**Chapter 11**

**Applying First-Best Principles: What to Tax and How**

1. The five main objectives in designing broad-based taxes

 a. Ease of administration and taxpayer compliance

 1). Ease of administration is the Departments of Revenue viewpoint--taxes have to be easy and inexpensive to collect or the tax will not be used

 2). Ease of compliance—the taxpayers' viewpoint—tax payers need to be capable of keeping the records required to determine their tax liability and to compute their tax liability in a reasonable period of time

 b. Minimize deadweight loss—the static efficiency concept

 1). Virtually all broad-based taxes are distortionary and generate some deadweight loss (to be discussed in Chapter 13)

 2). The goal is to collect a given amount of tax revenue with the least amount of deadweight loss

 c. Promote long-run economic growth—the dynamic efficiency concept—a macro goal

 1). Maintain incentives for saving and investment to the extent possible

 2). Help steer the economy to the Golden Rule of Accumulation, the capital/output ratio that maximizes consumption per person

 d. Flexibility—primarily a macro goal

 1). Taxes must be easily adjusted and lead to quick changes in tax liabilities to help smooth out business cycles and keep the economy close to its production possibilities frontier

 e. Equity—promote society's quest for end-results and process equity

 f. Note: Chapter 11 is concerned with equity in taxation, since it maintains first-best assumptions in which efficiency issues cannot arise—issues of administration and compliance are covered in later chapters as part of second-best analysis

2. The Adam Smith-John Stuart Mill ability-to-pay principle as a principle of equity in taxation-underlies tax policy debates in the U.S. and many other countries

 a. Before Smith and Mill, the only equity principle was the benefits-received principle-- harder to resort to as services and populations became more diffused and governments became involved with transfers to the poor.

 b. They thought of taxes as a necessary sacrifice that citizens had to make for the common good, without a direct benefit in return

 c. The question was how to ask people to sacrifice and their answer was according to their ability to pay.

 d. In addition, the sacrifice had to honor two subprinciples, horizontal and vertical equity

 1). Horizontal equity: equal treatment of equals—two people with same ability to pay should by the same tax—seen as the search for the ideal tax base

 2). Vertical equity—it is permissible to treat unequals unequally—two people with different abilities to pay can by asked to pay a different amount of tax—seen as the search for the ideal tax structure, which includes the pattern or tax rates and any differences in the tax base across taxpayers based on their personal circumstances

 e. Ability-to-pay principles can be thought of as first best principles because they are concerned only with equity in taxation, not efficiency

 f. By viewing taxes as a necessary sacrifice, the ability to pay perspective is quite different from the social welfare perspective, in which taxes can only promote social welfare in a first-best environment

3. The quest for horizontal equity, the ideal tax base

 a. The first proposal for a tax base to gain widespread appeal that was based on ability-to-pay principles came from economists Robert Haig and Herbert Simon in the 1920s and 1930s.

 b. Haig and Simon's three principles of tax design leading to the ideal tax base:

 1). Individuals bear the burden of taxation

 2). Individuals sacrifice utility when paying taxes

 Feldstein's versions of horizontal and vertical equity:

 Horizontal equity: two people with equal utilities before tax should have equal utilities after tax

 Vertical equity: at a minimum, no reversals: if person 1 has higher utility than person 2 before tax, person 1 should have higher utility after tax

 3). Since can't tax utility, the ideal tax base is the best surrogate measure of utility

 c. Haig and Simons proposed a broad-based measure of income as the best surrogate measure of utility, called Haig-Simons income (YHS)

 1). YHS = the increase in purchasing power during the year

 2). YHS = consumption + change in net worth = C + NW

 --realized purchasing power plus unused purchasing power

 3). YHS = C + S + Capital Gains (Losses)

 4). YHS = Ypersonal + CG

 5). Two people with the same YHS should pay the same tax: horizontal equity

 6). Two people with different YHS may pay different taxes, depending on society's view of distributive justice: vertical equity

 d. Impermissible distinctions that do matter under the U.S. federal personal income tax

