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2000

Discretionary Accrual Models and the Accounting Process

Corrections

a) Lines 1-2 in page 107 should be changed as follows

Dep = amount of depreciation

b) Footnote 2 in page 107 should be deleted

Conclusions remain unaltered with or without the corrections. Results are available from the authors on request.

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IMPERFECT SUBSTITUTES AND STRATEGIC TRADE POLICIES UNDER COURNOT DUOPOLY : MATHEMATICAL NOTE (*)

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Abstract

This is a mathematical note for our paper "Imperfect substitutes and strategic trade policies under Cournot duopoly". The main proposition of the paper is that under certain conditions an export subsidy improves the world welfare. The whole propositions are rigorously proved including the uniqueness for Cournot duopoly equilibrium solution.

JEL claasification: F12, F13
Keywords: strategic trade policy; differentiated goods

1. Introduction

Despite many criticisms of its general validity strategic trade policy arguments shed light on some aspects of modern world trade (see for example, Krugman (1993), and Feeney and Hillman (2000)). In our recent paper a general reciprocal market model is built to investigate welfare consequence of trade policies in a formal model (Uekawa, Katayama and

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Ohta (2000)). It is shown that under certain conditions an export subsidy improves the world welfare.

The model and propositions are expanded but the rigorous proofs for these results are not given in the paper due to its space limitation. Though they are somehow technical, the proofs themselves have their own value to the interested readers and should be kept somewhere. Thus, this note is the mathematical appendix to the paper.

All the symbols and the number of equations are the same as in the main text. And note that the propositions in Uekawa, et.al. (2000) are stated with the proofs.

2. The model

Consider a two-country trade model as follows. There are three goods (Z, X and Y). Good Z is competitively produced in the two countries under constant returns to scale and is taken as the *numeraire* in both countries. Good X is produced by one imperfectly competitive domestic firm and good Y by another imperfectly competitive firm in the foreign country. They behave in a Cournot fashion.

Cost functions of good X and Y, denoted by $c(X)$ and $c^*(Y)$, are characterized by

$$c'(X) > 0,\ c''(X) \leq 0 \quad \text{and} \quad c^{*\prime}(Y) > 0,\ \ c^{*\prime\prime}(X) \leq 0 \qquad (1)$$

where $X = x + x^*$ is the total output of good X, and x and x^* are domestic and foreign sales, respectively, by the domestic firm. Throughout, a starred variable denotes the entity in the foreign market. Similarly, $Y = y + y^*$ is the total output of good Y produced by the foreign firm, and y and y^* are its sales to the home and foreign markets, respectively. Note that we presume in condition (1) increasing returns to scale in production for some reason, for example, sufficiently large fixed costs for both firms.

The social utility functions for the two countries are assumed to take the quasi-linear form

$$U(x, y, z) = u(x, y) + z$$

and (2)

$$U(x^*, y^*, z^*) = u^*(x^*, y^*) + z^*,$$

where x, y and z are consumption levels of goods X, Y and Z in the domestic country and those with stars correspond to the foreign entities.

Assume that the sub-utilities in (2), namely, $u(x, y)$ and $u^*(x^*, y^*)$ are increasing and strictly concave such that for i, j=1, 2,

$$u_i > 0 \ , \ u_i^* > 0 \quad \text{and} \quad u_{ii} < u_{ij} < 0 \ , \ u_{ii}^* < u_{ij}^* < 0 \ , \tag{3}$$

where u_i is the partial derivative of $u(x, y)$ with respective to its ith argument, i=1, 2 : for example, $u_1 = \partial u / \partial x$ and $u_{12} = \partial^2 u / \partial y \, \partial x$. Since good Z is taken as the *numéraire* in both countries, $P^Z = P^{Z*} \equiv 1$, where P^Z (respectively, P^{Z*}) is the price of good Z in the home (foreign) country.

We see from the above assumptions on the social utility functions that the inverse demand functions of goods X and Y are obtained as

$$\begin{aligned} &P^X(x, y) = u_1 \ ; \ P^Y(x, y) = u_2 \\ \text{and} \quad &\\ &P^{X*}(x^*, y^*) = u_1^* \ ; \ P^{Y*}(x^*, y^*) = u_2^* \ . \end{aligned} \tag{4}$$

Consider domestic import tariffs and export subsidies as the trade policy instruments. For simplicity we assume that the foreign country imposes neither import tariffs nor export subsidies under any circumstances. In other words, the foreign country is passive in its trade policies. Let the domestic import tariff be denoted by t and the domestic export subsidy by s.

Thus, the profit of domestic and foreign firms are expressed, respectively, by

$$\begin{aligned} &V(x, x^*, y^*, y) = xP^X + x^*P^{X*} - c(x + x^*) + sx^* \\ \text{and} \quad &\\ &V^*(x, x^*, y^*, y) = y^*P^{Y*} + yP^X - c^*(y + y^*) - ty. \end{aligned} \tag{6}$$

3. The Propositions and the Proofs

Proposition 1. *The Jacobian matrix A of the equation system* (7) *is an N-P matrix. Therefore the solution, if any, to the system* (7) *is unique.* (*See,* Nikaido 1968, p. 371.)

Proof (Appendix 1 to the main text): The system of equation (7) is:

$$
\begin{aligned}
V_1 &= P^X + xP_1^X - c' = 0 \\
V_2 &= P^{X*} + x*P_1^{X*} - c' + s = 0 \\
V_3^* &= P^{Y*} + y*P_2^{Y*} - c*' = 0 \\
V_4^* &= P^Y + yP_2^Y - c*' - t = 0.
\end{aligned} \tag{7}
$$

We shall show that the Jacobian matrix A is an N-P matrix. Let us define $A(\gamma)$ for $0 \leq \gamma \leq 1$ as follows

$$
A(\gamma) = \begin{bmatrix}
q_{11} - c'' + P_1^X & -\gamma c'' & 0 & \gamma V_{14} \\
-\gamma c'' & q_{11}^* - c* + P_1^{X*} & \gamma V_{23} & 0 \\
0 & \gamma V_{32}^* & q_{22}^* - c*'' + P_2^{Y*} & -\gamma c*'' \\
\gamma V_{41}^* & 0 & -\gamma c*'' & q_{22} - c*'' + P_2^Y
\end{bmatrix} \tag{A1}
$$

Since we know from (9) that

$$
\begin{aligned}
&|q_{11} - c'' + P_1^X| - |-\gamma c''| - |\gamma V_{14}| = -\{q_{11} - (1+\gamma)c'' + P^X{}_1 - \gamma V_{14}\} > 0 \\
&|q_{11}^* - c'' + P_1^X| - |-\gamma c''| - |\gamma V_{23}| = -\{q_{11}^* - (1+\gamma)c'' + P_1^X \gamma V_{23}\} > 0 \\
&|q_{22}^* - c*'' + P_1^X| - |-\gamma c*''| - |\gamma V_{32}| = -\{q_{22}^* - (1+\gamma)c*'' + P_2^{Y*} - \gamma V_{32}\} > 0 \\
&|q_{22} - c*'' + P_2^Y| - |-\gamma c*''| - |\gamma V_{41}^*| = -\{q_{22} - (1+\gamma)c*'' + P_2^Y - \gamma V_{41}^*\} > 0,
\end{aligned}
$$

the transposed matrix $A(\gamma)'$ for $0 \leq \gamma \leq 1$ has dominant diagonals and therefore is non-singular. Since $|A(\gamma)|$ is a continuous function of γ for $0 \leq \gamma \leq 1$, we see that

$$\text{sign } |A(0)| = \text{sign } |A(1)| = \text{sign } |A|.$$

Thus, since $|A(0)| = V_{11} \cdot V_{22} \cdot V_{33}^* \cdot V_{44}^* > 0$, we see that $|A| > 0$. Furthermore, all principal submatrices of A have dominant diagonals and therefore all principal minors of order 3 are negative, those of order 2 positive and all diagonal elements negative. Hence, A is an N-P matrix and the solution to the system of equations (7) is unique.

Assumption 1 $P_1^{X*} < V_{23}$ and $P_2^{Y*} < V_{32}^*$

Proposition 2 *Suppose that either* c'' *or* $c*''$ *is negative and Assumption* 1

is satisfied. Then a rise in the domestic import tariff increases the consumption of good X in both countries and its output by the domestic firm, and reduces the consumption of good Y in both countries and its output by the foreign firm. Also, the tariff increase raises the sales revenue of the domestic firm and reduces that of the foreign firm.

The proof is given with Assumption 1 in Uekawa, et. al. (2000).

Assumption 2 $P_1^* < V_{14}$ and $P_2^Y < V_{14}^*$

Proposition 3 *Suppose that either c'' or $c^{*''}$ is negative and Assumption 2 is satisfied. Then an increase in the domestic export subsidy increases the consumption of good X in both countries and its output by the domestic firm, and reduces the consumption of good Y in both countries and its output of the foreign firm. Also, the increase in the subsidy raises the total sales revenue of the domestic firm and decreases that of the foreign firm.*

Proof (Appendix 2): From the system (11) we obtain the following.

$$\begin{aligned} x_s(t,s) &= -A_{21}/|A| \\ &= -[c''(V_{33}^* V_{44}^* - c^{*''2}) + c^{*''} V_{32} V_{14}]/|A| \geq 0 \end{aligned} \tag{A2}$$

with equality only if $c'' = c^{*''} = 0$,

$$\begin{aligned} x_s^*(t,s) &= -A_{22}/|A| \\ &= -\left[\begin{array}{l}(q_{11} - c'')\{V_{33}^*(q_{22} - c^{*''} + P_2^Y) - c^{*''2}\} \\ + P_1^X V_{33}^*(q_{22} - c^{*''}) - c^{*''2}\} + V_{33}^*(P_1^X P_2^Y - V_{14} V_{41}^*)\end{array}\right]/|A| \\ &> 0, \end{aligned} \tag{A3}$$

since $q_{11} - 2c'' < 0$, $q_{22} - c^{*''} < 0$, V_{14} and $V_{14}^* < 0$ from (9–1) and (9–2).

Also we have that

$$\begin{aligned} y_s^*(t,s) &= -A_{23}/|A| \\ &= [V_{32}^*(V_{11} V_{44}^* - V_{14} V_{41}^*) + c'' c^{*''} V_{41}^*]/|A| < 0. \end{aligned} \tag{A4}$$

$$\begin{aligned} y_s(t,s) &= A_{24}/|A| \\ &= [c^{*''} V_{11} V_{32}^* + c'' V_{33} V_{41}^*]/|A| \leq 0, \end{aligned} \tag{A5}$$

with quality only if $c'' = c^{*''} = 0$ holds.
Therefore, it is immediately known that

$$\partial X/\partial s \equiv X_s = x_s + x_s^* > 0 \quad \text{and} \quad \partial Y/\partial s \equiv Y_s = y_s + y_s^* < 0 . \tag{A6}$$

Furthermore, if the initial rate of export subsidy is less than the marginal cost of the domestic firm and the tariff rate is nonnegative, it is shown from (7) that

$$\begin{aligned} \partial [PX^X(x, y)x + P^{X*}(x^*, y^*)x^*]/ &= c' x_s + xP_2^X y_s \\ &+ (c' - s)x_s^* + x^* P_2^{X*} y_s^* \\ &> 0 \end{aligned} \tag{A7}$$

and

$$\begin{aligned} \partial [P^Y(x, y)x + P^Y(x^*, y^*)y^*]/\partial s &= (c^{*\prime} + t)y_s + yP_1^Y x_s \\ &+ c^{*\prime} y_s^* + y^* P_1^Y x_s^* \\ &< 0 \end{aligned} \tag{A8}$$

Proposition 4 *In the case where the cost functions are linear in the global sense, a full optimum calls for positive* t^0 *and* s^0.

Proof (Appendix 3): Using (4), (7) and (19) we obtain

$$\begin{aligned} \partial W/\partial t \equiv W_t &= (P^X - c')x_t + y\{1 - (P_t^Y x_t + P_2^Y y_t)\} + x^* P_2^{X*} y_t^* \\ &+ ty_t - sx_t^* + x_t^* (x^* P_1^{X*} + P^{X*} - c' + s) \\ &\equiv M + ty_t - sx_t^* . \end{aligned} \tag{A9}$$

Here from the first order condition $x^* P_1^{X*} + P^{X*} - c' + s = V_2 = 0$ is used, and

$$M \equiv (P^X - c')x_t + y\{1 - (P_1^Y x_t + P_2^Y y_t)\} + x^* P_2^{X*} y_t^* . \tag{A10}$$

Putting $W_t = 0$, we have that $ty_t - sx_t^* = -M$.

Differentiating W by s, we have

$$\begin{aligned} \partial W/\partial s \equiv W_s &= (P^X - c')x_s - y(P_1^X x_s + P_2^X y_s) + x^* P_2^{X*} y_s^* \\ &+ ty_s - sx_s^* + x_s^* (x^* P_1^X + P^{X*} - c' + s) \end{aligned} \tag{A11}$$

$$\equiv N + ty_s - sx_s^*$$

Here from the first order condition $x^*P_1^{X*} + P^{X*} - c' + s = V_2 = 0$ is used, and

$$N \equiv (P^X - c')x_s + y\{1 - (P_1^Y x_s + P_2^Y y_s)\} + x^*P_2^{X*}y_s^* . \qquad \text{(A12)}$$

Putting $W_s = 0$, we have that $ty_s - sx_s^* = -N$.

For the full optimality, $W_t = W_s = 0$. Therefore,

$$W_t(t, s) = M + ty_t - sx_t^* = 0 , \qquad \text{(A13)}$$

$$W_s(t, s) = N + ty_s - sx_s^* = 0 . \qquad \text{(A14)}$$

Let $B \equiv \begin{bmatrix} -y_t & x_t^* \\ -y_s & x_s^* \end{bmatrix}$ and express (A13) and (A14) as

$$B\begin{bmatrix} t \\ s \end{bmatrix} = \begin{bmatrix} M \\ N \end{bmatrix} . \qquad \text{(A15)}$$

The sign of $|B|$ is indeterminate, therefore the uniqueness and the sign of the solution (t^0, s^0) to the system in (A15) are in general indeterminate. Hence in the following we consider the special case where $c''(X) = c^{*''}(Y) = 0$, i.e., linear cost functions in both countries. Then we have $x_t^* = y_t^* = x_s = y_s = 0$, and $|B| = -y_t x_s^* > 0$. The solution (t^0, s^0) to the system (A15) is determined by

$$\begin{bmatrix} t^0 \\ s^0 \end{bmatrix} = |B|^{-1}\begin{bmatrix} x_s^* & -x_t^* \\ y_s & -y_t \end{bmatrix}\begin{bmatrix} M \\ N \end{bmatrix} = |B|^{-1}\begin{bmatrix} x_s^* & 0 \\ 0 & -y_t \end{bmatrix}\begin{bmatrix} M \\ N \end{bmatrix} \qquad \text{(A16)}$$

Namely,

$$t^0 = |B|^{-1}x_s^*M \text{ and } s^0 = -|B|^{-1}y_tN .$$

As we show in Appendix 4 below, it is revealed that $M > 0$ and $N > 0$. Thus, we have

$$t^0 = x_s^*M/|B| > 0 \quad \text{and} \quad s^0 = -y_tN/|B| > 0 .$$

Derivation of $M>0$ and $N>0$. (Appendix 4):

Using the fact that the (4, 4) th element of AA^{-1} is 1,

$$1=V^*_{41}x_t - c^{*\prime\prime}y^*_t + V^*_{44}y_t = V^*_{41}x_t - c^{*\prime\prime}y^*_t + (q_{22} + P^Y_2 - c^{*\prime\prime})y_t .$$

Therefore,

$$1-(P^Y_1 x_t + P^Y_2 y_t) = -P^Y_1 x_t + V^*_{41} x_t - c^{*\prime\prime} y^*_t + (q_{22} - c^{*\prime\prime})$$

$$= (-P^Y_1 + V^*_{41})x_t + (y_t - y^*_t)c^{*\prime\prime} + (P_{22} - 2c^{*\prime\prime})y_t .$$

Since $-P^Y_1 + V^*_{41} > 0$, and $y_t - y^*_t < 0$ as seen below,

$$1-(P^Y_1 x_t + P^Y_2 y_t) > 0 .$$

Note on $y_t - y^*_t < 0$:

$$y_t - y^*_t = V_{11}(P^{X*}_1 V^*_{33} - V^*_{32} V_{23}) - V^*_{33}(V_{11}(q^*_{11} - c'') - c''^2) - c^{*\prime\prime}(V_{11}V_{22} - c''^2) - c'' V^*_{32} V_{14}$$

$$= P^X_{11} P^{X*}_1 (q^*_{22} - 2c^{*\prime\prime}) + P^{X*}_1 (q_{11} - c'')(q^*_{22} - c^{*\prime\prime})$$

$$+ (V^*_{33} - c^{*\prime\prime})\{(q_{11} - c'')(q^*_{11} - c'') - c^{*\prime\prime}\}$$

$$+ \{V^*_{33} P^X_1 (q^*_{11} - c'') - c'' V^*_{11} V_{14}\} + V_{11}(P^{X*}_1 P^{Y*}_2 - V^*_{32} V_{23})$$

$$< 0 .$$

$$M = (P^X - c')x + y\{1-(P^Y_1 x_t + P^Y_2 y_t)\} + x^* P^{X*}_2 y^*_t > 0 ,$$

since $x_t > 0$, $P^{X*}_2 < 0$, $y^*_t < 0$ and $P^X - c' = -xP^X_1 > 0$.

On the other hand,

$$N = (P^X - c')x_s - y(P^Y_1 x_s + P^Y_2 y_s) + x^* P^{X*}_2 y^*_s .$$

The first term is nonnegative since $P^X - c' > 0$ and $x_s < 0$ ($= 0$ *iff* $c'' = c^{*\prime\prime} = 0$). And the third term is positive since $x^* > 0$, $P^{X*}_2 < 0$ and $y^*_s < 0$. And the second term is nonnegative since $P^Y_1 x_s + P^Y_2 y_s \leq 0$ ($= 0$ *iff* $c'' = c^{*\prime\prime} = 0$). Therefore, $N > 0$.

The following is a note on $P^X_1 x_s + P^Y_2 y_s \leq 0$ ($= 0$ *iff* $c'' = c^{*\prime\prime} = 0$). Since the (4,2)th element of AA^{-1} is 0,

$$-V^*_{41} x_s - c^{*\prime\prime} y^*_s + V^*_{44} y_s = 0 .$$

$$-(P^Y_1 + yP^Y_{21})x_s - c^{*\prime\prime} y^*_s + V^*_{44} y_s = 0$$

$$P_1^Y x_s + P_2^Y y_s = -(V_{41}^* - P_1^Y)x_s - c^{*\prime\prime} y_s^* - (q_{22} - c^{*\prime\prime})y_s$$

$$\therefore \quad P_1^Y x_s + P_2^Y y_s \leq 0, \text{ and } = 0 \text{ iff } c'' = c^{*\prime\prime} = 0.$$

Proposition 5. *Assume that the export subsidy rate is zero. An increase in the home country's import tariff raises its welfare if initially t is sufficiently small. Thus the optimal tariff rate is positive.*

The proof is obvious from Appendix 4 above.

The effect of tariff on the foreign welfare. (Appendix 5)

If the home country levies tariff at the free trade, the welfare of the foreign country deceases.

$$W_t^*(t, 0) = y(P_1^Y x_t - 1) + y_t^*(P^{Y*} - c^{*\prime}) - x^*(P_1^{X*} x_t^* + P_2^{X*} y_t^*). \quad (24)$$

Since $P_1^Y < 0$ and $x_t > 0$, the first term is negative. $P^{Y*} - c^{*\prime} = -yP_2^{Y*}$ and $y_t^* \leq 0$, therefore the second term is non-positive.

Proposition 6. *Assume that the export subsidy rate is zero. The impact effect of an increase in the home country's import tariff on the foreign welfare is generally indeterminate. If the cost functions are linear in both countries, the effect works to reduce the foreign welfare.*

Proof: See Appendix 5 above.

Proposition 7. *Assume that the import tariff is zero. An increase in the home country's export subsidy raises its welfare if initially s is sufficiently small. Thus the optimal subsidy rate is positive.*

Proposition 8. *Assume that the import tariff is zero. The effect of an increase in the home country's export subsidy on the foreign welfare is in general indeterminate.*

Proof (Appendix 6): From (19) and (20) again, we have

$$W(0, s) = u(x, y) - yP^Y + x^*P^{X*} - c(x + x^*) \quad (A17)$$

$$W^*(0,\ s) = u^*(x^*,\ y^*) - x^*P^{X*} + yP^Y - c(y^* + y)\,. \qquad \text{(A18)}$$

Differentiating $W(0,\ s)$ with respect to s yields,

$$W_s(0,\ s) = \left[(P^X - c'')x_s - y(P_1^Y x_s + P_2^Y y_s) - x^*P_2^{X*} y_s^*\right] - sx_s^* = N - sx_s^*\,. \qquad \text{(A19)}$$

As we show in Appendix 4, $N > 0$. In addition, $x_s^* > 0$ from (A3). Thus the optimal export subsidy s^{00} is

$$s^{00} = N / x_s^* > 0\,. \qquad \text{(A20)}$$

In the perfect substitute case, a sufficient condition to obtain the same proposition as this one is given (see Proposition 7 in Uekawa (1994)). The condition is on the relative magnitudes of the second derivatives of home and foreign cost functions. Here *without* such condition, we can assert that a home country's export subsidy increases its welfare.

Next we consider the effect of an export subsidy on the foreign welfare. Differenciating $W^*(0,\ s)$ with respect to s yields

$$W_s^*(0,\ s) = (P^{Y*} - c^{*\prime})y_s^* + yP_1^Y x_s - x^*(P_1^{X*} x_s^* + P_2^{X*} y_s^*)\,. \qquad \text{(A21)}$$

The sign of $W_s^*(0,\ s)$ is dependent on the term $(P_1^{X*} x_s^* + P_2^{X*} y_s^*)$ which is the change in export price of the domestic firm induced by the subsidy policy. Unfortunately, the sign of this term is indeterminate in general, and so is the sign of $W_s^*(0,\ s)$ in turn.

Proof of the fact that if $c^{*\prime\prime} \leq c'' < 0$ and $u_{11}^* < u_{22}^* < 0$, then $X_t + Y_t < 0$ (Appendix 7):

$$x_t + y_t = -\left[c''c^{*\prime\prime}V_{23} + V_{14}(V_{22}V_{33}^* - V_{23}V_{32}^*) - \begin{vmatrix} V_{11} & V_{12} & 0 \\ V_{21} & V_{22} & V_{23} \\ 0 & V_{32}^* & V_{33}^* \end{vmatrix}\right] / |A|$$

$$= [(P_1^X - V_{14})(V_{22}V_{33}^* - V_{23}V_{32}^*) + V_{32}^*\{(q_{11} - c'')(q^*_{23} - c'') - c''^2\}$$

$$+ (q_{11} - c'')(P_1^{X*} P_2^{Y*} - V_{32}^* V_{23}) + \{(q_{11} - c'')(q_{22}^* - c^{*\prime\prime})P_1^{X*} - c''c^{*\prime\prime}V_{23}\}]/|A|$$

$$< 0\,.$$

$$x_t^* + y_t^* = [-c^{*\prime\prime}V_{11}V_{23} - c''V_{14}V_{32}^* + c^{*\prime\prime}(V_{11}V_{22} - V_{12}V_{21}) + c''V_{32}^* V_{14}]/|A|$$

$$= [\{-c''V_{14}(q^*_{22}-c^{*\prime\prime})+c^{*\prime\prime}P^X_1(q^*_{11}-c'')\}$$
$$+\{-c''V_{14}(P^{Y*}_2-V^*_{32})+c^{*\prime\prime}P^X_1(P^{X*}_1-V_{23})\}$$
$$+c^{*\prime\prime}(q_{11}-c'')(P^{X*}_1-V_{23})+c^{*\prime\prime}\{(q_{11}-c'')(q^*_{11}-c'')-c''^2\}]/|A|.$$

Now, if $c^{*\prime\prime}=c''=0$, $x_t^*+y_t^*<0$ and therefore $x_t+y_t+x_t^*+y_t^*<0$.

Suppose that $c^{*\prime\prime}\leq c''<0$. Then, from $P^X_1<V_{14}<0$, the first { } is negative if $q_{11}-c''\leq q^*_{22}-c^{*\prime\prime}<0$ and in turn if $q^*_{11}\leq q^*_{22}$. Recall that $q_{11}=P^{X*}_1+x^*P^X_{11}$ and $q^{Y*}_{22}=P^Y_2+y^*P^{Y*}_{22}$. The second terms in these equations include the third partial derivatives of u^* with respect to the first and the second arguments, respectively. Normally, their signs are not known. Therefore, escaping from the ambiguity and assuming that the effects of these derivatives are small, we see the first { } negative if $u^*_{11}\leq u^*_{22}<0$. Similarly, the second { } is also negative if the same condition on the second partial derivatives of u^* holds. Since the third and forth terms in [ ] are readily seen as negative, we have $X_t+Y_t<0$.

Proof of the fact that when $c'\geq c^{*\prime}\geq 0$ and $c''\geq c^{*\prime\prime}$, $c'\geq c^{*\prime}>c_0$ (Appendix 8):

If $c^{*\prime\prime}\leq c''\leq 0$ then $X_t+Y_t<0$. By definition,

$$c_0=\frac{X_t}{X_t+Y_t}\,c'+\frac{Y_t}{X_t+Y_t}\,c^{*\prime}.$$

Therefore, if $c'=c^{*\prime}$ then $c'=c^{*\prime}=c_0$.

If instead $c'>c^{*\prime}$, then $c_0<\frac{X_t}{X_t+Y_t}\,c^{*\prime}+\frac{Y_t}{X_t+Y_t}\,c^{*\prime}=c^{*\prime}$.

$$\therefore \qquad c'>c^{*\prime}>c_0.$$

If $c'<c^{*\prime}$, then $c_0>c^{*\prime}$, and therefore it may not be the case that $P^{X*}>c_0$ and $P^Y>c_0$.

Proof of the fact that if $\bar{P}^X<\bar{P}^Y$, then $\tilde{P}>c_0$ (Appendix 9):

By definition, $\tilde{P}=\frac{X_t}{X_t+Y_t}\,\bar{P}^X+\frac{Y_t}{X_t+Y_t}\,\bar{P}^Y$, where $X_t+Y_t<0$.

Since $X_t>0$ and $Y_t<0$, if $\bar{P}^X<\bar{P}^Y$, then $\tilde{P}>\bar{P}^Y$ and in turn $\tilde{P}>c_0$.

Proposition 9. *If* $c'\geq c^{*\prime}\geq 0$, $c''\geq c^{*\prime\prime}$, $u^*_{11}\leq u^*_{22}$ and $\bar{P}^X<\bar{P}^Y$, *a rise in the*

domestic import tariff, starting from free trade, reduces the world welfare.

Proof: See the above Appendices.

Proof of the fact that if $c' \leq c^{*\prime}$, $c'' < 0$ and $c^{*\prime\prime} \cong 0$ then $c^{*\prime} \geq c' > c^0$. (Appendix 10):

$$\begin{aligned} x_s + x_s^* + y_s + y_s^* = & [-c''(V_{33}^* V_{44}^* - c^{*\prime\prime 2}) - c^{*\prime\prime} V_{32}^* V_{14} \\ & - V_{11} V_{33}^* V_{44}^* + V_{33}^* V_{14} V_{41}^* + c^{*\prime\prime 2} \\ & + V_{32}^* (V_{11} V_{44}^* - V_{14} V_{41}^*) + c''\, c^{*\prime\prime} V_{41}^* \\ & + c^{*\prime\prime} V_{11} V_{32}^* + c'' V_{33}^* V_{41}^*] / |A| \\ = & [c'' V_{33}^* (V_{41}^* - V_{44}^*) + (V_{32}^* - V_{33}^*)(V_{11} V_{44}^* - V_{14} V_{41}^*) \\ & + c^{*\prime\prime}\{c''(c^{*\prime\prime} + V_{41}^*) + c^{*\prime\prime} V_{11} + V_{32}^* (V_{11} - V_{14})\}] / |A| \\ > & 0 \quad \text{if } c'' \leq 0 \text{ and } c^{*\prime\prime} \cong 0. \end{aligned}$$

Thus, with the similar argument as Appendix 8, we have the following results.
If $c^{*\prime} = c'$ then $c^0 = c^{*\prime} = c'$.
If $c' > c^{*\prime}$, then $c^0 > c^{*\prime}$, and therefore $P^X > c^0$ and $P^{Y*} > c^0$ may not hold.

Proof of the fact that $U_s^W(0, s) = (\breve{P} - c^0)(X_s + Y_s) > 0$ if $c' \leq c^{*\prime}$, $c'' \leq 0$, $c^{*\prime\prime} \cong 0$ and $P^X > P^Y$ (Appendix 11):

By definition, $\breve{P} = \dfrac{X_s}{X_s + Y_s} \hat{P}^X + \dfrac{Y_s}{X_s + Y_s} \hat{P}^Y$, where $X_s > 0$, $Y_s < 0$ and $X_s + Y_s < 0$.

Thus, $\hat{P}^X > \hat{P}^Y$ implies that $\breve{P} > \hat{P}^X$ and in turn that $\breve{P} > c^0$.

This appendix 11 is nothing but a proof of

Proposition 10 *If $c' \leq c^{*\prime}$, $c'' < 0$, $c^{*\prime\prime} \cong 0$ and $\hat{P}^X > \hat{P}^Y$, then an increase in the domestic export subsidy, starting from free trade, increases the world welfare.*

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SHIFTS IN THE JAPANESE CORPORATE GOVERNANCE *

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Abstract

This paper examines the effects of structural changes in financial system on corporate governance and finance in Japan, and discusses the future directions. Major shifts in the Japanese corporate governance are under way. As equity financing replace bank financing as the primary source of capital in Japanese major firms, the power of main banks and the government to direct corporate behavior through funds control are waning. As the economy continues to be sluggish, the effective role of relationship-based governance system is under serious consideration.

