

# **Evaluation of Housing Taxation in Korea**

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\*Very Preliminary

## **Abstract**

Our paper aims to evaluate the current system of housing taxation in Korea and suggest which direction the current system should evolve into. In order to achieve these goals, we prepare the following two analytical frameworks. First, we search for a balance among three housing related taxes (the capital gains tax, transaction tax, and wealth tax). Basically it deals with determining which level of activity housing taxation should be levied on. Second, we analyze the housing taxation in relation to taxes on trading and holding financial assets, such as security and bond. Accordingly, our discussion covers the issue of finding an optimal cross-asset taxation scheme, which minimizes the distortion resulting from substitution across different assets. Based on the theoretical derivations from the above frameworks, we evaluate the current system of housing taxation in Korea and suggest policy recommendations.

## **I. Introduction**

In Korea, the current discussions on reforming the real estate related tax system has rather centered on verifying its effectiveness either in stabilizing housing prices or in boosting a business cycle. However, these issues cannot be handled with by merely changing the tax code and they may require a general equilibrium approach, which puts all the sectors of an economy into consideration. Accordingly, the issue of designing a new system of housing taxation should be targeted not at controlling a business cycle but at enhancing the efficiency and the equity of tax incidence.

The current housing taxes, classified into capital gains tax, property tax, acquisition and registration tax, is problematic in the following senses. First, tax base for capital gains taxation (one of national taxes) is not marked to market and admits unnecessarily many exemption and deduction clauses. Second, the proportion of registration and acquisition taxes amounts to 40% of local government tax revenues, while the revenues are geographically unevenly distributed. Third, property tax and aggregate land tax (both of them are local taxes) are criticized for being too progressive and applying tax bases, which are not properly marked to market price.

In designing a reform in the housing taxation scheme, a primary focus should be laid on the creation and abolishment of certain tax items as well as the rate adjustments of various taxes. However, a most fundamental reform package should include discussion over the optimal allocation of tax bases between the central vs. local or local vs. local governments, considered that the revenues from the housing related taxes (specifically registration and acquisition taxes) comprises a significant portion in the local government revenue. Therefore, the reform in the housing taxation should be scheduled in accordance with a reform in local fiscal system.

Our paper analyzes the current system of housing taxation in Korea from various perspectives and it evaluates possible reform agenda. Hence, instead of setting a scope of analysis within the housing taxation system itself, it chooses to perceive the current system as a sub-system of taxation on various types of assets. By doing so, we could identify factors of distortion from treating different assets differently. In addition our paper introduces foreign cases and derives policy implications from comparisons.

Second, our paper analyzes the effects of taxation on housing price and trading behavior, based on an analytic tool of no-arbitrage pricing. After classifying the current housing taxes into capital gains tax, wealth tax and transaction tax, we investigate how the rate adjustment of each tax item influences the trading behaviors of sellers and buyers in the housing market. In addition, our paper solves a Ramsey problem of optimal capital income taxation in a multi-asset economy. A rule for optimal tax rates is prescribed to minimize the distortion induced by taxation on assets.

Third, our paper discusses a rationale for pursuing a change in the intergovernmental allocation of tax bases beyond the rate adjustments of housing taxes. Our claims are to be supported by the data of local government tax revenues. Finally, based on such theoretical and empirical discussion, we evaluate the current government's plan for reforming the housing taxation and suggest an alternative.

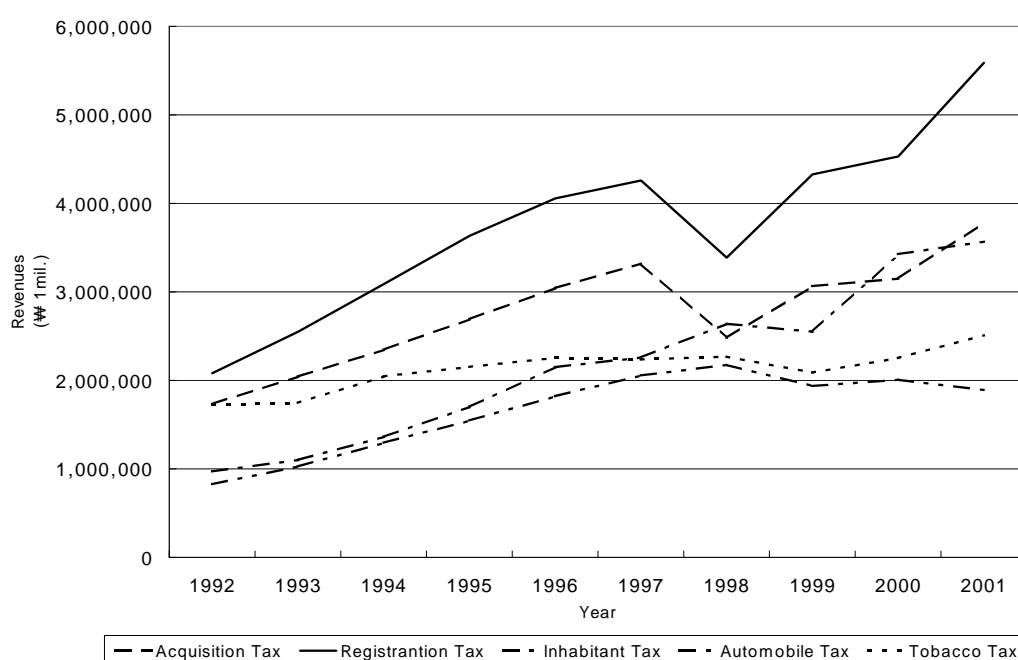
## II. Current Housing Taxation System in Korea

Under the current tax system, a reform in the housing taxation should be directed towards enhancing the efficiency and the equity of the total tax system by encompassing the rate adjustments not only among the housing taxes but also across different assets (including housing and non-housing assets) and the intergovernmental allocation of tax bases within a hierarchy of governments.

