«Note»

Empirics of A Function of Consumption Consistent with A Technology-Golden Rule: Using Three Dimensional Graphs

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1. Introduction

This paper, first, intends to express the relationship between saving and consumption by connecting three kinds of ratios in saving with a utility function designed from the idea of Ramsey [1928] and second, to connect saving and consumption with wages and returns/rental by using the utility function of consumption. In the current statistics of national accounts, compensation of employees (hereafter wages) is included in GDP while final consumption is included in national disposable income. I indicate that there is no way to connect wages with consumption as far as I investigated.

Why do I need to search for an integrated relationship between saving or consumption and wages or rental? First, I am curious about confirming the relationship between the structure of saving (for the retention ratio, the ratio of saved dividends to dividends, and the saved wages to wages) and the utility function of consumption that uses a discount rate for consumers, where saving and consumption are dual to national disposable income, NDI. Second, I need new data for wages and returns/rental in my endogenous growth model, whose base is still "production" that guarantees an optimum/maximum rate of rental. I need new

1) I am much obliged to the advice of Dr. Toshimi Fujimoto for the understanding of the utility function using the calculus of variations. I am also thankful to Dr. Itsuo Sakuma (on 11 June 2005) for the discussion about the character of wages and rental in this paper.

definitions for wages and rental so that wages and rental in production are compatible with optimum consumption in income. Assume that NDI happens to be equal to GDP, and still NDI is for income and GDP is for production.

My previous model [PhD, 2003] is based on corporate profit. The model uses output as the sum of corporate profit (calculated as the sum of corporate saving and dividends) and total compensation or wages shown in GDP, where corporate profit is much less than the operating surplus as a residual of GDP. My current model (after 2004) researches optimum each for consumption and production.

In this paper, I started with the OECD National Accounts Statistics data that disclose both wages and consumption (see Appendix) to establish my own method to connect consumption with compensation. Then, I totally clarified the essence of my method by using Table 5-1. This table presents a basis for the ratio of a discount rate, *rho*, to the optimum rate of rental under convergence, *r*, (*rho*/*r*), by the level of a technology-golden rule/age, where the rate of saving, *s*, equals the relative share of rental, *alpha*: *s*=*alpha*. Any country has its own level of *s*=*alpha*, where *rho*=*r* holds. For empirical work, I use IMF data (available in IFSY and GFSY) and apply Table 5-1 to the data.

How can consumption be converted to wages or how can wages to consumption? Theoretically, if we assume that GDP is equal to NDI, we can directly use both consumption and wages in statistics. When I compare wages shown in GDP with estimated wages in production using my method, I use the word, "estimated" still based on production. For estimating wages, I need the help of the literature, in particular the utility function of consumption originated in Frank Plumpton Ramsey [1928]. In this case, first I need to clarify the contents of saving as a saving structure and then the dual relationship between saving and consumption in NDI, which should be consistent with the saving structure. Jan Tinbergen [1956] reviewed Ramsey and stated that the utility function should be measurable more easily (without an assumption of "bliss" as maximum utility). Tinbergen uses the marginal capital-output ratio instead of Ramsey's direct relationship between consumption and wages each as flow. I find that both methods reach the same result. Note that Robert Solow [1992] (whose original exogenous growth model [1956] is based on a fixed rate of saving) only suggested a short version of using a discount rate and a taste parameter.

It is a main purpose of this paper to establish my method for estimating wages (modified wages; hereafter wages) and confirm its usefulness by showing empirical results using IMF data by country. In this case, I find, if I introduce technology that uses $beta^*$ into a golden rule and accordingly, the utility function of consumption, the empirical results are well-fitted. I need to review the golden rule in the literature, using variables under convergence. By extending equations in Kamiryo [2004a], I will prove that the golden rule in the literature assumes no technology. I will also prove that the rate of technological progress is deeply involved in a new golden rule and accordingly, the utility function of consumption. Kamiryo [2005c] will separately extend equations under convergence in more detail.

In Appendix, I attach tables and figures for the characteristics between consumption and wages using three dimensional graphs. Also I attach results of (*rho*/*r*), comparing consumption with wages in OECD data by country.

2. The saving structure and the utility function

2.1 Relationship among saving ratios

In this section, I clarify that a compatible relationship between consumption in income and "estimated" wages in production, based on the saving structure (that is dual to the consumption structure) and the relative share of rental (that is dual to the ratio of wages to output). There is no literature to clarify the relationship between wages in GDP and "estimated" wages that satisfies optimum consumption, as long as I have investigated.

I will start with the saving structure. I assume that dividends paid by corporations belong to household consumption and saving (since corporation do not consume), and saving is divided into corporate saving (before paying dividends) and household savings. An equal condition lying between the rate of saving and the relative share of rental, $s=\alpha$, presents the clue for setting up a saving structure. The condition of $s=\alpha$ is well known as the golden rule, where the rate of rental will be equal to the growth rate of output under convergence but without technology. Later I will discuss under what condition the golden rule holds in an endogenous growth.

In the saving structure, I distinguish three kinds of savings and each corresponding ratio in saving: (1) corporate saving and the retention ratio of corporations, s_{Π}, (or the payout ratio), (2) saved dividends and the ratio of saved dividends to dividends, $s_{SD/D}$, and (3) saved wages and the ratio of saved wages to wages, s_W, and/or, household saving as the sum of saved wages and saved dividends by households and the ratio of household saving to the sum of wages and dividends, s_H, where I simply assume, as I mentioned above, that dividends are saved by households, neglecting the dividends received and saved by corporations since it is difficult to estimate the ratio of corporate-saved dividends to dividends decided by corporations. I will show, first of all, each saving as a ratio to national disposable income, NDI (hereafter, output), so that each saving ratio is connected with the relative share of rental estimated in NDI. Thus, I need to clarify the relationships between each of the above three savings and each ratio to output. Using symbols, the saving structure is shown in comparison with consumption as follows:

Output $Y=NDI$, estimated returns/rental Π, estimated wages/compensation W: $Y= \Pi+W$ (hereafter, I abbreviate "estimated").

Corporate saving S_{Π}, saved dividends S_D, saved wages S_W, total saving S: S=

$S_{\Pi} + S_D + S_W$. Consumed dividends C_D, consumed wages C_W, total consumption C: C= $C_D + C_W$. And, $Y=S + C$, where $\Pi= S_{\Pi} + D$, D= $S_D + C_D$, $W= S_W + C_W$, and $Y=S + C= \Pi + W$.

I will show each saving or consumption divided by output, using small character:

$1=s+c$, where $s=s_{SP/Y}+s_{SD/Y}+s_{SW/Y}$, $c=c_{CD/Y}+c_{CW/Y}$, $\alpha=\alpha_{S\Pi}+\alpha_D$, $d_{D/Y}=s_{SD/Y}+c_{CD/Y}$, $w_{W/Y}= s_{SW/Y}+c_{CW/Y}$, and $y=s+c=\alpha+w_{W/Y}$.[2)]

As the results, the retention ratio of corporations $S_{\Pi}/\Pi= s_{S\Pi/\Pi}=s_{\Pi}$, the ratio of saved dividends to dividends $S_D/D= s_{SD/Y}/d_{D/Y}$, and the ratio of household saving to the sum of wages and dividends $S_H/(W+D)= (s_{SW/Y} + s_{SD/Y})/(w_{W/Y}+ d_{D/Y})\equiv s_H$. The literature often uses s_{Π} and s_H, but without clarifying saved and consumed dividends or the relationship between the ratio of consumed dividends to output and the ratio of saved wages to output (for a version towards these relationships, see Robinson [1962]). I will show the equations before introducing a utility function and the equations after introducing a utility function.

Before introducing a utility function:

$$\alpha_{S\Pi} = \frac{S_{\Pi}}{Y} = \frac{S_{\Pi}}{\Pi}\cdot\frac{\Pi}{Y} = \alpha\cdot s_{\Pi} = s_{S\Pi/Y}. \tag{1}$$

$$\alpha_{SD} = \frac{S_D}{Y} = \frac{S_D}{D}\cdot\frac{D}{Y} = \alpha(1-s_{\Pi})s_{SD/D} = s_{SD/Y}. \tag{2}$$

$$\alpha_{CD} = \frac{C_D}{Y} = \frac{\Pi - S_{\Pi} - S_D}{Y} = \alpha - s_{S\Pi/Y} - s_{SD/Y} = \alpha(1-s_{S\Pi})(1-s_{SD/D}), \tag{3}$$

where $\alpha_D = \alpha_{SD} + \alpha_{CD} = \alpha - s_{S\Pi/Y}$.

$$s_{SW/Y} = \frac{S_W}{Y} = \frac{S_W}{W}\cdot\frac{W}{Y} = s_W(1-\alpha), \text{ where } s_W=S_W/W. \tag{4}$$

$$s_{SH/Y} \equiv \frac{S_H}{Y} = \frac{S_W}{Y} + \frac{S_D}{Y} = s_W(1-\alpha) + s_{SD/Y} \text{ or,} \tag{5}$$

2) In symbols, I distinguish the wage rate, w, with the ratio of wages to output, $w_{W/Y}$., where w is used for estimating the capital-labor ratio, using r/w.

$$s_{SH/Y} \equiv \frac{S_H}{Y} = \frac{S_W + S_D}{W + D} \cdot \frac{W + D}{Y} = s_H(1 - s_{S\Pi/Y}),$$ where $s_H = S_H/(W+D)$.

Therefore, paying attention to the dual relationship between saving and consumption,

$$\alpha = s_{S\Pi/Y} + \alpha_{SD} + \alpha_{CD} = s_{S\Pi/Y} + (\alpha - s_{S\Pi/Y}),\ \text{where}\ \alpha_D = \alpha_{SD} + \alpha_{CD} = \alpha(1 - s_\Pi). \tag{6}$$

$$s = s_{S\Pi/Y} + s_{SD/Y} + s_{SW/Y} = s_{S\Pi/Y} + s_{SH/Y}. \tag{7}$$

$$c = c_{CD/Y} + c_{CW/Y} = 1 - (s_{S\Pi/Y} + s_{SD/Y} + s_{SW/Y}). \tag{8}$$

Thus, $s - \alpha = s_{SW/Y} - c_{CD/Y}$, or $s - \alpha = s_W(1-\alpha) - ((1 - s_\Pi)(1 - s_{SD/D})\alpha)$,[3)]

where $s_{SW/Y} = s_W(1-\alpha)$ and $c_{CD/Y} = \alpha(1 - s_\Pi)(1 - s_{SD/D})$. (9)

$$\frac{s}{\alpha} = \frac{s_W}{\alpha} + (s_\Pi + s_{SD/D}(1 - s_\Pi) - s_W). \tag{10}$$ [4)]

Since c=1-s and $w_{W/Y}$=1-α, Eq.9 is replaced by c-$w_{W/Y}$ and Eq.10 is replaced by $c/w_{W/Y}$.

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3) Give the values of three saving ratios, s-α is a negative function of α: s-α=A-$B\alpha$, where A is the ratio of saved wages to wages and B is the value of the ratio of saved wages to wages minus the product of the dividend payout ratio and the ratio of consumed dividends to dividends. This implies that economic policy can address the changes in these three ratios.

4) My model uses a concept of net investment that corresponds with saving (for detail, see Kamiryo, Black box [hopefully, 2005]. The investment structure should be shown using net investment, appropriately to connect with the saving structure. The relationship between the depreciation rate and the growth rate of capital is essential to the understanding of the relationship between the investment and saving structures, even if it comes from accounting identity. The depreciation rate in my endogenous model, even if net investment after depreciation is used, corresponds with the depreciation rate explicitly required for an exogenous model.
Net investment is finally connected with the relative share of rental using the ratio of investment to the relative share of rental: $\frac{i}{\alpha} = \frac{s}{\alpha} \cdot \frac{i}{s}$.

After introducing a utility function:

I distinguish the character of $s\text{-}\alpha$ with that of s/α (see Eqs. 9 and 10 above). I indicate that the character of s/α is much more fitted for the introduction of a utility function of consumption. Here I will conclusively use a key ratio derived from a utility function (for detail, see the next section). The key ratio is the ratio of the discount rate for consumption to the rate of rental under convergence: (*rho*/*r*), where a discount rate, *rho*, is used for the present values of saving and consumption each as flow, and *r* is the optimum rate of rental and used for the present values of rental and wages each as flow. As a result, $w_{W/Y}$ and c are each expressed as,

$$(1-\alpha)=c/(rho/r) \text{ and } c=(rho/r)(1-\alpha), \tag{11}$$

Or, $rho(1-\alpha)=r(1-s)$.

Note that in Eq.11, the ratio of wages to output, $1\text{-}\alpha$, cannot be replaced by the rate of rental, α, and the rate of consumption, c, cannot be replaced by the rate of saving, s,

$$\alpha \neq s/(rho/r) \text{ and } s \neq (rho/r)\alpha. \tag{12}$$ [5)]

Using Eq.11, the relationship between (*rho*/*r*) and s/α are derived as follows:

1. If $rho=r$, $1\text{-}s=1\text{-}\alpha$ or $s=\alpha$ or, if $(rho/r)=1$, $s/\alpha=1$.
2. If $rho<r$, $1\text{-}s<1\text{-}\alpha$ or $s>\alpha$ or, if $(rho/r)<1$, $s/\alpha>1$.
3. If $rho>r$, $1\text{-}s>1\text{-}\alpha$ or $s<\alpha$ or, if $(rho/r)>1$, $s/\alpha<1$.

Recall Eqs.7 to 10 and express these equations in Eq.12, then,

1. If $rho=r$ or $s=\alpha$, $s_{SW/Y}=c_{CD/Y}$ holds and thus, $s_W(1-\alpha)=\alpha(1-s_\Pi)(1-s_{D/D})$,

$$\text{Or, } \alpha=\frac{s_W}{1-(s_\Pi+s_{SD/D}(1-s_\Pi)-s_W)} \text{ holds.} \tag{13}$$ [6)]

5) When we need to express the area of saving in three dimensional graphs, we calculate and express the area of consumption and then, by replacing this area with 1-c, the area of saving is expressed.

6) If $\alpha=s_W$, $s_W=s_\Pi+s_{S/D/D}(1\text{-}s_\Pi)$ holds but the retention ratio must be extremely low even if dividends are all consumed.

2. If *rho*<*r* or *s*>α, $s_{SW/Y} > c_{CD/Y}$ holds. (14)

3. If *rho*>*r* or *s*<α, $s_{SW/Y} < c_{CD/Y}$ holds. (15)

When the three saving ratios on the RHS of Eq.13 are each fixed, the golden rule will be maintained.

2.2 From the saving structure to the utility function

Now I will connect the above saving structure with a utility function in this section. I find that the rate of saving is closely connected with the relative share of rental in case study and empirical work, as I will show below. I find that the above ratio of the discount rate *rho* to the rate of rental *r*, (*rho*/*r*), will control the above two ratios, *s* and *a*. This ratio, (*rho*/*r*), is supported by the idea of the utility function originated by Ramsey.

My framework for introducing a utility function into consumption will be justified by the following two assumptions: First, the marginal discount rate of consumption and the marginal rate of rental under convergence guarantee an optimum consumption as proved by Ramsey (apart from some restrictions below). Second, the marginal discount rate is equal to the discount rate on average. And also, the marginal rate of rental is equal to the rate of rental on average. The second assumption guarantees equilibrium under convergence. The above two assumptions present a base for a compatibility between optimum choice (lying between saving/investment and consumption) and equilibrium under convergence that uses real assets in national accounts. For the relationship between market equilibrium and equilibrium under convergence, I present a method for neutralizing of financial assets in Kamiryo [2004b].

Ramsey [1928, p.546] stresses the feeling of confrontation lying between the utility for consumption and the disutility for labor, where the production function is supported by using both labor and capital, and the rate of interest is applied to capital (see Eq.2). This is another expression of what I pursue—the relationship between consumption and wages. Ramsey [ibid., p.547] shows an optimum path for a maximum consumption, using a calculus of variations based on $\int cdt$, where c is the ratio of consumption to output. Ramsey expresses the optimum consumption as a bliss, B, as a maximum value, but this B is difficult to measure as indicated by Tinbergen. However, Ramsey [ibid., p.556] states that the discount rate, ρ, is equal to $\partial f / \partial c$, where the maximum rate of consumption, labor, and capital are determined using the calculus of variations.7)

Tinbergen [1956, pp.604-605], instead of using Ramsey's B, intends to measure a corresponding rate of consumption by assuming that utility is measurable and using the marginal capital-output ratio as a capital coefficient and m=log(1+the discount rate) as a "psychological discount rate" comparable to an interest rate, since log(1+m)=m holds if m is small. As a result, he showed the area of the rate of consumption, c, and for the region of c>1, he neglected each value using a dot: the higher the marginal capital-output ratio and m, the higher the rate of consumption: $c=m \times$ the marginal capital coefficient.

I interpret his approach as follows: In equilibrium under convergence the marginal capital-output ratio is equal to the capital-output ratio on average. I denote this ratio as Ω as in my papers8): $c = m \cdot \Omega$. The value of m, however, does not empirically correspond with the discount rate. Under c=0.9, for example, if Ω=2, m=0.45, and if Ω=4, m=0.225, which is still too high. If I introduce the above (rho/r) into Tinbergen's idea of the capital-output ratio, capital will be converted to rental as the product of capital and the rate of rental, r, and thus, $c = m \cdot \Omega$ is

7) In a state of equilibrium, $\frac{dx}{dt} = \frac{dc}{dt} = 0$, x=f(a,c), $v(a) = \frac{\partial f}{\partial a} u(x)$, and $\frac{\partial f}{\partial c} = \rho$, where a is labor, c is capital, x is the rate of consumption. Also, $u(x)$ is the marginal rate of utility of a rate of consumption, and $v(a)$ is the marginal rate of disutility of a rate of labor. I pay attention to the treatment of the utility for consumption versus the disutility for labor.

8) I also stress the importance of the capital-output ratio. The range of this ratio should be carefully reviewed under convergence as shown in Kamiryo [2004c].

reduced to the above Eq.11 or 12. This is because for capital and labor, *r* is used and for saving and consumption *rho* is used when (*rho*/*r*) is introduced into the utility function.

In short, both Ramsey and Tinbergen show how to measure the utility function of consumption and I stress here that both different approaches for utility measurement will be reduced to Eq. 11 or 12 by using the ratio of *rho* to *r*, (*rho*/*r*). Note that this ratio was explained by Ramsey [ibid., p.558] using an individual or his heirs: if $r>\rho$, he will save when he is young and if $r>\rho$ it may be negative, he or the class of men of this sort may borrow when young and pay back when old.

2.3 Relationship between the utility function and technological progress

Assume that the utility function is expressed simply by using *c*(*rho*/*r*) as I discussed above. Now, I raise two questions: (1) Is the utility function independent of technological progress? (2) If it is not, what is the relationship between the utility function and technological progress? I find that the growth rate of output is equal to the rate of rental under $s=\alpha$ if and only if the rate of technological progress is zero. The discount rate, *rho*, is independent of technological progress, but the optimum rate of rental under convergence, $r=r^*$, is influenced by technological progress. Therefore, I indicate that the utility function is inevitably related to technological progress. This is now discussed briefly in this section (for detail, see Kamiryo [2005c]).

For the above questions, I will prepare a few equations, starting with the following Eq.23 that holds under convergence in Kamiryo [2004a, p.60]:

$$\Omega^* = \frac{\beta^*_{\delta=0} \cdot i\ (1-\alpha)}{i\,(1-\beta^*_{\delta=0})(1+n)+n(1-\alpha)},$$ where if $\Omega^*=\Omega(0)$, the capital-output ratio is minimized or set at optimum.

The rate of rental under convergence, r^*, is obtained by solving $r^* = \alpha/\Omega^*$ at optimum.

$$r^* \equiv \frac{\alpha}{\Omega^*} = \alpha\left(\frac{i(1-\beta^*_{\delta=\alpha})(1+n)+n(1-\alpha)}{\beta^*_{\delta=\alpha}\cdot i(1-\alpha)}\right).$$

$$\text{Or, } \frac{r^*}{\alpha} = \frac{i(1-\beta^*_{\delta=\alpha})(1+n)}{\beta^*_{\delta=\alpha}\cdot i(1-\alpha)} + \frac{n}{\beta^*_{\delta=\alpha}\cdot i} \tag{16}$$

The growth rate of output under convergence, g^*_Y, is, in the literature, shown as $g^*_Y = \frac{g^*_A(1+n)}{1-\alpha} + n$ (consistently with Solow [1956]). Since the rate of technological progress, g^*_A, is shown in my endogenous growth model as $g^*_A = i(1-\beta^*_{\delta=\alpha})$, the growth rate of output is formulated by inserting $g^*_A = i(1-\beta^*_{\delta=\alpha})$ into g^*_Y:

$$g^*_Y = \frac{g^*_A(1+n)}{1-\alpha} + n = \frac{i(1-\beta^*_{\delta=\alpha})(1+n)}{1-\alpha} + n. \tag{17}$$

The relationship between the rate of rental and the growth rate of output under convergence is now derived by using $A = \frac{i(1-\beta^*_{\delta=\alpha})(1+n)}{1-\alpha}$ for the above r^* in Eq.16 and $B = \frac{i(1-\beta^*_{\delta=\alpha})}{1-\alpha}$ for the above in Eq.17.

$$r^* = \left(\frac{\alpha}{\beta^*_{\delta=\alpha}\cdot i}\right) g^*_Y. \tag{18}$$

$$\text{or } g^*_Y = \left(\frac{\beta^*_{\delta=\alpha}\cdot i}{\alpha}\right) r^*. \tag{19}$$

In Eqs.18 or Eq.19, the relationship between r^* and g^*_Y is reduced to:

When $r^* = g^*_Y$, $\alpha = \beta^*_{\delta=\alpha}\cdot i$ $\alpha/(\beta^*_{\delta=\alpha}\cdot i) = 1$ holds since. (20)

Eq.20 is useful to understand the character of the golden rule that includes the rate of technological progress. Eq.20 suggests that the relative share of rental under convergence may differ from the current relative share of rental: $\alpha < \alpha^*$, where $\alpha^* \equiv \alpha/\beta^*$. This idea will present a useful device when we estimate *alpha* from consumption, by using (*rho*/*r*) (see empirical results in 3.3 below).

1. If the rate of technological progress is zero or the structural reform parameter, $\beta^{*}_{\delta=\alpha}$, is 1.0, the relative share of rental is equal to the rate of saving assuming that the rate of saving equals the rate of investment or exports equals imports.
2. The higher the rate of technological progress the lower the rate of saving and vice versa assuming that the relative share of rental is fixed.

Under the optimum convergence, $\Omega(0)=\Omega^{*}$ and $r(0)=r^{*}$ (see in Kamiryo [PhD 2003]). Therefore, the utility function of consumption is shown as $c(rho/r^{*})$. In short, when my model is used, an endogenous rate of technological progress influences the relationship between the rate of consumption and the relative share of rental. Or, three fixed ratios in saving have already reflected technological progress.

3. Case study and empirical results using the utility function

3.1 Case study between saving and wages

In this section, I will explain the above saving structure and the relationship between the rate of saving and the relative share of rental, first using case study shown as Tables 1 and 2. Second, I will apply the above relationship to the Japanese national accounts in 1993 to 2002, by dividing total accounts into the government sector and the private sector. Third, I will apply the above relationship to fifteen countries whose data come from OECD national accounts statistics.

Before stating, I will explain the relationship between saving and returns/rental or between consumption and wages using the utility function of consumption, (rho/r). Saving is dual to consumption. When saving is determined by the retention ratio, the ratio of saved dividends to dividends, and the ratio of household saving to wages, the rate of saving is, at the same time, determined from the utility function of consumption, c(rho/r). In other words, when $c(rho/r)$ is determined, at the same time, the above three saving ratios are determined and balanced so that the sum of saving and consumption equals national disposable income. In these cases, when consumption is determined, at the same time, returns/rental and wages are newly determined, each value being different from that in GDP.

Table 1 Given $C/W=\rho/r$ in national disposable accounts, saving raios are determined with the relative share of rental

Case	$s=S/Y$	$c=C/Y$	$C/W=\rho/r$	$W/Y=(1-\alpha)$	$\Pi/Y=\alpha$	S_{Π}/Y	S_{H}/Y	$S_{H}/(D+W)$
1	0	1	1.0500	0.9524	0.0476	0.0190	-0.0190	-0.0187
2	0.05	0.95	1.0250	0.9268	0.0732	0.0293	0.0207	0.0201
3	**0.1**	**0.9**	**1.0**	0.9000	**0.1000**	**0.0400**	**0.0600**	**0.0576**
4	0.15	0.85	0.9757	0.8712	0.1288	0.0515	0.0985	0.0934
5	0.2	0.8	0.9500	0.8421	0.1579	0.0632	0.1368	0.1282
6	0.25	0.75	0.9250	0.8108	0.1892	0.0757	0.1743	0.1611
7	0.3	0.7	0.9000	0.7778	0.2222	0.0889	0.2111	0.1923
8	0.35	0.65	0.8750	0.7429	0.2571	0.1029	0.2471	0.2217
9	0.4	0.6	0.8500	0.7059	0.2941	0.1176	0.2824	0.2491

Note: 1. $C/W=\rho/r$: This presents how to estimate wages, when s or c is given. Case 3, $s=\alpha=0.1$, is a base. From $c(\rho/r)$, consumption, C, is theroretically derived, but in statistics, given C, W should be estimated.
2. The table replaces $Y-S+C$ by $Y-\Pi+W$ using rho/r=W/C, for $s<\alpha$ and $s>\alpha$.
3. The table assumes that the retention ratio S_{Π}/Π (=1-payout ratio, D/Π) is 0.4.
4. As a result, S_H/Y and $S_H/(D+W)$ are calculated. The literature may show S_H/W.

