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Chapter Author: Tatsuo Hatta, Hideki Nishioka

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7 The Dynamic Efficiency Effect of a Change in the Marginal Capital Income Tax Rate: The Nakasone-Takeshita Tax Reform

Tatsuo Hatta and Hideki Nishioka

The Nakasone-Takeshita tax reform, which took place during 1987–89 in Japan, is best known for making a deep wage tax reduction and establishing a new value-added tax. Less attention has been paid to the reform's restructuring of capital income taxation.[1]

1. The corporate income tax rate was reduced. In particular, the top statutory rate for the national corporate tax was reduced from 42% to 37.5%.[2]
2. A flat interest tax of 20% was introduced, changing the interest tax in two ways:
   a. The maximum tax rate on interest income was reduced from 35% to 20%.
   b. Before the reform, various exemptions entitled each individual to have savings of ¥9 million with their interest free of tax. The reform eliminated these exemptions. We will call the eliminated exemptions "the maruyu system" after its principal exemption program, maruyu.[3]

Tatsuo Hatta is professor of economics at Osaka University. Hideki Nishioka is assistant professor of economics at University of Osaka Prefecture.

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1. See Yukio Noguchi's and Masaaki Homma's papers in this volume for details of the Nakasone-Takeshita tax reform.

2. The combined national and local effective tax rate as defined by the Ministry of Finance was reduced from 52.92% to 49.98%. See Ministry of Finance (1990).

3. The maruyu system consists of three programs, maruyu, tokuyu, and yucho. They allowed each individual to have ¥3 million of bank deposits, government bonds, and postal savings, respectively, with their interest free of tax. Exclusion of interest income from the tax base remains

Japan does not have a social security number system; hence a person can open several bank accounts, each with different false names, without being detected by the tax authority. By doing so a wealthy person was able to get around the maximum individual exemption level and evade the interest tax payments completely. Although it is difficult to tell exactly how much evasion was taking place, circumstantial evidence indicate that it was pervasive. For example, there were more maruyu savings accounts than the population of Japan in 1983, and the Tax Administration Agency estimated illegal maruyu savings to be at least ¥5 trillion (" 'Maruyu' Akuyo 5600 Oku Yen" 1983). Thus the primary purpose of abolishing the maruyu system was to make interest taxation more equitable between honest savers and tax evaders.

The effects on efficiency of abolishing the maruyu system, however, were mixed. For those honest savers who paid the interest tax at rates between 21% and 35%, the reform lowered the marginal interest tax rate, reducing tax distortion, while for those whose interest tax rates were below 20%, the reform raised the interest tax rate, increasing distortion. In all likelihood, abolishing the maruyu system increased the marginal interest tax rate for the median taxpayer, since 73% of interest income was exempted from income tax.[4] Indeed some economists, including Noguchi (1987, 99), criticized the abolition of the maruyu system for increasing tax distortion.

The aim of reducing the corporate income tax rate, on the other hand, was to reduce tax distortion. The tax cut was intended to stimulate capital formation by lowering the effective marginal capital income tax rate.[5] The resulting revenue reduction was roughly similar to the increased revenue from the abolition of the maruyu system.[6]

after the reform for those with minimal income-earning capabilities, such as the aged, fatherless families, and the handicapped.

The maruyu system was applicable to every taxpayer. In addition, each employee was entitled to have additional savings of ¥5 million with tax-free interest. This privilege, called zaikei, was retained after the reform.

4. In 1987, untaxable interest income from nonpostal savings was ¥9.8 trillion, according to Ministry of Finance (1991) and that from postal savings was ¥6.7 trillion, according to unpublished data obtained from the Saving Bureau of Ministry of Post and Telecommunications. These figures imply that 73% of the interest income was nontaxable in 1987.

5. See Nakatani, Inoue, Iwamoto, and Fukushige (1986) and Economic Federation of Japan (1984) for the argument for reducing the corporate tax to stimulate capital formation.

6. We estimate the hypothetical revenue increase in the interest income tax and revenue decrease in the corporate income tax in 1986, assuming the entire Nakasone-Takeshita reform had taken place at the beginning of that year.

Although the average interest tax rate from 1977 through 1986 was 7.8%, the rate jumped to 14% in 1989 when the abolition of the maruyu system was fully implemented. If we assume that the difference, i.e., 6.2%, is due to the abolition of the maruyu system, we can estimate that the abolition would have reduced the government revenue by $0.062 \times 24.1 =$ ¥1.5 trillion in 1986, when ¥24.1 trillion was the personal interest income.

In computing average interest tax rates, we obtain the data on tax revenue and on interest income from different sources. First, we obtain tax revenue from the Ministry of Finance (1991). Second, we obtain personal interest income from Economic Planning Agency (1990b). This is

Therefore, the Nakasone-Takeshita package of capital income tax changes was a reform to eliminate the maruyu-related tax evasion accompanied by a revenue-neutralizing measure that mitigates the possible increase in the effective marginal tax rate. Yet the reform may have increased intertemporal dynamic efficiency cost.

Intertemporal efficiency cost could be unequivocally reduced without reducing the revenue, by making the capital income tax proportional. This could be attained, for example, by abolishing the corporate income tax while making the tax rates flat on interests, dividends, and capital gains.[7] The Nakasone-Takeshita package can be viewed as the first step of such reforms, since it reduced tax rates on corporate capital income and installed a flat tax on interest income.[8] It would be of interest to estimate the size of the efficiency gain that would have been caused by an alternative reform of making the capital income tax proportional.

Moreover, the intertemporal efficiency cost would be eliminated if the capital income tax were abolished, with the revenue loss compensated with an increased tax on wage or consumption, even if it would reduce equity. Clearly, the Nakasone-Takeshita reform did not change the tax system in this direction.[9] But this would be the policy of choice for those who opposed the abolition of the maruyu system on efficiency grounds. In order to determine whether or not future reforms should be carried out in the direction of no capital income tax, it is essential to estimate the efficiency gain from abolishing the capital income tax so that it can be compared with the subjective cost of lost equity.

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because the Ministry of Finance figures before the reform do not contain interest from postal savings.

It should be noted that the interest income figures of the Ministry of Finance cited above contain corporate interest receipt as well. The reform must have reduced interest tax payment by corporations, since the corporate income tax rate was reduced, while the abolition of the maruyu system did not affect corporations. Thus the above estimate of the reduction in the personal income tax payment as the result of the reform, i.e., ¥1.5 trillion, is likely to be an underestimation.

On the other hand, Ministry of Finance (1988, 1991) and Local Tax Association (1987, 1989) estimate that the Nakasone-Takeshita tax reform reduced the revenue from the national corporate income tax by ¥0.45 trillion in 1987 and ¥1.20 trillion in 1988, while it reduced the local corporate income tax by ¥0.08 trillion in 1987 and ¥0.15 trillion in 1988. We can estimate the loss in tax revenue in 1986 under our hypothetical tax reform by scaling down these figures in proportion to the corporate income of the respective years. Since the corporate income was ¥34.48 trillion in 1986, ¥36.28 trillion in 1987, and ¥40.64 trillion in 1988, we estimate that the revenue loss from the corporate income tax reform would have been ¥1.66 trillion in the 1986 base.

See Nishioka (1991) for more detail on the estimation of average tax rates.

