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Analyzing Tax Policy Changes Using a Stochastic OLG Model with Heterogeneous Households

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Abstract

This paper describes a stochastic overlapping generations (OLG) model with heterogeneous agents, which is one of five models used at the Congressional Budget Office for recent fiscal policy analyses. In this model economy, households are heterogeneous with respect to their age, wealth holding, working ability, and working history, and households face individual shocks to their ability to earn income every year. The paper also explains the choice of parameters, the characteristics of the baseline economy, and the features of the model through policy experiments under several different assumptions. The solution algorithm is also shown in the Appendix.

Journal of Economic Literature Classification Numbers: D9, H3, H6.

Key Words: overlapping generations; dynamic general equilibrium.

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1 Introduction

This paper describes a stochastic overlapping generations (OLG) model, which is one of five macroeconomic models used in "An Analysis of the President's Budgetary Proposals for Fiscal Year 2004" (Congressional Budget Office, 2003a) and for several other fiscal policy analyses at the Congressional Budget Office (CBO).[1]

The model is a life-cycle general equilibrium growth model, in which households are heterogeneous with respect to their ages, working abilities (measured by hourly wages), wealth holdings, and earnings histories (which determine their Social Security benefits). A household is assumed to be a married couple with some children. Every year, a large number of households with parents aged 20 enter the model economy. At the beginning of each year, households below age 80 receive idiosyncratic working ability shocks (which follow a first-order Markov process). There are 8 distinct working ability levels for each age below 80. At the end of each age, a fraction of households die, according to the mortality rate of each age. Households can live at most 110 years, that is, the mortality rate at the end of age 109 is one.

Each household (with different age, working ability, wealth holding, and earnings history) chooses its optimal consumption, labor supply (working hours), and savings, taking current and future factor prices (such as the interest rate and wage rate) and policy variables (such as marginal income tax rates) as given. Households in the model are forward looking and have model-consistent expectations of future factor prices and policy variables. Because there are no aggregate shocks in the model, households have perfect foresight about those future factor prices and policy variables. Yet, they still do not know their own future working ability and mortality.

The utility function of a household is a combination of Cobb-Douglas and constant relative risk aversion (CRRA). Government consumption is not included in the utility function, so it is assumed to have no value. However, this assumption is not as restrictive as it may first appear. One could interpret simulations that cut lump-sum transfers as also illustrating the economic effects of cutting government consumption that is valued by consumers and viewed as a perfect substitute for private goods. Thus, the model can be used to illustrate

[1] The other four macroeconomic models used at CBO are a Solow growth model, an infinite-horizon (Ramsey) growth model, the Global Insight model, and the Macroeconomic Advisers model.

polar views about the value of government consumption.

The model has a representative (but perfectly-competitive) firm with Cobb-Douglas production technology. Regarding the openness of the economy, the model assumes two polar cases—a closed economy and a small open economy. In a closed economy, no international capital flow is assumed, and trade surplus (deficit) is assumed to be zero. The interest rate and the wage rate are determined by domestic capital stock (which is equal to the sum of total private wealth and net government wealth) and labor supply. In a small open economy, a perfectly flexible international capital flow is assumed. The interest rate and the wage rate are fixed at their international levels. Domestic capital stock is determined by the labor supply of the economy, and the difference between domestic capital and national wealth (the sum of private wealth and net government wealth) is filled up by international capital inflow (or outflow).

The model includes progressive federal income tax, flat state income tax, a payroll tax, and OASDI benefits calibrated to those of the United States. For federal income tax, the statutory marginal tax rates are modified by two adjustment factors so that the effective tax rates on labor income and capital income are roughly the same as those in the U.S. economy.

In the model, no intergenerational altruism is assumed. All of the bequests in the model are accidental, due to uncertain life span. For simplicity, the wealth left by the deceased households are collected and distributed to the working-age households (ages 20 to 64) in a lump-sum manner. Each working-age households expect rationally the future accidental inheritances when it makes a decision on consumption, labor supply, and savings.

To illustrate the properties of the model, this paper examines the economic effects of cutting all federal individual income tax rates by 10 percent. Because the model imposes the government's intertemporal budget constraint, the tax cut must eventually be financed by either cutting spending or raising taxes. The paper explores five alternative assumptions about financing. Two of the alternatives assume that the tax cut is financed contemporaneously by reducing government consumption or lump-sum transfers. Under those assumptions, the policy experiment is budget neutral. The remaining three financing alternatives assume that the tax cut is deficit financed for 10 years. After that, the simulations assume that the government gradually adjusts fiscal policy so that the debt-output ratio is stabilized in 20 years.

The policy adjustments involve one of three changes: reducing the government consumption, cutting transfers, or raising individual income tax rates.

The rest of the paper is laid out as follows: Section 2 describes the model, Section 3 explains the calibration of the model, Section 4 shows the results of cutting individual income tax rates by 10 percent, Appendix A explains the algorithm of computing equilibria, and Appendix B shows the detailed results of the policy experiments in Section 4.

2 Model

The model is a standard general equilibrium growth model with uninsurable idiosyncratic shocks (also known as Bewley model), which is similar to the models in Aiyagari (1994), Huggett (1996), and many others. The present model is also an extension of those in Nishiyama (2002) and Nishiyama and Smetters (2003).[2]

The economy consists of three sectors: heterogeneous households with elastic labor supply; a perfectly competitive representative firm with constant-returns-to-scale production technology; and a government with a full commitment technology. Time is discrete, and a period of the model corresponds to a year.

2.1 The Household Sector

Households are heterogeneous with respect to ages i, working abilities e_i (measured by their hourly wages), beginning-of-period wealth holdings a_i, and average historical earnings b_i that determine their Social Security benefits. Every year, a large number (normalized to unity) of new households of age 20 enter into the economy. The population of this economy grows at a constant rate of ν. A household of age i observes an idiosyncratic working ability shock, e_i, at the beginning of each year and chooses its optimal consumption c_i, working hours h_i, and end-of-period wealth holding a_{i+1}, taking the government's policy rule and series of factor prices and the government's policy variables as given.[3] At the end of each year, a fraction of households die based on the mortality tables. The model assumes that no

[2]The model is also influenced by Auerbach and Kotlikoff (1987) in many aspects.

[3]Because there are no aggregate shocks in the present model, households can perfectly foresee these factor prices and policy variables, using the current distribution of households and the current policy variables. Yet, their own future working ability and mortality are uncertain.

one lives longer than 110 years. For simplicity, all households are assumed to be two-earner married couples of the same age.

2.1.1 The Household's Problem

Let $\mathbf{s}_i$ denote the state of an age i household,

$$\mathbf{s}_i = (i, e_i, a_i, b_i), \tag{1}$$

where $i \in I = \{20, ..., 109\}$ is the household's age, $e_i \in E = [e^{\min}, e^{\max}]$ is its working ability (measured by hourly wage), $a_i \in A = [a^{\min}, a^{\max}]$ is its beginning-of-period wealth, and $b_i \in B = [b^{\min}, b^{\max}]$ is its average historical earnings.[4] Let $\mathbf{S}_t$ denote the state of the economy at the beginning of year t,

$$\mathbf{S}_t = (x_t(\mathbf{s}_i), W_{G,t}), \tag{2}$$

where $x_t(\mathbf{s}_i)$ is the joint distribution of households with $\mathbf{s}_i \in I \times E \times A \times B$, and $W_{G,t}$ is the beginning-of-period net government's wealth. Let $\mathbf{\Psi}_t$ denote a series of government policy rules known at the beginning of year t,[5]

$$\mathbf{\Psi}_t = \{W_{G,s+1}, C_{G,s}, tr_{LS,s}, \tau_{I,s}(.), \tau_{P,s}(.), tr_{SS,s}(.)\}_{s=t}^{\infty}, \tag{3}$$

where $C_{G,s}$ is government's consumption, $tr_{LS,s}$ is lump-sum transfers (lump-sum tax if negative), $\tau_{I,s}(.)$ is an income tax function, $\tau_{P,s}(.)$ is a payroll tax function for Social Security, and $tr_{SS,s}(.)$ is a Social Security benefit function.[6]

[4] The average historical earnings are used to calculate the Social Security benefits of each household. The variable b_i approximates the average indexed monthly earnings (AIME) multiplied by 12 as of age i.

[5] In this model economy, the government does not solve an optimization problem. The government's policy rule is described as a set of tax and spending functions, in which functional forms are possibly time variant, and a financing rule must satisfy an intertemporal budget constraint. At least one of the series in Ψ_t is unknown to the households. Households form rational expectations of the series based on the government's policy rule, the intertemporal budget constraint, and the structure of the model.

[6] In this paper, the payroll tax function covers taxes for the Old-Age, Survivors, and Disability Insurance (OASDI) and Hospital Insurance (HI). For computational convenience, the function $\tau_{P,t}(.)$ denotes the OASDI-HI tax levied on employees (a married couple) only. The rest of payroll tax is levied on their employers. See equations (19) and (23). For simplicity, the Social Security benefit function $tr_{SS,s}(.)$ includes the OASDI benefits only and does not include Medicare and Medicaid (HI) benefits.

The household's problem is

$$v\left(\mathbf{s}_i, \mathbf{S}_t; \mathbf{\Psi}_t\right) = \max_{c_i, h_i, a_{i+1}} u_i\left(c_i, h_i\right) + \beta\, \phi_i E\left[v\left(\mathbf{s}_{i+1}, \mathbf{S}_{t+1}; \mathbf{\Psi}_{t+1}\right) \mid e_i\right] \tag{4}$$

subject to

$$\begin{aligned} a_{i+1} = \frac{1}{1+\mu}\{&w_t e_i h_i + (1+r_t)a_i - \tau_{I,t}\left(w_t e_i h_i, r_t a_i, tr_{SS,t}\left(i, b_i\right)\right) \\ &-\tau_{P,t}\left(w_t e_i h_i\right) + tr_{SS,t}\left(i, b_i\right) + tr_{LS,t} - c_i\} \geq a^{\min}, \\ a_{20} = 0, \quad &a_{110} \geq 0, \end{aligned} \tag{5}$$

where $u_i(.)$ is a period utility function of an age i household, β is the time-preference factor, ϕ_i is the survival rate, w_t is the wage rate per efficiency unit of labor, and r_t is the interest rate (the rate of return to capital).[7] Individual variables of the model are normalized by the steady-state per capita growth rate μ. Let $\pi_{i,i+1}\left(e_{i+1} \mid e_i\right)$ denote the conditional probability for the age $i+1$ working ability being e_{i+1} when the age i working ability is e_i. Then,

$$E\left[v\left(\mathbf{s}_{i+1}, \mathbf{S}_{t+1}; \mathbf{\Psi}_{t+1}\right) \mid e_i\right] = \int_E v\left(\mathbf{s}_{i+1}, \mathbf{S}_{t+1}; \mathbf{\Psi}_{t+1}\right) \pi_{i,i+1}\left(e_{i+1} \mid e_i\right) \mathrm{d}\, e_{i+1}. \tag{6}$$

At the beginning of the next period, the state of the household, the state of the economy, and the government policy rule become

$$\mathbf{s}_{i+1} = \left(i+1, e_{i+1}, a_{i+1} + q_t, b_{i+1}\right) \quad \text{with} \quad \pi_{i,i+1}\left(e_{i+1} \mid e_i\right), \tag{7}$$

$$\mathbf{S}_{t+1} = \left(x_{t+1}\left(.\right), W_{G,t+1}\right), \tag{8}$$

$$\mathbf{\Psi}_{t+1} = \left\{W_{G,s+1}, C_{G,s}, tr_{LS,s}, \tau_{I,s}\left(.\right), \tau_{P,s}\left(.\right), tr_{SS,s}\left(.\right)\right\}_{s=t+1}^{\infty}, \tag{9}$$

where q_t denotes accidental bequests that a household receives at the end of the period, and net government wealth $W_{G,t+1}$ is determined by the government budget constraint. The average historical earnings b_i follows

$$b_{i+1} = \begin{cases} 0 & \text{if } i \leq 24 \\ \frac{1}{i-24}\{(i-25) b_i \frac{w_t}{w_{t-1}} + \min\left(w_t e_i h_i/2, w e h_t^{\max}\right)\} & \text{if } 25 \leq i \leq 59 \\ b_i/(1+\mu) & \text{if } i \geq 60, \end{cases}$$

[7] So, $w_t e_i h_i$ is the earnings of a household of age i with working ability e_i in year t.

where $weh_t^{\max}$ is the Old-Age, Survivors, and Disability Insurance (OASDI) tax cap, which is \$80,400 in 2001. For simplicity, the model assumes that the highest 35 years of earnings correspond to those in ages between 25 and 59.[8]

2.1.2 The Measure of Households

Let $x_t(\mathbf{s}_i)$ denote the measure of households, and let $X_t(\mathbf{s}_i)$ be the corresponding cumulative measure. The measure of households is adjusted by the steady-state population growth rate ν. The population of age 20 households is normalized to be unity in the baseline economy on the balanced growth path, that is,

$$\int_E \mathrm{d}X_t(20, e_{20}, 0, 0) = 1. \tag{11}$$

Let $\mathbf{1}_{[a=y]}$ be an indicator function that returns 1 if $a = y$ and 0 if $a \neq y$. Then, the law of motion of the measure of households is, for $i \in I = \{20, ..., 109\}$,

$$x_{t+1}(\mathbf{s}_{i+1}) = \frac{\phi_i}{1+\nu} \int_{E\times A\times B} \mathbf{1}_{[a_{i+1}=a_{i+1}(\mathbf{s}_i,\mathbf{S}_t;\mathbf{\Psi}_t)+q_t]} \tag{12}$$

$$\times \mathbf{1}_{[b_{i+1}=b_{i+1}(w_t e_i h_i(\mathbf{s}_i,\mathbf{S}_t;\mathbf{\Psi}),b_i)]}\, \pi_{i,i+1}(e_{i+1} \mid e_i)\, \mathrm{d}X_t(\mathbf{s}_i).$$

For simplicity, accidental bequests due to uncertain life span are captured by the government and distributed to all surviving working-age households in a lump-sum manner. The accidental bequests per household at the end of year t is

$$q_t = \frac{\sum_{i=20}^{109}(1-\phi_i)\int_{E\times A\times B} a_{i+1}(\mathbf{s}_i, \mathbf{S}_t; \mathbf{\Psi}_t)\, \mathrm{d}X_t(\mathbf{s}_i)}{\sum_{i=20}^{64}\phi_i \int_{E\times A\times B} \mathrm{d}X_t(\mathbf{s}_i)}.$$

The steady-state condition is

$$\mathbf{S}_{t+1} = \mathbf{S}_t \tag{14}$$

for all t and $\mathbf{s}_i \in I \times E \times A \times B$.

[8] Social Security benefits in the United States are computed on the basis of the highest 35 years of earnings, adding an additional state variable to the model. Earnings before age 60 are wage indexed and earnings after age 60 are price indexed.

2.2 The Firm

National wealth W_t is the sum of total private wealth and government's net wealth $W_{G,t}$. Total labor supply L_t is measured in efficiency units.

$$W_t = \sum_{i=20}^{109} \int_{E\times A\times B} a_i \, \mathrm{d}X_t \left(\mathbf{s}_i\right) + W_{G,t}, \tag{15}$$

$$L_t = \sum_{i=20}^{109} \int_{E\times A\times B} e_i \, h_i(\mathbf{s}_i, \mathbf{S}_t; \mathbf{\Psi}_t) \, \mathrm{d}X_t \left(\mathbf{s}_i\right). \tag{16}$$

There is a perfectly competitive representative firm in this economy. In a closed economy, capital stock is equal to national wealth, that is, $K_t = W_t$, and gross national product Y_t is determined by a constant-returns-to-scale production function,

$$Y_t = F(K_t, L_t). \tag{17}$$

The profit-maximizing condition of the firm is

$$r_t + \delta = F_K(K_t, L_t), \tag{18}$$

$$(1 + \tau'_{P,t}) w_t = F_L(K_t, L_t), \tag{19}$$

where δ is the depreciation rate of capital, and $\tau'_{P,t}$ is the employer's portion of the marginal payroll tax rate.[9]

In a small open economy, factor prices, r_t^* and w_t^* are fixed at international levels, and domestic capital stock $K_{D,t}$ and labor supply L_t are determined so that the firm's profit maximizing condition satisfies,

$$r_t^* + \delta = F_K(K_{D,t}, L_t), \tag{20}$$

$$(1 + \tau'_{P,t}) w_t^* = F_L(K_{D,t}, L_t). \tag{21}$$

Gross domestic product $Y_{D,t}$ is determined by the production function,

$$Y_{D,t} = F(K_{D,t}, L_t),$$

[9] U.S. payroll taxes are divided equally between firms and employees. While the incidence of the tax does not depend on this division, the present model explicitly includes the division for calibration purposes.

and gross national product Y_t is determined by

$$Y_t = (r_t^* + \delta)\, W_t + (1 + \tau'_{P,t}) w_t^*\, L_t.$$

Net foreign investment is shown by the difference between national wealth and domestic capital stock, that is, $W_t - K_{D,t}$.

2.3 The Government

Government tax revenue consists of federal income tax $T_{I,t}$ and payroll tax for Social Security $T_{P,t}$. These revenues are

$$T_{I,t} = \sum_{i=20}^{109} \int_{E\times A\times B} \tau_{I,t}\left(w_t e_i h_i(\mathbf{s}_i, \mathbf{S}_t; \mathbf{\Psi}_t), r_t a_i, tr_{SS,t}\left(i, b_i\right)\right)\, \mathrm{d}X_t\left(\mathbf{s}_i\right), \tag{22}$$

$$T_{P,t} = 2 \times \sum_{i=20}^{109} \int_{E\times A\times B} \tau_{p,t}\left(w_t e_i h_i(\mathbf{s}_i, \mathbf{S}_t; \mathbf{\Psi}_t)\right)\, \mathrm{d}X_t\left(\mathbf{s}_i\right). \tag{23}$$

Total lump-sum transfer $Tr_{LS,t}$ is

$$Tr_{LS,t} = tr_{LC,t} \sum_{i=20}^{109} \int_{E\times A\times B} \mathrm{d}X_t\left(\mathbf{s}_i\right), \tag{24}$$

and Social Security (OASDI) benefit expenditure $Tr_{SS,t}$ is

$$Tr_{SS,t} = \sum_{i=20}^{109} \int_{E\times A\times B} tr_{SS,t}\left(i, b_i\right)\, \mathrm{d}X_t\left(\mathbf{s}_i\right). \tag{25}$$

The law of motion of the government wealth (normalized by productivity growth and population growth) is

$$W_{G,t+1} = \frac{1}{(1+\mu)(1+\nu)} \left\{(1 + r_t) W_{G,t} + T_{I,t} + T_{P,t} - T_{LS,t} - Tr_{SS,t} - C_{G,t}\right\}, \tag{26}$$

where $C_{G,t}$ is government consumption.

2.4 Recursive Competitive Equilibrium

Definition **Recursive Competitive Equilibrium (Steady State):** Let $\mathbf{s}_i = (i, e_i, a_i, b_i)$ be the individual state of households and let $\mathbf{\Psi}$ be the time-invariant government policy rules,

$$\mathbf{\Psi} = \{W_G, C_G, tr_{LS}, \tau_I(.), \tau_P(.), tr_{SS}(.)\}.$$

Factor prices (r, w); accidental bequests q; the policy variables (W_G, C_G, τ_{LS}); the parameters φ of policy functions $(\tau_I(.), \tau_P(.), tr_{SS}(.))$; the value function of households, $v(\mathbf{s}_i; \mathbf{\Psi})$; the decision rule of households,

$$\mathbf{d}(\mathbf{s}_i; \mathbf{\Psi}) = \{c_i(\mathbf{s}_i; \mathbf{\Psi}), h_i(\mathbf{s}_i; \mathbf{\Psi}), a_{i+1}(\mathbf{s}_i; \mathbf{\Psi})\};$$

and the measure of households, $x(\mathbf{s}_i)$, are in a steady-state recursive competitive equilibrium if, in every period, each household solves the utility maximization problem (1) – (5) taking $\mathbf{\Psi}$ as given; the firm solves the profit maximization problem, and the capital and labor markets clear, that is, (15) – (21) hold; the government policy rules satisfy (22) – (26); the goods market clears; and the measure of households is constant, that is, (14) holds.

Definition **Recursive Competitive Equilibrium (Equilibrium Transition Path):** Let $\mathbf{s}_i = (i, e_i, a_i, b_i)$ be the individual state of households, let $\mathbf{S}_t = (x_t(\mathbf{s}_i), W_{G,t})$ be the aggregate state of the economy, and let $\mathbf{\Psi}_t$ be the government policy rules known at the beginning of year t,

$$\mathbf{\Psi}_t = \{W_{G,s+1}, C_{G,s}, tr_{LS,s}, \tau_{I,s}(.), \tau_{P,s}(.), tr_{SS,s}(.)\}_{s=t}^{\infty}.$$

A series of factor prices, accidental bequests, the policy variables, and the parameters of policy functions,

$$\mathbf{\Omega} = \{r_s, w_s, q_s, W_{G,s+1}, C_{G,s}, \tau_{LS,s}, \varphi_s\}_{s=t}^{\infty};$$

the value function of households,$\{v(\mathbf{s}_i, \mathbf{S}_s; \mathbf{\Psi}_s)\}_{s=t}^{\infty}$; the decision rule of households,

$$\{\mathbf{d}(\mathbf{s}_i, \mathbf{S}_s; \mathbf{\Psi}_s)\}_{s=t}^{\infty} = \{c_i(\mathbf{s}_i, \mathbf{S}_s; \mathbf{\Psi}_s), h_i(\mathbf{s}_i, \mathbf{S}_s; \mathbf{\Psi}_s), a_{i+1}(\mathbf{s}_i, \mathbf{S}_s; \mathbf{\Psi}_s)\}_{s=t}^{\infty};$$

and a series of the measure of households, $\{x_s(\mathbf{s}_i)\}_{s=t}^{\infty}$, are in a recursive competitive equilibrium if, in every period $s = t, ..., \infty$, each household solves the utility maximization problem (1) – (5) taking $\mathbf{\Psi}_t$ as given; the firm solves the profit maximization problem, and the capital and labor markets clear, that is, (15) – (21) hold; the government policy rules satisfy (22) – (26); and the goods market clears.