First, Table 1 shows a case which starts with the rate of saving and Table 2 shows a case which starts with the rate of saving and the relative share of rental. Both in Tables 1 and 2, the utility function of consumption, $c(rho/r)$, integrates consistently each value of saving, consumption, rental, and wages or interrelated ratios. Figure 1 shows each ratio in Table 1, where the above three

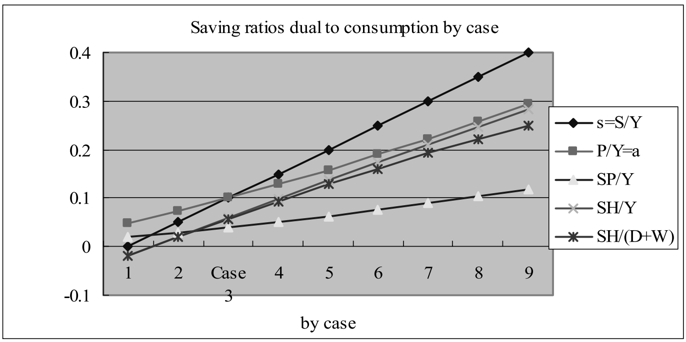


Figure 1 Given $C/W=\rho/r$ in national disposable accounts, saving raios are determined with the relative share of rental

saving ratios are fixed and suggest that if each ratio changes together with the change in (*rho*/*r*) each line will not be a linear.

In Tables 1 and 2, the ratio of consumption to wages is 1.0 when the rate of saving, s, is equal to the relative share of rental, α, where the golden rule/age is realized. And, if $s<\alpha$ this ratio gradually decreases below 1.0, and if $s>\alpha$ it gradually increases above 1.0.[9)]

Table 2 Given three kinds of saving ratios with the relative share of rental, $\rho/\rho=C/W$ is determined

given	s	0	0.05	0.1	0.15	0.2	0.25	0.3
given	*alpha*	0.06	0.08	0.1	0.12	0.14	0.16	0.18
	s/alpha	0	0.625	**1.0000**	1.25	1.4286	1.5625	1.6667
$s_{S\Pi\ \Pi}$	*s-alpha*	-0.06	-0.03	0	0.03	0.06	0.09	0.12
0.35	$s_{S\Pi\ Y}$	0.021	0.028	0.035	0.042	0.049	0.056	0.063
$s_{SD\ D}$	$\alpha_{D/Y}$	0.039	0.052	0.065	0.078	0.091	0.104	0.117
0.6	$s_{SD\ Y}$	0.0234	0.0312	0.0390	0.0468	0.0546	0.0624	0.0702
	$c_{CD\ Y}$	0.0156	0.0208	0.0260	0.0312	0.0364	0.0416	0.0468
	$s_{SW\ Y}$	-0.0444	-0.0092	0.0260	0.0612	0.0964	0.1316	0.1668
$s_{SH\ Y}$	$s_{SW\ Y}+s_{SD\ Y}$	-0.0210	0.0220	0.0650	0.1080	0.1510	0.1940	0.2370
	$s_{SW\ W}$	-0.0472	-0.0100	0.0289	0.0695	0.1121	0.1567	0.2034
	$s_{SH\ (D+W)}$	-0.0215	0.0226	0.0674	0.1127	0.1588	0.2055	0.2529
	$c_{CW\ Y}$	0.9844	0.9292	0.8740	0.8188	0.7636	0.7084	0.6532
	$c-c_{CD\ Y}+c_{CW\ Y}$	1.0000	0.9500	0.9000	0.8500	0.8000	0.7500	0.7000
	$s_{SW\ Y}-c_{CD\ Y}$	-0.06	-0.03	0.00	0.03	0.06	0.09	0.12
	$c-w_{W\ Y}$	0.06	0.03	0	-0.03	-0.06	-0.09	-0.12
	$\rho/r=c/w_{W\ Y}$	1.0638	1.0326	**1.0000**	0.9659	0.9302	0.8929	0.8537

Note: 1. *s-alpha*$=-(c-w_{W\ Y})$: dual each other. And, *s-alpha*$=s_{SW\ Y}-c_{CD\ Y}$ if related parameters are given.
2. The literature often assumes that the above saved wages equal consumed dividends.
3. The ratio of houshold saving, in this table, is totally adjusted by fixing $s_{S\ \Pi/\Pi}$ and $s_{SD\ D}$.

It is suggested in Table 2 that the higher the rate of saving the higher the difference between s and α. Is it possible for policy-makers to realize the golden rule/age when the rate of saving is extremely high? How can consumption increase when the rate of saving is high? An only way is to spend all dividends for consumption, where the ratio of saved dividends to dividends is zero. In any case, it is shown that the rate of saving cannot separate from *alpha* beyond a

9) Recall that Ramsey [1928, p.556] uses two kinds of the rate of rental: the demand curve for capital as $r=\partial f/\partial K$ and the discount rate, ρ, as the supply line. I find that this intersect corresponds with the point of the above C/W=1.0 and his demand rate of capital corresponds with the rate of rental under convergence in my model.

certain range.

3.2 Case study with three dimensional graphs

Let me now explain some cases using three dimensional graphs. This section first shows a basic case using Tables 3 and 4 together with Figures 2 and 3. Second, I will clarify the characteristics of (*rho*/*r*) using Table 5-1, where the golden rule/age is deeply involved. The process to calculate Table 5-1 will be shown by case in tables of Appendixes (Tables A1 to A3), starting with Table 4.

As shown in Figures 2 and 3 corresponding with Tables 3 and 4, the shape of the area of the ratio of consumption to output, *c*, is rather simple. The higher (*rho*/*r*) and "1-*alpha*," the higher the ratio of consumption to output is. Here, first of all, I pay attention to the upper limit of (*rho*/*r*), where if the value of (*rho*/*r*) is a little bit higher than 1.0 (e.g., 1.05 or 1.07), the ratio of consumption to output, *c*, becomes beyond 1.0:$c>1$. When (*rho*/*r*) is 1.0, by definition, it is under the golden age/rule, where *s*=*alpha*. The estimation of (*rho*/*r*) is closely related to the level of *s*=*alpha*. In other words, it is inevitable for the estimation of wages (or rental) using consumption (or saving) to know the relationship between (*rho*/*r*) and the level of the golden age. This is shown as Table 5-1, "Table of (*rho*/*r*) by the level of golden age," together with Figure 4.

Table 5-1 was calculated changing each or two of the three saving ratios, by the level of the golden age. Consumption is the current consumption and saving is future consumption as an alternative, yet, 1=*c*+*s* and c is dual to s and s is dual to c. Note that when I finalize the values of (*rho*/*r*) in Table 5-1, I use *c* (or 1-*s*) and 1-*alpha*. I raise here two questions for Table 5-1 (or Figure 4): (1) Why is (*rho*/*r*) higher when 1-*alpha* is lower (the rate of rental is higher)? How can I interpret this tendency? (2) Why is (*rho*/*r*) higher when the golden age is lower? How can I interpret this tendency? I conclude as follows:

1. The line of (*rho*/*r*)=1.0 constitutes a diagonal line downwards to the right in

Table 3 The utility function of $c(\rho/r)$ by 1-*alpha*: as a base

ρ is the discount rate of the utility function & r is the rate of rental under convergence.

Case 1

ρ = 0.2 $c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$. $1-\alpha$

r	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.16	*1.2500*	0.8125	0.8750	0.9375	**1.0000**	1.0625	1.1250	1.1875
0.17	1.1765	0.7647	0.8235	0.8824	0.9412	**1.0000**	1.0588	1.1176
0.18	1.1111	0.7222	0.7778	0.8333	0.8889	0.9444	**1.0000**	1.0556
0.19	1.0526	0.6842	0.7368	0.7895	0.8421	0.8947	0.9474	**1.0000**
0.2	1	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.21	0.9524	0.6190	0.6667	0.7143	0.7619	0.8095	0.8571	0.9048
0.22	0.9091	0.5909	0.6364	0.6818	0.7273	0.7727	0.8182	0.8636
0.23	0.8696	0.5652	0.6087	0.6522	0.6957	0.7391	0.7826	0.8261
0.24	*0.8333*	0.5417	0.5833	0.6250	0.6667	0.7083	0.7500	0.7917

The z axis: for ρ/r. The above idea comes from both F.P. Ramsey [1928] and J Tinbergen [1956].

Case 2

ρ = 0.1 $c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$. $1-\alpha$

r	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.08	*1.2500*	0.8125	0.8750	0.9375	**1.0000**	1.0625	1.1250	1.1875
0.085	1.1765	0.7647	0.8235	0.8824	0.9412	**1.0000**	1.0588	1.1176
0.09	1.1111	0.7222	0.7778	0.8333	0.8889	0.9444	**1.0000**	1.0556
0.095	1.0526	0.6842	0.7368	0.7895	0.8421	0.8947	0.9474	**1.0000**
0.1	1	0.6500	0.7000	0.7500	0.8000	0.8500	0.9000	0.9500
0.105	0.9524	0.6190	0.6667	0.7143	0.7619	0.8095	0.8571	0.9048
0.11	0.9091	0.5909	0.6364	0.6818	0.7273	0.7727	0.8182	0.8636
0.115	0.8696	0.5652	0.6087	0.6522	0.6957	0.7391	0.7826	0.8261
0.12	*0.8333*	0.5417	0.5833	0.6250	0.6667	0.7083	0.7500	0.7917

The z axis: for ρ/r.

Case 3

ρ = 0.1 $c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$. $1-\alpha$

r	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.09	*1.1111*	0.7222	0.7778	0.8333	0.8889	0.9444	**1.0000**	1.0556
0.095	1.0526	0.6842	0.7368	0.7895	0.8421	0.8947	0.9474	**1.0000**
0.1	1	0.6500	0.7000	0.7500	0.8000	0.8500	0.9000	0.9500
0.105	0.9524	0.6190	0.6667	0.7143	0.7619	0.8095	0.8571	0.9048
0.11	0.9091	0.5909	0.6364	0.6818	0.7273	0.7727	0.8182	0.8636
0.115	0.8696	0.5652	0.6087	0.6522	0.6957	0.7391	0.7826	0.8261
0.125	0.8000	0.5200	0.5600	0.6000	0.6400	0.6800	0.7200	0.7600
0.13	0.7692	0.5000	0.5385	0.5769	0.6154	0.6538	0.6923	0.7308
0.135	*0.7407*	0.4815	0.5185	0.5556	0.5926	0.6296	0.6667	0.7037

The z axis: for ρ/r.

Case 4

ρ = 0.1 $c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$. $1-\alpha$

r	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.07	*1.4286*	0.9286	**1.0000**	1.0714	1.1429	1.2143	1.2857	1.3571
0.075	1.3333	0.8667	0.9333	**1.0000**	1.0667	1.1333	1.2000	1.2667
0.08	1.2500	0.8125	0.8750	0.9375	**1.0000**	1.0625	1.1250	1.1875
0.085	1.1765	0.7647	0.8235	0.8824	0.9412	**1.0000**	1.0588	1.1176
0.09	1.1111	0.7222	0.7778	0.8333	0.8889	0.9444	**1.0000**	1.0556
0.095	1.0526	0.6842	0.7368	0.7895	0.8421	0.8947	0.9474	**1.0000**
0.1	1	0.6500	0.7000	0.7500	0.8000	0.8500	0.9000	0.9500
0.105	0.9524	0.6190	0.6667	0.7143	0.7619	0.8095	0.8571	0.9048
0.11	*0.9091*	0.5909	0.6364	0.6818	0.7273	0.7727	0.8182	0.8636

The z axis: for ρ/r.

Table 5-1. In the area above this line, (*rho*/*r*) is below 1.0, where the situation is more saving- oriented under *r*>*rho*. The lower the (*rho*/*r*) when (*rho*/*r*) is farther above from this line. In the area below this line, (*rho*/*r*) is above 1.0, where the situation is more consumption-oriented under *rho*>*r*. The higher the (*rho*/*r*) when (*rho*/*r*) is farther below from this

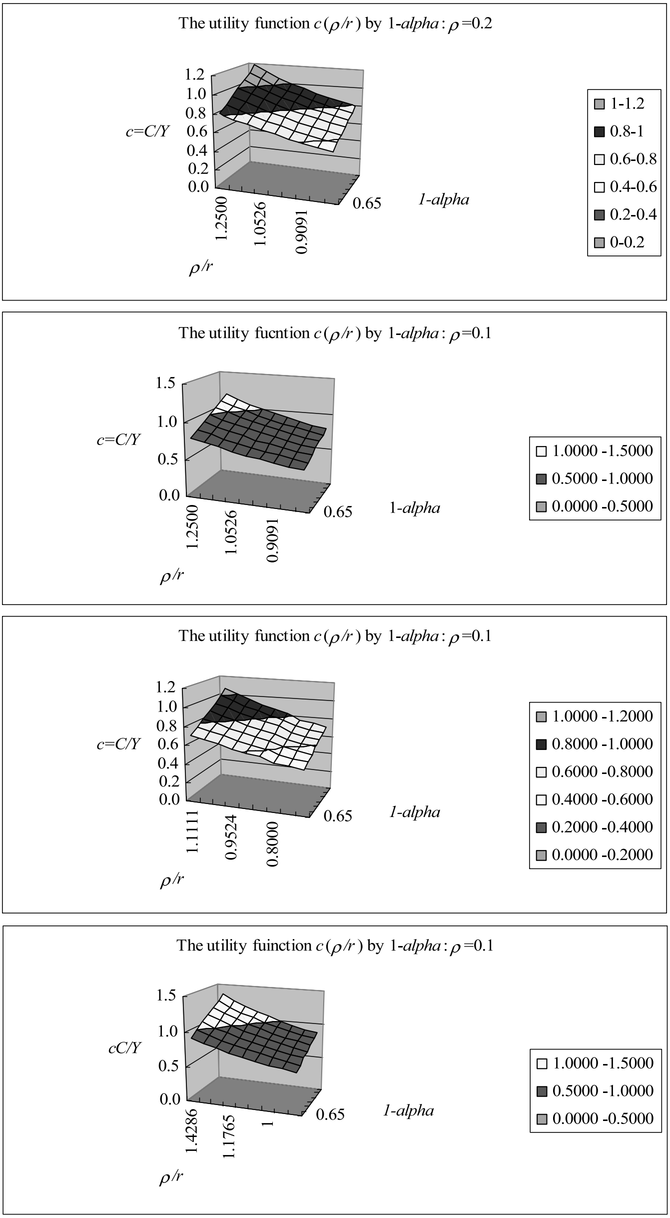


Figure 2 The utility function of $c(\rho/r)$ by 1-*alpha*: for Table 3

Table 4 The rate of saving that is dual to the utility function of *c*(*ρ*/*r*) by 1-*alpha*

ρ is the discount rate of the utility function & *r* is the rate of rental under convergence.

Case 1		*ρ*						
		0.2		*s=1-c=(ρ/r)(1-α)*, where *ρ/r=C/W.*				1-*α*
r	*ρ/r*	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.24	0.8333	0.1875	0.1250	0.0625	0.0000	-0.0625	-0.1250	-0.1875
0.23	0.8696	0.2353	0.1765	0.1176	0.0588	0.0000	-0.0588	-0.1176
0.22	0.9091	0.2778	0.2222	0.1667	0.1111	0.0556	0.0000	-0.0556
0.21	0.9524	0.3158	0.2632	0.2105	0.1579	0.1053	0.0526	0.0000
0.2	1	0.35	0.3	0.25	0.2	0.15	0.1	0.05
0.19	1.0526	0.3810	0.3333	0.2857	0.2381	0.1905	0.1429	**0.0952**
0.18	1.1111	0.4091	0.3636	0.3182	0.2727	0.2273	**0.1818**	0.1364
0.17	1.1765	0.4348	0.3913	0.3478	0.3043	**0.2609**	0.2174	0.1739
0.16	1.2500	0.4583	0.4167	0.3750	**0.3333**	0.2917	0.2500	0.2083

The z axis: for *ρ/r.* The X ais is for *n*, and the Y axis is for *beta**.

Case 2		*ρ*						
		0.1		*s=1-c=(ρ/r)(1-α)*, where *ρ/r=C/W.*				1-*α*
r	*ρ/r*	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.12	0.8333	0.1875	0.1250	0.0625	0.0000	-0.0625	-0.1250	-0.1875
0.115	0.8696	0.2353	0.1765	0.1176	0.0588	0.0000	-0.0588	-0.1176
0.11	0.9091	0.2778	0.2222	0.1667	0.1111	0.0556	0.0000	-0.0556
0.105	0.9524	0.3158	0.2632	0.2105	0.1579	0.1053	0.0526	0.0000
0.1	1	0.35	0.3	0.25	0.2	0.15	0.1	0.05
0.095	1.0526	0.3810	0.3333	0.2857	0.2381	0.1905	0.1429	**0.0952**
0.09	1.1111	0.4091	0.3636	0.3182	0.2727	0.2273	**0.1818**	0.1364
0.085	1.1765	0.4348	0.3913	0.3478	0.3043	**0.2609**	0.2174	0.1739
0.08	1.2500	0.4583	0.4167	0.3750	**0.3333**	0.2917	0.2500	0.2083

The z axis: for *ρ/r.*

Case 3		*ρ*						
		0.1		*s=1-c=(ρ/r)(1-α)*, where *ρ/r=C/W.*				1-*α*
r	*ρ/r*	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.099	1.0101	0.7222	0.7778	0.8333	0.8889	0.9444	1.0000	1.0556
0.105	0.9524	0.6842	0.7368	0.7895	0.8421	0.8947	0.9474	1.0000
0.1	1	0.6500	0.7000	0.7500	0.8000	0.8500	0.9000	0.9500
0.095	1.0526	0.6190	0.6667	0.7143	0.7619	0.8095	0.8571	**0.9048**
0.09	1.1111	0.5909	0.6364	0.6818	0.7273	0.7727	**0.8182**	0.8636
0.085	1.1765	0.5652	0.6087	0.6522	0.6957	**0.7391**	0.7826	0.8261
0.08	1.2500	0.5200	0.5600	0.6000	**0.6400**	0.6800	0.7200	0.7600
0.075	1.3333	0.5000	0.5385	**0.5769**	0.6154	0.6538	0.6923	0.7308
0.07	1.4286	0.4815	**0.5185**	0.5556	0.5926	0.6296	0.6667	0.7037

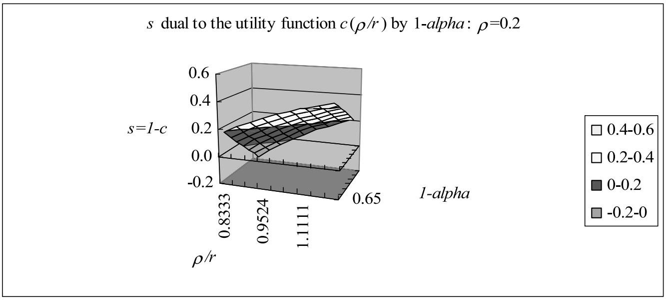
The z axis: for *ρ/r.*

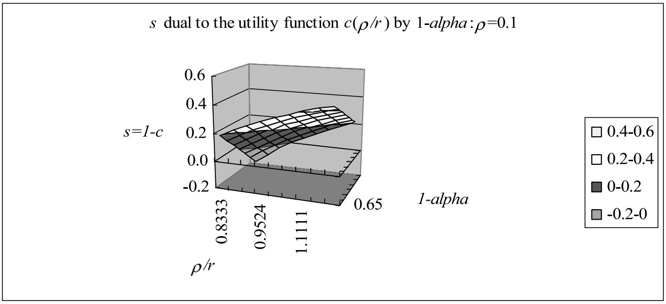
Case 4		*ρ*						
		0.1		*s=1-c=(ρ/r)(1-α)*, where *ρ/r=C/W.*				1-*α*
r	*ρ/r*	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.13	0.7692	0.0714	0.0000	-0.0714	-0.1429	-0.2143	-0.2857	-0.3571
0.125	0.8000	0.1333	0.0667	0.0000	-0.0667	-0.1333	-0.2000	-0.2667
0.12	0.8333	0.1875	0.1250	0.0625	0.0000	-0.0625	-0.1250	-0.1875
0.115	0.8696	0.2353	0.1765	0.1176	0.0588	0.0000	-0.0588	-0.1176
0.11	0.9091	0.2778	0.2222	0.1667	0.1111	0.0556	0.0000	-0.0556
0.105	0.9524	0.3158	0.2632	0.2105	0.1579	0.1053	0.0526	0.0000
0.1	1	0.3500	0.3000	0.2500	0.2000	0.1500	0.1000	0.0500
0.095	1.0526	0.3810	0.3333	0.2857	0.2381	0.1905	0.1429	**0.0952**
0.09	1.1111	0.4091	0.3636	0.3182	0.2727	0.2273	**0.1818**	0.1364

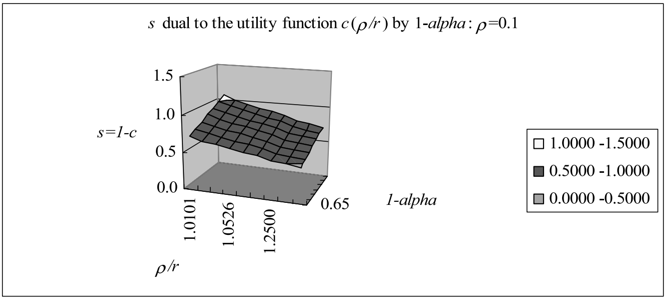
The z axis: for *ρ/r.*

line. I understand these characteristics are reasonable.

2. The lower the golden age, where *s=alpha*, the more consumption-oriented the area is. For example, in the case of *s=alpha*=0.05, the situation is completely consumption-oriented. Then, does this situation show the lowest







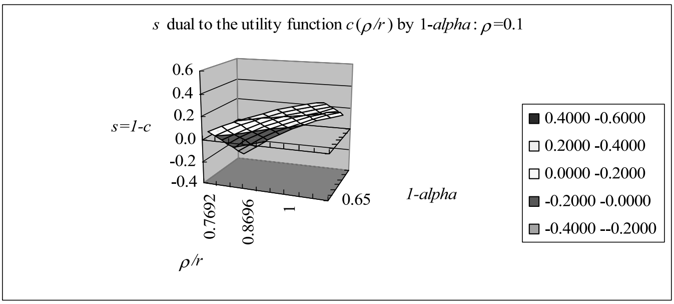


Figure 3 The rate of saving, *s*, dual to the utility function of $c(\rho/r)$ by 1-*alpha*: for Table 4

Table 5-1 Table of (rho/r) by the level of golden age, *s*=*α*, where *beta=1.0 and i/s=1.0**

	$1-\alpha$	0.65	0.7	0.75	0.8	0.85	0.9	0.95
	α	0.35	0.3	0.25	0.2	0.15	0.1	0.05
$s=\alpha=0.35$	s	***0.3500***	0.3093	0.2686	0.2279	0.1871	0.1464	0.1057
	c=1-s	0.6500	0.6907	0.7314	0.7721	0.8129	0.8536	0.8943
	ρ/r	**1.0000**	**0.9867**	**0.9752**	**0.9652**	**0.9563**	**0.9484**	**0.9414**
$s=\alpha=0.30$	s	0.3400	***0.3000***	0.2600	0.2200	0.1800	0.1400	0.1000
	c	0.6600	0.7000	0.7400	0.7800	0.8200	0.8600	0.9000
	ρ/r	**1.0154**	**1.0000**	**0.9867**	**0.9750**	**0.9647**	**0.9556**	**0.9474**
$s=\alpha=0.25$	s	0.3260	0.2880	***0.2500***	0.2120	0.1740	0.1360	0.0980
	c	0.6740	0.7120	0.7500	0.7880	0.8260	0.8640	0.9020
	ρ/r	**1.0370**	**1.0172**	**1.0000**	**0.9850**	**0.9718**	**0.9600**	**0.9495**
$s=\alpha=0.20$	s	0.3126	0.2750	0.2375	***0.2000***	0.1625	0.1250	0.0875
	c	0.6874	0.7250	0.7625	0.8000	0.8375	0.8750	0.9125
	ρ/r	**1.0576**	**1.0357**	**1.0166**	**1.0000**	**0.9853**	**0.9722**	**0.9605**
$s=\alpha=0.15$	s	0.2968	0.2601	0.2234	0.1867	***0.1500***	0.1134	0.0767
	c	0.7032	0.7399	0.7766	0.8133	0.8500	0.8866	0.9233
	ρ/r	**1.0819**	**1.0570**	**1.0355**	**1.0166**	**1.0000**	**0.9852**	**0.9719**
$s=\alpha=0.10$	s	0.2500	0.2200	0.1900	0.1600	0.1300	***0.1000***	0.0700
	c	0.7500	0.7800	0.8100	0.8400	0.8700	0.9000	0.9300
	ρ/r	**1.1538**	**1.1143**	**1.0800**	**1.0500**	**1.0235**	**1.0000**	**0.9789**
$s=\alpha=0.05$	s	0.2001	0.1751	0.1501	0.1251	0.1001	0.0750	***0.0500***
	c	0.7999	0.8249	0.8499	0.8749	0.8999	0.9250	0.9500
	ρ/r	**1.2306**	**1.1784**	**1.1332**	**1.0937**	**1.0588**	**1.0277**	**1.0000**

Note: saving maches rental by changing each of $s_{S\,IT/IT}$, $s_{SD/D}$, and $s_{SW/W}$: by the level of the golden age.