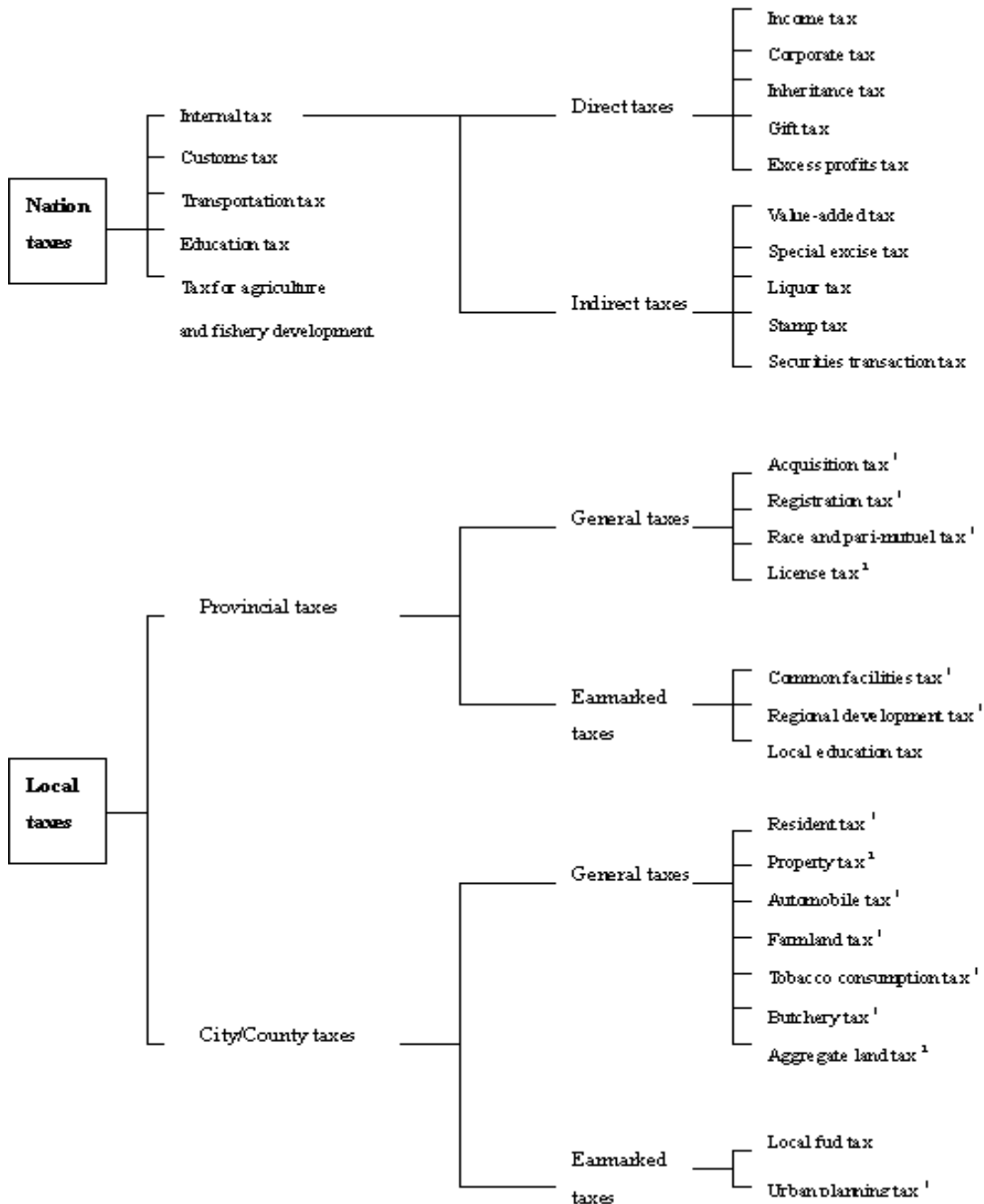
### 1. The Current tax System

The current tax system in Korea is very complicated: it consists of total 31 tax items, among which 14 are national tax items, 7 tax items are under the control of Metro-cities or provinces, and the rest 10 tax items under the control of counties, cities, and wards. In addition to a variety of taxes, many exemption and deduction clauses complicate Korea tax system further. This implies that Korea needs a tax reform, which involves not simply adjusting housing taxes but also changing the whole tax system.

[Figure 1] Annual Local Tax Revenues



[Figure 2] The Current Tax System in Korea



Note: 1) Special Metropolitan City and Metropolitan Cities taxes.

2) Autonomous District taxes.

Source: Korean Taxation 2002, Ministry of Finance and Economy

Of course, in presence of information asymmetry, the number of tax items tends to increase rather inevitably. Though, the complication of the current tax system evidenced by several factors of inefficiency, such as overlapping tax bases requires a tax reform in a grand scale.

Housing taxes (real estate taxes) are categorized into three groups by the assignment of tax right. Capital gains tax is attributed to the central government, registration and acquisition taxes to the prefectures, and property and aggregate land taxes are to the municipalities. The assignment of the tax right across the different level of governments makes it politically difficult for the central government to change tax rates. Especially, the revenues from transaction taxes (registration and acquisition taxes) take a substantial portion in the revenue of the local governments. As of 2001, the proportions of local tax revenues are in the order of acquisition tax, registration tax, local education tax, tobacco spending tax, automobile tax, aggregate land tax, and their sum takes 70 %of local government revenue. Considering that sum of aggregate land tax, property tax, urban planning tax, common facility tax takes 16.2% of the revenue, it seems that the local government revenues are heavily dependent on the transaction taxes.

According to tax theory, taxes levied on transactions cause frictions in the resource allocation and distort the allocation outcome. On the other hand, taxes on wealth relatively inflict less distortion in economic behaviors. In this context, a revenue neutral plan to lower transaction cost and raise wealth tax seems agreeable. However, a tax reform moving in this direction may lead to conflicts between the prefectures and the municipalities because transaction taxes are in the hands of prefectures whereas wealth tax is in the hands of municipalities.

To make it worse, reallocation of housing tax bases between the central and the local governments is not an easy option, either. In presence of regional inequality of tax bases (especially heavy concentration on Seoul Metropolitan area), the current local share tax system with zero lower boundary would cause resistance of non-subsidized regions (mostly urban areas) to the reallocation of tax bases. Thus, a prerequisite for the tax reform is mutual agreements of all the participants involved.

[Table 1] shows the inequality of local tax revenues is much smaller than that of national tax revenues, which is opposite to our previous argument. However, this seemingly contradictory observation can be explained in the following context. To begin with, several major national tax items including corporate tax and transportation tax are mostly collected in certain urban areas where the headquarters of the relevant corporations are located. Accordingly, they are liable to pay tax only at the location of the headquarters, though their economic activities are carried out mostly in other areas. The Gini coefficients of the national tax items exaggerate the geographical distribution of tax bases and they can be lowered by simply changing places of taxation defined in the tax codes.

Furthermore, admitted that there exists an economy of scale in provision of local public goods(Hur(2003)), the regional disparity of tax bases would aggravate the regional inequality in welfare derived from local public goods.

The local governments, which benefit from the current regime, are likely to resist the reform in the housing taxation initiated by the central government by exploiting the current flexible(or elastic) tax rate adjustment system.

[Table 1] Gini coefficients of per capita regional tax revenues (prefectures) (Hur(2003))

Classification	1999	2000	2001
Grand Total	0.3180	0.3570	0.3504
<b>Domestic Taxes</b>	0.4173	0.4541	0.4575
Income Tax	0.3041	0.2945	0.2798
Corporation Tax	0.6197	0.5811	0.5538
Value Added Tax	0.4806	0.6064	0.5824
Special Excise Tax	0.6182	0.6766	0.6878
Transportation Tax	0.8676	0.8814	0.8784
<b>Local Taxes</b>	0.1409	0.1535	0.1547
Asquisition Tax	0.1291	0.1493	0.1702
Registration Tax	0.1462	0.1618	0.1789
License Tax	0.1854	0.1805	0.1129
Inhabitant Tax	0.3744	0.3702	0.3700
Property Tax	0.0978	0.0937	0.0910
Automobile Tax	0.0679	0.0649	0.0628
Tobacco Spending Tax	0.0571	0.0478	0.0535
Synthesis Land Tax	0.1781	0.1756	0.1720
Motor Fuel Tax	N.A.	0.0753	0.0414

## 2. Comparison with taxation on other assets

In general, taxation on assets can be classified into the three categories of capital gains tax, wealth tax, and Transaction tax according to the timing and the basis of taxation. However, depending on the unique characteristics each asset holds, these three types of taxation on the specific asset are implemented in heterogeneous ways.