3 Calibration

The model is calibrated to broad features of the economy. For the baseline economy on a balanced growth path, the degree of time preference β is chosen so that the capital-output ratio is 2.74; the share parameter of consumption α is chosen so that the average annual working hours of married couples (aged 20 to 64) in the initial steady state are consistent with U.S. data. In addition, total factor productivity A is chosen so that the wage rate equals unity. The coefficient or relative risk aversion γ is set to either 2.0 or 4.0, following the previous literature. As explained below, a Cobb-Douglas-CRRA utility function and a Cobb-Douglas production function are used for the calibration.[10]

Table 1 summarizes the parameter choices. The first column presents the set of parameters that CBO used in its March 2003 "Analysis of the President's Budget (Congressional Budget Office, 2003a)." The second column presents an alternative set of assumptions. Differences between the two columns stem largely from the assumptions about the coefficient of relative risk aversion and the maximum number of hours that a household could work per year. Both sets of assumptions are within reasonable bounds given the empirical research.

The parameter choices are interrelated. If the coefficient of relative risk aversion or maximum hours is changed, it will alter the time preference parameter needed to produce a capital-output ratio of 2.74 in the baseline. Changing those parameters will also affect the share parameter of consumption needed to target the average hours of work.

The following sections describe the choice of functional forms and parameter values, the choice of four target variables and values.

[10]The calibration strategy is similar to those in Nishiyama (2002) and Nishiyama and Smetters (2003), but many parameters in this analysis are revised.

Table 1: Parameters

		Assumptions	
		March 2003	Alternative
Time preference parameter	β	0.984	1.012
Share parameter for consumption	α	0.454	0.694
Maximum working hours	$h_i^{\max}$	8,760	5,460
Coefficient of relative risk aversion	γ	2.0	4.0
Capital share of output	θ	0.30	0.30
Depreciation rate of capital stock	δ	0.047	0.047
Long-term per capita real growth rate	μ	0.018	0.018
Population growth rate	ν	0.010	0.010
Total factor productivity	A	0.988	0.988

3.1 Households

Utility Function. The model has elastic labor supply and uses the following Cobb-Douglas utility function with constant relative risk aversion (CRRA),

$$u(c_i, h_i) = \frac{\left\{((1+n_i/2)^{-\zeta}\, c_i)^{\alpha}(h_i^{\max} - h_i)^{1-\alpha}\right\}^{1-\gamma}}{1-\gamma},$$

where γ is the coefficient of relative risk aversion, α is the share parameter for consumption, n_i is the number of dependent children, ζ is the consumption adjustment parameter for children, and $h_i^{\max}$ is the maximum working hours.[11] The coefficient of relative risk aversion is assumed to be either 2.0 or 4.0. The numbers of dependent children by age cohorts are calculated from the Panel Study of Income Dynamics (PSID) 1993 Family Data (see Table 2). The consumption adjustment parameter for children is assumed to be 0.6.[12]

The annual working hours in the model are the sum of the working hours of a husband and a wife. The average working hours of married households between ages 20 and 64 are 3,368 hours in the 1998 Survey of Consumer Finances (SCF). In the March 2003 assumption, $h_i^{\max}$ is set to be 8,760 per household, which is simply calculated as 12 hours times 365 days times 2 people. In the alternative parameterization, $h_i^{\max}$ is set to be 5,460 hours per

[11] In this setting, the growth-adjusted β becomes $\beta(1+\mu)^{\alpha(1-\gamma)}$.

[12] When $\zeta = 0.6$, since $2^{0.6} = 1.517$, a married couple with two dependent children needs to consume 52 percent more than a married couple with no children does to attain the same level of utility if other things are equal.

Table 2: Number of People Under 18 Years of Age in a Married Household

Age cohorts	Number of people under age 18	Age cohorts	Number of people under age 18
20-24	0.895	45-49	1.011
25-29	1.149	50-54	0.445
30-34	1.617	55-59	0.188
35-39	1.905	60-64	0.094
40-44	1.649	65-plus	0.000*

Source: Nishiyama and Smetters (2003). The authors' calculations from the Panel Study of Income Dynamics (PSID) 1993 Family Data.

*The number 0.000 for ages 65-plus is an assumption and not from PSID data.

couple, which is the 95th percentile of working hours in the 1998 SCF. Given those alternative assumptions about maximum hours, the parameter α is chosen so that average working hours of households of age 20 to age 64 is 3,368 hours in the steady-state baseline economy. In March 2003 assumptions, α is 0.454, in the alternative assumption, it is 0.694.

Working Ability. The working ability in this calibration corresponds to the hourly wage (labor income per hour) of each household in the 1998 SCF. The average hourly wage of a married couple (family members #1 and #2 in SCF) used for the calibration is calculated by

$$\text{Hourly Wage} = \frac{\text{Regular and Additional Salaries (\#1 + \#2) + Welfare or Assistance}}{\max\{\text{Working Hours (\#1 + \#2), 520}\}}.$$

To capture the household's exposure to earnings risk more precisely, unemployment or worker's compensation, Temporary Assistance for Needy Families (TANF), food stamps, and other forms of welfare or assistance are added to the salaries before calculating the hourly wage. Table 3 shows the eight discrete levels of working abilities of five-year age cohorts.[13] Using a shape-preserving cubic spline interpolation, the working ability of each age cohort is obtained. The average hourly earnings of production workers have increased by 16.7 percent during the years from 1997 to 2001.[14] In the calibration, the numbers in the table are

[13]The hourly wage of a household that works less than 520 hours (10 hours a week per couple) is calculated as its adjusted labor income divided by 520 hours. Accordingly, the hourly wage of a household that does not work at all is assumed to be zero. In the real economy, some households have fairly high working ability but choose not to work (for example, because of schooling). One observation of the age 20-24 cohort, which has an hourly wage of $193.01, is ignored.

[14]Source: Department of Commerce, Bureau of Labor Statistics.

Table 3: Working Abilities of a Household (in U.S. Dollars per Hour)

	Percentile	Age cohorts					
		20-24	25-29	30-34	35-39	40-44	45-49
e^1	0-20th	3.83	5.42	5.42	6.93	6.12	6.59
e^2	20-40th	7.07	8.64	9.76	11.28	11.36	12.70
e^3	40-60th	8.68	10.91	13.46	15.01	15.59	17.22
e^4	60-80th	10.67	14.01	18.08	19.96	22.09	23.22
e^5	80-90th	14.05	17.52	27.17	25.27	30.89	31.58
e^6	90-95th	18.20	22.48	33.71	33.38	48.59	44.31
e^7	95-99th	28.43	32.64	54.11	52.16	76.13	86.50
e^8	99-100th	36.81	46.09	167.15	186.47	221.34	301.99
	Percentile	Age cohorts					
		50-54	55-59	60-64	65-69	70-74	75-79
e^1	0-20th	5.48	3.52	0.00	0.00	0.00	0.00
e^2	20-40th	11.53	10.06	4.54	0.00	0.00	0.00
e^3	40-60th	16.16	14.26	11.18	2.82	0.00	0.00
e^4	60-80th	23.44	21.28	18.16	10.37	1.81	0.00
e^5	80-90th	32.14	30.93	28.56	19.48	12.57	0.00
e^6	90-95th	43.01	44.10	59.36	27.68	29.03	1.96
e^7	95-99th	78.61	85.29	96.22	59.34	64.91	14.25
e^8	99-100th	314.59	379.44	421.55	299.25	195.73	146.14

Source: Nishiyama and Smetters (2003). The authors' calculations from the 1998 SCF data.

multiplied by 1.167 to convert the hourly wages in 1997 into those in 2001.

Markov Transition Matrix. The Markov transition matrix, Γ, of working ability is calculated from the hourly wage of people ages 30-39 in 1991 in the PSID individual data. To make the working ability process more persistent, the matrix is calculated as the transition from the average of years 1989 and 1990 to the average of years 1990 and 1991.

$$\Gamma = \begin{pmatrix} 0.7674 & 0.2049 & 0.0183 & 0.0045 & 0.0049 & 0.0000 & 0.0000 & 0.0000 \\ 0.1810 & 0.6033 & 0.1844 & 0.0129 & 0.0000 & 0.0086 & 0.0046 & 0.0052 \\ 0.0388 & 0.1517 & 0.6768 & 0.1220 & 0.0011 & 0.0046 & 0.0050 & 0.0000 \\ 0.0126 & 0.0361 & 0.1039 & 0.7210 & 0.0980 & 0.0139 & 0.0145 & 0.0000 \\ 0.0000 & 0.0081 & 0.0332 & 0.2360 & 0.6306 & 0.0676 & 0.0145 & 0.0100 \\ 0.0000 & 0.0000 & 0.0000 & 0.0582 & 0.3224 & 0.5303 & 0.0891 & 0.0000 \\ 0.0007 & 0.0000 & 0.0000 & 0.0354 & 0.0000 & 0.2827 & 0.6433 & 0.0379 \\ 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.0000 & 0.3553 & 0.6447 \end{pmatrix},$$

Table 4: Survival Rates in the United States in 1998 (Weighted Average of Males and Females of Each Age)

Age	Survival Rate	Age	Survival Rate	Age	Survival Rate	Age	Survival Rate	Age	Survival Rate
20	0.999113	40	0.997978	60	0.989365	80	0.938048	100	0.676941
21	0.999066	41	0.997820	61	0.988361	81	0.931804	101	0.658846
22	0.999037	42	0.997654	62	0.987195	82	0.924980	102	0.639629
23	0.999028	43	0.997465	63	0.985840	83	0.917566	103	0.619216
24	0.999032	44	0.997267	64	0.984324	84	0.909481	104	0.597532
25	0.999043	45	0.997044	65	0.982631	85	0.900623	105	0.574495
26	0.999049	46	0.996797	66	0.980851	86	0.890904	106	0.550021
27	0.999041	47	0.996534	67	0.979101	87	0.880258	107	0.524022
28	0.999014	48	0.996258	68	0.977433	88	0.868650	108	0.496402
29	0.998970	49	0.995960	69	0.975763	89	0.856070	109	0.467066
30	0.998919	50	0.995626	70	0.973892	90	0.842518		
31	0.998865	51	0.995247	71	0.971745	91	0.828007		
32	0.998804	52	0.994823	72	0.969406	92	0.812554		
33	0.998735	53	0.994352	73	0.966856	93	0.796181		
34	0.998660	54	0.993826	74	0.964033	94	0.778913		
35	0.998573	55	0.993231	75	0.960839	95	0.761457		
36	0.998475	56	0.992570	76	0.957219	96	0.744011		
37	0.998368	57	0.991857	77	0.953175	97	0.726790		
38	0.998250	58	0.991094	78	0.948673	98	0.710031		
39	0.998122	59	0.990263	79	0.943665	99	0.693980		

Source: Nishiyama and Smetters (2003). The authors' calculations from the Social Security Administration (2001). In the calibration, the survival rate at the end of age 109 is set to zero.

where $\Gamma(j,k) = \pi(e_{i+1} = e_{i+1}^{k} \,|\, e_i = e_i^j)$.[15]

Population Growth and Mortality. The population growth rate ν is assumed to be 1.0 percent per year in a balanced growth path. The survival rates ϕ_i at the end of age $i = \{20, ..., 109\}$ are the weighted average of males and females in 1998 from Social Security Administration (2001).[16] (See Table 4.) The survival rate at the end of age 109 is replaced by zero.

[15]The Markov transition matrix is fairly stable across age cohorts, although the diagonal elements tend to be smaller in age 20s and slightly larger in age 50s.

[16]The numbers are calculated from Table 4.C6 in the Social Security Administration (2001).

3.2 The Firm

Production Function. Production takes the Cobb-Douglas form,

$$F(K_t, L_t) = A_t K_t^{\theta} L_t^{1-\theta}.$$

To compute GNP, the model uses the sum of working hours in efficiency units as total labor supply L_t. The capital share of output θ is chosen by

$$\theta = 1 - \frac{\text{Compensation of Employees } + (1-\theta) \times \text{Proprietors' Income}}{\text{National Income } + \text{ Consumption of Fixed Capital}}.$$

The number of θ in 2000 is 0.30.[17] The annual per-capita growth rate μ is assumed to be 1.8 percent. The annual population growth rate ν is assumed to be 1.0 percent. Total factor productivity A is chosen to be 0.988 so that the wage per unit of efficient labor is normalized to be unity.

Fixed Capital and Private Wealth. Fixed capital K in the calibration is the sum of private fixed assets and government fixed assets. In 2000, private fixed assets were $21,165 billion, government fixed assets were $5,743 billion, and the government debt held by the public is $3,410 billion.[18] From these numbers, the government net wealth is set at 9.5 percent of total private wealth in the initial steady-state economy. In 2000, the capital-GDP ratio is 2.74. The time preference parameter β is chosen so that the capital-GDP ratio of the steady state economy (a balanced growth path) is 2.74.

The Depreciation Rate of Fixed Capital. The depreciation rate of fixed capital δ is chosen by the steady-state condition,

$$\delta = \frac{\text{Total Gross Investment}}{\text{Fixed Capital}} - \mu - \nu.$$

In 2000, private gross fixed investment accounted for 17.2 percent of GDP, and government (federal and state) gross investment accounted for 3.3 percent of GDP.[19] When the capital-

[17] Source: Department of Commerce, Bureau of Economic Analysis. The average of θ in years between 1996 and 2000 is 0.31.

[18] *ibid*.

[19] *ibid*.

Table 5: Marginal Individual Income Tax Rates in 2001 (Married Household, Filed Jointly)

Taxable Income						Marginal Income Tax Rate (%)
In 2001 Income (Model)			In 2006 (Projected)			
\$0	–	\$9,523	\$0	–	\$12,000	$10 \times \varphi_{\tau_I}$
\$9,523	–	\$45,908	\$12,000	–	\$57,850	$15 \times \varphi_{\tau_I}$
\$45,908	–	\$99,116	\$57,850	–	\$124,900	$25 \times \varphi_{\tau_I}$
\$99,116	–	\$151,015	\$124,900	–	\$190,300	$28 \times \varphi_{\tau_I}$
\$151,015	–	\$269,692	\$190,300	–	\$339,850	$33 \times \varphi_{\tau_I}$
\$269,692	–		\$339,850	–		$35 \times \varphi_{\tau_I}$

Note: The tax brackets corresponding to the 2001 income level are calculated from the projected tax brackets for 2006 in House of Representatives (2001).

output ratio is 2.74, the ratio of gross investment to fixed capital is 7.5 percent. Subtracting the productivity and population growth rates, the annual depreciation rate is 4.7 percent.

3.3 Government

Income Taxes. The model assumes a progressive income tax schedule, standard deduction, and personal exemptions for self, spouse, and dependent children. For simplicity, all households in the model are assumed to be married households that file tax returns jointly, and corporate income is included into the capital income of households. The individual income tax schedule in the baseline economy is matched to the projected one for 2006 in the "Economic Growth and Tax Relief Reconciliation Act of 2001 (House of Representatives, 2001)." Because the model uses the 2001 working-ability profile, the tax brackets are adjusted to the 2001 income level. Table 5 shows the statutory marginal tax rates. In 2001, the standard deduction for a married household was \$7,600, and the exemption was \$2,900 per person. The exemptions for dependent children follow Table 2. All of the tax brackets, standard deduction, and exemption are assumed to be growth adjusted so that there is no real bracket creep.

To adjust the effective capital income tax rates at lower levels than labor income tax rates, the taxable capital income ratio 0.768 is multiplied to the capital income.[20] For elderly households, a part of Social Security benefits are taxable and included to the adjusted gross

[20]Table 10 shows that the effective tax rate on capital income in 2004 (projected by CBO) is about 23 percent lower than effective tax late on labor income.

income.[21] Because economic income is higher than taxable income, the effective marginal tax rates are lower than the statutory ones. All statutory rates are proportionately adjusted by φ_{τ_I}, which equals 0.673 under the March 2003 assumption and 0.705 under the alternative assumption, so that federal income tax revenue, including corporate income tax revenue, is 10.2 percent of GDP in the baseline economy. In addition, refundable child tax credits ($500 per child, reduced if taxable income is above $110,000) are applied. State and local income taxes in the model are 4.0 percent of income (excluding Social Security benefits) above the same standard deduction and exemptions.

Social Security. The tax rate levied on both employers and employees for Old-Age, Survivors, and Disability Insurance (OASDI) is 6.2 percent, and the tax rate for Medicare (HI) is 1.45 percent. In 2001, employee compensation above $80,400 was not taxable for OASDI. (See Table 6.) So, the firm's profit-maximization problem becomes

$$w \times (1 + \text{Marginal Payroll Tax Rate}) = AF_L(K, L),$$

where the marginal payroll tax rate is either 0.0765 or 0.0145 for high-earnings workers. Because the marginal payroll tax rates are not uniform across households, the calibration uses the average payroll tax rate (total payroll tax paid by employers divided by total labor income) instead.[22]

Social Security benefits are based on each worker's Average Indexed Monthly Earnings (AIME), $b_i/12$, and the replacement rate schedule in the United States. The replacement rates are 90 percent for the first $561, 32 percent for amounts between $561 and $3,381, and 15 percent for amounts above $3,381.

The benefits received by retired workers accounted for 69.1 percent of total OASDI benefits in December 2000.[23] The calibration simply assumes that each elderly household re-

[21] See Table 2.A32 in Social Security Administration (2001).

[22] The marginal payroll tax rate faced by a representative firm depends on how the firm increases one additional unit of labor input. If the firm hires an additional set of workers of the same earnings distribution of existing workers, the marginal labor cost for the firm is the market wage rate plus the average payroll tax rate. If the firm does not increase its workers but make them work an additional hour, then, the marginal labor cost is the market wage rate plus the weighted average of marginal payroll tax rates, which will likely be lower than the average payroll tax rate. The calibration uses the average payroll tax rate, which is 5.94 percent in the baseline, to calculate the marginal cost for the firm for simplicity.

[23] See Table 5.A1 in Social Security Administration (2001).

Table 6: Marginal Payroll Tax Rates in 2001

Labor Income per worker $(w_t e_i h_i/2)$			Marginal Tax Rate (%)	
			OASDI	HI
\$0	–	\$80,400	$6.2 \times \tau_{P,Adj}$	1.45
\$80,400	–		$0.0 \times \tau_{P,Adj}$	1.45

Note: The same taxes are levied to employers. The payroll tax adjustment factor $\tau_{\text{P,Adj}}$ is assumed to be 1.0.

Table 7: OASDI Replacement Rates in 2001

AIME (b/12)			Marginal Replacement Rate (%)
\$0	–	\$561	$90.0 \times tr_{SS,Adj}$
\$561	–	\$3,381	$32.0 \times tr_{SS,Adj}$
\$3,381	–		$15.0 \times tr_{SS,Adj}$

Note: The OASDI benefit adjustment factor $\text{tr}_{\text{SS,Adj}}$ is assumed to be 1.448 to reflect disability insurance and survivors insurance.

ceives other benefits—those for spouses, children, and disabled workers—proportionally. Benefits calculated from AIME are multiplied uniformly by 1.448 (=1/0.691). For simplicity, the model assumes that the government consumes the difference between the OASDI payroll tax revenue and the OASDI benefits in the initial steady-state economy.[24]

Government Bond Yields. In the baseline economy, the real rate of return to capital, before corporate and individual income taxes, is about 6.25 percent, so the real rate on government debt is 3.25 percent. Because aggregate uncertainty does not exist in the model, it does not endogenously generate a risk premium between capital and government bonds. However, assuming that the risk premium is zero would cause government debt to accumulate too fast in simulations where tax cuts were temporarily financed through budget deficits. To overcome this problem, the model assumes an exogenous risk premium, $\rho = 0.03$ (or 300 basis points), between the market rate of return and the government bond yield.[25]

The procedure of applying the premium is implemented as follows. Let W_G, K_G, and D_G be the government's net wealth, capital stock, and debt held by public, respectively, and

[24] In the real economy, the surplus is added to the Social Security trust fund after subtracting administration costs.

[25] There is a criticism on this *ad hoc* treatment of government bond yields, however.

let W_P and K_P be private (households') net wealth and private capital stock, respectively.[26] Then, we have $W_G = K_G - D_G$ and $W_P = K_P + D_G$. National wealth W and capital stock K are defined as $W = W_P + W_G$ and $K = K_P + K_G$. In a closed economy we have $W = K$. The market rate of return r is determined by the marginal product of capital, that is, $r = F_K(K, L) - \delta$.

Suppose that the government bond yield r_G is defined as $r_G = r - \rho$, where $\rho > 0$ is a risk premium. If the market rate of return r is not stochastic, no households will purchase government bonds. One of the simplest ways to avoid this problem is, by assumption, making the households hold government bonds proportionally to their wealth levels.

The share of government bonds in a household's portfolio, s_B, is calculated as

$$s_B = \frac{D_G}{W_P} = \frac{D_G}{K_P + D_G}.$$

The average rate of return to the household's portfolio, $\widetilde{r}$, is

$$\widetilde{r} = (1 - s_B)\, r + s_B r_G = (1 - s_B)\, r + s_B\, (r - \rho)\,.$$

This average rate of return $\widetilde{r}$ will be used to find the household's decision rules. For example, the capital income of a household becomes smaller if $\rho > 0$ and $s_B > 0$. In the government's intertemporal budget constraint, the market rate r will be used for the rate of return to the government capital stock K_G, but $r_G = r - \rho$ will be used for the cost of the government debt. When the debt-GDP ratio goes up, and s_B goes up, the market interest rate r will go up because of the crowding out, but the average interest rate $\widetilde{r}$ will not go up as much and it discourage private savings further.

3.4 How Well Does the Model Match the Data?

Tables 8 and 9 show the distribution statistics of the overlapping generation models and those in the U.S. data. The model roughly capture the distributions in earnings, income, and wealth. In terms of Gini coefficients, the earnings and wealth inequalities under March 2003 assumptions are about the same as those in the U.S. data, and the inequalities under the alternative assumptions are slightly lower. However, the model does not replicate the wealth

[26] In the baseline economy, the ratio of K_G to GDP is set at 0.586 and the ratio of D_G to GDP is 0.348.

Table 8: The Gini Coefficients in the Baseline Economy

	Earnings		Income	Wealth
	All	Ages 20-64		
March 2003 Assumptions	0.608	0.531	0.581	0.748
Alternative Assumptions	0.566	0.499	0.545	0.706
U.S. data (married households)*	0.60	–	–	0.75

*The author's calculation using data from the 1998 Survey of Consumer Finances.

Table 9: The Wealth Distribution in the Baseline Economy

	Percentage of wealth held by top				
	1%	5%	10%	20%	40%
March 2003 Assumptions	18.6	46.3	61.4	77.5	92.5
Alternative Assumptions	16.6	41.9	56.6	73.0	89.5
U.S. data (married households)*	30.5	53.9	64.9	77.2	90.4

*The author's calculation using data from the 1998 Survey of Consumer Finances.

inequality completely. For example, the share of wealth held by top 1 percent of households is 18.6 percent under March 2003 assumptions and 16.6 percent under the alternative assumptions, and the numbers are significantly lower than 30.5 percent calculated from the 1998 Survey of Consumer Finances.