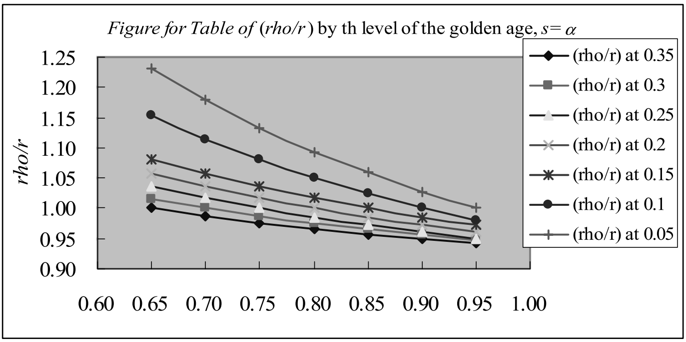


Figure 4 Figure for Table of (*rho*/*r*) by the level of the golden age, *s*=*alpha*: for Table 5-1

alpha? This differs from the real

3. The lower the golden age, where *s*=*alpha*, the more consumption-oriented the area is. For example, in the case of *s*=*alpha*=0.05, the situation is completely consumption-oriented. Then, does this situation show the lowest

alpha? This differs from the real

world: does the US show a low *alpha*? No, it does not and we need a suitable interpretation.

If *alpha* is low, the rate of rental is also low and cannot absorb funds from the world assuming a fixed moderate capital-output ratio, $\Omega(0)$: if *alpha*=0.05 and $\Omega(0)$=2.5, then the rate of rental, $r(0)$, will be 0.02, which is no attractive at all in the world money market. Recall the above Eq.20, $\alpha = \beta^*_{\delta=\alpha} \cdot i$ under the golden age, when technological progress is not zero. A modified *alpha* is set $\alpha^* \equiv \alpha / \beta^*_{\delta=\alpha}$. If $\beta^*_{\delta=\alpha}$=0.7 and *alpha*=0.1, then the modified *alpha* is 0.1÷0.7=0.1428. This implies that *alpha* is estimated at a higher value than that in Table 5-1. I will briefly discuss this problem in 3.3 soon below and also in Kamiryo [2005c] in more detail.[10)]

Finally, I raise two propositions derived from Table 5-1 and Figure 4.

Proposition 1: The value of (*rho*/*r*) and the ratio of consumption to output will be hyperbolically higher if the relative share of rental increases.

Proposition 2: The higher the (*rho*/*r*), the more consumption-oriented the situation is, if the level of *s*=*alpha* at the golden age becomes lower, assuming no technological progress. On the other hand, the level of (*rho*/*r*) is more mitigated if the rate of technological progress is higher.

In short, in my endogenous growth model, the golden rule is modified and influenced by the level of *beta** and thus, the level of *s*=*alpha* will be higher than that with no technological progress. This corresponds with such that technology will induce investment as stressed by Schumpeter.

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10) When *alpha* is estimated at a higher value, usually the capital-labor will be estimated at a higher value. When capital is unknown, if I divide *alpha*/*(1-alpha)* by the ratio of the rate of rental to the wage rate, *r*/*w*, the capital-labor ratio, $k(0)$, will be estimated: if the rate of rental is lower *r*/*w* will be lower and thus, the capital-labor ratio and capital will be higher, assuming that *alpha* is fixed. This idea comes from Kamiryo [2004c]. In this respect, *alpha* is indirectly related to capital.

3.3 Empirical results in the Japanese national accounts

This section, using (*rho*/*r*), shows estimated wages and rental based on national disposable income as the sum of saving and consumption, using the Japanese national accounts, 1993 to 2002. The results are more vividly shown when the total economy is divided into the government sector and the private sector (compare Tables 6-1 with Tables 6-2 and 6-3, together with Figure 5).

The Japanese economy has changed significantly last one decade in terms of the relationship between saving and *alpha*. This change is expressed by the transition of the ratio of *s* to *alpha*: *s*/*alpha*. When *s*/*alpha*=1.0, the situation is under the golden rule/age. The higher the value of *s*/*alpha* beyond 1.0, the more saving-oriented it is and vice versa. The value of *s*/*alpha* has declined from 1.25 in 1993 to 0.75 in 2002, slightly influenced by the value of (*rho*/*r*) as seen in Table 6-1 by case. Japan rapidly turned to consumption-oriented economy during this decade.

Table 6-1 Measurement of wages using the utility function: Cases of Japan (Open S-I Approach)

For total economy: Japanese cases

		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Final consumpt	C	334189.1	344000.5	352096.3	362349.8	364961.7	367224.5	368276.1	370896	372136.2	371944.7
	Y=S+C	402296.5	407054.3	411920.9	423474.5	428522.4	396183.8	419292.3	419970.9	411570.5	406983.1
	c=C/Y	0.8307	0.8451	0.8548	0.8557	0.8517	0.9269	0.8783	0.8831	0.9042	0.9139
	s=S/Y	0.1693	0.1549	0.1452	0.1443	0.1483	0.0731	0.1217	0.1169	0.0958	0.0861
	$L_{EV}=(I-S_{CORP})/S_{CORP}$	3.1710	2.1915	1.7713	1.1233	1.0937	0.8611	0.7296	0.2663	(0.0884)	(0.3712)
	(S-I)/Y	0.0354	0.0305	0.0230	0.0172	0.0309	(0.0277)	0.0316	0.0295	0.0289	0.0329
Case1	(rho/r)	**0.960**	**0.960**	**0.960**	**0.960**	**0.960**	**1.020**	**0.980**	**0.990**	**1.015**	**1.030**
as a base	W=C/(ρ/r)	348113.6	358333.9	366767.0	377447.7	380168.4	360024.0	375791.9	374642.4	366636.7	361111.4
$W=W_G+W_{PRI}$	1-α=W/Y	0.8653	0.8803	0.8904	0.8913	0.8872	0.9087	0.8963	0.8921	0.8908	0.8873
361111.4	alpha	0.1347	0.1197	0.1096	0.1087	0.1128	0.0913	0.1037	0.1079	0.1092	0.1127
361111.4	s/alpha	1.2570	1.2942	1.3249	1.3280	1.3145	0.8009	1.1728	1.0827	0.8776	0.7638
	Rental	54182.9	48720.4	45153.9	46026.8	48354.0	36159.8	43500.4	45328.5	44933.8	45871.7
Case 2	(rho/r)	**0.960**	**0.960**	**0.964**	**0.964**	**0.964**	**0.984**	**0.975**	**0.975**	**0.979**	**0.984**
	W=C/(ρ/r)	348113.6	358333.9	365416.5	376068.2	378745.5	373142.1	377827.1	380498.5	379964.5	377994.4
$W=W_G+W_{PRI}$	1-α=W/Y	0.8653	0.8803	0.8871	0.8881	0.8838	0.9418	0.9011	0.9060	0.9232	0.9288
377994.4	alpha	0.1347	0.1197	0.1129	0.1119	0.1162	0.0582	0.0989	0.0940	0.0768	0.0712
361111.4	s/alpha	1.2570	1.2942	1.2864	1.2894	1.2769	1.2568	1.2303	1.2433	1.2477	1.2087
	Rental	54183	48720	46504	47406	49777	23042	41465	39472	31606	28989
Case 3	(rho/r)	**0.960**	**0.960**	**0.960**	**0.960**	**0.960**	**1.012**	**1.025**	**1.014**	**1.014**	**1.020**
	W=C/(ρ/r)	348113.6	358333.9	366767.0	377447.7	380168.4	362960.8	359352.1	365889.1	367160.0	364691.2
$W=W_G+W_{PRI}$	1-α=W/Y	0.8653	0.8803	0.8904	0.8913	0.8872	0.9161	0.8570	0.8712	0.8921	0.8961
364691.2	alpha	0.1347	0.1197	0.1096	0.1087	0.1128	0.0839	0.1430	0.1288	0.1079	0.1039
361111.4	s/alpha	1.2570	1.2942	1.3249	1.3280	1.3145	0.8717	0.8511	0.9074	0.8880	0.8285
	Rental	54183	48720	45154	46027	48354	33223	59940	54082	44410	42292
Case 4	(rho/r)	**0.943**	**0.943**	**0.943**	**0.943**	**0.943**	**1.014**	**1.018**	**1.027**	**1.036**	**1.045**
	W=C/(ρ/r)	354531.1	364937.3	373504.1	384389.2	387133.5	362317.7	361768.5	361170.1	359279.9	356066.9
$W=W_G+W_{PRI}$	1-α=W/Y	0.8813	0.8965	0.9067	0.9077	0.9034	0.9145	0.8628	0.8600	0.8729	0.8749
356066.9	alpha	0.1187	0.1035	0.0933	0.0923	0.0966	0.0855	0.1372	0.1400	0.1271	0.1251
361111.4	s/alpha	1.4259	1.4971	1.5573	1.5639	1.5357	0.8551	0.8869	0.8346	0.7541	0.6882
	Rental	47765	42117	38417	39085	41389	33866	57524	58801	52291	50916
Case 5	(rho/r)	**0.962**	**0.963**	**0.964**	**0.964**	**0.964**	**1.021**	**1.007**	**1.012**	**1.017**	**1.022**
	W=C/(ρ/r)	347474.5	357354.6	365255.2	375740.4	378407.4	359689.0	365565.0	366512.9	365915.6	363925.6
$W=W_G+W_{PRI}$	1-α=W/Y	0.8637	0.8779	0.8867	0.8873	0.8831	0.9079	0.8719	0.8727	0.8891	0.8942
363925.6	alpha	0.1363	0.1221	0.1133	0.1127	0.1169	0.0921	0.1281	0.1273	0.1109	0.1058
361111.4	s/alpha	1.2423	1.2687	1.2820	1.2805	1.2683	0.7935	0.9495	0.9180	0.8637	0.8138
	Rental	54822	49700	46666	47734	50115	36495	53727	53458	45655	43058

Table 6-2 Measurement of wages using the utility function: Cases of Japan (Open S-I Approach)

The government sector

		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Excl.**pension**	C_G	30066.2	31023.3	32411.6	33108.1	34150.7	35197.9	36389.4	36974.3	37872.2	38511
	$Y_G=S_G+C_G$	39261.1	32428.9	31462.9	31803.2	33457.8	24592.4	19009.1	21221.1	17956	10019.5
	$c_G=C_G/Y_G$	0.7658	0.9567	1.0302	1.0410	1.0207	1.4313	1.9143	1.7423	2.1092	3.8436
	$s_G=S_G/Y_G$	0.2342	0.0433	(0.0302)	(0.0410)	(0.0207)	(0.4313)	(0.9143)	(0.7423)	(1.1092)	(2.8436)
	$L_{EV(G)}=(I_G-S_G)/S_G$	0.4479	2.1296	3.4040	4.0836	3.8715	(4.2401)	(2.3008)	(2.1746)	(1.7172)	(1.3804)
	$(S_G-I_G)/Y_G$	(0.3399)	(0.6167)	(0.7517)	(0.6986)	(0.5698)	(1.1815)	(1.8078)	(1.3877)	(1.7586)	(3.8042)
Case1	(rho/r)	**0.960**	**0.960**	**0.960**	**0.960**	**0.960**	**1.020**	**0.980**	**0.990**	**1.015**	**1.030**
	$W_G=C_G/(\rho/r)$	31319.0	32315.9	33762.1	34487.6	35573.6	34507.7	37132.0	37347.8	37312.5	37389.3
	W_G/Y_G	0.7977	0.9965	1.0731	1.0844	1.0632	1.4032	1.9534	1.7599	2.0780	3.7317
	$alpha_G$	0.2023	0.0035	(0.0731)	(0.0844)	(0.0632)	(0.4032)	(0.9534)	(0.7599)	(1.0780)	(2.7317)
	$s_G/alpha_G$	1.1577	12.4431	0.4126	0.4861	0.3275	1.0696	0.9590	0.9768	1.0289	1.0410
	Rental	7942	113	(2299)	(2684)	(2116)	(9915)	(18123)	(16127)	(19357)	(27370)
Case 2	(rho/r)	**0.960**	**0.960**	**1.000**	**1.000**	**1.000**	**1.025**	**1.020**	**1.020**	**1.020**	**1.020**
	$W_G=C_G/(\rho/r)$	31319.0	32315.9	32411.6	33108.1	34150.7	34339.4	35675.9	36249.3	37129.6	37755.9
$W=W_G+W_{PRI}$	W_G/Y_G	0.7977	0.9965	1.0302	1.0410	1.0207	1.3963	1.8768	1.7082	2.0678	3.7682
377994.4	$alpha_G$	0.2023	0.0035	(0.0302)	(0.0410)	(0.0207)	(0.3963)	(0.8768)	(0.7082)	(1.0678)	(2.7682)
361111.4	$s_G/alpha_G$	1.1577	12.4431	1.0000	1.0000	1.0000	1.0881	1.0428	1.0482	1.0387	1.0272
	Rental	7942	113	(949)	(1305)	(693)	(9747)	(16667)	(15028)	(19174)	(27736)
Case 3	(rho/r)	**0.960**	**0.960**	**0.960**	**0.960**	**0.960**	**0.940**	**0.980**	**0.960**	**0.960**	**0.940**
	$W_G=C_G/(\rho/r)$	31319.0	32315.9	33762.1	34487.6	35573.6	37444.6	37132.0	38514.9	39450.2	40969.1
$W=W_G+W_{PRI}$	W_G/Y_G	0.7977	0.9965	1.0731	1.0844	1.0632	1.5226	1.9534	1.8149	2.1970	4.0889
364691.2	$alpha_G$	0.2023	0.0035	(0.0731)	(0.0844)	(0.0632)	(0.5226)	(0.9534)	(0.8149)	(1.1970)	(3.0889)
361111.4	$s_G/alpha_G$	1.1577	12.4431	0.4126	0.4861	0.3275	0.8252	0.9590	0.9109	0.9266	0.9206
maximum(-)	Rental	7942	113	(2299)	(2684)	(2116)	(12852)	(18123)	(17294)	(21494)	(30950)
Case 4	(rho/r)	**0.970**	**0.970**	**0.970**	**0.970**	**0.970**	**1.000**	**1.000**	**1.000**	**1.000**	**1.000**
	$W_G=C_G/(\rho/r)$	30996.1	31982.8	33414.0	34132.1	35206.9	35197.9	36389.4	36974.3	37872.2	38511.0
$W=W_G+W_{PRI}$	W_G/Y_G	0.7895	0.9862	1.0620	1.0732	1.0523	1.4313	1.9143	1.7423	2.1092	3.8436
356066.9	$alpha_G$	0.2105	0.0138	(0.0620)	(0.0732)	(0.0523)	(0.4313)	(0.9143)	(0.7423)	(1.1092)	(2.8436)
361111.4	$s_G/alpha_G$	1.1125	3.1507	0.4862	0.5603	0.3961	1.0000	1.0000	1.0000	1.0000	1.0000
	Rental	8265	446	(1951)	(2329)	(1749)	(10606)	(17380)	(15753)	(19916)	(28492)
Case 5	(rho/r)	**0.980**	**0.990**	**1.005**	**1.010**	**1.010**	**1.030**	**1.030**	**1.030**	**1.035**	**1.040**
	$W_G=C_G/(\rho/r)$	30679.8	31336.7	32250.3	32780.3	33812.6	34172.7	35329.5	35897.4	36591.5	37029.8
$W=W_G+W_{PRI}$	W_G/Y_G	0.7814	0.9663	1.0250	1.0307	1.0106	1.3896	1.8586	1.6916	2.0378	3.6958
363925.6	$alpha_G$	0.2186	0.0337	(0.0250)	(0.0307)	(0.0106)	(0.3896)	(0.8586)	(0.6916)	(1.0378)	(2.6958)
361111.4	$s_G/alpha_G$	1.0715	1.2869	1.2048	1.3355	1.9531	1.1070	1.0649	1.0734	1.0687	1.0548
minimum(-)	Rental	8581	1092	(787)	(977)	(355)	(9580)	(16320)	(14676)	(18635)	(27010)

Table 6-3 Measurement of wages using the utility function: Cases of Japan (Open S-I Approach)

The private sector

		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Incl.**pension**	C_{PRI}	304122.9	312977.2	319684.7	329241.7	330811	332026.6	331886.7	333921.7	334264	333433.7
	$Y_{PRI}=S_{PRI}+C_{PRI}$	363035.4	374625.4	380458	391671.3	395064.6	371591.4	400283.2	398749.8	393614.5	396963.6
	$c_{PRI}=C_{PRI}/Y_{PRI}$	0.8377	0.8354	0.8403	0.8406	0.8374	0.8935	0.8291	0.8374	0.8492	0.8400
	$s_{PRI}=S_{PRI}/Y_{PRI}$	0.1623	0.1646	0.1597	0.1594	0.1626	0.1065	0.1709	0.1626	0.1508	0.1600
	$L_{EV(PRI)}=(I_{PRI}-S_{CORP})/S_{CORP}$	1.4264	0.8421	0.5216	0.2985	0.3294	0.0012	(0.0481)	(0.2065)	(0.4747)	(0.6507)
	$(S_{PRI}-I_{PRI})/Y_{PRI}$	0.0759	0.0866	0.0871	0.0753	0.0818	0.0487	0.1189	0.1049	0.1105	0.1297
Case1	(rho/r)	**0.960**	**0.960**	**0.960**	**0.960**	**0.960**	**1.020**	**0.980**	**0.990**	**1.015**	**1.030**
	$W_{PRI}=C_{PRI}/(\rho/r)$	316794.7	326017.9	333004.9	342960.1	344594.8	325516.3	338659.9	337294.6	329324.1	323722.0
	W_{PRI}/Y_{PRI}	0.8726	0.8703	0.8753	0.8756	0.8722	0.8760	0.8461	0.8459	0.8367	0.8155
	$alpha_{PRI}$	0.1274	0.1297	0.1247	0.1244	0.1278	0.1240	0.1539	0.1541	0.1633	0.1845
	$s_{PRI}/alpha_{PRI}$	1.2740	1.2683	1.2807	1.2816	1.2731	0.8587	1.1099	1.0549	0.9232	0.8674
	Rental	46241	48607	47453	48711	50470	46075	61623	61455	64290	73242
Case 2	(rho/r)	**0.960**	**0.960**	**0.960**	**0.960**	**0.960**	**0.980**	**0.970**	**0.970**	**0.975**	**0.980**
	$W_{PRI}=C_{PRI}/(\rho/r)$	316794.7	326017.9	333004.9	342960.1	344594.8	338802.7	342151.2	344249.2	342834.9	340238.5
	W_{PRI}/Y_{PRI}	0.8726	0.8703	0.8753	0.8756	0.8722	0.9118	0.8548	0.8633	0.8710	0.8571
	$alpha_{PRI}$	0.1274	0.1297	0.1247	0.1244	0.1278	0.0882	0.1452	0.1367	0.1290	0.1429
	$s_{PRI}/alpha_{PRI}$	1.2740	1.2683	1.2807	1.2816	1.2731	1.2067	1.1766	1.1895	1.1688	1.1200
	Rental	46241	48607	47453	48711	50470	32789	58132	54501	50780	56725
Case 3	(rho/r)	**0.960**	**0.960**	**0.960**	**0.960**	**0.960**	**1.020**	**1.030**	**1.020**	**1.020**	**1.030**
	$W_{PRI}=C_{PRI}/(\rho/r)$	316794.7	326017.9	333004.9	342960.1	344594.8	325516.3	322220.1	327374.2	327709.8	323722.0
	W_{PRI}/Y_{PRI}	0.8726	0.8703	0.8753	0.8756	0.8722	0.8760	0.8050	0.8210	0.8326	0.8155
	$alpha_{PRI}$	0.1274	0.1297	0.1247	0.1244	0.1278	0.1240	0.1950	0.1790	0.1674	0.1845
	$s_{PRI}/alpha_{PRI}$	1.2740	1.2683	1.2807	1.2816	1.2731	0.8587	0.8762	0.9083	0.9006	0.8674
	Rental	46241	48607	47453	48711	50470	46075	78063	71376	65905	73242
Case 4	(rho/r)	**0.940**	**0.940**	**0.940**	**0.940**	**0.940**	**1.015**	**1.020**	**1.030**	**1.040**	**1.050**
	$W_{PRI}=C_{PRI}/(\rho/r)$	323535.0	332954.5	340090.1	350257.1	351926.6	327119.8	325379.1	324195.8	321407.7	317555.9
	W_{PRI}/Y_{PRI}	0.8912	0.8888	0.8939	0.8943	0.8908	0.8803	0.8129	0.8130	0.8166	0.8000
	$alpha_{PRI}$	0.1088	0.1112	0.1061	0.1057	0.1092	0.1197	0.1871	0.1870	0.1834	0.2000
	$s_{PRI}/alpha_{PRI}$	1.4914	1.4794	1.5055	1.5074	1.4895	0.8897	0.9131	0.8695	0.8220	0.8000
	Rental	39500	41671	40368	41414	43138	44472	74904	74554	72207	79408
Case 5	(rho/r)	**0.960**	**0.960**	**0.960**	**0.960**	**0.960**	**1.020**	**1.005**	**1.010**	**1.015**	**1.020**
	$W_{PRI}=C_{PRI}/(\rho/r)$	316794.7	326017.9	333004.9	342960.1	344594.8	325516.3	330235.5	330615.5	329324.1	326895.8
	W_{PRI}/Y_{PRI}	0.8726	0.8703	0.8753	0.8756	0.8722	0.8760	0.8250	0.8291	0.8367	0.8235
	$alpha_{PRI}$	0.1274	0.1297	0.1247	0.1244	0.1278	0.1240	0.1750	0.1709	0.1633	0.1765
	$s_{PRI}/alpha_{PRI}$	1.2740	1.2683	1.2807	1.2816	1.2731	0.8587	0.9764	0.9515	0.9232	0.9067
	Rental	46241	48607	47453	48711	50470	46075	70048	68134	64290	70068

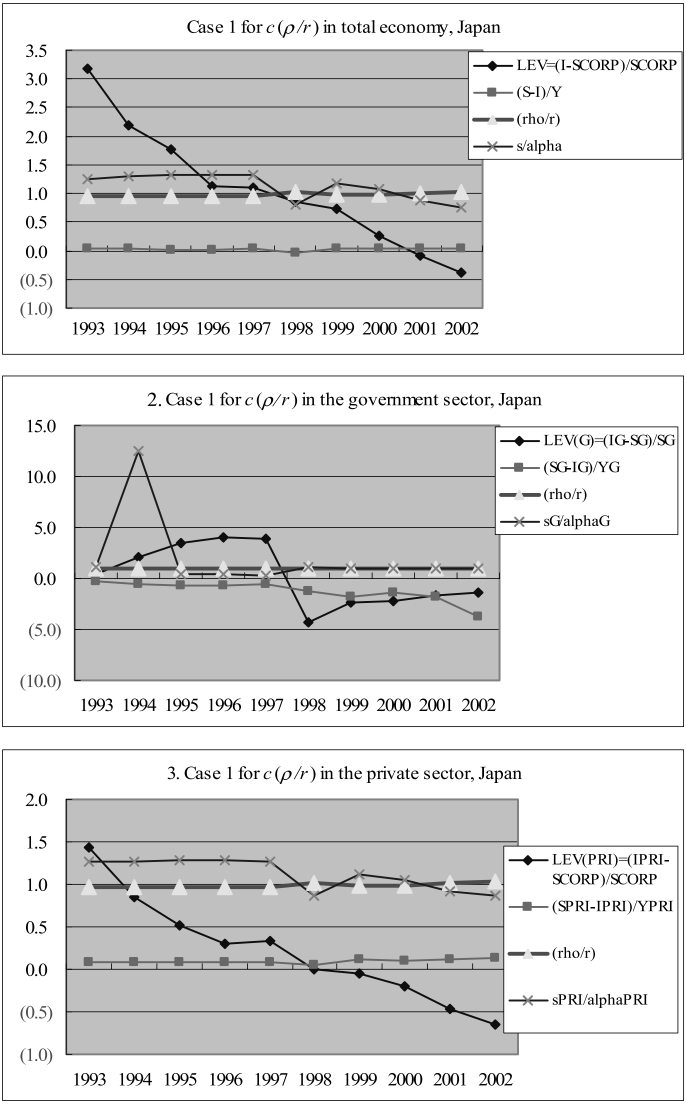

Figure 5 The relationship between saving and rental using the utility function: cases of Japan: for Table 6

The above tendency is significantly stronger in the government sector, but *alpha* becoming negative as seen in most EU countries. And, the above tendency should be weaker in the private sector, but note that the private sector has decreased borrowings without facing at "crowding out," as seen in Figure 5. In other words, the leverage defined as the ratio of net investment minus corporate saving to corporate saving has decreased continuously in the decade. This corresponds with the decrease in bad debts and also in the capital-output ratio. Under these circumstances, how can the value of (*rho*/*r*) be discriminated by sector? This will be discussed more in Kamiryo [2005c].

3.4 Empirical results in the OECD national accounts

Finally, in most countries in EU, the results derived using OECD National Accounts Statistics data in 1967 to 2003, show that in the long-term the value of *s*/*alpha* significantly has varied due to budget deficits but the value of (*rho*/*r*) has compulsively remained within some narrow ranges. This is because if (*rho*/*r*) increased continuously the value of *alpha* also increases, resulting in the increase in the capital-output ratio without limit,[11] which destroys an economic system.

For my empirical analysis, I need four values[12] (which I call raw data in statistics) together with the determination of (*rho*/*r*): GDP, national disposable income, consumption, and actual compensation/wages in GDP. I investigated twenty five countries available in OECD Statistics, but finally I found that ten countries publish all of the above four values. Thus, I added five countries to my investigation, although national disposable income and/or actual wages are

11) I discussed this problem in Kamiryo [2004c], where the capital-output ratio has its upper limit by club, classified using many developing and advanced countries.

12) In the neat future I intend to use together "employed persons" (available in OECD raw data) instead of population (available in IFS and GFS, IMF). In this case, I hope I can distinguish increasing returns to capital (IRC) with decreasing returns to capital (DRC) more accurately.

often not available after 1996. The results are shown in Appendix (Figures A4 with OECD data). Thus,

Proposition 3: If the value of (*rho*/*r*) is determined within a certain limit or within a range of Table 5-1, the ratio of consumption to output, *c*, and/or *alpha* may fluctuate significantly in a short term, but in the long-term, *c* and/or *alpha* will return back to a normal level by economic policies.