7. Capital gains can be taxed at realization, as if they have been taxed actuarially. See Vickrey (1939), Hatta (1987, 1988), and Auerbach (1991).

8. If we take this view, the logical next step has to be the establishment of substantive capital gains tax on stocks and bonds, coupled with deeper reductions in corporate income tax rates.

9. After all, the flat interest tax was introduced to roughly offset the revenue loss from the reduced corporate tax. On the other hand, the cut in the wage tax rate was so drastic that the resulting revenue loss exceeded the revenue gain from the indirect taxes.

The principal aim of the present paper is to estimate the dynamic efficiency effect of the Nakasone-Takeshita package of the capital income tax reform. To this end, we will estimate the effective marginal tax rates before and after the reform. From these estimates, we will derive the lower and upper bounds of the dynamic efficiency effect of the reform.

We will also estimate the dynamic efficiency effects of two hypothetical reforms: (1) making the capital income tax rate proportional to the level of the prereform average capital income tax rate, and (2) abolishing the capital income tax while raising the wage tax to make the reform revenue-neutral. This will enable us to examine alternatives to the actual Nakasone-Takeshita reform that are consistent with eliminating the maruyu system.

We will assume that the prereform equilibrium was in a steady state and that the reform brings the economy to an adjustment path that takes it to the new steady state in the long run. The equivalent variation associated with the consumption stream in the prereform steady state and that along the adjustment path is the dynamic efficiency effect of the tax reform.

In his pioneering work, Chamley (1981) estimates dynamic efficiency effects of reductions in the capital income tax rate. Chamley as well as Judd (1987) and Nishioka (1989) is concerned with the efficiency gains of a *marginal* reduction in the marginal tax rate. Efficiency gains of *global* reductions in the capital income tax rate are studied through simulations. Auerbach, Kotlikoff, and Skinner (1983) and Auerbach and Kotlikoff (1987) construct overlapping generation models where the bequest motive is assumed away. They estimate welfare effects of changing average tax rates. Jorgenson and Yun (1986a, 1986b), on the other hand, use a multisector multi-capital-good dynasty model to perform a global simulation analysis of various hypothetical tax reforms that narrow capital income tax rates among different capital goods. Fullerton, Henderson, and Mackie (1987), Jorgenson and Yun (1990), and Goulder and Thalmann (1990) apply such models to the U.S. Tax Reform Act of 1986. For the Japanese economy, Hatta and Nishioka (1989, 1990) estimate the dynamic efficiency effects of abolishing the capital income tax, using one-sector, one-capital-good dynasty models.

Unlike the 1986 Reagan tax reform, the Nakasone-Takeshita reform hardly changed relative tax rates among different capital goods. Hence little will be sacrificed by using a one-capital-good model in examining its efficiency effect. Since the reform kept the average capital income tax rate constant, however, the average tax rate models of Hatta and Nishioka (1989, 1990) are inadequate for examining this reform. In the present paper, we will extend the model of Hatta and Nishioka (1990) by allowing the discrepancy between the marginal and the average capital income tax rates.

Section 7.1 presents our model and a measure of the efficiency change a tax reform causes. Simulation analyses of tax reforms are discussed in section 7.2, where an adjustment path comparison is presented. Section 7.3 compares our results with those of the literature. Concluding remarks are given in section 7.4. The effective marginal capital income tax rate is estimated in appendix A, and the production function is estimated in appendix B.

7.1 The Model

We present a simple neoclassical dynasty model for which the efficiency effect of a change in the marginal tax rate can be examined. For this purpose we modify the model of Hatta and Nishioka (1990) by allowing the capital income tax rate structure to be nonproportional.[10] We deliberately preserve the same notation and a similar order of presentation to facilitate the comparison of the two models.

7.1.1 Production Sector

We assume that the production function obeys Harrod neutral technical progress and is linear homogeneous with respect to labor (measured in efficiency units) and capital. The production function is written as

$$Y(t) = F(K(t), N(t)),$$

where $Y(t)$ denotes gross output, $K(t)$ the capital stock, and $N(t)$ labor input measured in efficiency units at time t. Letting small letters denote the variables per efficiency unit of labor, we can rewrite the production function

$$y(t) = f(k(t)).$$

The following relationship holds between the labor inputs measured in efficiency units and in man-hour units:

$$N(t) = L(t)e^{\mu t},$$

where $L(t)$ is the labor input measured in man-hour units and μ is the constant exogenous rate of technical progress.

We assume that the rate of depreciation is constant at δ, so that net output is $Y(t) - \delta K(t)$. We define the marginal productivity of capital net of depreciation, $r(t)$, by

$$r(t) \equiv f'(k(t)) - \delta, \tag{1}$$

and the marginal productivity of labor, $w(t)$, by

$$w(t) \equiv f(k(t)) - k(t)f'(k(t)). \tag{2}$$

These are equal to the before-tax rate of return of investment and the before-tax wage rate, respectively.

10. Hatta and Nishioka (1990) assume that the capital income tax is proportional at the prereform situation. This model gives useful information for the purpose of designing a desirable mix of tax base but is unsuitable for examining the efficiency effects of the Nakasone-Takeshita reform, which changed the marginal capital income tax rate but kept the average rate roughly constant.

7.1.2 Government Sector

Government expenditure is financed through the capital income tax and the wage tax. A proportional wage tax rate of $\theta_w(t)$ is imposed, so that the total revenue from wage tax in year t is $\theta_w(t)w(t)N(t)$.

Since the focus of the present paper is to examine reforms of the marginal and average capital income tax rates, we assume that, after the reform, the marginal tax rate θ_r^m and the average tax rate θ_r are fixed over time, while the lump-sum tax rate $\theta_r^\ell(t)$ is variable. Thus total government revenue from the capital tax is $\theta_r^\ell(t) + \theta_r^m r(t)K(t)$. The average tax rate on capital income θ_r satisfies

$$\theta_r r(t)K(t) \equiv \theta_r^\ell(t) + \theta_r^m r(t)K(t).$$

Let $G(t)$ denote government expenditures at t. Then a balanced budget in each period implies

$$G(t) = \theta_r^\ell(t) + \theta_r^m r(t)K(t) + \theta_w(t)w(t)N(t) \quad \text{for all } t. \tag{3}$$

Hence

$$G(t) = \theta_r^m r(t)K(t) + \theta^\ell(t)N(t) \quad \text{for all } t, \tag{4}$$

where

$$\theta^\ell(t) \equiv \theta_r^\ell(t)\frac{1}{N(t)} + \theta_w(t)w(t).$$

The term $\theta^\ell(t)$ denotes the lump-sum portion of the taxes per efficiency unit of labor in year t.

We assume that the government increases the supply of public goods at a constant rate $n + \mu$, so that its level per efficiency unit of labor is maintained constant at g. Thus we have

$$G(t) \equiv g \cdot N(t).$$

This and (4) yield

$$g = \theta_r^m r(t)k(t) + \theta^\ell(t), \quad \text{for all } t. \tag{5}$$

We further assume that the government constantly adjusts the lump-sum tax $\theta^\ell(t)$ so that equality (5) always holds for given g and θ_r^m. This can be carried out by adjusting $\theta_w(t)$, $\theta_r^\ell(t)$, or both.