Broadly tangible asset is classified into two groups-financial and non-financial assets. On financial asset, such as equity, bond and deposits, are levied capital gains tax and transaction tax. In contrast, wealth tax in addition to them is levied on non-financial asset. Especially, on real estate and houses various taxes are imposed, such as acquisition-registration tax (transaction tax), transfer of income tax(capital gains tax), and property-aggregate land taxes(wealth tax).

One notable point in Korean system of taxation on financial income is its differential treatment of listed equities. Capital gains from trading listed stocks are not liable for taxation. Instead investors should pay certain fraction of trading amount for equity trading tax. Such tax treatment is different from those of dividends, bonds, and deposits, which are taxed based on the aggregate financial income taxation. This is a good example of discrimination persisting across asset.

The legal status of a holder as well as the type of asset held determines the tax treatment she/he would receive. For example, a corporation pays tax for financial income not according to the aggregate financial income taxation but according to the corporate income taxation. Before revision in December, 2000, non-resident individuals or foreign corporations were required to pay capital gains taxes from stock trading (listed or not).

In addition to the securities transaction tax, another transaction tax (the tax for Agriculture and fishery development) is levied whenever an investor sells stocks listed in the Korean Stock Exchange (KSE). There has been a view that such concentration on transaction taxes contributes to the financial market stability. However this view shows discrepancy from a principle of taxation, “where there is income, there is taxation”. Under the condition that capital gains taxation for stock trading is introduced in Korea, the reduction of transaction taxes should be considered.

[Table 2] Taxation on security trading

Category	Securities Transaction tax	tax for Agriculture and fishery development	Total
KSE	0.15%	0.15%	0.3%
Odd Lot (less than 10 shares)	0.5%	-	0.5%
KOSDAQ	0.3%	-	0.3%
Over-the-Counter Market	0.5%	-	0.5%

Second, taxation on income from financial assets other than capital gains from security holdings are levied under the provisions of Aggregate Financial Income taxation rule. The rule stipulates that one, whose annual financial income(interest and dividends) combined with her/his spouse’s is no greater than 40 million KRW should be taxed at the source of income(withholding taxation). On the other hand, one with financial income over 40 million KRW should be taxed at progressive rates after being summed with other sources of income including labor income, rents, business income, sales of property, and etc(needless to say, the withheld amount at the source of income is deducted from the tax due).

A possible distortion from the current Aggregate Financial Income taxation rule lies in

treating financial income differently from non-financial income, which in turn may have distortionary effects on the determination of household portfolio. For example, consider a taxpayer at the point of choosing investment items. If he invests in financial assets and raises income from the investment less than 40 mil KRW, then the tax rate he would be applied to is 16.5%(= income tax 15% + inhabitant tax 1.5%) uniformly at the sources of income. In contrast, if he invests in a business, then his business income would be taxed at progressive rate (though he earns the same amount of income as in the previous case).

Third, housing taxation consists of acquisition and registration taxes (administered by the prefectures), property tax and aggregate land tax (administered by the municipalities) and transfer of income tax (national tax). Acquisition and registration taxes combined with Education tax and the tax for Agriculture and fishery development amounts to 5.6%~5.8% of the original purchase price. Property tax and aggregate land tax are taxes at progressive rates ranging from 0.3~7% and 0.2~5%. The transfer of income tax allowing many exceptions, such as an exemption clause for single house owning household, levies different tax rates based on purchase/sales price, holding period and registration status at the point of transaction. Sale of a house previously owned at least 1 year would be taxed at the rates of 9~36% depending the sales price. Sales of a house within a year would be taxed at 36%, while the transfer of the house without proper registration would be regarded to have a speculative motive and be taxed heavily at the rate of 60%. However, it is not trivial to judge whether the effective tax rates applied in real estate transactions are higher than those on other assets because the appraisal of tax bases seems arbitrary and are not completely marked to market.

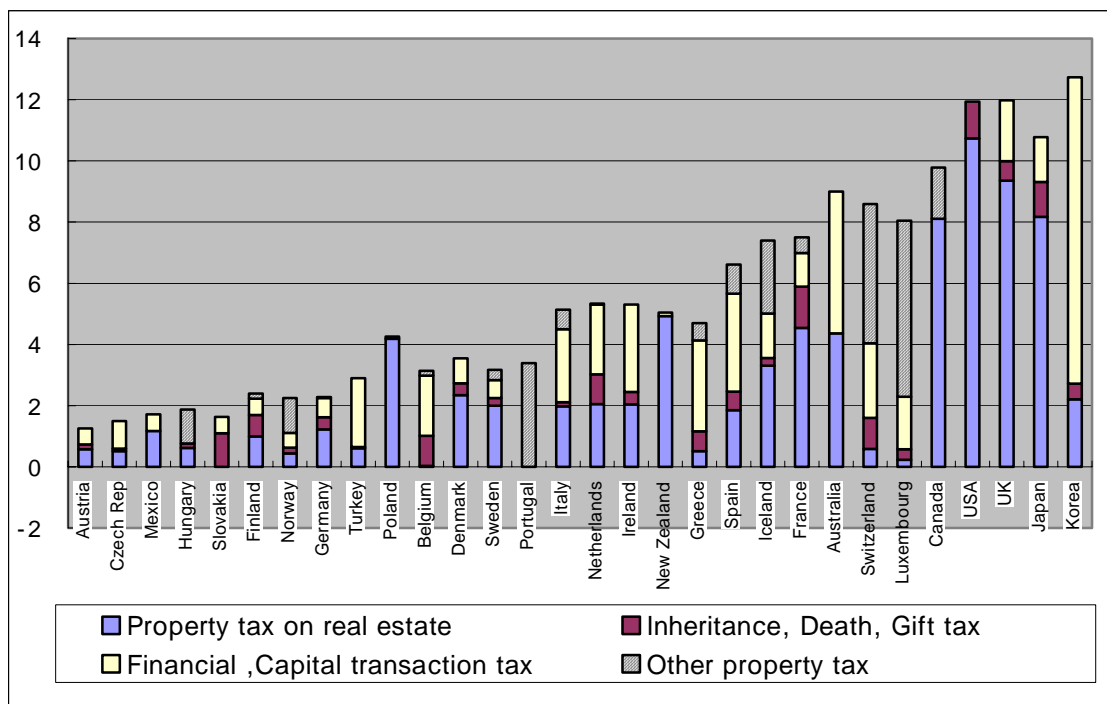
Overall, taxation on asset in Korea is evaluated to have differential factors and treat different types of asset in heterogeneous ways. Such asymmetric treatment of assets is well exemplified in a case that capital gains from listed stock trading is not taxed while dividends and interest are taxed at the source of income. Also, the Aggregate Financial Income taxation displays how the financial income is treated differently under the current tax code from other assets. These differential factors are significant in that they may cause distortionary effect in the allocation of resources. Therefore, we come to a principle of Equal Tax Treatment for Different Assets. However, it still remains an issue to evaluate the magnitudes of the differential factors by measuring the effective tax rates on different assets.

