retailing given earlier. This low productivity has at least something to do with regulation, in particular the Large Retail Store Act which has allowed small retailers to block the opening of large stores. Relatively large gross margins in retailing will obviously raise the real exchange rate, for any given level of competitiveness in traded goods. Extensive regulation of prices in other areas of the Japanese economy not exposed to international competition (e.g. domestic air transport) may also be part of the explanation of the high Japanese price level.

Looking at the pattern of relative prices in more detail may give more of an idea of the factors at work. As a detailed breakdown of the 1990 PPP results has not yet been published, movements in components of the Japanese CPI and in the UK Consumers Expenditure Deflator have been used to update some components of the 1985 PPPs in the results shown below. The figures do not provide any obvious confirmation of the hypothesis that the shortage of land is the main factor behind Japan's high relative prices. Japanese housing rents are not particularly high in relative terms—less so than clothing and footwear which are traded goods. The most striking feature is the high price of fruit and vegetables, which—while in a closed economy it could well be attributed to a scarcity of land—in a potentially open economy must be regarded as reflecting the protection of domestic agriculture.

Components of consumers expenditure:
Japan/UK relative prices in 1990 (¥/£)

Food, beverages and tobacco	398.3
Fruit and vegetables	510.2
Gross rent and water charges	330.4
Fuel and power	331.3
Household equipment and operations	291.7
Transport and communications	240.1
Clothes and footwear	418.7
Medical care	263.8
Education, recreation, culture	358.5
Market exchange rate	257.4

The comparison of average housing rents does not, however, really provide a very meaningful indicator of general pressures of land

availability on the price level, because it reflects a mixture of public sector subsidised rents and controlled private rents as well as free market rents. While it has been growing recently under the stimulus of housing law reform, the uncontrolled rented sector is still relatively small in the UK. Data on average rents paid in a large number of Japanese cities and towns can be obtained from the annual reports of the Japanese retail price survey¹². Data in this survey is reported in units of monthly rent per 3.3 m². The table below, based on figures for December 1992, shows the implied rents for a 100m² house.

Monthly private house rents in selected Japanese cities

(December 1992, per 100m²)

	¥	£ (at £1 = ¥155)
Tokyo (Ku area)	241394	1557.38
Nagoya	120424	776.93
Kyoto	137818	889.15
Osaka	142424	918.86
Kobe	142121	916.91
Himeji	86727	559.53
Hiroshima	104515	674.29
Sapporo	97727	630.50

Even converted at recent exchange rate levels which make most Japanese service prices very much higher than UK prices, the sterling rents shown are not greatly out of line with private uncontrolled rents that would be paid in the more prosperous parts of the UK. (There is no official, or reputable private sector, index of house rents for the UK, so this statement is based on personal observation only.) However, the Japanese rent levels shown are to some extent affected by rent controls.

What is certainly the case is that residential property prices are very much higher in Japan than in the UK. Just as share price/earnings ratios are much higher, so houses trade at a much larger multiple of current rents. In Tokyo, the ratio of residential property prices to annual rents had fallen from a "bubble" peak of around 40 to around 25 by mid 1993; but at this level it was still more

12 Published by the Statistics Bureau, Management and Coordination Agency

than double the London price/rents ratio. (The latter figure is generally put by property market experts in the range 10 to 12.5, e.g. see the Financial Times of 27/28 August 1994¹³.) The differences must reflect some combination of faster expected growth in earnings / rentals in Japan, and a higher savings rate driving down returns in the absence of perfect capital mobility.

Another analysis of relative prices (in London and Tokyo) is provided in the Economic Planning Agency's Report on Prices. (This work, which is now an annual exercise, also covers prices in New York, Paris and Berlin¹⁴. Data on prices is collected by a private consulting firm, to specifications drawn up by the EPA. One foreign capital city is surveyed in detail each year—1994 is London's turn—with data for the most recent survey year updated using national consumer price indices. The project specifically covers consumer prices rather than prices for the whole of GDP. To produce the overall comparison for each foreign city, prices of individual items are weighted together using both foreign consumption weights and Japanese weights. The published figures are the average of the results obtained with the alternative weighting bases.) The table below shows the EPA's estimates of the ratio of Tokyo to London prices in November 1993, converting prices at the average 1993 exchange rate of £1=¥166.87.

The EPA's figures confirm in some interesting respects the earlier calculations based on the 1985 PPP benchmark. The real cost of house rents (deflated by the respective capital city's general price level) comes out as lower in Tokyo than in London. And it is food that is most strikingly more expensive in Tokyo than in London.

Tokyo/London relative prices

Food	2.15	Durable goods	1.07
Clothing and footwear	1.66	Other goods	1.34
Energy/water	1.71	Transport/communication	1.71
Health and medical care	1.83	Education	0.81
House rents	1.21	General services	1.28
All items	1.46		

13 "London's landlords can smile again." weekend section, p.XVI

14 Tokyo prices were estimated to 141 per cent higher than prices in New York in November 1993, 138 per cent higher than prices in Berlin and 136 per cent higher than prices in Paris.

The report notes some far more remarkable examples of price differences for individual items: for example, lip-stick is more than five times more expensive in Tokyo than in western capital cities. The impact of regulation is illustrated by the EPA's comparison of some important prices affected by regulation in Japan with corresponding UK prices. Based on Tokyo=100, London prices as of November 1993 were estimated as follows.

Electricity (280 kwh monthly bill)	61.8
Gas (550,000 kilo calories monthly bill)	31.5
Postage: internal letter	67.3
post card	101.8
Railway fare (100 km)	95.7
Bus (one zone)	74.2
Taxi (day rate, 5 km, one person, no luggage)	56.6
Rice (10 kg.)	47.2
Telephone (3 minutes, shortest distance)	240
(40km.)	67
(100km.)	80
(500km.)	36

While the EPA's statistics correspond in some ways with the PPP details, they differ in one very important respect, namely the overall estimate of how much more expensive Japan/Tokyo is than the UK/London. As shown above, the EPA estimates London to be 46 percent more expensive than Tokyo, while updating the latest PPP benchmark to 1993 prices and exchange rates one gets an estimate that Japan is 76 per cent more expensive than the UK. The EPA argues that because the PPP estimates are based on "international" weights they in effect largely represent western demand patterns, whereas their own estimate gives a 50 per cent weight to the composition of Japanese demand. There may be something in this, although as the example of rice shows, it is not necessarily true that Japanese consumption patterns are skewed towards commodities that are at present relatively cheap in Japan. At the same time there is a risk of (at least unconscious) bias in a comparison project that is sponsored by a national government agency rather than by an international organisation.