 1). Sources of income

 Whether income is earned or unearned (transfer receipts)

 Whether income is Ypersonal or capital gains

 Whether income is received as cash or in-kind

 Within Ypersonal, whether it comes from wages, rents, or returns to capital

 2). Uses of income

 Whether income is consumed or saved

 The form that consumption takes

 Whether capital gains are realized (assets sold) on accrued (assets not sold)

 e. The only permissible deduction from YHS are business expenses incurred to earn income—not available to the taxpayer as an increase in their purchasing power

 f. YHS should be indexed to inflation so that real tax liabilities are independent of the rate of inflation.

 g. All other taxes are subject to charges of horizontal inequity since they cannot guarantee that two taxpayers with equal YHS pay the same tax

4. Criticisms of YHS

 a. Likely to be a flawed surrogate measure of utility

 1). Consider the simple labor-leisure model with a fixed wage and 16 hours of leisure time—Y = w(16 – Leis)

 {Insert Figure 11.1}

 2). If two people have same tastes, abilities, opportunities in this model then they have the same Y and Leisure and achieve the same utility level—income (or anything else people consume in common) is a perfect surrogate for utility

 3). Tastes differ—left hand panel—both reach the same utility but have different Y and will be taxed differently

 3). Opportunities differ-right hand panel—higher wage person #1 assumed to take all the increased opportunity as increased Leisure—same Y, but different utility levels

 b. Consumption is a better surrogate measure of utility—may well have replaced YHS among mainstream economists as the best tax base

 1). Should take a lifetime view of utility: Two people with equal PVutility before tax should have same PVutility after tax and pay the same PVtaxes over their lifetimes

 2). Consumption is the act that generates utility—saving simply postpones consumption

 3). Therefore, the goal is equal lifetime CPV before tax, equal lifetime CPV after tax

 4). If the tax authority kept track of taxes over lifetimes, either income or consumption could serve as the tax base because of the lifetime budget constraint: YPV= CPV, counting bequests as the final act of consumption or inheritance as the first source of income

 5). But with taxes levied annually, only a consumption tax can guarantee

equal CPV before tax, equal CPV after tax

 6). Consider simple two person, two period example

 {Insert Table 11.1}

 Both people earn income = Y each period

 Person 1 consumes the Y each period

 Person 2 saves all first-period Y and consumes everything in period 2

 The rate of interest is r

 7). CPV= Y + Y(1+r) for both before taxes. A proportional consumption tax preserves equal CPV before tax, equal CPV after tax

 8). An income tax

 - changes the effective interest rate to r(1-ty)

 - involves double taxation of saving, since saving is taxed and the return to saving is taxed

 -the CPV  after tax differs for the two people, violating horizontal equity in a lifetime framework

 9). Can turn the income tax into a consumption tax in this model in two ways:

 --deduct saving from the tax base—that is a personal consumption tax

 --deduct the return from saving from the income tax base; only wage income is taxed-- the interest rate returns to r and the equality of CPV before and after taxes returns

 10). In this model, a consumption tax is equivalent to a wage tax.

 11). Not true in real life because a consumption tax applies to all years of adult life but a wage tax applies only to those adults still working, not the retirees.

 -- In an OLG/Life-Cycle framework, a consumption tax is equivalent (in expected value) to a wage tax plus a one-time levy on wealth at the time of retirement (the wealth equals the expected CPV during retirement, counting any bequest as the last act of consumption)

 12). The closest the U.S. came to a consumption tax was the mid-1980s wen the Reagan administration seriously considered a proposal to replace the personal income tax with a consumption tax. They did not, and the Tax Reform Act of 1986 (TRA-86) called for a simplified personal income tax.