4 Policy Experiments

This section describes the economic effects of cutting all statutory federal income tax rates by 10 percent. The tax cut is assumed to be unanticipated and be enacted in year 1. Table 10 shows the impact on the average effective marginal tax rates on capital and labor. The effective tax rate on capital declines by only 3 to 4 percent because the policy does not change corporate income tax rates.

The policy experiment was implemented in two steps:

First, the changes in average effective marginal income tax rates are calculated outside the model. Then, the percent changes in marginal tax rates on labor income and capital income were incorporated in the model by proportionately adjusting the model's tax rates on labor and capital so that the percentage changes in effective marginal rates were similar to

Table 10: Effective Marginal Tax Rates on Labor Income and Capital Income (%)

Model	Calendar	Tax Rate on Labor Income			Rate on Capital Income		
Year	Year	Current Law	Proposal	%ch	Current Law	Proposal	%ch
1	2004	18.1	16.3	-9.7	13.9	13.5	-3.1
2	2005	19.0	17.1	-9.7	13.9	13.5	-3.2
3	2006	19.0	17.2	-9.7	14.0	13.5	-3.2
4	2007	19.3	17.4	-10.0	14.0	13.6	-3.2
5	2008	19.5	17.6	-9.8	13.9	13.5	-3.1
6	2009	19.8	17.8	-9.7	14.9	14.3	-3.5
7	2010	20.0	18.1	-9.6	14.9	14.3	-3.6
8	2011	21.8	19.7	-9.6	15.5	14.9	-3.9
9	2012	22.0	19.8	-9.8	15.5	14.9	-3.9
10-	2013-	22.0	19.8	-10.2	15.5	14.9	-3.9

the numbers in Table 10.

Second, adjustments were made in lump-sum transfers so that the model's prediction of the revenue loss without macroeconomic feedbacks matched the estimates provided by the Joint Committee on Taxation (JCT). See Table 11.

Because the model imposes the government's intertemporal budget constraint, tax cuts must eventually be financed by either cutting spending or raising taxes. This paper considers five alternatives:

1. Government consumption (waste) $C_{G,t}$ reduced contemporaneously;
2. Lump-sum transfers $tr_{LS,t}$ reduced contemporaneously;
3. Government consumption $C_{G,t}$ reduced gradually after 10 years;
4. Lump-sum transfers $tr_{LS,t}$ reduced gradually after 10 years;
5. Income tax rates φ_{τ_I} raised gradually after 10 years.

The ratio of government debt (net wealth) to the baseline GDP is fixed throughout the transition path in first two alternatives. In the remaining alternatives, the debt-GDP ratio is stabilized after 20 years.

Table 11: Matching JCT's Revenue Estimates

Model Year	Calendar Year	Static Revenue Change (as % of GDP)		Lump-sum Transfer Adjustment (in 2001 dollars)	
		JCT Estimate*1	OLG Model*2	March 2003	Alternative
1	2004	-0.65	-0.90	-262	-234
2	2005	-0.76	-0.90	-136	-115
3	2006	-0.81	-0.90	-89	-71
4	2007	-0.82	-0.92	-98	-79
5	2008	-0.85	-0.91	-53	-36
6	2009	-0.86	-0.90	-40	-25
7	2010	-0.93	-0.90	51	60
8	2011	-1.02	-0.90	135	138
9	2012	-0.99	-0.92	87	93
10-	2013-	-1.01	-0.96	75	83

*1 Converted to calender year from fiscal year.

*2 Before lump-sum transfer adjustments; without macroeconomic feedbacks.

4.1 March 2003 Assumptions

Table 12 show the results of the experiment in selected macroeconomic variables. The numbers are percent changes from the baseline economy.

(1) Contemporaneous reductions in government consumption. When the marginal tax rate on labor income was reduced by 10 percent, labor supply would increase both in the short run and in the long run. National wealth would also increase, because the marginal tax rate on capital income was reduced by 3 to 4 percent by assumption, and because after-tax earnings would be higher. Except for the first 5 years, the percent increase in national wealth is larger than the percent increase in labor supply, and the wage rate would be higher and the interest rate would be lower in a closed economy. So, the long-run change in national wealth would be smaller and the long-run change in labor supply would be larger in a closed economy than in a small open economy. The increase in GNP is simply calculated from the production function. Throughout the transition path, the percent increase in private consumption would be larger than the percent increase in GNP, because government consumption was reduced to make the government budget balanced, and more resources were allocated to households.

Table 12: Income Tax Rates Reduced by 10 Percent Proportionally—March 2003 Assumptions (Percent Changes from the Baseline)

	Closed Economy				Small Open Economy			
	Years			Long	Years			Long
	1-5	6-10	1-10	Run	1-5	6-10	1-10	Run
(1) Contemporaneous reductions in government consumption								
National Wealth	0.3	1.0	0.6	2.2	0.4	1.3	0.9	3.7
Labor Supply	0.7	0.5	0.6	0.4	0.8	0.5	0.7	0.2
GNP	0.6	0.6	0.6	1.0	0.7	0.8	0.7	1.2
Consumption	1.1	1.5	1.3	2.2	1.0	1.3	1.2	2.1
(2) Contemporaneous reductions in lump-sum transfers								
National Wealth	0.5	1.8	1.2	3.0	0.7	2.3	1.5	4.6
Labor Supply	0.9	0.9	0.9	1.0	1.1	0.9	1.0	0.8
GNP	0.8	1.2	1.0	1.6	1.0	1.3	1.2	1.9
Consumption	0.9	1.2	1.0	1.6	0.7	0.9	0.8	1.6
(3) Deficit finance for 10 years then phased-in reductions in government consumption								
National Wealth	0.1	-0.2	-0.1	-1.2	-0.1	-0.7	-0.4	-2.5
Labor Supply	0.8	0.5	0.7	0.2	0.8	0.5	0.6	0.4
GNP	0.6	0.3	0.4	-0.2	0.5	0.1	0.3	-0.4
Consumption	0.9	1.2	1.0	1.7	1.1	1.4	1.3	1.7
(4) Deficit finance for 10 years then phased-in reductions in lump-sum transfers								
National Wealth	0.2	0.4	0.3	0.1	0.2	0.2	0.2	-0.6
Labor Supply	1.0	0.8	0.9	1.0	1.0	0.8	0.9	1.1
GNP	0.8	0.7	0.7	0.7	0.8	0.6	0.7	0.6
Consumption	0.8	1.0	0.9	1.1	0.9	1.1	1.0	1.1
(5) Deficit finance for 10 years then phased-in increases in income tax rates								
National Wealth	0.1	0.0	0.0	-4.4	0.0	-0.5	-0.2	-7.6
Labor Supply	0.8	0.7	0.8	-0.3	0.8	0.6	0.7	0.3
GNP	0.6	0.5	0.5	-1.6	0.6	0.3	0.4	-2.1
Consumption	0.9	1.1	1.0	-1.0	1.1	1.3	1.2	-0.8

When the effective marginal tax rate on labor income is on average 19 percent, marginal payroll tax rate is on average 6 percent, and marginal state and local tax rate is 4 percent, the after-tax wage goes up by 2.7 percent by a 10 percent marginal income tax rate cut if the market wage rate does not change. In a small open economy, where the wage rate was not assumed to change, labor supply would increase by 0.7 percent on average in the first 10 years. From these two numbers, the model implies that the uncompensated wage elasticity of labor supply is about 0.26 under this assumption.

(2) Contemporaneous reductions in lump-sum transfers. Compared to the financing assumption (1), both labor supply and national wealth would be larger throughout the transition path. Because the reductions in lump-sum transfers were applied to both working-age households and retired households, households would have to accumulate higher life-cycle savings to prepare for the period after retirement and, accordingly, they would have to work more under this financing assumption. Since government consumption was not reduced, the percent increase in private consumption would be smaller under this assumption than the financing assumption (1).

(3) Deficit finance for 10 years then phased-in reductions in government consumption. Compared to the financing assumption (1), the government debt would increase for the first 20 years, because the phased-in reductions in government consumption took 10 more years. By assumption, households would have to hold a larger share of government bonds, which rate of return was lower than the market rate of return. So, in a small open economy, private savings would be smaller and private consumption would be slightly larger. National wealth would decrease mostly due to the increase in government debt, and the interest rate would be higher in a closed economy. The percent decrease in national wealth would be smaller in a closed economy than in a small open economy because of the general equilibrium effect. In the long run, the increased government debt would push down national wealth and GNP, and the percent changes in those two variables would be negative. The increase in private consumption would also be smaller than the financing assumption (1).

(4) Deficit finance for 10 years then phased-in reductions in lump-sum transfers. Compared to the financing assumption (2), national wealth would be smaller because of the increased government debt, and labor supply would be slightly smaller in a small open economy. Consumption in a small open economy would be slightly larger in the short run, because the average rate of return would be lower, but the increase in consumption is smaller in the long run due to the larger reduction of lump-sum transfers. Compared to the small open economy case, the interest rate would be slightly higher in a closed economy, so would be national wealth and GNP. Private consumption would be slightly lower in a closed economy

than in a small open economy.

(5) Deficit finance for 10 years then phased-in increases in income tax rates. The effect of a 10 percent tax cut would be larger than the financing assumption (3) but less than the financing assumption (4) in the short run. Because an income tax rate increase after 10 years would hurt retired households less than working-age households, compared to the financing assumption (4), households would have to accumulate less wealth for the period after retirement. In the long run, the negative effect of the government debt increase would be the largest among the five government-financing assumptions. Higher marginal tax rates on capital income would reduce national wealth and GNP in the long run. Private consumption would decrease, too.[27]

4.2 Alternative Assumptions

Under the alternative assumptions, the share parameter for consumption is increased from 0.454 to 0.694, and the wage elasticity of labor supply is lower than that under the March 2003 assumptions. In addition, the coefficient of relative risk aversion is increased from 2.0 to 4.0 (or, equivalently, the intertemporal elasticity of substitution of the composite of consumption and leisure is reduced from 0.5 to 0.25).

So, in all financing assumptions and in both a closed economy and a small open economy, percent increases in labor supply under the alternative assumptions would be smaller than those under the March 2003 assumptions. Labor supply would increase by 0.4 percent for the first 10 years in a small open economy under the financing assumption (1). This result implies that the uncompensated wage elasticity of labor supply is around 0.15 in the short run. Compared to the March 2003 assumptions, the percent increase in GNP would be smaller in the short run.

[27] The present policy experiment reduces the marginal tax rates on labor income by 10 percent, but it reduces the marginal tax rates on capital income by only 3 to 4 percent. After 10 years, the policy experiment assumes that the tax rates on both labor income tax and capital income tax would be increased proportionally from the level in year 10. This assumption makes the negative effect on national wealth larger than that on labor supply in the long run.

Table 13: Income Tax Rates Reduced by 10 Percent Proportionally—Alternative Assumptions (Percent Changes from the Baseline)

	Closed Economy				Small Open Economy			
	Years			Long	Years			Long
	1-5	6-10	1-10	Run	1-5	6-10	1-10	Run
(1) Contemporaneous reductions in government consumption								
National Wealth	0.3	1.0	0.6	2.8	0.3	1.0	0.6	3.2
Labor Supply	0.5	0.4	0.4	0.4	0.5	0.3	0.4	0.1
GNP	0.4	0.6	0.5	1.1	0.4	0.5	0.5	1.1
Consumption	1.0	1.3	1.1	2.1	1.0	1.2	1.1	2.0
(2) Contemporaneous reductions in lump-sum transfers								
National Wealth	0.6	2.1	1.3	3.8	0.6	2.3	1.5	4.5
Labor Supply	0.7	0.7	0.7	0.8	0.7	0.6	0.6	0.5
GNP	0.7	1.1	0.9	1.7	0.7	1.1	0.9	1.7
Consumption	0.5	0.8	0.7	1.4	0.4	0.6	0.5	1.2
(3) Deficit finance for 10 years then phased-in reductions in government consumption								
National Wealth	-0.2	-0.9	-0.5	-1.8	-0.2	-1.0	-0.6	-1.9
Labor Supply	0.4	0.2	0.3	0.0	0.5	0.3	0.4	0.1
GNP	0.2	-0.1	0.1	-0.6	0.3	0.0	0.1	-0.5
Consumption	0.9	1.1	1.0	2.0	1.0	1.2	1.1	2.0
(4) Deficit finance for 10 years then phased-in reductions in lump-sum transfers								
National Wealth	0.2	0.4	0.3	0.6	0.2	0.4	0.3	0.6
Labor Supply	0.7	0.6	0.6	0.7	0.7	0.6	0.6	0.7
GNP	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.7
Consumption	0.4	0.6	0.5	0.8	0.5	0.7	0.6	0.8
(5) Deficit finance for 10 years then phased-in increases in income tax rates								
National Wealth	-0.1	-0.7	-0.4	-7.1	-0.1	-0.7	-0.4	-7.4
Labor Supply	0.5	0.3	0.4	-0.7	0.5	0.4	0.5	0.0
GNP	0.3	0.0	0.2	-2.6	0.3	0.1	0.2	-2.2
Consumption	0.8	1.0	0.9	-1.9	0.9	1.1	1.0	-1.1

In the long run, the sizes (absolute values) of percent changes from the baseline would be smaller in a small open economy than the March 2003 assumption, but the sizes of percent changes would be larger in a closed economy. In other words, the difference between a closed economy and a small open economy would be smaller under the alternative assumptions than the March 2003 assumptions.

Appendices

A The Computation of Equilibria

The algorithm to solve the model for a steady-state equilibrium and an equilibrium transition path is similar to those in Conesa and Krueger (1999), Nishiyama (2002), and Nishiyama and Smetters (2003).[28]

A.1 The Discretization of the State Space

The state of a household is $\mathbf{s}_i = (i, e_i, a_i, b_i) \in I \times E \times A \times B$, where $I = \{20, ..., 109\}$, $E = [e^{\min}, e^{\max}]$, $A = \left[a^{\min}, a^{\max}\right]$, and $B = [b^{\min}, b^{\max}]$. To compute an equilibrium, the state space of a household is discretized as $\widehat{\mathbf{s}}_i \in I \times \widehat{E} \times \widehat{A} \times \widehat{B}$, where $\widehat{E} = \{e^1, e^2, ..., e^{N_e}\}$, $\widehat{A} = \{a^1, a^2, ..., a^{N_a}\}$, and $\widehat{B} = \{b^1, b^2, ..., b^{N_b}\}$.[29] For all these discrete points, the model computes the optimal decision of households, $\mathbf{d}(\widehat{\mathbf{s}}_i, \mathbf{S}_t; \mathbf{\Psi}_t) = (c_i(.), h_i(.), a_{i+1}(.)) \in (0, c^{\max}] \times [0, h_i^{\max}] \times A$, the marginal values, $\frac{\partial}{\partial a} v(\widehat{\mathbf{s}}_i, \mathbf{S}_t; \mathbf{\Psi}_t)$ and $\frac{\partial}{\partial b} v(\widehat{\mathbf{s}}_i, \mathbf{S}_t; \mathbf{\Psi}_t)$, and the values $v(\widehat{\mathbf{s}}_i, \mathbf{S}_t; \mathbf{\Psi}_t)$, given the expected factor prices and policy variables.[30]

To find the optimal end-of-period wealth, the model uses the Euler equation and bilinear interpolation (with respect to a and b) of marginal values at the beginning of the next period.[31] In this paper, N_e, N_a, and N_b are 8, 35, and 8, respectively. Since there are 90 different ages, the total number of discrete states is 201,600.[32]

A.2 A Steady-State Equilibrium

The algorithm to compute a steady-state equilibrium is as follows. Let $\mathbf{\Psi}$ denote the time-invariant government policy rule $\mathbf{\Psi} = (W_G, C_G, tr_{LS}, \tau_I(.), \tau_P(.), tr_{SS}(.))$.

[28]The author is grateful to José Víctor Ríos-Rull for his teaching of the computational procedure of heterogeneous agent models.

[29]The grid points on the wealth space A is not equally spaced. The present calibration assumes $a^j = \$100 \times j^{3.5}$ for $j = 2, ..., N_a$ and $a^1 = \$0$.

[30]Because the marginal value with respect to historical earnings, $\frac{\partial}{\partial b} v(\widehat{\mathbf{s}}_i, \mathbf{S}_t; \mathbf{\Psi}_t)$, is difficult to obtain analytically, it is approximated by $(v(., b^{j+1}, \mathbf{S}_t; \mathbf{\Psi}_t) - v(., b^j, \mathbf{S}_t; \mathbf{\Psi}_t))/(b^{j+1} - b^j)$ where $j = 1, 2, ..., N_b$.

[31]The marginal values with respect to wealth, $\frac{\partial}{\partial a} v(\widehat{\mathbf{s}}_i, \mathbf{S}_t; \mathbf{\Psi}_t)$, are used in the Euler equation to obtain optimal savings, the marginal values with respect to historical earnings, $\frac{\partial}{\partial b} v(\widehat{\mathbf{s}}_i, \mathbf{S}_t; \mathbf{\Psi}_t)$, are used in the marginal rate of substitution condition of consumption for leisure to obtain optimal working hours, and the values, $v(\widehat{\mathbf{s}}_i, \mathbf{S}_t; \mathbf{\Psi}_t)$, are used to calculate welfare changes measured by compensating variations in wealth.

[32]When the number of grid points is 201,600, it takes AMD Athron$^{(TM)}$ XP 2600+ about 48 minutes to calculate one loop of iteration (120 years). It usually takes 5 to 10 loops, depending on the complexity of the experiment, to calculate an equilibrium transition path of 120 years.

1. Set the initial values of factor prices (r^0, w^0), accidental bequests q^0, the policy variables $(W_G^0, C_G^0, tr_{LS}^0)$, and the parameters φ^0 of policy functions $(\tau_I(.), \tau_P(.), tr_{SS}(.))$ if these are determined endogenously.[33]

2. Given $\mathbf{\Omega}^0 = (r^0, w^0, q^0, W_G^0, C_G^0, tr_{LS}^0, \varphi^0)$, find the decision rule of a household $\mathbf{d}(\widehat{\mathbf{s}}_i; \mathbf{\Psi}, \mathbf{\Omega}^0)$ for all $\widehat{\mathbf{s}}_i \in I \times \widehat{E} \times \widehat{A} \times \widehat{B}$.[34]

   (a) For age $i = 109$, find the decision rule $\mathbf{d}(\widehat{\mathbf{s}}_{109}; \mathbf{\Psi}, \mathbf{\Omega}^0)$. Since the survival rate $\phi_{109} = 0$, the end-of-period wealth $a_{i+1}(\widehat{\mathbf{s}}_{109}; .) = 0$ for all $\widehat{\mathbf{s}}_{109}$. Compute consumption and working hours $(c_i(\widehat{\mathbf{s}}_{109}; .), h_i(\widehat{\mathbf{s}}_{109}; .))$ and, then, marginal values $\frac{\partial}{\partial a} v(\widehat{\mathbf{s}}_{109}; \mathbf{\Psi}, \mathbf{\Omega}^0)$ and values $v(\widehat{\mathbf{s}}_{109}; \mathbf{\Psi}, \mathbf{\Omega}^0)$ for all $\widehat{\mathbf{s}}_{109}$.[35]

   (b) For age $i = 108, ..., 20$, find the decision rule $\mathbf{d}(\widehat{\mathbf{s}}_i; \mathbf{\Psi}, \mathbf{\Omega}^0)$, marginal values $\frac{\partial}{\partial a} v(\widehat{\mathbf{s}}_i; \mathbf{\Psi}, \mathbf{\Omega}^0)$, and values $v(\widehat{\mathbf{s}}_i; \mathbf{\Psi}, \mathbf{\Omega}^0)$ for all $\widehat{\mathbf{s}}_i$, using $\frac{\partial}{\partial a} v(\widehat{\mathbf{s}}_{i+1}; \mathbf{\Psi}, \mathbf{\Omega}^0)$ and $\frac{\partial}{\partial b} v(\widehat{\mathbf{s}}_{i+1}; \mathbf{\Psi}, \mathbf{\Omega}^0)$ recursively.[36]

      i. Set the initial guess of $a_{i+1}^0(\widehat{\mathbf{s}}_i; .)$.

      ii. Given $a_{i+1}^0(\widehat{\mathbf{s}}_i; .)$, compute $(c_i(\widehat{\mathbf{s}}_i; .), h_i(\widehat{\mathbf{s}}_i; .))$, using $\frac{\partial}{\partial b} v(\widehat{\mathbf{s}}_{i+1}; \mathbf{\Psi}, \mathbf{\Omega}^0)$. Plug these into the Euler equation with $\frac{\partial}{\partial a} v(\widehat{\mathbf{s}}_{i+1}; \mathbf{\Psi}, \mathbf{\Omega}^0)$.

      iii. If the Euler error is sufficiently small, then stop. Otherwise, update $a_{i+1}^0(\widehat{\mathbf{s}}_i; .)$ and return to Step ii.

3. Find the steady-state measure of households $x(\widehat{\mathbf{s}}_i; \mathbf{\Omega}^0)$ using the decision rule obtained in Step 2. This computation is done forward from age 20 to age 109. Repeat this step to iterate q for q^1.

4. Compute new factor prices (r^1, w^1), the policy variables $(W_G^1, C_G^1, tr_{LS}^1)$, and the parameters φ^1 of policy functions.[37]

[33] Actually, if we find the capital-labor ratio, both r and w are calculated from the given production function and depreciation rate.

[34] In the steady-state economy, the decision rule of a household $\mathbf{d}(\widehat{\mathbf{s}}_i; \mathbf{\Psi}, \mathbf{\Omega}^0)$ is not a function of the aggregate state of economy $\widehat{\mathbf{S}} = (x(\widehat{\mathbf{s}}_i), W_G)$. The measure of household $x(\widehat{\mathbf{s}}_i)$ is determined uniquely by the steady-state condition, and the government's wealth W_G is determined by the policy rule $\mathbf{\Psi}$.

[35] The marginal value with respect to historical earnings, $\frac{\partial}{\partial b} v(\widehat{\mathbf{s}}_i; \mathbf{\Psi}, \mathbf{\Omega}^0)$, is zero when $i > 60$ in this paper.

[36] Again, $\frac{\partial}{\partial b} v(\widehat{\mathbf{s}}_i; \mathbf{\Psi}, \mathbf{\Omega}^0)$, is obtained by $(v(., b^{j+1}; \mathbf{\Psi}, \mathbf{\Omega}^0) - v(., b^j; \mathbf{\Psi}, \mathbf{\Omega}^0))/(b^{j+1} - b^j)$.

[37] In many cases, only one of the policy variables and parameters, $(W_G^1, C_G^1, tr_{LS}^1, \varphi^1)$, is assumed to be endogenous (by the government's financing rule), and it is calculated from the government's intertemporal budget constraint.