A brief investigation of the EPA's work unearthed two examples of such bias. Firstly, the comparison of rents was not based on identical types of location. On the grounds that the typical Tokyo commuter travels further than the typical London commuter, the Tokyo rents chosen for the EPA's index relate to locations further out from the centre of the city than do the London rents. Secondly, the comparison of railway fares is based on full-price tickets. However, in the UK, unlike Japan, discount fares are generally available for travel outside peak hours and at weekends. Most leisure travel is at half or less than half the full fare. Some account should have been taken of this.

Another recent international comparison¹⁵ shows Tokyo as 89.5 per cent more expensive than London (at an exchange rate of £1=¥154.9). This estimate is explicitly based on the consumption pattern of a typical western executive, and so not as broadly based as the other studies. Like them, it highlights food and clothing as particularly costly in Tokyo; with prices respectively 222 per cent and 462 per cent (for medium price range women's clothing) higher than in London. Unlike the other studies, it also shows rents as much more expensive in Tokyo—for example, a medium range furnished 4 room apartment is shown as 190 per cent more expensive in Tokyo than in London—but this may reflect the level of rents in particular areas of Tokyo and of particular types of apartments favoured by western executives.

3. Consumption and sustainable consumption

This section begins a more detailed consideration of the relationship between GDP and welfare. Section 1 noted the possibility of arguing that investment is really intermediate spending, and that investment expenditure should be ignored in the comparison of Japanese and UK welfare. If this position were to be maintained it would have a significant effect on the welfare ranking of the two countries, given the much higher share of GDP that domestic investment accounts for in Japan, as well as the big difference in the two countries' net overseas investment in 1990: a Japanese balance of payments current account surplus and a UK deficit. In fact the

15 *Prices and Earnings Around the Globe* Union Bank of Switzerland 1994

complete discounting of investment is hard to defend. Firstly, it seems to imply that if an individual decides to invest rather than consume that reduces his welfare. Secondly, to the extent that one might use these welfare calculations to make value judgments about the two economies, it would seem unreasonable to commend the UK economy if relatively high consumption were being achieved not through high output but by running down the capital stock and borrowing from foreigners.

It is therefore preferable to focus on sustainable consumption rather than actual consumption. With a traditional neoclassical growth model, any growth in the domestic capital stock above that needed to keep a constant capital/labour ratio implies increasing output per head and might reasonably be treated as adding to welfare; any shortfall below that level would be a deduction from welfare. Nordhaus and Tobin (op. cit.) did, in fact, make an adjustment of this sort in an alternative version of their index.

We have therefore calculated the fixed investment needed in both countries to maintain the fixed capital stock at a constant ratio to the population aged 15 and over. Combining ten years average population growth centred on 1990 with the net fixed capital stock at the end of 1989, and deducting this "warranted" capital stock growth, as well as depreciation of the existing capital stock, from actual fixed investment, we derive an addition to welfare of £42.1 billion in the UK, and ¥41,744 billion in Japan.

Actual and warranted fixed investment

	UK	Japan
Growth of 15 plus population (per cent)	0.19	1.04
End 1989 net capital stock (billion £/¥)	1457.5	3093109 ¹⁶
Warranted capital stock increase (bn. £/¥)	2.8	32168
Capital consumption(..)	61.1	62820
Fixed capital expenditure(..)	106.0	136733
Actual less warranted fixed investment(..)	42.1	41744

A similar adjustment should be made in respect of net foreign investment. To the extent that the ratio of net foreign assets to

16 includes non-reproducible fixed assets

population is increasing, that might count as an addition to welfare; a decline would be a deduction from welfare. There is a need to refine the calculation to reflect the different demographic structure of the two countries. A country that is aging fast, like Japan, should save more than a country whose demographic structure is relatively static, such as the UK. On the basis that people save primarily for their old age, we have defined the "warranted" current account as one that allows growth of net foreign assets in line with growth of the population aged over 65.

Projections of growth of the population aged 65 years or more over a ten year period centred in 1990 give a figure of 3.8 per cent annual average growth in Japan, and only 0.6 per cent in the UK. Applied to end 1989 stocks of net overseas assets (evaluated at the average of end 1989 and end 1990 values) we derive a "warranted" current account surplus of £0.4 billion for the UK and of ¥1560 billion for Japan. Comparing these with the actual current account figures in 1990—a deficit of £18.3 billion in the UK and a surplus of ¥5203 billion in Japan—we calculate a deduction from welfare of £18.7 billion in the case of the UK and an addition to welfare of ¥3643 billion in the case of Japan.

Investment in stocks can similarly be included in the welfare total. Actual stockbuilding in 1990 totalled ¥2322 billion in Japan, while there was a rundown in stocks in the UK of £1.5 billion. Making an adjustment of the same form as that used in the case of fixed investment (calculating the difference between the actual increase in stocks and the increase needed for a constant ratio of stocks to the population aged 15 plus) we find a contribution to welfare of ¥1566 billion in Japan, and a deduction from welfare of £1.7 billion in the UK.

This discussion of investment serves to raise the question of the appropriate denominator to be used in the overall welfare comparison. Clearly we have to normalise the adjusted GDP figures in some way to take account of the relative population sizes of the two countries: we would not want to conclude that welfare was higher in Japan just because its population was more than twice as large as that of the UK. In the introductory section, we presented various comparisons in terms of amounts per head of population. However, a comparison based on adjusted GDP per head of total population would show a country that

had recently experienced a baby boom as on that account enjoying a lower level of welfare. The implication that a country can increase its welfare by not reproducing itself is unacceptable and it seems better to regard the unproductive young as an investment rather than a deduction from welfare. Thus when the final overall comparison of welfare is made, we normalise the total of adjusted GDP by dividing by the population of 15 and over, rather than by the whole population.