7.1.3 Household Sector

We assume that the consumer has an infinite horizon. The consumer's labor supply, $L(t)$, grows at a given constant rate n. There is no leisure-labor substitution.

We define the instantaneous utility function by

$$
(6) \qquad u(\tilde{c}(t)) = \frac{1}{1 - 1/\sigma}\tilde{c}(t)^{1-1/\sigma} \text{ if } \sigma \neq 1, \\
= \ln \tilde{c}(t) \text{ if } \sigma = 1,
$$

where σ is the elasticity of intertemporal substitution. The intertemporal utility function is then represented by

$$
(7) \qquad U = \int_0^\infty e^{-(\rho-n)t} u(\tilde{c}(t))dt,
$$

where $\tilde{c}(t)$ is consumption per man-hour at time t and ρ is the rate of time preference.

Define the after-tax net return on capital at time t by

$$
(8) \qquad s(t) = (1 - \theta_r^m)r(t).
$$

This is the rate of return that consumers face at time t. The after-tax net return on capital between time 0 and t is defined by

$$
(9) \qquad s(t) \equiv \int_0^t s(\tau)d\tau.
$$

Then the household's intertemporal budget equation is

$$
(10) \qquad \int_0^\infty e^{-s(t)+nt}\,\tilde{c}(t)dt = \int_0^\infty e^{-s(t)+nt}\,(\tilde{w}(t) - \tilde{\theta}^\ell(t))dt + \tilde{k}^0,
$$

where $\tilde{w}(t)$ is the per-man-hour wage rate, $\tilde{\theta}^\ell(t)$ is the per-man-hour lump-sum tax rate, i.e.,

$$
\tilde{\theta}^\ell(t) \equiv \theta_w(t)\tilde{w}(t) + \frac{\theta_r^\ell(t)}{L(t)}
$$

at time t, and $\tilde{k}^0$ is the per-man-hour capital endowment at the initial equilibrium. We assume that the household with perfect foresight maximizes (7) subject to (10), given a time path of future prices.

Since technical progress is Harrod neutral, the following relationships hold between per-man-hour variables and per-efficiency-unit variables:

$$
(11) \qquad \tilde{c}(t) = c(t)e^{\mu t},\ \tilde{w}(t) = w(t)e^{\mu t},\ \tilde{k}(t) = k(t)e^{\mu t},\ \tilde{\theta}^\ell(t) = \theta^\ell(t)e^{\mu t}.
$$

From (6) and (11), we can rewrite (7) as

$$
(12) \qquad U = \int_0^\infty e^{-(\rho^* - n - \mu)t} u(c(t))dt,
$$

where

$$
\rho^* \equiv \rho + \mu/\sigma.
$$

Similarly, applying (11), we can rewrite the intertemporal budget equation as

$$(13) \qquad \int_0^\infty e^{-s(t)+(n+\mu)t}(c(t) + \theta^\ell(t) - w(t))dt = k^0,$$

where k^0 is the per-efficiency-unit capital endowment. The original constrained utility maximization problem is equivalent to the problem of maximizing (12) subject to (13). The household chooses the optimal consumption path, $c(t)$, taking the price profiles $s(t)$ and $w(t) - \theta^\ell(t)$ as given.

The first-order conditions for this problem are

$$(14) \qquad \dot{c} = (\sigma c)\,[r(k)\,(1 - \theta_r^m) - \rho^*]$$

and

$$(15) \qquad \lim_{t \to \infty} k(t)\, e^{-s(t)+(n+\mu)t} = 0,$$

which is the transversality condition.

7.1.4 Market Equilibrium

The market equilibrium condition for output is

$$C + G + (\dot{K} + \delta K) = F(K, N),$$

where C denotes consumption expenditures. We thus obtain

$$(16) \qquad \dot{k} = f(k) - c - g - (n + \mu + \delta)k.$$

We may rewrite this and (14) as

$$(17) \qquad \dot{k} = \dot{k}(k, c)$$

and

$$(18) \qquad \dot{c} = \dot{c}(k, c; \theta_r^m),$$

respectively. These two equations yield the time path of (k, c), given the initial condition $k(0) = k^0$ and the value of the parameter θ_r^m. Figure 7.1 is the phase diagram of the system (17) and (18). Dark arrows depict saddle paths, which are the only stable paths of the model. If the initial level of k is at k^0, away from the steady-state level for the given θ_r^m, the economy under perfect foresight will choose $c(0)$ on the saddle path. From (5) and the path of $k(t)$ and $c(t)$ thus determined, the time paths of $\theta^\ell(t)$ and of $\theta_w(t)$ are derived.

7.1.5 Evaluating the Efficiency Effect of Tax Reform along the Adjustment Path

In the present paper, we consider the long-term efficiency effect of an unexpected, permanent change in the marginal capital income tax rate. We assume that the change in the capital income tax rates is accompanied by a revenue-offsetting adjustment in the lump-sum tax stream.

Economic adjustment following such a tax reform is depicted in figure 7.1.

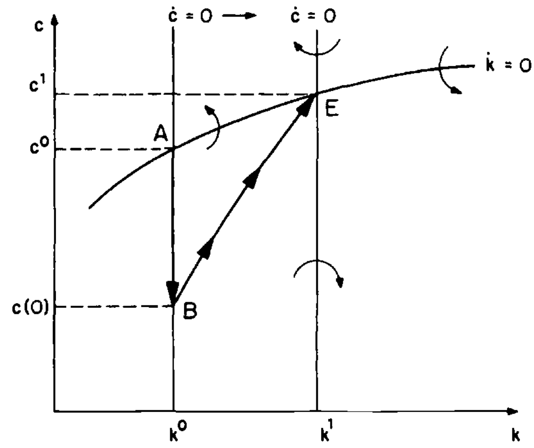

Fig. 7.1 Phase diagram

Let A be the initial steady state, and imagine that the $\dot{c} = 0$ line is a vertical line passing through point A with coordinate (k^0, c^0) rather than through point E. Now assume that the marginal capital income tax rate θ_r^m is reduced, shifting the $\dot{c} = 0$ line to the right so that it passes through point E. Since this does not affect the $\dot{k} = 0$ curve, the new steady-state equilibrium is obtained at point E.

Immediately after the reform, however, the economy will jump from point A to point B, which is on the saddle path leading to the new steady state, by lowering the consumption level to $c(0)$. It will then gradually move along the saddle path toward the new steady state E by adjusting the stock variable k.

We now compare the welfare level along the initial steady state with that along the adjustment path after the reform. As the measure of the efficiency change caused by the tax reform, we adopt the equivalent variations as a percentage of the initial consumption wealth.[11] It is formally defined as

$$(19) \qquad \frac{\int_0^{\infty} e^{-s^0(t)}\, C^1(t)dt - \int_0^{\infty} e^{-s^0(t)}\, C^0(t)dt}{\int_0^{\infty} e^{-s^0(t)}\, C^0(t)dt} \times 100,$$

11. The present value of the consumption stream $C(t)$ discounted by the private rate-of-return stream $s(t)$, i.e.,

$$\int_0^{\infty} e^{-s(t)}\, C(t)dt,$$

is called *consumption wealth* of $C(t)$ discounted by the rate-of-return stream $s(t)$.

where $C^0(t)$ and $s^0(t)$ are the prereform consumption and rate-of-return streams, respectively, while $C^1(t)$ is the consumption stream that minimizes consumption wealth evaluated by $s^0(t)$ among all the consumption streams that attain the postreform utility level. The numerator of (19) compares the values of $C^0(t)$ and $C^1(t)$ under the constant price stream corresponding to $C^0(t)$, and hence is the equivalent variation of the tax change.[12]

7.2 Numerical Evaluation of the Efficiency Effects of the Tax Reform

We now numerically estimate the efficiency effect of the changes in the capital income tax rate in the Nakasone-Takeshita tax reforms as well as the reforms that the government could have carried out. Since the Nakasone-Takeshita reform took place between 1987 and 1989, the last year for which the reform did not affect the data is 1986. Thus we choose 1986 to be the base year of our simulation analysis. We assume that the economy was in a steady state under the prevailing tax mix in 1986, that the entire Nakasone-Takeshita reform took place at the end of 1986, and that the tax reform immediately brought the economy to the adjustment path.