5. Compare $\mathbf{\Omega}^1 = (r^1, w^1, q^1, W_G^1, C_G^1, tr_{LS}^1, \varphi^1)$ with $\mathbf{\Omega}^0$. If the difference is sufficiently small, then stop. Otherwise, update $\mathbf{\Omega}^0$ and return to Step 2.

A.3 An Equilibrium Transition Path

Let's assume that the economy is in the initial steady state in period 0, and that the new policy schedule (rule) $\mathbf{\Psi}_1$, which was not expected in period 0, is announced at the beginning of period 1, where $\mathbf{\Psi}_1 = \{W_{G,t+1}, C_{G,t}, tr_{LS,t}, \tau_{I,t}(.), \tau_{P,t}(.), tr_{SS,t}(.)\}_{t=1}^{\infty}$. Let $\widehat{\mathbf{S}}_1 = (x_1(\widehat{\mathbf{s}}_i), W_{G,1})$ be the state of the economy at the beginning of period 1. The state of the economy $\widehat{\mathbf{S}}_1$ is usually equal to that of the initial steady state. The algorithm to compute a transition path to a new steady-state equilibrium (thereafter, final steady-state equilibrium) is as follows.

1. Choose a sufficiently large number, T, such that the economy is said to reach the new steady state within T periods.[38] Set the initial guess, $\{\mathbf{\Omega}_t^0\}_{t=1}^T$, on factor prices (r_t^0, w_t^0), accidental bequests q_t^0, the policy variables $(W_{G,t+1}^0, C_{G,t}^0, tr_{LS,t}^0)$, and the parameters φ_t^0 of policy functions for $t = 1, 2, ..., T$.

2. Given $\mathbf{\Omega}_T^0 = (r_T^0, w_T^0, q_T^0, W_{G,T}^0, C_{G,T}^0, tr_{LS,T}^0, \varphi_T^0)$, find the final steady-state decision rule $\mathbf{d}(\widehat{\mathbf{s}}_i, \widehat{\mathbf{S}}_T; \mathbf{\Psi}_T; \mathbf{\Omega}_T^0)$, marginal values, $\frac{\partial}{\partial a} v(\widehat{\mathbf{s}}_i, \widehat{\mathbf{S}}_T; \mathbf{\Psi}_T; \mathbf{\Omega}_T^0)$, and values $v(\widehat{\mathbf{s}}_i, \widehat{\mathbf{S}}_T; \mathbf{\Psi}_T; \mathbf{\Omega}_T^0)$ for all $\widehat{\mathbf{s}}_i \in I \times \widehat{E} \times \widehat{A} \times \widehat{B}$. (See the algorithm for a steady-state equilibrium.)

3. For period $t = T-1, T-2, ..., 1$, based on the guess, $\mathbf{\Omega}_t^0$, find backward the decision rule $\mathbf{d}(\widehat{\mathbf{s}}_i, \widehat{\mathbf{S}}_t; \mathbf{\Psi}_t; \mathbf{\Omega}_t^0)$, marginal values $\frac{\partial}{\partial a} v(\widehat{\mathbf{s}}_i, \widehat{\mathbf{S}}_t; \mathbf{\Psi}_t; \mathbf{\Omega}_t^0)$, and values $v(\widehat{\mathbf{s}}_i, \widehat{\mathbf{S}}_t; \mathbf{\Psi}_t; \mathbf{\Omega}_t^0)$ for all $\widehat{\mathbf{s}}_i \in I \times \widehat{E} \times \widehat{A} \times \widehat{B}$, using the next period marginal values $\frac{\partial}{\partial a} v(\widehat{\mathbf{s}}_{i+1}, \widehat{\mathbf{S}}_{t+1}; \mathbf{\Psi}_{t+1}; \mathbf{\Omega}_{t+1}^0)$ and values $v(\widehat{\mathbf{s}}_{i+1}, \widehat{\mathbf{S}}_{t+1}; \mathbf{\Psi}_{t+1}; \mathbf{\Omega}_{t+1}^0)$ recursively.

   (a) For age $i = 109$, find the decision rule $\mathbf{d}(\widehat{\mathbf{s}}_{109}, \widehat{\mathbf{S}}_t; \mathbf{\Psi}_t; \mathbf{\Omega}_t^0)$ and compute the marginal values $\frac{\partial}{\partial a} v(\widehat{\mathbf{s}}_{109}, \widehat{\mathbf{S}}_t; \mathbf{\Psi}_t; \mathbf{\Omega}_t^0)$ and values $v(\widehat{\mathbf{s}}_{109}, \widehat{\mathbf{S}}_t; \mathbf{\Psi}_t; \mathbf{\Omega}_t^0)$ for all $\widehat{\mathbf{s}}_{109}$.

   (b) For age $i = 108, ..., 20$, find the decision rule $\mathbf{d}(\widehat{\mathbf{s}}_i, \widehat{\mathbf{S}}_t; \mathbf{\Psi}_t; \mathbf{\Omega}_t^0)$ and compute $\frac{\partial}{\partial a} v(\widehat{\mathbf{s}}_i, \widehat{\mathbf{S}}_t; \mathbf{\Psi}_t; \mathbf{\Omega}_t^0)$ and $v(\widehat{\mathbf{s}}_i, \widehat{\mathbf{S}}_t; \mathbf{\Psi}_t; \mathbf{\Omega}_t^0)$ for all $\widehat{\mathbf{s}}_i$, using $\frac{\partial}{\partial a} v(\widehat{\mathbf{s}}_{i+1}, \widehat{\mathbf{S}}_{t+1}; \mathbf{\Psi}_{t+1}; \mathbf{\Omega}_{t+1}^0)$ and $v(\widehat{\mathbf{s}}_{i+1}, \widehat{\mathbf{S}}_{t+1}; \mathbf{\Psi}_{t+1}; \mathbf{\Omega}_{t+1}^0)$ previously computed.[39]

[38] For this to be the case, the government's policy rule has to be time-invariant sufficiently before period T, that is, $\mathbf{\Psi}_s = \mathbf{\Psi}_T$ for $1 \leq s < T$.

[39] Note that this step does not use $\frac{\partial}{\partial a} v(\widehat{\mathbf{s}}_{i+1}, \widehat{\mathbf{S}}_t; \mathbf{\Psi}_t; \mathbf{\Omega}_t^0)$ recursively.

i. Set the initial guess of $a^0_{i+1}(\widehat{\mathbf{s}}_i;.)$.

ii. Given $a^0_{i+1}(\widehat{\mathbf{s}}_i;.)$, compute $(c_i(\widehat{\mathbf{s}}_i;.), h_i(\widehat{\mathbf{s}}_i;.))$, using $\frac{\partial}{\partial b}v(\widehat{\mathbf{s}}_{i+1}, \widehat{\mathbf{S}}_{t+1}; \mathbf{\Psi}_{t+1}; \mathbf{\Omega}^0_{t+1})$ calculated from $v(\widehat{\mathbf{s}}_{i+1}, \widehat{\mathbf{S}}_{t+1}; \mathbf{\Psi}_{t+1}; \mathbf{\Omega}^0_{t+1})$. Plug these into the Euler equation with $\frac{\partial}{\partial a}v(\widehat{\mathbf{s}}_{i+1}, \widehat{\mathbf{S}}_{t+1}; \mathbf{\Psi}_{t+1}; \mathbf{\Omega}^0_{t+1})$.

iii. If the Euler error is sufficiently small, then stop. Otherwise, update $a^0_{i+1}(\widehat{\mathbf{s}}_i;.)$ and return to Step ii.

4. For period $t = 1, 2, ..., T-1$, compute forward $\mathbf{\Omega}^1_t = (r^1_t, w^1_t, q^1_t, W^1_{G,t+1}, C^1_{G,t}, tr^1_{LS,t}, \varphi^1_t)$ and the measure of households $x_{t+1}(\widehat{\mathbf{s}}_i)$, using the decision rule $\mathbf{d}(\widehat{\mathbf{s}}_i, \widehat{\mathbf{S}}_t; \mathbf{\Psi}_t; \mathbf{\Omega}^0_t)$ obtained in Step 3 and using the state of economy $\widehat{\mathbf{S}}_t = (x_t(\widehat{\mathbf{s}}_i), W_{G,t})$ recursively.

5. Compare $\{\mathbf{\Omega}^1_t\}^T_{t=1}$ with $\{\mathbf{\Omega}^0_t\}^T_{t=1}$. If the difference is sufficiently small, then stop. Otherwise, update $\{\mathbf{\Omega}^0_t\}^T_{t=1}$ and return to Step 2. If the final steady-state equilibrium is known, return to Step 3 instead.[40]

B Detailed Tables and Figures

March 2003 Assumptions. Tables A.1 (a) to A.5 (a) show the effects of a 10 percent marginal rate cut on macroeconomic variables in selected years; Tables A.1 (b) to A.5 (b) show the welfare gains or losses of households of selected age cohorts and temporary working abilities; and Figures A.1 to A.5 also show the effects of a 10 percent marginal rate cut throughout the transition paths.

Alternative Assumptions. Similarly, Tables A.6 (a) to A.10 (a) show the effects of a 10 percent marginal rate cut on macroeconomic variables; Tables A.6 (b) to A.10 (b) show the welfare gains or losses; and Figures A.1 to A.5 also show the effects of a 10 percent marginal rate cut throughout the transition paths.

[40] For example, for a policy experiment with balanced budget assumption, the final steady state needs to be calculated only once, because the government wealth (debt) level in T is known and fixed. If deficit financing is assumed for the first several years, the government wealth level in T changes, and the final steady state needs to be calculated in every iteration.

Table A.1 (a). Income Tax Rates Reduced by 10 Percent Proportionally; Government Consumption Reduced Contemporaneously
Changes in Macroeconomic Indicators from the Baseline---March 2003 Assumptions

	Year																Average		
	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	120	01-05	06-10	01-10
(Closed Economy)																			
%ch(National Wealth)	0.0	0.2	0.3	0.5	0.6	0.7	0.9	1.0	1.1	1.2	1.6	1.9	2.0	2.1	2.2	2.2	0.3	1.0	0.6
%ch(Labor)	0.8	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.7	0.5	0.6
%ch(GNP=GDP)	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.0	0.6	0.6	0.6
%ch(Consumption)	0.9	1.0	1.1	1.2	1.3	1.4	1.4	1.5	1.6	1.6	1.8	2.0	2.1	2.1	2.2	2.2	1.1	1.5	1.3
%ch(Gross Investment)	2.2	2.4	2.4	2.4	2.3	2.2	2.4	2.7	2.5	2.7	2.5	2.4	2.3	2.3	2.2	2.2	2.4	2.5	2.4
ch(Lump-Sum Transfer/GDP%)	-0.24	-0.12	-0.08	-0.09	-0.05	-0.04	0.05	0.12	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	-0.12	0.06	-0.03
ch(Gov't Consumption/GDP%)	-0.49	-0.61	-0.66	-0.67	-0.70	-0.71	-0.80	-0.87	-0.84	-0.85	-0.85	-0.84	-0.85	-0.85	-0.85	-0.86	-0.63	-0.82	-0.72
ch(Income Tax/GDP%)	-0.80	-0.80	-0.81	-0.83	-0.81	-0.81	-0.80	-0.81	-0.82	-0.84	-0.84	-0.83	-0.83	-0.82	-0.82	-0.82	-0.81	-0.82	-0.81
ch(Interest Rate%)	0.06	0.04	0.02	0.01	0.00	-0.02	-0.03	-0.04	-0.05	-0.05	-0.09	-0.11	-0.12	-0.13	-0.13	-0.13	0.03	-0.04	0.00
%ch(Wage Rate)	-0.2	-0.2	-0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.5	0.5	-0.1	0.1	0.0
ch(Private Wealth/GDP%)	0.0	0.4	0.9	1.3	1.7	2.0	2.3	2.6	3.0	3.3	4.5	5.2	5.6	5.8	6.0	6.0	0.9	2.7	1.8
ch(Gov't Wealth/GDP%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ch(Budget Deficit/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Small Open Economy)																			
%ch(National Wealth)	0.0	0.2	0.4	0.6	0.8	1.0	1.1	1.3	1.5	1.6	2.3	2.8	3.1	3.4	3.6	3.7	0.4	1.3	0.9
%ch(Labor)	1.0	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.8	0.5	0.7
%ch(GNP)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9	1.0	1.1	1.1	1.2	1.2	1.2	0.7	0.8	0.7
%ch(GDP)	1.0	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.8	0.5	0.7
%ch(Consumption)	0.9	1.0	1.0	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.7	1.8	1.9	2.0	2.1	2.1	1.0	1.3	1.2
%ch(Gross Dom. Investment)	1.0	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.8	0.5	0.7
ch(Lump-Sum Transfer/GDP%)	-0.24	-0.12	-0.08	-0.09	-0.05	-0.04	0.05	0.12	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	-0.12	0.06	-0.03
ch(Gov't Consumption/GDP%)	-0.44	-0.57	-0.63	-0.64	-0.67	-0.69	-0.78	-0.87	-0.84	-0.85	-0.86	-0.86	-0.86	-0.87	-0.87	-0.86	-0.59	-0.81	-0.70
ch(Income Tax/GDP%)	-0.78	-0.78	-0.79	-0.81	-0.79	-0.80	-0.79	-0.80	-0.81	-0.84	-0.84	-0.83	-0.83	-0.83	-0.83	-0.83	-0.79	-0.81	-0.80
ch(Net Foreign Assets/GDP%)	-2.6	-1.8	-1.0	-0.4	0.3	1.0	1.6	2.2	2.7	3.0	5.3	6.9	7.9	8.5	9.2	9.6	-1.1	2.1	0.5
ch(Private Wealth/GDP%)	0.0	0.5	1.1	1.7	2.2	2.7	3.1	3.6	4.1	4.5	6.4	7.7	8.6	9.2	9.8	10.1	1.1	3.6	2.3
ch(Gov't Wealth/GDP%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ch(Budget Deficit/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A.1 (b). Income Tax Rates Reduced by 10 Percent Proportionally; Government Consumption Reduced Contemporaneously
Compensating Variations in Wealth as Percentages of Per-Household GDP---March 2003 Assumptions

	The Year When Age 20 (Top) / the Age in Year 1 (Bottom)																
	-88	-79	-69	-59	-49	-39	-29	-19	-9	1	11	21	41	61	81	101	120
	109	100	90	80	70	60	50	40	30	20	10	0	-20	-40	-60	-80	-99
(Closed Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.4	-0.4	0.0	0.1	0.3	2.6	4.5	4.2	2.4	3.9	4.1	4.3	4.3	4.3	4.3	4.3
20-40 percentile					0.2	0.9	4.2	7.6	7.8	5.6	7.7	8.2	8.5	8.5	8.5	8.5	8.5
40-60 percentile					0.2	1.6	6.0	9.7	10.6	7.5	9.9	10.5	10.8	10.8	10.9	10.9	10.9
60-80 percentile					0.4	3.1	9.0	13.1	14.4	10.2	12.9	13.6	14.0	14.0	14.0	14.1	14.0
80-90 percentile					1.1	5.4	11.9	16.4	17.7	13.1	16.1	16.9	17.2	17.3	17.3	17.4	17.4
90-95 percentile					3.5	11.3	15.2	21.4	21.0	16.2	19.5	20.4	20.8	20.8	20.9	21.0	20.9
95-99 percentile					12.2	25.9	27.1	31.5	28.5	21.0	24.6	25.5	26.0	26.0	26.1	26.2	26.2
99-100 percentile					52.9	111.9	88.9	69.3	52.8	27.6	31.7	32.8	33.3	33.4	33.4	33.6	33.6
Average	-0.3	-0.4	-0.4	0.0	1.5	4.4	8.3	11.6	11.9	8.4	10.8	11.4	11.6	11.7	11.7	11.7	11.7
(Small Open Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.4	-0.4	-0.1	0.3	0.6	2.9	4.7	4.3	2.5	3.7	4.0	4.2	4.2	4.2	4.2	4.2
20-40 percentile					0.4	1.3	4.8	8.0	8.0	5.7	7.4	7.9	8.3	8.3	8.3	8.3	8.3
40-60 percentile					0.5	2.4	6.9	10.5	11.1	7.6	9.5	10.0	10.5	10.6	10.6	10.6	10.6
60-80 percentile					1.0	4.8	10.8	15.0	15.6	10.5	12.5	13.1	13.6	13.7	13.7	13.7	13.7
80-90 percentile					2.1	8.2	15.1	19.7	20.2	13.7	15.7	16.4	17.0	17.1	17.1	17.1	17.0
90-95 percentile					5.2	16.6	20.9	27.5	25.0	17.3	19.6	20.3	20.8	20.9	20.9	20.9	20.9
95-99 percentile					15.5	35.5	38.3	43.1	36.1	23.6	26.1	26.9	27.4	27.5	27.5	27.5	27.5
99-100 percentile					62.5	142.6	122.8	100.7	73.8	32.6	35.6	36.4	37.0	37.1	37.1	37.1	37.1
Average	-0.3	-0.4	-0.4	-0.1	2.1	6.3	10.4	13.7	13.3	8.8	10.5	11.1	11.5	11.6	11.6	11.6	11.6

Figure A.1. Income Tax Rates Reduced by 10 Percent Proportionally; Government Consumption Reduced Contemporaneously---March 2003 Assumptions

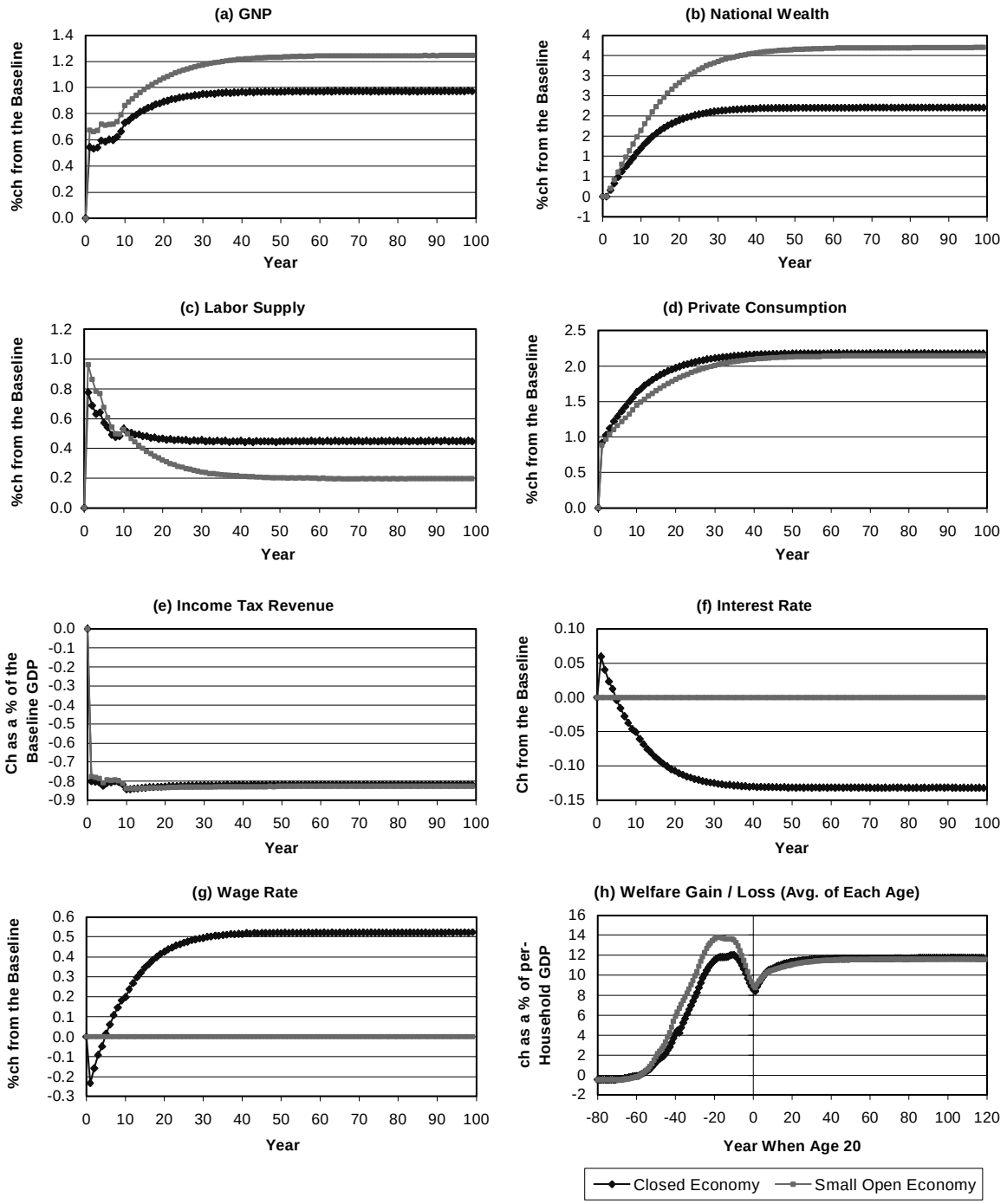


Table A.2 (a). Income Tax Rates Reduced by 10 Percent Proportionally; Lump-Sum Transfers Reduced Contemporaneously
Changes in Macroeconomic Indicators from the Baseline---March 2003 Assumptions