### **3. Practices in Other countries**

The proportion of property related tax revenues in the total tax revenue in Korea is greatest among OECD countries. According to OECD Revenue Statistics (2003), the proportion is recorded at 11.8%, which is more or less equivalent with Japan(10.8%) and US(12.2%) and far above the levels of Germany(2.4%) and Austria(1.29%). This is partly

because incomes from non-property sources are not fully verified by Tax Authorities of Korea and they relatively concentrate on levying taxes on property, which is more convenient to use tax bases.

[Table 3] Proportion of Property Related Tax Revenue in the Total Tax Revenue by OECD Countries (2002)

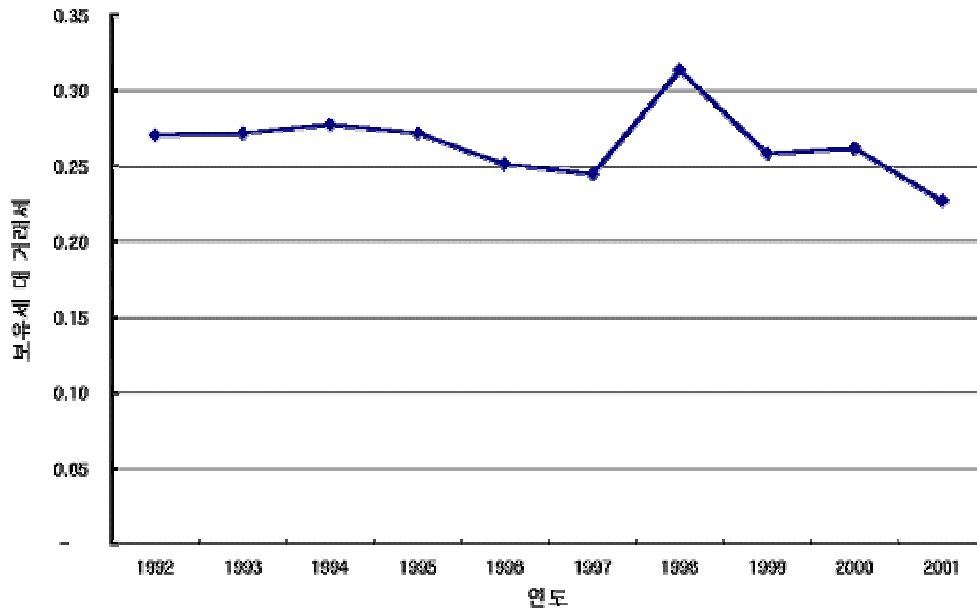


Note: 1) Other tax items such as net asset tax and non-regular property tax are included in "Other property tax".

2) Date Source: Revenue Statistics, OECD, 2001.

The current property related taxation in Korea has the characteristics of light wealth tax and heavy transaction tax. Furthermore, such concentration on transaction tax is still in progress.

[Figure 3] The Time Trends in the ratio of transaction tax revenues to wealth tax revenues

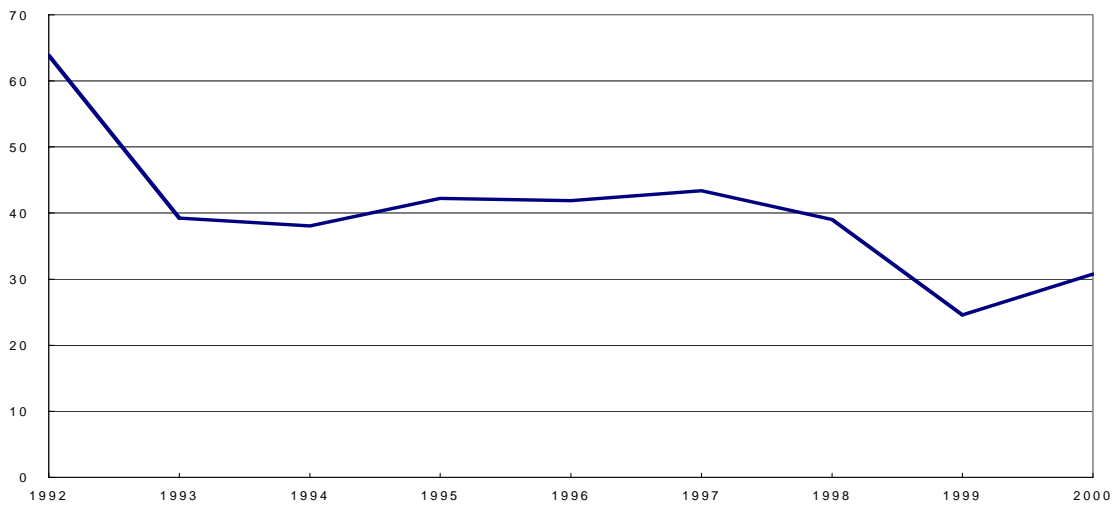


Note: 1) Data Source: Statistical Yearbook of National Tax (1992-2000), Public Finance Yearbook of Local Governments (1992-2000)  
 2) ratio = (property tax + aggregate land tax) / (acquisition and registration taxes)

According to OECD(2000), the effective wealth tax rate for real estate measured by the ratio of the tax revenue to the market price ranges from 0.1 to 0.15%, which is far smaller than 0.25% in Japan. In contrast, the tax burden on transaction amounts to 2.25% of GDP in 2003, which is the highest level in OECD countries.

In [Figure 4], the time trend in the ratio of capital gains tax revenues to transaction tax revenues is declining from 64% (1992) to 31%(2000). Heavy transaction tax burden accompanied by the transfer of income taxation has been a major policy tools for cooling down the housing market in Korea. However, it still needs careful attention to evaluate whether the higher tax burden on transactions has been successful in stabilizing the market or on the contrary it has frozen the market through lock-in-effect.

[Figure 4] The Time Trends in the ratio of capital gains tax revenues to transaction tax revenues



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e: 1) Date Source: Statistical Yearbook of National Tax (1992-2000), Public Finance Yearbook of Local Governments (1992-2000)

2) ratio = (transfer of income tax) / (acquisition and registration taxes)

On the other hand, if compared with other countries, the intergovernmental allocation pattern of housing or property taxes is notable. [Table 4] shows that there is no golden rule for that and the current system each country adopts seems stemming from her unique socio-political backgrounds. Even tax-sharing is also observed.

[Table 4] Intergovernmental Allocation of Real Estate related tax bases in other countries

	Central Government	Local Government
Aus	land tax	municipal rate
UK	NNDR	Council tax:
Japan	Land Price Tax	Fixed Property Tax (Land & Building), Land Planning Tax, Special Land Tax
US	-	property tax
Sweden	Property tax	-
Denmark	Property tax sharing	

### **III. Theoretical Discussions**

#### **1. General Claims**

A reform in the housing taxation should be motivated not by the need for controlling business cycles but by the need for raising government revenues and enhancing the efficiency of land utilization. At the same time, the existing exemption and deduction clauses as well as the number of tax items should be reduced in order to simplify the whole tax system and magnify its effectiveness.