JEL Classification: G21; G32; G33.
Keywords: Corporate governance; financial deregulation; financial relationships; Japanese firms.

1. Introduction

Japan has been managing to avoid the worst of the pain from the collapse of its bubble economy earlier this decade. In the late 1980s Japanese firms raised cheap equity-linked debt to investment in the expectation that the economy would continue to grow at a fair rate. Two decades of heavy spending have left Japanese firms laden with debt. While Japan's fairly healthy manufacturing sector is abundant in cash, the rest of the economy,

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particularly construction and property companies, is heavily indebted. Firms have been able to meet the interest charges on this debt mainly because the Bank of Japan has, for the past two-and-a-half years, kept short-term interest rates at the bottom levels.

Japanese government has continued to protect even the weakest banks into the mid-1990s. Until recent failure, no Japanese bank had gone burst since the Second World War. Lending has been collateralized by real estates, the price of which always seemed to go up until the burst of the bubble. What Japanese banks were for was to lend money to firms that needed the cash. Profitability of firms was not seriously considered. Credit risk was not a problem: fast economic growth would in due course take care of it. If a firm ran into trouble, its main bank would rescue it. But such an implicit guarantee created moral hazard of managers in banks and firms.

Major shifts in Japanese corporate governance are under way. The government bureaucrats' ability to manage the Japanese economy through traditional methods has been severely eroded by the financial deregulation. Large Japanese firms can no longer be pressured to do whatever banks and government may ask. The financial liberalization in Japanese capital market led to a period of excessive investments by many Japanese firms. Lacking proper oversight, many investment projects are now in great trouble. These misguided investments were partially created by the government itself, but many of the changes made are now beyond government control. The significant changes in the Japanese financial system are now under consideration: new standards of accounting and financial disclosure, heightened capital adequacy requirements for banks, and reforms in the financial system.

The Japanese corporate system has worked well in the most of the post-war period. But the balance of power in the Japanese corporate system is changing. As equity financing replaces bank financing as the primary source of capital in Japanese major firms, the power of main banks and the government to direct corporate behavior through funds control are waning. As the economy continues to be sluggish, the effective role of relationship-based governance system is under serious consideration. As a result, the potential power of stock market is likely to be rising.

This paper examines the effects of structural changes in financial system on corporate governance and finance in Japan, and discusses the future directions. The primary purpose of this study is twofold: to identify important features of changes in financial system in Japan and their effects

on corporate finance and governance; to develop insights concerning corporate governance and capital market under institutional and regulatory environments.

This paper is organized as follows. The next section presents the major characteristics of chronic problems in the Japanese corporate finance. Section 3 describes major problems and changes in the Japanese financial system. In particular, it describes serious bad loan problems and major financial reforms in Japan. And it also discusses structural changes in main bank system, which is one of the most distinctive features in the Japanese corporate finance. Some aspects of Japanese corporate finance have changed dramatically over the last decade. Most of these changes are the result of changes in the structure of Japanese financial markets, which in turn can be traced to regulatory changes. Section 4 discusses recent shifts in the Japanese corporate governance under the financial deregulation and its direction in future. Finally, section 5 presents concluding remarks.

2. Chronic Problems in the Japanese Corporate Finance

Most of the restructuring undertaken by Japanese firms in the 1990s failed to improve corporate profitability. Much of the improvement in firms' financial performance in the last decade was a reflection of inexpensive capital rather than improved efficiency. Japanese firms made excessive use of capital in the late 1980s, failing to take into serious consideration the long-run return for their investments. Japanese firms were making low-return, long-term capital investment based on short and medium-term costs of capital. Hence, many of those investments are no longer profitable at current costs of capital.

In the bubble economy of the late 1980s, Japanese executives could look forward to an immediate impact on sales and asset growth of large-scale investment projects, ignoring the long-term risk to corporate profitability and to shareholder wealth. Now most of Japanese firms need to focus more on corporate value maximization. As well as cost reducing efforts, moves to restructure business units and project developments are intensifying. Moreover, adding capacity and diversification are being reviewed where they are considered to have been pursued to be infeasible, and then intensive efforts in restructuring their businesses are prevailing.

Japan's economic slowdown in the 1990s is not cyclical phenomenon, but one of Japan's worst and potentially long-lasting recessions in the post-

war era. Japanese major firms are experiencing a substantial downward trend in profitability that has pushed returns on investment to their lowest levels in the postwar era. One cause of decline in profitability can be pointed out that Japanese managers failed to adapt to structural changes of Japanese economy since 1980s. Over the past decade, major firms have significantly reduced their dependence on bank financing by improving their cash flows. Table 1 shows that major manufacturing firms in Japan have improved debt-equity ratio substantially since 1980. As a consequence, major mechanism of corporate governance has gradually been eroding including the main bank system and the burden of debt. The core strategy of major corporations has been simply to increase recurring profits without giving proper consideration to the interests of shareholders. Thus, Japanese firms have continued to make investments that earn low returns, creating a situation in which extra assets with low return can easily build up under the strategy for long-term growth.

Table 1

Debt-Equity Ratio of Manufacturing Firms in Germany, Japan, and the U.S.A.

Five-Years Average

(Percentage)

	1960-64	1965-69	1970-74	1975-79	1980-84	1985-89	1990-94	1995
Germany	139.48	152.2	196.94	226.08	238.41	248.25	259.79	n.a.
Japan	236.36	309.91	409.74	460.37	310.72	204.70	164.37	152.07
U.S.A.	55.76	73.45	88.24	90.56	105.13	133.62	161.90	159.74

Sources: The Bank of Japan (1974, 1978, 1986, 1994, 1996, 1997), *Comparative Economic and Financial Statistics: Japan and Other Countries.*

Source Note:Statistiches 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*

Growths in market share and continued employment clearly have been two of the dominant corporate goals in Japanese firms for most of the post-war period. A more difficult item to assess is what performance measures are typically used by Japanese firms. Annual profitability is considered an important financial goal, whether it is attaining an increase in annual profits or achieving certain level of profits to satisfy the requirement of main banks. Generating adequate cash flow to cover debt

interests is also a high priority for Japanese managers. But Japanese managers do not appear to consider consistently their earning stream, cash flow, return on investment, or cost of capital with a viewpoint of corporate value maximization.

The retention of much of their cash flow and fewer growing investment opportunities in major businesses has produced considerable financial slack for Japanese firms. Coupled with freer access to international capital markets, this has led to distancing of Japanese non-financial firms from their banks, widening of managerial discretion over the allocation of resources, and a drive to diversification. Freedom from product and capital market discipline is prompting Japanese managers to deploy cash in ways more likely to benefit themselves and other employees of the firm by maintaining jobs than to benefit shareholders. The problematic use of excess cash to speculate in capital markets and plunge into strategies of unrelated diversification is two major deployments ending in failure.

In this regard, the remarkable success of Japanese corporations in the post-war period has revealed its weakness. The managerial entrenchment afforded by excess cash has given rise to the expression of latent self-interests that were contained during high-growth period. With their diminishing control over non-financial firms, the ability of banks to monitor and undertake corrective action is greatly reduced. It is weakening of vital control mechanism in the Japanese corporate governance system that can substitute for market for corporate control.

Since Japanese major firms are no longer subject to substantial control from main banks, the lack of an effective control mechanism would be detrimental to corporate value maximization in the long run. The stable cross-shareholding isolates firm's executives from the control of stock market, depriving managers of an effective mechanism for checking against the accumulation of extra assets. Stable cross-shareholding insulates managers from short-term oriented investors, thereby enabling managers to carry out long-term investments. Cross-shareholding, however, leads to a lack of close monitoring on management, leaving it up to managers to discipline themselves. Japanese managers could be entrenched to run firms as they want.

Japan has been managing to avoid the worst of the pain from the collapse of its bubble economy earlier this decade. Japan has two chronic problems. The first is excess capacity. In the 1980s Japanese firms raised cheap equity-linked debt to investment in the expectation that the economy would continue to grow at a fair rate. But rather than reduce capacity since then,

firms borrowed to add more, encouraged by interest rates that were close to zero. It is indicated that, although the ratio of corporate investment to GDP has fallen from its peak of 20 per cent, it still 16%, compared with 10.5% in the U.S. Overseas markets soaked up some of the resulting output, thank to a falling yen. But demand from Asia, which takes more than 40% of exports from Japan, is decreasing. Japan would try to export more to the U.S. and Europe, but would require a further sharp and politically unacceptable fall in the yen. It can be estimated that corporate capital spending will fall by around 2% of GDP in 1998 and again the year after (*The Economist*, 1997).

Two decades of heavy spending have left Japanese firms laden with debt. Although business sales have doubled since 1980, corporate debts are more than triple their level in that year. While healthy manufacturing sector is abundant in cash, particularly construction and property companies are hugely indebted in Japan. Firms have been able to meet the interest charges on this debt mainly because the Bank of Japan has kept short-term interest rates at the bottom levels since 1994. As a result, by fiscal year 1996 the total amount paid in interest charges had dropped to 19 trillion yen from 38 trillion yen in 1991.

But cheap borrowing is rapidly becoming a thing of the past. Banks have been tightening up their lax lending practices. So have domestic bond investors, to whom borrowers have turned in increasing numbers. Until lately, lenders assumed that large firms would not be allowed to fail, so they paid little attention to creditworthiness. This has changed dramatically. In November 1997, credit spreads; that is, the extra rate riskier borrowers must pay to sell their paper, shot up when Yamaichi Securities, the Japan's fourth largest security firm, and Hokkaido Takushoku, a large city bank, went bankrupt. These bankruptcies had two important implications: that even large firms can fail, and that a main bank's implicit promise to rescue its major client firms is doubtful. Table 2 shows that number of bankruptcies and average amount of debt default have been growing since 1995.

The Japanese corporate finance is now in trouble: excess capacity, rising interest costs, declining profits. More bankruptcies seem inevitable, as small-medium size firms become unable to serve their debts. Without growth, the only way to improve the profitability of Japanese is drastic restructuring to remove excess capacity and unrelated businesses. While some firms are moving in the right direction, they are few.

Table 2
Bankruptcy of Japanese Firms
Five-Year Average

	Number of Cases	Amount of Liabilitie (100 million yen)	Average Amount of Liabilities (100 million yen)
1970-74	9,199	8,588	0.934
1975-79	15,725	23,650	1.540
1980-84	18,522	28,072	1.515
1985-89	13,260	26,845	2.025
1990-94	11,977	60,446	5.047
1995	14,834	81,228	5.475
1996	16,464	140,447	8.530

Sources: The Bank of Japan (1974, 1978, 1986, 1995,), *Economic Statistics Annual,* The Bank of Japan (1997, 1998), *Economic Statistics Monthly*
Source Note: Tokyo Shoko Research Ltd.

3. Problems and Changes in the Japanese Financial System

3.1. Bad Loan Problem

In the late 1980s, deregulation of interest rates, which raised the cost of funds to banks, caused the change of bank portfolio. Coping with decreasing operating margin, Japanese banks introduced various measures to reduce operating costs and started to compete for deposits and loans more eagerly than ever. Many banks loosed loan examination cutting the staff in the department to reduce costs and accelerate the loan making. Then the bank increased easy collateralized loans to investment in real estates. Prices of assets have been stagnating since the early 1990s in Japan.

This stagnation of asset prices caused the large amount of non-performing loans to investments in real estates. Non-performing loans include four kinds of loans: loans to bankruptcy; loans overdue in six months; loans with reduced interest rates; and other loans used for rescue. According to the report of Ministry of Finance in April 1995, the amount of non-performing loans was 23.8 trillion yen in major banks. Large amount of non-performing loans has deteriorated banks' equity and major banks unable to meet BIS (Bank for International Settlements) capital requirement. Japanese banks issued the subordinated debts to recover their capital-assets ratio. Non-performing loans to real estates caused the

serious problems with banks' own balance sheets.

The size of the bad-loan problem has been growing since then. Japanese economy has stalled and bankruptcies, already at record levels, are increasing. Furthermore, there are substantial amounts of loans by Japanese banks to companies in Asian countries. The latest official figure for the banks' bad loans, 77 trillion yen (600 billion dollar), may still be an underestimate, and the gap in life-insurance companies' accounts may be 60 trillion-yen more. The government announced it was ready to spend 30 trillion yen to restore the banking system to be healthy. The government intended to obtain funds mainly by borrowing from the government-run postal saving system, and to use them in two different ways. About ¥17 trillion would go to pay off depositors in failed banks. The rest, about ¥13 trillion, would buy preferred stock and subordinated debt in individual banks. This injection of capital would bolster the banks so that they can lend again to reduce the purported credit crunch on which many Japanese blame a sluggish economy.

While paying off depositors is unavoidable, the Japanese government has long promised its citizens that all of their bank deposits are insured. It would not force the banks to write off and sell assets that have lost value. This would leave investors, depositors and foreign banks with only the most ambiguous view of any institution's true financial conditions. Recapitalization will also interfere with the long-overdue shrinkage of the financial system, Japan lags well behind the U.S. in restructuring its banking sector. From 1987 through 1996, while the U.S. largest banks earned an average 8.4% return on equity, the Japanese earned an average of 1.8% (*The Economist*, 1998). Only handful of banks have merged or gone out of business. The survival of so many banks has made it hard for the more efficient ones to earn a decent return. The onset of financial deregulation will only add to these competitive pressures. The government needs to allow weak institutions to fail rather than helping them survive.

Although the finance ministry assured that they have nearly solved their bad loan problems, many of Japanese banks are still in trouble with bad loans. By the end of the financial year 1997, banks had written off, reserved against some ¥25.4 trillion of bad loans, with about ¥15 trillion still to go and at a time when interest rates are at a record low. Japanese government had continued to protect even the weakest banks well into the 1990s. Until recent failure, no Japanese bank had gone burst since the Second World War. None of the top 20 banks had actually gone bust. Although the government claimed that none would be allowed to at least one, Hokkaido-

Takushoku bank has been shut down.

Japan is in the grip of a credit crunch. Strapped for capital, most Japanese banks are loath to lend to any firms with the slightest trace of risk, which means mainly small domestically oriented ones. The government has rushed forward with solutions in credit crunch. The government's source of funds will allow the public institutions, which it finances to lend an extra 12 trillion-yen to small firms. The government is also proposing to strengthen banks to buying preference stocks and subordinated debt and by approving some new accounting method, such as not deducting unrealized losses on equities form banks' capital. In addition, the prompt corrective action program, which would automatically penalize banks, which capital falls below a certain level has been deferred for a year.

The average spread between the rate at which banks borrow and the rate at which they lend has fallen, suggesting that banks are not deliberately deterring borrowers by raising the price of credit. That does not mean that funds are easy to come by. Banks are favoring larger, creditworthier borrowers, and becoming more careful about lending to the rest. This reflects a great awareness of credit risk. Historically, credit risk has never been much a serious concern; Japanese banks have tended to lend to anyone who wanted money. This was possible because loans were backed by collateral and because a borrower's main bank could be counted on to bail it out before it defaulted. Now that the economy has slowed, the value of collateral is dubious and main banks no longer have the funds enough to bail out their clients, credit risk matters. Banks are anxious about lending to firms that are unlikely to repay[1].

3.2. Reforms in the Japanese Financial System

The Japanese financial system would have its own "Big Bang" to free it from heavy regulation and segmentation. The reforms in the Japanese financial system are intended to shrink the banking system and its ability to lend recklessly. This should increase competition and thus welfare for savers. The most compelling reason for deregulation is a fundamental flaw in the Japanese financial system: its inefficiency at allocating money. Despite recent deregulation, the system remains hugely biased against savers and in favor of borrowers and intermediaries such as banks. Since

1 Kang and Stulz (1997) show that bank-dependence affects firms adversely during the 1990 and 1993 period in Japan when bank balance sheets were weak. It suggests that a firm can be constrained from investing in valuable projects when banks do not have sound assets enough to support a firm.

savers have little choice over where to invest their money, most of them put it on deposit at the bank or the post office. Deposit-takers, on the other hand, until recently had little reason to worry about the credit risk seriously. Lending has been backed by collateral and if that was not enough, a firm's main bank would bail it out. Ultimately the government guaranteed the banks. And cross-shareholdings among firms with common interests made it hard for outsider shareholders to apply pressure on banks to lend more profitably. While the system worked reasonably well while the economy was growing and money was scarce, but now that the economy has got mature and money more plentiful, the system has become counterproductive.

The most urgent need is for great flexibility in the Japanese financial system. Certain financial products and services were offered only by specific institutions allowed by the government. Banks cannot underwrite or deal in shares, but only they can offer foreign-exchange services; securities firms cannot offer banking services, but only they can directly sell investment trusts. Neither is allowed to sell or underwrite insurance. Commissions on all but the largest equity trades are still fixed. The main obstacle in the way of more flexibility has been the Japanese finance ministry. The ministry's strong control on new product also makes for some odd inconsistencies. Japan's Big Bang is supposed to change all this. In response to the ministry's mishandling of the banking crisis, a decision has already been made to move supervision of banks and securities firms to a new independent body, which will start to work in July 1998. The reforms in the Japanese financial system will have profound consequences for the way firms are run. Although the Japanese corporate finance reflects the inadequate rewards that capital has attracted, firms will now have to start counting the true cost of capital. Deprived of cheap funds from the banks, many of the weaker ones would be forced out of business.

As shown in Table 3, the rapid growth of assets and low profitability of Japanese banks has led to concern about their capital adequacy. Japanese banks need to watch 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 clients. Increasingly, banks according to the profitability of the relationship with them are ranking clients. 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.

Table 3
Profit Performances of Commercial Banks in Germany, Japan, and the U.S.A
Five-Years Average
(Percentage)

Gross Profit Margin	Germany	Japan	U.S.A.
1980-84	2.24	1.75	1.99
1985-89	2.21	1.35	3.47
1990-94	2.10	1.23	3.35
1995	1.95	1.51	3.42
Pre-tax Return on Assets			
1980-84	0.54	0.53	0.90
1985-89	0.70	0.58	0.78
1990-94	0.54	0.26	1.10
1995	0.73	−0.16	1.80
Return on Equity			
1980-84	14.06	14.43	15.34
1985-89	12.11	16.41	11.13
1990-94	10.49	6.11	16.04
1995	9.59	−3.35	22.49
Equity to Assets			
1980-84	5.89	3.69	6.19
1985-89	6.84	3.64	6.50
1990-94	8.15	4.41	7.20
1995	7.66	4.91	8.01

Sources: The Bank of Japan (1974, 1978, 1986, 1994, 1996, 1997), *Comparative Economic and Financial Statistics: Japan and Other Countries.*
Source Note: Statistiches 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*

The shifting patterns of Japanese corporate finance and the competitive pressures on Japanese financial institutions to increase their return on assets is collectively resulting in a gradual separating of claims held against non-financial firms. 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. For their part, Japanese banks, lately under pressure to meet BIS capital requirements, are becoming more sensitive to performance on their equity investments.[2] Japanese banks are now forced to liquidate some of their equity holdings to maintain adequate cash balances.

More generally, the effects of financial deregulation over the last decades have been enormous. The process of change will continue, both because of continuing deregulation and because some financial patterns change sluggishly. Financial deregulation tends to undermine the main bank system because major non-financial firms have greater access to market debt as well as borrowing from foreign financial institutions. This makes it potentially much more difficult for the main bank to monitor and control those firms' behaviors. In consequence, the main bank system could continue to be viable and advantageous for small-and-medium-sized firms, which need strong bank supports[3]. As Table 4 shows, there is significant differences in capital structure and external financing between large and small-and-medium size firms in Japan. Small and medium firms depend heavily on borrowing from banks. 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.

In general, the slowing of economic activity in Japan has destabilized a

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2 Horiuchi (1995) points out that bank regulation in Japan provided banks with a considerable amount of rent that could be utilized when regulatory authority had a chance to rescue troubled banks. Furthermore, competition-restricting regulations kept the franchise value in the banking at a high level, giving banks incentives not to engage in activities associate with moral hazard that are likely to prevail under extensive nets.

3 Petersen and Rajan (1994) find that borrowing from a single lender increases the availability of credit for small firms. For smaller firms without publicly traded common stock, the benefit of bank monitoring are likely to be large relative to the potential adverse incentive effects of information monopoly by a single bank.

number of traditional relationships and resulted in sales of a fraction of shares previously held under cross-shareholding relationships. Yet, many sales of cross-held shares are little more than efforts to book current period gains that can be used to boost sagging profits, and are followed by near immediate repurchases. Other sales represent only a fraction of cross-held stock, not the entire amount; still others are sales to some other stable owner of the stocks in question, thereby causing little substantive change in the cross-shareholding relationships. The bad loan problem in the early 1990s has resulted in weakening the Japanese banking system. Although the effectiveness of main bank relationships is now under test, the financial system in Japan seems unlikely to shift the arm's length financial system in the U.S. Not well-developed infrastructure of Japanese capital market restrains to replace relationship banking.

Table 4
Capital Structure by Size of Manufacturing Firms in Japan
(Percentage)

	1970	1975	1980	1985	1990	1995	1997
Large Firms							
Accounts Payable	20.4	20.4	23.1	21.5	17.1	14.4	15.2
Bank Loans	35.1	37.1	31.9	26.2	15.3	17.5	15.7
Bonds	3.6	2.8	3.5	4.8	11.2	10.3	9.2
Stockholder's Equity	22.8	18.4	20.8	28.2	36.7	40.2	41.5
Debt-Equity Ratio	338.6	443.5	380.8	254.6	167.0	148.8	141.0
Small and Medium Firms							
Accounts Payable	32.9	30.3	34.2	28.7	24.4	19.2	19.1
Bank Loans	29.7	31.7	28.9	35.9	36.9	40.4	40.2
Bonds	0.1	0.0	0.0	0.0	0.0	0.2	0.3
Stockholder's Equity	20.4	21.0	20.5	20.2	24.0	25.4	25.9
Debt-Equity Ratio	390.2	376.2	387.8	395.0	316.7	293.7	286.1

Source: Ministry of Finance (1970, 1975, 1980, 1985, 1990, 1995, 1997), *Houjinkigyou Toukei Nenpou* (Annual Statistics of Corporations).

Note: Size of firms is based on their stocks. Large firms have more than 1billion yen value of stocks, and small and medium firms have between 10 and 49 million yen value of stocks

3.3. Structural Changes in the Main Bank System

Japanese 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 shareholders and debtholders over the choice of policies, particularly in situations of financial distress. The significance of the main bank system is the close information-sharing relationship that exists between the bank and the firm. It is possible to view the main bank system as functioning as a substitute for the kind of screening and monitoring institutions that are prevalent in other capital markets such as bond and credit-rating institutions and security analysis agencies. The close association that the main bank has with the firm means that the bank is able to obtain inside access to the firm and its management, which is not readily available to the external capital market. The main bank system can be also characterized in terms of banks themselves delegating the monitoring of a particular firm to one particular bank: the main bank. The bank delegated to be monitoring is not only the bank with the largest loan share but also holds a significant stake in the firm as a shareholder. Having a sufficient large loan share may be the way in which the bank ensures that it obtains an adequate return on its monitoring outlays. In this regard, it is worth noting the free-rider problem may be mitigated somewhat by virtue of the fact that non-monitoring banks will not be able to imitate the loan portfolio of the main bank in size. It can be arued that this function of the main bank provides an important substitute mechanism for what in effect is inactive market for corporate control in Japan.

Main bank intervention can take a number of forms, ranging on the one hand from cases where the main bank stipulates certain measures that requires the firm to take in exchange for the bank's support during a period of financial difficulty to cases where the bank sends officers to take over the management and carry out the reorganization of a firm that is on the verge of bankruptcy on the other. As a consequence, one can suggest that the relationship-based corporate governance substitutes for the more market-based in Japanese firms.

Much of corporate finance in Japan has evolved around the main bank relationship. This has been changing for large firms. Financial deregulation in Japan has created difficulties for the main bank system. Nevertheless,

that system seems likely to adapt and continue to provide supports for small and medium firms. The process of change will continue because of continuing deregulation in capital market. Increasing financial sophistication and capability to exploit opportunities arising from regulatory changes will also continue to alter corporate financial practices. Financial deregulation tends to undermine the main bank system because major non-financial firms have greater access to arm's length debt as well as borrowing from foreign financial institutions. This makes it potentially much more difficult for the main bank to monitor and control those firms. Consequently, the main bank system could continue to be viable and advantageous for firms which is limited to access to alternative debt sources and need strong bank support. The financing practice of large Japanese firms is beginning to resemble the more arms-length financing patterns observed in the U.S. The shift to the arms-length financing system may emerge, although it will certainly take time. The infrastructure in financial market including rating agencies, disclosure rules, regulation and enforcement of insider trading are now being developed in Japan. Even though the deregulation made it possible for major firms to arm's length financing, some firms still maintain main bank relationships. The firms seeking the benefits of main bank relationships will continue to have close ties with banks.

4. Shifts in the Japanese Corporate Governance

Deficiencies in the Japanese corporate governance may eventually give rise to sufficiently large abuses of non-controlling shareholders interests. Economic incentives are beginning to change, in large measure because of emerging weaknesses in the traditional Japanese corporate governance system. Ironically, part of the cause of that weakness is due to an abundance of cash. The combined effects of sluggish economic growth and considerable success in product markets around the world have been the buildup of free cash flow. With this have come profound changes in the financing patterns of large corporations. New investment by Japanese corporations has been growing less quickly and the funds have being raised from securities markets, not from banks. This has meant a shift in the balance of power among corporate stakeholders away from financial intermediaries, the traditional primary suppliers of capital, and into the hands of corporate managers. It is now commonplace to observe Japanese firms repaying their loans and even refusing to accept former bank officers

as nominees for directors.

Financial independence has further the deployment of cash in ways that are disputable. Cash was expended in diversification of unrelated businesses. The rationale for doing so was to escape the limitations and intensifying rivalry of mature core businesses and, in particular, to keep personnel continuously employed, thereby honoring implicit promises of lifetime employment. However well intentioned these efforts might be, there was little reason to be optimistic about their prospects for success. Many of the new businesses being pursued had loose connections with firms' present capabilities. To the extent that these capabilities were exceeded, under-performance resulted and capital has been wasted. No longer mainly dependent on bank credit to fund investment programs, Japanese firms make less substantive disclosures of information about past performance and future plans to their main banks.

The foremost objective of Japanese firms has been to sustain growth. For many of these firms, growth is a useful proxy objective for the maximization of the value of the firm. Given the wartime destruction of much of Japan's industrial capital and substantial economies of scale in many basic industries, there was a strong fundamental profit incentive underlying strategy oriented toward high rate of investment and high market shares. However, the bias of Japanese firms toward growth extended well beyond the period of reconstruction. This suggests a wider role for growth than as a proxy for value maximization. It might be a means by which management might entrench itself. Managers might proactively seek to secure their positions in the firm by investing heavily in those assets that they have a special expertise in managing, even to the point of expanding beyond the point justified by corporate value maximization considerations. It can be also argued that growth and managerial entrenchment are desired because they support the continuity of valuable long-term relationships. Growth in particular may forestall potentially costly stakeholder disputes while maladjusted contracts are realigned to changed economic circumstances. The managerial discretion afforded by excess cash has given rise to the expression of latent self-interests that were successfully contained during Japan's high-growth period. Today, Japanese stakeholders appear to be gaining at the expense of others without any immediate prospects of re-contracting. With their diminished control over the supply of capital, and being largely owned by their industrial clients, the ability of lending-shareholding financial

institutions to undertake corrective action has been greatly reduced.

Return on investments (hereafter, ROI) of Japanese firms are considerably lower than those of the U.S. firms. As shown in Table 5 returns on assets have been consistently higher in the United States than in Japan since 1960.[4] It suggests 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. 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 taxes, interest earnings and expenses, and extraordinary gains and losses do not affect it. Japanese firms appear to be consistently less profitable than their U.S. counterparts (Blaine, 1993).

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.

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4 Brown, Soybel, and Stinckney (1994) compare the operating performance of Japanese and U.S. firms using financial statement date restated to a similar rporting basis during the period of 1985-88. The result show that neither country appears to generate systematically higher profit margin, but that U.S. firms has 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. Return on assets of U.S. firms are significantly higher than those of the Japanese for the year 1985 to 1988 do, primarily because turnover rates of assets are higher for U.S. firms.

Table 5

Profitability of Manufacturing Firms in Germany, Japan, and the United States

Five-Year Average

(Percentage)

Return on Assets		Germany	Japan	U.S.A.
	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	3.87	2.37	5.24
	1990-94	2.66	1.65	3.24
	1995	n.a.	1.73	6.08
Return on Sales		Germany	Japan	U.S.A.
	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	2.54	2.24	4.66
	1990-94	2.23	1.70	3.09
	1995	n.a.	1.89	5.72

Sources: The Bank of Japan (1974, 1978, 1986, 1994, 1996, 1997), *Comparative Economic and Financial Statistics: Japan and Other Countries.*

Source Note: Statistiches 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 differ greatly from currentvalues.

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 serve 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 criterion 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 competitor or offers an opportunity to grow, then the investment may be made. While an U.S. manager might first determine the cost of capital and proceed to look for investments that offer returns more than that cost, the Japanese managers may first make the investment decision and then worry about how to finance it.

But changes are under way. Investors taking a new interest in performance have started rewarding firms with higher ROI. Not many executives of Japanese firms care about their firm's share price. But firms, which have started to set their goal in increasing their ROE, have been gradually prevailing. After a change in the law in 1994, and a change in their tax treatment the following year that made it easier for firms to buy back their own shares, 14 firms have said that they will take advantage of the new rules. Toyota repurchased ¥100 billion-worth of shares last year and will do the same again in 1998.