4. What consumption counts?

Adjustments to the national accounts to make them more closely related to a measurement of welfare normally include other deductions and additions to both the personal and government consumption series published in the national accounts. In the case of **personal consumption**, cash spending on consumer durables as recorded in the national accounts is often replaced by an estimate of the flow of services from the stock of consumer durables.

However, the case for making such adjustment is much less compelling in the case of a cross-country comparison than it is when an adjusted time series is being produced for a single country. Obviously the large cyclical variations in consumer durable spending give a completely misleading picture of how the consumption of the services of durable goods is changing over time: a 25 per cent fall in car sales, for example, might be consistent with an increase in the consumption of car services. There may well be a large margin of error over the estimate of the size of the durables capital stock and there may be considerable uncertainty over the amount of services provided by any given size of the capital stock; but these problems may have only a second order effect on the figure of interest in time series studies, namely the rate of growth in durables services.

For a cross-country comparison, however, these problems may be first order rather than second order; and a better way to avoid a distortion to the comparison caused by cyclical variations in durables goods purchases may be to take care to base the comparison on a year when durables purchases were not at unusual levels, or perhaps to take an average of several years' durables purchases. In neither Japan nor the UK were durables purchases at either a cyclical peak or a cyclical trough in 1990; particularly in view of the "sustainability"

current account adjustment made in the previous section, we have preferred to include unadjusted consumer durables spending figures in this study. If we had adjusted the consumer durables figures in some way we would have had to make some offsetting change to the current account adjustment, to allow for the impact of consumer durables purchases on the current account.

Another type of adjustment normally made in "extended national accounts" exercises is the exclusion of some consumption expenditure on the grounds that it is really intermediate rather than final consumption. This issue arises in some areas of personal consumption; but it arises most keenly in areas of government expenditure such as crime prevention and law enforcement. It would clearly be odd to rank a crime-ridden country, which consequently spent a lot of money on law enforcement, as better off on that account than a country with little crime and consequently low spending on law enforcement. The contribution to welfare comes from the output of the police/law-enforcement system—the level of public safety—not from the input of public spending which is measured in the national accounts, and which may well be inversely related to the output of public safety.

General government administration expenditures can also be regarded as intermediate in nature rather than as genuinely final consumption. In any case, the Japanese national accounts figures do not separate expenditure on law and order from "general government services", so if the former is to be deducted from the total of consumption that contributes to welfare, it is simplest to take the latter out as well.

Japanese general government final consumption of general government services, including law and order, came to ¥10614 billion in 1990 (2.5 per cent of Japanese GDP). UK general government current expenditure on general public services came to £6.7 billion, while spending on public order and safety came to £9.7 billion: adding in an allowance for capital consumption, which is not included in these figures, final consumption of general public services and public order and safety is estimated to have come to £17 billion (3.1 per cent of UK GDP). Excluding these items of spending from the total contributing to the estimate of welfare thus reduces estimated UK welfare somewhat relative to Japanese welfare.

A similar argument may be advanced in relation to health expen-

diture – that variations in national expenditure levels may be the response to more or less healthy lifestyles and eating habits, and that what is relevant to welfare is quality of life and longevity, not the treatment of illness that is measured in the national accounts. (If this argument is accepted in respect of government consumption of health services, it needs of course to be carried over to personal consumer spending on health which in Japan accounts for by far the larger part of total health spending.) Japan is clearly a healthier country than the UK, as the following statistics illustrate.

Summary indicators of health

	UK (1988-90 life table)		Japan (1990 life table)	
	Male	Female	Male	Female
Life expectancy at birth (years)	73.0	78.5	75.9	81.9
Infant mortality (per 1,000 live births)	UK		Japan	
	7.9		4.6	

Personal and general government final consumption of health services, pharmaceuticals etc. in Japan came to ¥26833 billion in 1990 (6.3 per cent of GDP); in the UK such spending totalled £31.5 billion (5.7 per cent of GDP). Since the relative weight of health spending in GDP at least corresponds qualitatively with the relative healthiness of the two countries' populations it seems best to treat this spending as contributing to welfare; although this is a second best procedure compared with basing a contribution to welfare on the output of this spending.

Defence expenditure is another area where a case for omission can be made. A country that manages to enjoy security without high military expenditures is not obviously worse off on that account than a country with higher military expenditure that does not buy a higher level of security. Nevertheless, there may be psychic benefits from higher defence spending. People seem to get such benefits from their country's participation in international peace-keeping efforts, from the continued existence of traditional regiments with colourful histories, and so on. Moreover, to the extent that there are more concrete returns to defence spending (genuinely greater security) the best available proxy for comparing the amount of this output – in the case of countries with similar external threats – may be the input of defence

expenditure recorded in the national accounts.

Expenditure on education has in general the character of investment rather than consumption, even though most of it is classed as consumption in the national accounts. (This applies to spending by both government and the personal sector; the latter accounts for the larger part of what is recorded as final consumption of education services in Japan.) In line with the “sustainability” discussion in section 3, some account of spending on education should be taken in the measurement of welfare. While in principle what should be included is not actual spending but variations in the human capital stock per capita (on the lines of the treatment of fixed capital spending) estimation of the size of the Japanese and UK human capital stock and its depreciation is beyond the scope of this paper, so we simply include all spending on education.

Within other categories of personal consumption, much spending on transport can be argued to have the quality of an intermediate expenditure. This is particularly true of commuter travel, which is itself a source of disutility. Even “travel for pleasure” may be travel in order to obtain pleasure rather than a pleasurable process. Excluding some part of travel for pleasure would, however, involve too much of a value judgment, but travel to work expenditures clearly need to be excluded from the measurement of welfare. We have proxied such expenditures by expenditure on rail and subway season tickets. In Japan such expenditure came to ¥1371 billion in 1990. In the UK (British Rail for 1990 and London Underground for 1990-1991) the total was £0.8 billion.

Personal expenditure on insurance against theft and on lawyers might also be excluded for much the same reasons as those for excluding government expenditure on law and order. The low level of litigation in Japan, and the extent to which business relations are based on trust – rather than on the threat of litigation – is a major structural difference between Japan and western economies. According to figures quoted by van Wolferen, who takes a dim view of Japanese lack of litigiousness, “the number of civil suits per capita brought before the courts is roughly between one-twentieth and one-tenth of the figures for common-law countries...Japan has one lawyer per 9,294 people, as compared with one for 360 in the USA, 872 in Britain and 1,486 in West Germany”¹⁷.