	Year																Average		
	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	120	01-05	06-10	01-10
(Closed Economy)																			
%ch(National Wealth)	0.0	0.3	0.5	0.8	1.1	1.3	1.5	1.8	2.1	2.3	2.6	2.8	2.9	3.0	3.0	3.0	0.5	1.8	1.2
%ch(Labor)	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9
%ch(GNP=GDP)	0.7	0.7	0.8	0.9	0.9	1.0	1.1	1.1	1.3	1.4	1.5	1.6	1.6	1.6	1.6	1.6	0.8	1.2	1.0
%ch(Consumption)	0.6	0.8	0.9	1.0	1.0	1.1	1.2	1.2	1.2	1.2	1.4	1.4	1.5	1.6	1.6	1.6	0.9	1.2	1.0
%ch(Gross Investment)	3.6	4.0	4.1	4.3	4.4	4.5	5.0	5.6	5.9	3.2	3.2	3.1	3.1	3.1	3.0	3.0	4.1	4.8	4.5
ch(Lump-Sum Transfer/GDP%)	-0.68	-0.68	-0.68	-0.69	-0.67	-0.67	-0.65	-0.64	-0.64	-0.64	-0.64	-0.64	-0.64	-0.65	-0.66	-0.67	-0.68	-0.65	-0.67
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.78	-0.78	-0.78	-0.79	-0.77	-0.76	-0.75	-0.75	-0.75	-0.77	-0.77	-0.76	-0.76	-0.75	-0.75	-0.75	-0.78	-0.76	-0.77
ch(Interest Rate%)	0.08	0.05	0.03	0.01	-0.01	-0.03	-0.05	-0.07	-0.09	-0.10	-0.12	-0.13	-0.14	-0.14	-0.15	-0.15	0.03	-0.07	-0.02
%ch(Wage Rate)	-0.3	-0.2	-0.1	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.5	0.6	0.6	0.6	-0.1	0.3	0.1
ch(Private Wealth/GDP%)	0.0	0.7	1.5	2.2	2.9	3.5	4.2	4.9	5.7	6.4	7.1	7.6	7.9	8.1	8.2	8.2	1.5	4.9	3.2
ch(Gov't Wealth/GDP%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ch(Budget Deficit/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Small Open Economy)																			
%ch(National Wealth)	0.0	0.3	0.7	1.0	1.3	1.7	2.0	2.3	2.7	3.0	3.6	4.0	4.2	4.4	4.6	4.6	0.7	2.3	1.5
%ch(Labor)	1.3	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.9	1.0	0.9	0.9	0.8	0.8	0.8	0.8	1.1	0.9	1.0
%ch(GNP)	0.9	0.9	1.0	1.1	1.1	1.2	1.2	1.3	1.4	1.6	1.7	1.8	1.8	1.9	1.9	1.9	1.0	1.3	1.2
%ch(GDP)	1.3	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.9	1.0	0.9	0.9	0.8	0.8	0.8	0.8	1.1	0.9	1.0
%ch(Consumption)	0.6	0.6	0.7	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.1	1.3	1.4	1.4	1.5	1.6	0.7	0.9	0.8
%ch(Gross Dom. Investment)	1.3	1.2	1.1	1.1	1.0	1.0	0.9	0.9	0.9	1.0	0.9	0.9	0.8	0.8	0.8	0.8	1.1	0.9	1.0
ch(Lump-Sum Transfer/GDP%)	-0.61	-0.62	-0.63	-0.65	-0.64	-0.64	-0.64	-0.64	-0.64	-0.65	-0.66	-0.66	-0.66	-0.66	-0.67	-0.68	-0.63	-0.64	-0.64
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.74	-0.74	-0.75	-0.77	-0.75	-0.75	-0.74	-0.74	-0.75	-0.77	-0.77	-0.77	-0.77	-0.76	-0.76	-0.76	-0.75	-0.75	-0.75
ch(Net Foreign Assets/GDP%)	-3.5	-2.4	-1.2	-0.3	0.9	1.9	2.9	3.9	4.9	5.6	7.3	8.5	9.4	9.9	10.4	10.5	-1.3	3.8	1.3
ch(Private Wealth/GDP%)	0.0	0.9	1.8	2.7	3.6	4.5	5.4	6.3	7.3	8.2	9.8	10.9	11.6	12.1	12.5	12.7	1.8	6.4	4.1
ch(Gov't Wealth/GDP%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ch(Budget Deficit/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A.2 (b). Income Tax Rates Reduced by 10 Percent Proportionally; Lump-Sum Transfers Reduced Contemporaneously
Compensating Variations in Wealth as Percentages of Per-Household GDP---March 2003 Assumptions

	The Year When Age 20 (Top) / the Age in Year 1 (Bottom)																
	-88	-79	-69	-59	-49	-39	-29	-19	-9	1	11	21	41	61	81	101	120
	109	100	90	80	70	60	50	40	30	20	10	0	-20	-40	-60	-80	-99
(Closed Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.4	-1.0	-3.8	-6.3	-6.3	-4.9	-2.6	-1.1	-0.7	-2.6	-2.5	-2.5	-2.6	-2.6	-2.6	-2.5
20-40 percentile					-6.4	-7.3	-4.5	-2.2	-0.5	-0.6	-3.3	-3.0	-3.0	-3.1	-3.1	-3.1	-3.1
40-60 percentile					-6.8	-8.0	-3.6	-1.2	0.4	-0.1	-2.8	-2.4	-2.5	-2.6	-2.6	-2.5	-2.5
60-80 percentile					-7.7	-7.7	-1.7	1.4	2.5	1.1	-1.4	-1.0	-1.0	-1.1	-1.1	-1.1	-1.1
80-90 percentile					-8.0	-6.4	0.0	3.8	4.7	2.3	-0.1	0.4	0.4	0.3	0.3	0.3	0.3
90-95 percentile					-6.5	-2.0	1.6	7.0	7.1	4.1	2.0	2.5	2.5	2.4	2.4	2.4	2.4
95-99 percentile					1.1	10.5	11.0	14.9	13.0	7.4	6.0	6.5	6.5	6.4	6.4	6.4	6.5
99-100 percentile					38.1	87.8	64.6	46.0	32.8	12.4	11.8	12.4	12.5	12.4	12.4	12.4	12.4
Average	-0.3	-0.4	-1.0	-3.8	-6.1	-5.3	-1.8	0.9	1.9	0.8	-1.6	-1.2	-1.3	-1.3	-1.4	-1.3	-1.3
(Small Open Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.4	-1.0	-3.8	-6.1	-6.0	-4.8	-2.7	-1.3	-0.9	-3.0	-2.8	-2.7	-2.7	-2.7	-2.7	-2.7
20-40 percentile					-6.0	-6.7	-4.0	-1.9	-0.6	-0.8	-4.0	-3.5	-3.3	-3.3	-3.3	-3.3	-3.3
40-60 percentile					-6.3	-6.7	-2.6	-0.4	0.6	-0.3	-3.6	-3.1	-2.9	-2.9	-2.9	-2.9	-2.9
60-80 percentile					-6.6	-5.0	0.6	3.6	3.7	1.0	-2.3	-1.8	-1.5	-1.6	-1.6	-1.5	-1.5
80-90 percentile					-6.1	-1.8	4.2	7.8	7.4	2.5	-0.9	-0.3	0.0	0.0	0.0	0.0	0.0
90-95 percentile					-3.2	6.1	9.4	15.0	11.8	4.8	1.6	2.2	2.5	2.5	2.5	2.5	2.5
95-99 percentile					6.8	24.4	26.2	30.0	22.3	10.1	7.1	7.8	8.1	8.1	8.1	8.1	8.1
99-100 percentile					52.9	131.6	110.6	87.2	59.4	18.1	15.4	16.1	16.4	16.4	16.4	16.4	16.5
Average	-0.3	-0.4	-1.0	-3.8	-5.0	-2.5	0.9	3.4	3.3	0.9	-2.2	-1.7	-1.5	-1.5	-1.5	-1.5	-1.5

Figure A.2. Income Tax Rates Reduced by 10 Percent Proportionally; Lump-Sum Transfers Reduced Contemporaneously---March 2003 Assumptions

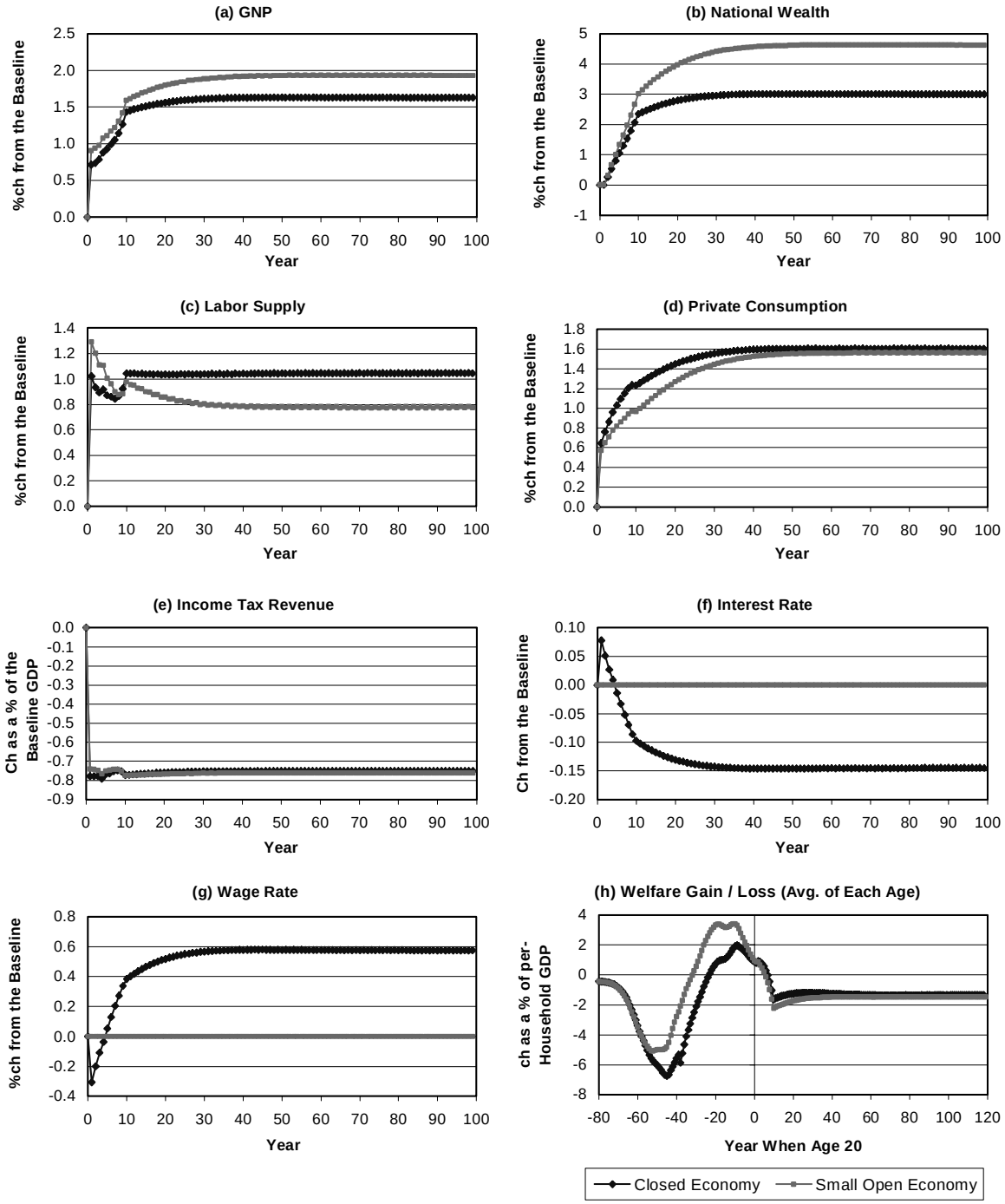


Table A.3 (a). Income Tax Rates Reduced by 10 Percent Proportionally; Government Consumption Reduced Gradually After 10 Years
Changes in Macroeconomic Indicators from the Baseline---March 2003 Assumptions

	Year																Average		
	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	120	01-05	06-10	01-10
(Closed Economy)																			
%ch(National Wealth)	0.0	0.1	0.1	0.1	0.1	0.0	-0.1	-0.2	-0.4	-0.5	-1.3	-1.5	-1.4	-1.3	-1.3	-1.2	0.1	-0.2	-0.1
%ch(Labor)	0.9	0.8	0.8	0.8	0.7	0.6	0.6	0.5	0.5	0.5	0.3	0.2	0.2	0.2	0.2	0.2	0.8	0.5	0.7
%ch(GNP=GDP)	0.7	0.6	0.6	0.6	0.5	0.4	0.4	0.3	0.2	0.2	-0.2	-0.3	-0.2	-0.2	-0.2	-0.2	0.6	0.3	0.4
%ch(Consumption)	0.7	0.8	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.7	0.9	1.2	1.0
%ch(Gross Investment)	1.0	0.4	0.0	-0.3	-0.8	-1.2	-1.7	-2.2	-2.6	-2.9	-2.6	-1.0	-1.1	-1.2	-1.2	-1.2	0.0	-2.1	-1.0
ch(Lump-Sum Transfer/GDP%)	-0.24	-0.12	-0.08	-0.09	-0.05	-0.04	0.05	0.12	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	-0.12	0.06	-0.03
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.50	-1.02	-1.01	-1.00	-1.00	-1.00	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.79	-0.79	-0.80	-0.82	-0.81	-0.81	-0.81	-0.82	-0.84	-0.87	-0.90	-0.91	-0.90	-0.90	-0.90	-0.90	-0.80	-0.83	-0.82
ch(Interest Rate%)	0.07	0.06	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.08	0.12	0.14	0.12	0.12	0.11	0.11	0.06	0.06	0.06
%ch(Wage Rate)	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3	-0.5	-0.5	-0.5	-0.5	-0.4	-0.4	-0.2	-0.2	-0.2
ch(Private Wealth/GDP%)	0.0	0.6	1.3	1.9	2.4	3.0	3.4	3.9	4.4	4.8	6.4	7.2	7.6	7.8	8.0	8.0	1.2	3.9	2.6
ch(Gov't Wealth/GDP%)	0.0	-0.4	-1.0	-1.6	-2.3	-3.0	-3.7	-4.5	-5.4	-6.2	-9.9	-11.4	-11.4	-11.4	-11.4	-11.4	-1.1	-4.5	-2.8
ch(Budget Deficit/GDP%)	0.46	0.60	0.67	0.71	0.77	0.81	0.92	1.04	1.04	1.10	0.77	0.32	0.32	0.32	0.32	0.32	0.64	0.98	0.81
(Small Open Economy)																			
%ch(National Wealth)	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.5	-0.7	-0.9	-1.1	-2.2	-2.6	-2.6	-2.5	-2.5	-2.5	-0.1	-0.7	-0.4
%ch(Labor)	0.9	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.8	0.5	0.6
%ch(GNP)	0.6	0.6	0.5	0.5	0.4	0.3	0.2	0.1	0.1	0.0	-0.3	-0.5	-0.4	-0.4	-0.4	-0.4	0.5	0.1	0.3
%ch(GDP)	0.9	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.8	0.5	0.6
%ch(Consumption)	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.5	1.6	1.6	1.7	1.7	1.7	1.7	1.1	1.4	1.3
%ch(Gross Dom. Investment)	12.3	-0.5	-0.2	0.5	-0.5	-0.2	-0.2	0.0	0.6	1.0	0.4	0.4	0.5	0.4	0.4	0.4	2.3	0.2	1.3
ch(Lump-Sum Transfer/GDP%)	-0.24	-0.12	-0.08	-0.09	-0.05	-0.04	0.05	0.12	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	-0.12	0.06	-0.03
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.48	-0.98	-0.98	-0.98	-0.98	-0.98	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.78	-0.79	-0.80	-0.82	-0.81	-0.82	-0.82	-0.83	-0.85	-0.88	-0.89	-0.89	-0.89	-0.89	-0.89	-0.89	-0.80	-0.84	-0.82
ch(Net Foreign Assets/GDP%)	-2.5	-2.2	-2.1	-2.2	-2.3	-2.4	-2.7	-3.2	-3.8	-4.5	-7.2	-8.4	-8.3	-8.2	-8.1	-8.1	-2.2	-3.3	-2.8
ch(Private Wealth/GDP%)	0.0	0.5	0.9	1.4	1.7	2.1	2.4	2.6	2.9	3.2	4.0	4.2	4.4	4.4	4.5	4.5	0.9	2.6	1.8
ch(Gov't Wealth/GDP%)	0.0	-0.4	-1.0	-1.6	-2.3	-3.0	-3.7	-4.5	-5.4	-6.3	-10.0	-11.4	-11.4	-11.4	-11.4	-11.4	-1.1	-4.6	-2.8
ch(Budget Deficit/GDP%)	0.46	0.60	0.68	0.72	0.78	0.82	0.94	1.05	1.05	1.10	0.76	0.32	0.32	0.32	0.32	0.32	0.65	0.99	0.82

Table A.3 (b). Income Tax Rates Reduced by 10 Percent Proportionally; Government Consumption Reduced Gradually After 10 Years
Compensating Variations in Wealth as Percentages of Per-Household GDP---March 2003 Assumptions

	The Year When Age 20 (Top) / the Age in Year 1 (Bottom)																
	-88	-79	-69	-59	-49	-39	-29	-19	-9	1	11	21	41	61	81	101	120
	109	100	90	80	70	60	50	40	30	20	10	0	-20	-40	-60	-80	-99
(Closed Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.4	-0.4	0.3	0.6	0.8	2.2	3.4	2.9	1.5	2.4	2.6	2.8	2.8	2.8	2.8	2.8
20-40 percentile					0.8	1.5	3.9	6.0	5.7	3.8	4.9	5.3	5.6	5.6	5.6	5.6	5.6
40-60 percentile					1.0	2.6	5.8	8.1	8.2	5.3	6.4	6.8	7.1	7.1	7.1	7.1	7.1
60-80 percentile					1.8	5.2	9.6	12.3	12.1	7.5	8.6	9.0	9.3	9.3	9.3	9.3	9.3
80-90 percentile					3.2	8.7	13.7	16.7	16.2	9.9	11.0	11.4	11.8	11.8	11.8	11.8	11.8
90-95 percentile					6.7	17.3	19.8	24.3	20.7	13.0	13.9	14.3	14.7	14.7	14.7	14.7	14.7
95-99 percentile					17.1	36.3	36.9	39.3	31.0	18.5	19.2	19.3	19.8	19.8	19.8	19.8	19.7
99-100 percentile					63.0	140.4	118.8	94.7	66.8	26.5	26.8	26.7	27.2	27.3	27.3	27.2	27.2
Average	-0.3	-0.4	-0.4	0.3	2.8	6.6	9.3	11.4	10.3	6.3	7.3	7.6	7.9	7.9	7.9	7.9	7.9
(Small Open Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.4	-0.5	-0.6	-0.4	-0.2	1.8	3.4	3.1	1.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8
20-40 percentile					-0.3	0.2	3.2	5.8	5.9	4.2	5.4	5.5	5.6	5.6	5.6	5.6	5.6
40-60 percentile					-0.6	0.7	4.6	7.5	8.3	5.7	7.0	7.1	7.2	7.2	7.2	7.2	7.2
60-80 percentile					-0.8	1.6	6.8	10.3	11.3	7.9	9.2	9.4	9.5	9.5	9.5	9.5	9.5
80-90 percentile					-0.6	3.2	8.9	12.9	14.1	10.2	11.6	11.7	11.8	11.8	11.8	11.8	11.8
90-95 percentile					1.0	7.9	10.8	16.8	16.8	12.9	14.2	14.3	14.4	14.4	14.4	14.4	14.4
95-99 percentile					8.9	20.7	20.9	25.4	23.5	17.1	18.1	18.2	18.3	18.3	18.3	18.3	18.3
99-100 percentile					48.4	102.6	78.0	59.5	46.1	23.0	23.7	23.7	23.9	23.9	23.9	23.9	23.8
Average	-0.3	-0.4	-0.5	-0.6	0.4	3.0	6.3	9.2	9.4	6.5	7.7	7.8	7.9	7.9	7.9	7.9	7.9

Figure A.3. Income Tax Rates Reduced by 10 Percent Proportionally; Government Consumption Reduced Gradually After 10 Years---March 2003 Assumptions

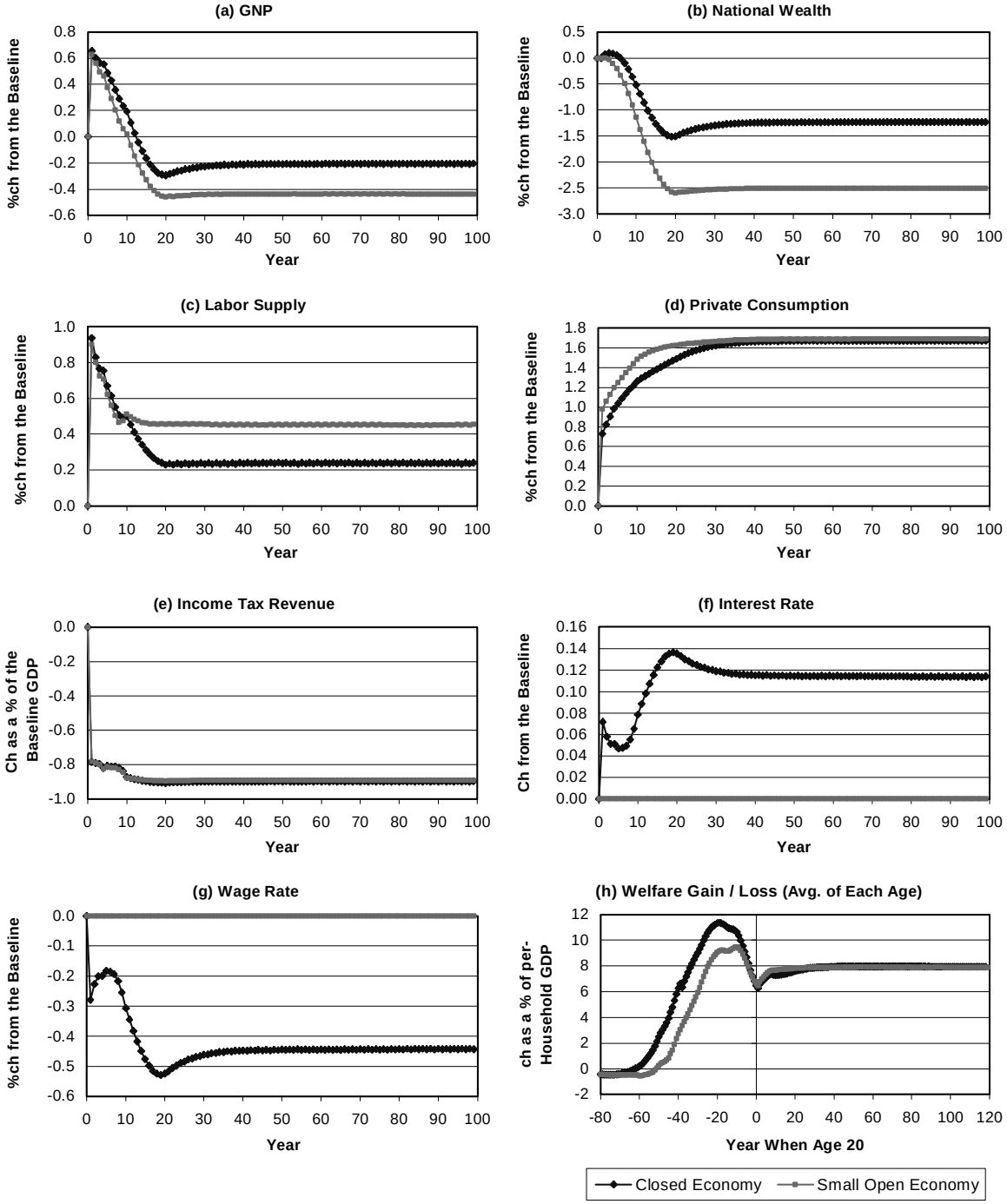


Table A.4 (a). Income Tax Rates Reduced by 10 Percent Proportionally; Lump-Sum Transfers Reduced Gradually After 10 Years
Changes in Macroeconomic Indicators from the Baseline---March 2003 Assumptions