But at least it has made a start, taking its cue from signs that Japanese investors are beginning to care more about corporate governance. Traditionally, the system has been that main banks made sure management of client firms with monitoring closely. In return for providing funds, and a rescue policy against financial trouble, main banks wielded a great deal of influence over a firm's management. That system worked fairly well while corporate funds was scarce, and the banks were correspondingly enough resources. But as money became easier, the system started to break down. The bubble and its aftermath accelerated its demise. Firms flush with cash no longer needed the insurance that banks used to provide. Those without money no longer believed that the banks could provide it. The banks, mired in bad loans, lacked the money to rescue ailing firms. Moreover, their moral high ground has been undermined by the dismal state of their own business. Then, who are supposed to replace their places,

if the banks are no longer capable of ensuring that managers can act in shareholders' interests? While the stock market provides a mechanism for corporate control in the U.S., it has not been in a position to play the same role in Japan. Since most of firms' shares are typically held in closely related firms, hostile takeovers have been almost impossible.

But two recent changes have given shareholders more of a voice. The first was a revision to Japan's Commercial Code in 1993, making it easier and cheaper to sue a firm. Previously, the legal cost to the plaintiff was in proportion to the amount claimed, making most suits prohibitively expensive. Now the flat-rate fee to the plaintiff is a mere 8,300 yen. The effect had been to remove the barrier to shareholder suits. As a result, such suits have often been brought against executives. The second change is that giving stock option to employees has become much easier. An option to buy their firm's shares at a fixed price gives directors an incentive to push up the share price, bringing the interests of management and shareholders more closely into line. Awarding stock options was possible only in a roundabout way because firms were not allowed to hold their own shares directly. A few firms, such as Sony, got round this restriction through a technical fix, but now the law has been changed there is no longer any need for that. Toyota and other firms have already announced that they will grant stock options to employees, although there are still questions over their tax treatment.

Japanese corporate governance has been an arrangement that arguably reduces the agency costs associated with outside equity and debt financing. The differences may help explain how, from the perspective of the U.S., Japanese firms can run in an environment in which corporate control mechanisms appear very weak. Viewed together, these patterns seems to suggest that Japanese managers can operate virtually independent of the interests of their shareholders. The agency problem is addressed in Japan by placing representatives of significant share-owning stakeholders on the board, and by relying on main banks as delegated monitors for other major lender-owners. Importantly, the business relationship, itself, also serves as a kind of monitoring system for share-owning stakeholders in Japan. Such monitoring by large shareholders do not completely resolve agency problems of the separation between ownership and management. Indeed, from the perspective of Japanese individual or non-group-affiliated institutional shareholders without a representative on the board, agency problems may actually be worse in Japan than in the United States.

Excess capacity in mature businesses, excess employment, excess diversification, and speculative uses of excess cash, among other problems; appear to be more problematic in Japan than in the U.S. While possibly recognizing deficiencies in the value maximizing behavior of the corporations in which they invest, non-controlling Japanese shareholders may, nevertheless, acquiesce to such behavior so long as they perceive the advantages of sustaining long-term business relationships that support their investment to be worth more than the foregone incremental value. In other words, they may tolerate agency costs associated with the separation of ownership from management if the offsetting gain from bearing such cost is substantially reduced transaction costs.

U.S. executives' preoccupation with shareholder wealth contrasts sharply with the goals that guide Japanese managers: adequate returns; secure employment; increased corporate capabilities. Within the context of the Japanese stakeholders, good management is measured not so much by it ability to maximize the welfare of any one isolated stakeholder as by its ability to maximize the aggregate size of the welfare. Certainly the training, promotion, and reward systems for Japanese managers are aligned with these objectives. Other corporate stakeholders' preferences do indeed become part of Japanese managers' preferences.[5]

Although the significant differences in corporate governance between Japan and the U.S., poor stock performance and an inability to generate positive income increase the likelihood of top management turnover in both counties. It strongly suggests that an efficient governance system can not approve managers of firms with poor stock performance and with particular poor cash flows. Current earnings and current stock returns are important determinants of management turnover in Japan. This suggests

5 By the time Japaese managers have become senior managing directors, they tend to make decisions that will generate primarily efficiency gain from which all stakeholders stand to benefit rather than primarily redistribute gains in which one or a few stakeholders gain at the expense of others. The typical Japanese reward system reinforces this predisposition by not aligning management's interest with those of any one corporate stakeholder. Instead, management's interest is aligned with the preservation of the entire coalition of stakeholders by a system that facilitates to achieve corporate growth, stability, and longevity. Given a reward system consisting of steady promotions, seniority-based compensation, regular semiannual cash bonus, lump-sum severance indemnities, and placement with affiliated firms at the time of retirement, management's well-being depends on the firm's longevity, growth, and the preservation of its relationships with other firms. These achievements will ensure an ever-expanding set of opportunities for promotion coupled with salary advancement and a source of income on retirement (Kojima, 1997).

that a firm's current stock price and cash flows provide good measures of firm's current and future prospects. The relation of management turnover to stock returns and to negative income does not indicate that the Japanese system favors employees and managers at the expense of shareholders in any obvious way.

Japanese corporate system has worked well in the most of the post-war period. But the balance of power in Japanese corporate system is changing. As equity financing replace bank financing as the primary source of capital in Japanese major firms, the power of main banks and the government to direct corporate behavior through funds control are waning. As the economy continues to be sluggish, the effective role of the relationship-based governance system is under serious consideration. As a result, the potential power of stock market is likely to be rising.

5. Conclusion

Japan has been managing to avoid the worst of the pain from the collapse of its bubble economy earlier this decade. In the late 1980s Japanese firms raised cheap equity-linked debt to investment in the expectation that the economy would continue to grow at a fair rate. Until recent failure, no Japanese bank had gone burst since the Second World War. Major shifts in the Japanese corporate governance are under way. The government bureaucrats' ability to manage the Japanese economy through traditional methods has been severely eroded by the financial deregulation. Large Japanese firms can no longer be pressured to do whatever banks and government may ask. The financial liberalization in the Japanese capital market led to a period of excessive investments by many Japanese firms. The significant changes in the Japanese financial systems are now in consideration: new standards of accounting and financial disclosure heightened capital adequacy requirements for banks, and reforms in financial system.

The Japanese corporate system has worked well in the most of the post-war period. But the balance of power in the Japanese corporate system is changing. As equity financing replaces bank financing as the primary source of capital in Japanese major firms, the power of main banks and the government to direct corporate behavior through funds control are waning. As the economy continues to be sluggish, the effective role of the relationship-based governance system is under serious consideration. As a

consequence, the market-based governance can be likely more effective.

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 environments. There is some evidence that these systems of corporate governance are converging: Japanese corporate governance is moving toward the U.S. Yet these changes are slow. As in Japan, these changes do not appear significant so much. It is contended that the Japanese corporate governance system cannot be appropriate to the U.S. corporate climate. The closed nature of governance under the system contradicts U.S. values of openness, mobility, and accountability in running publicly owned corporations in the U.S. Strengthening broad participation in corporate governance and extensive disclosure of corporate management will help ensure both a strong and open investment market and prompt and meaningful managerial accountability for consistent profitability and growth. As the capital and product markets are getting more integrated in the world, and as firms domiciled in different countries engage in investments and transactions across the border more extensively, different systems of corporate governance are increasingly getting into direct contact and conflict with one another. As they do so, the advantages and limitations of each become more clearly revealed.

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FSC CERTIFICATION IN JAPAN: AN UNCERTAIN FUTURE

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Abstract

This article presents an assessment of the adoption of Forest Stewardship Council (FSC) certification in Japan based on insights from concepts and theories provided from the disciplines of sociology, social psychology, economics, and organizational behavior. It provides a brief history of relevant developments in the forest sector in Japan, as well as a brief discussion of certain characteristics of the collective nature of Japanese society as they concern the current paradigm shift in Japan. Certification is discussed with specific information about FSC Certification as a possible substitute for assurance being lost due to the changes in business relationships resulting from Japan's shift to a more open market. The article suggests that the adoption of a western social instrument such as certification will have possible outcomes which differ from those expected in countries where certification originated.

JEL classification: Q2, Z1
Keywords: FSC, certification, assurance, social change, trust, business relationship, collectivist, decision making

Introduction

A visitor to a commercial Japanese forest might notice carvings on the trunks of the trees. These carvings are the signatures of the person who cared for the trees during their growth, and those signatures carry with them the reputations of the caretakers. These "brands" assure buyers that the forest product meets the standards of quality associated with the

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reputation of a specific caretaker. This interpersonal connection between producer and buyer forms a closed system of procurement and functioned successfully over many years to reduce transaction costs by reducing risks for the buyer. Through repeated transactions across generations, reputations were established and these signatures carved into the trunks of trees during their growth provided assurance in the market of forest products.

Today these signatures can still be seen in some of Japan's forests, but after harvesting of these areas, the forests that replace them do not have trees with signatures. These new forests are not forests of "branded" trees because over the last 20 years the market price has moved further and further away from covering this kind of intensive silviculture. Buyers have turned to cheaper imports and with only a small market for domestic trees, there is less incentive for this assurance system to continue to function. The loss of these signatures is an indicator of the depth to which changes in Japan's socio-economic structures are being felt in the forest sector.

Over the last decade Japan's industries have experienced difficult economic times. This situation has forced Japan's business community to reevaluate its traditional systems of business organization. Business relationships are moving away from the traditional long-term interpersonal system of transactions to the more flexible short-term market-based transactions which have been dominate in the West for several decades. This paradigm shift is not an easy one, especially for the more traditional and conservative actors in supply, manufacturing, and trading sectors, but the change is happening and most of Japan's industries and businesses seem to be recovering. Japan's forest industry has not been one of these. There have been no signs of recovery, and most observers are saying that the forest industry cannot survive in today's economy if it holds to the traditional systems. Those persons associated with the forest industry are not optimistic about recovery, and no solutions have been forth coming to revitalize this once important contributor to many local economies.

In 1996, coincident with the continued downturn in the forestry sector and the paradigm shift mentioned above, WWF Japan introduced FSC certification to a few key actors in the forest sector. It seemed strange to many observers because there is no obvious logical rationale for the Japanese forest industry to be interested in adopting forest product certification comparable to the rationale for certification in other countries. Also, the concept of certification is historically unfamiliar in

Japanese society. In spite of these conditions, these actors joined together informally to promote FSC certification in Japan and have attracted others to join them from a variety of associated professions. These persons are actively promoting FSC certification in Japan and are meeting with some success. It is unclear at this time what the outcomes of this initiative will be, and even though there is apparent cooperation between the actors, their expectations for this alien social instrument may be found to be incompatible with actual implementation of FSC certification as it proceeds.

Forest Sector in Japan

Japanese society experienced two major social transitions prior to the current paradigm shift. In 1868 at the beginning of the Meiji Restoration, Japan adopted western style social institutions such as the parliamentary monarchy system of England and the legal systems of France and Germany. German forestry systems and technologies were imposed on national forest lands. These national forest lands were created from the very large estate lands of the aristocratic clans, *han*. The Meiji government seized these lands and brought them under the control of a national governmental agency. Lands which were privately owned and not part of the feudal clan system were not confiscated, but ownership was clearly established for taxation purposes. Therefore, in the forest sector, structure of private ownership did not change and associated traditions remained the same. Privately owned forest lands stayed as they had been for centuries.

The second major social change was at the end of the Second World War. During the occupation of Japan by the allied powers, the USA forces attempted to change Japan to be a more democratic society. Three of these democratic changes were the creation of labor unions, the dissolution of the *zaibatsu*, large company groups owned exclusively by one family, and the redistribution of farmland ownerships. These changes were successful in many sectors of Japanese society, but the forest sector managed to avoid almost all effects of these changes.

The two society-wide major social changes mentioned above had tremendous impact on Japanese society, but the forest sector was able to avoid them and kept traditional methods of operations in tact. The forest sector can be described as old fashioned and traditional in almost all aspects of their operations. The forest sector avoided sweeping changes in

Japanese society at two significant times, but it appears that it cannot avoid the results of the financial crisis of the late 1990s. This upheaval revealed the serious malfunction of Japanese society, and one of the most typical examples is the forest sector which is suffering very serious trouble.

The serious financial problems of this last decade have caused the organizations and people in the forest sector to be apathetic because there seem to be no solutions. One of the most demoralizing factors is the chronic financial loss in the domestic forest business. Since Japanese labor and transportation costs are some of the highest in the world, and since forest business is a heavily labor intensive industry, it is very hard to maintain a profitable forest business in Japan. Furthermore, due to strong Japanese currency, yen, tremendous numbers of cheap timber products have been imported to Japan over the last twenty years. This economic structure has made an already bad situation even worse for timber companies.

Another serious problem is the failures in forest policy which created an accumulated deficit in national forest account. Japanese forest authority in government, *Rin-Ya-Cho*, Forest Agency, made a series of unfortunate management decisions in response to changing government policies and shifts in market demands. During the economic expansion of the 1950s and 1960s the agency grew rapidly because there was high demand for timber products and domestic timber production was protected by the Japanese government ban on imported timber products. The agency expanded rapidly over these years and by the 1960s it had financial responsibility for a huge number of permanent/life-time employees as well as extensive subsidy programs for influencing private timber production. During these times of expansion, agency management did not expect the changes in trade policies that were to come.

In 1964, the Japanese government completely opened the Japanese market to imported timber. This was devastating to the forest industry in Japan and to the Forest Agency. In addition, in 1971 the government of the USA eliminated the gold standard as backing for the USA currency. This change in the conversion system caused major market fluctuations resulting in the value of the Japanese yen being raised significantly in relation to the USA dollar. The forest agency was not prepared to respond to these drastic changes which seriously impacted the economic situation surrounding the forest industry. A series of management decisions such as acceptance of high interest loans from commercial banks rather than asking for

assistance from other branches of government produced a US$ 30 billion accumulated deficit in the national forest account as of 1998. The agency sought commercial loans because it wanted to avoid political and financial influence and interference from the Ministry of Finance. Due to this deficit, in March of 2000, the Diet redirected two-thirds of this deficit to the national general account. The remaining one-third was left as the responsibility of the Forest Agency over a term of 50 years (Forest Agency, 1999). As a condition of this arrangement, the Forest Agency agreed to change their organizational structure loosing much of its autonomy and authority.

These problems mentioned above have caused some serious side effects. Due to the financial problem in national forest account, the Forest Agency has reduced intensive forest management on the national forest lands replacing it with the concept of "natural forest management approach". (Arinaga and Kasahara, 1988; Kasahara, 1996) The adoption of this natural management approach has in effect created a situation in which previously highly managed plantation production forests are now suffering from reduction in management and silvicultural treatment. This lack of management policy has reduced the quality of stumpage in Japanese national forests and there have been no initiatives to actively encourage the development of balanced natural ecosystems (Kawakita Shimposha, 1989). Also, the Forest Agency and other public and private landowners have sold their forest lands to private enterprises to create golf and ski resorts. This situation has made local forest dependent communities decline economically because the recession which Japan is now experiencing has undercut the potential of this change in economic dependency from timber to tourism (Suzuki, 1999).

As can be seen from these problems, the forest sector in Japan is severely depressed. The Forest Agency has lost its power to subsidize the industry and the market price for timber products has made harvesting domestic timber a liability. The traditional operating procedures are not functioning and there have been no promising solutions to these serious financial problems. Therefore, even in the very conservative and traditional forest sector, the paradigm shift which is being observed in Japan's social and organizational behavior is being felt intensively. In this dire situation, forest industry actors are desperate to survive and this desperation may have opened them to consideration of any possible initiatives which might offer hope to improve their situation. The adoption of FSC certification

may be driven by the hope that it can help revitalize the forest industry in Japan.

Certification

Certification of forest lands is based on third party conformance evaluation of management practices. This certification process begins with a forest landowner or manager voluntarily requesting that a third party certification body examine their forest operations. Certification is granted if their management practices are in compliance with sustainable resource standards. Specifically, for FSC certification this means compliance with the *Forest Stewardship Council Certification Principles and Criteria for Forest Management,* which requires certain levels of environmental, social, economic, and technical qualification. Successful completion of a thorough assessment permits the party seeking certification to associate wood product from their land with the FSC logo. This logo is intended to communicate to the consumer that the product they are purchasing originated from "certified well-managed lands."

Certification was originally intended as an economic incentive which would generate higher profits for those timber producers, suppliers, and retailers who participate in certification programs. In addition to this incentive, it was believed that companies producing and consuming wood products could utilize certification as a quality control mechanism. Buying certified products could be a way of avoiding low-performance suppliers. It was also postulated that some companies producing wood products could find a market place advantage in this situation and be encouraged to pursue certification. Since Japanese companies place considerable emphasis on the quality of supplied raw materials as well as quality of their products, it could be expected that these original intentions would make certification a useful instrument for Japanese timber related manufactures. However, because most of the original intentions have not actually been realized by the implementation of certification in other countries, it could be unreasonable to expect them to be realized in Japan as well.

Furthermore, if we look at the countries where certification evolved and found application, we see that there are critical differences which make Japan unique as a participant in FSC certification. Markets in Europe and the USA have been established for certified wood products. These markets

encourage land owners in timber exporting countries to participate in certification. Japan does not export timber and almost no FSC certified wood products are traded in Japan. Therefore, because Japan is unique as a participant and because the original intentions cannot be expected to benefit timber manufacturers, there is currently no apparent economic incentive for FSC certification in Japan and no apparent rationale for the implementation of FSC certification scheme in Japan. However, in February of 2000, a private Japanese timber company obtained Japan's first Forest Stewardship Council's certificate for their forest management. This company pursued FSC certification even though the initial assessment cost to certify one thousand hectares was over US$ 40,000 (US$ 40/ha). Compared to the fact that certifying large tracts of timberland can cost anywhere from 7cents/ha to 21cents/ha for the initial certification in USA (Environmental Building News 2000), the cost in Japan is very expensive. At the same time, two timber mills affiliated with this company also acquired certificates for their CoC process. In June of 2000, a second certification was initiated by a timber partnership on its lands in Kochi prefecture. This certification project was supported by the local government of this economically declining rural timber community. These certifications are being implemented even though there seems to be no economic rational to justify the cost.

There seem to be no immediately observable incentives for these companies to participate in FSC certification not only because these companies do not export wood products to countries where FSC certification is recognized but also because there is no consumer market for FSC certified products in Japan. However, these certification efforts are being supported by several other organizations and this movement to implement FSC certification into Japanese forest sector is gaining momentum.

Organizations and People

The first and originally most active promoter for forest certification schemes in Japan was WWF Japan. It is similar to its parent and affiliated organizations in European and North American countries where forest certification is more widely adopted. WWF Japan started to develop forest certification initiatives in Japan in 1996, in line with Target 2 of the WWF global "Forests for Life Campaign." They believed that their most

important role was to provide information and facilitate communication since there are very few documents related to certification written in Japanese (Maesawa 1999). Since early 1996, WWF Japan has translated and published a few relevant documents including "The WWF Guide to Forest Certification 1996" and an FSC leaflet and offered several conferences and workshops all over the Japan. From April 1997, WWF Japan has started selling FSC endorsed products in its mail order catalogue to introduce examples of certified products to consumers. Also, WWF Japan has been trying to establish buyers groups and trying to find forest owners and/or managers who are interested in being certified under FSC scheme. Due to the continuous efforts of WWF Japan through Mr. Maesawa, the nation's first FSC certification was granted to the Hayami Forest, a 1,070 hectare site located in the community of Miyama in Kii Peninsula along the coast of the Japanese island of Honsyu.

It is important to point out that development and acceptance of certification programs has not been led by final consumers in countries where forest certification is widely adopted. Rather, environmental organizations, companies, and individuals having specific reasons for supporting certification have been the driving forces (Hansen and Juslin, 1999). Specific reasons in other countries include economic incentives, ecosystem health and preservation, and sustainable timber production. Specific reasons for supporting forest certification such as these are not yet recognized in Japan.

In most countries such as those in North America and Europe where certification has been successful, many large companies, often retailers like B&Q and Home Depot, have joined buyers' groups and created demand for FSC certified products. This has not happened so far in Japan. However, the National Federation of Timber Co-operative Associations which is affiliated with the Forestry Agency, and Sanwa Research Institute (SRI) which is one of the biggest consulting firms in Japan affiliated with a large commercial bank, Sanwa Bank, have joined with WWF Japan as the currently most active promoters of FSC certification in Japan. SRI is now managing the Forest Certification Research Working Group focusing on implementation of FSC certification in Japan. This working group has brought together most of the main actors in the arena of forest products certification.

Organizational factors in Japan discussed above compared to Europe and America show us that the influence of ENGOs could be a critical element in

adoption of certification in Japan. Those influences are very strong in Europe and North America and only beginning to be felt in Japanese society. Government regulations which are strong in Europe and North America have given support to environmental initiatives such as forest certification. In Japan, government has not strongly supported environmental initiatives, but this kind of activity is beginning to be seen. Furthermore, Japan is more and more feeling the pressure of compliance to international expectation resulting from its participation in the international markets and is moving towards decision making that is more similar to countries whose markets are more internationally open such as those of Europe and North America. These changes are influencing the current paradigm shift in Japan.

The Collective Nature of Japanese Society

Japan is an example of what sociologists term a collective society (Nakane, 1972). This concept of collectivism is often misunderstood. Many people believe that in a collective society the members of that society will sacrifice their personal well being for the good of the society. These societies are often viewed as societies in which individual gain is less important than the well being of the society as a whole. This view is simplistic, incorrect, and misleading for anyone interested in studying the dynamics of collectivist society behavior. Collectivist societies are ones in which long-term closed relationships between individuals and groups dominate the social functioning within the larger society (Miller and Kanazawa, 2000). Closed in this context means that groups form within the society which exclude others from participation. *Keiretsu* is the term used for these closed groups in Japan. These *keiretsu* groups provide assurance for the members of the group through long-term association and the expectations which evolve over many years of interaction (Yamaji, Kajiwara et al. 1994). By exclusion of others and commitment to the members of the groups, all in the group are assured that their individual interests will be met by the other members of the group as long as each member adheres to the group's expectations. This loyalty to one's group creates in-group and out-group bias, and functioning successfully in a collective society without being a member of one of these groups is almost impossible (Yamagishi, et al., 1998; Miller and Kanazawa, 2000).

Japan's collectivist society functioned very well in the past to reduce

uncertainty in social encounters, and allowed Japan to create a stable, highly productive and efficient society. Low transaction costs and stable equilibrium were enjoyed because of the in-group favoritism created by transactions based on long-term relationships which were closed to outsiders. Being closed to outsiders is an opportunity cost because new opportunities offered by non-in-group members cannot be enjoyed. Until recently savings in transaction costs exceeded opportunity costs in Japanese society. However, the losses from not taking advantage of outside opportunities have grown and the shift is being felt in all parts of Japanese society. Thus the mutually committed long-term relationships such as *keiretsu* and permanent employment and the equilibrium established through them is being challenged. In-group favoritism is becoming a liability rather than an asset, and the paradigm shift from the long-term closed relationships as the base for transactions to a more open system is being felt throughout Japan.

Paradigm Shift and Certification

The paradigm shift currently being experienced in Japan is explained by Yamagishi's theories concerning collectivism and in-group favoritism (Yamagishi, Miller et al. 1998). His findings that in-group favoritism is pragmatically based on sanctioning, monitoring, and reciprocity as opposed to psychological mechanisms and phenomenon provide insights into the demise of the successful functioning of the long-term relationship basis for transactions traditionally favored by Japanese business people. Yamagishi predicts that changes are going to come quickly to Japan. He warns that as the "collectivist strategies" for maintaining equilibrium and reducing uncertainty fade away, Japan will go through a period of searching for new systems to replace the traditional ones. These new systems will have to be ones that are compatible with the more open social environment that is now evolving because of the irresistible opportunities offered outside of the closed in-group arrangements. If we accept Yamagishi's warning that Japan's collectivist strategies for maintaining equilibrium are being eliminated by the necessity to open to outside opportunities, certification is coming to Japan at the time of paradigm shift.

Social Adaptation

As Japanese society searches for replacements for the sanctioning and monitoring of the collectivist long-term relationship system, there will be a period of adaptive trial and error. North states that there is little in depth understanding of all the aspects of adaptive efficiency in times of environmental change, but observations suggest that overall institutional framework is an important influence on how much a society encourages the trials, experiments, and innovations that produce adaptive efficiency (North, 1990). Incentives built into the institutional framework direct decision making processes, and decisions change and modify the existing systems. If incentives exist and encourage problem solving experimentation, the adaptive efforts have more opportunities for maximization. In traditional Japanese society, social institutions and human preferences for finding solutions have not encouraged the trials, experimentation, and innovations which North deems important for adaptive efficiency. Japanese problem solving has not been oriented to encourage adaptive efficiency because until now there has been little pressure to adapt due to the relative unimportance of outside environments. This has been especially true in the Japanese forest sector.

As witnessed by the advent of FSC certification in Japan, some Japanese are attempting trials, experiments, and innovations even in the forest sector. North's observation that adaptations are often initiated at margins of organizations provides insights into the roles of the actors in FSC certification in the initial stages of promotion in Japan. Margins are the nodes of organizations which are directly connected with the environment. Because of their location close to the environment, agents or actors located in the margins are often those who initiate changes in response to changes in the environment.

> . . . the immediate instruments of institutional change are political and economic entrepreneurs who attempt to maximize at the margins that appear to offer the most profitable (short-run) alternatives. (North, 1990, 100)

One of the important characteristics of actors located at the margins is they are often less constrained by organizational rules and conventions than their superiors in the organizational structure. Since Japan's

organizations are highly centralized and hierarchical and usually have not encouraged individuals to experiment and innovate, adaptive problem solving and decision making has been limited. The forest sector exemplifies this phenomena, but if we look at the initial promoters of FSC certification in Japan we see that many of them are located in the margins of their professions and organizations. It appears that their location at the margins has provided them with freedom from traditional constraints.

The location of these actors at the margins of their organizations has implications for the adoption of FSC certification in Japan. One of the main implications for FSC certification is that we cannot expect it to have the same outcomes in Japan that it has had in the countries where it originated. North points out that margins are especially sensitive to cultural influence. Because margins are in direct contact with environments, the margin actors are heavily influenced by those environments. These environments are the interface of all the cultural norms of a society and the needs created by interaction with the outside world. North states that the cultural specific norms of each society create a society's informal constraints and are prevalent and persistent. Therefore, needs at the margins are culturally specific. Each environment in each society has unique social institutions and constraints which dictate the choice processes made by actors at the margins. One of these culturally specific characteristics is the bargaining power of individuals and groups at the margins. Since bargaining power will be different from society to society, we can expect marginal adjustments to have different outcomes. Furthermore, since societies have different histories which limit how change can be experienced, and since feedback on outcomes of adoption of social instruments from another society is necessarily incomplete, we see that marginal adjustments can not be expected to have the same outcome in different societies. We can expect widely divergent outcomes when social instruments are borrowed from another society. FSC certification can be expected to have different outcomes in Japan than it has had in the countries where it originated.

The insights gained from North's work give us cause for concern about the implementation of FSC certification in Japan. We see a situation in which the actors promoting FSC certification in Japan are doing so with expectations based on insufficient information. If the paradigm shift is happening in the forest sector and if the other factors mentioned in this paper are causing the financial difficulties observed in the forest sector,

there are problems which need to be addressed by innovation and experimentation, but at present no rational solutions are available.

Garbage Can Model of Decision Making

Concurrent with this situation, certification has been introduced to Japan as a social instrument valuable in countries Japan has looked to for innovation in the past. Certification is not well understood in Japan, but instead of being scrutinized and analyzed for its value in application in Japan, it has been promoted as an exotic valuable tool for social innovation for the forest sector in Japan. It appears that certification may have been chosen mainly because of its availability at a time when problems exist that need solutions, people recognize the need for social change, and pressure for immediate change has intensified. March and Olson describe this kind of decision making in their Garbage Can Model of Decision Making. According to their model, it is common organizational behavior for decisions to be made dependent on availability, timing and mix of participants (March and Olson, 1979).

March and Olsen's theory provides insights to understand organizational behavior in the adoption of certification in Japan. They state that when the three features of problematic preferences, unclear technology, and fluid participation are present, decision making can be subject to processes described in their Garbage Can Model of Organizational Choice. Of the three, unclear technology seems to be evident since forest certification is new to Japan, and information about forest certification is not readily available. There is not enough information in Japanese because there has been very little original work in the area of forest certification done in Japan, and information from outside Japan is not easily understood and not widely available. Fluid participation can be observed in the variation and lack of consistency in who attends certification meetings. There has been relatively little formal structure for the organization of this coalition. The informal network which has evolved does not provide consistency with regards to the input from participants in decision making. The third feature, problematic preferences is not yet readily observable, but I believe closer inspection will reveal that differences in motivations and reasons for promoting FSC certification are already influencing the actors' choices concerning who they align themselves with, which meetings they attend, and which ideas they support. The implementation of FSC certification in Japan

has all the hallmarks to be a classic candidate for Garbage Can Decision Making analysis. If this model accurately describes the process of FSC certification adoption in Japan, we have further cause for concern about whether or not FSC certification as a social instrument can provide outcomes compatible with the expectations of the promoters.