17 Karel van Wolferen *The enigma of Japanese power*. Papermac 1990, pp.213-214

Most expenditure on law, however, is incurred by companies and so treated as intermediate rather than final expenditure in the national accounts. Whether the transactions costs of frequent litigation are greater than the transactions costs involved in the way the Japanese prefer to do business is an interesting question; but the effect of these transactions costs on the relative efficiency of the two systems is largely already reflected in the estimates of output, productivity etc. derived directly from the national accounts. Some downward adjustment to personal consumption might be called for in respect of legal expenditure incurred by households, and this adjustment would be greater in the case of the relatively litigious UK. But the adjustment would not be large, its size is not readily computable from published data, and so it has been ignored here.

At the same time, some upward adjustment might be made to personal consumption to take account of business expenditure on socialising, which is treated as intermediate expenditure in the national accounts, but which is nevertheless a close substitute for final consumption: food and drink may taste just as good when consumed in the course of business entertainment. The Japanese way of doing business involves a relatively large amount of this form of consumption. Data published by Japan's National Tax Agency show that spending by Japanese businesses on entertainment came to around ¥5630 billion (1.3 per cent of GDP) in the year ending in January 1991. We have provisionally assumed that UK businesses' spending on entertainment came to 1/4 per cent of GDP, and added these figures to the estimate of welfare in the two countries.

There might seem to be a case for other upward adjustments, to reflect the consumption of unpriced services. Television, radio and newspapers financed at least in part by advertising provide entertainment and information services that are not included in the national accounts statistics. In both Japan and the UK there is a public television and radio service, financed by a licence fee. But given the amount of time that many people spend watching commercial television in both countries, there is a potentially significant understatement of nominal GDP, compared to what it would be if all television broadcasts were financed by a user fee. However, this understatement of GDP should be reflected in the relevant deflator—the financing of television and newspapers by advertising makes them cheaper than they would be

if the consumer had to pay the full cost—so there should be no net effect on comparisons of real GDP.

Further examples of unpriced services include admissions to free museums and art galleries (many museums and galleries are free in the UK, very few in Japan). If these are government institutions, the free provision of services may simply involve a switch between personal and general government final consumption; but if they are private institutions being financed by government subsidies (or by donations from businesses or private individuals) the statistics for nominal GDP will not record the services being provided—though again this should, in principle, be accompanied by a corresponding reduction in the relevant deflators.

A further area of under-recorded services is the use of public infrastructure such as roads and bridges. These are, with very few exceptions, free to the user in the UK, while in Japan high speed roads are subject to high tolls. Again, if properly accounted for in the GDP deflator, this should have no effect on the comparison of real GDP. Moreover, a substantial part of road use is intermediate output (freight transport, commuting, business trips) and so should not be included in GDP anyway.

5. Welfare from non-marketed time

Extended national accounts estimates generally include some allowance for the value of time not spent in paid work. This can be split into three categories of use:

- time spent in unpaid work
- time spent on getting to work
- other time, i.e. leisure (defining study, sleep, eating, washing etc. as leisure activities).

The first and third of these can both be regarded as adding to welfare. The estimate of the value of leisure typically dominates the other adjustments to the national accounts: for example in Nordhaus and Tobin's study the imputation for leisure accounted for \$627 billion of the total \$1241 billion of "sustainable MEW".

The Japanese Survey on Time Use and Leisure Activities showed that in 1986 people with a job spent on average 42 minutes a day commuting (averaged over a seven day week). Although many

Japanese salarymen have much longer commuting journeys, the average commuting time is brought down by the relatively large number of family workers and self-employed who live at or close to their place of work. As it has not yet been possible to obtain comparable data for the UK, no account has been taken here of commuting time. Leisure time (broadly defined as above) plus time spent on unpaid work is assumed to be some constant minus time spent on paid work.

The main component of unpaid work is housework, undertaken primarily by women. Kanamori et al. (op.cit.) take figures for the number of women occupied exclusively in housework from labour force surveys, data on average hours spent on housework from national surveys of time use, and multiply the product of these by the average female wage. Thus in 1975, for example, 15.97 million women did an average of 53.18 hours of housework per week, and the value of this work was estimated at ¥21.1 trillion, about 14 per cent of GDP. These estimates seem to assume that if women go out to work they do not do any housework. Kanamori et al. then make a separate estimate of the value of leisure time.

Starting from the identity that time not spent at work or getting to work must either be spent in unpaid work or at leisure, and as there is no basis for assuming that the hourly value of leisure time is different from that of time spent in unpaid work, there seems no gain in computing separately the value of leisure time and the value of unpaid work: one global figure can be calculated to cover both items. This simplification allows us to dispense with the need for survey data on housework hours; all that is needed is data on hours spent at paid work.

Clearly, a crucial element in the computation of the contribution to welfare from non-marketed time is the estimate of the value of a unit of time so used, which we refer to hereafter as the basic hourly value of leisure. While it is obvious that people are not in general in a position to maximise over consumption and leisure by making the value of the marginal hour of leisure equal to the marginal return from an hour's paid work, there seems no better alternative to relating the estimate of the value of leisure to the remuneration from work. Specifically, we have assumed that for someone working 2000 hours per week, the value of an extra hour's leisure is equal to the average

hourly wage rate net of income tax (calculated at a marginal rate of 10 per cent in Japan and 25 percent in the UK) plus the average hourly employers' pension etc. contribution. This calculation produces different figures for Japan and the UK, which we have taken as alternative estimates of the true value of marginal hourly leisure, which is assumed to be the same in Japan and the UK for someone working the same number of hours. The estimates for Japan and the UK (expressed in a common currency, using PPPs) have therefore been averaged, with the resulting figure used as the basic hourly value of leisure in both countries.

We have further assumed that the marginal value of leisure for someone working 3000 hours or more per year is $1\frac{1}{2}$ times the value at 2000 hours; that the marginal value at 1000 hours is $\frac{1}{2}$ the value at 2000 hours, falling to zero at 0 hours work per year. This picks up in a very rough way the premium rates paid for overtime work and the low average pay of part-time workers.