7.2.1 Specification of the Model

We specify the various parameter values of the model, by setting time 0 to be 1986. First, we choose the functional form of the production function to be Cobb-Douglas,

$$Y = AK^{\alpha}(Le^{\mu t})^{1-\alpha}, \tag{20}$$

and set the parameter values as

$$A = 148.16,\ \alpha = 0.31,\ \mu = 0.03,\ \text{and}\ \delta = 0.1513, \tag{21}$$

based on the estimation procedure described in appendix B.

Second, we set

$$\rho^* = 0.046\ (\text{when}\ \theta_r^m = 0.5434),$$
$$= 0.055\ (\text{when}\ \theta_r^m = 0.4465).$$

These parameter values are derived from the assumption that the economy is in a steady-state equilibrium in the base year of 1986. Since $\dot{c} = 0$ at the initial equilibrium, (14), (20), and (21) yield

12. In the present study, we can directly compute cardinal utility levels of the economy both before and after reforms. Thus we could directly examine the rate of change in the utility level caused by the relevant reform instead of comparing consumption wealth. Under our specification of the utility function, however, doubling the budget under a fixed stream of prices will not necessarily double the expenditure minimizing utility level. The specification of σ in the utility function crucially affects the degree of cardinality. Use of equivalent variations may be viewed as a way to avoid this arbitrariness. When the sensitivity analysis is carried out with respect to σ as in Hatta and Nishioka (1990), this becomes particularly important. Note, however, we will specify σ to be one in the main part of our paper, and hence the utility function becomes linear homogeneous. For this particular case, the rates of change in the equivalent variations and in utility levels are equivalent.

$$\rho^* = r(k(0))\,(1 - \theta_r^m)$$
$$= (0.31y(0)/k(0) - \delta)\,(1 - \theta_r^m).$$

The value of ρ^* is obtained by substituting the 1986 values of $y(0)/k(0)$, δ, and θ_r^m. Estimation of θ_r^m is explained in section 7.2.2 as well as in appendix A. Note that, in view of the definition of ρ^*, the corresponding values of ρ are 0.016 and 0.025 when the values of ρ^* are 0.046 and 0.055, respectively.

Third, we set the elasticity of intertemporal substitution equal to $\sigma = 1$. This value is within the range of the estimates (0.3–1.0) of Ogawa (1986) for the Japanese economy. The estimates by Summers (1987) for the U.S. economy are also similar. Moreover, this value was assumed in Jorgenson and Yun (1986a, 1986b) and Hatta and Nishioka (1990) in their simulations. A sensitivity analysis for this parameter for the average tax changes by Hatta and Nishioka (1990) shows that the welfare effect increases monotonically with respect to the value of σ, but it is insensitive when σ takes a value higher than 1.

Fourth, other parameter values and the initial conditions $y(0)/k(0)$ are set as displayed in table 7.1. The data sources of these parameter values are given in the documents published by the Japanese government cited in the list of references. For the data of capital stock, see appendix B. Our estimation of tax rates is discussed in section 7.2.2

Since the rate of return on land is considerably different from that on nonland physical capital in Japan, and since tax structure on land is different from that on nonland physical capital, we exclude land from the definition of capital in the above numerical specifications. Also in calculating capital tax rates below, we ignore land taxes for the same reason.

7.2.2 Tax Rates

Average Tax Rates

The average capital income tax rate θ_r is obtained by dividing the tax revenue by its base. The capital income tax is defined as the sum of interest taxes, dividend taxes, and corporate income tax. The property tax is excluded, since housing and land are excluded from the definition of K in the present model.

Table 7.1 Parameter Values

Parameter	Symbol	Value
Elasticity of intertemporal substitution	σ	1
Rate of population growth	n	0.005
Wage tax rate	θ_w	0.23
Average capital income tax rate	θ_r	0.327
Marginal capital income tax rate	θ_r^m	0.4465
		0.5434
Government revenue/GNP ratio	g/y	0.20
Initial value of Y/K	$y(0)/k(0)$	0.81

The base for the capital income tax is the sum of income from interest and dividends, entrepreneurial income (corporate, public), and a part of noncorporate entrepreneurial income. Noncorporate entrepreneurial income is divided into capital and labor income in proportion to the economy-wide share excluding this income. This yields $\theta_r = 0.327$.

The wage tax rate is computed on the assumption that all the tax revenue other than the capital income tax is the wage income tax. Thus this revenue includes excise taxes and others that are not classified as a part of the income tax in the tax code. In our model, however, taxes other than the capital income tax are nondistortional and hence can be treated in the same category as the wage tax. The base for the wage tax is the sum of the compensation for employees and three-fourths of noncorporate entrepreneurial income. Since the revenue-GNP ratio (g/y) is 20.0% according to the Japanese Ministry of Finance (1990, 8), these definitions and the above estimates of θ_r yield $\theta_w = 0.23$.

Effective Marginal Capital Income Tax Rates

In the Nakasone-Takeshita reform of 1987–89 the effective marginal capital income tax rate was changed in three major ways: (1) the corporate income tax rate was reduced, (2) the maximum tax rate on interest income was reduced from 35% to 20%, and (3) the minimum tax rate on interest was increased from 0% to 20%

In appendix A, we estimate the effective marginal capital income tax rate before and after the reform. This estimation shows that the effective marginal capital income tax rate is 46.58% after the reform. For a person who formally faced the 35% marginal interest tax rate, the effective marginal capital income tax rate was 54.34%, and the reform reduced the rate. For a person who formally faced zero marginal interest rate because of the maruyu system, the initial effective marginal capital income tax rate was 44.65%, and the reform increased the rate. In view of the widespread evasion of the interest income tax, it is not possible to determine the percentage of the people for each marginal rate of interest. Rather than attempt to estimate the "representative" marginal capital income tax rate, we will estimate the efficiency effects of the tax reform for the case in which everyone faces the maximum interest tax rate and for the case in which everyone faces the minimum rate. The efficiency effects of the tax reform are bound by these two extreme cases.

7.2.3 Dynamic Efficiency Effects

Estimates of the dynamic efficiency effects of tax reforms are presented in table 7.2 and illustrated in figure 7.2.