	Year																Average		
	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	120	01-05	06-10	01-10
(Closed Economy)																			
%ch(National Wealth)	0.0	0.1	0.2	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.4	0.3
%ch(Labor)	1.1	1.0	0.9	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	1.0	1.0	0.8	0.9
%ch(GNP=GDP)	0.8	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7
%ch(Consumption)	0.6	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.1	1.0	1.1	1.1	1.1	1.1	0.8	1.0	0.9
%ch(Gross Investment)	2.0	1.6	1.3	1.1	0.8	0.6	0.3	0.1	0.0	0.0	0.0	0.2	0.2	0.2	0.1	0.1	1.4	0.2	0.8
ch(Lump-Sum Transfer/GDP%)	-0.24	-0.12	-0.08	-0.09	-0.05	-0.04	0.05	0.12	0.08	0.07	-0.38	-0.76	-0.75	-0.75	-0.76	-0.77	-0.12	0.06	-0.03
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.77	-0.77	-0.78	-0.79	-0.78	-0.78	-0.77	-0.78	-0.79	-0.82	-0.82	-0.81	-0.81	-0.81	-0.81	-0.81	-0.78	-0.79	-0.78
ch(Interest Rate%)	0.08	0.07	0.05	0.05	0.04	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.03	0.04
%ch(Wage Rate)	-0.3	-0.3	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	-0.2
ch(Private Wealth/GDP%)	0.0	0.8	1.6	2.4	3.2	3.9	4.6	5.3	6.0	6.7	9.4	10.3	10.3	10.3	10.3	10.2	1.6	5.3	3.4
ch(Gov't Wealth/GDP%)	0.0	-0.4	-0.9	-1.5	-2.1	-2.8	-3.4	-4.1	-4.9	-5.7	-8.7	-9.8	-9.8	-9.8	-9.8	-9.8	-1.0	-4.2	-2.6
ch(Budget Deficit/GDP%)	0.42	0.56	0.63	0.66	0.71	0.74	0.84	0.95	0.94	0.98	0.63	0.28	0.28	0.28	0.28	0.28	0.60	0.89	0.74
(Small Open Economy)																			
%ch(National Wealth)	0.0	0.1	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.1	-0.1	-0.3	-0.4	-0.4	-0.5	-0.6	0.2	0.2	0.2
%ch(Labor)	1.2	1.1	1.0	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.1	1.0	0.8	0.9
%ch(GNP)	0.8	0.8	0.7	0.8	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.8	0.6	0.7
%ch(GDP)	1.2	1.1	1.0	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.1	1.0	0.8	0.9
%ch(Consumption)	0.8	0.8	0.9	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	0.9	1.1	1.0
%ch(Gross Dom. Investment)	15.8	0.0	-0.1	1.0	-0.3	0.3	0.0	0.6	0.9	1.7	1.0	1.3	1.0	1.2	1.2	1.1	3.3	0.7	2.0
ch(Lump-Sum Transfer/GDP%)	-0.24	-0.12	-0.08	-0.09	-0.05	-0.04	0.05	0.12	0.08	0.07	-0.38	-0.74	-0.74	-0.74	-0.75	-0.76	-0.12	0.06	-0.03
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.75	-0.76	-0.77	-0.79	-0.78	-0.78	-0.78	-0.78	-0.79	-0.82	-0.82	-0.81	-0.81	-0.81	-0.81	-0.81	-0.77	-0.79	-0.78
ch(Net Foreign Assets/GDP%)	-3.2	-2.6	-2.2	-2.0	-1.7	-1.5	-1.4	-1.5	-1.6	-2.0	-2.8	-3.5	-3.8	-4.0	-4.2	-4.5	-2.3	-1.6	-2.0
ch(Private Wealth/GDP%)	0.0	0.7	1.4	2.2	2.8	3.5	4.1	4.7	5.4	6.0	8.3	9.0	8.8	8.7	8.5	8.2	1.4	4.7	3.1
ch(Gov't Wealth/GDP%)	0.0	-0.4	-0.9	-1.5	-2.1	-2.7	-3.3	-4.1	-4.9	-5.7	-8.7	-9.8	-9.8	-9.8	-9.8	-9.8	-1.0	-4.1	-2.5
ch(Budget Deficit/GDP%)	0.40	0.54	0.61	0.64	0.70	0.74	0.85	0.95	0.95	0.98	0.62	0.28	0.28	0.28	0.28	0.28	0.58	0.89	0.74

Table A.4 (b). Income Tax Rates Reduced by 10 Percent Proportionally; Lump-Sum Transfers Reduced Gradually After 10 Years
Compensating Variations in Wealth as Percentages of Per-Household GDP---March 2003 Assumptions

	The Year When Age 20 (Top) / the Age in Year 1 (Bottom)																
	-88	-79	-69	-59	-49	-39	-29	-19	-9	1	11	21	41	61	81	101	120
	109	100	90	80	70	60	50	40	30	20	10	0	-20	-40	-60	-80	-99
(Closed Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.4	-0.5	-1.6	-3.9	-4.7	-3.8	-3.0	-1.9	-1.1	-2.7	-4.8	-4.7	-4.8	-4.9	-4.9	-4.9
20-40 percentile					-3.9	-5.3	-3.5	-2.6	-1.7	-1.4	-4.5	-7.1	-7.1	-7.3	-7.3	-7.3	-7.3
40-60 percentile					-4.1	-5.5	-2.6	-1.5	-1.0	-1.2	-4.8	-7.5	-7.5	-7.6	-7.7	-7.7	-7.7
60-80 percentile					-4.3	-4.2	-0.2	1.6	1.3	-0.5	-4.3	-7.0	-7.1	-7.2	-7.3	-7.3	-7.3
80-90 percentile					-3.9	-1.6	2.5	4.8	4.1	0.4	-3.7	-6.5	-6.5	-6.7	-6.7	-6.7	-6.7
90-95 percentile					-1.3	4.9	6.4	10.2	7.3	2.0	-2.3	-5.1	-5.2	-5.3	-5.4	-5.4	-5.4
95-99 percentile					7.5	20.6	19.9	21.9	15.5	5.8	1.6	-1.3	-1.4	-1.5	-1.6	-1.6	-1.6
99-100 percentile					48.8	113.2	89.9	67.3	44.3	11.7	7.5	4.5	4.5	4.3	4.3	4.3	4.3
Average	-0.3	-0.4	-0.5	-1.6	-2.9	-1.9	0.2	1.4	1.2	-0.4	-3.6	-6.2	-6.2	-6.3	-6.4	-6.4	-6.4
(Small Open Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.4	-0.6	-2.4	-4.7	-5.4	-4.0	-2.9	-1.7	-1.0	-2.6	-4.5	-4.6	-4.7	-4.7	-4.8	-4.7
20-40 percentile					-4.8	-6.1	-3.8	-2.6	-1.4	-1.1	-4.2	-6.9	-6.9	-7.1	-7.1	-7.1	-7.1
40-60 percentile					-5.2	-6.7	-3.2	-1.7	-0.8	-0.9	-4.4	-7.1	-7.2	-7.4	-7.4	-7.4	-7.4
60-80 percentile					-6.2	-6.4	-1.7	0.8	1.1	-0.1	-3.9	-6.7	-6.8	-7.0	-7.0	-7.0	-7.0
80-90 percentile					-6.6	-5.0	0.0	3.2	3.4	0.8	-3.4	-6.2	-6.3	-6.5	-6.5	-6.5	-6.5
90-95 percentile					-5.3	-0.2	1.7	6.9	5.9	2.3	-2.2	-5.0	-5.1	-5.3	-5.4	-5.4	-5.4
95-99 percentile					2.5	13.0	12.2	15.9	12.6	5.6	1.0	-1.8	-2.0	-2.2	-2.2	-2.3	-2.2
99-100 percentile					42.1	98.2	73.1	52.9	36.7	10.8	5.9	3.0	2.8	2.6	2.6	2.5	2.6
Average	-0.3	-0.4	-0.6	-2.4	-4.6	-3.9	-1.2	0.6	1.0	-0.1	-3.4	-5.9	-6.1	-6.2	-6.2	-6.3	-6.2

Figure A.4. Income Tax Rates Reduced by 10 Percent Proportionally; Lump-Sum Transfers Reduced Gradually After 10 Years---March 2003 Assumptions

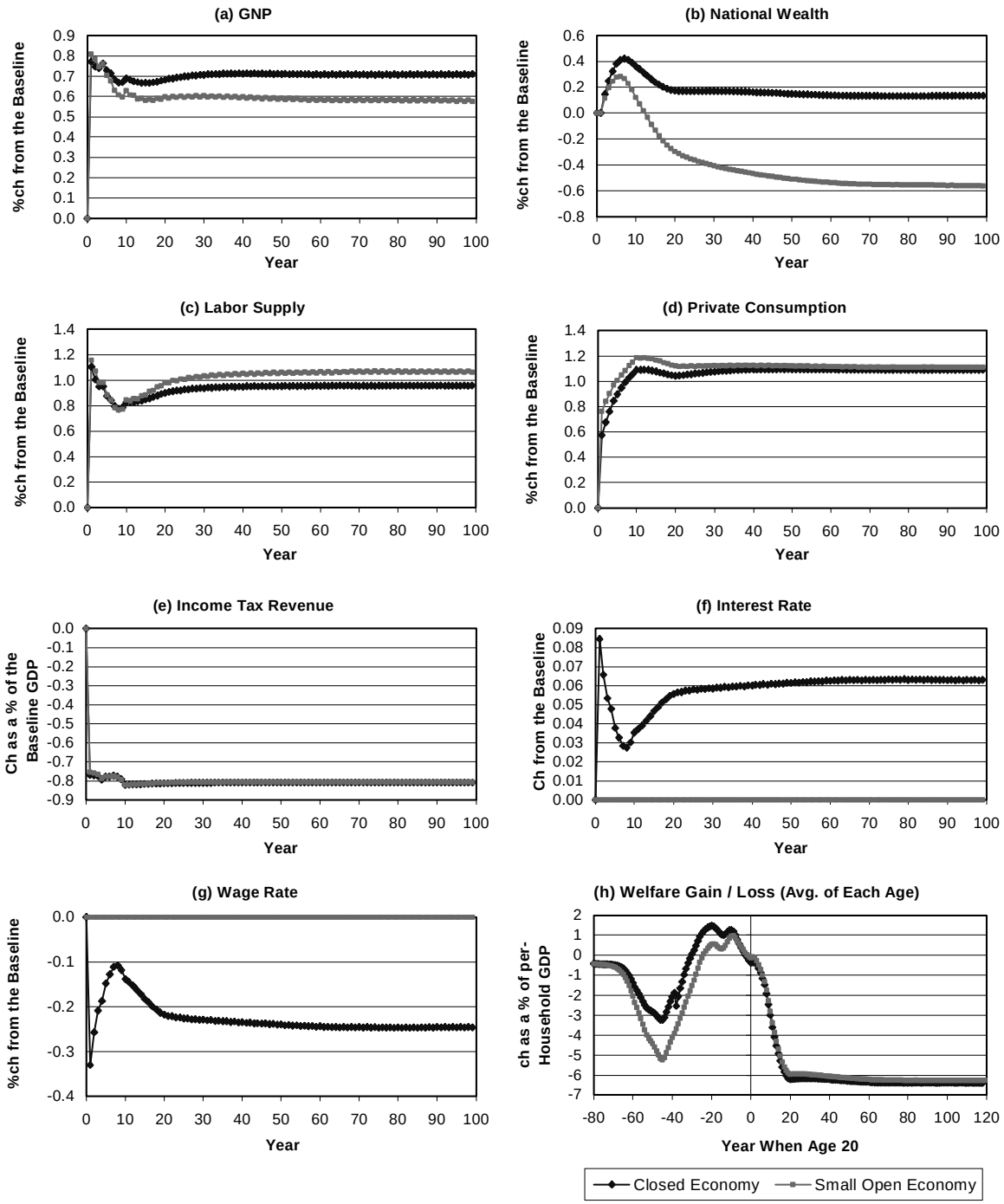


Table A.5 (a). Income Tax Rates Reduced by 10 Percent Proportionally; Income Tax Rates Increased Gradually After 10 Years
Changes in Macroeconomic Indicators from the Baseline---March 2003 Assumptions

	Year																Average		
	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	120	01-05	06-10	01-10
(Closed Economy)																			
%ch(National Wealth)	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	-0.1	-0.2	-0.9	-1.9	-2.9	-3.5	-4.1	-4.4	0.1	0.0	0.0
%ch(Labor)	1.0	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.7	0.1	-0.6	-0.5	-0.4	-0.4	-0.3	0.8	0.7	0.8
%ch(GNP=GDP)	0.7	0.6	0.6	0.6	0.6	0.5	0.5	0.4	0.4	0.4	-0.2	-1.0	-1.2	-1.3	-1.5	-1.6	0.6	0.5	0.5
%ch(Consumption)	0.7	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.1	1.2	0.8	0.1	-0.3	-0.6	-0.9	-1.0	0.9	1.1	1.0
%ch(Gross Investment)	1.2	0.7	0.3	0.1	-0.3	-0.6	-1.0	-1.3	-1.4	-1.5	-3.5	-5.2	-4.9	-4.7	-4.5	-4.4	0.4	-1.2	-0.4
ch(Lump-Sum Transfer/GDP%)	-0.24	-0.12	-0.08	-0.09	-0.05	-0.04	0.05	0.12	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	-0.12	0.06	-0.03
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.78	-0.79	-0.79	-0.81	-0.80	-0.80	-0.80	-0.80	-0.82	-0.85	-0.40	0.19	0.20	0.20	0.19	0.16	-0.79	-0.81	-0.80
ch(Interest Rate%)	0.07	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.08	0.11	0.19	0.25	0.30	0.32	0.06	0.05	0.06
%ch(Wage Rate)	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3	-0.4	-0.7	-0.9	-1.1	-1.2	-0.2	-0.2	-0.2
ch(Private Wealth/GDP%)	0.0	0.7	1.4	2.0	2.6	3.2	3.8	4.3	4.9	5.5	7.1	5.8	3.1	1.5	-0.1	-0.9	1.3	4.3	2.8
ch(Gov't Wealth/GDP%)	0.0	-0.4	-1.0	-1.6	-2.2	-2.9	-3.6	-4.4	-5.2	-6.0	-9.6	-11.1	-11.1	-11.1	-11.1	-11.1	-1.1	-4.4	-2.7
ch(Budget Deficit/GDP%)	0.45	0.59	0.66	0.69	0.75	0.78	0.89	1.00	1.00	1.04	0.77	0.31	0.31	0.31	0.31	0.31	0.63	0.94	0.79
(Small Open Economy)																			
%ch(National Wealth)	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.3	-0.5	-0.6	-0.8	-1.8	-3.4	-4.8	-5.8	-6.9	-7.6	0.0	-0.5	-0.2
%ch(Labor)	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.7	0.1	-0.6	-0.2	0.0	0.2	0.3	0.8	0.6	0.7
%ch(GNP)	0.7	0.6	0.6	0.5	0.5	0.4	0.3	0.3	0.3	0.3	-0.5	-1.4	-1.6	-1.8	-1.9	-2.1	0.6	0.3	0.4
%ch(GDP)	1.0	0.9	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.7	0.1	-0.6	-0.2	0.0	0.2	0.3	0.8	0.6	0.7
%ch(Consumption)	1.0	1.0	1.1	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.0	0.4	0.1	-0.2	-0.6	-0.8	1.1	1.3	1.2
%ch(Gross Dom. Investment)	13.1	-0.3	-0.1	0.8	-0.3	0.1	0.0	0.4	0.9	1.6	-1.4	-2.7	0.4	0.4	0.4	0.3	2.6	0.6	1.6
ch(Lump-Sum Transfer/GDP%)	-0.24	-0.12	-0.08	-0.09	-0.05	-0.04	0.05	0.12	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	-0.12	0.06	-0.03
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.78	-0.78	-0.79	-0.81	-0.80	-0.80	-0.80	-0.81	-0.82	-0.85	-0.40	0.19	0.16	0.15	0.13	0.13	-0.79	-0.82	-0.81
ch(Net Foreign Assets/GDP%)	-2.6	-2.3	-2.2	-2.3	-2.2	-2.4	-2.6	-2.9	-3.4	-4.1	-5.3	-7.6	-12.6	-15.9	-19.3	-21.6	-2.3	-3.1	-2.7
ch(Private Wealth/GDP%)	0.0	0.5	1.0	1.5	2.0	2.4	2.7	3.1	3.6	3.9	4.6	2.0	-2.0	-4.7	-7.6	-9.6	1.0	3.1	2.1
ch(Gov't Wealth/GDP%)	0.0	-0.4	-1.0	-1.6	-2.2	-2.9	-3.6	-4.4	-5.3	-6.1	-9.7	-11.2	-11.2	-11.2	-11.2	-11.2	-1.1	-4.4	-2.8
ch(Budget Deficit/GDP%)	0.44	0.59	0.66	0.70	0.75	0.79	0.90	1.01	1.01	1.05	0.78	0.32	0.32	0.32	0.32	0.32	0.63	0.95	0.79

Table A.5 (b). Income Tax Rates Reduced by 10 Percent Proportionally; Income Tax Rates Increased Gradually After 10 Years
Compensating Variations in Wealth as Percentages of Per-Household GDP---March 2003 Assumptions

	The Year When Age 20 (Top) / the Age in Year 1 (Bottom)																
	-88	-79	-69	-59	-49	-39	-29	-19	-9	1	11	21	41	61	81	101	120
	109	100	90	80	70	60	50	40	30	20	10	0	-20	-40	-60	-80	-99
(Closed Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.4	-0.4	0.3	0.5	0.6	1.9	2.0	0.6	-0.3	-0.4	-1.3	-2.0	-2.0	-2.1	-2.1	-2.1
20-40 percentile					0.7	1.2	3.3	3.9	1.8	0.1	-0.9	-2.8	-4.0	-4.1	-4.1	-4.1	-4.1
40-60 percentile					0.8	2.2	4.9	5.5	3.0	0.5	-1.2	-3.7	-5.2	-5.3	-5.4	-5.4	-5.4
60-80 percentile					1.4	4.3	8.0	8.7	5.4	1.4	-1.6	-5.0	-6.8	-6.9	-6.9	-7.0	-7.0
80-90 percentile					2.6	7.2	11.3	12.3	8.5	2.4	-1.9	-6.1	-8.1	-8.2	-8.3	-8.3	-8.3
90-95 percentile					5.7	14.4	15.8	18.6	12.0	4.0	-1.5	-7.2	-9.5	-9.6	-9.6	-9.7	-9.6
95-99 percentile					15.4	30.6	29.5	31.2	20.9	8.0	0.5	-8.4	-11.0	-11.0	-11.0	-11.1	-11.1
99-100 percentile					58.7	121.9	97.2	77.4	52.9	14.2	3.3	-10.1	-13.1	-13.1	-13.0	-13.1	-13.1
Average	-0.3	-0.4	-0.4	0.3	2.4	5.5	7.7	8.2	5.0	1.2	-1.1	-4.0	-5.5	-5.6	-5.6	-5.6	-5.6
(Small Open Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.4	-0.5	-0.5	-0.4	-0.3	1.3	1.6	0.5	-0.2	-0.2	-0.8	-1.6	-1.8	-1.8	-1.8	-1.9
20-40 percentile					-0.3	0.0	2.4	3.1	1.4	0.2	-0.6	-1.9	-3.2	-3.5	-3.6	-3.6	-3.6
40-60 percentile					-0.6	0.4	3.5	4.1	2.3	0.5	-0.9	-2.6	-4.0	-4.4	-4.5	-4.5	-4.6
60-80 percentile					-0.9	1.0	4.9	5.8	3.7	1.1	-1.5	-3.8	-5.4	-5.9	-5.9	-6.0	-6.0
80-90 percentile					-0.8	2.1	6.0	7.3	5.2	1.8	-2.2	-5.3	-7.0	-7.5	-7.6	-7.6	-7.6
90-95 percentile					0.7	5.7	6.1	9.2	6.5	2.7	-2.8	-7.4	-9.2	-9.6	-9.7	-9.8	-9.8
95-99 percentile					8.3	16.2	12.2	14.2	10.7	4.8	-3.8	-12.1	-13.8	-14.3	-14.4	-14.5	-14.5
99-100 percentile					46.6	87.6	54.3	35.6	25.8	7.7	-5.8	-19.0	-20.7	-21.3	-21.4	-21.5	-21.5
Average	-0.3	-0.4	-0.5	-0.5	0.3	2.2	4.3	5.0	3.1	0.9	-1.2	-3.4	-4.8	-5.1	-5.2	-5.2	-5.2

Figure A.5. Income Tax Rates Reduced by 10 Percent Proportionally; Income Tax Rates Increased Gradually After 10 Years---March 2003 Assumptions