More specifically, the reform measures should be taken in the direction of shifting the concentration of taxation to wealth taxes and reducing acquisition and registration taxes while raising transfer of income tax order to reduce efficiency loss.

In regard to the recent over-heated housing market, there have been many discussions about the readjustment of tax rates for property tax, aggregate land tax, and transfer of income tax in consideration of intergovernmental tax bases allocation. In the following, we summarize the focal points of the discussion (Hur(2003))

In order to strengthen fiscal independence of local governments and alleviate the regional disparity, tax bases, which are less susceptible to economic fluctuations, should be assigned to the local governments. In addition, the role of the local share tax should be minimized to induce more responsibility of the local governments. To implement this, acquisition and registration taxes should be directed to the central government, and the property tax should be reassigned to the prefectures. Instead the local governments should be assigned to the relatively stable (across time and states) tax bases, such as local consumption tax.

Aforementioned, the current heavy dependence on transaction taxes is likely to block trades of houses in the market thorough lock-in-effect or distort resource allocation between housing market and the other markets. Furthermore, transaction taxes are known to be more sensitive to economic fluctuations. Thus, it would be desirable that the transaction tax rates should be lowered and reassigned to the central government. In regard to the transfer of income tax, the effective tax rate should be raised by scaling back the scope of exemption and deductions.

In property tax and aggregate land tax, it should be given a priority to maintaining the tax bases closely to the market prices. To do so, the databases separately managed by NTO(income) and MOHAGA(property holdings) should be integrated. Property taxes based on the marked-to-market tax base is taxation to unrealized income, which is in contrast with the transfer of income tax(realized gains). However, levying property taxes on a basis of the marked-to-market tax base is justifiable on a ground that it is taxation on imputed rent.

Finally, the increase of tax burden on holding real estate should be matched with

reduction in other taxes.

The points introduced in the above summarizes the current discussions about the tax reform, at the center of which housing taxation lies. It is beyond our capacity to deal with every detail. Instead our paper focuses on the following issues, such as searching for the proper combination of income, wealth and transaction taxes on real estate and the optimal capital gains taxation across assets.

## **2. Analysis<sup>1</sup>**

### **2.1 Model**

The next model, basic framework of which are mostly borrowed from Constantinides(1984), Dammon and Spatt(1996), and Williams (1985), is designed to explore the impact of taxation on the behavior of trading houses in presence of transaction, income and wealth taxes. In addition it provides comparative static analysis on the trading behavior induced by the changes in these three taxes. Of course the tax system assumed herein considers most indispensable features at a minimum level for simplicity and it seems too abstract to be realistic. Hence, the implications of the model should be interpreted with certain level of reservation.

#### **(1) Capital gains tax**

The transfer of income tax, a sub category of income tax, is levied on the difference of original purchase price and sales price of asset. In practice, its effective tax rate is hard to calculate because it contains so many exemption and deduction clauses and treat tax payers depending on holding periods.

In the model we assume that there is no exemption and deduction clauses but the long-term holders is liable for lower tax rates than the short-term holders. Additionally, we assume that the tax base is completely marked to market and reflects the market price at the point of purchase and sales.

#### **(2) Wealth tax(holding tax)**

It is analogous to aggregate land tax and property tax under the current system. For the holding periods, house owners pay taxes amounting to a certain fraction of house value at the point of taxation regularly(semi annually or annually). Unlike the current aggregate land tax, the wealth tax considered in the model is not progressive.

#### **(3) Income tax(for rents)**

For the rents a house owner receives from tenant, income taxation is levied. However, one, who resided in owned house is not responsible for it.

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<sup>1</sup> This analysis is based only on no-arbitrage pricing model, therefore, does not deal with distribution issues.

#### (4) Transaction tax(Acquisition and Registration tax)

It is analogous to Acquisition and Registration tax. It is assumed that each party of the trades pays a certain fraction of the house price at the pint of transaction.

First, the house owner receives  $X_t$  of benefit each period. The benefit he receives next period  $X_{t+1}$  follows a binomial process: with probability of  $q$  it becomes  $uX_t$  and with the probability of  $1-q$  it becomes  $u^{-1}X_t$ .

$$X_t \rightarrow X_{t+1}, X_{t+1} = uX_t, \text{ with probability of } q \quad ;$$

$$X_{t+1} = u^{-1}X_t, \text{ with probability of } 1-q$$

On the other hand there exists a risk-free asset, which pays \$ R next period in return for \$ 1 invested at the current period. The rate of return on this risk-free asset ( $r$ ) is  $R-1$  accordingly.

In such an economy, we represent the equilibrium state price or Arrow-Debreu-McKenzie price,  $\pi_u (X_{t+1}=uX_t)$  and  $\pi_d (X_{t+1}=u^{-1}X_t)$ , as follows.

$$\pi_u = R^{-1}q, \quad \pi_d = R^{-1}(1-q), \quad R = 1+r$$

Then, assuming there is no taxation whatsoever, the price of the house  $\hat{P}_t$ , is calculated from solving  $\hat{P}_t = \pi_u [uX_t + u\hat{P}_t] + \pi_d [u^{-1}X_t + u^{-1}\hat{P}_t]$ .

$$\hat{P}_t = \hat{\Pi}X_t, \quad \hat{\Pi} = \frac{\pi_u u + \pi_d u^{-1}}{1 - \pi_u u - \pi_d u^{-1}}$$

However in reality there are various taxes involved in transaction and holding of houses. In presence of all the relevant taxes the value of the house  $P_t$  diverges from the value of owning the house  $W(P_t, B, h)$ , where  $B$  is the original purchase price of the house and  $h$  is the holding period of the house.

## 2.2 Optimal Investment Strategy for house owners

The price of a house is the present value of benefit follows from the house and a function of  $X_t$

$$P_t = P(X_t)$$

On the other hand the value of owning the house can differ from an individual to another depending on the current house price, the purchase price and holding period.

$$W(P, B, h) = W(P(X), B, h) \equiv V(X, B, h)$$

To begin with, the value of a house at the time of purchase is

$$V(X, (1+c)P(X), 0) = (1+c)P(X),$$

where  $c$  is the transaction tax rate

Second, the value of a house estimated by the owner at the time of sale should satisfy the following boundary condition.

$$V(X, B, h) = (1-c)(1-\tau)P(X) + \tau B$$

In this case, the house owner is responsible to pay not only transaction tax but also the capital gains tax. Of course, depending on the length of holding period, the different capital gains tax rate would be applied. Specifically, if  $h > N$ ,  $\tau = \tau_L$  and if  $h \leq N$ ,  $\tau = \tau_S$  ( $\tau_L \leq \tau_S$ )

Third, the value of a house estimated by the owner during the holding period should satisfy the following Bellman equation.

$$V(X, B, h) = \pi_u [uX(1-\tau_D) + V(uX, B, h+1)] + \pi_d [u^{-1}X(1-\tau_D) + V(u^{-1}X, B, h+1)],$$

where  $\tau_D$  is a tax rate on the service flow from housing.