The Nakasone-Takeshita Reform

The heavy line in figure 7.2 depicts the value of (19) corresponding to various changes in the effective marginal capital income tax rate when the initial

Table 7.2 Sensitivity Analysis with Respect to g/y: Efficiency Gains from Tax Reforms (%)

	Marginal Tax Rates after the Reform (θ_r^m)			
(g/y)	46.58%	32.70%	0%	
(A)	(B)	(C)	(D)	(D–C)
	Initial Marginal Tax Rate 54.34%			
20.00	0.87	1.69	2.15	0.46
30.00	1.05	2.05	2.61	0.56
40.00	1.33	2.61	3.31	0.70
	Initial Marginal Tax Rate 44.65%			
20.00	−0.18	0.77	1.31	0.54
30.00	−0.22	0.92	1.58	0.65
40.00	−0.27	1.15	1.97	0.82

Note: The figures show the percentage increase in consumption wealth caused by the respective reforms for the respective initial conditions.

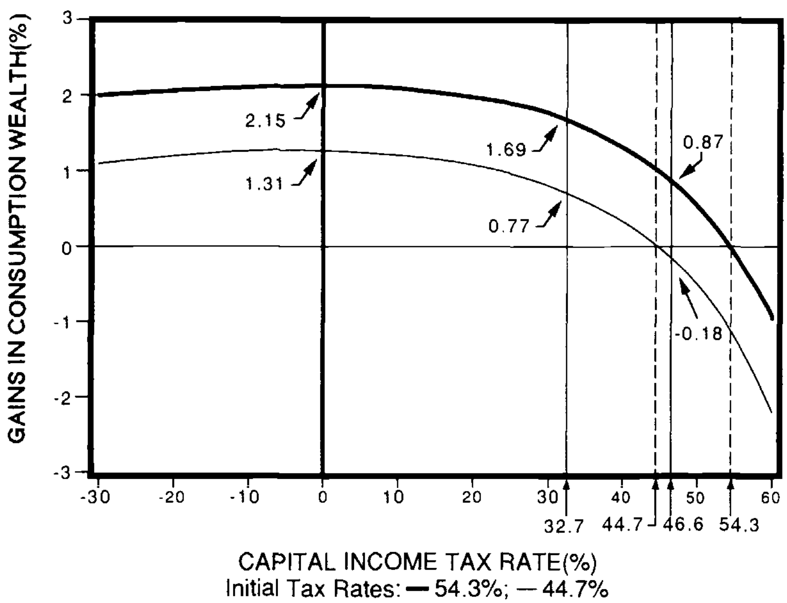

Fig. 7.2 Efficiency gains from changes in the capital income tax rate

rate is 54.34%.[13] It indicates that tax reform reduced the effective marginal rate from 54.34% to 46.58% and improved efficiency by 0.87% of consumption wealth in the economy.

The light line in figure 7.2 depicts the value of (19) corresponding to the various changes in the effective rate when the initial rate is 44.65%. It indicates that a tax increase in the effective marginal rate from 44.65% to 46.58% reduces efficiency by 0.18% of consumption wealth in the economy.

Thus the efficiency effect of the changes in the capital income tax rate in the Nakasone-Takeshita reform was in the range between −0.18% and 0.87%. To put it differently, the efficiency cost of eliminating widespread tax evasion through the illegal use of the maruyu system was at most 0.18% of consumption wealth. Since the amount of interest income for which the tax rate was reduced was at least one-third of that for which the tax rate was raised,[14] however, the elimination is likely to have yielded a small efficiency gain.

Making the Capital Income Tax Rate Proportional

The marginal tax rate could be lowered to the level of the initial average capital income tax rate, i.e., 32.7%, by making the tax proportional without reducing the revenue from capital taxation as a whole. For example, an abolition of the corporate income tax coupled with an increase in the interest tax and the capital gains tax could attain this.

Figure 7.2 indicates that when the initial rate is 54.34% (44.65%), the efficiency gain from this reform is 1.69% (0.77%). This is 0.82% (0.95%) more than the gain under the Nakasone-Takeshita reform. There is ample room for further improving the efficiency of the capital income tax structure without reducing its average tax rate.

Abolishing the Capital Income Tax

If the marginal tax rate is reduced to 0% instead of 32.7%, the economy in our model could attain the optimum (see Abel and Blanchard 1983). According to our simulation, the efficiency gain derived from abolishing the capital income tax is 2.15% (1.31%) of consumption wealth when the initial marginal rate is 54.34% (44.65%).

This implies that the additional efficiency gain from abolishing the capital income tax in excess of the gain from making it proportional is only 0.46%

13. See Hatta and Nishioka (1990, nn. 10, 12) for the computational method.

14. According to Ministry of Finance (1989), interest income that was taxed 20% or higher was ¥3.3 trillion, while untaxable interest income was ¥16.5 trillion in 1987. If we assume that only 60% of the formally untaxed interest income is now taxed, the amount of interest income for which the tax rate was reduced was one-third of that for which the tax rate was raised.

Note that the above figure of untaxable interest income contains interests on zaikei savings, but the balance of zaikei savings is only 7% of maruyu savings, as is reported by the Bank of Japan (1987, 160). Thus our assumption that 40% of the formally untaxed interest income is still untaxed implies that we are assuming that the balance of the savings by the elderly is substantial.

(0.54%), i.e., approximately 0.5% of the consumption wealth. Thus a large portion of the efficiency gain obtained from abolishing the capital income tax could be attained simply by making the capital income tax proportional without reducing the revenue from the capital income tax.

Since the present study assumes a fixed labor supply, our estimate of additional efficiency gains ignores the efficiency loss due to the revenue-compensating increase in the wage rate. Hence even 0.5% is an overestimation of the efficiency gain obtainable from eliminating capital income tax as a tax base. This implies that eliminating capital income as a tax base hardly gives additional efficiency gains.

7.2.4 Sensitivity Analysis

The sensitivity analysis with respect to σ for reductions of average tax rates in Hatta and Nishioka (1990) showed that assuming a value higher than 1 hardly changes the efficiency effect but that assuming a lower value makes the effect smaller. This implies that our estimates above are the upper bounds of these effects.

Iwata, Suzuki, and Yoshida (1987) estimated the rates of depreciation of various types of capital for Japan in 1983. Our estimate of the rate of depreciation, which is 15.13%, is obtained as an aggregate of these rates weighted by the capital stock of each type. This estimate of depreciation rate is much higher than that of the United States, presumably because of a higher Japanese growth rate. A lower depreciation rate would reduce effective marginal capital income tax rates, as can be seen from the comparison between the estimate of Kikutani and Tachibanaki and those of others in table 7A.2. Thus lower depreciation rates would further reduce our estimate of the efficiency effect of the Nakasone-Takeshita reform, reinforcing our qualitative conclusion.

The sensitivity analysis with respect to the share of government spending is presented in tables 7.2 for the two initial marginal tax rates; the range of the efficiency effect of the Nakasone-Takeshita reform would be −0.22% and 1.05% if g/y were 30%, while it would be −0.27% and 1.33% if g/y were 40%. Thus the change in g/y has rather mild impacts on the efficiency effect of a given tax reform.

The tables also indicate that the additional efficiency gain brought about by abolishing the capital income tax in excess of making it simply proportional is approximately 0.6% of consumption wealth when g/y is 30% or less.