The other important components of the calculation are the estimates of the numbers in employment and of average hours worked. Of the UK population aged 15 or over in 1990, 57.4 per cent were at work. The corresponding figure in Japan was 61.9 per cent. A figure for average hours worked in Japan has been derived from the Labour Force Survey, as described in the annex. For the UK, a figure was taken from Maddison (op.cit.), updated to 1990, as Maddison's data end in 1989. According to these figures, average annual hours worked in Japan in 1990 (2108 hours) were 37 per cent more than average hours in the UK (1538 hours). (Although full-time manual workers in Japan and the UK work a similar number of hours per day, non-manual workers have a longer working day in Japan; there is more working at week-ends in Japan; and annual holiday entitlements are much smaller than in the UK. In addition, a higher proportion of the work-force in the UK works part-time.) Estimates of the distribution of weekly hours were taken from the Labour Force Survey in the case of Japan and from the New Earning Survey for the UK. These distributions were then applied to the figures for annual hours described above.

The basic unit—the basic hourly value of leisure time for someone working 2000 hours per year—came out at £6.04 or ¥1954 when estimated as described above. The Japanese Annual Report on the

Labour Force Survey shows the distribution of weekly hours worked in eight bands, and we grouped the UK data also into eight bands. We assumed that people working the longest hours in the Japanese survey enjoyed no leisure; so that the amount of leisure of those in each of the other bands (for Japan and the UK) was computed as the difference between the hours worked in that band and the hours worked in the Japanese band with the longest hours.

The result obtained was that the total value of leisure in Japan came to 157.7 billion times the basic hourly value of leisure, or ¥308103 billion (72.6 per cent of GDP). For the UK, the total value of leisure came to 91.3 billion times the basic hourly value, or £551.5 billion (100.4 per cent of GDP).

6. Possible further extensions

The "black economy"

In both the UK and Japan, a certain amount of economic activity escapes the attention of the national accountants because it is deliberately concealed in order, for example, to evade taxes. No adjustment is made in the Japanese or UK national accounts to allow for such concealed activity. Although estimates of the size of the UK's black economy vary widely, a figure of around 5 per cent has been suggested in one well-respected study¹⁸. Japan, with its relatively low tax rates and low crime level has traditionally been viewed as a country with a relatively small black economy, less than 5 per cent of GDP¹⁹.

Illegal immigration, encouraged by the growth of the Japanese economy, may have made earlier estimates of the size of the black economy rather dated. But concealed economic activity, if it is being undertaken by people whose residence is also concealed, may have little implication for the measure of welfare; as both the numerator and the denominator of GDP per capita are affected in the same direction by concealment. Allowing for hidden economic activity would thus add to computed UK welfare relative to that of Japan; but there would be some double counting with the estimated value of leisure computed in

18 Stephen Smith *Britain's Hidden Economy*, IFS

19 e.g. Vito Tanzi *The Underground Economy* World Bank, Finance and Development Vol. 20, No.4 (December 1983), pp.12ff.

the previous section: some "leisure" is in fact used for activity in the black economy.

Pollution and the environment

Twenty-five years ago, Japan had major problems of environmental pollution, as in the high growth period from the mid 1950s to the end of the 1960s little was done to control industries' lethal discharges into the atmosphere or into Japan's seas and rivers. Although its environment has been greatly improved since the early 1970s, Japan still has the reputation abroad of a country with serious pollution problems; just as London still has the reputation of being a foggy city, some forty years after the passing of the Clean Air Act which did away with the traditional London winter fog or smog. In terms of emission of air pollutants, Japanese performance is now clearly superior to that of the UK, although that does not mean that Japanese residents enjoy cleaner air than UK residents. As long as the UK's normal weather pattern prevails, UK residents escape the worst consequences of their country's emissions.

Per capita emission of gases (1991)

	Sulphur oxides (kg.)	Nitrogen oxides (kg.)	Carbon dioxide (tonnes)
Japan	6.9	9.7	8.6
UK	62.1	47.9	10.3

Accidents

Nordhaus and Tobin and the subsequent Japanese work on welfare included road accidents as a component of the "costs of urbanisation" that were deducted from the estimate of welfare. Although Japan has succeeded in reducing the number of persons killed annually in road accidents by about a third since the early 1970s, in spite of a large increase in road traffic, road accident death rates remain slightly higher in Japan than in the UK. (The figures for motor vehicle accident deaths below are taken from both countries' vital statistics and are higher than figures sometimes quoted: from police statistics for Japan—which include only those who die within 24 hours of an accident—and from transport statistics for the UK—which include those who die within 30 days of an accident.)

Road accident deaths per ten thousand population (1990)

Japan	1.18
UK	0.99

At the same time, deaths from rail accidents are much higher in Japan than in the UK (though the numbers involved are relatively small in both countries). Over the three years to 1989, deaths from rail accidents averaged 23 per year in the UK; in Japan they were 436 per year over the same period. Deaths from industrial injuries are also higher in Japan; 1872 deaths in Japan in 1990 compared with 433 in the UK in financial year 1990-91. Another statistic worth noting is the relatively high rate of suicide in Japan: Japanese suicides totalled 20,088 in 1990 compared with 4,643 deaths from suicides and self-inflicted injuries in the UK.

Income distribution

As income and consumption are more equally distributed in Japan than in the UK, it might be argued that the same level of average consumption would produce a higher level of welfare in Japan.

7. Results

The results of the calculations described in this paper are summarised in the following table. Using the PPP statistic to convert the figures for Japan and the UK into a common currency, Japanese welfare comes out at 86.6 per cent of the UK level. Clearly the size of difference calculated is smaller than the margin of uncertainty over the PPP statistics, as well as the various other areas of uncertainty discussed in the paper. Thus the results of this paper must be regarded as inconclusive in terms of the welfare ranking of the two countries.