In case of lease,  $X_t$  is understood as a rent paid to the house owner and  $X_t$  is taxable. In contrast, the service flow(imputed rent) from the owner residing house is not taxable in reality. Thus, we define  $\tau_D$  as follows:

$$\tau_D \equiv t_D I,$$

where  $I$  is an indicator function, which has the value of 0 if the owner resides in the house and 1 otherwise.

The price of a house is a linear function of the service flow  $\{X_t\}$ . The linear pricing kernel  $\Pi$  is calculated under the assumption of no-arbitrage pricing as in the case of  $\hat{\Pi}$ . However, unlike  $\hat{\Pi}$ ,  $\Pi$  considers the presence of taxation.

$$P(X) = \Pi X$$

In addition, considered that the valuation of a house held by an individual investor is linear with respect to  $X$  and  $B$ , we could save the number of variables by one in  $V$  as below.

$$V(\alpha X, \alpha B, h) = \alpha V(X, B, h), \quad x \equiv \frac{X}{B}, \quad v(x, h) \equiv V(x, 1, h) = \frac{V(X, B, h)}{B}$$

Through such a simplification process, the above defined Bellman equation is summarized with boundary conditions as follows.

$$v\left(\frac{X}{(1+c)P(X)}, 0\right) = 1 \quad , \quad v\left(\frac{X}{(1+c)\Pi}, 0\right) = 1 \quad , \quad v(x, h) = (1-c)(1-\tau)\Pi x + \tau$$

$$v(x, h) = \pi_u[ux(1-\tau_D) + v(ux, h+1)] + \pi_d[u^{-1}x(1-\tau_D) + v(u^{-1}x, h+1)]$$

## 2.3 Optimal Housing Investment Strategy

### 2.3.1 Case of Long-term holding

In this section, we analyze what factors determine the optimal trading strategy of a house in the long-term holding period ( $h > N$ ). In this case,  $v(x, h)$  is independent of the holding period  $h$  and is reduced to a time homogeneous difference equation  $v(x)$ . Thus, we obtain an explicit closed form solution of solution of  $v(x)$  by guess-and-verify

$$v(x) = \left[ \left[ (1-c)(1-\tau_L)\Pi - (1-\tau_D)\hat{\Pi} \right] x_L + \tau_L \right] \left( \frac{x}{x_L} \right)^m,$$

where  $x_L$  (=the current price of the house divided by the original purchase price) is an optimal selling point when  $x \leq x_L$  and

$$m = \frac{\ln[1 - (1 - 4\pi_u\pi_d)^{1/2} - \ln\pi_u - \ln 2]}{\ln u} < 0.$$

The optimal selling point  $x_L$  is obtained by differentiating  $v(x)$  with respect to  $x_L$  and setting its value at  $x = x_L$  to 0.

$$x_L = \frac{\tau_L m}{\left[ (1-c)(1-\tau_L)\Pi - (1-\tau_D)\hat{\Pi} \right] (1-m)}$$

$$\tau_L > 0, \quad (1-c)(1-\tau_L)\Pi - (1-\tau_D)\hat{\Pi} < 0$$

$$\Pi = \frac{(1-\tau_D)\hat{\Pi}}{1-\tau_L/(1-m)}$$

Representing it again by the ratio of the present price and the purchase price( $x$ ),

$$\frac{P}{B} = \Pi x_L = \frac{\tau_L m}{\left[ (1-c)(1-\tau_L) - (1+c)(1-z) \right] (1-m)}, \quad z \equiv 1 - \frac{\hat{\Pi}(1-\tau_D)}{\Pi(1+c)}.$$

For the long-term holder, an optimal strategy,  $x_L$  or  $\frac{P}{B}$ , is a function of tax rates. First, the rise in transaction tax rate lowers  $x_L$  and  $\frac{P}{B}$  and tends to reduce the trading volume of houses.

$$\frac{dx_L}{dc} = \frac{c(1-\tau_L)\tau_L\Pi m}{[(1-c)(1-\tau_L)\Pi - (1-\tau_D)\hat{\Pi}]^2(1-m)} < 0, \quad \frac{d(\frac{P}{B})}{dc} = \Pi \frac{dx_L}{dc} < 0$$

Second, the rise in the wealth tax rate<sup>2</sup> ( $\tau_D$ ) raises  $x_L$  and is likely to spur the transactions of houses. On the other hand,  $\frac{P}{B}$  does not respond to the change in  $\tau_D$ . Reminded that  $x = \frac{X}{B}$  and  $\frac{P}{B} = \frac{P}{X} \frac{X}{B}$ , the increased wealth tax rate increases the tax burden of holding a house and in turn it lowers the house price. Hence,  $x_L$  is lowered while  $\frac{P}{B}$  stays at the same level after the rise in  $\tau_D$ .

$$\frac{dx_L}{d\tau_D} = \frac{-\tau_L m}{(1-\tau_D)^2 \left[ \frac{(1-c)(1-\tau_L)\hat{\Pi}}{1-\tau_L/(1-m)} - \hat{\Pi} \right] (1-m)} > 0$$

$$\frac{d(\frac{P}{B})}{d\tau_D} = \frac{d}{d\tau_D} \frac{\tau_L m}{\left[ \frac{(1-c)(1-\tau_L)\hat{\Pi}}{1-\tau_L/(1-m)} - \hat{\Pi} \right] (1-m)} = 0$$

Third, the increased long-term capital gains tax ( $\tau_L$ ) has different effects on  $x_L$  and  $\frac{P}{B}$  depending on the magnitude of transaction tax rates(c). When c is very low, the increase in  $\tau_L$  lowers  $x_L$ <sup>3</sup>. However, as the size of c increase, the increased  $\tau_L$  raises  $x_L$  and  $\frac{P}{B}$

<sup>2</sup> Here, we do not differentiate  $\tau_D$  from rental income tax. However, it is more realistic to assume  $\frac{\tau_D}{\Pi}$  as wealth tax rate. In this case, the new definition of wealth tax rate becomes a function of  $\tau_D$  as well as  $\tau_L$ , which makes our analysis more complicated.

<sup>3</sup>  $\frac{P}{B}$  is increasing in  $\Pi$  if  $c > 0$  and non-decreasing if  $c = 0$ .

and expedite the transactions of houses. This result is exactly opposite to the existing theory that the increase capital gains tax deters the transactions in housing market. Instead it exhibits that the effect of a change in capital gains tax rate is not one-directional and holds different signs depending on the presence and the value of the transaction rate  $c$ . Also, it shows that under a certain tax system the change in a tax rate cannot be fully analyzed without considering other tax items.