4. Conclusion

This paper discussed the relationship between consumption and compensation. I synthesize consumption and compensation with both optimum consumption in income and maximum rental in production. For consumption, I use the discount rate for consumers and the rate of rental for production and integrate the relationship between consumption and compensation by using (*rho*/*r*), maintaining each character of production and income.

I reviewed Ramsey [1928] and Tinbergen [1956] together with Sen Amarta Kumar [1957, 1961]. This is because Solow [1992] indicated the necessity of introducing the utility function of consumption and Tinbergen assumed and advocated that the utility function should be measurable. And, I found in this paper that both approaches finally are integrated to a simple utility function of consumption, *c*(*rho*/*r*). My approach differs from Tinbergen, yet I got a hint from him and expressed the area of *c*(*rho*/*r*), by using three dimensional graphs and presenting Table 5-1 (abbreviating 5-2 and 5-3 for calculation in this paper).

I showed the above results using cases together with three dimensional graphs, and also testing the Japanese national accounts in 1993 to 2002 and OECD National Statistics in 1967 to 2003. As the results, I found three propositions that were related to a golden rule/age consistent with technology. These propositions are useful when we estimate wages or rental by country and year, using the values of (*rho*/*r*) as in Table 5-1.[13)]

Finally, I add that I am soon applying my method (that is uniquely related to a golden rule consistent with technology) to many countries "by sector," using the data of IFS and GFS of IMF, which covers many countries in the world. And also, I must justify how to apply a technology-golden rule to the private sector. If the private sector constitutes an economy, income must be equal to production/output as "net product" stated by Bailey Martin, J. [1971, 33, 257–259].

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13) A question may still remain: how can we determine the level of $s=alpha$ by country? The higher the rate of saving the higher the *alpha*, but at what rate of saving *alpha* should be equal to the rate of saving? If I follow Solow [1958], the golden age by country may converge by club of convergence and the range of the golden age will be narrower than the range of rate of saving among countries. Two factors will reply to the above question: (1) the influence of technology by country as discussed in this paper and (2) the introduction of the differences between saving and net investment by sector (the balance of payment=budget deficit + the difference of saving and net investment in the private sector).

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Contents of Tables and Figures

Table A1-1 Structure of saving and consumption as a base to be consisent with the utility function

Case 1	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1-*alpha*
alpha	0.35	0.3	0.25	**0.2**	0.15	0.1	0.05	$s_{SP/P}$=
$\alpha_{SP/Y}$	0.2275	0.195	0.1625	0.13	0.0975	0.065	0.0325	0.65
$\alpha_{D/Y}$	0.1225	0.105	0.0875	0.07	0.0525	0.035	0.0175	$s_{SD/D}$=
$s_{SD/Y}$	0.0526	0.0450	0.0375	0.0300	0.0225	0.0150	0.0075	0.429
$c_{CD/Y}$	0.0699	0.0600	0.0500	0.0400	0.0300	0.0200	0.0100	
$w_{W/Y}=1-\alpha$	0.65	0.7	0.75	0.8	0.85	0.9	0.95	$s_{SW/W}$=
$s_{SW/Y}$	0.0325	0.0350	0.0375	0.0400	0.0425	0.0450	0.0475	0.05
$c_{CW/Y}$	0.6175	0.6650	0.7125	0.7600	0.8075	0.8550	0.9025	
s	0.3126	0.2750	0.24	**0.2**	0.1625	0.1250	0.0875	
c	0.6874	0.7250	0.7625	0.8000	0.8375	0.8750	0.9125	$c_{CW/Y}+c_{CD/Y}$
$\rho/r=c/w_{W/Y}$	**1.0576**	**1.0357**	**1.0166**	**1.0000**	**0.9853**	**0.9722**	**0.9605**	

Case 2	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1-*alpha*
alpha	0.35	0.3	0.25	**0.2**	0.15	0.1	0.05	$s_{SP/P}$=
$\alpha_{SP/Y}$	0.1575	0.135	0.1125	0.09	0.0675	0.045	0.0225	0.45
$\alpha_{D/Y}$	0.1925	0.165	0.1375	0.11	0.0825	0.055	0.0275	$s_{SD/D}$=
$s_{SD/Y}$	0.1155	0.0990	0.0825	0.0660	0.0495	0.0330	0.0165	0.6
$c_{CD/Y}$	0.0770	0.0660	0.0550	0.0440	0.0330	0.0220	0.0110	
$w_{W/Y}=1-\alpha$	0.65	0.7	0.75	0.8	0.85	0.9	0.95	$s_{SW/W}$=
$s_{SW/Y}$	0.0358	0.0385	0.0413	0.0440	0.0468	0.0495	0.0523	0.055
$c_{CW/Y}$	0.6143	0.6615	0.7088	0.7560	0.8033	0.8505	0.8978	
s	0.3088	0.2725	0.24	**0.2**	0.1638	0.1275	0.0913	
c	0.6913	0.7275	0.7638	0.8000	0.8363	0.8725	0.9088	$c_{CW/Y}+c_{CD/Y}$
$\rho/r=c/w_{W/Y}$	**1.0635**	**1.0393**	**1.0183**	**1.0000**	**0.9838**	**0.9694**	**0.9566**	

Case 3	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1-*alpha*
alpha	0.35	**0.3**	0.25	0.2	0.15	0.1	0.05	$s_{SP/P}$=
$\alpha_{SP/Y}$	0.175	0.15	0.125	0.1	0.075	0.05	0.025	0.5
$\alpha_{D/Y}$	0.175	0.15	0.125	0.1	0.075	0.05	0.025	$s_{SD/D}$=
$s_{SD/Y}$	0.1260	0.1080	0.0900	0.0720	0.0540	0.0360	0.0180	0.72
$c_{CD/Y}$	0.0490	0.0420	0.0350	0.0280	0.0210	0.0140	0.0070	
$w_{W/Y}=1-\alpha$	0.65	0.7	0.75	0.8	0.85	0.9	0.95	$s_{SW/W}$=
$s_{SW/Y}$	0.0390	0.0420	0.0450	0.0480	0.0510	0.0540	0.0570	0.06
$c_{CW/Y}$	0.6110	0.6580	0.7050	0.7520	0.7990	0.8460	0.8930	
s	0.3400	**0.3**	0.26	0.2200	0.1800	0.1400	0.1000	
c	0.6600	0.7000	0.7400	0.7800	0.8200	0.8600	0.9000	$c_{CW/Y}+c_{CD/Y}$
$\rho/r=c/w_{W/Y}$	**1.0154**	**1.0000**	**0.9867**	**0.9750**	**0.9647**	**0.9556**	**0.9474**	

Case 4	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1-*alpha*
alpha	0.35	0.3	0.25	0.2	0.15	**0.1**	0.05	$s_{SP/P}$=
$\alpha_{SP/Y}$	0.14	0.12	0.1	0.08	0.06	0.04	0.02	0.4
$\alpha_{D/Y}$	0.21	0.18	0.15	0.12	0.09	0.06	0.03	$s_{SD/D}$=
$s_{SD/Y}$	0.0840	0.0720	0.0600	0.0480	0.0360	0.0240	0.0120	0.4
$c_{CD/Y}$	0.1260	0.1080	0.0900	0.0720	0.0540	0.0360	0.0180	
$w_{W/Y}=1-\alpha$	0.65	0.7	0.75	0.8	0.85	0.9	0.95	$s_{SW/W}$=
$s_{SW/Y}$	0.0260	0.0280	0.0300	0.0320	0.0340	0.0360	0.0380	0.04
$c_{CW/Y}$	0.6240	0.6720	0.7200	0.7680	0.8160	0.8640	0.9120	
s	0.2500	0.2	0.19	0.1600	0.1300	**0.1**	0.0700	
c	0.7500	0.7800	0.8100	0.8400	0.8700	0.9000	0.9300	$c_{CW/Y}+c_{CD/Y}$
$\rho/r=c/w_{W/Y}$	**1.1538**	**1.1143**	**1.0800**	**1.0500**	**1.0235**	**1.0000**	**0.9789**	

Table A1-2 The utility function of *c* (ρ/*r*) by 1-*alpha* : consistent with saving and consumption as a base

Count backward — ρ — ρ is the discount rate of the utility function and r is the rate of profit under convergence.

Case 1 — ρ = 0.05 — $c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$. — 1-α

$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0466	*1.0730*	0.6975	0.7511	0.8048	0.8584	0.9121	0.9657	1.0194
0.0473	1.0576	0.6874	0.7403	0.7932	0.8461	0.8990	0.9519	1.0047
0.0483	1.0357	0.6732	0.7250	0.7767	0.8285	0.8803	0.9321	0.9839
0.0492	1.0166	0.6608	0.7116	0.7625	0.8133	0.8641	0.9150	0.9658
0.0500	1	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0507	0.9853	0.6404	0.6897	0.7390	0.7882	0.8375	0.8867	0.9360
0.0514	0.9722	0.6319	0.6805	0.7292	0.7778	0.8264	0.8750	0.9236
0.0521	0.9605	0.6243	0.6724	0.7204	0.7684	0.8164	0.8645	0.9125
0.0526	*0.9500*	0.6175	0.6650	0.7125	0.7600	0.8075	0.8550	0.9025

The z axis: for ρ/r. The above idea comes from both F.P. Ramsey [1928] and J Tinbergen [1956].

Count backward — ρ

Case 2 — ρ = 0.1 — $c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$. — 1-α

$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0917	*1.0900*	0.7085	0.7630	0.8175	0.8720	0.9265	0.9810	1.0355
0.0940	1.0635	0.6913	0.7444	0.7976	0.8508	0.9039	0.9571	1.0103
0.0962	1.0393	0.6755	0.7275	0.7795	0.8314	0.8834	0.9354	0.9873
0.0982	1.0183	0.6619	0.7128	0.7638	0.8147	0.8656	0.9165	0.9674
0.1000	1	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.1016	0.9838	0.6395	0.6887	0.7379	0.7871	0.8363	0.8854	0.9346
0.1032	0.9694	0.6301	0.6786	0.7271	0.7756	0.8240	0.8725	0.9210
0.1045	0.9566	0.6218	0.6696	0.7174	0.7653	0.8131	0.8609	0.9088
0.1064	*0.9400*	0.6110	0.6580	0.7050	0.7520	0.7990	0.8460	0.8930

The z axis: for ρ/r.

Count backward — ρ

Case 3 — ρ = 0.1 — $c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$. — 1-α

$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0971	*1.0300*	0.6695	0.7210	0.7725	0.8240	0.8755	0.9270	0.9785
0.0985	1.0154	0.6600	0.7108	0.7615	0.8123	0.8631	0.9138	0.9646
0.1000	1	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.1014	0.9867	0.6413	0.6907	0.7400	0.7893	0.8387	0.8880	0.9373
0.1026	0.9750	0.6338	0.6825	0.7313	0.7800	0.8288	0.8775	0.9263
0.1037	0.9647	0.6271	0.6753	0.7235	0.7718	0.8200	0.8682	0.9165
0.1047	0.9556	0.6211	0.6689	0.7167	0.7644	0.8122	0.8600	0.9078
0.1056	0.9474	0.6158	0.6632	0.7105	0.7579	0.8053	0.8526	0.9000
0.1067	*0.9370*	0.6091	0.6559	0.7028	0.7496	0.7965	0.8433	0.8902

The z axis: for ρ/r.

Count backward — ρ

Case 4 — ρ = 0.1 — $c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$. — 1-α

$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0833	*1.2000*	0.7800	0.8400	0.9000	0.9600	1.0200	1.0800	1.1400
0.0867	1.1538	0.7500	0.8077	0.8654	0.9231	0.9808	1.0385	1.0962
0.0897	1.1143	0.7243	0.7800	0.8357	0.8914	0.9471	1.0029	1.0586
0.0926	1.0800	0.7020	0.7560	0.8100	0.8640	0.9180	0.9720	1.0260
0.0952	1.0500	0.6825	0.7350	0.7875	0.8400	0.8925	0.9450	0.9975
0.0977	1.0235	0.6653	0.7165	0.7676	0.8188	0.8700	0.9212	0.9724
0.1000	1	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.1022	0.9789	0.6363	0.6853	0.7342	0.7832	0.8321	0.8811	0.9300
0.1053	*0.9500*	0.6175	0.6650	0.7125	0.7600	0.8075	0.8550	0.9025

The z axis: for ρ/r.

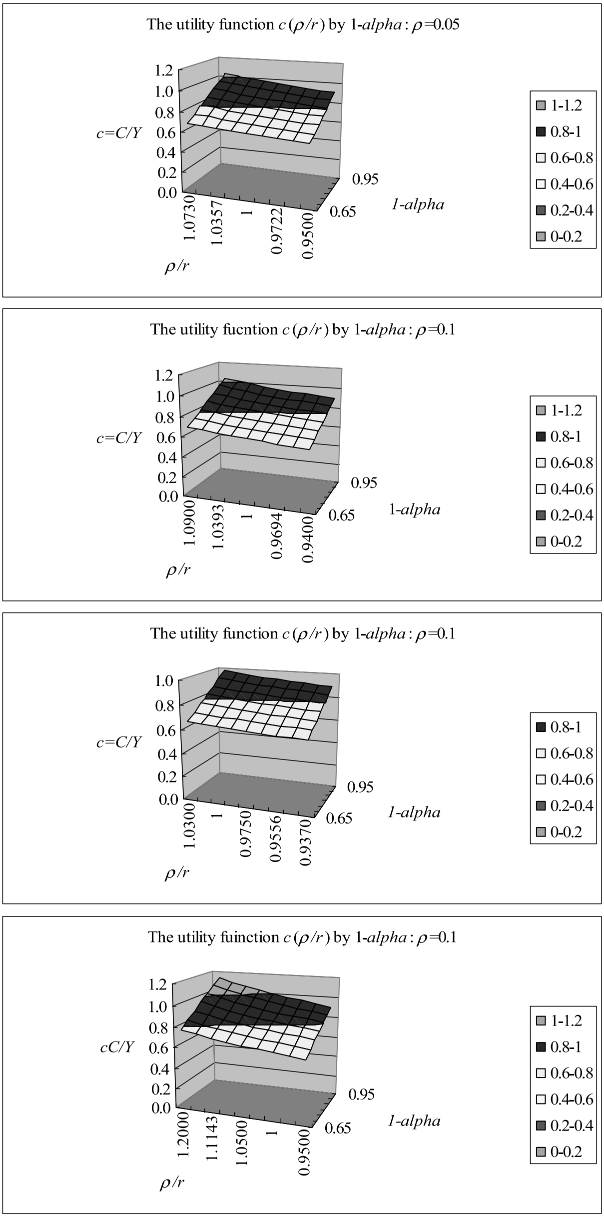


Figure A1-2 The utility function of c (ρ/r) by 1-*alpha*

Table A1-3 The rate of saving dual to the utility function: consistent with saving and consumption as a base

Count backward		ρ	ρ is the discount rate of the utility function and r is the rate of profit under convergence.					
Case 1		0.05		$s=1-c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.				1-α
$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0466	*1.0730*	0.3026	0.2489	0.1953	0.1416	0.0880	0.0343	-0.0194
0.0473	1.0576	0.3126	0.2597	0.2068	0.1539	0.1010	0.0481	-0.0047
0.0483	1.0357	0.3268	0.2750	0.2233	0.1715	0.1197	0.0679	0.0161
0.0492	1.0166	0.3392	0.2884	0.2375	0.1867	0.1359	0.0850	0.0342
0.0500	1	0.35	0.3	0.25	0.2	0.15	0.1	0.05
0.0507	0.9853	0.3596	0.3103	0.2610	0.2118	0.1625	0.1133	0.0640
0.0514	0.9722	0.3681	0.3195	0.2708	0.2222	0.1736	0.1250	0.0764
0.0521	0.9605	0.3757	0.3276	0.2796	0.2316	0.1836	0.1355	0.0875
0.0526	*0.9500*	0.3825	0.3350	0.2875	0.2400	0.1925	0.1450	0.0975

The z axis: for ρ/r.

Count backward		ρ						
Case 2		0.1		$s=1-c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.				1-α
$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0917	*1.0900*	0.2915	0.2370	0.1825	0.1280	0.0735	0.0190	-0.0355
0.0940	1.0635	0.3088	0.2556	0.2024	0.1492	0.0961	0.0429	-0.0103
0.0962	1.0393	0.3245	0.2725	0.2205	0.1686	0.1166	0.0646	0.0127
0.0982	1.0183	0.3381	0.2872	0.2363	0.1853	0.1344	0.0835	0.0326
0.1000	1	0.35	0.3	0.25	0.2	0.15	0.1	0.05
0.1016	0.9838	0.3605	0.3113	0.2621	0.2129	0.1638	0.1146	0.0654
0.1032	0.9694	0.3699	0.3214	0.2729	0.2244	0.1760	0.1275	0.0790
0.1045	0.9566	0.3782	0.3304	0.2826	0.2347	0.1869	0.1391	0.0913
0.1064	*0.9400*	0.3890	0.3420	0.2950	0.2480	0.2010	0.1540	0.1070

The z axis: for ρ/r.

Count backward		ρ						
Case 3		0.1		$s=1-c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.				1-α
$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0971	*1.0300*	0.3305	0.2790	0.2275	0.1760	0.1245	0.0730	0.0215
0.0985	1.0154	0.3400	0.2892	0.2385	0.1877	0.1369	0.0862	0.0354
0.1000	1	0.35	0.3	0.25	0.2	0.15	0.1	0.05
0.1014	0.9867	0.3587	0.3093	0.2600	0.2107	0.1613	0.1120	0.0627
0.1026	0.9750	0.3663	0.3175	0.2688	0.2200	0.1713	0.1225	0.0738
0.1037	0.9647	0.3729	0.3247	0.2765	0.2282	0.1800	0.1318	0.0835
0.1047	0.9556	0.3789	0.3311	0.2833	0.2356	0.1878	0.1400	0.0922
0.1056	0.9474	0.3842	0.3368	0.2895	0.2421	0.1947	0.1474	0.1000
0.1067	*0.9370*	0.3910	0.3441	0.2973	0.2504	0.2036	0.1567	0.1099

The z axis: for ρ/r.

Count backward		ρ						
Case 4		0.1		$s=1-c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.				1-α
$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0833	*1.2000*	0.2200	0.1600	0.1000	0.0400	-0.0200	-0.0800	-0.1400
0.0897	1.1143	0.2500	0.1923	0.1346	0.0769	0.0192	-0.0385	-0.0962
0.0926	1.0800	0.2757	0.2200	0.1643	0.1086	0.0529	-0.0029	-0.0586
0.0952	1.0500	0.2980	0.2440	0.1900	0.1360	0.0820	0.0280	-0.0260
0.0977	1.0235	0.3175	0.2650	0.2125	0.1600	0.1075	0.0550	0.0025
0.1000	1.0000	0.3347	0.2835	0.2324	0.1812	0.1300	0.0788	0.0276
0.1000	1	0.35	0.3	0.25	0.2	0.15	0.1	0.05
0.1022	0.9789	0.3637	0.3147	0.2658	0.2168	0.1679	0.1189	0.0700
0.1053	*0.9500*	0.3825	0.3350	0.2875	0.2400	0.1925	0.1450	0.0975

The z axis: for ρ/r.

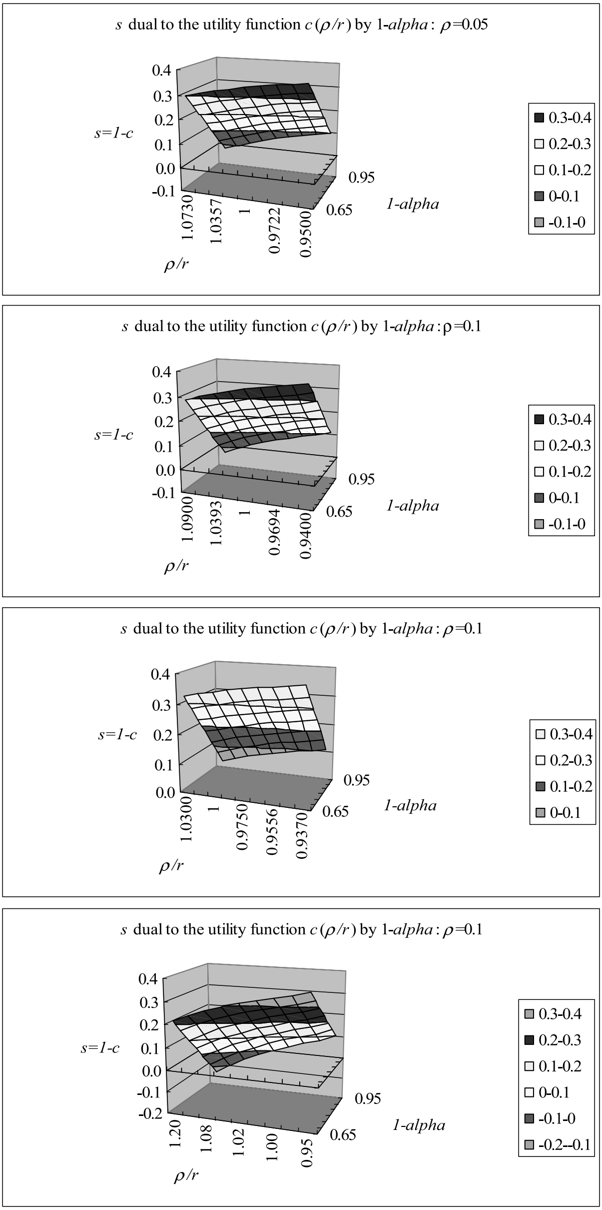


Figure A1-3 The rate of saving dual to the utility function of *c* (ρ/r) by 1-*alpha*

Table A2-1 Structure of saving and consumption as a base to be consistent with the utility function

Case 1	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1-*alpha*
alpha	0.35	0.3	0.25	**0.2**	0.15	0.1	0.05	$s_{SP/P}$ at $\alpha=s$
$\alpha_{SP/Y}$	0.1323	0.1350	0.1325	0.1300	0.0900	0.0600	0.0350	0.65
$\alpha_{D/Y}$	0.2177	0.1650	0.1175	0.0700	0.0600	0.0400	0.0150	$s_{SD/D}$ at $\alpha=s$
$s_{SD/Y}$	0.0894	0.0660	0.0470	0.0300	0.0270	0.0180	0.0078	0.429
$c_{CD/Y}$	0.1284	0.0990	0.0705	0.0400	0.0330	0.0220	0.0072	
$w_{W/Y}=1-\alpha$	0.65	0.7	0.75	0.8	0.85	0.9	0.95	$s_{SW/W}$ at $\alpha=s$
$s_{SW/Y}$	0.0137	0.0212	0.0311	0.0400	0.0735	0.1038	0.1311	0.05
$c_{CW/Y}$	0.6364	0.6788	0.7190	0.7600	0.7765	0.7962	0.8189	
s	0.2353	0.2222	0.21	**0.2**	0.1905	0.1818	0.1739	
c	0.7647	0.7778	0.7895	0.8000	0.8095	0.8182	0.8261	$c_{CW/Y}+c_{CD/Y}$
$\rho/r=c/w_{W/Y}$	**1.1765**	**1.1111**	**1.0526**	**1.0000**	**0.9524**	**0.9091**	**0.8696**	
$s_{SP/P}=$	0.3779	0.45	0.53	0.65	0.6	0.6	0.7	
$s_{SD/D}=$	0.4104	0.4	0.4	0.429	0.45	0.45	0.52	
$s_{SW/W}=$	0.021	0.0303	0.0414	0.05	0.0864	0.1153	0.138	

Case 2	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1-*alpha*
alpha	0.35	0.3	0.25	**0.2**	0.15	0.1	0.05	$s_{SP/P}$ at $\alpha=s$
$\alpha_{SP/Y}$	0.1323	0.1350	0.1325	0.1300	0.0900	0.0600	0.0350	0.45
$\alpha_{D/Y}$	0.217735	0.165	0.1175	0.07	0.06	0.04	0.015	$s_{SD/D}$ at $\alpha=s$
$s_{SD/Y}$	0.0894	0.0660	0.0470	0.0300	0.0270	0.0180	0.0078	0.6
$c_{CD/Y}$	0.1284	0.0990	0.0705	0.0400	0.0330	0.0220	0.0072	
$w_{W/Y}=1-\alpha$	0.65	0.7	0.75	0.8	0.85	0.9	0.95	$s_{SW/W}$ at $\alpha=s$
$s_{SW/Y}$	0.0137	0.0212	0.0311	0.0400	0.0735	0.1038	0.1311	0.055
$c_{CW/Y}$	0.6364	0.6788	0.7190	0.7600	0.7765	0.7962	0.8189	
s	0.2353	0.2222	0.21	**0.2**	0.1905	0.1818	0.1739	
c	0.7647	0.7778	0.7895	0.8000	0.8095	0.8182	0.8261	$c_{CW/Y}+c_{CD/Y}$
$\rho/r=c/w_{W/Y}$	**1.1765**	**1.1111**	**1.0526**	**1.0000**	**0.9524**	**0.9091**	**0.8696**	
$s_{SP/P}=$	0.3779	0.45	0.53	0.65	0.6	0.6	0.7	
$s_{SD/D}=$	0.4104	0.4	0.4	0.429	0.45	0.45	0.52	
$s_{SW/W}=$	0.021	0.0303	0.0414	0.05	0.0864	0.1153	0.138	

Case 3	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1-*alpha*
alpha	0.35	**0.3**	0.25	0.2	0.15	0.1	0.05	$s_{SP/P}$ at $\alpha=s$
$\alpha_{SP/Y}$	0.2100	0.1800	0.1500	0.1200	0.0900	0.0600	0.0300	0.5
$\alpha_{D/Y}$	0.14	0.12	0.1	0.08	0.06	0.04	0.02	$s_{SD/D}$ at $\alpha=s$
$s_{SD/Y}$	0.0630	0.0540	0.0450	0.0360	0.0270	0.0180	0.0090	0.72
$c_{CD/Y}$	0.0770	0.0660	0.0550	0.0440	0.0330	0.0220	0.0110	
$w_{W/Y}=1-\alpha$	0.65	0.7	0.75	0.8	0.85	0.9	0.95	$s_{SW/W}$ at $\alpha=s$
$s_{SW/Y}$	0.0428	0.0660	0.0907	0.1167	0.1438	0.2020	0.2303	0.06
$c_{CW/Y}$	0.6072	0.6340	0.6593	0.6833	0.7062	0.6980	0.7197	
s	0.3158	**0.3**	0.29	0.2727	0.2608	0.2800	0.2693	
c	0.6842	0.7000	0.7143	0.7273	0.7392	0.7200	0.7307	$c_{CW/Y}+c_{CD/Y}$
$\rho/r=c/w_{W/Y}$	**1.0526**	**1.0000**	**0.9524**	**0.9091**	**0.8696**	**0.8000**	**0.7692**	
$s_{SP/P}=$	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
$s_{SD/D}=$	0.45	0.45	0.45	0.45	0.45	0.45	0.45	
$s_{SW/W}=$	0.0659	0.0943	0.1209	0.1459	0.1692	0.2244	0.2424	

Case 4	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1-*alpha*
alpha	0.35	0.3	0.25	0.2	0.15	**0.1**	0.05	$s_{SP/P}$ at $\alpha=s$
$\alpha_{SP/Y}$	0.0175	0.0300	0.0500	0.0400	0.0450	0.0400	0.0200	0.4
$\alpha_{D/Y}$	0.3325	0.27	0.2	0.16	0.105	0.06	0.03	$s_{SD/D}$ at $\alpha=s$
$s_{SD/Y}$	0.0000	0.0270	0.0200	0.0240	0.0210	0.0210	0.0120	0.4
$c_{CD/Y}$	0.3325	0.2430	0.1800	0.1360	0.0840	0.0390	0.0180	
$w_{W/Y}=1-\alpha$	0.65	0.7	0.75	0.8	0.85	0.9	0.95	$s_{SW/W}$ at $\alpha=s$
$s_{SW/Y}$	0.1159	0.0680	0.0476	0.0471	0.0393	0.0390	0.0624	0.04
$c_{CW/Y}$	0.5341	0.6320	0.7024	0.7529	0.8107	0.8610	0.8876	
s	0.1334	0.1	0.12	0.1111	0.1053	**0.1**	0.0944	
c	0.8666	0.8750	0.8824	0.8889	0.8947	0.9000	0.9056	$c_{CW/Y}+c_{CD/Y}$
$\rho/r=c/w_{W/Y}$	**1.3333**	**1.2500**	**1.1765**	**1.1111**	**1.0526**	**1.0000**	**0.9533**	
$s_{SP/P}=$	0.05	0.1	0.2	0.2	0.3	0.4	0.4	
$s_{SD/D}=$	0	0.1	0.1	0.15	0.2	0.35	0.4	
$s_{SW/W}=$	0.1782	0.0971	0.0635	0.0589	0.0462	0.0433	0.0657	

Table A2-2 The utility function of c (ρ/r) by 1-*alpha* : consistent with saving and consumption as a base

ρ is the discount rate of the utility function & r is the rate of rental under convergence.