Substitute for Assurance

As Yamagishi points out, Western societies are trust-based as opposed to the assurance-based system of a collective society like Japan. In trust-based societies, certain kinds of social instruments have evolved to reduce risk and uncertainty which did not evolve in collectivist societies. Examples of these social instruments are seals of approval, accreditations, credit ratings, better business bureaus, and certifications. These social instruments function to provide predictability and reduce risk in the societies of the west where exchanges are more impersonal than in the collectivist type of society in which long-term relationships are fundamental to exchanges. North points out that large amounts of time and energy have been dedicated over centuries to the development of codes of conduct for the exchanges within all societies. Many of these norms find their way into the formal rules and laws of government while many others become institutionalized in the informal constraints and customs of a society. In the west, the social instruments mentioned above evolved to supplement the formal rules or laws of a trust-based society. These social instruments can be installed by private sector groups without society wide approval and do not require the legislation of governments. They can be installed within a sector by the actors of that sector to establish credibility for the organizations and individuals in the sector. The effectiveness of these social instruments depends on the trustworthiness of the body responsible for administering the social instrument and its reputation with the general public. In the trust-based societies of the west, these social instruments serve the purpose of providing risk reduction and predictability intermediate between formal laws and informal constraints. Most of these social instruments rely on some kind of third party authority as a means of eliminating self-serving bias and thereby establish credibility.

FSC certification relies on third party participation for its effectiveness. A third party as certification authority, usually through an accredited auditor, evaluates the product or service of the first party by a set of

standards. If the first party, such as a manufacturer, satisfies the auditor with proof of ability to perform by those standards, the third party certifies for the second party, such as general consumers, that the first party can achieve those standards. Certification is not a third party guarantee that each and every product or service meets the standards. It is a statement of professional opinion that says that a first party has the ability to meet certain standards and operates with those standards consistently. Furthermore, North says that "cheating, shirking, and opportunism" are natural to transactions and third party enforcement is necessary to provide legitimacy and equilibrium. With certification, if there is periodical renewal, then that renewal functions as enforcement. If evidence shows that a first party has lowered its performance below that expected for certification, certification can be taken away. Thus, with the addition of renewal as an enforcer, certification reduces risks for second parties and may make it seem attractive to FSC certification promoters as a substitute for assurance.

Yamagishi says that assurance system equilibrium is being lost due to the paradigm shift in Japan, and there is nothing to replace it. It can be argued that certification renewal as a kind of enforcement can replace the sanctioning and monitoring of the assurance system, and the formality of certification as a social instrument to reduce risk and uncertainty could replace long-term relationships. Characteristics associated with certification such as these may be increasing its attractiveness as a social instrument for forest sector actors in Japan. Therefore, even though Japan is not a trust-based society, it is possible that certification could function as a replacement for the assurance of long-term relationships which is being lost in Japanese society. Therefore, regardless of the expectation of the promoters, certification may function as a substitute for long-term relationships. It may function for the forest sector in Japan very differently from the way it functions in the societies where it originated.

Ritual or Rationale ?

According to Meyer and Scott, modern organizations which are decentralized can respond to complex external changes and influences and absorb conflicts better than centralized organizations. Furthermore, they state that most organizations begin as rational, but in the face of conflict, they become more institutionalized and rely on ritual rather than technical

activity for their legitimacy. Institutionalized rituals consistent with prevailing myths and compatible with the socio-cultural environment generate confidence in the organization and legitimize it. Legitimacy is necessary for stability, and in order to perpetuate itself, maintaining stability is the actual purpose of an organization. To understand an organization it is important to identify where decision making actually takes place. It is also important to identify the number of sovereigns to which an organization must answer. The number of sovereigns influences the structure of an organization, and multiple sovereigns can destabilize it (Meyer and Scott, 1992).

These theories related to organizational behavior are applicable to the investigation and understanding of the behavior of the organizations which are promoting FSC certification in Japan and of the organizations which are growing out of their efforts. Because certification is a new kind of social instrument in Japan and because coalitions proactive with ecological issues are new to this society, gaining legitimacy is critical for survival. From the perspectives of Meyer and Scott, viewing certification as a ritual can offer insights into the apparent non-rational application of certification in Japan at this time. Also, most of the activities of the actors are not following the traditional Japanese centralized organizational structure. Decision making seems to be happening outside of the normal top/down Japanese structure, but there are multiple sovereigns waiting to see what will evolve out of this initiative. Meyer and Scott's theories provide a valuable framework with which to question the function of ritual and rationality in the organizational behavior of the actors involved in certification.

Japan has just begun the process of adopting the western concept of certification. As I have attempted to show in this paper, the adoption of FSC certification scheme in the forest sector is a complex initiative. In analyzing this process, it is important to look at not only the expectations normally associated with certification and those voiced by the promoters, but also the more subtle dynamics which may be operating to encourage adoption of FSC certification due to the current paradigm shift in Japan. FSC certification as a social instrument may provide important outcomes which serve the Japanese forest sector in positive ways so far unnamed. The loss of "brands" in Japanese forests as assurance could be replaced by logos signifying assurance through certification.

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THE LONG-RUN IMPACT OF APEC TRADE LIBERALIZATION ON REAL GDP AND SECTORAL ADJUSTMENTS †

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Abstract

On the threshold of a new century, most of the APEC countries are embarking on an ambitious plan for open multilateralism. Using an 18-region, 16-sector dynamic computable general equilibrium (CGE) model of the global economy, we appraise the effects of APEC trade liberalization on member-country real GDP, sectoral output, exports and imports by the year 2020. Our results suggest that developing-country APEC members could realize significantly greater gains in real GDP than developed members. Although implied structural adjustments may be challenging for some groups, they are necessary if each member economy and the region as a whole are to realize the full economic potential of expanded regional trade.

JEL Classification: F13, F14
Keywords: APEC; trade liberalization; CGE model

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1 Introduction

The impetus of trade and investment liberalization by the Asia-Pacific Economic Cooperation (APEC) countries appears to have slowed since the Asian financial crisis of 1997-78. Before the crisis, the APEC countries were on a steady course of greater commitments to open multilateralism. At the 1994 summit, APEC leaders delivered the Bogor Declaration to remove trade and investment barriers (by 2010 for developed members and 2020 for developing members). In Osaka in 1995, they agreed on the Action Agenda for implementing the objectives. In 1996, APEC leaders adopted the Manila Action Plan for APEC (MAPA), including individual and collective action plans to liberalize trade and investment in the region, starting in 1997.

At the APEC summits of the past three years, a number of members (Japan and the United States in particular), have advanced no substantial reductions in their individual action plans, beyond concurrent WTO commitments. APEC currently has no consensual mechanisms for dealing with countries that are slow-movers, nor does it possess agreed means to advance trade liberalization in more protected sectors such as agriculture (Lloyd, 1999). For example, Japan and Korea are very reluctant to remove trade barriers in the agricultural sector because this producer lobby is a vocal opponent of trade liberalization in these countries. Moreover, for some of the developing members, liberalization threatens to undermine state-sponsored efforts to develop industries deemed strategic to the national interest.

Despite APEC's preference for voluntary trade liberalization over formal binding agreements, we argue that liberalization on a nondiscriminatory basis can reinforce economic recovery and long-run growth of the region. Attaining a vision of open multilateral trade will require reorganization of economic activity around the Pacific to more fully exploit the diverse resources, technologies, and tastes of this vast region. At the national level, such a transition may imply dramatic adjustments in specific economic activities and policies, and resistance to such change will pose a challenge to reformers. There is, however, conclusive evidence that all APEC members will ultimately benefit from this process, and empirical economists can facilitate reform by elucidating the detailed benefits and costs of APEC trade reform.

This paper contributes to the policy dialogue by evaluating the effects of APEC trade liberalization on member-country real GDP, sectoral output,

exports and imports using an 18-region, 16-sector dynamic computable general equilibrium (CGE) model of the global economy. The next section provides a brief description of the APEC model used for quantitative assessments. In section 3, we present the aggregate and sectoral results of the APEC trade liberalization experiment, and the final section summarizes our main research and policy conclusions.

2 The Model and Data

2.1 Brief Description of the APEC Model

A CGE model is an empirical tool that is well suited to evaluating of new trading arrangements for several reasons. First, it captures extensive indirect effects, such as interindustry linkages between sectors and trade linkages between countries and regions. Second, it can evaluate the effect of removing trade barriers on resource allocation and structural adjustment in each country. Third, it can detail the impacts on both member and nonmember countries and thereby better elucidate implications for the negotiating environment.

The APEC model used in this study is a dynamic CGE model of the global economy, which is to a large extent based upon OECD's LINKAGE model (OECD, 1997). It contains 15 APEC countries/regions — Australasia (ANZ: Australia and New Zealand), Japan (JPN), China including Hong Kong (CHN), Korea (KOR), Taiwan (TWN), Singapore (SGP), Malaysia (MYS), Thailand (THA), Indonesia (IDN), the Philippines (PHL), Vietnam (VNM), Canada (CAN), the United States (USA), Mexico (MEX), and Chile (CHL) — and 3 non-APEC regions — the rest of Latin America (LAT), Europe (EUR), and the rest of the world (ROW).[1]

One of the key features of the model is that goods are differentiated by region of origin and are modeled as imperfect substitutes. On the import side, this is reflected by the implementation of the so-called Armington assumption where a constant elasticity of substitution (CES) specification is used to incorporate imperfect substitution of imported goods with respect to domestically produced goods. A symmetric specification is used

1 The model is calibrated to social accounting matrices (SAMs) of the 18 regions, which are constructed from the Global Trade Analysis Project (GTAP) database, version 4. See Gehlhar et al. (1997) and McDougall et al. (1998) for detailed descriptions of the GTAP database. Due to the data limitations, Brunei, Papua New Guinea, and Peru are aggregated into ROW. Russia, which is newly admitted to APEC in 1998, is also aggregated into ROW.

to model export supply, the latter being implemented with constant elasticity of transformation (CET) functions.[2]

Three different production archetypes are defined in the model: crops, livestock, and all other goods and services. The CES nests for the three archetypes are depicted in Figures 1-3. In each production archetype, sectors will be differentiated by different input combinations and substitution elasticities.

The key feature of the crop production structure is the substitution between intensive cropping versus extensive cropping, i.e., between fertilizer and land [see Figure 1]. Livestock production captures the important role played by feed versus land, i.e., between ranch- versus range-fed production [see Figure 2]. Production in the other sectors more closely matches the traditional role of capital-labor substitution, with energy introduced as an additional factor of production [see Figure 3].

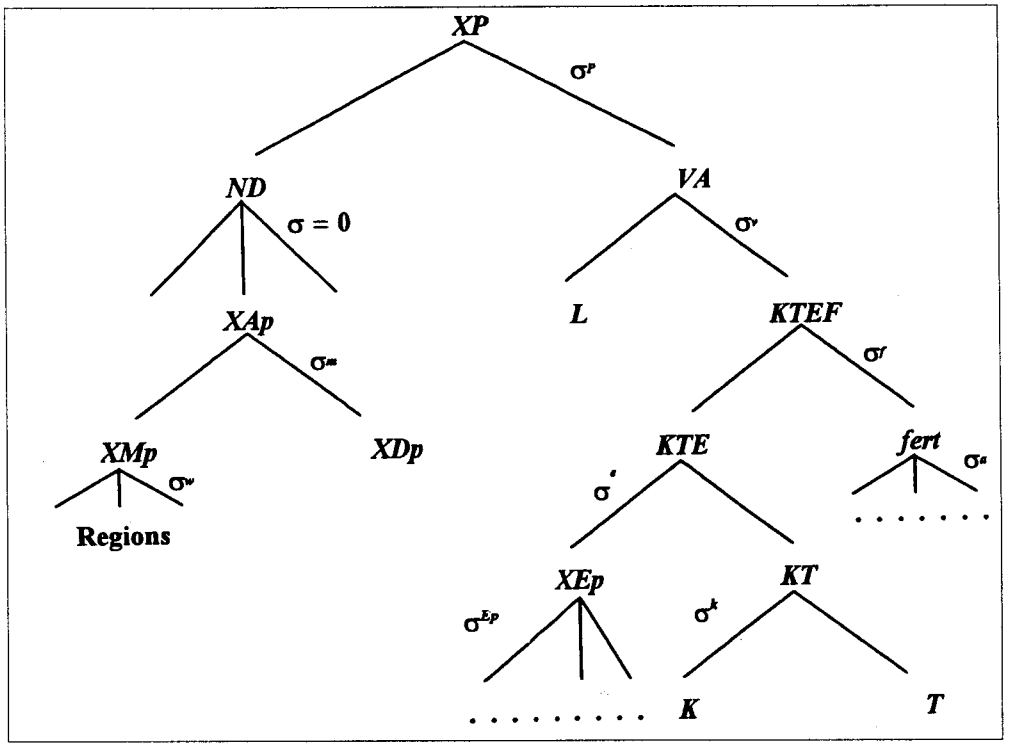
All sectors are assumed to be perfectly competitive and operate under constant returns to scale. Production technology is modeled mainly by a nesting of CES functions. The model has three kinds of factors of production: labor, capital, and sector-specific fixed factors (e.g., land in agricultural sectors). Labor supply is assumed to be fixed in all regions and for all time periods, and the wage rate adjusts to insure equilibrium in the domestic labor market. While we assume no international migration, labor is free to move across all sectors of the economy. Thus, there is a single equilibrium wage rate.

Within each period, capital is classified as being either *old* or *new*. New capital is generated by the previous period's investment. This vintage structure of capital allows for differentiating the substitution possibilities across inputs by the age of capital. Similar to labor, new capital is assumed to be perfectly mobile across sectors and there is a single economywide rate of return on capital.

All income generated by economic activity is assumed to be distributed to consumers. A single representative consumer allocates optimally his/her disposable income among the consumer goods and saving. The consumption /saving decision is static: saving is treated as a good and its amount is determined simultaneously with the demands for the other goods. The price

2 Note that the CET export specification was not implemented in the LINKAGE model. Hence, differences in model results can partially be attributed to this change in model specification. Further, the trade elasticities used in this analysis were somewhat reduced from those used in the previous study.

Figure 1: Production Structure in the Crop Sectors[a]

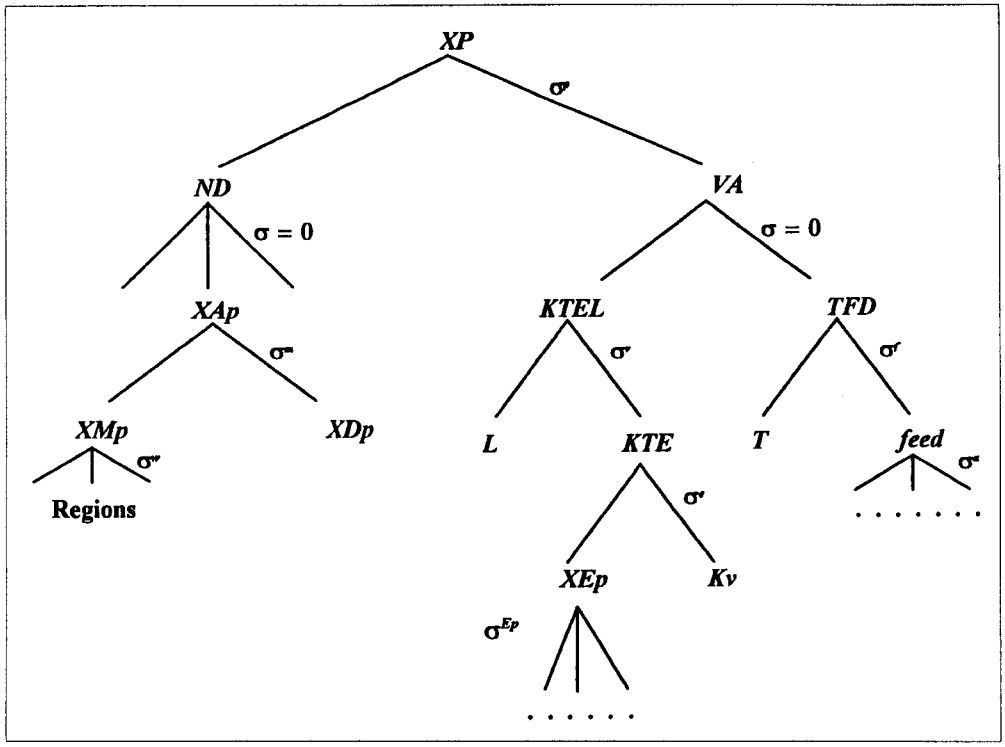


XP:	Output (by vintage)
VA:	Capital, labor, energy, land, and fertilizer composite good
KTEF:	Capital, energy, land, and fertilizer composite good
KTE:	Capital, energy, and land composite good
fert:	Aggregate fertilizer bundle
XEp:	The aggregate energy bundle
KT:	Capital and land bundle
K, *L*, and *T*:	Respectively capital, labor, and land
XAp:	Armington demand for intermediate goods (other than fertilizer and energy)
XDp:	The domestic component of intermediate demand
XMp:	The imported component of intermediate demand

Note: The following production elasticities are differentiated by capital vintage, the others are vintage independent: σ^p, σ^v, σ^k and σ^e.

[a] In the current version of the bundle, there is a single fertilizer input, which is associated with the chemicals sector in GTAP.

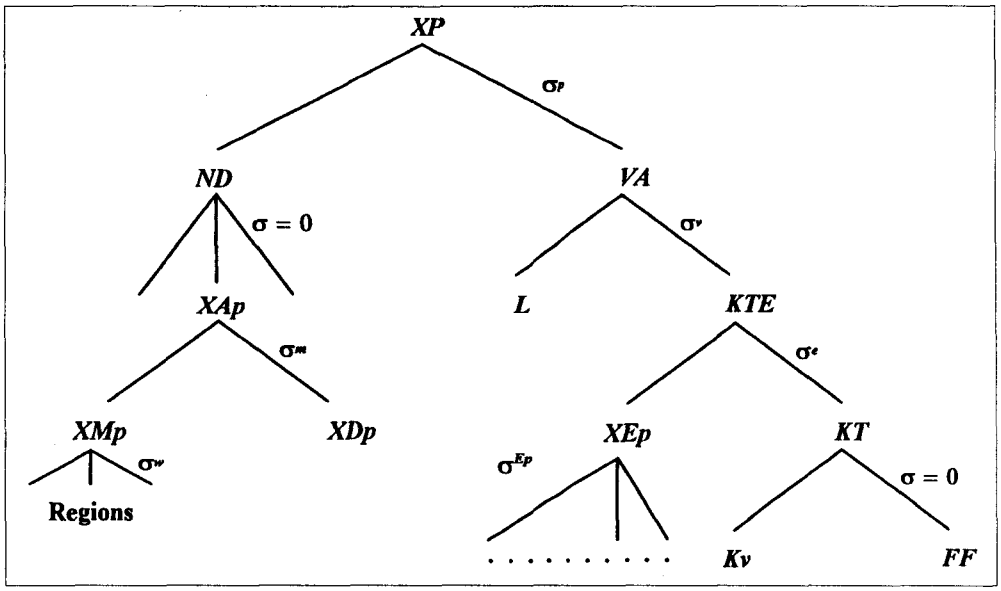
Figure 2: Production Structure in the Livestock Sectors



XP:	Output (by vintage)
VA:	Capital, labor, energy, land, and feed composite good
TFD:	Land, and feed composite good
KTEL:	Capital, energy, and labor composite good
feed:	Aggregate feed bundle
KTE:	Capital and energy bundle
Kv	Capital demand (by vintage)
XEp:	The aggregate energy bundle
K, *L*, and *T*:	Respectively capital, labor, and land
XAp:	Armington demand for intermediate goods (other than fertilizer and energy)
XDp:	The domestic component of intermediate demand
XMp:	The imported component of intermediate demand

Note: The following production elasticities are differentiated by capital vintage, the others are vintage independent: σ^P, σ^V and σ^E.

Figure 3: Production Structure in the Manufacturing and Services Sectors[a]



XP:	Output (by vintage)
VA:	Capital, labor, energy, and sector-specific factor composite good
KTE:	Capital, energy, and sector-specific factor composite good
KT:	Capital and sector-specific factor composite good
Kv	Capital demand (by vintage)
XEp:	The aggregate energy bundle
K, *L*, and *FF*:	Respectively capital, labor, and sector-specific factor
XAp:	Armington demand for intermediate goods (other than energy)
XDp:	The domestic component of intermediate demand
XMp:	The imported component of intermediate demand

Note: The following production elasticities are differentiated by capital vintage, the others are vintage independent: σ^p, σ^v and σ^e.

[a] The sector-specific factor includes the resource base in the coal, crude oil, natural gas, and mining sectors.

of saving is set arbitrarily equal to the average price of consumer goods.

The model spans the period 1995-2020. It solves every year from 1995-2010 and every five years from 2010-2020. While the model relies on sequential static computation of equilibria, intertemporal trends are specified for factor growth (labor) and accumulation (capital), as well as changes in productivity. Land is assumed to be price-responsive, however, with no time trend on the supply curve.

The model is calibrated on exogenous growth rates of real GDP, population, labor productivity, and an autonomous energy efficiency improvement in energy use.[3] In the baseline scenario, the dynamics are calibrated in each country/region by imposing the assumption of a balanced growth path. This implies that the ratio between labor and the capital/fixed-factor bundle (in efficiency units) is held constant over time.[4] When the APEC trade liberalization scenario is simulated, the growth of capital is endogenously determined by the saving-investment relation.

2.2 Import Protection and Export Tax/Subsidy Rates

Sectoral rates of nominal import protection and export tax/subsidy rates for the 15 APEC countries/regions are summarized in Tables 1 and 2, respectively. The import protection rates are the sum of sectoral tariff rates and ad valorem equivalents of quantitative restrictions (QRs) on imports, which are computed from the GTAP database. The average protection rates in 1995 [the last row of Table 1] range from 1.4 percent in Singapore to 19.3 percent in the Philippines, and sectoral protection rates differ significantly across APEC. The most notable sector is rice and wheat, where the rates range from zero or negative in a number of countries to 535 percent in Japan.[5] In other agriculture they are very high in Japan, Korea, Taiwan, and Malaysia, whereas in processed food they are quite high in

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3 Real GDP and population growth rates are based on the World Bank's latest projections.

4 This involves computing in each period a measure of Harrod-neutral technical progress in the capital/fixed-factor bundle as a residual, given that the growth of the labor force (in efficiency units) is pre-determined. This is a standard calibration procedure in dynamic CGE modeling.

5 In version 4 of the GTAP database, the observed domestic-world price gap is applied at the commodity level to estimate import protection and export tax/subsidy rates. Thus a negative protection rate might result (e.g., rice and wheat in China, Mexico, and Chile) when the domestic price is lower than the world price.

Table 1
Import Protection Rates in Major APEC Countries, 1995 (percent)

	Products	ANZ	JPN	CHN	KOR	TWN	SGP	MYS	THA	IDN	PHL	VNM	CAN	USA	MEX	CHL
1	Rice and wheat[a]	0.3	535.0	-14.5	66.0	68.0	34.9	85.2	59.2	0.0	70.8	5.2	0.0	1.2	-17.5	-23.3
2	Other agriculture	2.4	65.9	7.6	45.0	49.2	17.6	45.4	25.7	6.4	18.0	8.5	0.6	4.4	0.9	5.9
3	Coal, oil, and gas	0.1	0.7	3.0	4.2	5.7	2.7	2.8	2.8	3.4	1.1	21.6	6.0	0.6	0.7	8.8
4	Other mining	0.5	0.0	1.4	1.8	0.9	0.0	1.7	1.6	3.7	4.8	1.7	0.0	0.1	3.2	8.4
5	Processed food	4.0	30.9	11.4	26.0	28.9	20.3	34.2	53.1	9.2	45.2	68.3	6.4	9.9	-2.0	10.1
6	Textiles and clothing[b]	14.6	6.8	30.9	6.9	8.6	1.4	17.4	24.1	14.0	23.0	28.1	11.2	9.9	3.4	10.4
7	Wood and paper	6.5	0.7	13.6	5.2	4.0	0.4	9.4	10.9	6.0	21.7	13.1	0.5	0.5	1.1	9.8
8	Chemicals[c]	6.4	2.2	14.6	7.5	5.6	1.3	8.0	16.4	8.0	26.0	4.8	1.5	2.9	2.6	9.9
9	Metals and prod.	7.7	0.9	12.4	5.9	5.8	0.0	9.4	11.5	7.1	20.4	5.8	1.6	2.0	3.0	10.0
10	Machinery and equip.	7.4	0.4	12.7	8.0	6.4	0.0	6.4	9.9	4.5	25.0	4.5	1.0	1.9	3.1	10.5
11	Transport equip.	11.2	1.6	38.4	4.8	18.2	2.8	14.5	37.8	27.2	19.4	25.5	0.8	1.4	3.4	10.5
12	Other manufac.	10.2	1.3	24.8	7.5	7.8	0.1	11.5	25.2	10.4	27.8	18.4	1.3	3.0	7.0	10.2
13	Construction	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	Electricity	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	Trade and transp.	0.3	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	Other services	0.1	2.9	1.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Weighted average	6.1	9.1	14.5	8.1	8.3	1.4	9.0	13.1	6.7	19.3	17.2	1.6	2.4	2.3	8.1

These rates include ad valorem equivalents of quantitative restrictions on imports.
[a] Include processed rice.
[b] Includes leather and footwear.
[c] Include plastics and rubber products.
Source: GTAP database, Version 4.

Table 2
Export Tax and Subsidy Rates in Major APEC Countries, 1995 (percent)

	Products	ANZ	JPN	CHN	KOR	TWN	SGP	MYS	THA	IDN	PHL	VNM	CAN	USA	MEX	CHL
1	Rice and wheat[a]	-0.1	-83.5	32.7	-51.6	-56.8	0.0	-52.2	-55.7	-0.6	-44.1	4.4	-0.3	-1.5	29.5	13.7
2	Other agriculture	-2.7	-12.5	2.4	-0.3	-0.7	0.0	13.3	-1.0	0.0	-0.3	13.5	-0.6	0.6	3.8	0.0
3	Coal, oil, and gas	1.7	0.0	19.6	0.0	0.0	0.0	13.7	0.0	0.0	0.0	0.7	0.0	6.1	0.0	1.3
4	Other mining	0.0	0.0	-0.9	0.0	0.0	0.0	13.6	0.0	0.0	0.0	3.1	0.2	3.9	0.0	0.0
5	Processed food	-3.0	-4.4	2.2	-1.6	-0.7	0.0	0.0	-5.7	0.0	-0.9	4.7	-3.0	0.0	1.9	0.0
6	Textiles and clothing[b]	0.0	0.0	-1.2	0.3	0.5	0.2	15.5	1.3	0.6	21.5	2.6	0.0	0.3	0.0	0.0
7	Wood and paper	0.3	0.0	-5.5	0.0	0.0	0.0	13.7	0.0	0.0	0.0	5.7	0.1	1.0	0.0	0.0
8	Chemicals[c]	0.2	0.0	-10.8	0.0	0.0	0.0	13.7	0.0	0.0	1.3	1.9	0.0	1.5	0.0	0.0
9	Metals and prod.	0.0	0.0	-7.3	0.0	0.0	0.0	13.7	0.0	0.0	0.0	0.4	0.0	0.7	0.0	0.0
10	Machinery and equip.	1.0	-0.1	-5.0	0.0	0.0	0.0	13.7	0.0	0.0	2.0	1.9	0.1	0.8	0.0	0.2
11	Transport equip.	-0.2	0.1	-0.9	0.4	0.0	0.1	13.0	0.0	0.0	0.0	1.9	0.0	0.5	0.1	0.8
12	Other manufac.	1.5	0.0	30.3	0.0	0.0	0.0	13.7	0.0	0.0	1.1	4.0	0.4	0.5	0.0	0.0
13	Construction	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	Electricity	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	Trade and transp.	0.1	0.0	0.0	0.0	0.0	0.0	21.4	0.0	0.0	0.0	3.2	0.2	10.0	0.0	0.0
16	Other services	0.1	0.0	0.0	0.0	0.0	0.0	13.7	0.0	0.0	0.0	26.3	0.1	4.9	0.0	8.9
	Weighted average	-0.5	-0.1	-0.8	0.0	0.0	0.0	13.2	-3.2	0.1	2.4	4.4	-0.1	2.2	0.2	0.5

Positive number indicates export taxes and negative numbers indicate export subsidies.
[a, b, c] See Table 1.
Source: GTAP database, Version 4.

Vietnam, Thailand, and the Philippines.[6]

Developing-country members have substantially lowered trade barriers on a variety of manufactured products, yet some of them still maintain relatively high tariff rates. A number of manufacturing sectors, for example, are still highly protected in the Philippines, Thailand, and China. In simple manufactures (e.g., textiles, clothing, and footwear), developed countries tend to impose trade barriers to protect unskilled workers. Nevertheless, the import protection rates on textiles and clothing are higher in developing members than in developed members.

On the export side, Malaysia imposes export taxes on all goods and services with the exception of rice and wheat and processed food [Table 2]. Its average export tax rate is 13.2 percent. Several APEC countries' export subsidy rates on rice and wheat are very high, but these reflect large domestic-world price differentials on the highly protected sector.[7] It is also worth noting that, although many members rely on heavy export tax and subsidy instruments in the grain sectors, this does not represent a significant macro trade distortion for any country. Trade distortions on other agriculture, manufactures, and services are the main determinants of economywide export bias.

3 Empirical Assessments

In this section, we examine both aggregate and sectoral effects of APEC trade liberalization. To assess the implications of regional trade liberalization, we first establish a baseline scenario that assumes no trade liberalization during the 2000-2020 period. We then run a simulation on nondiscriminatory APEC trade liberalization; i.e., developed members remove import and export distortions by 2010 and developing members remove them by 2020 on a Most-Favored Nation (MFN) basis.[8]

In contrast to a free trade area where each member country removes bilateral trade barriers on imports from other members, trade liberalization

6 These are largely caused by the imposition of import quotas on a number of agricultural products in these countries.

7 Japan's export subsidy rate of 83.5 percent on rice and wheat is significantly smaller than its import protection rate of 535 percent. This is because heavily protected paddy rice and wheat have negligible amount of exports compared to processed rice. In GTAP database, Japan's export subsidy rate on processed rice is set to zero whereas its import protection rates on processed rice is the same as that on paddy rice.