7.3 Notes on the Literature

Different measures of efficiency gains have been employed in the literature. In equation (19) we are concerned with the "rate of increase in consumption wealth" as defined in that equation. Goulder and Thalmann (1990), however, examine "the rate of increase in full wealth," where full wealth is the sum of consumption wealth and the present value of leisure time. Jorgenson and Yun

(1990), on the other hand, use a measure whose numerator is the same as that of Goulder and Thalmann and whose denominator is "private national wealth," which is full wealth minus human wealth (i.e., the present value of leisure and the wage income streams). Thus their percentage figures overestimate the rate of increase either in full wealth or in private wealth. (See their footnote 27.) Although the ratio of private national wealth to full wealth is not available in Jorgenson and Yun (1986a, 1986b, 1990), it is 5.6% in Goulder and Thalmann (1990).[15] We will thus transform Jorgenson and Yun's percentage figures into the rate of increase in full wealth by multiplying by 0.056.

We are now in a position to compare our simulation results with those of the literature.

First, Fullerton, Henderson, and Mackie (1987), Jorgenson and Yun (1990), and Goulder and Thalmann (1990) estimate the dynamic efficiency effects of the U.S. Tax Reform Act of 1986. While the Nakasone-Takeshita reform simply reduced the statutory rate of corporate tax across the board, the U.S. reform reduced intratemporal tax wedges among different capital goods. Thus these articles use large-scale simulation models that allow different marginal tax rates on heterogeneous capital goods. Fullerton, Henderson, and Mackie (1987) and Jorgenson and Yun (1990) show that the efficiency improvement caused by the reduced intratemporal tax wedges outweigh the efficiency loss caused by the increased intertemporal tax wedge, while Goulder and Thalmann (1990) show the opposite. The former models may yield higher efficiency gains from reductions of intratemporal distortions than the latter, because the former assume an instantaneous shift of capital assets between different types and sectors, while the latter does not.

Second, Jorgenson and Yun (1990) show that elimination of all intratemporal wedges increases full wealth by 16.7% of private national wealth, or by 0.96% of full wealth. Goulder and Thalmann (1990, 29) show that a hypothetical, revenue-neutral reform that "combines housing integration with a 30 percent reduction (on average) of marginal effective tax rates" increases full wealth by 0.5%.

These estimates of the gains are smaller than our estimate of the gains from making the capital income tax rate proportional for Japan, which is between 0.77% and 1.69%. This may be caused by the fact that the prereform effective marginal tax rate is higher in Japan than in the United States.

Third, Jorgenson and Yun (1986a, 1986b) study the dynamic efficiency effect of making all the marginal tax rates of heterogeneous capital goods zero. They show that expensing investment expenditure increases full wealth by 26–27% of private national wealth, or 1.5% of full wealth, if the resulting

15. According to Goulder and Thalmann (1990, 45), the private national wealth (financial wealth in their terminology) is 20/355 = 0.056 of full wealth (present value of full consumption). See page 43 n. 1, for their terminology.

revenue loss is financed by an increase in the wage tax. Jorgenson and Yun (1990) also estimate an almost identical percentage increase in efficiency gain from a reform that removes "intertemporal tax wedges on all assets."[16]

These efficiency gains are in the same order of magnitude as our estimate of the gain from abolishing the capital income tax, which is between 1.31% and 2.15% of consumption wealth. The closeness is purely accidental, however. The prereform Japanese effective marginal tax rate is higher than that of the United States, but intrasectoral distortions, especially between business capital and housing, are greater in the United States.[17] It appears that these two factors offset each other to yield similar total efficiency effects.

Fourth, several authors study the dynamic efficiency effect of abolishing the capital income tax in a single-capital-good model where the capital income tax is assumed to be already proportional in the prereform equilibrium. Employing an overlapping generation model with endogenous labor supply, Auerbach, Kotlikoff, and Skinner (1983) and Auerbach and Kotlikoff (1987) estimate a *negative* efficiency gain associated with the abolition of the capital income tax accompanied by a revenue-offsetting increase in the wage tax rate. This implies that the efficiency gain obtained from reducing intertemporal distortions is smaller than the efficiency loss from increasing the distortion in the labor-consumption choice. Employing a dynasty model with an endogenous labor supply for the Japanese economy, Hatta and Nishioka (1989) estimate that the dynamic efficiency gain from abolishing the capital income tax would be 0.08% of the consumption wealth.

Employing a similar model with fixed labor supply, Hatta and Nishioka (1990) estimate that this gain is around 0.43% of consumption wealth. This number is remarkably similar to our estimate in the present paper that the difference between the efficiency gain from abolishing the capital income tax in excess of the gain from making the tax proportional is just about 0.5% of consumption wealth. This suggests that average tax rate models, as simple as they are, are sufficiently powerful for the purpose of analyzing the relative efficiency of different tax bases.

7.4 Concluding Remarks

We have evaluated the efficiency effects of changing the effective marginal capital income tax rate by simulating the Nakasone-Takeshita reform and a few alternative reforms.

16. Their estimate of the efficiency gain is $3,853.9 billion, while the nominal value of the U.S. private national wealth at the beginning of 1987 was $15,920.2 billion (Jorgenson and Yun 1990, S189, S182). The rate of increase in the full wealth is obtained from footnote 17.

17. In particular, the large discrepancies between the marginal tax rate between housing and other capital goods in the United States, which do not exist in Japan, appear a major cause of inefficiencies in the U.S. tax system. See Jorgenson and Yun (1990), Goulder and Thalmann (1990), and Skinner (1990) on the importance of the wedge between the housing sector and the business sector.

The revenue-neutral changes in the capital income tax rates in the Nakasone-Takeshita reform eliminated a source of major tax evasion—the maruyu system. Our estimates show that this reform was accompanied by an efficiency gain of between −0.18% and 0.87% of consumption wealth. We may conclude, therefore, that the Nakasone-Takeshita reform eliminated a major source of tax evasion with relatively little efficiency cost, if any.

Our simulation also indicates that the marginal capital income tax rate could have been reduced to the level of the average tax rate to yield an efficiency gain of between 0.77% and 1.69% of consumption wealth, while maintaining a constant level of revenue from the capital income tax. The additional efficiency gain that could be brought about from abolishing the capital income tax is 0.5% of consumption wealth, and even this is likely to be an overestimation of the gain. This implies that eliminating capital income as a tax base yields relatively small additional efficiency gains.

Appendix A
Estimation of Effective Marginal Capital Income Tax Rates

In this appendix, we estimate the aggregate effective marginal capital income tax rates for the 1986 Japanese economy. In this estimation, the marginal interest rate that firms face are not given exogenously, but will be derived from the data on production function and tax rates.

Marginal Capital Income Tax Rate and Interest Rate

From equation (8), the effective marginal capital income tax rate can be expressed as

$$\text{(A1)} \qquad \theta_r^m = \frac{r - s}{r},$$

where r is the before-tax real rate of return on marginal investment and s is the after-tax real rate of return that savers face.[18] At the initial equilibrium, the value of r is derived from the production function. Once s is determined, then θ_r^m at the initial equilibrium can be estimated.

The relationship between s and the marginal nominal interest rate i is given by

$$\text{(A2)} \qquad s = (1 - \theta_i)i - \pi,$$

18. The basic reference for the concept of the effective marginal capital income tax is King and Fullerton (1984).

where θ_i is the marginal personal tax rate on interest income and π the rate of inflation. Statistical data are amply available for average interest rates but not for marginal rates; hence we have to estimate the value of i.