Case 1

		ρ						
		0.05	$c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.					$1-\alpha$
$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0400	*1.2500*	0.8125	0.8750	0.9375	**1.0000**	1.0625	1.1250	1.1875
0.0425	1.1765	0.7647	0.8236	0.8824	0.9412	**1.0000**	1.0589	1.1177
0.0450	1.1111	0.7222	0.7778	0.8333	0.8889	0.9444	**1.0000**	1.0555
0.0475	1.0526	0.6842	0.7368	0.7895	0.8421	0.8947	0.9473	**1.0000**
0.0500	1	0.65	0.70	0.75	0.80	0.85	0.90	0.95
0.0525	0.9524	0.6191	0.6667	0.7143	0.7619	0.8095	0.8572	0.9048
0.0550	0.9091	0.5909	0.6364	0.6818	0.7273	0.7727	0.8182	0.8636
0.0575	0.8696	0.5652	0.6087	0.6522	0.6957	0.7391	0.7826	0.8261
0.0602	*0.8310*	0.5402	0.5817	0.6233	0.6648	0.7064	0.7479	0.7895

The z axis: for ρ/r. The above idea comes from both F.P. Ramsey [1928] and J Tinbergen [1956].

Count backward

Case 2

		ρ						
		0.1	$c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.					$1-\alpha$
$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0800	*1.2500*	0.8125	0.8750	0.9375	**1.0000**	1.0625	1.1250	1.1875
0.0850	1.1765	0.7647	0.8236	0.8824	0.9412	**1.0000**	1.0589	1.1177
0.0900	1.1111	0.7222	0.7778	0.8333	0.8889	0.9444	**1.0000**	1.0555
0.0950	1.0526	0.6842	0.7368	0.7895	0.8421	0.8947	0.9473	**1.0000**
0.1000	1	0.65	0.70	0.75	0.80	0.85	0.90	0.95
0.1050	0.9524	0.6191	0.6667	0.7143	0.7619	0.8095	0.8572	0.9048
0.1100	0.9091	0.5909	0.6364	0.6818	0.7273	0.7727	0.8182	0.8636
0.1150	0.8696	0.5652	0.6087	0.6522	0.6957	0.7391	0.7826	0.8261
0.1203	*0.8310*	0.5402	0.5817	0.6233	0.6648	0.7064	0.7479	0.7895

The z axis: for ρ/r.

Count backward

Case 3

		ρ						
		0.1	$c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.					$1-\alpha$
$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0900	*1.1111*	0.7222	0.7778	0.8333	0.8889	0.9444	**1.0000**	1.0556
0.0950	1.0526	0.6842	0.7368	0.7895	0.8421	0.8947	0.9473	**1.0000**
0.1000	1	0.65	0.70	0.75	0.80	0.85	0.90	0.95
0.1050	0.9524	0.6191	0.6667	0.7143	0.7619	0.8095	0.8572	0.9048
0.1100	0.9091	0.5909	0.6364	0.6818	0.7273	0.7727	0.8182	0.8636
0.1150	0.8696	0.5652	0.6087	0.6522	0.6957	0.7392	0.7826	0.8261
0.1250	0.8000	0.5200	0.5600	0.6000	0.6400	0.6800	0.7200	0.7600
0.1300	0.7692	0.5000	0.5384	0.5769	0.6154	0.6538	0.6923	0.7307
0.1351	*0.7400*	0.4810	0.5180	0.5550	0.5920	0.6290	0.6660	0.7030

The z axis: for ρ/r.

Count backward

Case 4

		ρ						
		0.1	$c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.					$1-\alpha$
$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0700	*1.4286*	0.9286	**1.0000**	1.0714	1.1429	1.2143	1.2857	1.3571
0.0750	1.3333	0.8666	0.9333	**1.0000**	1.0666	1.1333	1.2000	1.2666
0.0800	1.2500	0.8125	0.8750	0.9375	**1.0000**	1.0625	1.1250	1.1875
0.0850	1.1765	0.7647	0.8236	0.8824	0.9412	**1.0000**	1.0589	1.1177
0.0900	1.1111	0.7222	0.7778	0.8333	0.8889	0.9444	**1.0000**	1.0555
0.0950	1.0526	0.6842	0.7368	0.7895	0.8421	0.8947	0.9473	**1.0000**
0.1000	1	0.65	0.70	0.75	0.80	0.85	0.90	0.95
0.1049	0.9533	0.6196	0.6673	0.7149	0.7626	0.8103	0.8579	0.9056
0.1053	*0.9500*	0.6175	0.6650	0.7125	0.7600	0.8075	0.8550	0.9025

The z axis: for ρ/r.

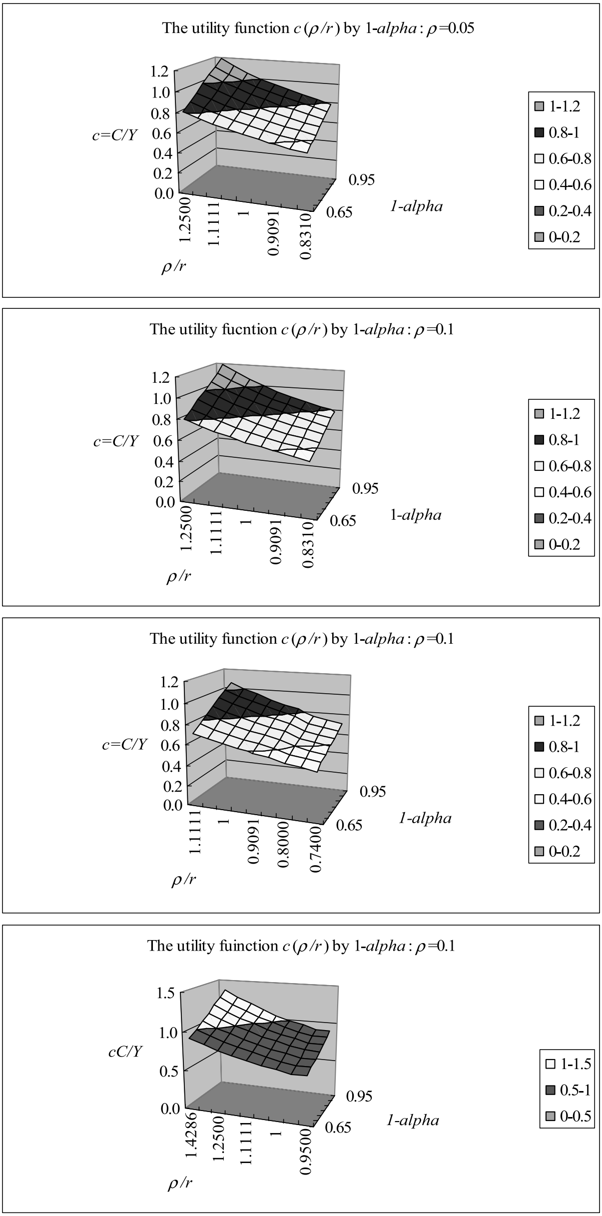


Figure A2-2 The utility function of *c* (ρ/*r*) by 1-*alpha*

Table A2-3 The rate of saving dual to the utility function: consistent with saving and consumption as a base

ρ is the discount rate of the utility function & r is the rate of rental under convergence.

Count backward		ρ						
Case 1		0.05		$s=1-c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.				$1-\alpha$
$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0400	*1.2500*	0.1875	0.1250	0.0625	**0.0000**	-0.0625	-0.1250	-0.1875
0.0425	1.1765	0.2353	0.1764	0.1176	0.0588	**0.0000**	-0.0589	-0.1177
0.0450	1.1111	0.2778	0.2222	0.1667	0.1111	0.0556	**0.0000**	-0.0555
0.0475	1.0526	0.3158	0.2632	0.2106	0.1579	0.1053	0.0527	**0.0000**
0.0500	1.0	0.35	0.3	0.25	0.2	0.15	0.1	0.05
0.0525	0.9524	0.3809	0.3333	0.2857	0.2381	0.1905	0.1428	0.0952
0.0550	0.9091	0.4091	0.3636	0.3182	0.2727	0.2273	0.1818	0.1364
0.0575	0.8696	0.4348	0.3913	0.3478	0.3043	0.2609	0.2174	0.1739
0.0602	*0.8310*	0.4599	0.4183	0.3768	0.3352	0.2937	0.2521	0.2106

The z axis: for ρ/r.

Count backward		ρ						
Case 2		0.1		$s=1-c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.				$1-\alpha$
$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0800	*1.2500*	0.1875	0.1250	0.0625	**0.0000**	-0.0625	-0.1250	-0.1875
0.0850	1.1765	0.2353	0.1764	0.1176	0.0588	**0.0000**	-0.0589	-0.1177
0.0900	1.1111	0.2778	0.2222	0.1667	0.1111	0.0556	**0.0000**	-0.0555
0.0950	1.0526	0.3158	0.2632	0.2106	0.1579	0.1053	0.0527	**0.0000**
0.1000	1	0.35	0.3	0.25	0.2	0.15	0.1	0.05
0.1050	0.9524	0.3809	0.3333	0.2857	0.2381	0.1905	0.1428	0.0952
0.1100	0.9091	0.4091	0.3636	0.3182	0.2727	0.2273	0.1818	0.1364
0.1150	0.8696	0.4348	0.3913	0.3478	0.3043	0.2609	0.2174	0.1739
0.1203	*0.8310*	0.4599	0.4183	0.3768	0.3352	0.2937	0.2521	0.2106

The z axis: for ρ/r.

Count backward		ρ						
Case 3		0.1		$s=1-c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.				$1-\alpha$
$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0900	*1.1111*	0.7222	0.7778	0.8333	0.8889	0.9444	**1.0000**	1.0556
0.0950	1.0526	0.6842	0.7368	0.7895	0.8421	0.8947	0.9473	**1.0000**
0.1000	1	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.1050	0.9524	0.6191	0.6667	0.7143	0.7619	0.8095	0.8572	0.9048
0.1100	0.9091	0.5909	0.6364	0.6818	0.7273	0.7727	0.8182	0.8636
0.1150	0.8696	0.5652	0.6087	0.6522	0.6957	0.7392	0.7826	0.8261
0.1250	0.8000	0.5200	0.5600	0.6000	0.6400	0.6800	0.7200	0.7600
0.1300	0.7692	0.5000	0.5384	0.5769	0.6154	0.6538	0.6923	0.7307
0.1351	*0.7400*	0.4810	0.5180	0.5550	0.5920	0.6290	0.6660	0.7030

The z axis: for ρ/r.

Count backward		ρ						
Case 4		0.1		$s=1-c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.				$1-\alpha$
$r=\rho/(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0700	*1.4286*	0.0714	**0.0000**	-0.0714	-0.1429	-0.2143	-0.2857	-0.3571
0.0750	1.3333	0.1334	0.0667	**0.0000**	-0.0666	-0.1333	-0.2000	-0.2666
0.0800	1.2500	0.1875	0.1250	0.0625	**0.0000**	-0.0625	-0.1250	-0.1875
0.0850	1.1765	0.2353	0.1765	0.1176	0.0588	**0.0000**	-0.0589	-0.1177
0.0900	1.1111	0.2778	0.2222	0.1667	0.1111	0.0556	**0.0000**	-0.0555
0.0950	1.0526	0.3158	0.2632	0.2106	0.1579	0.1053	0.0527	**0.0000**
0.1000	1	0.35	0.3	0.25	0.2	0.15	0.1	0.05
0.1049	0.9533	0.3804	0.3327	0.2851	0.2374	0.1897	0.1421	0.0944
0.1053	*0.9500*	0.3825	0.3350	0.2875	0.2400	0.1925	0.1450	0.0975

The z axis: for ρ/r.

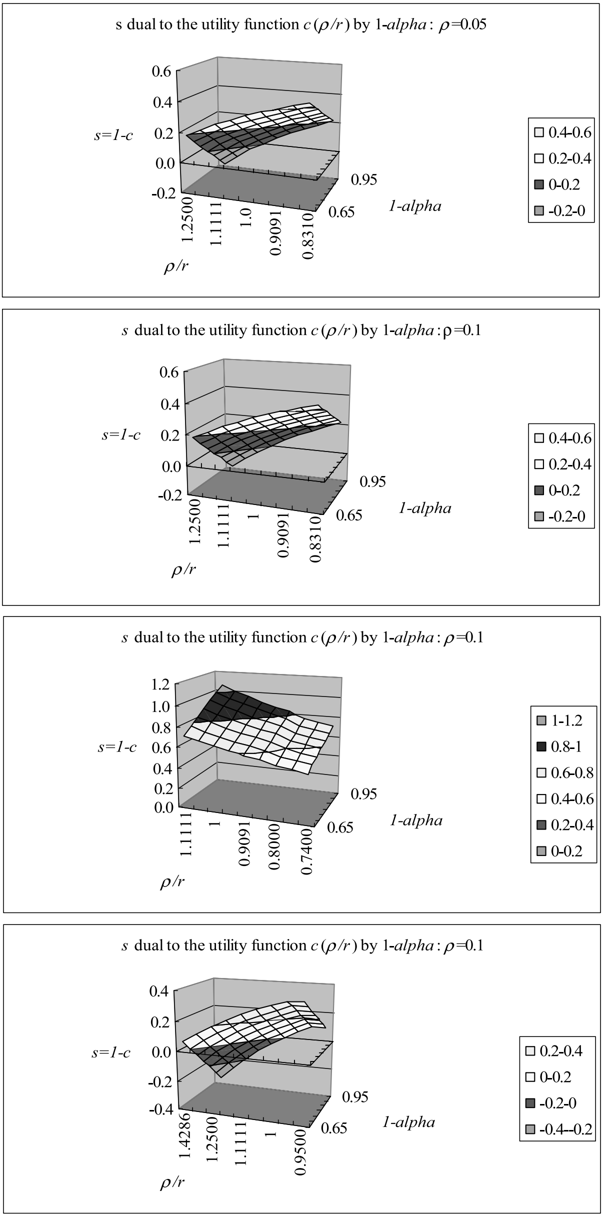


Figure A2-3 The rate of saving dual to the utility function of *c* (ρ/*r*) by 1-*alpha*

Table A3-1 Structure of saving and consumption as a base to be consisent with the utility function

Case 1	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1-*alpha*
alpha	0.35	0.3	0.25	**0.2**	0.15	0.1	0.05	$s_{SP/P}$=
$\alpha_{SP/Y}$	0.2275	0.195	0.1625	0.13	0.0975	0.065	0.0325	0.65
$\alpha_{D/Y}$	0.1225	0.105	0.0875	0.07	0.0525	0.035	0.0175	$s_{SD/D}$=
$s_{SD/Y}$	0.0526	0.0450	0.0375	0.0300	0.0225	0.0150	0.0075	0.429
$c_{CD/Y}$	0.0699	0.0600	0.0500	0.0400	0.0300	0.0200	0.0100	
$w_{W/Y}=1-\alpha$	0.65	0.7	0.75	0.8	0.85	0.9	0.95	$s_{SW/W}$=
$s_{SW/Y}$	0.0325	0.0350	0.0375	0.0400	0.0425	0.0450	0.0475	0.05
$c_{CW/Y}$	0.6175	0.6650	0.7125	0.7600	0.8075	0.8550	0.9025	
s	0.3126	0.2750	0.24	**0.2**	0.1625	0.1250	0.0875	
c	0.6874	0.7250	0.7625	0.8000	0.8375	0.8750	0.9125	$c_{CW/Y}+c_{CD/Y}$
$\rho/r=c/w_{W/Y}$	**1.0576**	**1.0357**	**1.0166**	**1.0000**	**0.9853**	**0.9722**	**0.9605**	

Case 2	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1-*alpha*
alpha	0.35	0.3	0.25	**0.2**	0.15	0.1	0.05	$s_{SP/P}$=
$\alpha_{SP/Y}$	0.1575	0.135	0.1125	0.09	0.0675	0.045	0.0225	0.45
$\alpha_{D/Y}$	0.1925	0.165	0.1375	0.11	0.0825	0.055	0.0275	$s_{SD/D}$=
$s_{SD/Y}$	0.1155	0.0990	0.0825	0.0660	0.0495	0.0330	0.0165	0.6
$c_{CD/Y}$	0.0770	0.0660	0.0550	0.0440	0.0330	0.0220	0.0110	
$w_{W/Y}=1-\alpha$	0.65	0.7	0.75	0.8	0.85	0.9	0.95	$s_{SW/W}$=
$s_{SW/Y}$	0.0358	0.0385	0.0413	0.0440	0.0468	0.0495	0.0523	0.055
$c_{CW/Y}$	0.6143	0.6615	0.7088	0.7560	0.8033	0.8505	0.8978	
s	0.3088	0.2725	0.24	**0.2**	0.1638	0.1275	0.0913	
c	0.6913	0.7275	0.7638	0.8000	0.8363	0.8725	0.9088	$c_{CW/Y}+c_{CD/Y}$
$\rho/r=c/w_{W/Y}$	**1.0635**	**1.0393**	**1.0183**	**1.0000**	**0.9838**	**0.9694**	**0.9566**	

Case 3	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1-*alpha*
alpha	0.35	**0.3**	0.25	0.2	0.15	0.1	0.05	$s_{SP/P}$=
$\alpha_{SP/Y}$	0.175	0.15	0.125	0.1	0.075	0.05	0.025	0.5
$\alpha_{D/Y}$	0.175	0.15	0.125	0.1	0.075	0.05	0.025	$s_{SD/D}$=
$s_{SD/Y}$	0.1260	0.1080	0.0900	0.0720	0.0540	0.0360	0.0180	0.72
$c_{CD/Y}$	0.0490	0.0420	0.0350	0.0280	0.0210	0.0140	0.0070	
$w_{W/Y}=1-\alpha$	0.65	0.7	0.75	0.8	0.85	0.9	0.95	$s_{SW/W}$=
$s_{SW/Y}$	0.0390	0.0420	0.0450	0.0480	0.0510	0.0540	0.0570	0.06
$c_{CW/Y}$	0.6110	0.6580	0.7050	0.7520	0.7990	0.8460	0.8930	
s	0.3400	**0.3**	0.26	0.2200	0.1800	0.1400	0.1000	
c	0.6600	0.7000	0.7400	0.7800	0.8200	0.8600	0.9000	$c_{CW/Y}+c_{CD/Y}$
$\rho/r=c/w_{W/Y}$	**1.0154**	**1.0000**	**0.9867**	**0.9750**	**0.9647**	**0.9556**	**0.9474**	

Case 4	0.65	0.7	0.75	0.8	0.85	0.9	0.95	1-*alpha*
alpha	0.35	0.3	0.25	0.2	0.15	**0.1**	0.05	$s_{SP/P}$=
$\alpha_{SP/Y}$	0.14	0.12	0.1	0.08	0.06	0.04	0.02	0.4
$\alpha_{D/Y}$	0.21	0.18	0.15	0.12	0.09	0.06	0.03	$s_{SD/D}$=
$s_{SD/Y}$	0.0840	0.0720	0.0600	0.0480	0.0360	0.0240	0.0120	0.4
$c_{CD/Y}$	0.1260	0.1080	0.0900	0.0720	0.0540	0.0360	0.0180	
$w_{W/Y}=1-\alpha$	0.65	0.7	0.75	0.8	0.85	0.9	0.95	$s_{SW/W}$=
$s_{SW/Y}$	0.0260	0.0280	0.0300	0.0320	0.0340	0.0360	0.0380	0.04
$c_{CW/Y}$	0.6240	0.6720	0.7200	0.7680	0.8160	0.8640	0.9120	
s	0.2500	0.2	0.19	0.1600	0.1300	**0.1**	0.0700	
c	0.7500	0.7800	0.8100	0.8400	0.8700	0.9000	0.9300	$c_{CW/Y}+c_{CD/Y}$
$\rho/r=c/w_{W/Y}$	**1.1538**	**1.1143**	**1.0800**	**1.0500**	**1.0235**	**1.0000**	**0.9789**	

Table A3-2 The utility function of *c* (ρ/r) by 1-*alpha* : consistent with saving and consumption as a base

ρ is the discount rate of the utility function & r is the rate of rental under convergence.

Count backward, Case 1 (r = 0.05), $c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.

$\rho=r(C/W)$	ρ/r	1-α: 0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0537	*1.0730*	0.6975	0.7511	0.8048	0.8584	0.9121	0.9657	1.0194
0.0529	1.0576	0.6874	0.7403	0.7932	0.8461	0.8990	0.9519	1.0047
0.0518	1.0357	0.6732	0.7250	0.7767	0.8285	0.8803	0.9321	0.9839
0.0508	1.0166	0.6608	0.7116	0.7625	0.8133	0.8641	0.9150	0.9658
0.0500	1	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0493	0.9853	0.6404	0.6897	0.7390	0.7882	0.8375	0.8867	0.9360
0.0486	0.9722	0.6319	0.6805	0.7292	0.7778	0.8264	0.8750	0.9236
0.0480	0.9605	0.6243	0.6724	0.7204	0.7684	0.8164	0.8645	0.9125
0.0475	*0.9500*	0.6175	0.6650	0.7125	0.7600	0.8075	0.8550	0.9025

The z axis: for ρ/r. The above idea comes from both F.P. Ramsey [1928] and J Tinbergen [1956].

Count backward, Case 2 (r = 0.1), $c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.

$\rho=r(C/W)$	ρ/r	1-α: 0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.1090	*1.0900*	0.7085	0.7630	0.8175	0.8720	0.9265	0.9810	1.0355
0.1063	1.0635	0.6913	0.7444	0.7976	0.8508	0.9039	0.9571	1.0103
0.1039	1.0393	0.6755	0.7275	0.7795	0.8314	0.8834	0.9354	0.9873
0.1018	1.0183	0.6619	0.7128	0.7638	0.8147	0.8656	0.9165	0.9674
0.1000	1	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0984	0.9838	0.6395	0.6887	0.7379	0.7871	0.8363	0.8854	0.9346
0.0969	0.9694	0.6301	0.6786	0.7271	0.7756	0.8240	0.8725	0.9210
0.0957	0.9566	0.6218	0.6696	0.7174	0.7653	0.8131	0.8609	0.9088
0.0940	*0.9400*	0.6110	0.6580	0.7050	0.7520	0.7990	0.8460	0.8930

The z axis: for ρ/r.

Count backward, Case 3 (r = 0.1), $c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.

$\rho=r(C/W)$	ρ/r	1-α: 0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.1030	*1.0300*	0.6695	0.7210	0.7725	0.8240	0.8755	0.9270	0.9785
0.1015	1.0154	0.6600	0.7108	0.7615	0.8123	0.8631	0.9138	0.9646
0.1000	1	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0987	0.9867	0.6413	0.6907	0.7400	0.7893	0.8387	0.8880	0.9373
0.0975	0.9750	0.6338	0.6825	0.7313	0.7800	0.8288	0.8775	0.9263
0.0965	0.9647	0.6271	0.6753	0.7235	0.7718	0.8200	0.8682	0.9165
0.0956	0.9556	0.6211	0.6689	0.7167	0.7644	0.8122	0.8600	0.9078
0.0947	0.9474	0.6158	0.6632	0.7105	0.7579	0.8053	0.8526	0.9000
0.0937	*0.9370*	0.6091	0.6559	0.7028	0.7496	0.7965	0.8433	0.8902

The z axis: for ρ/r.