5. Ability-to-pay versus the interpersonal equity conditions for social welfare maximization

 a. A superficial similarity since both consider taxpayers' abilities-to-pay, measured by income or consumption

 b. Differences

 1). IE conditions incorporate individuals' marginal social welfare weights

 2). Horizontal equity under ability-to-pay is a before and after levels comparison: equal utility before tax, equal utility after tax; the IE conditions are concerned only with the final outcome, at which social marginal utilities are equated

 c. Consequently, two people must have equal tastes, opportunities, abilities and marginal social welfare weights to be treated equally under the two standards.

d. Consider a two-person, two-good exchange economy with fixed endowments of the two goods. Let Xij = consumption of good j by person i, for i, j = 1, 2. The first-order conditions for a social welfare maximum in this economy are

*Pareto optimality:*



*Interpersonal equity:*

 1). If the marginal social welfare weights differ evaluated at equal utility levels (i.e., affirmative action),, then the IE conditions are inconsistent with equal utility before tax, equal utility after tax

 2). If the marginal social welfare weights are equal than the IE conditions become

 This differs from the ability-to-pay standard if tastes or initial endowments differ

 3). If the two consumers happen to enjoy the same level of utility at an initial pareto optimum before the government redistributes one of the goods to satisfy the interpersonal equity conditions, there is no guarantee they will enjoy equal utility levels after the socially optimum tax and transfer has been effected.

 4). Example with different tastes

 The equal-utility pareto optimum occurs at:

 (X1,X2)

Person 1 (4,2.4)

Person 2 (6,7.6)

 The social welfare optimum, satisfying both pareto-optimality and the IE conditions with equal marginal social welfare weights occurs at:

 (X1, X2)

Person 1 (5,15/4)

Person 2 (5,25/4)

with unequal utilities

 5). Final difference: the quest for horizontal equity under the ability-to-pay principle is concerned with determining the ideal tax base, whereas the choice of the tax base is *irrelevant* under the interpersonal equity conditions. As we saw in Chapter 2, if pareto optimality holds and the interpersonal equity conditions are satisfied for any one good or factor, then the interpersonal equity conditions are automatically satisfied for all goods and factors, as required for a social welfare maximum. Any good or factor can be chosen for lump-sum redistribution; that is, *any* tax base will do

 6). Only concern of the interpersonal equity conditions is vertical equity, the choice of the tax structure to be applied to whatever tax base is chosen.

 e. Musgrave's recommendation: don't worry about the tax base—either consumption or income will do—main concern should be vertical equity, the tax structure, since it has the biggest effect on distributive justice—in line with the social welfare perspective that any tax base will do

6. Vertical equity

 a. Standard practical measure of vertical equity is whether taxes are progressive, proportional, or regressive, in the ability-to-pay tradition

 1). Compute T/Y for each person, where T is the tax burden (not necessarily equal to the tax payment because of deadweight efficiency loss) and Y is the chosen tax base (YHS in an annual framework, CPV , along with TPV, in a lifetime framework)

 2). Ask what happens to T/Y as Y increases

 If T/Y increases, the tax is progressive

 If T/Y constant, the tax is proportional

 If T/Y decreases, the tax in regressive

 b. In the social welfare framework, the pattern is given by comparing the distributions of Y (or C) before tax after the IE conditions are implemented

 1). Problem in a first-best environment: under the Atkinson assumptions (equal marginal social welfare weights at same utility level, same tastes, diminishing private marginal utility of income), the policy prescription is to level to the mean

 2). Designing taxes under the social welfare framework makes sense only in a second-best environment, with both equity and efficiency concerns considered

 c. Older sacrifice principles of vertical equity

 1). Minimize aggregate sacrifice—utilitarian—

 Calls for highly progressive taxation if people have same tastes and diminishing MUY

 Example:

 Take from #3 until MUY rises to 9, then from #3 and #2 until MUY rises to 10, and then from all three