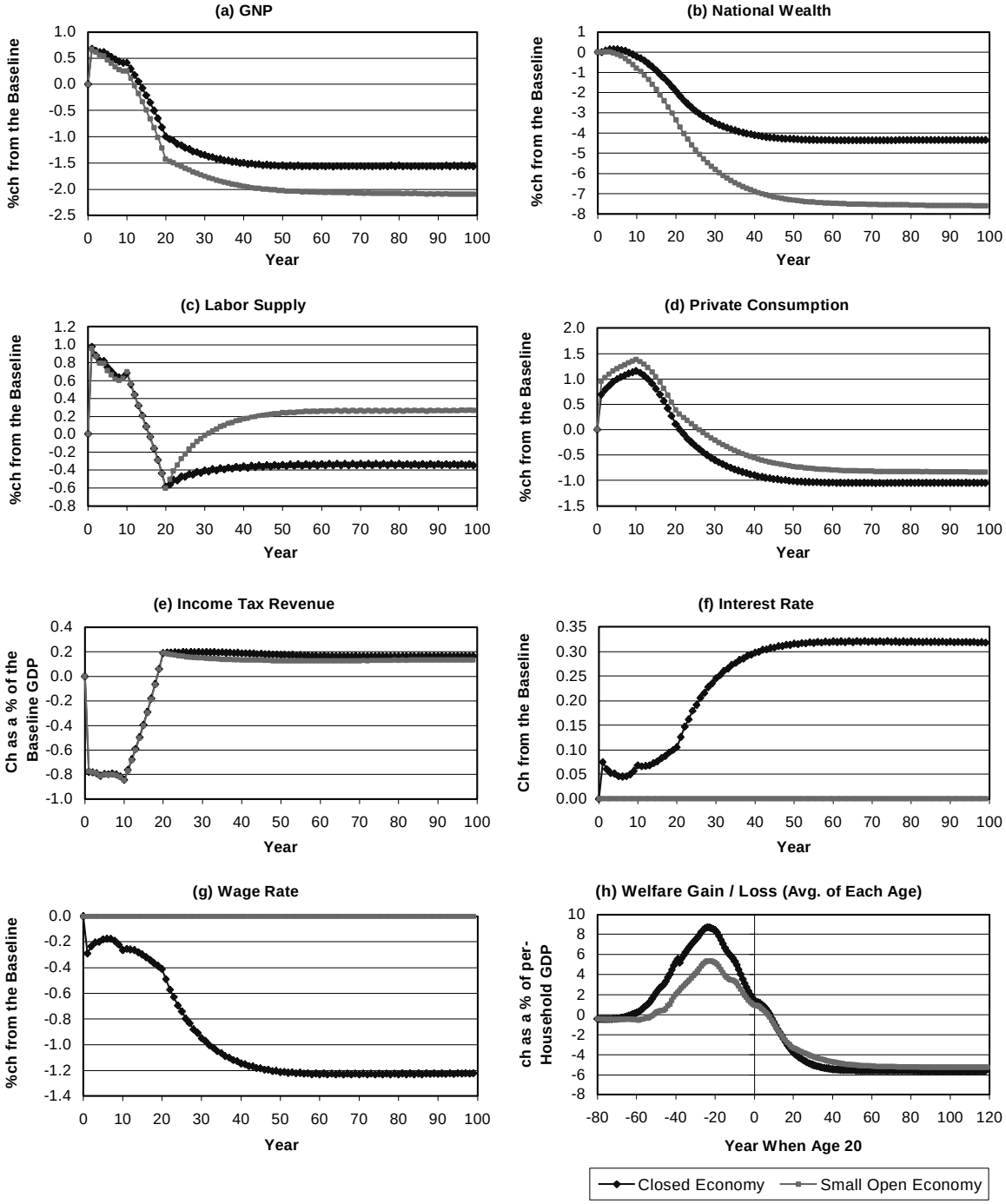


Table A.6 (a). Income Tax Rates Reduced by 10 Percent Proportionally; Government Consumption Reduced Contemporaneously
Changes in Macroeconomic Indicators from the Baseline---Alternative Assumptions

	Year																Average		
	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	120	01-05	06-10	01-10
(Closed Economy)																			
%ch(National Wealth)	0.0	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.2	1.8	2.1	2.4	2.5	2.7	2.8	0.3	1.0	0.6
%ch(Labor)	0.5	0.5	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.4
%ch(GNP=GDP)	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.8	0.9	1.0	1.0	1.1	1.1	0.4	0.6	0.5
%ch(Consumption)	0.8	0.9	1.0	1.1	1.1	1.2	1.2	1.3	1.4	1.4	1.6	1.8	1.9	2.0	2.1	2.1	1.0	1.3	1.1
%ch(Gross Investment)	1.8	2.2	2.3	2.3	2.4	2.3	2.6	3.0	2.9	3.0	3.0	2.9	2.9	2.8	2.8	2.8	2.2	2.7	2.5
ch(Lump-Sum Transfer/GDP%)	-0.23	-0.11	-0.07	-0.08	-0.04	-0.02	0.06	0.13	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-0.10	0.07	-0.02
ch(Gov't Consumption/GDP%)	-0.54	-0.66	-0.70	-0.71	-0.73	-0.74	-0.81	-0.89	-0.85	-0.87	-0.85	-0.84	-0.84	-0.84	-0.84	-0.85	-0.67	-0.83	-0.75
ch(Income Tax/GDP%)	-0.82	-0.82	-0.81	-0.83	-0.81	-0.81	-0.80	-0.80	-0.81	-0.84	-0.83	-0.82	-0.81	-0.80	-0.80	-0.80	-0.82	-0.81	-0.82
ch(Interest Rate%)	0.04	0.03	0.01	0.00	-0.01	-0.02	-0.03	-0.04	-0.05	-0.06	-0.10	-0.13	-0.15	-0.16	-0.17	-0.18	0.01	-0.04	-0.01
%ch(Wage Rate)	-0.2	-0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.2	0.2	0.4	0.5	0.6	0.6	0.7	0.7	-0.1	0.2	0.1
ch(Private Wealth/GDP%)	0.0	0.4	0.8	1.2	1.6	1.9	2.3	2.6	3.0	3.4	4.9	5.9	6.5	7.0	7.4	7.7	0.8	2.6	1.7
ch(Gov't Wealth/GDP%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ch(Budget Deficit/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Small Open Economy)																			
%ch(National Wealth)	0.0	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.3	1.9	2.3	2.6	2.8	3.0	3.2	0.3	1.0	0.6
%ch(Labor)	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.5	0.3	0.4
%ch(GNP)	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.8	0.9	0.9	1.0	1.0	1.1	0.4	0.5	0.5
%ch(GDP)	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.5	0.3	0.4
%ch(Consumption)	0.8	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.5	1.7	1.8	1.9	2.0	2.0	1.0	1.2	1.1
%ch(Gross Dom. Investment)	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.5	0.3	0.4
ch(Lump-Sum Transfer/GDP%)	-0.23	-0.11	-0.07	-0.08	-0.04	-0.02	0.06	0.13	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-0.10	0.07	-0.02
ch(Gov't Consumption/GDP%)	-0.53	-0.65	-0.70	-0.71	-0.74	-0.75	-0.83	-0.91	-0.88	-0.90	-0.89	-0.89	-0.89	-0.89	-0.89	-0.89	-0.66	-0.85	-0.76
ch(Income Tax/GDP%)	-0.81	-0.81	-0.81	-0.84	-0.82	-0.82	-0.81	-0.82	-0.83	-0.86	-0.85	-0.84	-0.84	-0.84	-0.83	-0.83	-0.82	-0.83	-0.82
ch(Net Foreign Assets/GDP%)	-1.4	-1.0	-0.5	0.0	0.5	0.9	1.4	1.8	2.2	2.6	4.4	5.7	6.6	7.2	7.9	8.3	-0.5	1.8	0.6
ch(Private Wealth/GDP%)	0.0	0.4	0.8	1.2	1.6	2.0	2.3	2.7	3.1	3.5	5.2	6.3	7.2	7.7	8.3	8.7	0.8	2.7	1.7
ch(Gov't Wealth/GDP%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ch(Budget Deficit/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.44	0.00	0.00	0.00

Table A.6 (b). Income Tax Rates Reduced by 10 Percent Proportionally; Government Consumption Reduced Contemporaneously
Compensating Variations in Wealth as Percentages of Per-Household GDP---Alternative Assumptions

	The Year When Age 20 (Top) / the Age in Year 1 (Bottom)																
	-88	-79	-69	-59	-49	-39	-29	-19	-9	1	11	21	41	61	81	101	120
	109	100	90	80	70	60	50	40	30	20	10	0	-20	-40	-60	-80	-99
(Closed Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.5	-0.2	-0.4	-0.4	-1.7	1.5	2.7	2.0	0.2	1.4	1.6	1.7	1.8	1.8	1.8	1.8
20-40 percentile					-0.5	-0.2	2.6	5.0	4.7	2.6	4.8	5.5	5.9	6.0	6.0	6.0	6.0
40-60 percentile					-0.7	0.4	3.8	6.6	7.3	4.3	6.9	7.7	8.3	8.4	8.4	8.4	8.4
60-80 percentile					-1.2	1.5	5.9	9.0	10.2	6.5	9.4	10.5	11.1	11.2	11.2	11.2	11.3
80-90 percentile					-0.4	2.9	8.2	11.6	13.1	9.5	12.9	14.1	14.9	15.0	15.0	15.1	15.1
90-95 percentile					1.4	7.4	10.8	15.9	15.9	11.8	15.3	16.7	17.5	17.6	17.6	17.6	17.7
95-99 percentile					9.0	18.2	18.9	23.4	21.7	16.1	20.0	21.6	22.5	22.6	22.6	22.7	22.7
99-100 percentile					41.6	77.5	59.4	49.9	40.0	22.1	26.3	27.9	28.9	29.0	29.0	29.0	29.0
Average	-0.3	-0.5	-0.2	-0.4	0.2	2.1	5.5	8.1	8.2	5.1	7.6	8.4	9.0	9.0	9.1	9.1	9.1
(Small Open Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.5	-0.2	0.1	0.4	-1.1	1.8	2.6	1.8	0.2	1.1	1.2	1.3	1.4	1.4	1.4	1.4
20-40 percentile					0.5	0.8	3.1	5.0	4.3	2.2	3.8	4.3	4.8	4.8	4.9	4.9	4.9
40-60 percentile					0.5	2.1	4.6	6.9	6.9	3.8	5.6	6.2	6.7	6.8	6.8	6.8	6.8
60-80 percentile					0.9	4.5	7.8	10.0	10.2	5.9	7.8	8.5	9.1	9.2	9.3	9.3	9.3
80-90 percentile					2.6	7.6	11.6	13.6	13.9	8.8	11.0	11.8	12.5	12.7	12.7	12.7	12.7
90-95 percentile					5.7	15.4	17.2	20.2	17.7	11.3	13.6	14.4	15.1	15.3	15.3	15.3	15.3
95-99 percentile					15.7	31.6	31.0	32.0	25.6	16.5	19.1	20.0	20.7	20.9	20.9	20.9	20.9
99-100 percentile					56.6	113.9	93.6	75.2	52.9	23.9	26.7	27.6	28.4	28.5	28.6	28.5	28.5
Average	-0.3	-0.5	-0.2	0.1	2.2	5.2	7.7	9.3	8.5	4.8	6.5	7.0	7.5	7.6	7.6	7.6	7.6

Figure A.6. Income Tax Rates Reduced by 10 Percent Proportionally; Government Consumption Reduced Contemporaneously---Alternative Assumptions

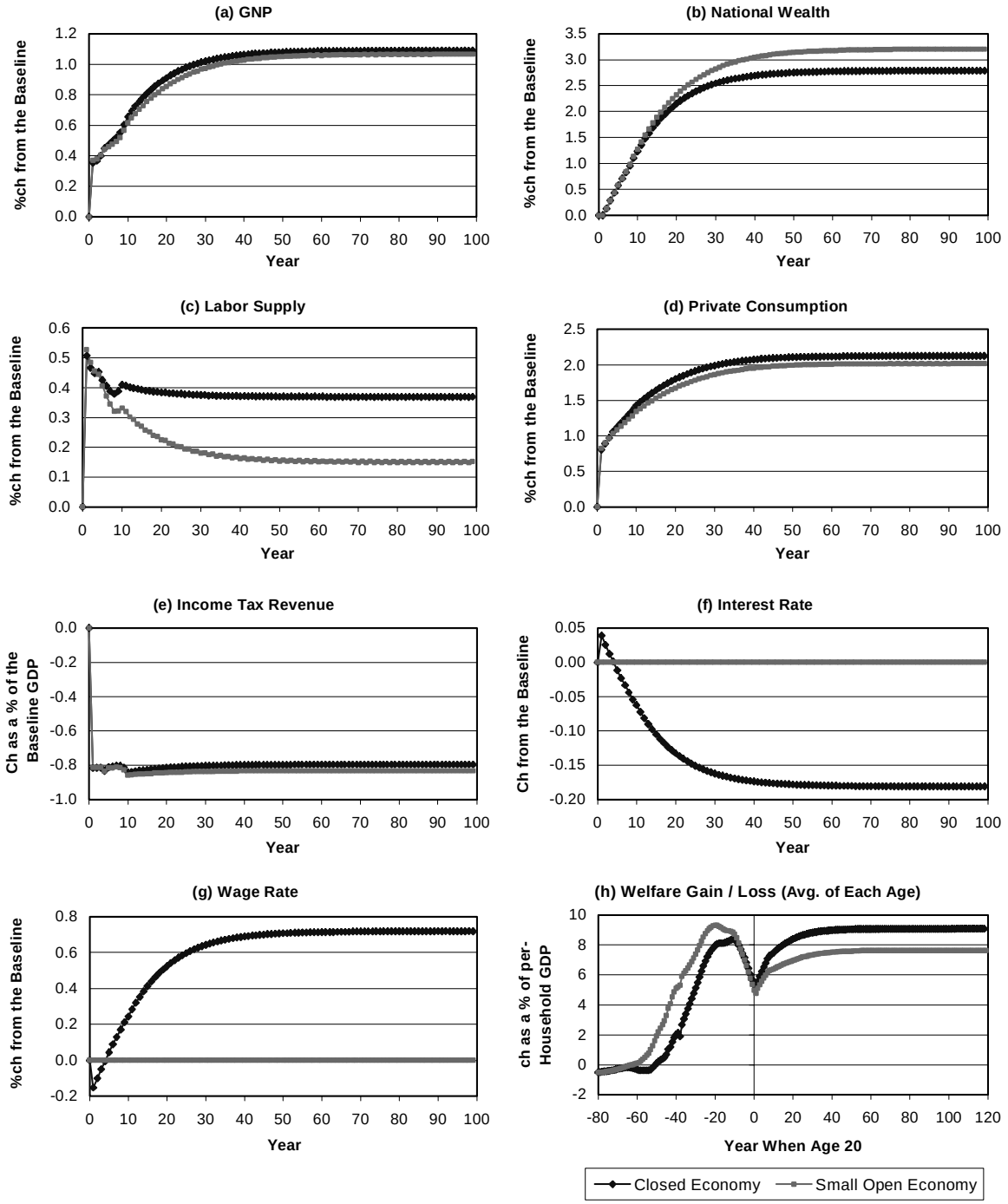


Table A.7 (a). Income Tax Rates Reduced by 10 Percent Proportionally; Lump-Sum Transfers Reduced Contemporaneously
Changes in Macroeconomic Indicators from the Baseline---Alternative Assumptions

	Year																Average		
	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	120	01-05	06-10	01-10
(Closed Economy)																			
%ch(National Wealth)	0.0	0.3	0.6	0.9	1.2	1.5	1.7	2.0	2.4	2.7	3.1	3.3	3.5	3.7	3.8	3.8	0.6	2.1	1.3
%ch(Labor)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7
%ch(GNP=GDP)	0.5	0.6	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.5	1.5	1.6	1.6	1.7	1.7	0.7	1.1	0.9
%ch(Consumption)	0.3	0.4	0.5	0.6	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.1	1.2	1.3	1.3	1.4	0.5	0.8	0.7
%ch(Gross Investment)	3.8	4.3	4.7	4.9	5.1	5.3	5.9	6.6	6.8	3.8	3.9	4.0	4.0	4.0	4.0	3.8	4.6	5.7	5.1
ch(Lump-Sum Transfer/GDP%)	-0.73	-0.72	-0.71	-0.72	-0.69	-0.68	-0.66	-0.66	-0.65	-0.67	-0.65	-0.65	-0.65	-0.66	-0.66	-0.67	-0.71	-0.66	-0.69
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.80	-0.79	-0.79	-0.80	-0.77	-0.76	-0.75	-0.75	-0.75	-0.77	-0.76	-0.75	-0.75	-0.74	-0.74	-0.74	-0.79	-0.76	-0.77
ch(Interest Rate%)	0.05	0.03	0.01	-0.01	-0.04	-0.06	-0.08	-0.10	-0.13	-0.14	-0.17	-0.19	-0.21	-0.22	-0.23	-0.22	0.01	-0.10	-0.05
%ch(Wage Rate)	-0.2	-0.1	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.8	0.9	0.9	0.9	0.0	0.4	0.2
ch(Private Wealth/GDP%)	0.0	0.8	1.6	2.4	3.2	4.0	4.8	5.6	6.5	7.4	8.4	9.2	9.7	10.1	10.5	10.4	1.6	5.7	3.6
ch(Gov't Wealth/GDP%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ch(Budget Deficit/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(Small Open Economy)																			
%ch(National Wealth)	0.0	0.3	0.6	0.9	1.3	1.6	1.9	2.3	2.6	3.0	3.5	3.8	4.1	4.3	4.4	4.5	0.6	2.3	1.5
%ch(Labor)	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.7	0.6	0.6
%ch(GNP)	0.5	0.6	0.7	0.8	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.6	1.7	1.7	0.7	1.1	0.9
%ch(GDP)	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.7	0.6	0.6
%ch(Consumption)	0.3	0.3	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.8	0.9	1.0	1.1	1.2	1.2	0.4	0.6	0.5
%ch(Gross Dom. Investment)	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.7	0.6	0.6
ch(Lump-Sum Transfer/GDP%)	-0.71	-0.71	-0.71	-0.72	-0.70	-0.70	-0.69	-0.69	-0.70	-0.72	-0.71	-0.71	-0.71	-0.71	-0.71	-0.71	-0.71	-0.70	-0.70
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.79	-0.79	-0.78	-0.80	-0.78	-0.78	-0.77	-0.77	-0.78	-0.80	-0.79	-0.79	-0.78	-0.78	-0.78	-0.78	-0.79	-0.78	-0.78
ch(Net Foreign Assets/GDP%)	-2.1	-1.1	-0.2	0.7	1.8	2.7	3.7	4.6	5.6	6.5	8.0	9.0	9.8	10.3	10.8	11.1	-0.2	4.6	2.2
ch(Private Wealth/GDP%)	0.0	0.8	1.7	2.6	3.5	4.4	5.2	6.2	7.2	8.2	9.5	10.5	11.2	11.7	12.2	12.4	1.7	6.2	4.0
ch(Gov't Wealth/GDP%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ch(Budget Deficit/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.44	0.00	0.00	0.00

Table A.7 (b). Income Tax Rates Reduced by 10 Percent Proportionally; Lump-Sum Transfers Reduced Contemporaneously
Compensating Variations in Wealth as Percentages of Per-Household GDP---Alternative Assumptions

	The Year When Age 20 (Top) / the Age in Year 1 (Bottom)																
	-88	-79	-69	-59	-49	-39	-29	-19	-9	1	11	21	41	61	81	101	120
	109	100	90	80	70	60	50	40	30	20	10	0	-20	-40	-60	-80	-99
(Closed Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.5	-2.9	-8.6	-10.4	-9.8	-9.0	-5.3	-1.9	-0.6	-1.9	-1.8	-1.7	-1.6	-1.6	-1.6	-1.6
20-40 percentile					-10.9	-10.9	-8.4	-6.2	-2.4	-0.9	-3.8	-3.3	-3.1	-2.6	-2.6	-2.5	-2.6
40-60 percentile					-12.0	-12.6	-7.4	-5.9	-2.7	-0.9	-4.0	-3.4	-3.1	-2.3	-2.3	-2.2	-2.3
60-80 percentile					-14.9	-14.2	-6.4	-4.1	-2.0	-0.5	-3.8	-3.1	-2.7	-1.6	-1.5	-1.5	-1.6
80-90 percentile					-16.4	-15.1	-5.8	-2.2	-0.7	-0.2	-3.7	-2.8	-2.4	-0.8	-0.8	-0.7	-0.9
90-95 percentile					-17.3	-14.0	-6.7	-0.1	1.1	0.7	-2.6	-1.7	-1.2	0.6	0.7	0.7	0.5
95-99 percentile					-11.5	-7.1	-3.5	3.7	5.1	2.7	-0.4	0.6	1.1	3.2	3.3	3.4	3.2
99-100 percentile					15.5	37.2	23.7	19.7	17.2	6.2	3.7	4.7	5.3	7.5	7.5	7.6	7.5
Average	-0.3	-0.5	-2.9	-8.6	-12.4	-11.6	-7.1	-4.2	-1.4	-0.4	-3.2	-2.6	-2.3	-1.5	-1.4	-1.4	-1.5
(Small Open Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.6	-2.9	-7.5	-9.0	-8.8	-14.6	-9.6	-4.1	-0.9	-2.5	-2.4	-2.3	-2.3	-2.3	-2.3	-2.3
20-40 percentile					-9.1	-9.2	-12.2	-11.2	-5.9	-2.3	-5.8	-5.2	-4.7	-4.7	-4.7	-4.7	-4.7
40-60 percentile					-9.6	-9.6	-9.2	-10.2	-6.8	-2.9	-6.6	-5.9	-5.3	-5.3	-5.3	-5.3	-5.3
60-80 percentile					-10.5	-8.0	-4.6	-6.1	-5.8	-3.1	-6.8	-6.0	-5.4	-5.4	-5.4	-5.4	-5.4
80-90 percentile					-9.7	-5.2	-0.2	-1.4	-3.1	-3.3	-6.9	-6.1	-5.5	-5.5	-5.4	-5.4	-5.4
90-95 percentile					-6.7	2.5	4.3	5.4	0.7	-2.3	-5.7	-4.8	-4.2	-4.2	-4.2	-4.2	-4.2
95-99 percentile					3.8	17.2	16.6	16.8	8.5	0.7	-2.5	-1.6	-1.0	-1.0	-0.9	-0.9	-1.0
99-100 percentile					42.2	96.9	76.7	58.3	35.3	6.2	3.3	4.2	4.8	4.9	4.9	4.9	4.9
Average	-0.3	-0.6	-2.9	-7.5	-8.4	-5.9	-6.5	-6.0	-4.1	-2.2	-5.4	-4.8	-4.3	-4.3	-4.3	-4.3	-4.3

Figure A.7. Income Tax Rates Reduced by 10 Percent Proportionally; Lump-Sum Transfers Reduced Contemporaneously---Alternative Assumptions