Summary table of welfare calculations

(all figures relate to 1990)

	Japan (¥ billion)	UK (£ billion)
Personal consumption	243638	345.65
Government consumption	38807	133.0
Fixed investment (less warranted)	41744	42.1
Overseas investment(..)	3643	-18.7
Stockbuilding(..)	1566	-1.7
Less consumption of general govt. services and law and order	-10614	-17.0
Less expenditure on commuting	-1371	-0.8
Business entertainment	5630	1.4
Value of non-marketed time	308103	551.5
<i>Total of above</i>	<i>631146</i>	<i>1035.45</i>
Total population aged 15 and above (000s)	100890	46407
Welfare per head of population aged 15 and above	¥6255783	£22312
Japanese welfare (in ¥)/UK welfare (in £)	280.4	
Purchasing power parity	323.9	

Common currency welfare ratio

86.6 per cent

ANNEX: ANNUAL HOURS OF WORK IN JAPAN

Published estimates of Japanese annual hours of work (including Maddison's²⁰) are generally based on the Monthly Labour Survey, which is a survey of establishments. Alternative estimates can be derived from data in the monthly labour force survey. The LFS asks respondents to give the number of hours they worked in the week covered by the survey, in the case that they worked at some time during the week; or to state if they were in regular employment but had not worked in the week covered by the survey. The published statistics of the employed

20 *op.cit.*

work force are derived from these responses (which is equal to the number of people actually at work plus those in employment but not at work in the survey week, scaled up to cover the whole population).

An estimate of number of hours worked per year can be derived from the total of those at work on average during the year in question (i.e. the employed labour force less those employed but not at work during the survey week) times the average number of hours per week times $52 \frac{1}{7}$. This should be an accurate estimate of hours worked per year net of holidays, sickness, strikes etc. if days off work are evenly distributed throughout the month.

The week covered by the monthly labour force surveys is the last 7 days of each month, except in December when it is the seven days ending on 26 December. Of the annual fourteen days of national holidays, only two (Greenery Day on 29 April and the holiday commemorating the Emperor's birthday on 23 December) will normally fall in a week covered by the survey. In addition, the other main times at which the Japanese take holidays are the first few days of January (following New Year's Day which is an official national holiday), in the first week of May (to add to the three national holidays in "golden week") and in mid-August at the time of the "bon" festival when people traditionally go back to their home towns on the occasion of the temporary return to this earth of their ancestors' spirits. None of these main holiday periods falls in weeks covered by the survey. There is therefore a need for some downward adjustment to the calculation suggested in the previous paragraph.

Using data in the Japanese Labour Ministry's 1993 employment White Paper on annual holidays of production workers in manufacturing industry, we have calculated an adjustment based on 87 weekend days off per year, 30 days holiday (including national holidays) and 3 days off for other reasons. We assume that the days off for "other" reasons will be reflected in the LFS returns, but that only 2 of the 30 days holiday will be picked up (a somewhat extreme assumption which probably causes the resulting adjusted figure for hours worked per year to be an underestimate). These assumptions lead to a downward adjustment to the simple calculation described above of 10.26 per cent. Estimates of hours per year are shown in the table below.

LFS based estimates of average annual hours per worker in Japan

	Total employed	Not at work	Weekly hours	Annual hours
1989	6128	83	46.4	2141
1990	6249	88	45.7	2108
1991	6369	96	45.0	2074
1992	6436	98	44.1	2032

The estimate of average annual hours worked in 1989 is some 143 hours higher than Maddison's estimate. It is possible to suggest at least two reasons why his estimate is biased downwards.

Firstly, Maddison derives his estimate of hours, as noted earlier, from the Monthly Labour Survey rather than the labour force survey. In the latter survey, respondents who hold more than one job are asked to give the total number of hours they work in all their jobs. Thus multiplying the number of respondents who say they have jobs by the number of hours they say they work should give an unbiased estimate of the total number of hours worked in the economy. The Monthly Labour Survey's hours figures, by contrast, will obviously be an average per job, not an average per person: they will understate average hours worked per person to the extent that people hold more than one job. Combining such an estimate of hours with employment figures that count the number of people with jobs, not the number of jobs, will obviously lead to some understatement of aggregate man hours worked in the economy.

The labour force survey does not ask people whether they have more than one job (merely whether they would like to have an additional job). However, the 1987 Employment Status Survey showed that of 60,502,000 workers 3,390,000 (5.6 per cent) had second jobs. (And of those with second jobs, 2,198,000 were working 35 hours per week or more in their main job.) These are quite large numbers, but not large enough to explain the main part of the gap between Maddison's estimates of annual hours and those derived above. Nevertheless, they do mean that using Maddison's estimates of total Japanese and UK labour inputs would involve some overstatement of the relative UK labour input. Although his figures for UK average hours are similarly hours per job, rather than hours per person, the UK employment statistics are bench-marked on the Census of Employment and so measure the number of jobs not the number of

workers: thus it is appropriate to combine them with figures for hours per job to get an estimate of aggregate man hours.

A more important source of bias in Maddison's figure is a 5.4 per cent downward adjustment that he makes to the data for regular employees' hours over the whole post-war period to allow for self-employed and temporary workers working shorter hours than regular employees. While self-employed workers in agriculture work relatively short hours, outside agriculture the self-employed work longer hours than employees. Figures for all industries from the 1992 labour force survey were as shown below.

Average weekly hours by employment status	
All workers	44.1
Self-employed	44.2
Family workers	40.3
Employees	44.4

While Maddison's adjustment may have been appropriate in a period when the share of agriculture in total employment was much larger, it seems clearly too large for recent years.

A further point is that establishment data on overtime seems likely to include only paid overtime, while labour force survey data seems likely to include both unpaid and paid overtime. This point applies to the UK as well, of course; but it might be particularly important to bear in mind in relation to Japan, given the different work ethic and the high levels of overtime worked by white collar workers, a significant amount of which is unpaid— "service overtime". In this paper we have therefore preferred to use the labour force survey based estimates of annual hours for Japan.