Define  $C^* \equiv \frac{-m\tau_L^2}{(m^2 + (1-\tau_L)^2 - m(2-2\tau_L + \tau_L^2))}$ . Then, if  $C \geq C^*$ ,

$$\frac{dx_L}{d\tau_L} = \frac{-m(m\tau_L^2 + c(m^2 + (1-\tau_L)^2 - m(2-2\tau_L + \tau_L^2)))}{(1-\tau_D)(1-m)\hat{\Pi}(c(1-m)(1-\tau_L) - mt)^2} \geq 0, \text{ and if } C < C^*, \text{ then } \frac{dx_L}{d\tau_L} < 0.$$

Next, we can easily show that  $\frac{d(\frac{P}{B})}{d\tau_L} = \Pi \frac{dx_L}{d\tau_L} + x_L \frac{d\Pi_L}{d\tau_L} \geq 0$  by applying the fact that

$$\frac{d\Pi}{d\tau_L} = \frac{(1-\tau_D)}{(1-m)(1-\frac{\tau_L}{1-m})^2} > 0, \quad \frac{d\Pi}{d\tau_L} \frac{\tau_L}{\Pi} = \frac{1}{1-m-\tau_L} > 0, \quad \frac{dx_L}{d\tau_L} \frac{\tau_L}{x_L} \geq \frac{-1}{1-m-\tau_L} \quad (\text{the equality}$$

holds when  $c=0$ ).

So far we have explored the properties of the optimal strategy for the long-term holder in terms of  $x = \frac{X}{B}$  (the ratio of Rent to the original purchase price)  $\frac{P}{B}$  (the ratio of the house price to the original purchase price). Using  $\Pi = \frac{P}{X}$ , we can also analyze how the changes in tax rates affect the ratio of  $\frac{\text{House Price}}{\text{Rent}}$ .

Furthermore, we already know that  $\Pi$  is a function of capital gains tax rate and the wealth tax rate. The changes in  $\frac{\text{House Price}}{\text{Rent}}$  following the tax rate changes are estimated by differentiating  $\Pi$  with respect to the tax rates.

$$\frac{d\Pi}{dc} = 0, \quad \frac{d\Pi}{d\tau_L} > 0, \quad \frac{d\Pi}{d\tau_D} < 0$$

The results show that the increase in wealth tax rate reduces the discrepancy between the asset value of a house from its use value whereas the increase in capital gains rate widens the chasm.

### 2.3.2 Cases of short-term holding

In this section, we discuss about the determinants of house trades for the short-term holders ( $h \leq N$ ). In case of the short-term holding, the value of owning a house  $v(x, h)$  depends on the length of the holding period ( $h$ ). Accordingly, an optimal strategy of the house owner should be calculated recursively and numerically.

For the short-term holding case, the only available qualitative result is that the optimal trading strategy represented by  $x_L$  is an increasing function in the holding period  $h$  ( $x_L = x_L(h), x_L(h) \leq x_L(h+1)$ ) and  $\Pi x_L(h) < 1$ . For the short-term holders,  $\frac{P}{B} = \Pi x_L(h) < 1$  implies that it is optimal to realize loss sooner as means of reducing the burden of income taxation.

Here it is notable that unlike taxation on the long-term gains the taxation on the short-term gains blocks the transactions of houses. In addition the higher short-term tax rate (compared with the long-term rate) induces householders to maintain the ownership till the minimum long-term holding period passes<sup>4</sup>. Despite its effect of blocking house trading, the higher short-term taxation has effect of reducing the trades motivated by the short-term profits. In sum, it is not necessarily undesirable to levy taxes on the capital gains.

## 3. Analysis-II

So far we have analyzed the impact of housing taxes on the behavior of holding and trading houses. A combination of income tax, wealth tax, and transaction tax is shown to induce a trading pattern of houses in a certain direction. Thus, we could deduce some policy recommendations while maintaining the revenue neutrality.

In this section, we broaden our perspectives to consider other asset markets than the housing market and explore how the taxation across assets should be designed<sup>5</sup>. In other words, we solve a Ramsey problem of capital gains taxation in a multi asset economy.

The traditional Ramsey rule suggests that the ratio of optimal tax rates between different goods is the inverse ratio of demand elasticities in goods market. The results are obtained from solving the government's maximization problem with consumers' demands schedule and the governmental budget constraint as given. The situation we will consider is quite similar to the original Ramsey setup. The governmental expenditures are exogenously determined.

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<sup>4</sup> Constantinides(1984) proves that it is optimal not to leave capital gains, either long-term or short-term, unrealized if there is no difference in capital gain tax rate between long-term holding and short-term holding.

<sup>5</sup> Considering wealth tax is not imposed on assets other than real estate, this section focuses only on capital gains tax in order to main consistency.

Under the budget constraint, the government has to find a way to afford the spending, while hurting the investors' welfare at a minimum level.

Before applying the Ramsey setup directly to the financial markets, we have to consider the following points.

(1) Government's tax revenue is not deterministic in financial markets. It is a stochastic process, closely related to the movements of the market portfolio.

(2) A multi-period setup (beyond two periods) is hardly tractable due to the tax-saving behavior (so called, tax-timing option).

The point (2) seems okay, since the original Ramsey setup is also static. For the dynamic setup, we can use various numerical techniques for calculations. But how can we handle with (1)? The answer lies in financing strategies of the government, which will be discussed in the next section.

### 3.1 Assumption

The most simplifying assumptions are adopted in order to derive clear results. There are  $n$  types of financial assets available in an economy. All the  $n$  assets are risky assets. An investor can allocate his initial wealth on these assets and get utility from consuming his whole wealth in the next period.

0. A history of the economy starts at 0 period and ends at period 1 ( $i=0,1$ )<sup>6</sup>

1. A utility function depends on the terminal wealth and is strictly concave in the terminal wealth.

$$U = U(W), \quad U' > 0 \quad \text{and} \quad U'' < 0$$

Right now, we are assuming a single representative agent. However, we will discuss a multi-agent setup. Even in that case, we will assume that the preferences of the agents are homogeneous.

2.  $Z_i, i = 1, 2, 3, \dots, n$ , is return processes of each risky asset. There exists a continuous joint probability distribution for the return processes.

$$\Pr[Z_1 \leq z_1, \dots, Z_n \leq z_n] = F(z_1, \dots, z_n)$$

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<sup>6</sup> The reason why we do not extend the time horizon beyond two period is because in a longer time horizon tax-saving behavior should be considered and it will make the problem intractable. For more details in the tax-saving behavior, see Constantinides (1983).

$$= \int^{z_1} \cdots \int^{z_n} f(Z_1, Z_2, \dots, Z_n) dZ_n \cdots dZ_1$$

where  $\Pr[Z_i < -1, \forall i = 1, 2, \dots, n] = 0$

3. The initial wealth of the investor ( $W_0=1$ ) is 1 for normalization.

4. The government needs  $G$  amount of wealth at 0 period.  $G$  may be used for security or national defense. Assume that the use of  $G$  doesn't affect the investor's utility.

The decision procedures for the participants of this economy (government and the investors) are drawn in Figure 1. At 0 period, the government has to consider how to finance  $G$ . A different financing strategy leads to a different optimal taxation rule. Thus, the investor's portfolio selection will be affected. At period 1, the investor will consume all the wealth. The amount of the terminal wealth depends on the performance of his portfolio and the taxation system. The government will pay back debt, if the financing strategy at 0 period includes the issue of a new asset.

As mentioned above, the government has a few options to use in financing  $G$ . The policy options are :

(1) to issue money and finance  $G$  in the first period.