 2). Equal absolute sacrifice: U(Yh) – U(Yh – Th) = c all h = 1, ..., H

 3). Equal proportional sacrifice: U(Yh) – U(Yh – Th)] / U(Yh – Th) = k all h = 1, ..., H

 4). Problem: MYY not invariant to monotonic transformations of the utility fn-diminishing MUY can be turned into increasing MUY

7. Young's attempt to rescue the equal sacrifice principles through an axiomatic approach in the spirit of a cooperative game about taxation—

 a. Taxes should honor the following six principles:

 1). *The consistency principle*—If a method of taxation is considered to be fair for the entire group of taxpayers, then it must also be considered fair for any subgroup of the taxpayers- people cannot alter their tax liabilities simply by joining different subgroups-- automatically satisfied if the tax is on individuals

 2). *Monotonicity*—If the government is forced to increase total tax revenues, then everyone’s tax liability must increase. This is the strong version of the principle. The weak version is that if total tax revenues increase, then no individual’s tax liability can decrease.

 3). *The composition principle*—The method used to raise a given amount of tax revenue must also be used to raise any increment in tax revenue. In other words, society should stick with the method that it believes is fair-- satisfied by surtaxes

 4). *Horizontal equity*—Two people with equal utility before tax should have equal utility after tax.

 5). *Vertical equity*–No utility reversals. For any two people, the person with higher utility before tax must have higher utility after tax.

 6). . *Scale invariance or the homogeneity principle*—Suppose everyone’s incomes and the revenue requirement increase by a scalar . Then, every one’s tax liability must increase by .

b. Young’ six principles hold if and only if tax collections imply equal sacrifice with respect to one of two utility functions:

 Uh = aln(Yh) + b or Uh = aYP + b a, P < 0

c. Equal sacrifice under these two utility functions in turn implies very simple tax functions, the first a proportional tax and the second a progressive tax.

d. The distinction between equal absolute and equal proportional sacrifice is irrelevant-- equal absolute sacrifice with respect to some utility function, U, is equivalent to equal proportional sacrifice with respect to the function eU, which is a valid monotonic transformation of U and would have no effect on individual choice.

 U(Yh) – U(Yh – Th) = C

 [eU(Yh) – eU(Yh-Th)]/eU(Yh-Th)] = K

 , which can only hold if

 U(Yh) – U(Yh – Th) is constant

e. The sufficient condition

 1). Consistency holds by definition if tax base is YHS

 2). Monotonicity-. Let total tax collections rise and assume person i is taxed more. Then U(Yi) – U(Yi – Ti) > C. To maintain equal absolute sacrifice, everyone else must pay more taxes to increase their difference between U(Yh) and U(Yh – Th) and restore equal sacrifice.

 3). *Composition*—Assume that U(Yh) – U(Yh – Tlh) = C for given total tax collections T1. Suppose that tax collections rise to T2 and equal absolute sacrifice is maintained for the increment of taxes between T1 and T2: U(Yh – T1h) – U(Yh – T1h – T2h) = C.′ Adding the two results: U(Yh) – U(Yh – T1h – T2h) = C + C’ = C”. Equal absolute sacrifice is also maintained for the new higher tax collections T2.

 4). *Horizontal equity*- if U(Yi) = U(Yj) and U(Yi) – U(Yi – Ti) = C = U(Yj) – U(Yj) – Tj), then U(Yi – Ti) = U(Yj – Tj).—assumes positive MUY

 5). Vertical equity-- if U(Yi) > U (Yj) and U(Yi) – U(Yi – Ti) = C = U(Yj) – U(Yj – Tj), then U(Yi – Ti) > U(Yj – Tj).

 Conclusion: equal absolute sacrifice with respect to any valid utility function U satisfies each of Young’s first five principles of taxation.

f. Proportional taxation

 1). Consider the utility function Uh = aln Yh + b. Equal absolute sacrifice implies aln Yh – aln(Yh – Th) = C, for h = 1, ..., H.