8 Only positive tariffs and negative export distortions (i.e., subsidies) are phased out.

by APEC members is nondiscriminatory toward the rest of the world. Each member submits individual action plans (IAPs) every year, which provide a blueprint for implementing liberalization and facilitation in APEC (Yamazawa, 1997). The general perception among the APEC leaders is that regional integration should be nondiscriminatory toward the rest of the world, which is consistent with the process of multilateral trade liberalization as envisioned under the World Trade Organization (WTO).[9]

Three caveats should be mentioned with regard to the APEC scenario. First, it is assumed that APEC countries' liberalization coincides with the Uruguay Round (UR) commitments during 1995-2000. However, a number of countries (e.g., Chile, China, Indonesia, and the Philippines) have committed to tariff reductions that are significantly larger than the UR commitments (Yamazawa, 1997). Second, the baseline scenario does not incorporate conceivable reductions in trade distortions beyond the year 2000 under the new WTO Round. The first caveat would underestimate the impact of APEC trade liberalization while the second would overestimate it. Third, the assumption that all members remove trade barriers on agricultural products by 2010 / 2020 might be too optimistic. For example, Japan, Korea, and the Philippines have excluded liberalization of rice and some other agricultural products from their IAPs. In particular, it is highly unlikely that Japan would liberalize its rice market by 2010. Thus, these caveats must be borne in mind when interpreting the simulation results.

3.1 Impact of APEC Trade Liberalization on Real GDP

Table 3 summarizes the impact of APEC trade liberalization, on an MFN basis, on real GDP. It indicates percentage changes in real GDP relative to the baseline in 2005, 2010, 2015, and 2020, as well as absolute changes (in billions of 1995 U.S. $) in 2020. By the year 2020, real GDP of developed and developing APEC members would increase by $42 billion and $83 billion, respectively (the last column of the table). In addition, since there would be no trade diversion under nondiscriminatory liberalization, the non-APEC regions would also be able to capture nontrivial gains in real GDP ($16 billion). The gains in real GDP are distributed very unevenly, however. In 2020, the Philippines would realize a 3.8 percent increase in real GDP over the baseline projection, followed by Thailand (1.6 percent), Vietnam (1.4 percent), Singapore (1.3 percent), and Taiwan (1.1 percent). In percentage

9 See, e.g., Lloyd (1996), Oxley (1996), Tan (1998), and Yamazawa (1996).

Table 3
Changes in Real GDP relative to the Baseline Values

Country/Region	Percentage changes				Absolute changes in 2020[a]
	2005	2010	2015	2020	
Australasia	0.1	0.2	0.5	0.7	5.8
Japan	0.1	0.2	0.2	0.2	13.0
China (incl. Hong Kong)	0.2	0.4	0.7	0.9	38.8
Korea	0.1	0.3	0.4	0.5	6.6
Taiwan	0.2	0.5	0.8	1.1	11.8
Singapore	0.2	0.6	1.0	1.3	3.4
Malaysia	0.3	0.6	0.8	0.9	3.2
Thailand	0.3	0.7	1.2	1.6	6.9
Indonesia	0.0	0.1	0.3	0.4	2.1
Philippines	0.4	1.2	2.4	3.8	8.2
Vietnam	0.3	0.7	1.1	1.4	0.7
Canada	0.0	0.0	0.0	0.1	0.6
United States	0.0	0.1	0.1	0.2	22.8
Mexico	0.0	0.0	0.0	0.0	0.2
Chile	0.0	0.2	0.3	0.5	1.2
Other Latin America	0.0	0.0	0.0	0.1	2.4
Europe	0.0	0.0	0.0	0.1	9.2
Rest of World	0.0	0.0	0.0	0.1	4.2
Developed APEC	0.0	0.1	0.2	0.2	42.2
Developing APEC	0.1	0.3	0.5	0.7	83.0
Non-APEC Countries	0.0	0.0	0.0	0.1	15.9

[a] Billions of 1995 U.S. dollars.

terms, an increase in real GDP is very small in Japan, Canada, the United States, and Mexico.[10]

The real GDP gains reported in this paper are significantly smaller than those obtained in our earlier study (Lee et al., 1999) for two major reasons. First, the model used here is calibrated to the 1995 database, whereas we used the 1992 database in the previous study. During the three-year period, some APEC countries reduced trade barriers significantly, resulting in much lower trade distortions in the base year. For example, Thailand lowered its average tariff rate from 31.6 to 13.1 percent, and Indonesia from 12.3 to 6.7 percent during 1992-95. Second, some modifications in the structure of the APEC model would affect simulation results. Most importantly, the newly incorporated assumption of imperfect substitutability between domestically produced goods and exported goods, which are represented by CET functions, would reduce the impact of the removal of trade distortions.

While countries with higher initial protection rates generally achieve greater efficiency gains from trade reform, the extent of welfare gains depends upon several other factors. Singapore has the lowest average rate of protection (with the exception of Hong Kong which is aggregated into China), but its real GDP gains are relatively large. This is because its export to GDP ratio and intra-APEC trade share are both extremely high, and an APEC-wide trade liberalization would enable it to capture a relatively large gain through export expansion.

Canada and Mexico gain very little from APEC trade liberalization. This is because about three-quarters of Canadian and Mexican exports were destined to the United States in 1995, and the U.S. tariff rates on Canadian and Mexican products were already quite low.[11] Thus, the benefits for

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10 Studies evaluating the effects of alternative trade liberalization scenarios among Asia-Pacific countries include Brown et al. (1996), Lee and Woodall (1998), Lee et al. (1999), Lewis et al. (1995), Yang et al. (1998), and Young and Chye (1997). These studies generally find that, in percentage terms, both discriminatory and nondiscriminatory liberalization by East Asian or APEC countries would lead to welfare gains to developing countries (e.g., China and ASEAN) that are significantly greater than those to developed countries. Recent studies assessing the impact of the Uruguay Round (e.g., Francois et al., 1996, 1997; Goldin et al., 1993; Harrison et al., 1996; Hertel et al., 1996; Yang et al., 1997) also show substantial variations in the distribution of world welfare gains across regions.

11 While we only summarize APEC countries' average protection rates by commodity in Table 2, the GTAP database provide protection rates by trading partner and by commodity.

Canada and Mexico are expected to be very small because of their low trade shares with non-U.S. APEC members.

A major reason why the U.S. gains (in percentage terms) are small might be because ad valorem equivalents of nontariff measures (NTMs) in services are not estimated in the base year. The frequency of NTMs in various categories of services in APEC countries suggests that the magnitude of barriers to trade in services may be extremely large (APEC and PECC, 1995). However, there is no proper method to convert frequency ratios into ad valorem equivalents, and no attempt has been made in the present study. Service exports accounted for approximately one-quarter of U.S. exports in 1995, and its share in total exports would have been much greater in the absence of regulations in its trading partners. Since the U.S. has comparative advantage in services, service trade liberalization is expected to bring substantial benefits.

Another limitation of this study is that we have only considered trade liberalization. Liberalization on foreign direct investment (FDI) is expected to bring additional gains. Lee and Roland-Holst (1998) show that, in the context of U.S-Japan trade, capital mobility increases the welfare gains to both countries that accrue from bilateral trade liberalization. Petri (1997) conducts APEC trade and FDI liberalization experiments and finds that an exclusion of FDI liberalization would diminish global welfare gains resulting from APEC liberalization by $60 billion, or 23 percent of full liberalization.[12] These results confirm our *a priori* expectation that the removal of investment barriers would lead to additional real output and income gains, which could be substantial for developing members.

3.2 Sectoral Results

Although the real GDP results of the liberalization scenarios indicate the overall gains in the standard of living resulting from the removal of trade distortions, economywide efficiency gains are rarely distributed uniformly across sectors. Trade liberalization might lead to a sharp contraction of output and employment in highly protected activities, and the adversely affected sectors are likely to strongly oppose trade reform.

In many of the previous studies assessing the impact of APEC trade

12 Other relevant work in this area includes Walmsley (1999), who modifies the standard GTAP model and incorporates the existence of foreign ownership of capital and land. She finds that the foreign ownership of assets has a significant effect on the results of trade liberalization in the Asia-Pacific region.

liberalization (e.g., APEC, 1997; McKibbin, 1998; Yang et al., 1998), sectoral effects are not evaluated. However, aggregate results reveal only part of the story and can give misleading signals about the political feasibility of trade accords. Since trade policy is often formulated from the bottom up, a modern view of national interest, such as that based on trade reciprocity and open multilateralism, might encounter conflicts with established domestic interests.

Table 4 provides absolute and percentage changes in sectoral output, exports, and imports resulting from APEC liberalization compared with the projected baseline values in 2020. Since rice and wheat are the most protected products in many East Asian members, the removal of trade distortions in these products can lead to extreme adjustments. In particular, Japan's output of rice and wheat is estimated to contract by 56 percent while its imports would rise by almost 700 percent compared with the baseline values in 2020. By contrast, countries that export relatively large shares of rice and wheat would experience sharp increases in output. Driven by a surge in exports, the output of rice and wheat in Australasia, Canada, and the United States is expected to rise by 108, 69, and 49 percent, respectively.

The agricultural exporters would generally experience reductions in manufacturing output because labor and capital are drawn into the agricultural sectors.[13] For example, the United States would experience reductions in growth rates of manufactures with the exception of processed food, wood and paper, and chemicals. However, increases in output of agricultural sectors and service-oriented sectors (sectors 13-16) would more than offset the reductions in manufacturing output.

In China, Asian NIEs (Korea, Taiwan, and Singapore), and the ASEAN-4 countries (Malaysia, Thailand, Indonesia, and the Philippines), exports and imports increase in all manufacturing sectors. Not only would they expand production of labor-intensive manufactures (e.g., textiles and clothing), but most of the Asian developing countries also increase output of the great majority of capital-intensive manufactures.

Korea and Taiwan's results are somewhat similar to Japan's as agricultural sectors contract (relative to the baseline case) and all

13 This result crucially depends upon the assumption that labor is homogeneous and perfectly mobile across sectors. Had we disaggregated labor by type and skill, labor mobility would have been limited and many of the manufacturing sectors might not have contracted.

Table 4

Changes in Sectoral Output, Exports, and Imports relative to the Baseline, 2020

(billions of 1995 U.S. dollars, percent)

	Australasia						Japan						China (incl. Hong Kong)					
	Output		Exports		Imports		Output		Exports		Imports		Output		Exports		Imports	
	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)
1 Rice and wheat	6.2	108.4	5.2	182.4	0.0	-6.5	-61.8	-55.7	-0.1	-89.0	74.4	691.9	-1.6	-0.7	0.0	17.4	-0.8	-17.1
2 Other agriculture	2.3	3.8	-0.1	-0.7	0.3	11.6	-28.2	-11.1	-0.1	-9.3	36.1	57.2	-9.0	-1.2	0.5	2.5	0.2	0.7
3 Coal, oil, and gas	0.5	1.0	-0.1	-0.4	0.3	3.1	1.4	1.9	0.2	8.6	-1.2	-0.7	13.0	2.7	2.7	11.9	-0.7	-3.7
4 Other mining	-0.5	-2.5	-0.4	-3.2	0.0	1.1	0.6	1.8	0.0	4.0	0.1	0.4	4.3	2.5	1.0	8.7	-1.0	-5.8
5 Processed food	7.0	8.8	5.4	22.5	0.4	7.1	-8.7	-1.3	0.4	14.1	19.9	23.2	-1.2	-0.3	4.2	15.5	1.7	5.4
6 Textiles, clothing	-1.4	-7.0	-0.2	-4.1	2.9	17.7	0.9	0.3	3.1	21.0	11.3	11.0	34.4	4.0	50.0	15.2	38.0	21.7
7 Wood and paper	-0.5	-0.9	-0.1	-2.1	0.9	8.4	3.6	0.6	0.5	7.2	-0.4	-0.7	1.5	0.4	2.7	6.4	2.2	5.6
8 Chemicals	-0.4	-0.7	0.1	0.4	1.8	7.2	7.5	0.8	5.1	7.2	-0.4	-0.6	-10.4	-1.1	2.2	2.0	9.7	6.9
9 Metals and prod.	-1.1	-1.6	-0.2	-0.9	0.8	8.1	16.9	2.1	4.2	7.8	-0.1	-0.1	-0.1	0.0	4.0	3.6	3.6	4.6
10 Machinery	-1.6	-3.6	-0.3	-2.1	3.5	6.3	40.4	2.2	27.0	5.8	0.5	0.3	13.8	0.8	29.7	7.1	13.1	3.8
11 Transport equip.	-1.5	-4.4	-0.1	-2.0	2.7	10.7	22.0	4.7	17.8	11.	-0.8	-2.1	-23.7	-7.0	1.2	5.1	13.2	21.1
12 Other manufac	-0.7	-3.7	0.0	-1.5	1.4	13.9	3.6	1.0	2.4	6.5	1.5	3.2	12.8	1.9	18.3	14.0	7.0	17.5
13 Construction	3.8	3.2	...	...	...	...	8.7	0.4	...	...	...	...	5.3	0.6	...	...	...	...
14 Electricity	0.3	1.6	...	...	...	...	1.6	0.7	...	...	...	...	3.7	1.0	...	...	...	...
15 Trade and transp.	1.3	0.3	0.0	-0.1	1.2	3.2	8.5	0.3	3.4	4.1	4.7	1.7	28.5	1.2	23.9	7.8	-2.6	-3.1
16 Other services	1.7	0.3	-0.2	-1.1	0.2	1.7	-0.7	0.0	0.5	1.7	0.6	0.9	8.4	0.6	4.3	6.6	-1.5	-4.0

Table 4 (continued)

	Korea						Taiwan						Singapore					
	Output		Exports		Imports		Output		Exports		Imports		Output		Exports		Imports	
	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)
1 Rice and wheat	-3.4	-4.5	0.0	-63.1	2.0	101.5	-1.4	-7.1	-0.2	-71.4	0.6	116.6	0.0	88.1	0.0	67.6	0.0	-0.4
2 Other agriculture	-5.2	-5.5	0.0	0.1	8.5	36.4	-3.0	-6.9	-0.1	-4.5	5.1	44.5	-0.4	-4.8	0.0	-0.7	0.5	8.3
3 Coal, oil, and gas	1.6	1.5	0.3	3.1	1.3	2.5	1.0	3.0	0.0	0.4	1.4	11.4	0.7	1.4	0.4	1.4	1.5	6.2
4 Other mining	0.3	1.6	0.0	2.3	0.1	1.6	0.2	2.6	0.0	3.9	0.1	4.5	0.0	1.4	0.0	0.3	0.1	3.5
5 Processed food	0.5	0.3	0.4	10.4	2.3	18.6	3.8	7.5	2.4	34.7	2.1	23.4	1.8	10.6	1.9	19.5	1.0	11.1
6 Textiles, clothing	22.8	15.1	14.3	23.0	2.0	9.2	30.8	25.5	21.3	31.7	2.7	20.1	0.8	7.3	0.7	9.1	0.9	7.6
7 Wood and paper	0.4	0.4	0.5	6.7	0.5	3.4	0.5	0.7	0.8	4.5	0.9	6.9	0.4	1.7	0.2	2.4	0.3	5.0
8 Chemicals	8.8	3.6	4.2	9.7	2.1	5.1	16.1	7.9	7.5	12.6	3.9	9.4	2.2	3.6	2.0	4.2	1.4	3.8
9 Metals and prod.	4.8	1.7	2.3	6.9	2.2	4.8	0.7	0.3	2.1	5.2	2.4	7.1	1.4	5.0	0.8	5.1	0.9	3.7
10 Machinery	6.7	1.6	9.1	5.4	5.5	4.1	1.4	0.4	4.6	2.2	8.2	5.7	8.3	3.3	7.9	3.4	7.2	3.4
11 Transport equip.	5.1	4.2	4.6	10.6	0.0	0.3	-1.5	-2.0	0.6	3.4	3.5	14.7	0.4	2.8	0.4	3.8	0.5	2.8
12 Other manufac	1.5	1.5	1.6	7.8	0.8	7.7	3.5	5.3	3.3	12.6	1.0	10.2	0.7	3.1	0.6	3.3	1.0	4.3
13 Construction	1.5	0.4	...	...	...	...	3.9	3.0	...	...	...	...	1.6	5.2	...	...	...	...
14 Electricity	0.2	0.6	...	...	...	...	1.3	3.4	...	...	...	...	0.2	4.3	...	...	...	...
15 Trade and transp.	-3.4	-0.9	1.4	2.3	-0.3	-0.8	-4.3	-1.3	-0.6	-2.4	0.9	4.9	1.3	0.6	0.2	0.2	0.6	7.9
16 Other services	-5.9	-0.8	0.3	1.4	-0.6	-2.0	-3.4	-0.5	-0.3	-2.2	0.5	1.7	1.7	1.2	-0.1	-0.6	0.7	2.3

Table 4 (continued)

	Malaysia						Thailand						Indonesia					
	Output		Exports		Imports		Output		Exports		Imports		Output		Exports		Imports	
	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)
1 Rice and wheat	-1.8	-10.2	0.0	-35.6	1.9	95.5	-9.4	-44.0	-5.1	-63.6	0.3	62.8	-0.1	-0.2	0.0	3.0	-0.4	-12.3
2 Other agriculture	-1.8	-4.7	0.0	0.3	2.7	36.8	1.0	2.4	1.1	12.8	0.6	11.4	0.0	0.0	0.2	2.2	0.0	-0.4
3 Coal, oil, and gas	-2.3	-4.3	-1.1	-4.5	0.1	2.6	-0.3	-1.6	0.1	6.8	-0.7	-4.0	1.7	2.6	1.3	3.8	0.2	2.0
4 Other mining	-0.3	-3.9	-0.1	-3.8	0.0	2.1	0.3	4.9	0.3	7.5	-0.2	-5.4	0.2	0.9	0.1	1.1	0.0	2.4
5 Processed food	0.9	2.5	1.8	11.4	1.0	16.9	1.3	2.7	2.3	13.2	2.1	32.7	-0.6	-1.1	0.1	2.0	0.3	9.3
6 Textiles, clothing	2.2	11.5	2.0	18.8	1.0	12.7	5.3	8.4	4.5	17.3	1.3	20.1	3.9	9.6	3.3	13.3	1.4	18.2
7 Wood and paper	1.7	5.0	1.7	9.1	0.1	2.5	0.0	0.0	0.4	7.2	0.2	3.9	1.3	2.8	1.1	5.0	0.2	4.1
8 Chemicals	3.2	10.1	2.5	17.7	0.4	1.9	0.5	1.7	1.2	10.1	1.2	4.8	0.3	0.7	0.5	5.6	1.2	5.8
9 Metals and prod.	-0.1	-0.4	0.5	4.7	1.0	4.8	0.1	0.8	0.4	9.0	0.8	2.9	-0.1	-0.3	0.3	4.6	0.5	3.7
10 Machinery	13.6	9.0	13.3	9.5	3.7	2.5	7.0	6.7	6.5	9.8	2.8	3.6	0.6	1.1	0.6	5.2	0.4	0.9
11 Transport equip.	-1.0	-3.3	0.6	6.2	0.5	3.6	-4.5	-10.6	0.2	6.1	4.6	21.6	-1.6	-11.8	0.0	0.9	1.7	15.5
12 Other manufac	1.1	3.5	1.4	7.7	0.6	6.0	0.4	1.3	1.1	8.7	1.1	16.5	0.0	-0.1	0.2	3.5	0.4	10.2
13 Construction	-1.5	-2.4	...	...	...	...	1.5	2.7	...	...	...	...	1.7	1.2	...	...	...	...
14 Electricity	0.1	1.1	...	...	...	...	0.2	1.5	...	...	...	...	0.0	0.1	...	...	...	...
15 Trade and transp.	-1.7	-1.5	0.4	1.4	0.1	5.1	2.5	1.7	3.6	8.6	-1.6	-7.9	-0.7	-0.4	0.3	2.6	-0.1	-0.9
16 Other services	-1.8	-2.1	0.0	-0.6	-0.4	-1.8	0.2	0.2	0.3	5.3	-0.6	-5.0	-0.7	-0.5	0.1	1.2	0.0	-1.7

Table 4 (continued)

	Philippines						Vietnam						Canada					
	Output		Exports		Imports		Output		Exports		Imports		Output		Exports		Imports	
	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)
1 Rice and wheat	-2.1	-11.8	0.0	-45.7	1.0	55.8	1.1	22.1	0.8	59.2	0.0	14.1	4.5	68.9	4.3	79.0	0.0	-18.1
2 Other agriculture	-0.1	-0.2	0.4	23.1	0.0	1.2	-0.8	-5.2	0.0	0.4	0.0	4.5	0.0	0.0	0.2	2.2	0.2	2.6
3 Coal, oil, and gas	1.7	14.0	0.4	27.5	-0.4	-5.6	1.5	19.7	1.3	21.9	0.6	20.1	0.1	0.1	0.1	0.4	0.8	6.7
4 Other mining	1.4	22.4	0.6	25.2	0.0	0.9	0.0	-1.9	0.0	4.3	0.0	-4.6	0.0	-0.2	0.0	-0.1	0.0	-0.3
5 Processed food	-1.7	-3.4	1.1	21.1	1.0	15.3	-1.3	-16.5	-0.1	-2.3	1.9	51.4	-0.6	-0.9	0.1	0.8	0.6	5.9
6 Textiles, clothing	6.4	42.1	4.4	54.5	1.3	19.0	2.1	24.2	1.7	30.4	0.9	23.9	-1.5	-6.1	-0.2	-3.3	2.9	14.1
7 Wood and paper	0.9	9.1	0.5	25.7	0.1	5.1	-0.1	-1.5	0.0	5.5	0.1	7.5	-0.7	-0.5	-0.3	-0.5	0.2	0.8
8 Chemicals	0.8	4.1	0.5	20.7	0.8	6.7	0.2	6.6	0.1	16.1	0.1	1.5	0.7	0.8	0.2	0.7	0.8	2.0
9 Metals and prod.	2.5	26.5	0.9	28.9	1.5	18.7	0.0	-1.9	0.0	5.1	0.0	-1.6	-0.4	-0.5	0.0	-0.2	0.3	1.1
10 Machinery	9.7	32.6	9.2	33.1	6.7	18.9	0.0	0.5	0.0	4.9	0.0	0.6	-0.8	-0.8	-0.4	-0.7	0.7	0.6
11 Transport equip.	0.6	27.9	0.4	41.7	0.4	5.8	-0.2	-15.0	0.0	4.1	0.3	8.3	0.4	0.3	0.5	0.5	0.4	0.6
12 Other manufac.	1.1	22.6	1.0	32.6	0.3	10.1	0.0	-0.7	0.0	8.1	0.1	10.9	-0.3	-1.6	0.0	-0.7	0.5	3.0
13 Construction	1.4	9.7	...	...	...	...	0.2	1.2	...	...	...	...	0.4	0.2	...	...	...	...
14 Electricity	0.1	1.6	...	...	...	...	0.0	-0.2	...	...	...	...	-0.1	-0.2	...	...	...	...
15 Trade and transp.	1.6	1.6	3.3	19.8	-1.9	-17.0	0.2	0.8	0.5	5.0	0.0	-0.7	-0.4	-0.1	0.3	1.0	0.3	0.8
16 Other services	2.2	2.2	2.8	14.0	-0.4	-13.2	-0.4	-2.6	0.0	0.7	0.0	-2.6	-0.9	-0.2	0.0	-0.1	0.0	0.0

Table 4 (continued)

	United States						Mexico						Chile					
	Output		Exports		Imports		Output		Exports		Imports		Output		Exports		Imports	
	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)	($bn)	(%)
1 Rice and wheat	12.8	48.8	10.3	80.7	-0.1	-11.2	0.0	-2.4	0.0	2.9	0.0	9.2	0.0	-0.5	0.0	7.1	0.0	2.1
2 Other agriculture	34.2	7.6	23.1	40.9	1.9	5.7	0.1	0.2	0.2	3.3	0.0	0.7	0.2	0.7	0.2	4.4	0.0	1.5
3 Coal, oil, and gas	2.8	0.6	0.2	1.2	1.5	1.0	1.3	1.2	0.7	3.0	0.0	-0.1	0.1	1.4	0.0	9.1	0.1	3.4
4 Other mining	-0.1	-0.1	0.0	-0.3	0.0	0.0	0.1	0.7	0.0	1.8	0.0	1.5	1.1	5.7	0.7	6.7	0.0	4.8
5 Processed food	4.0	0.5	3.1	6.8	4.8	10.9	0.1	0.1	0.2	4.9	-0.2	-5.3	-0.1	-0.2	0.2	3.3	0.1	4.0
6 Textiles, clothing	-15.1	-4.1	-0.4	-1.2	31.9	15.9	-0.8	-1.3	-0.2	-2.1	0.3	3.8	-0.4	-2.2	0.0	6.2	0.4	9.3
7 Wood and paper	1.6	0.2	0.1	0.1	1.2	1.3	0.2	0.4	0.1	2.0	0.0	-0.2	0.7	2.8	0.6	5.7	0.1	3.6
8 Chemicals	1.1	0.1	1.7	1.1	5.0	3.4	0.3	0.3	0.4	2.5	0.2	0.9	0.0	-0.1	0.2	5.8	0.2	3.4
9 Metals and prod.	-3.5	-0.4	0.1	0.2	2.7	2.3	0.7	1.1	0.4	2.7	0.2	1.4	2.2	6.4	1.8	9.1	0.1	3.8
10 Machinery	-19.8	-1.2	-3.1	-0.6	26.7	4.2	1.3	1.3	1.4	1.9	0.7	1.0	-0.1	-2.1	0.0	4.3	0.4	3.3
11 Transport equip.	-0.2	0.0	0.3	0.2	8.4	3.5	1.1	1.7	1.0	2.8	0.3	1.6	0.0	-1.0	0.0	7.4	0.3	2.8
12 Other manufac	-3.7	-1.4	0.1	0.4	8.3	7.0	-0.3	-1.0	0.0	0.5	0.5	8.3	-0.1	-2.0	0.0	4.5	0.2	8.1
13 Construction	13.5	0.6	...	...	...	...	0.1	0.2	...	...	...	...	0.5	1.3	...	...	...	...
14 Electricity	0.8	0.3	...	...	...	...	0.0	-0.1	...	...	...	...	0.0	0.4	...	...	...	...
15 Trade and transp.	6.4	0.2	1.7	0.9	5.1	3.0	-0.7	-0.2	0.7	2.0	-0.1	-1.2	0.0	0.0	0.5	5.6	-0.1	-2.9
16 Other services	16.1	0.2	0.4	0.2	0.3	0.2	-1.0	-0.4	0.0	1.0	-0.1	-1.3	-0.8	-0.7	0.1	3.0	-0.1	-3.1

manufacturing sectors expand except transport equipment in Taiwan. One notable difference is that the reductions in agricultural output in these two countries' are significantly smaller than in Japan mainly because of their much lower initial protection rates on agricultural products.

In China, removing the trade distortions would result in a fall in agricultural output, posing a potential problem on food supply in the long run. Real output of a number of manufacturing and service-oriented sectors would increase over the baseline level, where Hong Kong's comparative advantage in manufactures and services might be contributing significantly to these results.

Large structural adjustments occur in ASEAN countries, particularly in the Philippines. Textile and clothing output would increase in all six ASEAN countries reported in Table 4, ranging from 7.3 percent in Singapore to 42.1 percent in the Philippines. Machinery is another sector that expands in all the ASEAN countries. In the Philippines APEC trade liberalization would lead to output increases in all manufacturing sectors in excess of 20 percent over the baseline values in 2020.

Relatively small structural adjustments are predicted to occur in Mexico and Chile. In Mexico, output growth is higher in fossil fuels, metals and products, machinery, and transport equipment over baseline projections, whereas it is lower in rice and wheat, textiles and clothing, and other manufactures. The sectoral results for Chile are consistent with our *a priori* expectations on output adjustments for a resource-abundant country. Real output growth is faster under the liberalization scenario in other agriculture, fossil fuels, other mining, wood and paper, and nonferrous metals (aggregated into metals and products), largely driven by new export demand. Real output growth becomes slower in textiles and clothing, machinery, and other manufactures.

Although not reported in this paper, we also conducted a discriminatory liberalization experiment. Standard deviations of changes in real output relative to the baseline are not significantly different between the discriminatory and nondiscriminatory scenarios in most of the APEC countries / regions. For products with comparative disadvantage, such as agriculture and processed food in Japan and clothing in developed members, the shares of intra-APEC imports are extremely high. Thus, even though these products suffer greater output losses under nondiscriminatory liberalization, additional contractions are relatively small.

4 Conclusions

At the turn of this century, most of the nations bordering the Pacific have embarked upon an ambitious plan for open multilateralism. Although the aggregate benefits from more efficient regional specialization are readily apparent, more detailed adjustment costs *en route* to Pan-Pacific free trade are more difficult to ascertain but unlikely to be negligible in domestic policy agendas. For this reason, implementation of this trade reform agenda can be facilitated by a deeper understanding of these adjustment patterns, including the magnitude and incidence of their economic costs.

In that spirit, this paper has provided general equilibrium estimates of the impact of APEC trade liberalization on real GDP, sectoral output, exports and imports. Compared with the baseline scenario where no trade liberalization is assumed during 2000-2020, real GDP of developed and developing APEC members is predicted to increase by $42 billion and $83 billion, respectively, by the year 2020 while that of non-APEC members would increase by $16 billion. The estimates based on our dynamic CGE model are not forecasts, however. They depend upon the model structure, parameter values, and policy scenarios. The present model does not incorporate such features as scale economies or human capital in the production function. The inclusion of these factors with dynamic specification is likely to result in a substantially larger impact of liberalization.[14] In addition, we have only considered liberalization of merchandise trade and did not include liberalization of service trade or investment in this study. Thus our results may be considered a lower end of the full impact of APEC liberalization.