KOBE ECONOMIC & BUSINESS REVIEW

CONTENTS

NO. 32 (1986)

- Import Demand Structural Change in the Pacific
Basin Countries *Seiichi Katayama*
Kenichi Ishigaki
- A Synthetic Analysis of Structuralist and Monetarist
Theory of Latin American Inflation *Shoji Nishijima*
Stagflation—Causes and Policies— *Nobuo Okishio*
A Computable General Equilibrium Model of the
Japanese Economy *Mitsuo Ezaki*

NO. 33 (1988)

- Agency Problems and Accounting Communication *Isao Nakano*
Strategic Corporate Innovation and
Japanese Management *Hideki Yoshihara*
Financial Deregulation and Financial
Relationships between Japan and Australia *Kenichi Ishigaki*
Keynes' User Cost and the Theory of
International Trade *Kazuo Shimomura*
A Note on International Transmission of
Disturbances and Policy Interdependence
under Flexible Exchange Rates *Hideki Izawa*
Monetary Policy and Foreign Disturbances
in a Small Open Economy under Flexible
Exchange Rates and Rational Expectations *Hideki Izawa*
A Sketch of the Theory of Trade Cycle *Nobuo Okishio*

NO. 34 (1989)

- Recent Inflation of Land Prices in Metropolitan
Areas of Japan
—A Case Study of Regional Accounting— *Nobuko Nosse*
Little Basics and Employeeism
Japanese Management in
International Perspective *Hideki Yoshihara*
Bank's Loans to Developing Countries:
A Normative Approach *Kazuhiro Igawa*
Japan's Trade Diplomacy:
Yesterday, Today, Tomorrow *Peter Drysdale*
A Labour Union in Every Country
—A Game-Theoretic Approach— *Kazuo Shimomura*
The Costs and Benefits for Firms of
Accounting Information Disclosure *Hidetoshi Yamaji*
Increasing Returns to Scale and Optimal
Investment Policy of the Regulated Firm *Seiichi Katayama*
Fumio Abe
Problems and Method of Economics *Nobuo Okishio*
Industrial Organization and International Trade
—Textile Industries in the
Western Pacific Region— *Katuhiko Ikeda*

NO. 35 (1990)

- Some Implications of the Present-Value-
Based Depreciation Within the
Historical Cost Framework *Isao Nakano*
- Foreign Subsidiaries as Contributors
to Parent Companies
—A New Paradigm of Multinational
Enterprises— *Hideki Yoshihara*
- The Gains from Free Trade for a Monetary
Economy *Murray C. Kemp*
- On the Optimal Timing of Foreign Aid *Murray C. Kemp*
Ngo Van Long
Kazuo Shimomura
- A Simple Union-Ridden General
Equilibrium Model *Kazuo Shimomura*
- Industrial Policy under International
Oligopoly *Kenji Kojima*
- Realtime Distributed Control of World Link Models
in the International Computer Networks *Ko Miyazaki*

NO. 36 (1990)

- Outward Direct Foreign Investment
and Structural Adjustment in a
Small Open Economy *Chung H. Lee*
- An Approach to Transaction
Contracts with Asymmetric
Information *Kazuhiro Igawa*
- A Mathematical Note on the
Impossibility of Global Absolute Advantage *Kazuo Shimomura*
- On Reform of the International
Monetary System: A Survey *Hideki Izawa*

NO. 37 (1992)

- Corporate Behaviors on Disclosure of Social Responsibility
Information and Distrust Dissolution Accounting
—A Survey of Reserarches Not Based on Rigorous Models *Isao Nakano*
- Local Entrepreneurship and Reverse
Technology Transfer—Messages
from Foreign Companies in Japan— *Hideki Yoshihara*
- The Forms of Enterprises and Transaction
in General Equilibrium: A Note on
Analytical Framework *Kazuhiro Igawa*
- A Note on the Flatness of the
Transformation Surface *Kazuo Shimomura*
- The Long-Term Relationship in the
Japanese Distribution System:
Game-Theoretic Viempoints *Kenji Kojima*
- Recent Developments in the Theory
of Trade with Imperfect
Competition *Winston W. Chang*
Seiichi Katayama
- Long-term Expectations and Economic
Growth—A Post Keynesian Theory
of Long-term Growth— *Hideyuki Adachi*

NO. 38 (1993)

- Generalized Lower-of-Cost-or-Market Rule for Inventory
Valuation for Quasi-rational Managers *Isao Nakano*
- Effects of Financial Deregulation on Australian Financial
System *Kenichi Isigaki*
- NAFTA and Asia-Pacific Economic Relations *Seiji Naya*
- The Asian Development Experience and Its Relavance to
African Development Problems *Seiji Naya*
Robert K. McCleery
- A Qualitative Assessment of the Effects of NAFTA on Japan's
Foreign Investment and Trade with East Asia and Mexico:
Opportunity or Diversion? *William E. James*
- Dynamic Effects of Tax Policies in A q
Model of Investment *Takao Ohkawa*
Kazuo Shimomura
- Corporate Governance in Germany, Japan, and the
United States : A Comparative Study *Kenji Kojima*
- Economic Issues in International Debt:A Survey *Hideki Izawa*
- A Note on the Estimation of Scale Economies and their
Use in Modeling Free Trade Agreements *Robert K. McCleery*

KOBE UNIVERSITY ECONOMIC REVIEW 40, 1994

Edited by Faculty of Economics,
Kobe University, Kobe, Japan

CONTENTS

Recent Economic Changes of in Myanmmmer	<i>Nobuyoshi Nishizawa</i>
Technology Trade of Japan	<i>Taiji Hagiwara</i>
Alternative Ways to the Harmonization of the Tax Systems in the EU? -The ACE System and CBIT-	<i>Masayuki Tamaoka</i>
Turnover of the Landowners in Rural England: A Case Study of Land Tax Returns	<i>Kimio Shigetomi</i>
Toward a Theory of Trade Negotiations	<i>Noritsugu Nakanishi</i>

THE ANNALS OF THE SCHOOL OF BUSINESS ADMINISTRATION KOBE UNIVERSITY No. 39, 1994

Edited by the School of Business Administration,
Kobe University, Kobe, Japan

CONTENTS

New Forms of Management Organization under New Technology: Some Empirical Evidence	<i>Norio Kambayshi</i>
Seven Entrepreneurial Paradoxes and the Taxonomy of Networking: The Cases of the MIT Enterprise Forum, the Smaller Business Association of New England and the Yokohama Venture Business Club	<i>Toshihiro Kanai</i>
Überblick über die externe Rechnungslegung der japanischen Unternehmen	<i>Masatoshi Kuroda</i>
Coordination and Communication in Vertical Relationships	<i>Masayoshi Maruyama</i>
Das Japanische Produktionssystem im Kontext des Internationalen Vergleichs	<i>Masayuki Munakata</i>

KOBE UNIVERSITY LAW REVIEW 28, 1994 International Edition No. 28, 1994

Edited by Faculty of Law Kobe University, Kobe, Japan

CONTENTS

Legal Issues Facing Japanese Business in Canada	<i>Yoshio Ohara</i>
Extraterritorial Application of U.S. Antitrust Law After Hartford: The Exporter's Case	<i>Michael Peter Waxman</i>
Recent Development of Trust Law on Occupational Pension Scheme in U.K.	<i>Kazuhito Yukizawa</i>

RESEARCH INSTITUTE FOR ECONOMICS AND
BUSINESS ADMINISTRATION, KOBE UNIVERSITY



HISTORICAL SKETCH

In 1919, a research organization named the Institute for Commerce was founded in Kobe Higher Commercial School, one of the chief predecessors of Kobe University, with a gift made by F. Kanematsu & Company, a leading mercantile firm in Kobe. The organization was designed to carry on and facilitate integrated research on business and commerce and to formulate and publish the results of these studies and investigations in such form as to make them available to the business community.