The profit maximization condition requires the real rate of return, r, to be equal to the capital cost:

$$\text{(A3)} \qquad r = \frac{(1 - A(\iota))(\iota + \delta - \pi)}{1 - \theta_c} - \delta,$$

where ι is the nominal discount rate that investing firms face, θ_c is the marginal corporate tax rate, and $A(\iota)$ is the present value of grants and tax allowances per unit of investment (the functional form of which is to be defined later).

The nominal discount rate is different for each source of finance. In 1983 (Iwata, Suzuki, and Yoshida 1987), 49% of corporate investment was financed by retained earnings, 48% by debt, and 3% by newly issued shares. Thus we approximate the nominal discount rate by

$$\iota = 0.49\,\iota_e + 0.48\,\iota_b + 0.03\,\iota_n,$$

where ι_e is the nominal discount rate for retained earnings, ι_b is that for debt financing, and ι_n is that for new share issues. In turn, ι_e, ι_b, and ι_n may be defined as

$$\iota_e = \frac{i\,(1 - \theta_i)}{(1 - \theta_z)},$$

$$\iota_b = i\,(1 - \theta_c),$$

and

$$\iota_n = \frac{i(1 - \theta_i)}{\lambda\,(1 - \theta_d)},$$

where λ is the opportunity cost of retained earnings in terms of gross dividends foregone, while θ_i, θ_d, θ_c, and θ_z are the tax rates on interests, dividends, corporate income, and accrued capital gains, respectively. Combining the above three equations, we obtain the following:

$$\text{(A4)} \qquad \iota = i\{0.49\,\frac{1 - \theta_i}{(1 - \theta_z)} + 0.48\,(1 - \theta_c) + 0.03\,\frac{1 - \theta_i}{\lambda\,(1 - \theta_d)}\}.$$

We are now in a position to estimate i at the initial equilibrium. Since r is known, we can solve for ι from (A3) once the functional form of $A(\iota)$ and other parameters are given. By substituting this solution for ι in (A4), we can solve for i from (A4). In view of (A1) and (A2), we thus find the value of the marginal capital income tax rate at the initial equilibrium.

A tax reform will not change r immediately because K and L do not shift instantaneously. By changing the tax parameters but not r in equation (A3), we get a new ι. This and (A4) together yield the new interest rate after the tax reform. The new marginal capital income tax rate is similarly obtained as above.

Definition of the Function $A(\iota)$

Let us now define the function $A(\iota)$ for Japan by simplifying the formulation of Kikutani and Tachibanaki (1987). Let ω_1, ω_2, and ω_3 be the shares of the cost of assets that are depreciated by declining balance, by straight line, and by the first year write-off, respectively. Let $\theta_c A_1$, $\theta_c A_2$, and $\theta_c A_3$ be the present values of tax saving from the respective depreciation methods. Then the present value of all tax allowances, denoted by A, satisfies

$$A \equiv \theta_c\{\omega_1 A_1 + \omega_2 A_2 + \omega_3(A_3 + \xi)\},$$

where ξ is the proportion of special depreciation. In turn, A_1, A_2, and A_3 may be defined as follows:

$$A_1 = \frac{a(1 - e^{-(a+\iota)T})}{a + \iota},$$

$$A_2 = \frac{(1 - \nu)(1 - e^{-\iota T})}{\iota T},$$

$$A_3 = \frac{(1 - \nu)(1 - e^{-\iota T^*})}{\iota T^*},$$

where a is the rate of tax depreciation on an exponential basis, ν the rate of residual value of the asset, T the tax lifetime, and T^* a depreciable period after the first-year special write-off($T^* \equiv T(1 - \xi - \nu)/(1 - \nu)$). From the last four equations A can be expressed as a function of ι, and this defines the function $A(\iota)$.

Parameters ω_3, ξ, a, ν, T, and λ are aggregated from the data provided in Iwata, Suzuki, and Yoshida (1987) by taking a weighted average of the capital stock share. Parameters ω_1 and ω_2 are obtained by combining the data provided by Iwata et al. and by Kikutani and Tachibanaki (1987). These parameter values are presented in table 7A.1.

Estimates

Our estimates of the marginal capital income tax rates for 1986 are presented in table 7A.2 along with the estimates of Iwata, Suzuki, and Yoshida (1987) for 1983 and Kikutani and Tachibanaki (1987) for 1980. Our estimate is very close to that of Iwata et al. As Iwamoto (1989) reveals, different specifications of δ and π explain most of the difference between the estimates of Iwata et al. and Kikutani and Tachibanaki. Similar specification of these two key parameters in Iwata et al. and ours, therefore, explains the similarity of the estimates of the marginal tax rates between these two articles.[19]

Table 7A.1 Parameter Values for Computing Marginal Tax Rates

Parameter	Value	Parameter	Value
θ_d	0.20	ξ	0.3499
θ_z	0.00	a	0.1564
π	0.014	T	19.28
ω_1	0.72	ν	0.1
ω_2	0.18	λ	1.1
ω_3	0.099		

Table 7A.2 Estimates of the Effective Marginal Capital Income Tax Rates (%)

	Present Paper			Iwata, Suzuki, Yoshida	Kikutani, Tachibanaki
	1986	1986	1986 (after reform)	1983	1980
θ_i	0	35	20	20.02	18.85
π	1.4	1.4	1.4	0.6	8.25
δ	15.13	15.13	15.13	15.13	5.38
θ_c	52.92	52.92	49.98	56.83	52.61
θ_r^m	44.65	54.34	46.58	47.19	9.6

Appendix B
Estimation of the Production Function

Parameter values (21) are based on the following maximum likelihood estimation of (20) obtained under the assumption that the error term obeys the first order autoregressive model:

$$\ln (Y/L) = \underset{(6.4504)}{4.9983} + \underset{(2.7653)}{0.31353} \ln (K/L) + \underset{(2.2414)}{0.019669}\, t,$$

$$R^2 = 0.998262, \bar{R}^2 = 0.998058,$$

$$F = 4450.25, \text{SER} = 0.0230643, \text{DW} = 1.4580.$$

From this we obtain $\alpha = 0.31$, $A = 148.16$, and $\mu = 0.03$.

19. The cited estimate of Iwata, Suzuki, and Yoshida in table 7A.2 is based on their assumption that the capital cost is 10%. By accident, this is close to our value, 9.98%, which is derived from our estimated parameter values of the production function. This gives an additional reason for the similarity of the estimates θ_m^r of the two articles. Note that Iwamoto (1991) shows that the marginal capital income tax rate is lower than the estimate of Iwata, Suzuki, and Yoshida (1987) when land is included in capital.

In the above estimate, fiscal year data from 1968 to 1987 are used. The data sources are as follows: Y is from Economic Planning Agency, *Annual Report on National Accounts*, L is obtained by multiplying the employed labor force from *Monthly Report on the Labor Force Survey* and hours of labor from *Monthly Labor Survey* (both Ministry of Labor), and K is obtained by multiplying the capital stock data from Economic Planning Agency, *Capital Stock of Private Enterprises*, and the utilization ratio obtained from Ministry of International Trade and Industry, *Industrial Statistics Monthly*.