APEC members submit individual action plans (IAPs) each year, providing their own liberalization and facilitation plans for the short-, medium- and long-term horizons and unilaterally reduces its trade barriers accordingly. However, the implementation of IAPs is non-binding and several member governments are thus reluctant to remove trade barriers on politically sensitive sectors, particular when the domestic economy is experiencing a recession or crisis. Nonetheless, if each government implements an adjustment program, including the training of workers in

14 Francois et al. (1997) show that the welfare gains resulting from the Uruguay Round agreement under increasing returns to scale and monopolistic competition could be almost three times as large as those when constant returns and perfect competition are assumed.

depressed sectors, the social costs of economic transition could be mitigated. Overall, APEC trade liberalization would produce trade expansion in most product categories, especially inexpensive imports at the expense of high-priced domestic products.

Although the assessments of APEC liberalization would be enhanced by extension of our model, as well as by more careful evaluation of IAPs, our results provide some important policy implications. First, despite large disparities in per capita income, nondiscriminatory liberalization promises substantial benefits to the APEC member countries and people in the Pacific Basin. These benefits appear to outweigh the adjustment costs of attaining a higher and more sustainable growth trajectory. Second, while the adjustments may be difficult for some groups, they are necessary if each of the member economies and the region as a whole is to realize its full economic potential. A dynamic economy cannot avoid experiencing structural adjustments, inasmuch as technological innovation and growth-induced changes in consumption and production patterns would require such adjustments. Finally, while APEC liberalization is a good long-term prescription for regional growth, speeding up the process would also be good First Aid for a country such as Indonesia that is still experiencing economic crisis. Economies dealing with both recession and the prospect of globalization should focus their resources on the recovery of export-oriented activities to secure a more sustainable basis for economic recovery and future growth.

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MONETARY COOPERATION IN EAST ASIAN COUNTRIES: A POSSIBILITY FROM MACRO ECONOMIC INDEXES AND INTRA-REGIONAL TRADE DEPENDENCY

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Abstract

This paper analyzes the possibility of currency area in Asia depending on macro-economic indexes and on intra-regional trade dependency, and possibly depending on financial dependency. These will be compared with those in EU.

The next issue will be the process to converge into the currency area in Asia. APEC experience might give us much information about these issues. Not persuasive but voluntary participation of member countries in monetary cooperation and starting from weak cooperation to tighter cooperation will be the style in Asia. However it is not solved yet that gradual set-up of currency area is better or easier than rapid introduction of one common currency.

All our arguments depend on our speculative perspective that one global currency system is the best final stage of international monetary system and this stage will not be in far future. We will discuss the perspective to a global currency area, taking into account of relations with Dollar and Euro and the Asian currency.

JEL classification: F31; F33; O23
Key words: Monetary Cooperation; International Monetary System, ACU, EURO

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1. Introduction

Depending on developments of technology, especially of transportations and telecommunications and more recently of the information technology, a world economy with many countries has rapidly integrated into a global one. International trade of goods is growing faster than GDP growth rates, with trade liberalizations under GATT and WTO. International service trade is also growing, on average, faster than GDP growth rates with deregulation of service trades and of DFI in service sectors.

More impressive globalization has been accomplished by international activities by business firms. DFI among developed countries has integrated segmented markets into one world market. Multinational enterprises form their organizations taking into account of global strategies. DFI into developing countries has facilitated economic development of receiving countries and has pushed internationalization of their domestic markets. The technology developments have made optimum size of markets and of business organizations larger and larger. The economy of scale and the economy of scope have become dominant factors to determine sizes of economic activities. International M&A between large enterprises is common at the end of 20th century (see Table 16 in Appendix).

International capital movements are far more global than goods and service movements. As often pointed out, the capital accounts in the balance of payments are net capital movements flows and values of gross capital flows are much larger than the net values, some times more than hundreds times. An accumulation of financial assets has increased a stock value of international funds and this has been invested in global market. International portfolio selection of the funds is an important business activity in many financial organizations and business enterprises.

Liberalization of capital movements and deregulation of financial sector, these are on going trends in the recent world, which have pressures of forming a global market mechanism. An efficient use of funds is beneficial for both funds holders and funds users, and a global capital market is thought to be more efficient than locally segmented markets. This is true in a stable situation of a global capital market, without market failures. However, it is well known that capital markets are not only always stable but also are not effective in the sense of including market failure. Massive free short-term capital movements are often criticized to be unstable. Actually, speculative short-term capital movements have triggered many

currency crises.

Under these global economic activities and these developments of global markets, it becomes an important issue to design financial architecture, especially a new international monetary system. In this paper, we will discuss a possibility of Asian monetary cooperation as a first step to design a system of one global monetary unit, world money. In the following section, we will discuss formal evaluation of a fixed exchange rate system and a flexible exchange rate system, and will speculate to the better system of the one global money.

In section 3, we will discuss possibilities of Asian, especially East Asian, monetary cooperation, depending on macroeconomic indicators. Final section will be used for making bridge from a system with East Asian monetary cooperation to a system of global money.

2. Fixed rates vs. flexible rates

If a foreign exchange rate is stable in both senses of smaller volatility and of market stability, a risk cover for exchange rate uncertainties will not be difficult or costly. The adjustable peg IMF system after the world war 2nd worked well for two decades to facilitate international transactions, where US$ was convertible to monetary gold and the other countries tried to fix their exchange rates to US$. International capital movements are rather regulated to protect fixed exchange rates.

After the stop of convertibility of US$ to the monetary gold, foreign exchange rates have fluctuated to find appropriate rates. Depreciations of US$ might called for jump up of oil prices in 1970s. International portfolio managements become important under flexible rates. Oil money flows caused debt problems to developing countries. Financial deregulation and liberalization of international capital flows have been promoted. It is not clear whether foreign exchange risk under flexible rates deteriorated international transactions or not, but short-term capital movements, speculating for foreign exchange rates, triggered currency crises. With debt crises and currency crises, people understand that it is necessary to design a stable new international monetary system.

Debate about foreign exchange rate systems, especially between fixed rates and flexible rates, has been continued. Under fixed rates, long-run inflation rates cannot be different among fixing member countries, and even in a short-run, interest rates cannot be different with free capital

mobility. Monetary authority in most member countries must follows obligation to maintain its exchange rate, and thus loses its independence of monetary policy. To maintain fixed exchange rates of N member countries, N-1 effective instruments of N-1 countries are used and remained Nth country is free from an exchange rate policy. The burden of the maintaining exchange rates could be shared with N countries and the member countries can collectively use remained part of their policy for collective targets, such as inflation rates or interest rates. However monetary policy coordination might be difficult with many currencies of member countries.

Although a monetary independence is abandoned in fixed rates, utility or usefulness of each currency will be increased. A stability of value is a most important factor for money to be accepted. With currencies of stable exchange rates, international transactions will be facilitated. Especially international transactions of financial assets in different currencies will be directed to more productive ways than mere reshuffling for capital gains.

Fixed rate system is effective and is efficient when the rates are appropriate levels and are accepted with confidence by many countries. When gold or real goods sustain the value of currency, it become important to stabilize the gold price or the commodity prices. When government authority maintains its currency value without gold or goods, there is no clear foundation for the value. Fixing exchange rates without some foundation is very difficult and monetary cooperation becomes a play on knife-edges. Now we are in the situation that a currency has no backup like gold or some common foundation. A foreign reserve like US $ is not stable in value and it is difficult to accumulate enough amount of reserves against speculative currency attacks.

A flexible exchange rate system is accepted as better system than the adjustable peg system of IMF in 1973. It is expected that exchange rate adjustments work to remove current accounts imbalances and speculations are two ways and are stabilizing. However, it becomes clear that a flexible rate system is not ideal and was selected in the difficult stage before making better system. Without consensus about global system of exchange rates, a flexible rate system is the only way for which major countries, pursuing monetary independence, will accept. Of course, it is possible for some countries to select fixed rates or some mixture system of fixed and flexible rates. In these cases the countries abandon their independence of monetary policy, at least partially.

Flexible rates have exchange risks and an exchange rate overshooting has become one of common feature in currency markets. Speculations are often to be one way and overshooting or bandwagon effects produce unstable situations. Massive short-term capital movements easily produce currency crises. Some times the currency crises accompany financial crises. In spite of these defects, it is considered that a flexible rate system is a better system. This is a only consistent system with a monetary independence, which is thought to be one the most important matter for national sovereignty.

Now the question is whether the monetary independence has large merit or not. Our argument is the merit is not large enough to overcome costs of exchange risks and speculative risks. The merit is rather defensive against bad effects of foreign monetary policies. If a large foreign country takes more inflationary policies or high interest rate policies, an exchange rate fixing country to the foreign currency should accept its policies and must follow the similar domestic policies. To avoid the effects of high inflations or the high interest rates, the latter country should take flexible rates. The point is whether independent inflation rates are important matters or not. One answer for this is, no merit in the long run if quantity theory of money holds. Another answer is that long run economic growth rates will change depending on inflation rates, and an optimum inflation rate might be chosen in each country. In this case, monetary independence has some merit but the next question is whether the optimum inflation rates are very different among countries or not. We need more investigations about this question but we expect that the optimum inflation rates among advanced countries are not much different. Some inflation rate could be accepted among those countries to enjoy advantages of fixed rates.

A monetary independence might be necessary for short run stabilization policies. Interest rates can be different among countries with offsetting capital gains or losses, taking into account of risk factors. The foreign exchange rate movements adjust the capital gains and losses and these are important mechanisms of flexible rates. If an exchange rate is fixed, price movements of financial assets will adjust to produce the same interest rates among exchange rate fixing countries. International profit rates of financial assets should be equalized either through exchange rate adjustments or through asset price adjustments. In the global market of funds there will be no merit of adjustments through foreign exchange rates, which increase exchange risks.

We are now in the position to change the way of thinking to the direction

of constructing new financial architecture of an international monetary system. If both fixed and flexible rate systems are not good and intermediaries of the two are by and large not better, the new system should be the one with global money. An optimum currency area argument, which was originally proposed by R. A. Mundell, is the central issue at this point.

3. Asian monetary cooperation

The experiences of EMU and experiments of Euro have given a confidence to monetary authorities in the world that a monetary cooperation among member countries is not costly burden relative to the merits of usefulness of money. Of course the way to Euro was not straight and the historical experiment has just started. This experiment may confront difficulties, but it should not be fail.

Euro in EU is introduced to compete with Dollar, and there are two currency areas with three economic areas. Asia, one of the economic areas, has no regional common currencies to facilitate regional transactions. The Asian currency & financial crisis has indicated that the crisis might be much smaller if Asia has some regional common currency. Asia depends on Dollar and US did not extend sufficient supports to Asian countries in difficulty. IMF supports had enlarged the size of crisis, which push monetary authorities in those countries to follow international, American in reality, financial standard. Each country wants to defend its own financial system. However, a financial globalization has made it difficult to defend from speculative currency attack by small one country. Without global defense systems, it might be necessary to make regional defense systems. Organizing an Asia currency area and using an Asian common currency will be necessary to defend Asian financial system, we think. At least it will be necessary to investigate the possibilities of the Asian common currency.

To make a currency area, member countries should cooperate to keep a similar inflation rates and similar interest rates. They should coordinate their money supplies to economic growth rates and should keep macro economic indicators to be acceptable among member countries. Another important factor to form currency area is levels of intra-regional transaction or of interdependencies among regional members.

We are now in the position to investigate data of Asian countries

referencing to European data. Macro economic indicators in both regions are as follows.

Table 1 Asia: average annual growth rate in 1980s(1980-89) (%)

	Japan	Korea	China	Indonesia	Malaysia	Philippines	Singapore	Thailand
GDP	3.8	8.0	9.9	5.8	5.7	1.9	7.2	7.1
CPI	2.5	8.1	7.1	9.6	3.6	14.4	2.7	5.7
M1	5.0	16.4	20.6	20.5	10.1	16.5	9.3	11.0
M1-GDP	1.2	8.4	10.7	14.7	4.4	14.6	2.1	3.9

Note : China exclude Hong Kong

Source : IMF, *International Financial Statistics, Yearbook*。

Table 2 Asia: average annual growth rate in 1990s(1990-96) (%)

	Japan	Korea	China	Indonesia	Malaysia	Philippines	Singapore	Thailand
GDP	1.4	7.7	11.6	7.2	8.8	2.8	8.3	8.6
CPI	1.4	6.4	9.5	8.6	3.7	10.7	2.5	5.1
M1	7.4	16.0	25.8	14.3	19.3	16.3	10.3	13.5
M1-GDP	6.0	8.3	14.2	7.1	10.5	13.5	2.0	4.9

Note : China exclude Hong Kong

Source : IMF, *International Financial Statistics, Yearbook*。

Table 3 EU: average annual growth rate in 1980s(1980-89) (%)

	Austria	Belgium	Denmark	France	Germany	Ireland	Italy
GDP	2.09	3.37	1.82	2.28	1.79	3.46	2.38
CPI	3.83	4.72	6.90	7.38	2.91	9.35	11.2
M1	6.60	6.41	12.38	8.06	6.36	7.79	11.15
M1-GDP	4.51	3.04	10.55	5.78	4.57	4.33	8.77

(continued)

	Netherlands	Portugal	Spain	Sweden	U.K.
GDP	1.91	2.73	2.77	2.10	2.43
CPI	2.87	17.67	10.26	8.08	7.32
M1	6.82	19.02	15.90	7.55	5.07
M1-GDP	4.91	16.29	13.13	5.45	2.64

Source : IMF, *International Financial Statistics, Yearbook*。

Table 4 EU: average annual growth rate in 1990s(1990-97) (%)

	Austria	Belgium	Denmark	France	Germany	Ireland	Italy
GDP	2.33	1.69	2.34	1.49	3.52	6.59	1.25
CPI	2.83	2.41	2.10	2.22	2.62	2.38	4.70
M1	7.79	2.81	5.48	2.30	9.84	10.32	5.25
M1-GDP	5.46	1.12	3.14	0.81	6.32	3.73	4.00

(continued)

	Netherlands	Portugal	Spain	Sweden	U.K.
GDP	2.62	2.74	2.02	0.80	1.58
CPI	2.54	6.85	4.76	4.00	4.02
M1	7.38	11.56	7.18	4.79	4.88
M1-GDP	4.76	8.82	5.16	4.00	3.31

Source : IMF, *International Financial Statistics, Yearbook*。

Inflation rates in 1990s are more different among Asian countries in table 2, from 1.4% in Japan and 2.5% in Singapore to 10.7% in Philippines and 9.5% in China, relatively to EU member countries in 1990s. In EU, lowest is 2.1% in Belgium and highest in 6.85% in Portugal. This shows that it is more necessary to unify inflation rates in Asian members. However, if inflation rates of Asia in 1990s are compared to EU data in 1980s, the divergence among Asian members is not much different from the one in EU members. It might be possible to say that Asia is ready to form currency area in near future. The comparison of Table 1 and Table 2 shows that inflation rates in Asian members are stabilizing and moving toward unification, with rapid economic development in this area.

We can find similar results for the indicator "M1 growth rate minus GDP growth rate", and this implies that money supply policies in Asian members are not more divergent relative to those in EU members. Monetary policy coordination among Asian member counties is not unrealistic from our data.

Comparison of lending rates will be possible, using Table 12 and Table 13 in Appendix. In 1994, lending rates in Asia are low in Japan 4.13% and Singapore 5.88% and are high in Indonesia 17.76% and Philippines 15.06%. In EU, low rates are UK 5.96% and Ireland 6.13% and high rates are 27.44 in Greece and 15.01% in Portugal. We cannot say that interest rates are much different among Asian countries, compared with those among EU members.

Table 14 and Table 15 show that general government balance (deficit) indicators are rather better in Asian members relative to those in EU members. This will imply the less restrictions for fiscal policies and smaller costs of lose monetary independences in Asian members are than those in EU members.

Let us turn to the data about intra-regional trade interdependences.

Table 5 Asia members: weight of imports (%)

		Japan	Korea	China	ASEAN	Total
Japan	1980		2.15	3.48	15.1	20.74
	1985		3.18	5.60	14.12	22.90
	1990		4.99	6.05	11.92	22.96
	1996		4.57	12.8	14.05	30.92
Korea	1980	26.55		0.44	6.17	33.71
	1985	24.33		1.44	7.79	33.74
	1990	26.6		0.88	6.90	34.38
	1996	20.88		6.43	7.54	34.85
China	1980	24.61	3.81		7.13	35.55
	1985	30.49	3.64		4.71	38.85
	1990	15.28	2.81		6.85	24.95
	1996	16.63	6.51		9.18	32.32
ASEAN	1980	21.84	1.67	4.41	17.21	45.13
	1985	20.83	2.07	6.90	18.73	48.53
	1990	19.53	3.19	5.24	15.45	43.41
	1996	22.04	4.37	5.30	18.41	50.13

Comment : China include Hong Kong. ASEAN: Indonesia, Malaysia, Philippines, Singapore, Thailand

Source : IMF, *Direction of Trade Statistics, Yearbook*。

Table 6 Asian members: weight of exports (%)

		Japan	Korea	China	ASEAN	Total
Japan	1980		4.13	7.58	10.04	21.76
	1985		4.03	10.77	6.33	21.14
	1990		6.08	6.69	11.47	24.25
	1996		7.15	11.48	17.50	36.13
Korea	1980	17.43		4.72	6.51	28.65
	1985	15.01		5.17	5.02	25.19
	1990	19.44		5.81	7.78	33.04
	1996	12.34		17.48	14.33	44.15
China	1980	13.05	0.60		8.96	22.61
	1985	14.05	0.95		8.23	23.23
	1990	22.61	2.85		11.85	37.30
	1996	16.45	3.15		6.17	25.77
ASEAN	1980	26.80	1.65	4.67	16.71	49.82
	1985	25.53	3.20	5.33	19.02	53.09
	1990	18.43	3.25	6.42	18.14	46.25
	1996	14.16	3.57	9.13	22.27	49.12

Comment : China include Hong Kong. ASEAN: Indonesia, Malaysia, Philippines, Singapore, Thailand

Source : IMF, *Direction of Trade Statistics, Yearbook*。

Table 7 EURO : weight of intra regional exports (Billions of US$)

	Intra-regional exports	Total exports	Weight (%)
1980	298.6	590.6	50.55
1985	262.2	557.6	47.02
1990	652.2	1,207.2	54.03
1995	840.4	1,638.3	51.29
1996	841.0	1,673.6	50.25
1997	822.3	1,680.1	48.94

Comment : EURO 11 members : Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal

Source : IMF, *Direction of Trade Statistics, Yearbook*。

Table 5 and Table 6 show that the trade dependency among Asia members has tremendously increased from 1980 to 1996 and it is now more than 30% of exports and imports is intra members trade. Compared with Table 7, which shows intra regional exports of EURO members is about 50%, Asian members trade interdependency level is not relatively high. However, the

figure in Asia of more than 30% is not small, if we take into accounts that the Asian members form export-oriented area to large markets in EU and US. If the market size of Asia becomes large, with rapid developments in member countries, especially in China and ASEAN, intra regional trade will increase further. The recent movements to make free trade areas in Asia will be good news for this. EURO members' figure of 50% could be discounted if we take into accounts the regional geography of compound area consisting with many small members. In the case of the Asian region, geographical diversities and geographical distances might be another factors to reduce the figure, but these factors will be reduced quickly by technology innovations. The figures of ASEAN about 50 % suggest this. We can find similar relations of indicators in Table 9, Table 10 and Table 11, in Appendix. The coefficient of interdependence in Asia is not high but is catching up gradually to the one of EURO members.

In case of the Asian region, DFI dependences are also important. The trend of DFI was from Japan to Asia NIEs, and this changed to ASEAN and is now to China. In the mean time, Asia NIEs have graduated and started to make DFI to ASEAN and to China. Now ASEAN is not only trying to invite DFI in high-tech industry but also is planning to graduate and to make DFI to China and also to neighbors of ASEAN(See Table8). These DFI network will increase the interdependency among regional members, in trade and in finance. To protect these intra regional relations, it is necessary to have regional financial systems like Asian currency area.

Table 8 Asian Shares of FDI Inflow in Asian Countries (Millions of US$, %)

		Asian (Japan)	Total	Shares (Japan)
Korea	1990	257(236)	803	32.0(29.4)
	1996	1,202(255)	3,203	37.5(7.6)
China	1990	4,440(457)	6,596	67.3(6.9)
	1996	44,111(5,131)	73,276	60.2(7.0)
Thailand	1990	4,827(2,757)	8,182	59.0(33.7)
	1996	9,122(6,156)	13,050	69.9(47.2)
Malaysia	1990	973(657)	2,303	42.3(28.5)
	1996	4,006(1,831)	6,780	59.1(27.0)
Indonesia	1990	4,221(2,241)	8,750	48.2(25.6)
	1996	16,147(7,655)	29,931	53.9(25.6)
Philippines	1990	494(271)	851	58.1(31.8)
	1996	384(58)	967	39.7(6.0)

Note : 1) Asian members include Japan, Korea, China, Hong Kong,

Indonesia, Malaysia, Philippines, Singapore, Thailand

2) Contract Base

Source : JETRO, *White Paper on Foreign Direct Investment,* 1999.

4. For one world money

It is convenient to use domestic currency for international trades and investments. It is US who takes advantages of this and EU is planning to take this advantage at least within Euro members. There is no such country in Asia and Japanese Yen is partially used in trades and in investments in Asia. Transactions of Asian countries mostly depend on US $ and currency crisis and following financial crisis had accompanied Dollar shortages in countries of crisis. If Asian regional money (let us say ACU: Asian Currency Unit) is used in international transactions, effects of currency crisis will be mitigated and will be resolved by cooperative managements of ACU member countries.

A starting point of producing regional currency ACU will be fixing exchange rates of currencies in member countries to ACU and holding ACU reserves. Monetary policy coordination and also government fiscal constraints among member countries should be well planed. We already have the experiences of Euro in EU. The question is whether the Euro procedure is applicable or is the best way for the case of ACU. Here we do not intend to show a scenario to ACU, but we would like to discuss some preliminary conditions for ACU.

In the case of EU and Euro, agreements and contracts among members come first and then efforts for attaining agreed aims are followed. In the case of Asia, agreements and contracts are not strict and members rather want to enjoy contingent flexibilities. The Asian members, chosen here, have different histories and are in different development stages. Therefore strict and persuasive agreements and contracts might not be accepted and APEC type more flexible methods might be preferable. However weak monetary cooperation will call for speculative attacks and thus mitght put the ACU design into null. To construct a currency area, strict cooperation among members should be maintained, we think.

The size of ACU members should be large enough to protect ACU monetary system without non-member supports. This implies that at least Japan, Korea, and China should be included into the members. All three countries have strong government to control domestic financial sectors and

are expected to be leaders of East Asia. Any one of the three could not be a dominant leader, and the three must be core members of ACU system. ASEAN will join to ACU system to get merits of usefulness of their currencies. The roles of Korea and ASEAN as mediators to form ACU will be very important to reduce conflicts for seeking an inside hegemony between China and Japan.

To maintain the system of fixed rates, confidence of local currency values is important. Managements to sustain the system call for strong coordination among monetary authorities of member countries and also call for skilled managers and workers for the system. It might be speculative to jump to the argument for one common currency immediately. However, this is not unreasonable if we agree that costs for sustaining the system of fixed rates with confidence and costs for sustaining the system of one common currency might not be much different. The latter costs will be smaller once the system is established. Anyway, usefulness of money will increase and confidence for system will become strong as experiences of the common currecy system are accumulated.

When ACU is used for intra-Asia transaction, exchange rates between ACU, US$, and Euro might be flexible. However coordination of the three currency regions will mitigate exchange rate fluctuations. Final stage is the one global currency system. Political discussions of struggles for global hegemony might be possible but economic discussions are also necessary for the process to the one global currency system. Without ACU in Asia, Asian countries should take flexible rates (or some variation of flexible rates) or fixed rates to US$ (or Euro). Exchange rate risks and unstable speculations could not be eliminated for Asian local currencies. Situations of good bargains of Asian firms by EU firms and/or US firms might appear, as the situations after the last Asian currency crises. Approaching to the final stage of global money, Asia will have small power without ACU. EU plus US system will become a global standard of an international monetary system at expenses of Asian benefits.

Appendix

Table 9 Asia: coefficient of interdependence (%)

		Korea	China	ASEAN
Japan	1980	0.75	1.06	2.51
	1985	0.81	1.58	1.78
	1990	0.93	0.97	1.78
	1996	0.89	1.61	2.24
Korea	1980		0.27	0.95
	1985		0.49	1.19
	1990		0.85	1.66
	1996		2.28	2.60
China	1980			1.19
	1985			1.15
	1990			2.21
	1996			3.1
ASEAN	1980			6.4
	1985			5.89
	1990			7.81
	1996			10.75

Comment : 1) China include Hong Kong.
2) ASEAN include Indonesia, Malaysia, Philippines, Singapore, Thailand

Source : IMF, *Direction of Trade Statistics, Yearbook*。 *International Financial Statistics, Yearbook*。

Table 10 ASIA : coefficient of interdependence (%)

1980	1985	1990	1992	1994	1996
4.99	5.43	5.74	6.14	6.74	7.87

Comment : Asian members include Japan, Korea, China, Hong Kong, Indonesia, Malaysia, Philippines, Singapore, Thailand

Source : IMF, *Direction of Trade Statistics, Yearbook*。 *International Financial Statistics, Yearbook*。

Table 11 EURO members: coefficient of interdependence (%)

	EURO members	EU members
1980	11.52	12.58
1985	12.76	14.32
1990	12.60	13.91
1996	12.1	13.71
1997	12.95	14.51

Comment : EURO 11 members: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal
EU members: EURO members, Greece, Spain, Sweden, United Kingdom
Source : IMF, *Direction of Trade Statistics, Yearbook*。 *International Financial Statistics, Yearbook*。

Table 12 Asia:Lending Rate (End of Period) (%)

	1980	1985	1990	1992	1994	1996
Japan	8.35	6.6	6.95	6.15	4.13	2.66
Korea	18.0	10.0	9.36	10.0	8.5	8.84
China	5.04	7.92	9.36	8.64	10.98	10.8
Indonesia	-	21.49	20.83	24.03	17.76	19.22
Malaysia	7.75	11.54	7.17	9.31	7.61	8.89
Philippines	14.0	28.61	24.12	19.48	15.06	14.84
Singapore	11.72	7.93	7.36	5.95	5.88	6.26
Thailand	16.15	16.08	14.42	12.17	10.9	13.4

Source : IMF, *International Financial Statistics, Yearbook*。

Table 13 EU: Lending Rate (End of Period) (%)

	1980	1985	1990	1992	1994	1996
Belgium	12.54	13	13	9.42	7.17	7.06
Luxembourg	8.75	8.23	8.75	6.58	5.5	5.5
Demark	14.7	14.1	11.8	10	8.7	7.7
Finland	10.41	11.62	12.14	7.91	6.16	5.29
France	11.13	10.49	10	7.89	6.77	6.34
Germany	9.53	11.59	13.59	11.48	10.02	9.13
Ireland	12.44	11.29	12.66	6.13	5.85	6.57
Italy	18.06	14.09	15.76	11.22	12.06	9.75
Netherlands	9.25	11.75	12.75	8.29	5.9	6.13
Portugal	27.29	21.78	20.43	15.01	11.73	9.15
Greece	20.05	27.62	28.71	27.44	20.95	18.92
Spain	13.52	16.01	14.23	8.95	8.5	6.08
Sweden	16.89	16.69	15.2	10.64	7.38	7.01
UK	12.33	14.75	9.42	5.48	5.96	6.58

Source : IMF, *International Financial Statistics, Yearbook*。

Table 14 Asia: General Government Balance (as % of GDP)

	1980	1985	1990	1994	1996
Japan	-7.0	-4.9	-1.6	-3.1	-4.3
Korea	-2.2	-1.1	0.4	0.6	0.45
China	-1.5	0.0	-0.8	-1.2	-0.8
Hong Kong	2.7	1.0	0.7	1.1	1.3
Indonesia	-.2.4	-1.0	0.4	1.0	1.2
Malaysia	-13.3	-7.4	-4.8	2.4	0.7
Philippines	-1.4	-2.0	-3.5	1.1	0.3
Singapore	2.1	2.1	2.7	8.4	6.7
Thailand	-6.4	-5.2	4.7	1.8	2.2

Source: EPA(Japan): *Asian Economy* (Ajia Keizai), 1998。

Table 15 EU: General Government Balance (as % of GDP)

	Austria	Belgium	Denmark	France	Germany	Ireland	Italy
1990	-2.4	-5.5	-1.5	-1.6	-2.1	-2.3	-11.0
1995	-5.1	-4.0	-2.4	-4.9	-3.3	-2.1	-7.7
1996	-3.7	-3.1	-0.9	-4.1	-3.4	-0.3	-6.6
1997	-1.9	-1.9	0.4	-3.0	-2.7	1.1	-2.7

(continued)

	Netherlands	Portugal	Greece	Spain	Sweden	U.K.
1990	-5.1	-5.1	-16.1	-4.1	4.2	-0.9
1995	-4.0	-5.7	-10.9	-7.1	-7.0	-5.7
1996	-2.0	-3.3	-7.5	-4.5	-3.5	-4.4
1997	-0.9	-2.5	-3.9	-2.6	-0.7	-1.9

Source: European Commission, *European Economy,* No, 65, 1998. No.4, 1999.