Count backward, Case 4 (r = 0.1), $c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.

$\rho=r(C/W)$	ρ/r	1-α: 0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.1200	*1.2000*	0.7800	0.8400	0.9000	0.9600	1.0200	1.0800	1.1400
0.1154	1.1538	0.7500	0.8077	0.8654	0.9231	0.9808	1.0385	1.0962
0.1114	1.1143	0.7243	0.7800	0.8357	0.8914	0.9471	1.0029	1.0586
0.1080	1.0800	0.7020	0.7560	0.8100	0.8640	0.9180	0.9720	1.0260
0.1050	1.0500	0.6825	0.7350	0.7875	0.8400	0.8925	0.9450	0.9975
0.1024	1.0235	0.6653	0.7165	0.7676	0.8188	0.8700	0.9212	0.9724
0.1000	1	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0979	0.9789	0.6363	0.6853	0.7342	0.7832	0.8321	0.8811	0.9300
0.0950	*0.9500*	0.6175	0.6650	0.7125	0.7600	0.8075	0.8550	0.9025

The z axis: for ρ/r.

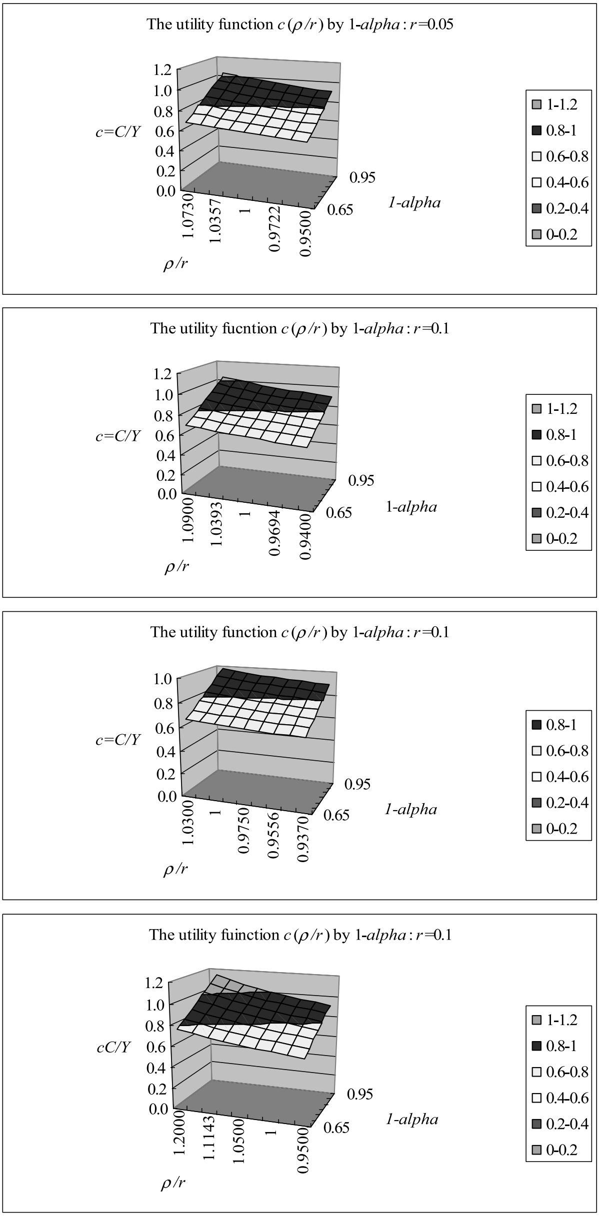


Figure A3-2 The utility function of c (ρ/r) by 1-*alpha*

Table A3-3 The rate of saving dual to the utility function: consistent with saving and consumption as a base

Count backward		r	ρ is the discount rate of the utility function & r is the rate of rental under convergence.					
Case 1		0.05			$s=1-c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.			$1-\alpha$
$\rho=r(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.0537	1.0730	0.3026	0.2489	0.1953	0.1416	0.0880	0.0343	-0.0194
0.0529	1.0576	0.3126	0.2597	0.2068	0.1539	0.1010	0.0481	-0.0047
0.0518	1.0357	0.3268	0.2750	0.2233	0.1715	0.1197	0.0679	0.0161
0.0508	1.0166	0.3392	0.2884	0.2375	0.1867	0.1359	0.0850	0.0342
0.0500	1	0.35	0.3	0.25	0.2	0.15	0.1	0.05
0.0493	0.9853	0.3596	0.3103	0.2610	0.2118	0.1625	0.1133	0.0640
0.0486	0.9722	0.3681	0.3195	0.2708	0.2222	0.1736	0.1250	0.0764
0.0480	0.9605	0.3757	0.3276	0.2796	0.2316	0.1836	0.1355	0.0875
0.0475	0.9500	0.3825	0.3350	0.2875	0.2400	0.1925	0.1450	0.0975

The z axis: for ρ/r.

Count backward		r						
Case 2		0.1			$s=1-c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.			$1-\alpha$
$\rho=r(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.1090	1.0900	0.2915	0.2370	0.1825	0.1280	0.0735	0.0190	-0.0355
0.1063	1.0635	0.3088	0.2556	0.2024	0.1492	0.0961	0.0429	-0.0103
0.1039	1.0393	0.3245	0.2725	0.2205	0.1686	0.1166	0.0646	0.0127
0.1018	1.0183	0.3381	0.2872	0.2363	0.1853	0.1344	0.0835	0.0326
0.1000	1	0.35	0.3	0.25	0.2	0.15	0.1	0.05
0.0984	0.9838	0.3605	0.3113	0.2621	0.2129	0.1638	0.1146	0.0654
0.0969	0.9694	0.3699	0.3214	0.2729	0.2244	0.1760	0.1275	0.0790
0.0957	0.9566	0.3782	0.3304	0.2826	0.2347	0.1869	0.1391	0.0913
0.0940	0.9400	0.3890	0.3420	0.2950	0.2480	0.2010	0.1540	0.1070

The z axis: for ρ/r.

Count backward		r						
Case 3		0.1			$s=1-c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.			$1-\alpha$
$\rho=r(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.1030	1.0300	0.3305	0.2790	0.2275	0.1760	0.1245	0.0730	0.0215
0.1015	1.0154	0.3400	0.2892	0.2385	0.1877	0.1369	0.0862	0.0354
0.1000	1	0.35	0.3	0.25	0.2	0.15	0.1	0.05
0.0987	0.9867	0.3587	0.3093	0.2600	0.2107	0.1613	0.1120	0.0627
0.0975	0.9750	0.3663	0.3175	0.2688	0.2200	0.1713	0.1225	0.0738
0.0965	0.9647	0.3729	0.3247	0.2765	0.2282	0.1800	0.1318	0.0835
0.0956	0.9556	0.3789	0.3311	0.2833	0.2356	0.1878	0.1400	0.0922
0.0947	0.9474	0.3842	0.3368	0.2895	0.2421	0.1947	0.1474	0.1000
0.0937	0.9370	0.3910	0.3441	0.2973	0.2504	0.2036	0.1567	0.1099

The z axis: for ρ/r.

Count backward		r						
Case 4		0.1			$s=1-c=(\rho/r)(1-\alpha)$, where $\rho/r=C/W$.			$1-\alpha$
$\rho=r(C/W)$	ρ/r	0.65	0.7	0.75	0.8	0.85	0.9	0.95
0.1200	1.2000	0.2200	0.1600	0.1000	0.0400	-0.0200	-0.0800	-0.1400
0.1154	1.1143	0.2500	0.1923	0.1346	0.0769	0.0192	-0.0385	-0.0962
0.1114	1.0800	0.2757	0.2200	0.1643	0.1086	0.0529	-0.0029	-0.0586
0.1080	1.0500	0.2980	0.2440	0.1900	0.1360	0.0820	0.0280	-0.0260
0.1050	1.0235	0.3175	0.2650	0.2125	0.1600	0.1075	0.0550	0.0025
0.1024	1.0000	0.3347	0.2835	0.2324	0.1812	0.1300	0.0788	0.0276
0.1000	1	0.35	0.3	0.25	0.2	0.15	0.1	0.05
0.0979	0.9789	0.3637	0.3147	0.2658	0.2168	0.1679	0.1189	0.0700
0.0950	0.9500	0.3825	0.3350	0.2875	0.2400	0.1925	0.1450	0.0975

The z axis: for ρ/r.

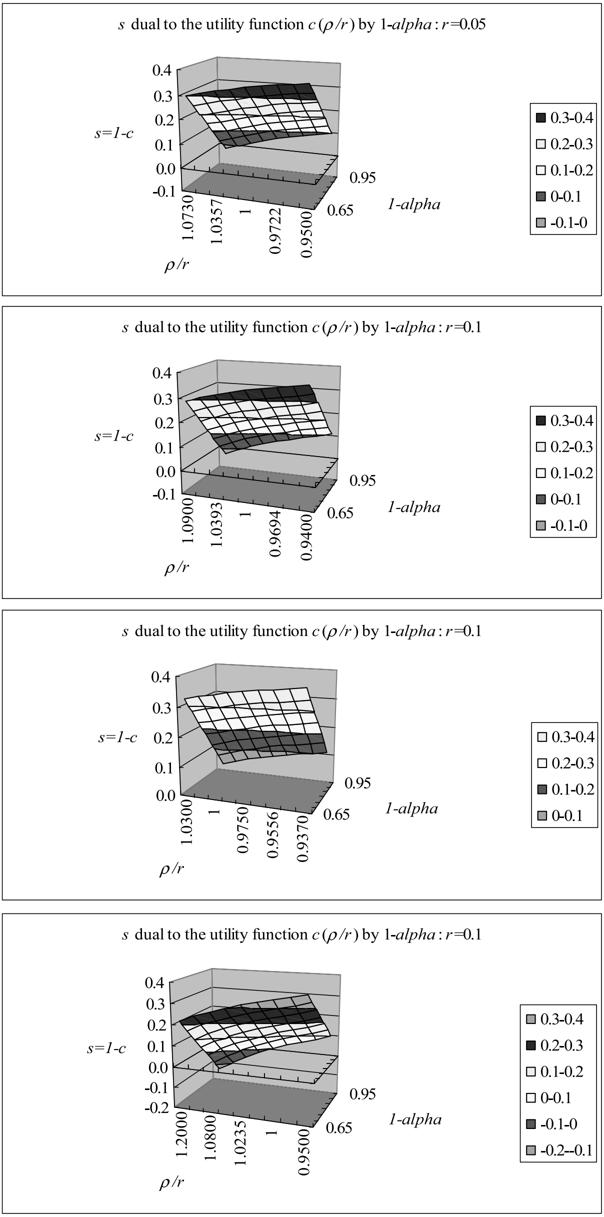
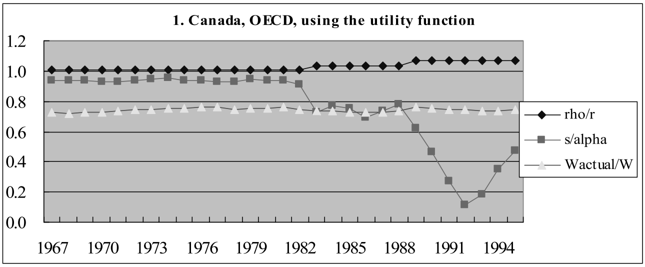
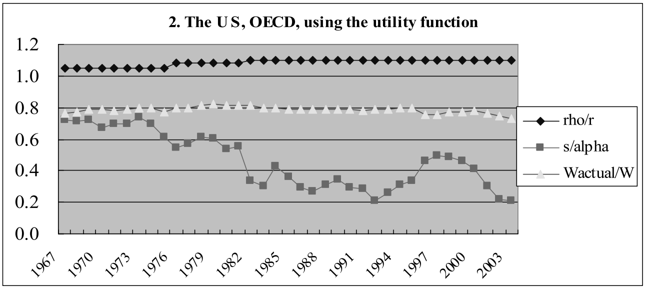
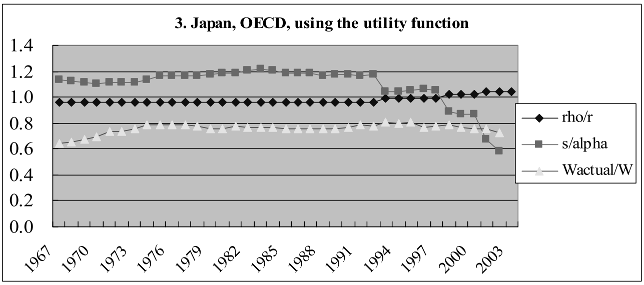


Figure A3-3 The rate of saving dual to the utility function of $c\ (\rho/r)$ by 1-*alpha*







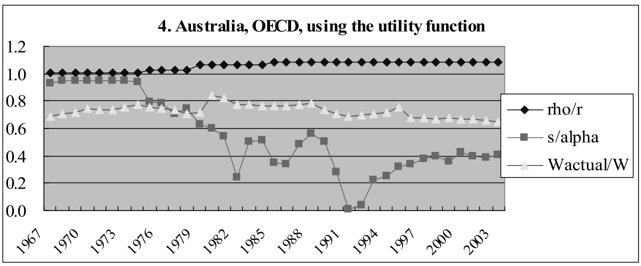


Figure A4-1 Utility coefficent, *rho*/*r*, and the ratio of saving to the relative share of rental using OECD data

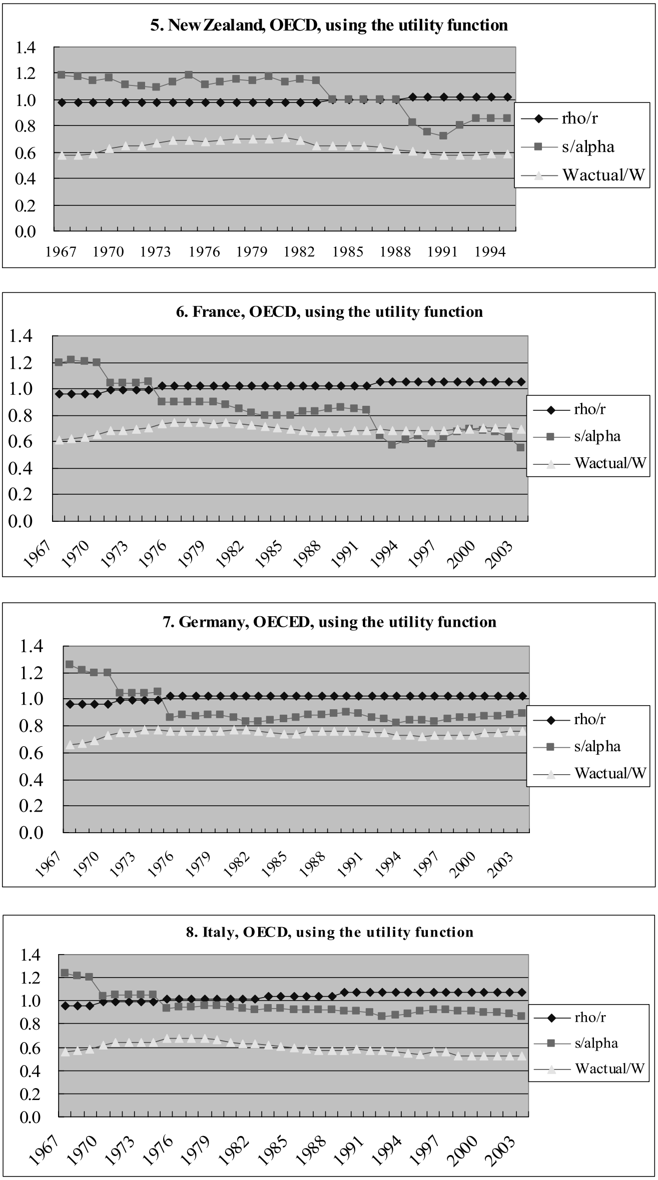
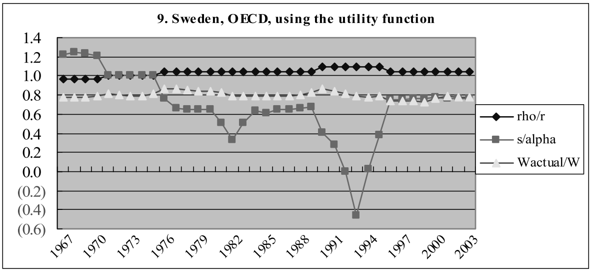
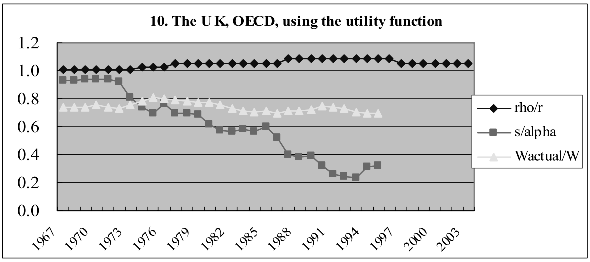
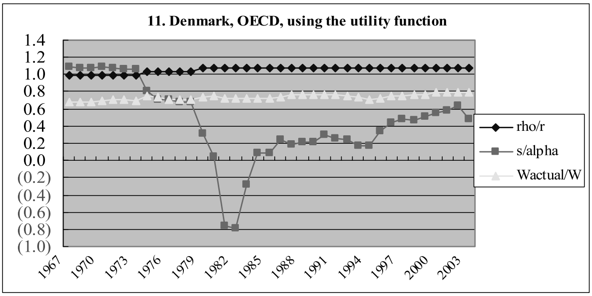


Figure A4-2 Utility coefficent, *rho*/*r* , and the ratio of saving to the relative share of rental using OECD data







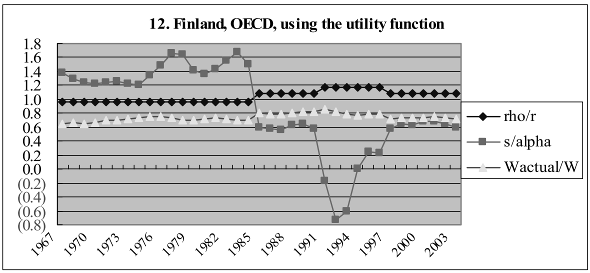
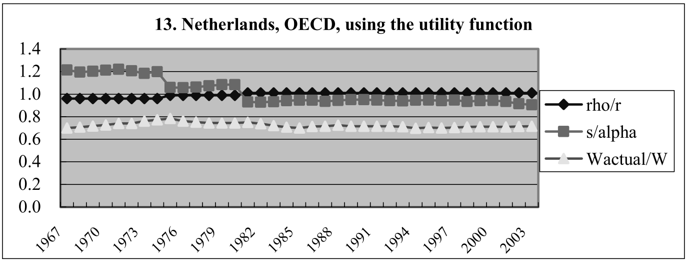
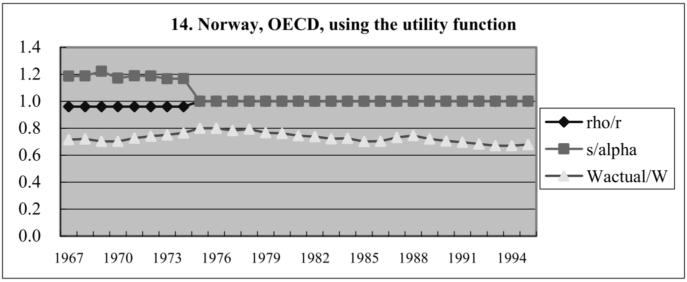
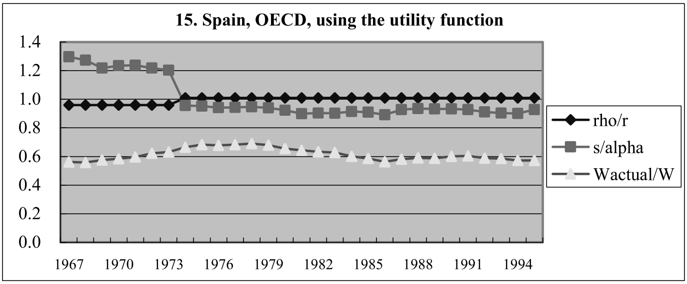


Figure A4-3 Utility coefficent, *rho*/*r* , and the ratio of saving to the relative share of rental using OECD data







Notes:
Data source: OECD National Statistics by year and my estimation of (*rho/r*) by year and country.

OECD data are GDP, actual wages, national disposable income, and consumption.
In some countries, national disposable income and/or actual wages are not avialable after 1995.
As the result, in these countries the ratio of saving to *alpha* and the ratio of actual wages in GDP to estimated compensation/wages in NDI cannot be shown in figures.

In several countries, the ratio of saving to *alpha* fluctuates due to bedget deficits, but this ratio will recover from critical situations in the long-term by taking appropriate policies.

Figure A4-4 Utility coefficent, *rho*/*r* , and the ratio of saving to the relative share of rental using OECD data

Tables A4-1 OECD data, applying my method to these data by country (1)

1. Canada	1a	2	(For after 1996)		6a	1a			ρ/r=	1.01	1.035	1.07	
	GDP	W_{actual}	W/GDP	$(C/W)_{actual}$	Y	C	Y/GDP	C/Y	rho/r	W=C/(ρ/r)	W/Y	s/alpha	W_{actual}/W
1967	68612	37150	0.5415	1.3919	59174	51708	0.8624	0.8738	1.010	51196	0.8652	0.9358	0.7256
1968	74839	40385	0.5396	1.4101	64886	56948	0.8670	0.8777	1.010	56384	0.8690	0.9337	0.7162
1969	82424	45161	0.5479	1.3879	72000	62677	0.8735	0.8705	1.010	62056	0.8619	0.9376	0.7277
1970	88462	48952	0.5534	1.3819	76423	67647	0.8639	0.8852	1.010	66977	0.8764	0.9291	0.7309
1971	96550	53758	0.5568	1.3721	83477	73759	0.8646	0.8836	1.010	73029	0.8748	0.9301	0.7361
1972	107785	60341	0.5598	1.3641	94382	82313	0.8757	0.8721	1.010	81498	0.8635	0.9367	0.7404
1973	126420	69521	0.5499	1.3516	110995	93968	0.8780	0.8466	1.010	93038	0.8382	0.9482	0.7472
1974	150956	82867	0.5489	1.3341	132820	110556	0.8799	0.8324	1.010	109461	0.8241	0.9531	0.7570
1975	170106	96623	0.5680	1.3392	148530	129398	0.8732	0.8712	1.010	128117	0.8626	0.9372	0.7542
1976	196292	111884	0.5700	1.3241	171366	148142	0.8730	0.8645	1.010	146675	0.8559	0.9406	0.7628
1977	216088	124021	0.5739	1.3318	186472	165175	0.8629	0.8858	1.010	163540	0.8770	0.9287	0.7584
1978	239580	134933	0.5632	1.3547	206652	182789	0.8626	0.8845	1.010	180979	0.8758	0.9295	0.7456
1979	274092	151736	0.5536	1.3423	236343	203672	0.8623	0.8618	1.010	201655	0.8532	0.9419	0.7525
1980	307730	171424	0.5571	1.3388	264535	229505	0.8596	0.8676	1.010	227233	0.8590	0.9391	0.7544
1981	353454	197910	0.5599	1.3261	301500	262443	0.8530	0.8705	1.010	259845	0.8618	0.9376	0.7616
1982	371820	211604	0.5691	1.3541	314581	286542	0.8461	0.9109	1.010	283705	0.9019	0.9081	0.7459
1983	402229	221800	0.5514	1.4091	341172	312535	0.8482	0.9161	1.035	301966	0.8851	0.7304	0.7345
1984	441311	238849	0.5412	1.4122	375568	337310	0.8510	0.8981	1.035	325903	0.8678	0.7703	0.7329
1985	474339	257518	0.5429	1.4227	403431	366373	0.8505	0.9081	1.035	353984	0.8774	0.7494	0.7275
1986	501426	274801	0.5480	1.4315	423534	393367	0.8447	0.9288	1.035	380065	0.8974	0.6940	0.7230
1987	546778	298834	0.5465	1.4181	463617	423786	0.8479	0.9141	1.035	409455	0.8832	0.7354	0.7298
1988	600840	327823	0.5456	1.4012	515150	459343	0.8574	0.8917	1.035	443810	0.8615	0.7823	0.7387
1989	645147	353632	0.5481	1.4067	550535	497440	0.8533	0.9036	1.070	464897	0.8444	0.6200	0.7607
1990	662809	372087	0.5614	1.4185	557839	527818	0.8416	0.9462	1.070	493288	0.8843	0.4651	0.7543
1991	669113	382378	0.5715	1.4370	562715	549481	0.8410	0.9765	1.070	513534	0.9126	0.2691	0.7446
1992	683086	391619	0.5733	1.4449	570590	565869	0.8353	0.9917	1.070	528850	0.9268	0.1131	0.7405
1993	705987	398163	0.5640	1.4613	590532	581832	0.8365	0.9853	1.070	543768	0.9208	0.1860	0.7322
1994	740129	409085	0.5527	1.4567	617313	595906	0.8341	0.9653	1.070	556921	0.9022	0.3545	0.7345
1995	768580	422110	0.5492	1.4430	644468	609085	0.8385	0.9451	1.070	569238	0.8833	0.4703	0.7415
1996	836864	428792	0.5124	1.5196	NA	651588	#VALUE!	#VALUE!	1.070	608961	#VALUE!	#VALUE!	0.7041
1997	882733	453073	0.5133	1.5063		682451	0.0000	#DIV/0!	1.070	637805	#DIV/0!	#DIV/0!	0.7104
1998	914973	475335	0.5195	1.4947		710486	0.0000	#DIV/0!	1.070	664006	#DIV/0!	#DIV/0!	0.7159
1999	982441	502726	0.5117	1.4858		746938	0.0000	#DIV/0!	1.070	698073	#DIV/0!	#DIV/0!	0.7202
2000	1076577	545204	0.5064	1.4602		796093	0.0000	#DIV/0!	1.070	744012	#DIV/0!	#DIV/0!	0.7328
2001	1108200	570008	0.5144	1.4632		834018	0.0000	#DIV/0!	1.070	779456	#DIV/0!	#DIV/0!	0.7313
2002	1157968	592692	0.5118	1.4864		880979	0.0000	#DIV/0!	1.070	823345	#DIV/0!	#DIV/0!	0.7199
2003	1218772	613718	0.5036	1.5095		926418	0.0000	#DIV/0!	1.070	865811	#DIV/0!	#DIV/0!	0.7088