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Comment Medhi Krongkaew

I have to start by saying that I am not a practitioner of neoclassical economic modeling. I rarely need to depend on it in my work in Thailand. This is not to say that it is not useful or relevant. It's just that we can find a better way to explain to the public at large or convince policymakers than using neoclassical modeling.

But perhaps this neoclassic paper by Tatsuo Hatta and Hideki Nishioka is different. It addresses a very pertinent issue, how much the economy gained from the reduction of distortions associated with capital income taxation.

This paper is concise yet comprehensive. It explains the steps involved and procedures used clearly and carefully. It is a very neat paper, and the authors should be congratulated for this.

I have several comments that might help to improve the paper. I will separate my comments into two parts: those on the technical aspects of the paper and those on the political economic aspects of the paper.

I don't find anything unusual about the model itself, but I know that for practitioners of neoclassical modeling the realism of assumptions is unimportant as long as the model's predictive power is assured. A general reader would find that the assumptions here are unacceptable: the consumer is an infinitely long-lived representative agent; the consumer has no leisure-commodity substitution; the household has perfect foresight; and the time path for future prices is freely visible. Of course some could try to relax some of the restrictive assumptions to make them more realistic, or put in more scenarios that might effect the outcomes of the study—and this is what Hatta and Nishioka might attempt to do. But since some parameter values are not actual but estimated, the more adjustments you make, the more estimations for parameter values you have to make. That may lead you farther from the true picture of the situation rather than nearer to it. I don't know whether we could call this the second-best theorem applied to model estimations.

The second comment has to do with the estimation techniques used in the study. In the neoclassical model where the economy is divided into two sectors, labor and capital, the measurement problems can become acute without a good statistical data base. Measuring labor is easy enough, but measuring capital may be a little tricky. I am not quite sure how reliable the statistics used by Hatta and Nishioka to measure capital inputs are. There seem to be several roundabout ways to get to the size of K. You used the sampled survey data from *Capital Stock of Private Enterprises* and the *National Wealth Survey of Japan* and multiply that by survey data on utilization ratio from *Industrial Statistics Monthly.* How reliable are these data and your method? If my understanding of your technique is correct, you have to work backward through the estimated depreciation rate.

Medhi Krongkaew is a lecturer on the Faculty of Economics, Thammasat University, Bangkok.

Third, the use of 1985 as the base year begs the question whether it is a typical or representative year that will not unnecessarily distort the final findings of the study. I don't know what happened in Japan during that year, but for countries in Southeast Asia, 1985 was an unusually bad year. Recession had hit many countries in the area. We have high growth economies such as Singapore and Malaysia experiencing negative growth rates for the first time in their modern history. In Thailand we still had positive growth rate but very small. In an unusual situation such as this, I don't know whether using 1985 as a base year in this study would affect the result so much that the use of another year's data is called for.

Fourth, most estimated values of parameters look reasonable. The rate of population growth in Japan is OK; the wage tax rate of 12% is OK; the import and capital income tax of 25% is OK; but the ratio of government revenue (from both wage and capital income) to GNP of 11.7% is too small. This should be explained.

Finally, the difference in the magnitude of the efficiency gains from the reduction in capital income tax between this study and the studies by other researchers, especially that of Jorgenson and Yun, requires further investigation. I tend to agree with the findings by Hatta and Nishioka that the efficiency gain from capital income tax abolishment is only 0.5% of the net present of future private consumption. But since this contrasts fantastically with the finding by Jorgenson and Yun that a similar tax change would lead to an increase of 25% of the national private wealth, there must be something wrong somewhere, if not in the modeling, then in the statistical data. This point should be considered more carefully.

This leads me to a comment on the political economics aspects of capital income tax change. Hatta and Nishioka confirms my existing belief that tax on capital income does not much affect the investment capital accumulation, because the capital owners can always find ways to shift the burden somewhere else. Therefore his finding that the efficiency gain from capital income abolition is only 0.5% of future consumption may lend support to a policy position against giving additional incentives to capital owners at the expense of wage earners. Perhaps the finding of John Whalley that taxes have little contribution to growth could also be used to support said position, although in a reverse fashion: if tax doesn't help, it doesn't hurt either.

The suggestion that the capital income tax be abolished and the revenues foregone recouped through increase in wage tax may be casually made in this paper or similar papers. But we all know that in actual practice this is a very difficult undertaking indeed. On many occasions we may find that a partial reform or revision of existing tax may not lead to the desired result, but that only partial reform is politically feasible. The question is whether you should wait until the situation and timing are right for a total reform or be content with piecemeal changes that are slow and ineffective. This kind of problem is not considered in most neoclassical papers.

The political economic issues governing capital income and wage income may be more sensitive than what the paper such as Hatta's and Nishioka's would indicate. In a country where the growth is good but the distribution is quite unequal, such as Thailand, the capital sector obviously benefits more from growth than does the wage sector. And wealth begets political power to protect and increase wealth. Any drastic, or I could even say blatant, effort to cut capital income tax and substitute the revenue loss by wage tax for the sake of efficiency would certainly lead to protest and political upheaval. So one needs to be very careful in coming to a conclusion that may lead to unintended revolution.

Despite these comments I still think that Hatta and Nishioka have done a very good job. They will have to continue to fight with other scholars such as Yuan, who has done similar studies with quite different results.

Comment Assaf Razin

The paper by Tatsuo Hatta and Hideki Nishioka provides estimates for the macroeconomic effects of a permanent change in the tax rate on capital income within the framework of a neoclassical growth model. The authors calibrate the basic parameters of the model and initial values to fit Japan's economic structure, based on 1985 figures. In their model the optimal capital income tax is zero, as in Chamley.[1] They estimate that the efficiency gain of a decline in the capital income tax from 50 percent to 25 percent, while adjusting the wage tax rate so as to maintain a balanced government budget, is at most less than one-half of a percent of consumption. This low estimate is in the spirit of the low estimate for the gains from consumption smoothing in Lucas.[2]

Two potentially important mechanisms, which could augment the gains from such a reform, are missing, however. First, the model abstracts from investment in *human capital*. Evidently, a tax on capital income discriminates against capital accumulation in human as well as physical form, because of the double taxation of saving, and against investment in physical capital in particular due to a substitution of human for physical capital. The wage tax on the other hand distorts the incentives to invest in human capital.[3] Both the

Assaf Razin is the Daniel Ross Professor of International Economics at Tel Aviv University and a research associate of the National Bureau of Economic Research.

1. Christopher Chamley, "The Welfare Cost of Capital Income Taxation in a Growing Economy," *Journal of Political Economy* 89(3)(1981): 468–96.
2. Robert E. Lucas, *Models of Business Cycles* (New York: Basil Blackwell, 1987).
3. Marc Nerlove, Assaf Razin, Efraim Sadka, and Robert K. von Weizsacker, "Tax Policy, Investments in Human and Physical Capital and Productivity," NBER Working Paper no. 3531 (Cambridge, Mass.: National Bureau of Economic Research, 1990).

volume and the mix of capital accumulations are affected by a revenue-neutral shift from capital income to labor income tax in ways that may significantly change the welfare implications of the tax reform. It is not a priori clear whether the welfare-improving reform should require such a tax shift at all. Second, it is commonplace that investments in human and physical capital augment not only the individual investor's earning capacity but also the economy's stock of knowledge. Incorporating this *externality* into the model tends to enlarge the gains from tax restructurings such as the ones considered in the paper.