 2). The left-hand side (LHS) is constant at any income if (and only if) Th = tYh, that is, under a flat-rate, proportional tax:

 a[ln Yh – ln(1 – t)Yh] = a ln(1 – t) = C

 3). A proportional tax clearly satisfies the homogeneity principle; the ratio Th/Yh is independent of .

g. Progressive taxation

 1). Consider the utility function Uh = a YPh + b.

 2). Equal absolute sacrifice implies:

 

 3). Rearranging terms and solving for Th yields,





 4). Under this tax, individual tax collections can be multiplied by a scalar as needed for total revenues.

 5). The tax is a flat rate tax applied to a tax base in which taxpayers exempt an amount (YPh + λ)1/P from their Haig-Simons income (Yh) in determining their taxable income

 6). Properties

 -- Th/Yh is independent of . This follows from dividing  by Yh, and noting that scaling Th and Yh by  scales λ by P

 -- The tax is progressive in terms of the standard average tax burden measure of progressivity. The average tax burden increases as Yh increases—divide by Yh and recall that P < 0 and λ > 0).

 -- the exemption from the income in computing taxable income, (YPh + λ)1/P, *increases* as income increases. In all actual taxes with exemptions, the exemption either remains constant or decreases as income increases. Even so, the increasing exemption does not prevent the tax from being progressive.

 -- the homogeneity principle rules out graduated tax rates (although not progressive taxes).

h. Young has provided a rationale for either proportional or progressive broad-based taxes using the methods of cooperative game theory. In doing so, he has brought the old equal-sacrifice principle of taxation into the realm of modern economic theory

7. Vertical equity in the U.S.

 a. U.S. tax system appears to be mildly progressive at low incomes and then essentially proportional

 b. The mild low-end regression is largely due to the personal exemptions under the personal income tax

8. The federal personal income tax base (taxable income) is much less than YHS

 a. Less than 1/2 of personal income is subject to tax as a result of :

 1). The personal exemptions given to the taxpayers and their dependents--$3,950 in 2014 and indexed to inflation—income that IRS recognizes as income but chooses not to tax

 2). Exclusions—items recognized as income by the Department of Commerce in the NIPA but not included in the tax base-main ones are employee fringe benefits (primarily employer contributions to pension plans [along with the accrued interest on the investments under these plans], health insurance, and life insurance); interest income on Individual Retirement Accounts and Roth IRA Accounts, which are earmarked for retirement income; many federal, state, and local transfer payments; imputed rental income on owner-occupied homes and imputed income on farm produce consumed on the farm; interest on state and local bonds ("municipals")

 3). Deductions—expenditures that are deducted from the tax base in computing taxable income—the main ones are extraordinary medical payments and other uninsured losses, state and local income and property taxes (taxpayers can elect to deduct state sales taxes instead of state income taxes), interest payments on mortgages for the principal residence, contributions to charities and other nonprofit organizations, and business expenses. Taxpayers can elect to take a “standard deduction” (equal to $12,400 in 2014 for married taxpayers filing jointly) instead of itemizing deductions.

b. Capital gains—The tax treatment of capital gains violates all the principles of the ideal YHS tax base--capital gains are:

 --taxed on a realized basis (that is, only when an asset is sold) ;

 --taxed at a separate rate from the rates applied to personal income (for assets held for more than one year), a rate that is often far below the rates applied to the higher income brackets (20% in 2014); in effect, part of the realized gains are excluded from the tax base;

 --the ability to offset losses against income is mostly limited to offsets against capital gains.

 --the tax is levied on nominal capital gains, with no adjustment for the effects of inflation on purchasing power.