2. The U S	1a	2	(For after 1996)		6a	1a			ρ/r=	1.05	1.08	1.1	
	GDP	W_{actual}	W/GDP	$(C/W)_{actual}$	Y	C	Y/GDP	C/Y	rho/r	W=C/(ρ/r)	W/Y	s/alpha	W_{actual}/W
1967	815094	476214	0.5842	1.3752	735354	654901	0.9022	0.8906	1.050	623715	0.8482	0.7207	0.7635
1968	889987	525470	0.5904	1.3633	802929	716378	0.9022	0.8922	1.050	682265	0.8497	0.7173	0.7702
1969	961091	579180	0.6026	1.3313	864980	771057	0.9000	0.8914	1.050	734340	0.8490	0.7189	0.7887
1970	1011563	619072	0.6120	1.3328	906138	825121	0.8958	0.9106	1.050	785830	0.8672	0.6734	0.7878
1971	1098112	660327	0.6013	1.3426	981903	886559	0.8942	0.9029	1.050	844342	0.8599	0.6931	0.7821
1972	1207916	727512	0.6023	1.3358	1077597	971834	0.8921	0.9019	1.050	925556	0.8589	0.6956	0.7860
1973	1350495	814663	0.6032	1.3114	1213442	1068328	0.8985	0.8804	1.050	1017455	0.8385	0.7404	0.8007
1974	1460627	893830	0.6119	1.3133	1302655	1173848	0.8918	0.9011	1.050	1117950	0.8582	0.6974	0.7995
1975	1587563	952118	0.5997	1.3641	1398220	1298800	0.8807	0.9289	1.050	1236952	0.8847	0.6165	0.7697
1976	1770353	1062353	0.6001	1.3556	1566721	1440128	0.8850	0.9192	1.080	1333452	0.8511	0.5427	0.7967
1977	1975357	1181813	0.5983	1.3485	1750703	1593626	0.8863	0.9103	1.080	1475580	0.8428	0.5709	0.8009
1978	2229544	1338406	0.6003	1.3204	1971870	1767283	0.8844	0.8962	1.080	1636373	0.8299	0.6098	0.8179
1979	2485969	1502639	0.6044	1.3097	2193635	1967950	0.8824	0.8971	1.080	1822176	0.8307	0.6076	0.8246
1980	2708148	1652530	0.6102	1.3220	2370275	2184620	0.8752	0.9217	1.080	2022796	0.8534	0.5343	0.8170
1981	3035796	1825399	0.6013	1.3239	2641610	2416713	0.8702	0.9149	1.080	2237697	0.8471	0.5568	0.8157
1982	3152497	1927107	0.6113	1.3472	2715075	2596216	0.8612	0.9562	1.100	2360196	0.8693	0.3349	0.8165
1983	3394299	2041148	0.6013	1.3829	2935981	2822729	0.8650	0.9614	1.100	2566117	0.8740	0.3062	0.7954
1984	3763467	2237670	0.5946	1.3727	3280585	3071632	0.8717	0.9363	1.100	2792393	0.8512	0.4280	0.8013
1985	4016649	2395159	0.5963	1.3888	3498288	3326304	0.8709	0.9508	1.100	3023913	0.8644	0.3625	0.7921
1986	4230784	2536519	0.5995	1.3982	3679418	3546666	0.8697	0.9639	1.100	3224242	0.8763	0.2916	0.7867
1987	4496574	2712491	0.6032	1.3978	3917604	3791556	0.8712	0.9678	1.100	3446869	0.8798	0.2678	0.7869
1988	4853962	2936165	0.6049	1.3877	4241006	4074555	0.8737	0.9608	1.100	3704141	0.8734	0.3100	0.7927
1989	5204500	3115500	0.5986	1.3918	4539900	4336300	0.8723	0.9552	1.100	3942091	0.8683	0.3406	0.7903
1990	5489600	3313500	0.6036	1.3963	4803200	4626500	0.8750	0.9632	1.100	4205909	0.8756	0.2958	0.7878
1991	5656500	3420900	0.6048	1.4037	4978100	4801900	0.8801	0.9646	1.100	4365364	0.8769	0.2876	0.7836
1992	5937300	3606100	0.6074	1.3997	5171100	5047300	0.8710	0.9761	1.100	4588455	0.8873	0.2125	0.7859
1993	6259900	3795500	0.6063	1.3981	5479500	5306300	0.8753	0.9684	1.100	4823909	0.8804	0.2642	0.7868
1994	6649800	4020600	0.6046	1.3858	5799600	5571800	0.8721	0.9607	1.100	5065273	0.8734	0.3102	0.7938
1995	6954800	4234100	0.6088	1.3743	6083700	5818800	0.8747	0.9565	1.100	5289818	0.8695	0.3337	0.8004
1996	7816.8	4394.7	0.5622	1.4626	*6933.8*	6427.9	0.8870	0.9270	1.100	5844	0.8428	0.4640	0.7521
1997	8304.3	4666.1	0.5619	1.4496	*7362.9*	6764	0.8866	0.9187	1.100	6149	0.8351	0.4934	0.7588
1998	8747	5024	0.5744	1.4181	*7738.2*	7124.5	0.8847	0.9207	1.100	6477	0.8370	0.4865	0.7757
1999	9268.4	5362.3	0.5786	1.4204	*8200.9*	7616.5	0.8848	0.9287	1.100	6924	0.8443	0.4577	0.7744
2000	9817	5787.3	0.5895	1.4094	*8668.1*	8156.5	0.8830	0.9410	1.100	7415	0.8554	0.4083	0.7805
2001	10128	5947.3	0.5872	1.4388	*8890.2*	8556.8	0.8778	0.9625	1.100	7779	0.8750	0.3000	0.7645
2002	10487	6074.9	0.5793	1.4791	*9210.1*	8985.3	0.8782	0.9756	1.100	8168	0.8869	0.2158	0.7437
2003	11004.1	6294.5	0.5720	1.5058	*9705.2*	9478	0.8820	0.9766	1.100	8616	0.8878	0.2087	0.7305

Tables A4-2 OECD data, applying my method to these data by country (2)

3. Japan	1a	2	(For after 1996)		6a	1a			ρ/r=	0.96	0.99	1.02	1.04
	GDP	W_{actual}	W/GDP	$(C/W)_{actual}$	Y	C	Y/GDP	C/Y	rho/r	W=C/(ρ/r)	W/Y	*s/alpha*	W_{actual}/W
1967	44731	19286	0.4312	1.4941	38741	28815	0.8661	0.7438	0.960	30016	0.7748	1.1376	0.6425
1968	52975	22477	0.4243	1.4641	45639	32908	0.8615	0.7210	0.960	34279	0.7511	1.1207	0.6557
1969	62229	26453	0.4251	1.4311	53509	37858	0.8599	0.7075	0.960	39435	0.7370	1.1121	0.6708
1970	73345	31895	0.4349	1.3729	63510	43788	0.8659	0.6895	0.960	45613	0.7182	1.1019	0.6993
1971	80701	37817	0.4686	1.3129	69400	49651	0.8600	0.7154	0.960	51720	0.7452	1.1170	0.7312
1972	92394	44026	0.4765	1.3046	79962	57438	0.8654	0.7183	0.960	59831	0.7482	1.1189	0.7358
1973	112498	55180	0.4905	1.2621	98492	69644	0.8755	0.7071	0.960	72546	0.7366	1.1118	0.7606
1974	134244	70010	0.5215	1.2163	116153	85152	0.8652	0.7331	0.960	88700	0.7636	1.1292	0.7893
1975	148327	81581	0.5500	1.2215	128498	99653	0.8663	0.7755	0.960	103805	0.8078	1.1682	0.7859
1976	166573	92020	0.5524	1.2193	145748	112201	0.8750	0.7698	0.960	116876	0.8019	1.1619	0.7873
1977	185622	102795	0.5538	1.2191	161735	125319	0.8713	0.7748	0.960	130541	0.8071	1.1674	0.7875
1978	204404	111079	0.5434	1.2394	178649	137676	0.8740	0.7707	0.960	143413	0.8028	1.1628	0.7745
1979	221547	120062	0.5419	1.2624	193794	151564	0.8747	0.7821	0.960	157879	0.8147	1.1758	0.7605
1980	240176	130398	0.5429	1.2645	208918	164892	0.8699	0.7893	0.960	171763	0.8222	1.1849	0.7592
1981	257963	141490	0.5485	1.2409	222733	175582	0.8634	0.7883	0.960	182898	0.8212	1.1837	0.7736
1982	270601	149559	0.5527	1.2546	234116	187630	0.8652	0.8014	0.960	195448	0.8348	1.2022	0.7652
1983	281767	157357	0.5585	1.2563	243320	197684	0.8636	0.8124	0.960	205921	0.8463	1.2202	0.7642
1984	300543	166120	0.5527	1.2526	259918	208080	0.8648	0.8006	0.960	216750	0.8339	1.2008	0.7664
1985	320419	173892	0.5427	1.2620	277527	219445	0.8661	0.7907	0.960	228589	0.8237	1.1868	0.7607
1986	335457	181278	0.5404	1.2638	289921	229099	0.8643	0.7902	0.960	238645	0.8231	1.1862	0.7596
1987	349760	187757	0.5368	1.2726	303542	238932	0.8679	0.7871	0.960	248888	0.8199	1.1822	0.7544
1988	373973	198284	0.5302	1.2710	324665	252023	0.8682	0.7763	0.960	262524	0.8086	1.1690	0.7553
1989	399998	212422	0.5311	1.2671	345285	269165	0.8632	0.7795	0.960	280380	0.8120	1.1728	0.7576
1990	430040	230313	0.5356	1.2509	369463	288095	0.8591	0.7798	0.960	300099	0.8123	1.1731	0.7675
1991	458972	248301	0.5410	1.2213	393052	303241	0.8564	0.7715	0.960	315876	0.8036	1.1637	0.7861
1992	471797	256885	0.5445	1.2284	402253	315557	0.8526	0.7845	0.960	328705	0.8172	1.1788	0.7815
1993	475438	262899	0.5530	1.2304	404508	323475	0.8508	0.7997	0.990	326742	0.8078	1.0420	0.8046
1994	479072	268043	0.5595	1.2371	406384	331598	0.8483	0.8160	0.990	334947	0.8242	1.0469	0.8003
1995	481020	272412	0.5663	1.2334	408085	335994	0.8484	0.8233	0.990	339388	0.8317	1.0494	0.8027
1996	509984	*276252*	0.5417	1.2919	*422003*	356891	0.8275	0.8457	0.990	360496	0.8542	1.0586	0.7663
1997	520939	*281432*	0.5402	1.2785	*427538*	359814	0.8207	0.8416	0.990	363448	0.8501	1.0567	0.7743
1998	514595	*276718*	0.5377	1.3038	*416769*	360787	0.8099	0.8657	1.020	353713	0.8487	0.8878	0.7823
1999	507224	*273030*	0.5383	1.3343	*410783*	364306	0.8099	0.8869	1.020	357163	0.8695	0.8668	0.7644
2000	511462	*275449*	0.5386	1.3424	*416198*	369769	0.8137	0.8884	1.020	362519	0.8710	0.8649	0.7598
2001	505847	*271864*	0.5374	1.3806	*405527*	375342	0.8017	0.9256	1.040	360906	0.8900	0.6765	0.7533
2002	497897	*264742*	0.5317	1.4323	*399454*	379201	0.8023	0.9493	1.040	364616	0.9128	0.5814	0.7261
2003	497485		0.0000	#DIV/0!		380871	0.0000	#DIV/0!	1.040	366222	#DIV/0!	#DIV/0!	0.0000

4. Australia	1a	2	(For after 1996)		6a	1a			ρ/r=	1.01	1.03	1.06	1.08
	GDP	W_{actual}	W/GDP	$(C/W)_{actual}$	Y	C	Y/GDP	C/Y	rho/r	W=C/(ρ/r)	W/Y	s/alpha	W_{actual}/W
1967	25483	13212	0.5185	1.4675	21797	19388	0.8554	0.8895	1.010	19196	0.8807	0.9262	0.6883
1968	28721	14627	0.5093	1.4335	24658	20968	0.8585	0.8504	1.010	20760	0.8419	0.9467	0.7046
1969	31813	16452	0.5171	1.4061	27238	23133	0.8562	0.8493	1.010	22904	0.8409	0.9472	0.7183
1970	35111	18884	0.5378	1.3628	30027	25736	0.8552	0.8571	1.010	25481	0.8486	0.9439	0.7411
1971	39288	21077	0.5365	1.3646	33584	28761	0.8548	0.8564	1.010	28476	0.8479	0.9442	0.7402
1972	44793	23562	0.5260	1.3733	38306	32358	0.8552	0.8447	1.010	32038	0.8364	0.9489	0.7354
1973	53610	28894	0.5390	1.3388	46114	38684	0.8602	0.8389	1.010	38301	0.8306	0.9510	0.7544
1974	64750	37160	0.5739	1.2978	54996	48226	0.8494	0.8769	1.010	47749	0.8682	0.9341	0.7782
1975	76601	42830	0.5591	1.3571	64516	58123	0.8422	0.9009	1.030	56430	0.8747	0.7906	0.7590
1976	87594	48316	0.5516	1.3777	73615	66565	0.8404	0.9042	1.030	64626	0.8779	0.7843	0.7476
1977	95308	53066	0.5568	1.3984	79500	74205	0.8341	0.9334	1.030	72044	0.9062	0.7101	0.7366
1978	108459	57085	0.5263	1.4597	90527	83327	0.8347	0.9205	1.030	80900	0.8937	0.7479	0.7056
1979	123284	63616	0.5160	1.4765	102779	93926	0.8337	0.9139	1.060	88609	0.8621	0.6248	0.7179
1980	158722	85566	0.5391	1.2616	117134	107946	0.7380	0.9216	1.060	101836	0.8694	0.6006	0.8402
1981	172476	94949	0.5505	1.2960	131274	123051	0.7611	0.9374	1.060	116086	0.8843	0.5414	0.8179
1982	195827	100618	0.5138	1.3759	140901	138439	0.7195	0.9825	1.060	130603	0.9269	0.2391	0.7704
1983	217130	110983	0.5111	1.3748	161363	152582	0.7432	0.9456	1.060	143945	0.8921	0.5041	0.7710
1984	240477	121945	0.5071	1.3805	178276	168351	0.7413	0.9443	1.060	158822	0.8909	0.5102	0.7678
1985	264007	132926	0.5035	1.4173	195997	188402	0.7424	0.9612	1.080	174446	0.8900	0.3524	0.7620
1986	298395	145945	0.4891	1.4115	213920	205998	0.7169	0.9630	1.080	190739	0.8916	0.3417	0.7652
1987	339068	163780	0.4830	1.3890	243029	227486	0.7168	0.9360	1.080	210635	0.8667	0.4798	0.7776
1988	370070	182417	0.4929	1.3818	276274	252072	0.7465	0.9124	1.080	233400	0.8448	0.5645	0.7816
1989	378964	190002	0.5014	1.4656	298965	278462	0.7889	0.9314	1.080	257835	0.8624	0.4985	0.7369
1990	387164	193832	0.5006	1.5306	305413	296673	0.7888	0.9714	1.080	274697	0.8994	0.2845	0.7056
1991	405764	200766	0.4948	1.5634	314023	313883	0.7739	0.9996	1.080	290632	0.9255	0.0060	0.6908
1992	430424	210955	0.4901	1.5594	330010	328970	0.7667	0.9968	1.080	304602	0.9230	0.0409	0.6926
1993	455616	223960	0.4916	1.5356	351333	343922	0.7711	0.9789	1.080	318446	0.9064	0.2253	0.7033
1994	486054	239954	0.4937	1.5178	373482	364203	0.7684	0.9752	1.080	337225	0.9029	0.2559	0.7116
1995	481020	272412	0.5663	1.4224	401022	387474	0.8337	0.9662	1.080	358772	0.8946	0.3207	0.7593
1996	515767	250624	0.7787	1.6026	416770	401648	0.8081	0.9637	1.080	371896	0.8923	0.3370	0.6739
1997	543485	263257	0.7776	1.6054	441684	422624	0.8127	0.9568	1.080	391319	0.8860	0.3784	0.6727
1998	574571	278355	0.7780	1.6058	468907	446990	0.8161	0.9533	1.080	413880	0.8826	0.3983	0.6726
1999	602823	293159	0.7805	1.6050	490109	470513	0.8130	0.9600	1.080	435660	0.8889	0.3599	0.6729
2000	648626	311948	0.7770	1.6155	531283	503957	0.8191	0.9486	1.080	466627	0.8783	0.4226	0.6685
2001	689958	329432	0.7764	1.6261	561642	535704	0.8140	0.9538	1.080	496022	0.8832	0.3953	0.6641
2002	736731	348165	0.7767	1.6436	599190	572250	0.8133	0.9550	1.080	529861	0.8843	0.3886	0.6571
2003	784655	368764	0.7776	1.6545	640457	610119	0.8162	0.9526	1.080	564925	0.8821	0.4017	0.6528

Tables A4-3 OECD data, applying my method to these data by country (3)

5. New Zeal	1a	2	(For after 1996)		6a	1a			ρ/r=	0.98	1	1.02	
	GDP	W_{actual}	W/GDP	$(C/W)_{actual}$	Y	C	Y/GDP	C/Y	rho/r	W=C/(ρ/r)	W/Y	s/alpha	W_{actual}/W
1967	4358	2035	0.4670	1.6988	3919	3457	0.8993	0.8821	0.980	3528	0.9001	1.1802	0.5769
1968	4611	2144	0.4650	1.7062	4157	3658	0.9015	0.8800	0.980	3733	0.8979	1.1759	0.5744
1969	5127	2382	0.4646	1.6738	4623	3987	0.9017	0.8624	0.980	4068	0.8800	1.1467	0.5855
1970	5727	2870	0.5011	1.5721	5173	4512	0.9033	0.8722	0.980	4604	0.8900	1.1619	0.6234
1971	6739	3403	0.5050	1.5019	6174	5111	0.9162	0.8278	0.980	5215	0.8447	1.1088	0.6525
1972	7708	3827	0.4965	1.5132	7089	5791	0.9197	0.8169	0.980	5909	0.8336	1.1002	0.6476
1973	9025	4514	0.5002	1.4743	8345	6655	0.9247	0.7975	0.980	6791	0.8138	1.0874	0.6647
1974	9847	5439	0.5524	1.4106	8985	7672	0.9125	0.8539	0.980	7829	0.8713	1.1354	0.6948
1975	11106	6278	0.5653	1.4111	10022	8859	0.9024	0.8840	0.980	9040	0.9020	1.1841	0.6945
1976	13512	7072	0.5234	1.4328	12178	10133	0.9013	0.8321	0.980	10340	0.8491	1.1125	0.6840
1977	14970	8102	0.5412	1.4209	13472	11512	0.8999	0.8545	0.980	11747	0.8720	1.1362	0.6897
1978	16957	9415	0.5552	1.4027	15219	13206	0.8975	0.8677	0.980	13476	0.8854	1.1546	0.6987
1979	19795	10977	0.5545	1.3999	17878	15367	0.9032	0.8595	0.980	15681	0.8771	1.1427	0.7000
1980	22991	13066	0.5683	1.4008	20849	18303	0.9068	0.8779	0.980	18677	0.8958	1.1719	0.6996
1981	27891	15754	0.5648	1.3725	25382	21622	0.9100	0.8519	0.980	22063	0.8692	1.1330	0.7140
1982	31410	17248	0.5491	1.4253	28416	24584	0.9047	0.8651	0.980	25086	0.8828	1.1507	0.6876
1983	34839	17589	0.5049	1.5109	30998	26576	0.8897	0.8573	0.980	27118	0.8748	1.1398	0.6486
1984	39346	19250	0.4892	1.5541	34293	29916	0.8716	0.8724	1.000	29916	0.8724	1.0000	0.6435
1985	45282	22675	0.5008	1.5530	39125	35214	0.8640	0.9000	1.000	35214	0.9000	1.0000	0.6439
1986	54725	27095	0.4951	1.5461	47745	41892	0.8725	0.8774	1.000	41892	0.8774	1.0000	0.6468
1987	61642	30458	0.4941	1.5615	53374	47560	0.8659	0.8911	1.000	47560	0.8911	1.0000	0.6404
1988	66424	31869	0.4798	1.6174	57579	51546	0.8668	0.8952	1.000	51546	0.8952	1.0000	0.6183
1989	70742	32959	0.4659	1.6744	60081	55188	0.8493	0.9186	1.020	54106	0.9005	0.8189	0.6092
1990	72137	33368	0.4626	1.7397	61505	58051	0.8526	0.9438	1.020	56913	0.9253	0.7521	0.5863
1991	72145	33001	0.4574	1.7599	61085	58079	0.8467	0.9508	1.020	56940	0.9321	0.7252	0.5796
1992	74425	33785	0.4539	1.7571	64199	59362	0.8626	0.9247	1.020	58198	0.9065	0.8060	0.5805
1993	80298	35072	0.4368	1.7574	68881	61634	0.8578	0.8948	1.020	60425	0.8772	0.8571	0.5804
1994	85875	37435	0.4359	1.7421	72844	65216	0.8483	0.8953	1.020	63937	0.8777	0.8564	0.5855
1995	91045	39906	0.4383	1.7338	77425	69191	0.8504	0.8937	1.020	67834	0.8761	0.8585	0.5883
1996	96755	NA	#VALUE!	#VALUE!	NA	73236	#VALUE!	#VALUE!	1.020	71800	#VALUE!	#VALUE!	#VALUE!
1997	100040		0.0000	#DIV/0!		75672	0.0000	#DIV/0!	1.020	74188	#DIV/0!	#DIV/0!	0.0000
1998	101414		0.0000	#DIV/0!		77194	0.0000	#DIV/0!	1.020	75680	#DIV/0!	#DIV/0!	0.0000
1999	106641		0.0000	#DIV/0!		80535	0.0000	#DIV/0!	1.020	78956	#DIV/0!	#DIV/0!	0.0000
2000	113375		0.0000	#DIV/0!		81254	0.0000	#DIV/0!	1.020	79661	#DIV/0!	#DIV/0!	0.0000
2001	121954		0.0000	#DIV/0!		83617	0.0000	#DIV/0!	1.020	81977	#DIV/0!	#DIV/0!	0.0000
2002	128018		0.0000	#DIV/0!		86895	0.0000	#DIV/0!	1.020	85191	#DIV/0!	#DIV/0!	0.0000
2003	134977		0.0000	#DIV/0!		90811	0.0000	#DIV/0!	1.020	89030	#DIV/0!	#DIV/0!	0.0000