Table 16 Cross border M&A (Millions of US$,%)

		1990	1995	1996	1997(Growth Rate)
Buy base	World	159,959	237,184	274,611	341,653(24.4)
	EU	90,967	98,725	114,316	127,787(11.8)
	America	21,691	65,580	65,346	81,442(24.6)
	Japan	25,133	16,963	12,573	11,710(-6.9)
	East Asia	4,792	19,175	21,713	27,732(27.7)
Sell base	World	159,959	237,184	274,611	341,653(24.4)
	EU	60,320	74,812	76,772	133,621(74.0)
	America	54,297	62,903	70,921	65,151(-8.1)
	Japan	102	1,573	4,780	1,053(-78.0)
	East Asia	8,846	25,475	35,159	31,787(-9.6)

Source : UNCTAD, *World Investment Report* , 2000.

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DISCRETIONARY ACCRUAL MODELS AND THE ACCOUNTING PROCESS

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Abstract

This paper introduces a discretionary accrual model based on the accounting process developed by Dechow, Kothari and Watts (1998). Our model tries to prevent a big proportion of nondiscretionary accruals from being judged as discretionary. Using data from the Japanese stock market, we find that our model fits accruals much better than versions based on Jones (1991). Evidence in this paper shows that our model may modify the findings of previous research in two areas: 1) studies that use the versions of Jones model to detect earnings management and 2) studies that analyze the relation between discretionary accruals and future performance or the relation between discretionary accruals and stock returns.

JEL classification: M40
Keywords: Cash flows; Accounting process; Discretionary accruals; Earnings management; Managerial discretion.

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1.Introduction

Several studies indicate that earnings contain more information than rather primitive constructs like operating cash flows. That is, the correlation between earnings and contemporaneous or future stock returns and the correlation between earnings and future performance are higher than the correlation between cash flows from operations and these variables. Such improvement in information content is obtained by the use of accruals. The explanation behind this is that accruals reduce the problems of timing in measuring cash flows over short intervals (Dechow 1994). In this sense, accruals contain the accounting adjustments necessary to cancel variations related to the operating cash cycle. Nevertheless, since GAAP allows certain discretion in reporting accounting numbers, there is a possibility that accruals contain management's expectations about future cash flows and/or management's intention to manipulate information.

There have been several attempts to separate the nondiscretionary and discretionary part of accruals. Among them, we find the early works of DeAngelo (1986), Healy (1985) and Jones (1991). However, these models ignore the relation between cash flows and accruals reported in Dechow (1994), so some nondiscretionary accruals are misclassified as discretionary causing a misspecification of these models.[1]

This paper introduces a discretionary accrual model based on the accounting process. To do this, we model the short-term (working capital) part and the long-term part of accruals. Our starting point for the working capital accruals is in the work of Dechow, Kothari and Watts (1998), in which they present a model that explains the serial and cross-correlations of accruals, cash flows, and earnings. The latter part is assumed to follow a random walk. By combining them, we get a model that resembles the accounting process much better than the Jones model and modifications of the Jones model including cash flows. Statistical tests indicate that our model outperforms the two models, and that the Jones model is miss-specified because it assigns most of the information content of total accruals to the discretionary part. This occurs despite the fact that cash flows can explain most of accruals' behavior.

As Bernard and Skinner (1996) point out, this miss-classification causes

1 Recent papers, such as Subramanyam (1996), Chaney, Jeter and Lewis (1998) and Jeter and Shivakumar (1999) add a cash flow term to the Jones model in an initial attempt to consider such relationship, and thus reduce this misspecification.

problems for empirical tests. In tests of earnings management, it can cause the researcher to find manipulation when it does not exist (or not to find manipulation when it exists); while in tests of the information content of discretionary accruals, it affects conclusions we can draw because the role of discretionary accruals could appear to be larger than the role of nondiscretionary accruals. When we explore these possibilities and use tests similar to Dechow, Sloan and Sweeney (1995), we find that our model has more power to detect earnings management than the other models and that the variable used to measure performance has a strong effect in tests of earnings management. To examine the information content of discretionary accruals once the relation between accruals and cash flows is considered, we replicate part of the tests presented in Chaney, Jeter and Lewis (1998) and Subramanyam (1996). These studies report a strong role of discretionary accruals, yet we measure the degree to which the reported results originate from the inaccuracy of the Jones model. In general, we find that the importance of discretionary accruals is reduced for our model and other model using cash flows compared to results obtained with the Jones model. We report, however, that despite the stronger role of nondiscretionary accruals, discretionary accruals remain statistically significant in our tests. In fact, results suggest that management might be communicating to the stock market part of its private knowledge about the firm's future performance by the use of discretion in accruals accounting. Nonetheless, even though our model does a good job to capture the accounting process, it does not consider some structural changes identified in Hansen (1999). Therefore, the possibility that some nondiscretionary accruals are incorrectly classified as managerial discretion still remains.

This paper contributes to current research in several ways: 1) It introduces a discretionary accrual model which captures the relation between cash flows and accruals better than previous models. 2) It provides evidence that the Jones' (1991) model miss-classifies nondiscretionary accruals as discretionary, and shows the problems this misspecification causes. 3) It provides international evidence of the relevance of accruals accounting in an important market such as the Japanese stock market, allowing comparison to previous reports in the U.S.

The paper is organized as follows. Section 2 describes the data used in our tests and the variable definitions. Section 3 introduces a discretionary accrual model that tries to mimic the accounting process. Section 4 shows the statistical properties of discretionary and nondiscretionary accruals

obtained under the different models. Section 5 analyzes the models' ability to detect earnings management. Section 6 uses the models to analyze income smoothing, and Section 7 concludes.

2.Research design

This paper uses data from the Japanese stock market to analyze discretionary accrual models. In this section, we establish the definition of accruals based on the Japanese accounting system, and we describe the data used in this study.

2.1 Accruals in Japan

This paper considers the accounting differences between U.S and Japan; therefore, our definition for accruals differs from the definition commonly used in the U.S. The main difference arises from the existence of special reserve accounts. That is, the Japanese tax code allows firms to set aside funds each year against future contingencies. These include reserves against product returns, repairs, payments on guarantees, losses due to doubtful accounts, and payment of retirement benefits (see French and Poterba (1991)). Japanese firms can use these reserve accounts as an additional way to smooth income. The earnings components are defined as follows. The item numbers of the Japanese Development Bank (Kaigin) database are in parentheses.

Net income (NI) (293)

Earnings before extraordinary items (EBEI)

$$= NI - \text{gain from EI (245)} + \text{loss from EI (257)}$$

Total accruals (TA)

$$= \text{Short-term (working capital) accruals} + \text{Long-term accruals}$$

Short-term (working capital) accruals (STA)

$$= (\Delta CA - \Delta Cash) - (\Delta CL - \Delta FI)$$

Long-term accruals (LTA) $= -Dep - \Delta Allow$

where

ΔCA	= change in current assets (1)
$\Delta Cash$	= change in cash and cash equivalents (2)
ΔCL	= change in current liabilities (77)
ΔFI	= change in financing items (82,83,84,85,86)

Dep = amount of depreciation not considered in inventory[2] (402-342*(12+13+14)/349)

ΔAllow = change in allowances (122,123,124,125,126)

and cash flow from operations (CFO) = EBEI − TA.

We scale all our variables by lagged total assets. We report that in preliminary tests that measure the predictability of EBEI or CFO, the use of lagged total assets as a deflator yields more stable variables than the use of lagged stock prices or lagged book equity. Thus, we choose lagged assets as the deflator in this study.

2.2 Sample

Our sample consists of all non-financial firms listed in the first section of the Tokyo Stock Exchange (TSE) for which all required data are available. For stock returns, we use the Japanese Securities Research Institute database. All accounting information is taken from the Japanese Development Bank (Kaigin) database. We have a maximum of 1,214 firms in 1995 and a minimum of 343 in 1962. Original accounting database consists of 33,193 firm-years, out of which 26,365 returns data are available.

2.3 Descriptive statistics

Table 1 reports descriptive information about the variables. Earnings before extraordinary items (EBEI) are positive in 90 percent of the sample, while cash flow from operations (CFO) are positive 81 percent of the time.

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2 This definition subtracts the depreciation cost allocated to the inventory assets remaining at the end of the period from the total amount of depreciation (402). Since STA includes the increment in the inventory assets manufactured in the current year and these assets have a part of the depreciation cost of the manufacturing plants, a double counting problem arises. We thank Isao Nakano for bringing to our attention this problem. To estimate the fraction of depreciation that is double counted, we first assume that the first-in first-out method is followed, then we calculate a ratio of inventory assets (12+13+14) over the totalmanufacturing cost (349) (called Ψ) and finally, we multiply it by the depreciation amount used in the production cost (342). We report that across all the firm-years, the average (median) value of Ψ is 0.17 (0.13). For those firm-years with Ψ above 1, we limit this value to 1. Nevertheless, we report that considering the double counting problem does not affect our overall conclusions. We find that when we neglect the problem (assuming Ψ is equal to zero) or when we assume that Ψ is equal to 1, results are very similar to those shown in this paper. Results are available from the authors on request.

The average autocorrelation of EBEI is 0.59, much higher than the autocorrelations of cash flows (CFO) (0.09). Long-term accruals (LTA) are positive only 1 percent of the time and have an autocorrelation of 0.53. On the contrary, short-term (working capital) (STA) accruals are positive about 60 percent of the time but their autocorrelation is −0.05. Yearly returns are positive 60 percent of the time and have a high variability. For the estimation of accrual models, which is done with data from 1962 to 1995, we limit our sample to those firms having a minimum of five years of financial data and to those industries having at least six or more companies.[3] To reduce the effect of extreme observations, we remove all observations having total accruals or cash flows (lagged by total assets) with an absolute value above 1, and those with stock returns that are more than 4 standard deviations away from their mean. These restrictions and the estimation of models cause a decrease of usable observations and thus our sample is reduced to 32,304 company-years. We use these data to compare discretionary accrual models in the next sections.

Table 1

Descriptive statistics

Variable	Mean	Median	Stdev	Max	MIn	%positive	Autocorrelation
EBEI	0.029	0.024	0.038	1.63	-0.52	90	0.59
CFO	0.053	0.051	0.082	1.47	-2.97	81	0.09
TA	-0.024	-0.025	0.073	2.98	-1.08	31	0.00
LTA	-0.036	-0.030	0.030	0.31	-0.86	1	0.53
STA	0.011	0.007	0.066	3.00	-1.05	58	-0.05
Return	0.135	0.062	0.424	9.04	-0.90	60	

Our sample corresponds to all non-financial firms listed in the Tokyo Stock Exchange during the period 1962-1995 for which five (or more) consecutive years of data are available. Original accounting database consists of 33,193 firm-years, out of which 26,365 returns data are available. All accounting variables are scaled by lagged total assets. Returns refer to cumulative annual stock returns measured from July of year t to June of year t+1.

3 We use the 33-industry classification established by the TSE.

3.The accounting process and discretionary accrual models

3.1 The origin of the explanatory power of accruals

In a recent paper, Dechow (1994) elaborates on the information contained in accounting accruals. She shows that cash flows have timing and matching problems that cause them to be a 'noisy' measure of firm performance.[4] Since accounting accruals are designed to diminish such problems, they will improve earnings' ability to reflect firm performance. In her paper, she reports evidence that earnings are more associated with stock returns than realized cash flows.

When we test this assertion using Japanese data, we also find that accruals increase the explanatory power of cash flows. In a regression of next year cash flows, adding the accruals variable to a univariate regression on cash flows increases the average R^2 from 0.107 to 0.145 (see Table 2). For future earnings, the increase in R^2 is 0.428, from 0.158 to 0.586. When we test the explanatory power of accruals on stock returns, average R^2 goes from 0.024 to 0.048 for contemporaneous returns and from 0.006 to 0.029 for future returns. This evidence is consistent with the high information content of accounting accruals.

Table 2

Information content of total accruals

Avg. R^2 for different specifications

	Explanatory variables	
Dependent variable	CFO_t	CFO_t, TA_t
Next year cash flows	0.107	0.145
Next year earning	0.158	0.586
Contemporaneous returns	0.024	0.048
Future returns	0.006	0.029

We report the average R^2 of 34 yearly cross-sectional regressions using univariate regressions of CFO (cash flows from operations) and multivariate regressions with

4 Timing refers to the revenue recognition principle, requiring firms to recognize revenues when a firm has performed all, or a substantial portion of services to be provided and cash receipt is reasonably certain. Matching refers to the principle requiring cash outflows associated with revenues to be expensed in the period in which the firm recognizes the revenue.

CFO and total accruals (TA). Four different dependent variables are used: Contemporaneous stock returns, next year cash flows and earnings and future stock returns. The sample includes all non-financial firms listed in the first section of the Tokyo Stock Exchange with at least 5 consecutive years of data. All extreme data for cash flows and total accruals were excluded from the sample and the resulting number of firm-years is 32,304 for regressions using accounting variables. The number of firm-years samples in regressions using stock returns is 26,117. The period starts in 1962 and ends in 1995. Contemporaneous returns are compounded for 12 months starting three months after the fiscal year end of year t-1. Future returns are compounded for 12 months starting three months after the fiscal year end of year t. Returns are measured in excess of an equally weighted index of all firms in the first section of TSE.

Yet, the origin of this high explanatory power cannot be clearly determined. One source of the high information content of accruals is, without a doubt, the accounting process itself. However, since GAAP allows certain discretion to report accounting accruals, there is a possibility that accruals contain management's expectations about future cash flows or management's intention to manipulate information. Several discretionary accrual models have appeared with the purpose of separating these two sources of explanatory power. Among them, we find the works of DeAngelo (1986), Healy (1985) and Jones (1991).[5] DeAngelo defines the nondiscretionary part of accruals as last year's value of total accruals, Healy uses the average of past total accruals, and Jones models them as a function of changes in sales and the level of equipment. Even though the Jones model and the modified version proposed by Dechow, Sloan and Sweeney (DSS (1995)) are recognized as the best alternatives, it has been reported that even those models have problems to separate the discretionary and nondiscretionary parts of accruals (see DSS (1995) and Guay, Kothari and Watts (GKW 1996)).[6]

5 Most of the early models are developed with the intention to determine whether management manipulated earnings in a specific point in time. Such studies assume certain behavior of nondiscretionary accruals, estimate the discretionary part of accruals as the error obtained by their model, and test for earnings management in a sample of firms where management is supposed to have an incentive to manipulate accounting reports.

6 In addition to the models of Healy (1985), DeAngelo (1986) and Jones (1991), GKW study the industry model proposed by Dechow and Sloan (1991), and the modified version of the Jones model. A comparison of discretionary accrual models applied to the UK is found in Young (1999).

Nevertheless, if the discretionary accrual model is misspecified and incorrectly classifies nondiscretionary accruals as discretionary, then this misclassification will cause problems in empirical tests. In tests of earnings management, it will cause the researcher to find manipulation when it does not exist (and vice versa), while in tests of the role of discretionary accruals, it will affect the conclusions we can draw because the relative information content of discretionary accruals (managerial discretion) appears to be larger than the relative information content of the nondiscretionary accruals (accounting process) (see Bernard and Skinner (1996)).[7] We consider that the weaknesses of the current discretionary accrual models are important enough to be examined, and that their correction may lead to more trustworthy conclusions in earnings management studies and to more reliable inferences for studies analyzing managerial discretion. The next subsections present our approach to model nondiscretionary accruals.

3.2 Accounting process and discretionary accrual models

If the main objective of accruals is to mitigate timing and matching problems in cash flows, then it is natural to find a relation between cash flows and accruals. Dechow (1994) reports that the correlation between changes in cash flows and changes in total accruals is strong, −0.55 for annual intervals and −0.88 for quarterly intervals. Using Japanese data, we also find a strong relation of −0.96 between changes in cash flows and total accruals for annual intervals. This empirical evidence suggests a close relation between accruals and cash flows. Yet a logical explanation for this relation was not available until DKW (1998) presented a model of the accounting process and explained how operating cash flow forecasts are incorporated in earnings. Dechow, Kothari and Watts (1998) model the relation between earnings, cash flows and working capital accruals and report that the properties of accruals make earnings a better predictor of future performance (measured by cash flows) than current cash flows. They explain why there is a negative serial correlation in changes in cash flow from operations and show how the accounting process offsets the negative correlation to produce smoother earnings series. This part of their

7 In a similar line, Hansen (1999) argues that structural changes (such as acquisitions or capital changes, etc.) constitute normal business practices, yet discretionary accrual models tend to attribute such changes to managerial discretion.

work indicates that one part of accruals can be explained by the behavior of cash flows. In fact, when DSS (1995) and GKW (1996) analyzed discretionary accrual models, both studies state that the problems of the evaluated models may derive from ignoring the time series properties and correlation structure of accruals and cash flows. Other studies, based on DSS (1995) and the evidence shown by Dechow (1994), have already tried to consider the relation between accruals and cash flows. Subramanyam (1996), and Chaney, Jeter and Lewis (1998) report using an extension of the Jones model where cash flow terms (or dummies controlling for the cash flow level) are added to the original equation.[8] These modifications represent a first attempt to incorporate cash flows to the modeling of nondiscretionary accruals. However, we consider this intuitive approach is insufficient to capture the accounting process described in DKW (1998), because DKW's model is based on the internal process taken by a firm to absorb a shock in sales, such as changes in the credit terms of sales, inventory adjustments, or modifications of the credit terms on purchases, and cannot be explained adding only the level of current cash flows to the Jones model.

3.3 The model

To introduce our discretionary accrual model, we start from the basic decomposition of accruals: short-term (working capital) accruals (STA) and long-term accruals (LTA). Since managers can exercise discretion on both components, we model the nondiscretionary part of each of them, and add it to get our estimate of total accruals (TA):

$$E\,[TA_{it}] = E\,[STA_{it}] + E\,[LTA_{it}]. \qquad (1)$$

To derive our estimate of short-term accruals, we consider the model presented in DKW (1998), which represents the accounting process by which cash flow forecasts are incorporated into earnings. Assuming that the only accruals are accounts receivable and payable and inventory, DKW were able to establish the contemporaneous correlation, between accrual

8 The reason for introducing this model in their reports is to check the robustness of their results against the possibility that the Jones model does not capture the relation between cash flows and accruals. Nevertheless, they do not evaluate the model's ability to separate the nondiscretionary and discretionary part of accruals. On the contrary, Jeter and Shivakumar (1999) report that their model, based on a cash flow specification, has a greater power in detecting earnings management than the Jones model.

changes, ΔA_t, and cash flow changes ΔCF_t as:

$$\rho\ \Delta A_t\ \Delta\ CF_t = (\pi\text{-}2\delta) / [2(\pi^2\text{-}2\,\delta\pi + 2\,\delta^2)]^{0.5}. \qquad (2)$$

Eq. (2) (which corresponds to equation 18 in DKW (1998))[9] indicates that the correlation coefficient ρ, is a function of the profit margin π and the expected operating cash cycle δ (expressed as a fraction of a year).

Considering that DKW's definition of accruals includes only short-term accruals, and assuming a linear relation for Eq. (2), we can get:

$$\Delta STA_{it} = \alpha_i + K_i\ \Delta CF_{it} + u_{it}, \qquad (3)$$

where the expected value for K_i equals the right hand side of Eq. (2) multiplied by the ratio of the standard deviation of short-term accruals $\sigma(\Delta STA_{it})$ over the standard deviation of cash flows $\sigma(\Delta CF_{it})$.[10] By separating the change (first difference) of accruals into levels we get:

$$STA_{it} = \alpha_i + STA_{it-1} + K_i \Delta CF_{it} + u_{it}, \qquad (4)$$

which shows that short-term accruals at time t depend on the parameter K, on the change of cash flows, on the value of accruals at time t-1, and on a constant term.

To empirically estimate accruals based on Eq. (4), we assume that the parameter K is similar among firms in the same industry for a particular year. However, since estimation of Eq. (4) is repeated for diverse industries, we allow the coefficient of lagged accruals to differ from 1 and use the following expression as our model to estimate STA:

$$STA_{it} = \phi_{0s} + \phi_{1s}\ STA_{it-1} + \phi_{2s}\ \Delta CF_{it} + \theta_{it}. \qquad (5)$$

To model long-term accruals, we assume they follow a random walk:

$$LTA_{it} = LTA_{it-1} + \omega_{it}. \qquad (6)$$

We obtain our nondiscretionary accruals model by combining equations (5) and (6) to get

$$TA_{it}/A_{it-1} = \phi_0\ [1/A_{it-1}] + \phi_{1s}\ [STA_{it-1}/A_{it-1}] + \phi_{11}\ [LTA_{it-1}/A_{it-1}]$$
$$+ \phi_2\ [(CF_{it}\text{-}CF_{it-1})/A_{it-1}] + \varepsilon_{it}. \qquad (7)$$

9 This expression is taken from equation 18 in DKW (1988), but it corrects for the misprint in p. 142.

10 This property follows from the definition of correlation coefficient and the definition of slope.

We call Eq. (7) the accounting process (AP) model because it is designed to reflect the cross-correlations between earnings, accruals and cash flows as well as their serial properties, which arise naturally from applying GAAP. For simplicity, we assume that the covariance between ω_{it} and θ_{it} is zero. Similar to Jones (1991), we divide all the terms in the equation by lagged total assets to control for heteroscedasticity.

This model is flexible because it can be simplified or extended depending on the assumptions made by the researcher. For example, Eq. (6) can be reduced to a constant if long-term accruals contain only depreciation.[11] The AP model represents our first attempt to consider the serial and cross-correlations of accruals and cash flows with the purpose of estimating nondiscretionary accruals. We recognize, however, that our model does not consider structural changes that do not modify current cash flows from operations, which leaves the possibility that some nondiscretionary accruals will be incorrectly labeled as discretionary (see Hansen (1999)).

3.4 Estimation of the competing models

Given that the AP model differs from previous discretionary accrual models, we must provide a basis of comparison for evaluating our model. To do it, we choose the modification of the Jones (1991) model done by DSS (1995). Actually, most of the current studies on income smoothing and earnings management use either the Jones model or this modification.[12] Since the results obtained with the Jones and modified Jones models are qualitatively similar in nature, in the remaining of the paper we only report results for the modified Jones model.[13] The empirical specification for this

11 We report that variations of Eq. (7) in which the change of cash flows is separated into current and lagged cash flows, or in which the coefficient of lagged accruals is forced to be equal to 1, yield results very similar to those obtained with Eq. (7) and that our conclusions remain the same. Results are available from the authors on request.

12 A small list includes Subramanyam (1996), DeFond and Park (1997), Hunt, Moyer and Shevlin (1997), Chaney, Jeter and Lewis (1998) who analyze income smoothing using large samples of firms and DeFond and Subramanyam (1998) who study the tendency of income smoothing in specific samples. In the Japanese market, earnings management research is also based on the Jones or the modified Jones models. Some examples include Kunimura, Kato and Yoshida (1998), who study earnings management in the banking industry, Okumura (1997) who studies the electric utilities, and Nakajo (1998) who studies distressed companies.

13 Our choice to report DSS version instead of the original Jones model is based on the better fit obtained in the estimation of nondiscretionary accruals.

model is:

$$TA_{it}/A_{t-1} = a_t [1/A_{t-1}] + b_t [\Delta REV_{it}/A_{it-1} - \Delta REC_{it}/A_{it-1}] + c_t [PPE_{it}/A_{it-1}] + \varepsilon_{it}. \quad (8)$$

where REV is revenue, REC refers to net receivables and PPE indicates gross property plant and equipment.

As an alternative model, we also study a version of the Jones' model used by Subramanyam (1996) and by Chaney, Jeter, and Lewis (1998) that adds CFO as explanatory variable:

$$TA_{it}/A_{t-1} = a_t [1/A_{it-1}] + b_t [\Delta REV_{it}/A_{it-1}] + c_t [PPE_{it}/A_{it-1}] + d_t [CFO/A_{it-1}] + \varepsilon_{it}. \quad (9)$$

This model represents an initial attempt to consider the relation between accruals and cash flows, so it is a natural rival to our AP model. For the remaining of the paper we refer to Eq. (9) as the Jones-CF model.

In earlier studies, discretionary accrual models are estimated firm by firm using time series data until time *t-1* and predicting values of accruals for time *t* (following Jones (1991)). However, this estimation method requires assuming stability of coefficients. DeFond and Jiambalvo (1994) propose a cross-sectional estimation method that avoids this assumption and reduces the likelihood of the model being misspecified due to non-stationarity. With this method, the models are estimated separately for each combination of industry classification and calendar year.[14] Similar to Subramanyam (1996), who estimates four combinations of the Jones model and reports several advantages for the cross-sectional estimation method including a larger sample and more precise estimates, we also compare the cross-sectional version against the time series versions of the models using Japanese data. Our results are similar to Subramanyam (1996)[15] and

14 Estimation of the AP model with the cross-sectional version implicitly assumes that the profit margin, and the operating cash flow cycle do not vary among firms with the same industry classification.

15 Preliminary tests, not shown, indicate that the cross-sectional versions of the models are better specified than the time series versions. They have less variability in the estimated coefficients and their estimates are superior to explain contemporaneous returns than the time-series versions. Additionally, the cross-sectional versions of the models yield better results when used to explain future performance and future stock returns. Other advantage is that the use of cross-sectional versions increases the number of observations available for estimation. This suggests that the superiority of the cross-sectional method is not particular to a data set.

therefore, we choose the cross-sectional over the time-series estimation method. All the results reported in the next sections correspond to results obtained with the cross-sectional method. Nondiscretionary accruals (NDA) are defined as the fitted values of the model and discretionary accruals (DA) correspond to the residuals. The combination of cash flows and nondiscretionary accruals is known as nondiscretionary income (NDNI) and is used as a benchmark between cash flows (CFO) and earnings before extraordinary items (EBEI).

4.Properties of discretionary and nondiscretionary accruals under the different models

This section presents a comparison of the statistical properties of nondiscretionary income, nondiscretionary and discretionary accruals obtained under the three competing models. The assessment is based on several criteria, which include the distribution of discretionary and nondiscretionary accruals, the correlation structure and autocorrelation patterns of earnings components, and the predictability of future performance.

4.1 Basic properties

Panel A of Table 3 shows the mean, the standard deviation, and the average of the absolute values of discretionary and nondiscretionary accruals calculated for the three competing models. When we compare the standard deviation of DA and NDA, we see that the modified Jones model does not capture the variability of total accruals and leaves most of it to the discretionary part, (the standard deviation of DA obtained with the modified Jones model is 0.053). On the contrary, the Jones CF and AP models do a better job at capturing the variability of accruals with standard deviations for DA of 0.020 and 0.016 respectively. The superior fit of the AP model can also be seen by comparing the averages of the absolute values of DA and NDA estimated by the competing models. The average of absolute value of NDA estimated with the modified Jones model is smaller than that estimated with the other two models. Similarly, the average of absolute values of DA estimated with the modified Jones model is more than double the value obtained by the models containing cash flows.

Table 3

Comparison of discretionary accrual models

Panel A: Distribution of DA and NDA

	M Jones	*Jones-CF*	*AP*
Average of DA	0.003	0.003	0.000
Standard deviation of DA	0.053	0.020	0.016
Average of absolute value of DA	0.040	0.018	0.012
Average of NDA	-0.026	-0.025	-0.023
Standard deviation of NDA	0.029	0.053	0.055
Average of absolute value of NDA	0.034	0.050	0.051

Panel B: Cross-sectional average of firm-specific contemporaneous correlation

		CFO	TA	NDNI	NDA	DA
EBEI	*M Jones*	0.35	0.02	0.32	-0.13	0.10
	Jones-CF			0.62	-0.16	0.43
	AP			0.71	-0.10	0.38
CFO	*M Jones*		-0.90	0.87	-0.41	-0.73
	Jones-CF			0.59	-0.93	-0.23
	AP			0.44	-0.92	-0.10
TA	*M Jones*			-0.77	0.40	0.84
	Jones-CF			-0.37	0.93	0.46
	AP			-0.18	0.95	0.28
NDNI	*M Jones*				0.03	-0.88
	Jones-CF				-0.30	-0.35
	AP				-0.10	-0.30
NDA	*M Jones*					-0.09
	Jones-CF					0.13
	AP					0.00

Three discretionary accrual models are estimated using the cross-sectional estimation method, and the resulting properties are compared. All firms in an industry are regressed year by year. Industries with less than six firms are discarded. The models analyzed include modified Jones, Jones-CF, and the AP model.

Panel A shows statistical properties of discretionary accruals (DA) and nondiscretionary accruals (NDA). Panel B shows the cross-sectional average of the contemporaneous correlation between earnings before extraordinary items (EBEI), cash flow from operations (CFO), nondiscretionary income (NDNI), DA, NDA and total accruals (TA) for 1,214 firms.

Panel A shows a big difference between the accruals estimated with the modified Jones model and the accruals obtained with models containing cash flows. We explore this difference with the use of Panel B. In this panel we show the average contemporaneous correlations between earnings, cash flows, nondiscretionary income (NDNI), total accruals (TA), nondiscretionary accruals (NDNI) and discretionary accruals (DA) obtained under the competing models. We estimate contemporaneous correlations using the time series of data for each firm and report the mean for the cross-section of firms. The differences between the modified Jones model and models containing cash flows are considerable. First, consistent with the evidence in panel A, we observe a very high correlation between TA and DA, and a low correlation between TA and NDA for the modified Jones model, while for the AP and Jones-CF models, the correlation between TA and NDA is higher than the correlation between TA and DA. Second, when we analyze the negative correlation between CFO and TA we see that the discretionary accrual models capture this relation differently. Though the negative relation between TA and CFO is absorbed by NDA in the AP and Jones-CF models, the relation between TA and CFO is left for the discretionary part in the modified Jones model.

4.2 Income smoothing

This section analyzes the time series properties of earnings components to examine earnings smoothing. DKW suggest that the accounting process works to smooth cash flow variations, yet results reported in Subramanyam (1996) suggest that managerial discretion is the source of smooth earnings. Table 4 shows evidence of income smoothing and compares the effect of nondiscretionary accruals for the three competing models.