9. Personal income: the tax "loopholes"

 a. The deviations from personal income and taxable income are referred to as tax loopholes, since they violate horizontal equity in terms of tax payments: two people with the same YHS often pay very different –they also affect the degree of vertical equity implied by the graduated tax rates

 b. The personal exemptions are viewed differently from the deductions and exclusions since they help make the tax more progressive

 c. Most single ("flat") rate tax proposals include personal exemptions

 {Insert Figure 11.2}

 d. A flat tax at an 18% rate and a personal exemption of $20,000, is quite progressive (T/Y rises) at low incomes until becoming essentially proportional

 e. The derogatory term loopholes is reserved for the exclusions and reductions

 f. If the tax base were YHS, then the two versions of horizontal equity would be the same since YHS is viewed as the best surrogate measure of utility

 1). Two people with the same YHS pay the same tax

 2). Feldstein version: two people with equal utility before tax should have equal utility after tax

 g. The first version is violated, but the market adjusts to the loopholes to guarantee that Feldstein's version holds in equilibrium

 {Insert Figure 11.3 here}

 h. Example: housing versus apartments-homeowners get three tax breaks that are not available to renters: deduction of mortgage interest; deduction of property taxes; exclusion of imputed rental income on the house

 1). Housing markets segment by income—assume two groups of equal people are indifferent between owning and renting, and distribute themselves such that that the annual price of housing and apartment rent would be equal without the tax breaks: =

 2). The tax breaks shift up the demand for housing and shifts down the demand for apartments- The market clears at and , such that - equals the annual value of the tax break

 3). The tax breaks are "capitalized" by the markets such that both home owners and renters are again equally well off—there is no violation of horizontal equity in terms of utility—equal treatment of equals is a condition for long-run equilibrium in a competitive market

 4). Feldstein's two principles related to tax loopholes

 --“Once the market system establishes a long-run equilibrium in response to a given tax system, the tax system per se cannot be a source of horizontal inequity, where horizontal equity is defined in terms of burden or utility.”

 --“Any reform of an existing tax code will create horizontal inequities through unanticipated gains and losses, and will continue to do so until a new long-run equilibrium obtains in the market place.”

 i. Still might want to close the loopholes

 1). They violate vertical equity—the housing tax breaks are worth more to high income than low income taxpayers—reduce the progressivity of the tax—the saving to the taxpayer per $ is t($1), which rises with t

 --this bias can be removed with a tax credit applied to the tax liability, equal for everyone, as opposed to using deductions and exclusions

 2). By moving the housing market from its natural equilibrium, introduce a deadweight efficiency loss into that market (discussed in Chapter 13)

 3). By removing deductions and exclusions, could significantly lower the tax rate to collect the same revenue—Chapter 13 shows that the overall deadweight loss from a tax varies with the square of the tax rate

 4). Removing the deductions and exclusions also reduces the costs of administering and complying with the tax

10. Inflation and income from capital

 a. Capital gains and other forms of capital income are not indexed for inflation—leads to a bias against such capital income

b. Define the accumulated inflation to time *t* as:

where i(t) = the instantaneous rate of inflation at time t. Assume further that inflation is fully anticipated so that i(t) represents both the actual and expected rate of inflation

 c. Wage income at time t

 1). W(t) without inflation

 2). W'(t) = W(t)I(t) with inflation

 d Capital income on asset with value V(t) and real interest rate r(t) at time t

 1). Y(t) = r(t) • V(t) without inflation

 2). With inflation:

 V´(t) = V(t) • I(t)

 n(t) = r(t) + i(t) , the nominal interest rate

 Y´(t) = n(t) • V´(t) = [r(t) + i(t) ]V(t) • I(t)

 e.

 Capital income grows more rapidly then wage income simply because of the inflation factor--if the tax base is nominal income, capital income is overly taxed.

 f. To remove the inflationary bias, subtract i(t) • V’(t) from capital income before applying the tax rates

 1). For interest bearing assets

 

 the taxpayer reports actual interest payments times the ratio of the real to the nominal rate of return

 2). For capital gains

 Y’(t) = CV – PV

 where; CV = current value, inclusive of inflation.

 PV = original purchase value.