With the founding of Kobe University of Commerce, successor of Kobe Higher Commercial School, in 1929, the Institute extended its research activities by adding several divisions. One was the famous Latin-American Library, which soon became the center of research in this field in Japan. A room for statistics equipped with various computing machines was established and began publication of *Júyo Keizai Tókei* and *Sekai Bóeki Tókei* annually. A filing room was prepared to deposit press clipping files systematically arranged by topics and dates. Another room was designed to become the center of all possible original records and data having to do with the beginning and progress of Japanese business.

On the campus of Kobe University of Commerce, another organization named the Institute for Business Mechanization was founded in 1941 utilizing business machines donated by the IBM Corporation and others. With Professor Yasutaro Hirai as its head a broad and forward-looking plan for business mechanization in Japan was developed.

In 1944, Kobe University of Commerce changed its name to Kobe University of Economics. After the War, however, the University was consolidated with three other colleges in Hyogo Prefecture to become Kobe University. With this development, the two Institutes were also amalgamated into the Research Institute for Economics and Business Administration, Kobe University. At present, the Institute, with its twenty-one full-time professional staff members, carries on studies and investigations in international economics, international environment, international comparative economics, international business, management information systems and international cooperation.

ORGANIZATION

The Institute consists of six sections. Each section and its research subjects are as follows:

- 1. International Economic Studies**

International Economics, International Monetary Economics,
Maritime Economics, International Labor Relations

- 2. International Environmental Studies**

Resource Development, International Organizations,
International Industrial Adjustment

- 3. International Comparative Economic Studies**

Pacific Basin I (Oceanian Economy)
Pacific Basin II (Latin American Economy)
Pacific Basin III (North American Economy)

- 4. International Business Studies**

Comparative Business, Multinational Enterprise,
International Business Finance

- 5. Management Information Systems**

Business and Accounting Information, Information Processing
System, International Comparative Statistics

6. International Cooperation

In addition to the ordinary work of each section, several research Groups, whose members are not limited to the Institute staffs, are regularly held to carry on joint studies. At present, there are eight standing research groups, as follows: Group of International Trade, Maritime Economics, Dynamic International Economic Analysis, Multimedia Information Systems, International Economic Comparison, International Comparative Financial Studies, and Business Finance and Governmental Rules, and International Comparative Statistics.

For convenience and greater efficiency in carrying out its research-activities, the Institute has a general office which is responsible for 1) the collection and preservation of a comprehensive collection of books, periodicals, pamphlets, and original records and data of finance, trade, commerce, industry and business generally: 2) the classification, cataloguing, indexing arranging, annotation and compilation of these research materials: and 3) the formulation and publication of the results of the investigations and studies accomplished by the professional staff members of the Institute.

As an affiliated institute, the Documentation Center for Business Analysis has been established in 1964. It is the first systematic information facilities in the field of business administration in Japan that has been recognized and authorized by the Ministry of Education. The purpose is to collect and to make intensive control of all kinds of materials on business administration and to make them available to scholars, universities, governments, and business world with the aid of modern documentation techniques.

**RESEARCH INSTITUTE FOR
ECONOMICS & BUSINESS ADMINISTRATION
KOBE UNIVERSITY**

Director: Hideki YOSHIHARA

Secretary: Koji UNNO

INTERNATIONAL ECONOMIC STUDIES

International Economics

Prof. Kazuhiro IGAWA

Assoc. Prof. Robert Kenneth MCCLEERY

International Monetary Economics

Assoc. Prof. Hideki IZAWA

Maritime Economics

Assoc. Prof. Masahiro TOMITA

International Labor Relations

Prof. Kazuo SHIMOMURA

Prof. Kouji SHINJO

INTERNATIONAL ENVIRONMENTAL STUDIES

Resource Development

Prof. Shigeyuki ABE

International Organizations

Prof. Junichi GOTO

International Industrial Adjustment

Prof. Hiroshi SADAMICHI

Research Assoc. Ko MIYAZAKI

Prof. Makoto IOKIBE

INTERNATIONAL COMPARATIVE ECONOMIC STUDIES

Pacific Basin I

Prof. Kenichi ISHIGAKI

(Oceanian Economy)

Research Assoc. Ryuzo MIYAO

Pacific Basin II

Prof. Shoji NISHIJIMA

(Latin American Economy)

Pacific Basin III

Prof. Seiichi KATAYAMA

(North American Economy)

INTERNATIONAL BUSINESS

Comparative Business

Assoc. Prof. Kenji KOJIMA

Multinational Enterprise

Prof. Hideki YOSHIHARA

Assoc. Prof. Kentaro NOBEOKA

International Business Finance

Assoc. Prof. Hidetoshi YAMAJI

MANAGEMENT INFORMATION SYSTEMS

Business and Accounting Information

Prof. Isao NAKANO

Information Processing Systems

Prof. Komayuki ITOW

International Comparative Statistics

Prof. Yasuo KONISHI

Prof. Takeyuki TANI

INTERNATIONAL COOPERATION

Prof. Chong Yeong LEE

DOCUMENTATION CENTER FOR BUSINESS ANALYSIS

Assoc. Prof. Norio OBATA

Office: RESEARCH INSTITUTE FOR ECONOMICS & BUSINESS ADMINISTRATION

(The Kanematsu Memorial Hall)
KOBE UNIVERSITY
ROKKO, KOBE, JAPAN