Panel A of Table 4 presents the cross-sectional mean and median values of firm-specific means and standard deviation for several performance variables. We report this characteristic for earnings, cash flows and the 3 estimates of nondiscretionary earnings obtained from the competing models. The mean (median) standard deviation for cash flows is 0.064 (0.056). For earnings, this value is 0.025 (0.021). When we analyze the time series of nondiscretionary income, we see the values of standard deviation differ greatly among models. The standard deviation obtained for the NDNI estimated with the modified Jones model is slightly lower than the

variability of CFO with a mean (median) of 0.057 (0.051). On the contrary, NDNI estimated using the AP or the Jones-CF models has smaller variability than earnings with a mean of 0.023 for the two models. The fact that these two models generate estimates of nondiscretionary income smoother than earnings suggests that the negative relation between NDA and CFO is the main cause of smooth earnings. Furthermore, because the addition of DA to NDNI increases the variability of income, discretionary accruals can be considered noise to the accounting process. This possibility is further analyzed in the next sections.

Table 4

Income smoothing and models of discretionary accruals

Panel A: Cross-sectional mean and median of time series mean and standard deviation

		Mean		Stdev	
		Mean	Median	Mean	Median
EBEI		0.031	0.027	0.025	0.021
CFO		0.053	0.050	0.064	0.056
NDNI	*M. Jones*	0.027	0.024	0.057	0.051
NDNI	*Jones-CF*	0.028	0.027	0.023	0.020
NDNI	*AP*	0.029	0.027	0.023	0.019

Panel B: Autocorrelations of first differences

	Delta EBEI		Delta CFO	
	Mean	Median	Mean	Median
Lag 1	-0.10	-0.11	-0.44	-0.46
Lag 2	-0.18	-0.19	-0.05	-0.05
Lag 3	-0.06	-0.07	0.02	0.01

	Delta NDNI					
	M. Jones		*Jones-CF*		*AP*	
	Mean	Median	Mean	Median	Mean	Median
Lag 1	-0.45	-0.47	-0.34	-0.36	-0.19	-0.19
Lag 2	-0.04	-0.03	-0.10	-0.11	-0.13	-0.16
Lag 3	0.01	0.00	-0.01	0.00	-0.04	-0.05

All discretionary accrual models are estimated with the cross-sectional version. The sample includes all nonfinancial firms listed in the first section of the Tokyo Stock Exchange with at least 5 consecutive years of data. The table reports the cross-sectional mean and median for 1,214 firms.

In Panel B of Table 4, we report the autocorrelation structure of the first-differences in EBEI, CFO and NDNI estimated by the three discretionary accrual models. All variables are negatively correlated up to three years, yet the trend in time is different for the 5 variables. For EBEI, it presents a small increase (in absolute value) followed by a decrease. For CFO, it presents a large negative value in the first year, followed by a sharp decrease in the second year and a value close to zero in the third year. The pattern obtained by NDNI estimated with the modified Jones model follows the trend of cash flows. Similar to Subramanyam (1996) it has a sharp decrease in the second year and approaches zero in the next year. Among the discretionary accrual models using cash flows as explanatory variables, we find that the estimates of NDNI made with the Jones-CF model, have autocorrelation patterns similar to cash flows and to the estimates of NDNI obtained with the modified Jones model but with lower absolute values. Estimates of NDNI obtained with the AP model are smoother and have a pattern very similar to that of EBEI. These findings suggest that the smoothing factor present in total accruals is assigned to the discretionary part by the modified Jones model but is assigned to the nondiscretionary part in the AP and Jones-CF model.

4.3 Predictability of future performance

Table 5 presents the mean and median correlation between current and future performance. We show results for EBEI, CFO and the 3 estimates of NDNI. First, we can see that EBEI predicts future levels of cash flow better than CFO. For example, in the case of CFO_{t+1}, $EBEI_t$ has a mean correlation of 0.12 while CFO_t has 0.09. This is consistent with DKW (1998), who assert that earnings predict future cash flows better than current cash flows. This phenomenon can be attributed to the forecasting power contained in accruals. We also measure the ability of NDNI to predict performance. From the reported results, we see that NDNI obtained with the modified Jones model has the lowest explanatory power, the Jones-CF model is second and the AP model generates the highest correlations with future performance. For example, the correlation between $EBEI_{t+1}$, and $NDNI_t$ estimated with the modified Jones, the Jones-CF and the AP models are 0.26, 0.44 and 0.47 respectively. When we measure the ability of NDNI to predict itself, we see that it is quite limited for the Jones model. The average correlations for one, two, and three years ahead are 0.07, 0.03 and

0.02. On the contrary, NDNI obtained with the AP model presents average correlations of 0.52, 0.27, and 0.17.

Table 5

Correlations between current and future net income, cash flow from operations and nondiscretionary income

Explanatory variable	One year ahead			Two years ahead			Three years ahead		
	$EBEI_{t+1}$	CFO_{t+1}	$NDNI_{t+1}$	$EBEI_{t+2}$	CFO_{t+2}	$NDNI_{t+2}$	$EBEI_{t+3}$	CFO_{t+3}	$NDNI_{t+3}$
Earnings before extraordinary items ($EBEI_t$)									
Mean	0.59	0.12		0.32	0.07		0.20	0.08	
Median	0.64	0.12		0.35	0.06		0.20	0.08	
Cash flow from operations(CFO_t)									
Mean	0.31	0.09		0.19	0.05		0.14	0.07	
Median	0.33	0.10		0.21	0.04		0.14	0.07	
Nondiscretionary income ($NDNI_t$) estimated with modified Jones model									
Mean	0.26	0.07	0.07	0.16	0.04	0.03	0.10	0.04	0.02
Median	0.28	0.07	0.08	0.17	0.04	0.03	0.11	0.04	0.02
Nondiscretionary income ($NDNI_t$) estimated with Jones-CF model									
Mean	0.44	0.07	0.33	0.24	0.05	0.16	0.16	0.06	0.10
Median	0.47	0.07	0.35	0.25	0.04	0.15	0.16	0.05	0.10
Nondiscretionary income ($NDNI_t$) estimated with AP model									
Mean	0.47	0.08	0.52	0.26	0.06	0.27	0.16	0.05	0.17
Median	0.50	0.09	0.56	0.28	0.07	0.29	0.17	0.06	0.18

The sample includes all nonfinancial firms listed in the first section of the Tokyo Stock Exchange with at least 5 consecutive years of data.

The time series data for each firm in the sample is used to calculate autocorrelations and cross-correlations one, two, and three years ahead. The table reports the cross-sectional mean and median for 1,214 firms.

These findings corroborate the evidence presented in this section which indicates that the use of the modified Jones model tends to assign all the forecasting power contained in total accruals to discretionary accruals, while the use of models containing cash flows suggests that the explanatory power of total accruals is shared by the accounting process and by managerial discretion.

5.Tests for detecting earnings management

In this section, we follow the work of Dechow, Sloan and Sweeney (1995) and present tests for earnings management for the three competing discretionary accrual models. First, we compare the patterns of earnings management found by the models in random samples and in samples based on financial performance. We then measure the degree of manipulation suggested by the models and finally, we present implications obtained from the comparison of our model against the commonly used modified Jones model.

5.1 Testing the hypothesis of no earnings management

DSS (1995) evaluate the performance of 5 discretionary accrual models. As part or their tests, they examine the frequency with which the competing models generate type I errors. This error occurs when the null-hypothesis of no earnings management is rejected even if the null is true. They found that the models work well when the firms suspected of having manipulated earnings are randomly selected. However, they report high standard error in their estimates, indicating low power to detect earnings management. When the suspects for manipulation are selected from firms with extreme performance, the models seem to be misspecified. The models analyzed by DSS find income decreasing practices for firms in the lowest decile of earnings performance. For the low CFO firms, the models tend to find income increasing (decreasing) practices more (less) often than the level specified for the test. Similarly, for firms with high CFO, the models find income increasing (decreasing) practices less (more) often than expected. DSS claim that the high rejection rates arise because the models do not capture the negative relation between accruals and cash flows and attribute a big part of accruals to discretionary accruals.

Table 6 presents the rejection frequencies for tests of earnings management performed on 7 random samples taken from Japanese data. The first sample contains 1000 firm-years randomly selected from the 32,304 firm-years in our data. The next samples are selected to have extreme performance. For every measure (standardized by lagged total assets), firm-years are assigned in equal numbers to decile portfolios (3,230 firm-years) and samples of 1000 firm-years are randomly selected from these portfolios.

Since the rejection rates are unknown, instead of comparing the observed frequency with a rejection rate, we present the frequencies obtained under different models. This allows to compare what kinds of firms are reported as having manipulated earnings by the competing models.

Table 6
Comparison of the proportion of earnings management found by alternative discretionary accrual models.

Null hypothesis	Earnings management $<=0$		Earnings management $>=0$	
Test level	5%	1%	5%	1%
1. Random sample of 1000 firms				
M. Jones	4.2	1.5	3.8	1.0
Jones-CF	4.9	1.7	3.4	1.3
AP	4.1	1.9	3.2	1.4
2. Random sample of 1000 firms from the lowest decile of earnings performance				
M. Jones	3.0	1.2	6.3	2.4
Jones-CF	0.4	0.3	22.5	10.5
AP	4.0	2.3	20.9	11.7
3. Random sample of 1000 firms from the highest decile of earnings performance				
M. Jones	8.7	3.7	6.8	3.0
Jones-CF	33.2	15.6	2.0	0.7
AP	15.5	8.9	3.2	1.1
4. Random sample of 1000 firms from the lowest decile of cash flow performance				
M. Jones	34.2	16.4	0.3	0.1
Jones-CF	8.0	2.8	7.5	3.9
AP	7.6	3.3	7.2	4.2
5. Random sample of 1000 firms from the highest decile of cash flow performance				
M. Jones	0.8	0.3	24.2	10.0
Jones-CF	9.2	5.0	7.9	3.1
AP	6.0	2.9	7.2	2.8
6. Random sample of 1000 firms from the lowest decile of NDNI performance				
M. Jones	38.4	16.9	0.1	0.0
Jones-CF	10.2	4.3	8.4	3.1
AP	18.9	11.5	7.8	2.8
7. Random sample of 1000 firms from the highest decile of NDNI performance				
M. Jones	0.2	0.0	30.4	12.0
Jones-CF	8.0	4.7	10.0	4.0
AP	6.8	3.8	9.9	4.5

Table reports the percentage of randomly selected firm-years for which the null hypothesis of no earnings management is rejected (one-tailed test).

The first block in Table 6 corresponds to random sample of 1000 firm-years. The pattern of rejection is quite similar among the three models. The next 2 blocks correspond to tests done using random samples of firms with extreme earnings performance. The AP and Jones-CF models tend to find income increasing (decreasing) manipulation for firms with high (low) income more frequently than the modified Jones model. For example, for low EBEI and the test level of 5 percent, the modified Jones model finds 6.3 percent of firms with income decreasing behavior while the AP and the Jones-CF models report frequencies above 20 percent. For high EBEI firms, the AP model finds 15.5 percent of rejection, the Jones-CF finds 33.2 percent and the modified Jones model finds only 8.7 percent. This evidence may suggest that the AP and the Jones-CF models may be overestimating the proportion of firms performing earnings management and the modified Jones model is appropriate. However, as explained below, this pattern of behavior in firms with extreme earnings should be expected.

The next 2 blocks contain results for samples taken from the bottom and top deciles of cash flow performance. Results for the modified Jones model are consistent with those reported in Table 4 of DSS (1995). This model tends to find income increasing (decreasing) manipulation for firms with low (high) cash flow very often. Similarly, the modified Jones finds income increasing (decreasing) for firms with high (low) cash flow in fewer occasions than the AP and Jones-CF models. We attribute this to the inability of the Jones model to control for the negative correlation between accrual changes and cash flow changes. However, the AP and Jones-CF models seem to correct this deficiency.

DSS present results obtained using earnings and cash flows as measures of performance of the firms. However, if we compare these two variables, we can say that cash flows are free from manipulation, while earnings contain managerial discretion. This difference is important when the tests are performed for firms with extreme performance. For example, using our 32,304 firm-years, we find that from the initial 10 percent of firms in the top (bottom) deciles of cash flow performance, only 4.0 (2.6) percent finish in the top (bottom) decile of earnings performance. This suggests two implications. First, a total of 13.4 percent (6.0 + 7.4) of firms in the middle 80 percent of cash flow performance end up in the top and bottom deciles of earnings perperformance due to a combination of discretionary and nondiscretionary accruals. This suggests that firms in the top (bottom) deciles of earnings performance consist mainly of firms with high (low)

total accruals, so we can expect to find income increasing in high-income firms and income decreasing manipulation in low-income firms. Second, a combination of discretionary and nondiscretionary accruals make the performance of 6.0 (7.4) percent of the firm-years in the top (bottom) deciles of cash flow performance move to the middle 80 percent of earnings performance. This suggests that being an extreme cash flow performer does not imply being an extreme earnings performer. In fact, managers cannot confront the alternative to exercise discretion based only on cash flows, since there are still some accounting accruals (nondiscretionary part of accruals) that can modify performance in the direction needed by management.

Because of the problems suggested above, we perform additional tests using nondiscretionary income (NDNI) in addition to earnings and cash flows to define random samples of extreme performance. This variable provides a good measure to discriminate performance, particularly when we try to detect earnings management, because in theory, it includes accruals obtained from the accounting process, but excludes discretionary accruals. Assuming that the model correctly separates the discretionary and nondiscretionary part of accruals, then NDNI represents the real situation confronted by managers considering the possibility to manipulate earnings. The last two samples present results for the bottom and top deciles of NDNI calculated with the competing models.[16] The rejection patterns are similar to those corresponding to cash flows. The modified Jones model tends to find income increasing (decreasing) manipulation for firms with low (high) NDNI more often than the other models but cannot detect income decreasing (increasing) for firms with low (high) NDNI. This suggests one more time that the modified Jones model leaves all the information of total accruals into the discretionary part.

5.2 Degree of manipulation found by the models

Results in the previous subsection suggest that the use of different models leads to different conclusions. The modified Jones model tends to find earnings management on firms with extreme CFO more often that other models while the AP and Jones-CF models tend to find earnings management on firms with extreme EBEI more often than the Jones-CF

16 Given that NDNI is different for the three models, the 1000 firms selected to perform tests do not coincide among them.

model. To assess the models' ability to detect earnings management, we estimate the regression of

$$DA_{it} = a + b\ PART_{it} + e_{it} \qquad (10)$$

where PART is the partitioning variable that identifies the sub sample in which earnings management is suspected. We perform this analysis for the same definitions of PART used in Table 6: random samples, and random sub samples of firms with high and low performance in terms of cash flows and nondiscretionary income. We exclude earnings from this part of our analysis because under the null hypothesis of no earnings management, if the sample is random, or if the sample is constructed so that PART is not itself a causal determinant of earnings management, we can expect that the estimated coefficient on PART to be zero, but for the case of earnings, which include manipulation, we cannot hypothesize the coefficient on PART to be zero.[17]

Table 7 presents results for pooled regressions of discretionary accruals on the dummy variable PART.[18] For the random sample obtained from all firms, we observe that the estimated manipulation is very close to zero and statistically insignificant for the three models. However, we remark that the standard error (see Table 3) differs drastically among models. The value obtained by the modified Jones model is 0.053, quite higher than the values obtained by the Jones-CF or AP models (0.020 and 0.016 respectively). These values suggest that the AP model has the highest sensitivity (highest power) to detect earnings manipulation.

17 We performed tests using earnings, and the coefficients are statistically lower (higher) than zero for the bottom (top) earnings decile. The coefficients and t-values for PART obtained for the modified Jones model are lower than for the AP and Jones-CF models.

18 Our estimation procedure differs from that used in DSS (1995). The reason is that while they estimate nondiscretionary accruals using the time series version of the Jones model, we use the cross-sectional versions. Accordingly, DSS estimate equation 10 for all the firms in the sample using time series data, while we report results using pooled regression. Nevertheless, we can report that we performed year-by-year cross-sectional regressions and firm-by-firm time series regressions and results are qualitatively the same and the ranking of models is maintained.

Table 7
Estimated degree of manipulation under discretionary accrual models (as percent of total assets)

Random sample taken from		M. Jones	Jones-CF	AP
All firms	*coef*	0.0000	0.0000	0.0006
	t-stat	0.00	-0.05	0.92
Bottom CFO decile	*coef*	0.0835	0.0026	0.0022
	t-stat	46.95	3.15	3.72
Top CFO decile	*coef*	-0.0658	-0.0025	-0.0018
	t-stat	-36.48	-3.08	-3.01
Bottom NDNI decile	*coef*	0.0908	0.0056	0.0093
	t-stat	51.40	6.90	15.47
Top NDNI decile	*coef*	-0.0806	-0.0060	-0.0028
	t-stat	-45.19	-7.42	-4.65

The table reports the estimated slope in the equation $DA_{it} = a + b\ PART_{it} + e_{it}DA_{it}$ represents discretionary accruals of firm i at time t and PART is the variable that identifies candidates for earnings management. PART is defined for random samples of all firms and also taken from top and bottom deciles of CFO and NDNI.

When we apply the regression to samples based on performance we find that when CFO is used to discriminate firms, the coefficients obtained by the modified Jones model are strongly significant with t-statistics above 20. The amount of manipulation found by this model is 8.4 (-6.6) percent of total assets for low (high) cash flow firms. For the models containing cash flows, the degree of manipulation is below 0.3 percent.

When NDNI is used to separate firms, all models find manipulation in the samples used. For the sample taken from the bottom NDNI deciles, the modified Jones model finds a manipulation of 9.1 percent while the Jones-CF finds 0.6 percent and the AP model finds 0.9 percent. Similarly, for the sample corresponding to the top NDNI deciles, the modified Jones finds −8.1 percent against −0.6 percent and −0.3 percent for the Jones-CF and AP models respectively. We attribute this big difference in the estimated degree of manipulation to the fact that the Jones model assigns most of the information in total accruals to the discretionary part.

5.3 *Implications for studies of earnings management*

As we have seen throughout this section, when different discretionary accrual models are used, results change considerably. In fact, finding manipulation with one model does not necessarily imply manipulation when a different model is used.[19] Consequently, the identification of the best discretionary accrual model is important in studies related to earnings management.

In relation to the variable used to measure performance, we know that because EBEI contains managerial discretion, we may expect to find income manipulation in firms with extreme income more often than in firms with extreme NDNI or extreme CFO. Yet, empirical results show that firms identified by the modified Jones model as having decreased income intentionally have high CFO and high NDNI. In the same way, those found as having increased income, have low CFO and low NDNI. On the other hand, the firms identified by the AP and Jones-CF models as having decreased (increased) income, have low (high) earnings.

In conclusion, our results indicate that the modified Jones model suffers from a misspecification, which is corrected by considering the relation between cash flows changes and accruals changes. Our evidence also suggests that models containing cash flows are better alternatives than the modified Jones model to test for earnings management. Furthermore, we emphasize that the selection of the variable used to measure performance is critical for this type of studies.[20] As stated above, nondiscretionary income seems to be the best alternative because it resembles the situation confronted by the manager considering the possibility to manipulate earnings.

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19 When we analyzed how many firms identified as having manipulated earnings under one model coincided with firms identified by the other models, we found that the degree of concurrence between the AP and Jones-CF models is 31 percent, between the Jones-CF and modified Jones models is 18 percent, and between the modified Jones and AP models is 13 percent. These numbers contrast drastically with the 87 percent obtained between the modified Jones model and the original Jones model.

20 DeFond and Park (1997) describe a similar experience. They report that when they classify firms into good and bad based on cash flows or based on premanaged earnings (nondiscretionary income), their predictions about earnings manipulation are supported, but when income is used, their predictions are rejected.

6.Tests of managerial discretion

Evidence presented in previous sections suggests that the modified Jones model will affect conclusions related to managerial discretion. That is, the bad fit of this model leaves too much explanatory power in the discretionary part of accruals. In this section, in the spirit of Bernard and Skinner (1996), we reproduce some of the tests performed by Chaney, Jeter and Lewis (1998) and Subramanyam (1996) using the three discretionary accrual models analyzed in this paper. We evaluate the amount of influence that the misspecification of the Jones model has on the conclusions obtained by such studies on the importance of managerial discretion.

6.1 Intensity of income smoothing

Chaney, Jeter and Lewis (1998), using the Jones model to estimate nondiscretionary accruals, find that managers consistently involve in earnings smoothing. They form predictions about the direction of discretionary accruals in a given year by comparing nondiscretionary income ($NDNI_t$) to the previous year's reported earnings ($EBEI_{t-1}$). When $NDNI_t$ is lower (higher) than $EBEI_{t-1}$, discretionary accruals should be positive (negative). They report that 85 percent of the firms report discretionary accruals in the direction needed to smooth income in any given year. They find that the average discretionary accruals of the 47 (53) percent of the firms that increase (decrease) earnings is 9.7 (-6.8) percent of assets. Their findings, however, depend crucially on the appropriateness of the Jones model. If the model leaves too much information on the discretionary part of accruals due to a misspecification, then CJL's results may be inflated by the use of a misspecified model.

Table 8
Effect of discretionary accrual model selection to get inferences about discretionary accruals.

Panel A: Tests for amount of manipulation			
	M. Jones	*Jones-CF*	*AP*
Firms with $NDNI_t > EBEI_{t-1}$			
Average DA	-0.0387	-0.0164	-0.0106
Firms with $NDNI_t < EBEI_{t-1}$			
Average DA	0.0403	0.0172	0.0095
Difference in means	0.0791	0.0336	0.0201

Panel B: Ave.R^2 obtained by a model using CFO and NDA as explanatory variables			
	M. Jones	*Jones-CF*	*AP*
Next year cash flows	0.113	0.113	0.132
Next year earnings	0.185	0.304	0.460
Contemporaneous returns	0.031	0.041	0.044
Future returns	0.018	0.024	0.026

Panel C: Increase of R^2 obtained by including DA beyond NDA and CFO			
	M. Jones	*Jones-CF*	*AP*
Next year cash flows	0.042	0.034	0.013
Next year earnings	0.398	0.280	0.126
Contemporaneous returns	0.021	0.012	0.022
Future returns	0.020	0.008	0.006

In Panel A, firms are identified as candidates for income decreasing and firms identified as candidates for income increasing based on tests made in Chaney, Jeter and Lewis (1998). The reported numbers show the amount of manipulation estimated for each of the discretionary accrual models.
Panels B and C report the average R^2 of 34 yearly cross-sectional regressions using different combinations of earnings components as explanatory variables. Panel B shows the results for models including CFO and NDA estimated using three different models. Panel C corresponds to the incremental explanatory power brought by DA once NDA and CFO are included in the regression. The dependent variables are the same used in Table 2.

Even if the majority of managers exercises discretion in the direction predicted by CJL, we think that the amount of manipulation found in their study is very high. We believe that the accounting process is a natural and very important source of income smoothing and the attribution of all the

smoothing to managers lessens the importance of accrual accounting. Therefore, we replicate this part of CJL's tests to evaluate the degree of dependence that their conclusions about the use of managerial discretion have on their choice of discretionary accrual model. We use a big sample of firm-year observations from the Japanese stock market, and use CJL's criteria to separate the two samples for which the predicted discretionary accruals will be negative ($NDNI_t > EBEI_{t-1}$) and positive ($NDNI_t < EBEI_{t-1}$). Panel A of Table 8 reports the results using the three discretionary accrual models presented in this paper. Using the modified Jones model the average discretionary accruals are −3.9 and 4.0 percent for income decreasing and income increasing samples, which results in a difference of 7.9 percent. Incorporating cash flow into the discretionary accrual model reduces the difference in discretionary accrual averages to 3.4 percent for the Jones-CF model, and to 2.0 percent for the AP model. Despite the lower spread between samples obtained under the AP model, the statistically significance for the reported difference is very strong. This constitutes evidence that the low fit obtained by the Jones model causes an over-estimation of the amount of managers' manipulation.

6.2 Discretionary accruals and future performance

Subramanyam (1996) finds that discretionary accruals have information content to explain stock returns. He supports his result showing evidence that managers use discretionary accruals to send signals concerning future performance. His results, however, depend on the appropriateness of the Jones model. If the model is misspecified, some of his results may be overstated. Therefore, we replicate some of his tests and assess his conclusions about the use of managerial discretion to signal future performance with the use of alternative discretionary accrual models.

Accruals are known to have high information content and strong explanatory power for stock returns or future performance (see Table 2). This important contribution of total accruals is to be separated into the part attributable to managers and the part explained by the discretionary accrual model. This is why the goodness of the model becomes critical if we try to evaluate the role of managerial discretion. Since discretionary accruals are defined as the difference between the fitted and the original values, a misspecified model will leave information unexplained, and the role of discretionary accruals will be overstated. Panel B of Table 8 shows

the predictive ability of a model that uses CFO and the estimates of NDA obtained with the three definitions of nondiscretionary accruals as explanatory variables. As we can see, the modified Jones model obtains the lowest information content of NDA and the AP model obtains the highest information. Panel C shows that the highest increase of information brought by discretionary accruals is for the modified Jones model and the lowest is for the AP model.[21] This provides evidence that the low fit of the modified Jones model causes the explanatory power of DA to appear larger relative to models with a better fit. Since Subramanyam (1996) uses the Jones model, his conclusions regarding discretionary accruals may have arisen from using misspecified discretionary accrual models. Therefore, the selection of an adequate discretionary accrual model becomes important. From the two models that incorporate cash flows, the AP model provides the best alternative to the Jones model to test the role of managerial discretion because the overestimation of discretionary accruals is reduced for this model. If DA is found to contain information, even in models that assign a big role to accounting accruals, then the conclusions regarding managerial discretion will become stronger.

Table 9
Explanatory power of discretionary accruals for future performance

Dependent variable		Int	CFO_t	NDA_t	DA_t	Adj. R^2	Incr R^2	Significance
CFO_{t+1}	*coef*	0.029	0.644	0.430	0.420	0.145	0.013	9/33
	t-stat	14.48	19.05	10.50	10.09			
$EBEI_{t+1}$	*coef*	0.005	0.762	0.737	0.668	0.587	0.126	32/33
	t-stat	4.84	46.57	40.86	23.74			
$EBEI_{t+2}$	*coef*	0.008	0.626	0.610	0.438	0.384	0.064	27/32
	t-stat	5.35	36.05	31.29	12.15			
$EBEI_{t+3}$	*coef*	0.009	0.545	0.532	0.360	0.292	0.042	23/31
	t-stat	5.57	29.70	25.57	12.84			
$NDNI_{t+1}$	*coef*	0.003	0.805	0.773	0.732	0.756	0.174	33/33
	t-stat	4.50	52.75	49.13	36.79			
$NDNI_{t+2}$	*coef*	0.007	0.625	0.601	0.501	0.453	0.087	31/32
	t-stat	5.74	36.07	33.23	18.60			
$NDNI_{t+3}$	*coef*	0.009	0.531	0.512	0.343	0.321	0.044	23/31
	t-stat	5.87	29.93	26.15	11.94			

21 The case of contemporaneous returns is special. The increase on R^2 is similar but the total R^2 is higher for the AP model than for the M-Jones model

Nondiscretionary accruals (NDA) and discretionary accruals (DA) are estimated using the AP model. Incr. R^2 indicates the gain in explanatory power obtained with the inclusion of DA to a regression including cash flow from operations (CFO) and NDA. Significance of the increment in R^2 is reported as the number of years for which a Vuong's test for null incremental information is rejected at the 5 percent significance level.
We use all non-financial firms listed in the first section of the Tokyo Stock Exchange from 1962 to 1995. The full sample includes 30,673 company years for regressions using accounting variables for next year.

To test this assessment, Table 9 presents tests of the predictive ability embedded in the discretionary accruals estimates obtained with the AP model. CFO_t, NDA_t, and DA_t are used to explain future performance as measured by CFO, NDNI, and EBEI. When we try to predict CFO_{t+1}, the increase in R^2 brought by the inclusion of DA_t is low, and significant only in 9 of the 33 years. When we predict $EBEI_{t+1}$ and $NDNI_{t+1}$, the increases in R^2 obtained by adding DA_t to the equation are in average 0.126 and 0.174 and significant in every year (only one year the increase in R^2 is not significant for the $EBEI_{t+1}$ case).[22] When we use longer prediction horizons, we find that the discretionary accruals and their incremental explanatory power above NDA remain significant up to 3 years into the future. Nevertheless, the power of DA decreases as the prediction horizon increases. Consistent with the idea of a relevant accounting process, the average coefficient for NDA is always larger than the coefficient obtained by DA. This difference grows as the horizon involved in the prediction increases.

7.Conclusions

This study develops a discretionary accrual model based on the accounting process and the relationship between cash flows and accruals presented by Dechow, Kothari and Watts (1998). We show that the commonly used Jones (1991) model and the modification proposed by Dechow, Sloan and Sweeney (1995) leave most of the information content of

22 We report that the predictability of NDNI obtained under the AP model is higher than EBEI's, but lower for NDNI obtained with other models. This is consistent with evidence in previous sections suggesting that DAs estimated with variations of the Jones model have a predictable part.

total accruals into the discretionary part. We show how this misclassification brings two problems for empirical tests. First, in tests for earnings management, it leads to incorrect inferences. Second, the relation between discretionary accruals and future performance and the relation between stock returns and discretionary accruals is inflated.

Throughout this paper, we have suggested and presented evidence that the accounting process plays an important role in income smoothing. Since managerial discretion is the other source of smooth income, we may expect a diminished role of managerial discretion. However, when we analyze the information content of discretionary accruals, we find evidence that managers do exercise discretion to signal future performance. In fact, using a discretionary accrual models designed to follow the nature of the accounting process, we still find that discretionary accruals contain predictive power for future performance. We recognize, however, that our model is a mere approximation to the real process generating accruals. Therefore the possibility that some discretionary accruals are incorrectly labeled as discretionary still exists.

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