 Y’(t)adjusted = (CV – PV) – (CV – PV)inflation

 Y’(t)adjusted = (CV – PV) – (PV • I(t) – PV)

 Y’(t)adjusted = CV – PV • I(t)

 Taxpayer increases the purchase price by the accumulated inflation since the time of purchase in computing the capital gain

 3). For money holdings-- receive a credit equal to i(t) • V’(t), since there is no nominal return from which to subtract this adjustment factor—difficult to administer, however—probably best to ignore this adjustment

 4). Caveat: these adjustments assume that inflation is always correctly anticipated and that inflation affects all assets by the same amount.

11. Taxing realized capital gains—the Auerbach proposal

 a. Not about to tax capital gains on an accrued basis—unsold real assets hard to evaluate—Problems:

 1). Leads to a lock-in bias to hold on to successful assets, sell losing assets to reduce tax liability

 2). Leads to executives favoring stock options to salary to reduce tax liability

 b. A two-period example of the gain from being able to postpone tax liability

 1). Consider two options for investing $1 at the beginning of the first period:

*Option 1:* Hold the asset for one period, realize the gain at the end of the period, and invest the after tax proceeds in a risk-free asset during the second period.

*Option 2.* Hold the asset for two periods and then realize the capital gain over the two periods.

 Assume:

 g = the capital gain during the first period

 i = the one-period return on the risk-free asset

 r = the (uncertain) capital gain during the second period

 t = the income tax rate

 2). Option 1:

The value of the asset at the end of the first period is (1 + g). The realized gain g is taxed at rate t, leaving net of tax proceeds of [1 + g(1 – t)] to be invested in the risk-free asset during the second period. The proceeds grow at rate i, and the interest is taxed at rate t. Therefore, the net-of-tax value of the asset at the end of period 2 is

 [1 + g(1 – t)][1 + i(1 – t)]

For comparison with option 2, rewrite the net-of-tax value as:

[(1 + g) – tg][(1 + i) – it] =

[(1 + g)(1 + i)] – t[(1 + g)i + g(1 + i(1 – t))]

The first bracketed term is the gross-of-tax value and the second bracketed term is the tax liability.

 3). Option 2:

The value of the asset at the end of period 2 is(1 +g)(1 + r), and a tax is paid on the capital gain, leaving a net-of-tax value at the end of period 2 equal to:

[(1 + g)(1 + r)] – t[(1 + g)(1 + r) – 1] =

[(1 + g)(1+r)]-t[(1+g)r + g]

 4). In comparing the two outcomes, note that r is an uncertain return at the end of period 1. Assume that the certainty equivalent of r is i. That is, investors are indifferent between investing at the uncertain return r or the certain return i. Under this assumption, the certainty equivalent net-of-tax value of option 2 is

 (1 + g)(1 + r) – t[(1 + g)i + g]

Thus, option 2 is more valuable by the amount (tg)i(1 – t), equal to the after tax interest on the portion of the accrued tax liability that is avoided by taxing the capital gain on a realized basis.

 5). The tax savings can be thought of as an interest-free loan by the government of (tg) made at the end of period 1. The taxpayer invests the loan risk free at rate i during the second period, pays a tax on the interest at rate t, and pays back the principal on the loan, for a net gain of (tg)i(1 – t), the after-tax interest on the loan.

 d. The Vickrey proposal to tax capital gains on a realized basis that is equivalent to taxing on an accrued basis

 1). Tax the gain in the final period on a realized basis, and add to the tax the interest on the current value of accrued tax liabilities to date, with the interest being tax deductible.