6. France	1a	2	(For after 1996)		6a	1a			ρ/r=	0.96	0.99	1.02	1.05
	GDP	W_{actual}	W/GDP	$(C/W)_{actual}$	Y	C	Y/GDP	C/Y	rho/r	W=C/(ρ/r)	W/Y	s/alpha	W_{actual}/W
1967	673307	269973	0.4010	1.5555	525381	419956	0.7803	0.7993	0.960	437454	0.8326	1.1990	0.6171
1968	623123	301803	0.4843	1.5300	571503	461762	0.9172	0.8080	0.960	481002	0.8416	1.2126	0.6274
1969	710501	345178	0.4858	1.5162	653320	523364	0.9195	0.8011	0.960	545171	0.8345	1.2016	0.6332
1970	793519	391444	0.4933	1.4720	723246	576217	0.9114	0.7967	0.960	600226	0.8299	1.1952	0.6522
1971	884186	441486	0.4993	1.4566	799614	643054	0.9044	0.8042	0.990	649549	0.8123	1.0433	0.6797
1972	987947	493521	0.4995	1.4530	891444	717103	0.9023	0.8044	0.990	724346	0.8126	1.0433	0.6813
1973	1129835	566401	0.5013	1.4348	1016110	812693	0.8993	0.7998	0.990	820902	0.8079	1.0421	0.6900
1974	1302978	678946	0.5211	1.3990	1160853	949819	0.8909	0.8182	0.990	959413	0.8265	1.0476	0.7077
1975	1467884	801764	0.5462	1.3791	1299141	1105696	0.8850	0.8511	1.020	1084016	0.8344	0.8992	0.7396
1976	1700553	932940	0.5486	1.3734	1505861	1281298	0.8855	0.8509	1.020	1256175	0.8342	0.8994	0.7427
1977	1917803	1061181	0.5533	1.3632	1691482	1446627	0.8820	0.8552	1.020	1418262	0.8385	0.8962	0.7482
1978	2182588	1203113	0.5512	1.3695	1931544	1647683	0.8850	0.8530	1.020	1615375	0.8363	0.8978	0.7448
1979	2481097	1363245	0.5495	1.3781	2197010	1878671	0.8855	0.8551	1.020	1841834	0.8383	0.8963	0.7402
1980	2808295	1575784	0.5611	1.3724	2479779	2162585	0.8830	0.8721	1.020	2120181	0.8550	0.8821	0.7432
1981	3164804	1792602	0.5664	1.3959	2772772	2502247	0.8761	0.9024	1.020	2453183	0.8847	0.8465	0.7307
1982	3626021	2054560	0.5666	1.4125	3161591	2902119	0.8719	0.9179	1.020	2845215	0.8999	0.8201	0.7221
1983	4006498	2259282	0.5639	1.4242	3472704	3217681	0.8668	0.9266	1.020	3154589	0.9084	0.8017	0.7162
1984	4361913	2425773	0.5561	1.4451	3781426	3505605	0.8669	0.9271	1.020	3436868	0.9089	0.8005	0.7058
1985	4700143	2582446	0.5494	1.4643	4081836	3781412	0.8684	0.9264	1.020	3707267	0.9082	0.8021	0.6966
1986	5069296	2708114	0.5342	1.4853	4408891	4022317	0.8697	0.9123	1.020	3943448	0.8944	0.8306	0.6867
1987	5336652	2821197	0.5286	1.5079	4646614	4254171	0.8707	0.9155	1.020	4170756	0.8976	0.8247	0.6764
1988	5735092	2976425	0.5190	1.5128	4988629	4502807	0.8698	0.9026	1.020	4414517	0.8849	0.8462	0.6742
1989	6159680	3151514	0.5116	1.5160	5342204	4777823	0.8673	0.8944	1.020	4684140	0.8768	0.8576	0.6728
1990	6509488	3371797	0.5180	1.4974	5620020	5049015	0.8634	0.8984	1.020	4950015	0.8808	0.8522	0.6812
1991	6776231	3531792	0.5212	1.4991	5835298	5294647	0.8611	0.9073	1.020	5190830	0.8896	0.8389	0.6804
1992	6999546	3668567	0.5241	1.5070	6007364	5528637	0.8583	0.9203	1.050	5265369	0.8765	0.6452	0.6967
1993	7077087	3738938	0.5283	1.5277	6071120	5712026	0.8579	0.9409	1.050	5440025	0.8960	0.5690	0.6873
1994	7389654	3829366	0.5182	1.5407	6346349	5899721	0.8588	0.9296	1.050	5618782	0.8854	0.6139	0.6815
1995	7674811	3980485	0.5186	1.5321	6627876	6098329	0.8636	0.9201	1.050	5807932	0.8763	0.6458	0.6854
1996	1212178	632112	0.5215	1.5348	1033759	970135	0.8528	0.9385	1.050	923938	0.8938	0.5793	0.6841
1997	1251163	649535	0.5191	1.5249	1071441	990476	0.8564	0.9244	1.050	943310	0.8804	0.6319	0.6886
1998	1305852	672592	0.5151	1.5197	1123262	1022124	0.8602	0.9100	1.050	973451	0.8666	0.6751	0.6909
1999	1355102	702818	0.5186	1.5054	1174663	1058054	0.8668	0.9007	1.050	1007670	0.8578	0.6983	0.6975
2000	1420139	738127	0.5198	1.4944	1218428	1103089	0.8580	0.9053	1.050	1050561	0.8622	0.6871	0.7026
2001	1475587	774558	0.5249	1.4851	1262077	1150277	0.8553	0.9114	1.050	1095502	0.8680	0.6712	0.7070
2002	1526820	802261	0.5254	1.4958	1298597	1200039	0.8505	0.9241	1.050	1142894	0.8801	0.6330	0.7020
2003	1558224	821112	0.5270	1.5142	1316527	1243303	0.8449	0.9444	1.050	1184098	0.8994	0.5529	0.6934

Tables A4-4 OECD data, applying my method to these data by country (4)

7. Germany	1a	2	(For after 1996)		6a	1a			ρ/r=	0.96	0.99	1.02	
	GDP	W_{actual}	W/GDP	$(C/W)_{actual}$	Y	C	Y/GDP	C/Y	rho/r	W=C/(ρ/r)	W/Y	s/alpha	W_{actual}/W
1967	494350	250350	0.5064	1.4487	436750	362680	0.8835	0.8304	0.960	377792	0.8650	1.2563	0.6627
1968	533280	268840	0.5041	1.4264	472600	383470	0.8862	0.8114	0.960	399448	0.8452	1.2184	0.6730
1969	596950	302620	0.5069	1.4012	530530	424020	0.8887	0.7992	0.960	441688	0.8325	1.1989	0.6851
1970	675300	359290	0.5320	1.3229	597320	475320	0.8845	0.7958	0.960	495125	0.8289	1.1938	0.7257
1971	749750	406820	0.5426	1.3169	661140	535740	0.8818	0.8103	0.990	541152	0.8185	1.0451	0.7518
1972	823120	450560	0.5474	1.3161	724600	593000	0.8803	0.8184	0.990	598990	0.8266	1.0477	0.7522
1973	917250	512630	0.5589	1.2849	807740	658680	0.8806	0.8155	0.990	665333	0.8237	1.0467	0.7705
1974	983930	566600	0.5759	1.2774	859360	723750	0.8734	0.8422	0.990	731061	0.8507	1.0570	0.7750
1975	1026630	591240	0.5759	1.3421	891740	793530	0.8686	0.8899	1.020	777971	0.8724	0.8632	0.7600
1976	1120500	637940	0.5693	1.3383	978560	853730	0.8733	0.8724	1.020	836990	0.8553	0.8818	0.7622
1977	1195290	685410	0.5734	1.3383	1042390	917260	0.8721	0.8800	1.020	899275	0.8627	0.8743	0.7622
1978	1283550	731740	0.5701	1.3379	1124990	979030	0.8765	0.8703	1.020	959833	0.8532	0.8838	0.7624
1979	1388440	791660	0.5702	1.3325	1214030	1054850	0.8744	0.8689	1.020	1034167	0.8518	0.8850	0.7655
1980	1472040	860880	0.5848	1.3185	1279120	1135040	0.8689	0.8874	1.020	1112784	0.8700	0.8662	0.7736
1981	1534970	902550	0.5880	1.3317	1322820	1201910	0.8618	0.9086	1.020	1178343	0.8908	0.8369	0.7659
1982	1588090	929750	0.5855	1.3364	1359380	1242540	0.8560	0.9140	1.020	1218176	0.8961	0.8275	0.7632
1983	1668540	949030	0.5688	1.3653	1434470	1295720	0.8597	0.9033	1.020	1270314	0.8856	0.8452	0.7471
1984	1750890	983690	0.5618	1.3741	1505480	1351640	0.8598	0.8978	1.020	1325137	0.8802	0.8530	0.7423
1985	1823180	1021420	0.5602	1.3728	1567870	1402250	0.8600	0.8944	1.020	1374755	0.8768	0.8576	0.7430
1986	1925290	1074440	0.5581	1.3486	1663920	1448980	0.8642	0.8708	1.020	1420569	0.8537	0.8832	0.7563
1987	1990480	1119350	0.5624	1.3448	1720550	1505300	0.8644	0.8749	1.020	1475784	0.8577	0.8794	0.7585
1988	2095980	1163780	0.5552	1.3457	1812330	1566070	0.8647	0.8641	1.020	1535363	0.8472	0.8891	0.7580
1989	2224440	1216250	0.5468	1.3482	1931870	1639770	0.8685	0.8488	1.020	1607618	0.8322	0.9008	0.7566
1990	2426000	1315520	0.5423	1.3415	2066080	1764780	0.8516	0.8542	1.020	1730176	0.8374	0.8970	0.7603
1991	2853600	1607970	0.5635	1.3601	2460700	2187050	0.8623	0.8888	1.020	2144167	0.8714	0.8645	0.7499
1992	3075600	1739250	0.5655	1.3632	2647680	2370950	0.8609	0.8955	1.020	2324461	0.8779	0.8562	0.7482
1993	3158100	1776710	0.5626	1.3868	2687850	2464010	0.8511	0.9167	1.020	2415696	0.8987	0.8225	0.7355
1994	3320400	1820740	0.5483	1.4022	2817300	2553100	0.8485	0.9062	1.020	2503039	0.8885	0.8407	0.7274
1995	3457400	1877020	0.5429	1.4118	2935020	2650030	0.8489	0.9029	1.020	2598069	0.8852	0.8458	0.7225
1996	1833700	1006170	0.5487	1.3897	1536430	1398320	0.8379	0.9101	1.020	1370902	0.8923	0.8344	0.7339
1997	1871600	1010300	0.5398	1.3914	1565740	1405720	0.8366	0.8978	1.020	1378157	0.8802	0.8531	0.7331
1998	1929400	1031420	0.5346	1.3875	1610140	1431120	0.8345	0.8888	1.020	1403059	0.8714	0.8645	0.7351
1999	1978600	1058710	0.5351	1.3917	1654590	1473440	0.8362	0.8905	1.020	1444549	0.8731	0.8625	0.7329
2000	2030000	1099950	0.5418	1.3636	1698000	1499860	0.8365	0.8833	1.020	1470451	0.8660	0.8708	0.7480
2001	2074000	1121380	0.5407	1.3583	1730560	1523140	0.8344	0.8801	1.020	1493275	0.8629	0.8741	0.7510
2002	2107300	1129800	0.5361	1.3482	1746530	1523140	0.8288	0.8721	1.020	1493275	0.8550	0.8821	0.7566
2003	2128200	1132280	0.5320	1.3444	1769860	1522210	0.8316	0.8601	1.020	1492363	0.8432	0.8924	0.7587

8. Italy	1a	2	(For after 1996)		6a	1a			ρ/r=	0.96	0.99	1.01	
	GDP	W_{actual}	W/GDP	$(C/W)_{actual}$	Y	C	Y/GDP	C/Y	rho/r	W=C/(ρ/r)	W/Y	s/alpha	W_{actual}/W
1967	49851	21800	0.4373	1.6969	45117	36992	0.9050	0.8199	0.960	38533	0.8541	1.2341	0.5657
1968	54035	23704	0.4387	1.6719	49000	39630	0.9068	0.8088	0.960	41281	0.8425	1.2139	0.5742
1969	59653	26118	0.4378	1.6606	54205	43371	0.9087	0.8001	0.960	45178	0.8335	1.2002	0.5781
1970	67133	30541	0.4549	1.5942	60539	48689	0.9018	0.8043	0.990	49181	0.8124	1.0433	0.6210
1971	73003	35012	0.4796	1.5520	65881	54338	0.9024	0.8248	0.990	54887	0.8331	1.0499	0.6379
1972	79750	39056	0.4897	1.5396	71960	60132	0.9023	0.8356	0.990	60739	0.8441	1.0541	0.6430
1973	96601	47051	0.4871	1.5401	86546	72463	0.8959	0.8373	0.990	73195	0.8457	1.0548	0.6428
1974	121988	58692	0.4811	1.5403	107800	90404	0.8837	0.8386	0.990	91317	0.8471	1.0554	0.6427
1975	138590	70854	0.5112	1.4914	120761	105674	0.8714	0.8751	1.010	104628	0.8664	0.9351	0.6772
1976	174584	86915	0.4978	1.4943	152845	129876	0.8755	0.8497	1.010	128590	0.8413	0.9470	0.6759
1977	212707	106315	0.4998	1.4830	186175	157664	0.8753	0.8469	1.010	156103	0.8385	0.9481	0.6811
1978	251000	123164	0.4907	1.4990	220169	184620	0.8772	0.8385	1.010	182792	0.8302	0.9511	0.6738
1979	307823	149607	0.4860	1.5282	273507	228626	0.8885	0.8359	1.010	226362	0.8276	0.9520	0.6609
1980	385327	184063	0.4777	1.5876	342766	292221	0.8895	0.8525	1.010	289328	0.8441	0.9459	0.6362
1981	461051	224032	0.4859	1.5886	403370	355904	0.8749	0.8823	1.010	352380	0.8736	0.9309	0.6358
1982	542125	260859	0.4812	1.6136	471969	420915	0.8706	0.8918	1.010	416748	0.8830	0.9245	0.6259
1983	631610	300156	0.4752	1.6276	551646	488533	0.8734	0.8856	1.035	483696	0.8768	0.9288	0.6205
1984	722811	334994	0.4635	1.6715	631747	559948	0.8740	0.8863	1.035	554404	0.8776	0.9283	0.6042
1985	810081	374051	0.4617	1.6879	705629	631351	0.8711	0.8947	1.035	625100	0.8859	0.9224	0.5984
1986	898289	404065	0.4498	1.7245	781142	696806	0.8696	0.8920	1.035	689907	0.8832	0.9244	0.5857
1987	982763	438837	0.4465	1.7525	857769	769073	0.8728	0.8966	1.035	761458	0.8877	0.9209	0.5763
1988	1090023	482553	0.4427	1.7702	951591	854229	0.8730	0.8977	1.035	845771	0.8888	0.9201	0.5705
1989	1191961	528340	0.4433	1.7763	1035852	938485	0.8690	0.9060	1.070	929193	0.8970	0.9129	0.5686
1990	1310659	592391	0.4520	1.7451	1134057	1033782	0.8653	0.9116	1.070	1023547	0.9026	0.9074	0.5788
1991	1427571	647792	0.4538	1.7495	1228543	1133339	0.8606	0.9225	1.070	1122118	0.9134	0.8946	0.5773
1992	1502493	681573	0.4536	1.7746	1286384	1209512	0.8562	0.9402	1.070	1197537	0.9309	0.8652	0.5691
1993	1550296	688223	0.4439	1.7943	1320298	1234845	0.8516	0.9353	1.070	1222619	0.9260	0.8748	0.5629
1994	1638506	697996	0.4260	1.8588	1399275	1297415	0.8540	0.9272	1.070	1284569	0.9180	0.8880	0.5434
1995	1770949	728444	0.4113	1.8888	1520431	1375903	0.8585	0.9049	1.070	1362280	0.8960	0.9139	0.5347
1996	982443	417714	0.4252	1.7967	838236	750511	0.8532	0.8953	1.070	743080	0.8865	0.9219	0.5621
1997	1026285	437780	0.4266	1.8072	880351	791152	0.8578	0.8987	1.070	783319	0.8898	0.9193	0.5589
1998	1073019	435444	0.4058	1.9051	918348	829565	0.8559	0.9033	1.070	821351	0.8944	0.9153	0.5302
1999	1107994	451350	0.4074	1.9220	952186	867486	0.8594	0.9110	1.070	858897	0.9020	0.9079	0.5255
2000	1166548	474075	0.4064	1.9395	1000772	919482	0.8579	0.9188	1.070	910378	0.9097	0.8993	0.5207
2001	1218535	499512	0.4099	1.9236	1043964	960856	0.8567	0.9204	1.070	951343	0.9113	0.8973	0.5251
2002	1260428	521283	0.4136	1.9113	1075336	996311	0.8532	0.9265	1.070	986447	0.9173	0.8890	0.5284
2003	1300926	543817	0.4180	1.9117	1102465	1039618	0.8474	0.9430	1.070	1029325	0.9337	0.8593	0.5283

Tables A4-5 OECD data, applying my method to these data by country (5)

9. Sweden	1a	2	(For after 1996)		6a	1a			ρ/r=	0.97	1	1.04	1.09
	GDP	W_{actual}	W/GDP	$(C/W)_{actual}$	Y	C	Y/GDP	C/Y	rho/r	W=C/(ρ/r)	W/Y	s/alpha	W_{actual}/W
1967	134971	80510	0.5965	1.2580	118612	101278	0.8788	0.8539	0.970	104410	0.8803	1.2206	0.7711
1968	143228	86762	0.6058	1.2545	126116	108840	0.8805	0.8630	0.970	112206	0.8897	1.2420	0.7732
1969	155543	94542	0.6078	1.2484	137631	118022	0.8848	0.8575	0.970	121672	0.8840	1.2287	0.7770
1970	174179	105839	0.6076	1.2345	154130	130657	0.8849	0.8477	0.970	134698	0.8739	1.2080	0.7858
1971	188327	115754	0.6146	1.2343	166675	142880	0.8850	0.8572	1.000	142880	0.8572	1.0000	0.8101
1972	206068	126692	0.6148	1.2430	182402	157478	0.8852	0.8634	1.000	157478	0.8634	1.0000	0.8045
1973	229314	136296	0.5944	1.2775	203069	174114	0.8855	0.8574	1.000	174114	0.8574	1.0000	0.7828
1974	259032	157529	0.6081	1.2657	228090	199377	0.8805	0.8741	1.000	199377	0.8741	1.0000	0.7901
1975	304197	188775	0.6206	1.2249	267730	231230	0.8801	0.8637	1.000	231230	0.8637	1.0000	0.8164
1976	344055	223939	0.6509	1.2025	302824	269282	0.8802	0.8892	1.040	258925	0.8550	0.7641	0.8649
1977	374212	251817	0.6729	1.2087	327156	304378	0.8743	0.9304	1.040	292671	0.8946	0.6605	0.8604
1978	417126	280382	0.6722	1.2121	363541	339864	0.8715	0.9349	1.040	326792	0.8989	0.6443	0.8580
1979	467551	308161	0.6591	1.2308	406625	379276	0.8697	0.9327	1.040	364688	0.8969	0.6522	0.8450
1980	531054	346317	0.6521	1.2381	458792	428782	0.8639	0.9346	1.040	412290	0.8986	0.6454	0.8400
1981	581685	378800	0.6512	1.2607	496308	477553	0.8532	0.9622	1.040	459186	0.9252	0.5052	0.8249
1982	636015	400577	0.6298	1.3173	537584	527690	0.8452	0.9816	1.040	507394	0.9438	0.3277	0.7895
1983	712310	434137	0.6095	1.3248	597983	575159	0.8395	0.9618	1.040	553038	0.9248	0.5078	0.7850
1984	797333	475004	0.5957	1.3204	669949	627178	0.8402	0.9362	1.040	603056	0.9002	0.6394	0.7877
1985	866601	517802	0.5975	1.3237	727272	685425	0.8392	0.9425	1.040	659063	0.9062	0.6135	0.7857
1986	947263	567510	0.5991	1.3172	800882	747499	0.8455	0.9333	1.040	718749	0.8974	0.6500	0.7896
1987	1023602	614232	0.6001	1.3208	869786	811276	0.8497	0.9327	1.040	780073	0.8969	0.6522	0.7874
1988	1114502	670708	0.6018	1.3040	941520	874620	0.8448	0.9289	1.040	840981	0.8932	0.6654	0.7975
1989	1232502	756614	0.6139	1.2627	1031935	955374	0.8373	0.9258	1.040	918629	0.8902	0.6757	0.8236
1990	1359879	851189	0.6259	1.2510	1126487	1064798	0.8284	0.9452	1.090	976879	0.8672	0.4123	0.8713
1991	1447327	895127	0.6185	1.3023	1202860	1165704	0.8311	0.9691	1.090	1069453	0.8891	0.2785	0.8370
1992	1441723	883597	0.6129	1.3353	1180068	1179832	0.8185	0.9998	1.090	1082415	0.9172	0.0024	0.8163
1993	1446212	867620	0.5999	1.3859	1171222	1202441	0.8099	1.0267	1.090	1103157	0.9419	-0.4587	0.7865
1994	1531102	897346	0.5861	1.3937	1253096	1250669	0.8184	0.9981	1.090	1147403	0.9157	0.0230	0.7821
1995	1644983	936491	0.5693	1.3735	1351017	1286282	0.8213	0.9521	1.090	1180075	0.8735	0.3787	0.7936
1996	1815144	995545	0.5485	1.4012	1553901	1394921	0.8561	0.8977	1.040	1341270	0.8632	0.7477	0.7422
1997	1888231	1029426	0.5452	1.4039	1614641	1445240	0.8551	0.8951	1.040	1389654	0.8607	0.7529	0.7408
1998	1971871	1073361	0.5443	1.4050	1694946	1508122	0.8596	0.8898	1.040	1450117	0.8556	0.7631	0.7402
1999	2076525	1110978	0.5350	1.4268	1785112	1585112	0.8597	0.8880	1.040	1524146	0.8538	0.7664	0.7289
2000	2194967	1223529	0.5574	1.3582	1884320	1661798	0.8585	0.8819	1.040	1597883	0.8480	0.7769	0.7657
2001	2269149	1307428	0.5762	1.3169	1935088	1721751	0.8528	0.8898	1.040	1655530	0.8555	0.7631	0.7897
2002	2352938	1349763	0.5737	1.3348	2019773	1801702	0.8584	0.8920	1.040	1732406	0.8577	0.7589	0.7791
2003	2438447	1390128	0.5701	1.3516	2112642	1878828	0.8664	0.8893	1.040	1806565	0.8551	0.7639	0.7695

10. The U K	1a	2	(For after 1996)		6a	1a			ρ/r=	1.01	1.03	1.05	1.09
	GDP	W_{actual}	W/GDP	$(C/W)_{actual}$	Y	C	Y/GDP	C/Y	rho/r	W=C/(ρ/r)	W/Y	s/alpha	W_{actual}/W
1967	40302	23851	0.5918	1.3719	36911	32722	0.9159	0.8865	1.010	32398	0.8777	0.9282	0.7362
1968	43671	25518	0.5843	1.3735	39916	35050	0.9140	0.8781	1.010	34703	0.8694	0.9334	0.7353
1969	46997	27295	0.5808	1.3703	42989	37403	0.9147	0.8701	1.010	37033	0.8614	0.9378	0.7371
1970	51607	30627	0.5935	1.3389	47163	41008	0.9139	0.8695	1.010	40602	0.8609	0.9381	0.7543
1971	57583	33570	0.5830	1.3624	52439	45737	0.9107	0.8722	1.010	45284	0.8636	0.9367	0.7413
1972	64478	37945	0.5885	1.3851	58473	52557	0.9069	0.8988	1.010	52037	0.8899	0.9192	0.7292
1973	74077	43972	0.5936	1.3556	67091	59609	0.9057	0.8885	1.010	57873	0.8626	0.8117	0.7598
1974	83711	52503	0.6272	1.3202	75025	69317	0.8962	0.9239	1.030	67298	0.8970	0.7387	0.7802
1975	105599	68630	0.6499	1.2782	93646	87721	0.8868	0.9367	1.030	85166	0.9094	0.6987	0.8058
1976	124991	78196	0.6256	1.2909	110420	100941	0.8834	0.9142	1.030	98001	0.8875	0.7633	0.7979
1977	145657	86776	0.5958	1.3331	128025	115677	0.8789	0.9036	1.050	110169	0.8605	0.6915	0.7877
1978	168143	99050	0.5891	1.3424	147344	132964	0.8763	0.9024	1.050	126632	0.8594	0.6943	0.7822
1979	197826	116072	0.5867	1.3611	174543	157981	0.8823	0.9051	1.050	150458	0.8620	0.6877	0.7715
1980	231233	137970	0.5967	1.3557	201523	187047	0.8715	0.9282	1.050	178140	0.8840	0.6191	0.7745
1981	254273	149923	0.5896	1.3908	221702	208507	0.8719	0.9405	1.050	198578	0.8957	0.5706	0.7550
1982	278241	159060	0.5717	1.4425	243521	229451	0.8752	0.9422	1.050	218525	0.8974	0.5629	0.7279
1983	303519	170094	0.5604	1.4751	267348	250900	0.8808	0.9385	1.050	238952	0.8938	0.5792	0.7118
1984	324842	181685	0.5593	1.4818	285878	269217	0.8801	0.9417	1.050	256397	0.8969	0.5651	0.7086
1985	356172	197168	0.5536	1.4773	312076	291270	0.8762	0.9333	1.050	277400	0.8889	0.6000	0.7108
1986	383632	212735	0.5545	1.5084	337371	320899	0.8794	0.9512	1.050	305618	0.9059	0.5188	0.6961
1987	421891	230590	0.5466	1.5210	369866	350723	0.8767	0.9482	1.090	321764	0.8699	0.3980	0.7166
1988	469760	256564	0.5462	1.5255	411459	391397	0.8759	0.9512	1.090	359080	0.8727	0.3830	0.7145
1989	514241	284487	0.5532	1.5022	449779	427366	0.8746	0.9502	1.090	392079	0.8717	0.3884	0.7256
1990	549386	313462	0.5706	1.4631	476501	458624	0.8673	0.9625	1.090	420756	0.8830	0.3207	0.7450
1991	573909	331159	0.5770	1.4727	502119	487695	0.8749	0.9713	1.090	447427	0.8911	0.2637	0.7401
1992	597012	342382	0.5735	1.4995	527041	513402	0.8828	0.9741	1.090	471011	0.8937	0.2434	0.7269
1993	628835	352133	0.5600	1.5397	555600	542179	0.8835	0.9758	1.090	497412	0.8953	0.2306	0.7079
1994	665570	365161	0.5486	1.5578	590498	568844	0.8872	0.9633	1.090	521875	0.8838	0.3156	0.6997
1995	698199	378095	0.5415	1.5724	617620	594499	0.8846	0.9626	1.090	545412	0.8831	0.3202	0.6932
1996	762610	405835	0.5322	1.5725	NA	638158	#VALUE!	#VALUE!	1.090	585466	#VALUE!	#VALUE!	0.6932
1997	810136	433306	0.5349	1.5478		670692	0.0000	#DIV/0!	1.050	638754	#DIV/0!	#DIV/0!	0.6784
1998	858616	465854	0.5426	1.5265		711125	0.0000	#DIV/0!	1.050	677262	#DIV/0!	#DIV/0!	0.6878
1999	903167	495596	0.5487	1.5543		770286	0.0000	#DIV/0!	1.050	733606	#DIV/0!	#DIV/0!	0.6756
2000	950561	532318	0.5600	1.5097		803627	0.0000	#DIV/0!	1.050	765359	#DIV/0!	#DIV/0!	0.6955
2001	994309	565313	0.5685	1.5030		849652	0.0000	#DIV/0!	1.050	809192	#DIV/0!	#DIV/0!	0.6986
2002	1044145	590154	0.5652	1.5269		901121	0.0000	#DIV/0!	1.050	858210	#DIV/0!	#DIV/0!	0.6877
2003	1101241	616955	0.5602	1.5423		951520	0.0000	#DIV/0!	1.050	906210	#DIV/0!	#DIV/0!	0.6808