(2) to levy tax on the initial wealth and finance  $G$  in the first period.

(3) to issue risky asset based on the future tax revenues of the government.

(4) to print out new money and issue bond in the first period and pay back the debt in the second period. If tax revenue is less than the amount of debt due in the second period, the government will also issue new money in the second period.

To begin with, it is easily verifiable that the method (1) is equivalent with (2). It is because money expansion in (1) can be regarded as an inflationary tax of the same effect with (2). (4) is potentially superior to (1) and (2), since (1) is its subcase. In (4), the maximization problem is decomposed into two parts. First, the government has to decide what proportion of  $G$  should be financed by monetary or fiscal policy. Second, it has to set tax rates on every asset in the financial market once the fiscal policy is adopted. The first part of (4) is beyond the scope of this paper, and the second part coincides with the model in section 3. In section 3, I will solve the case in which the government supplies the riskless bond to finance  $G$  at 0 period and pay back the debt at second period.

### **3.2 derivation of optimal capital gains tax rates**

So far the governmental policy is to borrow from public and pay it back by raising capital gains tax and issuing new money next period. However, we know that this is not the

only way of financing the government expenditure  $G$  from the earlier discussion. Let's take a look at the third financing scenario. In this model, the government issues a risky asset based on the future tax revenues. There is no money and all the returns are denominated in real terms.

The procedures are basically as follows. First, the government announces to issue a new risky asset and promises a certain stream of returns from the asset. Second, the investor composes his portfolio based on his prior information on the joint probability of returns  $f(Z_1, \dots, Z_n)$  and the return process of the newly introduced risky asset. In the equilibrium, the portfolio weight on the new risky asset should be equal to  $G$ . Third, at period 1, the government pays the principal and the rate of return from the new risky asset depending on its tax revenue. The investors consume what they have earned after paying the taxes due.

In addition we assume that the investor perceives how the rate of the return from the government issued tax exempt risky asset is linked with the returns from the other assets<sup>7</sup>. However, the investor's perception is incomplete in a sense that he doesn't expect his own portfolio decision changes the probability distribution of the return from the government issued tax-exempt asset<sup>8</sup>.

$$\begin{aligned} \max_{\alpha_1, \dots, \alpha_n} EU(W) &= \max_{\alpha_1, \dots, \alpha_n} \int \cdots \int_{Z_1, \dots, Z_n} U(W) f(Z_1, Z_2, \dots, Z_n) dZ_1 \cdots dZ_n \\ W &= \sum_{i=1}^n \alpha_i (1 + (1 - \tau_i) Z_i) + (1 - \sum_{i=1}^n \alpha_i) (1 + Z) \\ 1 + Z &= ((\sum_{i=1}^n \alpha_i \tau_i Z_i) / G), \end{aligned}$$

$\alpha_i, i = 1, 2, \dots, n$  is a weight of the  $i$ -the asset in a portfolio,  $Z$  denotes the rate of return from the government issued tax exempt risky asset. The, the FOCs of the maximization program are

$$E[U'(1 - \tau_k) Z_k - Z] = 0, \quad \text{for } k = 1, 2, \dots, n.$$

The government's maximization program is to find a capital gains tax rate system for all kinds of asset, which minimizes the reduction of the welfare loss while raising  $G$  amount of revenues.

$$\max_{\alpha_1, \dots, \alpha_n} EU(W) = \max_{\alpha_1, \dots, \alpha_n} \int \cdots \int_{Z_1, \dots, Z_n} U(W) f(Z_1, Z_2, \dots, Z_n) dZ_1 \cdots dZ_n$$

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<sup>7</sup> Although we assume that the government issued risky asset is taxable, we can derive the same result.

<sup>8</sup> In case that there are at least two homogeneous investors, we can derive the same result without assuming this.

$$\begin{aligned}
W &= \sum_{i=1}^n \alpha_i (1 + (1 - \tau_i) Z_i) + (1 - \sum_{i=1}^n \alpha_i) (1 + Z) \\
&= \sum_{i=1}^n \alpha_i (1 + Z_i), \quad \left( 1 + Z = \frac{\sum_{i=1}^n \alpha_i \tau_i Z_i}{1 - \sum_{i=1}^n \alpha_i} \right) \\
G &= (1 - \sum_{i=1}^n \alpha_i) \quad (\lambda \text{ is a Lagrange multiplier}).
\end{aligned}$$

With respect to the tax rate on the i-th asset, the FOC is represented as follows:

$$E[U' \sum_{i=1}^n (\partial \alpha_i / \partial \tau_k) (1 + Z_i)] = \lambda \sum_{i=1}^n \partial \alpha_i / \partial \tau_k$$

Dividing this with the FOC of the m-th asset, then we can eliminate the Lagrange multiplier ( $\lambda$ ).

$$\frac{\sum_{i=1}^n (\partial \alpha_i / \partial \tau_k) (1 / (1 - \tau_i))}{\sum_{i=1}^n (\partial \alpha_i / \partial \tau_m) (1 / (1 - \tau_i))} = \frac{\sum_{i=1}^n \partial \alpha_i / \partial \tau_k}{\sum_{i=1}^n \partial \alpha_i / \partial \tau_m}$$

The above equation implies that  $\tau_k = \tau_m = \tau$ . Thus, it is deduced that the optimal tax rates should assign a uniform tax rate regardless of taxable asset.

#### 4. Policy Implications

From the above models, we deduce the following implications.

First, lock-in-effect of the transaction tax is confirmed by the fact that increase in the transaction tax rate lowers  $x_L$  and  $\frac{P}{B}$  and reduces the trading volume of houses. Thus, the lowered transaction tax rate may lead to the increased tax revenue by increasing the trade frequencies.

Second, in presence of capital gains tax it is optimal to defer gains and realize loss sooner (Constantinides(1984)). However, in case there is no negative tax deduction like in Korea, the capital gains taxation has no effect of inducing the realization of capital gains sooner. On the other hand, tax rate differential over the holding periods(for example, levying the lower tax for the long-term holder) encourages the long-term holding of houses.

Third, wealth tax alleviate the lock-in effect possibly coming from the fortified

transaction tax or income tax. Hence, a revenue neutral adjustment involving the increase in wealth tax rate and the reduction in transaction tax would be considered.

Fourth, the effect of the rising capital gains tax rate has different directions depending on the size of the existing transaction tax rates. The increasing capital gains tax rate causes lock-in effect at low level, while it reduces the lock-in effect at high level.

Fifth, capital gains tax rates on various assets bring about the least welfare loss when they are uniform. Of course, interpretation of this argument is limited in that it doesn't consider the other assets than the capital gains tax.

#### **IV. Concluding remarks**

So far we have discussed the current housing related tax system and explored simple theoretical models to derive policy implications. Throughout the paper, we have found that the reduction of the transaction tax matched with a rise in wealth tax rate as well as applying differential tax treatment over the holding periods is desirable

On other hand, in regard to taxation on other assets, we have shown that the uniform tax rate system guarantees the optimality. Accordingly, it is undesirable to levy different tax rates across assets and to allow exemption and deduction clauses because such action would distort the investment across assets.

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