 2). The instantaneous *increase* in the tax at time s if the asset is held one more period is, in general,

 = i(1 – t)Ts + trsAs

 where:

Ts = the current value of the accumulated deferred tax liabilities to date at time s

rs = the gain in period s + 1

As = the current value of the asset at time s

 3). Problem: impractical-- requires knowing the entire pattern of accrued tax liabilities to the time of sale, which is the same as knowing the entire pattern of gains- --The current value of the total accrued taxes due on a asset held for ten years is quite different if all the gains came in the first year, or in the last year, or evenly over time—need to know as much as if tax were on an accrued basis

 e. Auerbach's proposal—a variation of the Vickrey proposal based on the certainty equivalence operator V()

 1). Principle: Investors are indifferent to holding an uncertain asset for one more period if the certainty equivalence of the after-tax return on the asset is equal to the risk-free after-tax return. In terms of the operator V, indifference requires that at time s:

where  is the uncertain next period return on the asset and the other terms are as defined above

 2). Multiply both sides by (As – Ts)

 , since V() is a linear operator

 But V() = iAs, the certainty equivalent next period return on the asset. Therefore, indifference to holding or selling requires that

 

 Auerbach’s proposal is Vickrey’s proposal from an *ex ante* rather than an *ex post* perspective.

 3).  is achieved if and only if the accumulated tax liability upon realization, Ts, is

 Ts = (1 – e-its)As

4). Ts depends only on current data at the time the asset is sold: the risk-free market interest rate, i; the number of periods that the asset has been held, s; the marginal tax rate, t; and the current value of the asset, As

 5). Necessary conditions

 Suppose Ts = (1 – e-its)As

 6). The instantaneous increase in taxes from holding one more period is

 

 7). Add and subtract it As to the RHS and multiply and divide the first term by As:

 

 

 8). But, /As = i + e, where e is a random variable with mean zero. Thus,

 

 

But V(e) = 0, by definition of the certainty equivalence operator. Therefore

 

or

 

 9). Caveat: Many proponents of income taxation tend to believe that the fair way to tax is on the *ex post* actual returns and not the *ex ante* expected returns. From the *ex post* perspective, exceptionally good assets are under taxed and exceptionally poor assets are overtaxed under Auerbach’s proposal—does remove the lock-in effect, which is based on prospective returns

12. Taxing human capital—Kaplow's proposal

 a. If wages are considered a return to human capital, then the ideal tax treatment of labor should be identical to the ideal tax treatment of capital under an income tax

 b. Human capital is equivalent to physical capital

 c. Under an ideal income tax, a gift of physical capital would be taxed as income, and the subsequent net returns to the capital would also be taxed, where the net returns equal the gross returns less the depreciation of the capital stock

d. The initial gift of human capital at birth is the capacity to engage in certain kinds investments in human capital throughout one’s lifetime, along with the lifetime wages that result from the investments, and should be taxed

 1). Its value is the present value of wages earned over a lifetime less any investments made to maintain or increase the capacity to earn the wages.

 2). The net wages generated each year should also be taxed, equal to the wages less the depreciation on the capital stock

 e. By taxing wages each year, the income tax misses the tax on the initial gift of the stock of human capital, but overtaxes wages as they occur because the depreciation on the stock of human capital is not deducted

 1). Wages in the last year of work should pay no tax since the depreciation of the stock of human capital in that year equals the wages earned

 f. The taxation of the gift of human capital

 1).The present value of $1 of wages received in time i is 

 2). Had a tax been collected on that wage at birth, the value of the human capital at time i would have been  where t is the tax rate and ra is the after-tax rate of interest, both assumed constant over time

 3). Therefore, the current value of the taxes that should have been collected at birth, increased by the after-tax interest rate since birth, is

 

 4). If the escaped taxes are to be collected retrospectively at rate t in period i, then the $1 of wages has to be scaled by  to collect this portion of the tax due under the ideal income tax.

 --With this added tax, the total taxes collected on wage income would rise considerably relative to current treatment.

 5). The derivation of the tax on human capital assumes perfect certainty. With uncertain incomes, once the uncertainty is resolved, any unexpected favorable (unfavorable) returns to human capital would increase (decrease) its value and the taxes due