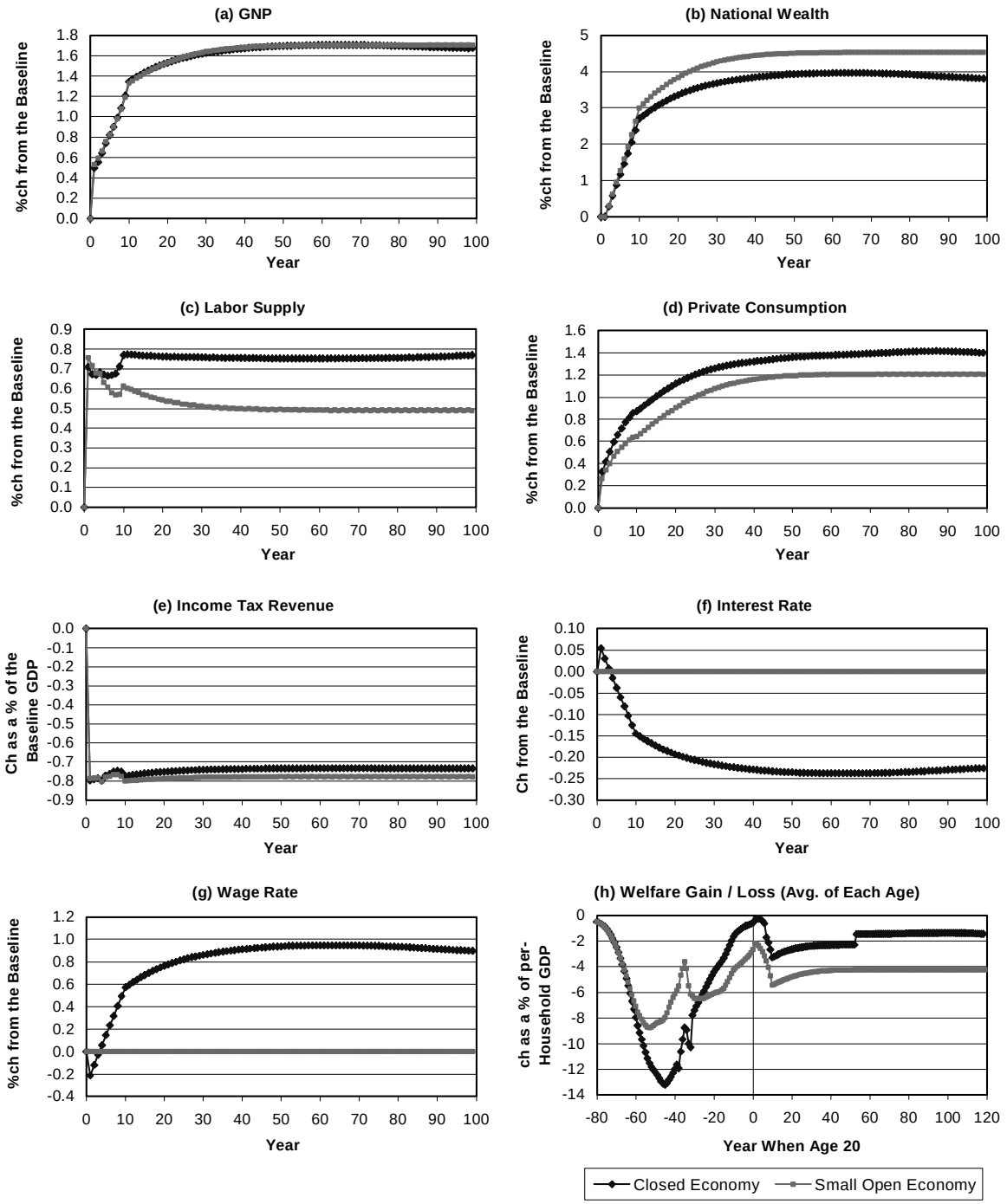


Table A.8 (a). Income Tax Rates Reduced by 10 Percent Proportionally; Government Consumption Reduced Gradually After 10 Years
Changes in Macroeconomic Indicators from the Baseline---Alternative Assumptions

	Year																Average		
	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	120	01-05	06-10	01-10
(Closed Economy)																			
%ch(National Wealth)	0.0	-0.1	-0.1	-0.2	-0.4	-0.5	-0.7	-0.9	-1.1	-1.4	-2.5	-2.7	-2.3	-2.1	-1.9	-1.8	-0.2	-0.9	-0.5
%ch(Labor)	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.3
%ch(GNP=GDP)	0.3	0.3	0.2	0.2	0.1	0.1	0.0	-0.1	-0.2	-0.3	-0.7	-0.8	-0.7	-0.6	-0.6	-0.6	0.2	-0.1	0.1
%ch(Consumption)	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.1	1.2	1.2	1.4	1.5	1.7	1.8	1.9	2.0	0.9	1.1	1.0
%ch(Gross Investment)	-0.7	-1.1	-1.6	-2.0	-2.4	-2.9	-3.4	-4.0	-4.5	-5.0	-4.2	-1.5	-1.6	-1.7	-1.7	-1.8	-1.6	-4.0	-2.8
ch(Lump-Sum Transfer/GDP%)	-0.23	-0.11	-0.07	-0.08	-0.04	-0.02	0.06	0.13	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-0.10	0.07	-0.02
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.70	-1.48	-1.46	-1.45	-1.44	-1.43	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.82	-0.82	-0.82	-0.85	-0.83	-0.83	-0.83	-0.83	-0.85	-0.88	-0.89	-0.88	-0.87	-0.87	-0.86	-0.86	-0.83	-0.84	-0.84
ch(Interest Rate%)	0.04	0.04	0.04	0.05	0.05	0.06	0.07	0.09	0.10	0.12	0.20	0.21	0.18	0.16	0.15	0.14	0.04	0.09	0.07
%ch(Wage Rate)	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3	-0.4	-0.5	-0.8	-0.8	-0.7	-0.6	-0.6	-0.5	-0.2	-0.3	-0.3
ch(Private Wealth/GDP%)	0.0	0.4	0.8	1.3	1.7	2.1	2.5	2.9	3.4	3.9	5.9	7.3	8.3	8.9	9.5	9.8	0.8	3.0	1.9
ch(Gov't Wealth/GDP%)	0.0	-0.5	-1.2	-1.9	-2.7	-3.5	-4.4	-5.4	-6.5	-7.6	-12.6	-14.7	-14.7	-14.7	-14.7	-14.7	-1.3	-5.5	-3.4
ch(Budget Deficit/GDP%)	0.54	0.70	0.79	0.85	0.93	0.99	1.13	1.28	1.32	1.42	1.06	0.41	0.41	0.41	0.41	0.41	0.76	1.23	1.00
(Small Open Economy)																			
%ch(National Wealth)	0.0	-0.1	-0.1	-0.3	-0.4	-0.5	-0.7	-0.9	-1.2	-1.4	-2.5	-2.8	-2.5	-2.3	-2.1	-1.9	-0.2	-1.0	-0.6
%ch(Labor)	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.5	0.3	0.4
%ch(GNP)	0.4	0.3	0.3	0.2	0.2	0.1	0.0	-0.1	-0.1	-0.2	-0.6	-0.7	-0.6	-0.6	-0.5	-0.5	0.3	0.0	0.1
%ch(GDP)	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.5	0.3	0.4
%ch(Consumption)	0.8	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.5	1.7	1.8	1.9	2.0	2.0	1.0	1.2	1.1
%ch(Gross Dom. Investment)	7.2	0.0	0.1	0.3	-0.1	0.0	0.0	0.0	0.3	0.5	0.2	0.1	0.2	0.1	0.1	0.1	1.5	0.2	0.8
ch(Lump-Sum Transfer/GDP%)	-0.23	-0.11	-0.07	-0.08	-0.04	-0.02	0.06	0.13	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-0.10	0.07	-0.02
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.65	-1.37	-1.37	-1.37	-1.37	-1.36	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.81	-0.81	-0.81	-0.84	-0.82	-0.82	-0.81	-0.82	-0.83	-0.86	-0.85	-0.84	-0.84	-0.84	-0.83	-0.83	-0.82	-0.83	-0.82
ch(Net Foreign Assets/GDP%)	-1.4	-1.5	-1.6	-1.9	-2.2	-2.5	-2.9	-3.4	-4.1	-4.8	-7.6	-8.3	-7.4	-6.8	-6.1	-5.7	-1.7	-3.5	-2.6
ch(Private Wealth/GDP%)	0.0	0.4	0.8	1.2	1.6	2.0	2.3	2.7	3.1	3.5	5.2	6.3	7.2	7.7	8.3	8.7	0.8	2.7	1.7
ch(Gov't Wealth/GDP%)	0.0	-0.5	-1.2	-1.9	-2.6	-3.4	-4.3	-5.2	-6.3	-7.4	-12.1	-14.0	-14.0	-14.0	-14.0	-14.0	-1.2	-5.3	-3.3
ch(Budget Deficit/GDP%)	0.53	0.68	0.77	0.83	0.90	0.96	1.10	1.24	1.27	1.36	0.99	0.39	0.39	0.39	0.39	0.39	0.74	1.18	0.96

Table A.8 (b). Income Tax Rates Reduced by 10 Percent Proportionally; Government Consumption Reduced Gradually After 10 Years
Compensating Variations in Wealth as Percentages of Per-Household GDP---Alternative Assumptions

	The Year When Age 20 (Top) / the Age in Year 1 (Bottom)																
	-88	-79	-69	-59	-49	-39	-29	-19	-9	1	11	21	41	61	81	101	120
	109	100	90	80	70	60	50	40	30	20	10	0	-20	-40	-60	-80	-99
(Closed Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.5	0.1	1.7	2.2	0.2	2.2	2.4	1.3	0.0	0.7	0.8	1.1	1.1	1.1	1.1	1.1
20-40 percentile					2.6	2.6	3.8	4.8	3.5	1.5	2.6	3.3	4.0	4.1	4.1	4.1	4.1
40-60 percentile					3.1	5.0	5.9	7.1	6.0	2.8	3.9	4.8	5.7	5.8	5.8	5.8	5.8
60-80 percentile					5.2	10.0	10.7	11.4	9.9	4.6	5.8	6.8	7.9	8.0	8.0	8.0	8.0
80-90 percentile					8.8	15.9	16.8	16.5	14.7	7.4	8.6	9.8	11.0	11.1	11.2	11.2	11.1
90-95 percentile					14.9	29.3	27.1	26.4	20.0	10.1	11.3	12.4	13.7	13.8	13.8	13.8	13.8
95-99 percentile					29.6	54.5	49.6	44.2	30.8	16.3	17.4	18.3	19.7	19.9	19.9	19.9	19.9
99-100 percentile					83.6	171.2	143.4	109.9	69.3	25.4	26.2	26.9	28.4	28.5	28.6	28.6	28.5
Average	-0.3	-0.5	0.1	1.7	6.3	10.5	11.0	11.0	8.5	3.9	5.0	5.8	6.6	6.7	6.7	6.7	6.7
(Small Open Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.5	-0.2	0.1	0.4	-1.1	1.8	2.6	1.8	0.2	1.1	1.2	1.3	1.4	1.4	1.4	1.4
20-40 percentile					0.5	0.8	3.0	5.0	4.3	2.2	3.8	4.3	4.8	4.8	4.9	4.9	4.9
40-60 percentile					0.5	2.1	4.6	6.9	6.9	3.8	5.6	6.2	6.7	6.8	6.8	6.8	6.8
60-80 percentile					0.9	4.5	7.8	10.0	10.2	5.9	7.8	8.5	9.1	9.2	9.3	9.3	9.3
80-90 percentile					2.6	7.6	11.6	13.6	13.9	8.8	11.0	11.8	12.5	12.7	12.7	12.7	12.7
90-95 percentile					5.7	15.4	17.2	20.2	17.7	11.3	13.6	14.4	15.1	15.3	15.3	15.3	15.3
95-99 percentile					15.7	31.6	31.0	32.0	25.6	16.5	19.1	19.9	20.7	20.9	20.9	20.9	20.9
99-100 percentile					56.6	113.9	93.6	75.2	52.9	23.9	26.7	27.6	28.4	28.5	28.5	28.5	28.5
Average	-0.3	-0.5	-0.2	0.1	2.2	5.2	7.7	9.3	8.5	4.8	6.4	7.0	7.5	7.6	7.6	7.6	7.6

Figure A.8. Income Tax Rates Reduced by 10 Percent Proportionally; Government Consumption Reduced Gradually After 10 Years---Alternative Assumptions

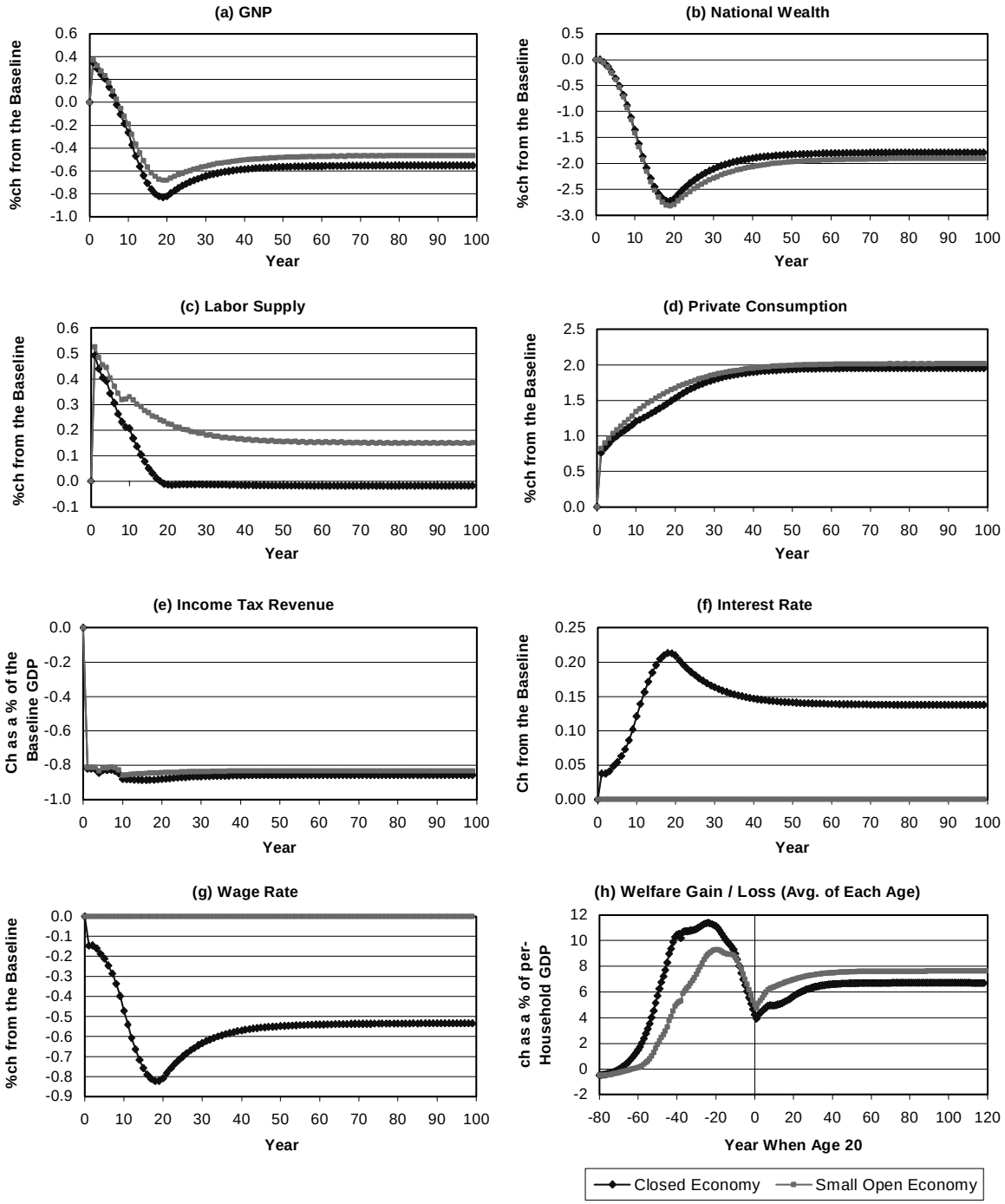


Table A.9 (a). Income Tax Rates Reduced by 10 Percent Proportionally; Lump-Sum Transfers Reduced Gradually After 10 Years
Changes in Macroeconomic Indicators from the Baseline---Alternative Assumptions

	Year																Average		
	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	120	01-05	06-10	01-10
(Closed Economy)																			
%ch(National Wealth)	0.0	0.1	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.6	0.6	0.6	0.2	0.4	0.3
%ch(Labor)	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.6	0.6
%ch(GNP=GDP)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.6	0.5	0.5	0.5
%ch(Consumption)	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.4	0.6	0.5
%ch(Gross Investment)	1.5	1.3	1.2	1.1	0.9	0.8	0.6	0.5	0.5	0.5	0.5	0.7	0.7	0.7	0.7	0.6	1.2	0.6	0.9
ch(Lump-Sum Transfer/GDP%)	-0.23	-0.11	-0.07	-0.08	-0.04	-0.02	0.06	0.13	0.09	0.08	-0.52	-1.08	-1.08	-1.08	-1.08	-1.09	-0.10	0.07	-0.02
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.80	-0.79	-0.79	-0.81	-0.78	-0.78	-0.77	-0.77	-0.78	-0.80	-0.77	-0.76	-0.76	-0.75	-0.75	-0.75	-0.79	-0.78	-0.79
ch(Interest Rate%)	0.05	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.04	0.01	0.02
%ch(Wage Rate)	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.1
ch(Private Wealth/GDP%)	0.0	0.8	1.6	2.5	3.4	4.2	5.1	6.0	7.0	8.0	11.9	13.6	13.8	13.9	14.0	13.9	1.7	6.0	3.9
ch(Gov't Wealth/GDP%)	0.0	-0.5	-1.1	-1.8	-2.5	-3.2	-4.0	-4.8	-5.8	-6.8	-10.7	-12.2	-12.2	-12.2	-12.2	-12.2	-1.2	-4.9	-3.0
ch(Budget Deficit/GDP%)	0.50	0.64	0.72	0.77	0.83	0.88	1.00	1.13	1.15	1.22	0.83	0.35	0.35	0.35	0.35	0.35	0.69	1.08	0.88
(Small Open Economy)																			
%ch(National Wealth)	0.0	0.1	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.6	0.6	0.7	0.6	0.2	0.4	0.3
%ch(Labor)	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.6	0.6
%ch(GNP)	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.5	0.5	0.5
%ch(GDP)	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.6	0.6
%ch(Consumption)	0.3	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.5	0.7	0.6
%ch(Gross Dom. Investment)	10.4	0.2	0.2	0.6	0.1	0.3	0.3	0.4	0.6	0.9	0.7	0.7	0.7	0.7	0.7	0.7	2.3	0.5	1.4
ch(Lump-Sum Transfer/GDP%)	-0.23	-0.11	-0.07	-0.08	-0.04	-0.02	0.06	0.13	0.09	0.08	-0.52	-1.08	-1.07	-1.07	-1.08	-1.09	-0.10	0.07	-0.02
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.79	-0.78	-0.78	-0.80	-0.78	-0.78	-0.77	-0.77	-0.77	-0.80	-0.77	-0.76	-0.76	-0.75	-0.75	-0.75	-0.79	-0.78	-0.78
ch(Net Foreign Assets/GDP%)	-2.1	-1.7	-1.3	-1.1	-0.8	-0.6	-0.5	-0.4	-0.4	-0.4	-0.4	-0.4	-0.2	-0.1	0.1	0.0	-1.4	-0.5	-0.9
ch(Private Wealth/GDP%)	0.0	0.8	1.6	2.5	3.3	4.2	5.0	5.9	6.9	7.9	11.8	13.5	13.7	13.9	14.0	13.9	1.6	6.0	3.8
ch(Gov't Wealth/GDP%)	0.0	-0.5	-1.1	-1.7	-2.4	-3.1	-3.9	-4.8	-5.7	-6.7	-10.6	-12.1	-12.1	-12.1	-12.1	-12.1	-1.1	-4.8	-3.0
ch(Budget Deficit/GDP%)	0.48	0.62	0.70	0.75	0.82	0.87	0.99	1.12	1.14	1.22	0.82	0.34	0.34	0.34	0.34	0.34	0.68	1.07	0.87

Table A.9 (b). Income Tax Rates Reduced by 10 Percent Proportionally; Lump-Sum Transfers Reduced Gradually After 10 Years
Compensating Variations in Wealth as Percentages of Per-Household GDP---Alternative Assumptions

	The Year When Age 20 (Top) / the Age in Year 1 (Bottom)																
	-88	-79	-69	-59	-49	-39	-29	-19	-9	1	11	21	41	61	81	101	120
	109	100	90	80	70	60	50	40	30	20	10	0	-20	-40	-60	-80	-99
(Closed Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.5	-1.2	-5.3	-8.2	-9.0	-7.3	-10.7	-4.7	-1.0	-1.8	-3.8	-3.7	-3.7	-3.7	-3.7	-3.7
20-40 percentile					-8.4	-9.6	-7.0	-12.7	-7.0	-2.5	-6.0	-9.6	-9.3	-9.3	-9.4	-9.4	-9.4
40-60 percentile					-8.8	-10.2	-6.2	-11.9	-8.6	-3.3	-7.8	-11.3	-10.9	-11.0	-11.1	-11.1	-11.1
60-80 percentile					-9.6	-8.6	-3.9	-7.9	-8.2	-3.9	-9.0	-12.5	-12.1	-12.2	-12.2	-12.2	-12.2
80-90 percentile					-8.6	-5.7	-0.9	-3.2	-5.9	-4.8	-10.1	-13.5	-13.1	-13.2	-13.2	-13.2	-13.2
90-95 percentile					-5.5	2.2	3.4	3.8	-2.0	-4.3	-9.9	-13.3	-12.9	-13.0	-13.0	-13.0	-13.0
95-99 percentile					4.6	17.1	15.5	14.9	5.8	-2.1	-7.4	-10.9	-10.4	-10.5	-10.6	-10.6	-10.6
99-100 percentile					42.4	96.7	75.6	56.1	32.0	2.7	-2.1	-5.5	-5.0	-5.2	-5.2	-5.2	-5.2
Average	-0.3	-0.5	-1.2	-5.3	-7.5	-6.3	-3.4	-7.6	-5.9	-2.9	-6.8	-9.9	-9.6	-9.7	-9.7	-9.7	-9.7
(Small Open Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.5	-1.5	-6.1	-8.8	-9.5	-7.5	-10.6	-4.6	-0.9	-1.8	-3.8	-3.7	-3.7	-3.7	-3.7	-3.7
20-40 percentile					-9.1	-10.1	-7.2	-12.6	-6.9	-2.3	-5.9	-9.5	-9.2	-9.3	-9.3	-9.3	-9.3
40-60 percentile					-9.7	-10.8	-6.4	-11.9	-8.4	-3.1	-7.7	-11.3	-10.9	-10.9	-11.0	-11.0	-11.0
60-80 percentile					-10.9	-9.5	-4.4	-8.0	-8.0	-3.7	-8.9	-12.4	-12.0	-12.1	-12.1	-12.1	-12.1
80-90 percentile					-10.4	-7.0	-1.6	-3.4	-5.7	-4.5	-10.0	-13.4	-13.0	-13.1	-13.1	-13.1	-13.1
90-95 percentile					-7.9	0.6	2.4	3.5	-2.0	-4.0	-9.7	-13.2	-12.8	-12.9	-12.9	-12.9	-12.9
95-99 percentile					2.5	14.9	14.0	14.3	5.8	-1.7	-7.2	-10.7	-10.3	-10.4	-10.4	-10.4	-10.4
99-100 percentile					40.0	93.5	73.2	55.0	32.2	3.3	-2.0	-5.4	-5.0	-5.1	-5.1	-5.1	-5.1
Average	-0.3	-0.5	-1.5	-6.1	-8.6	-7.1	-3.8	-7.7	-5.7	-2.7	-6.7	-9.9	-9.6	-9.6	-9.6	-9.6	-9.6

Figure A.9. Income Tax Rates Reduced by 10 Percent Proportionally; Lump-Sum Transfers Reduced Gradually After 10 Years---Alternative Assumptions

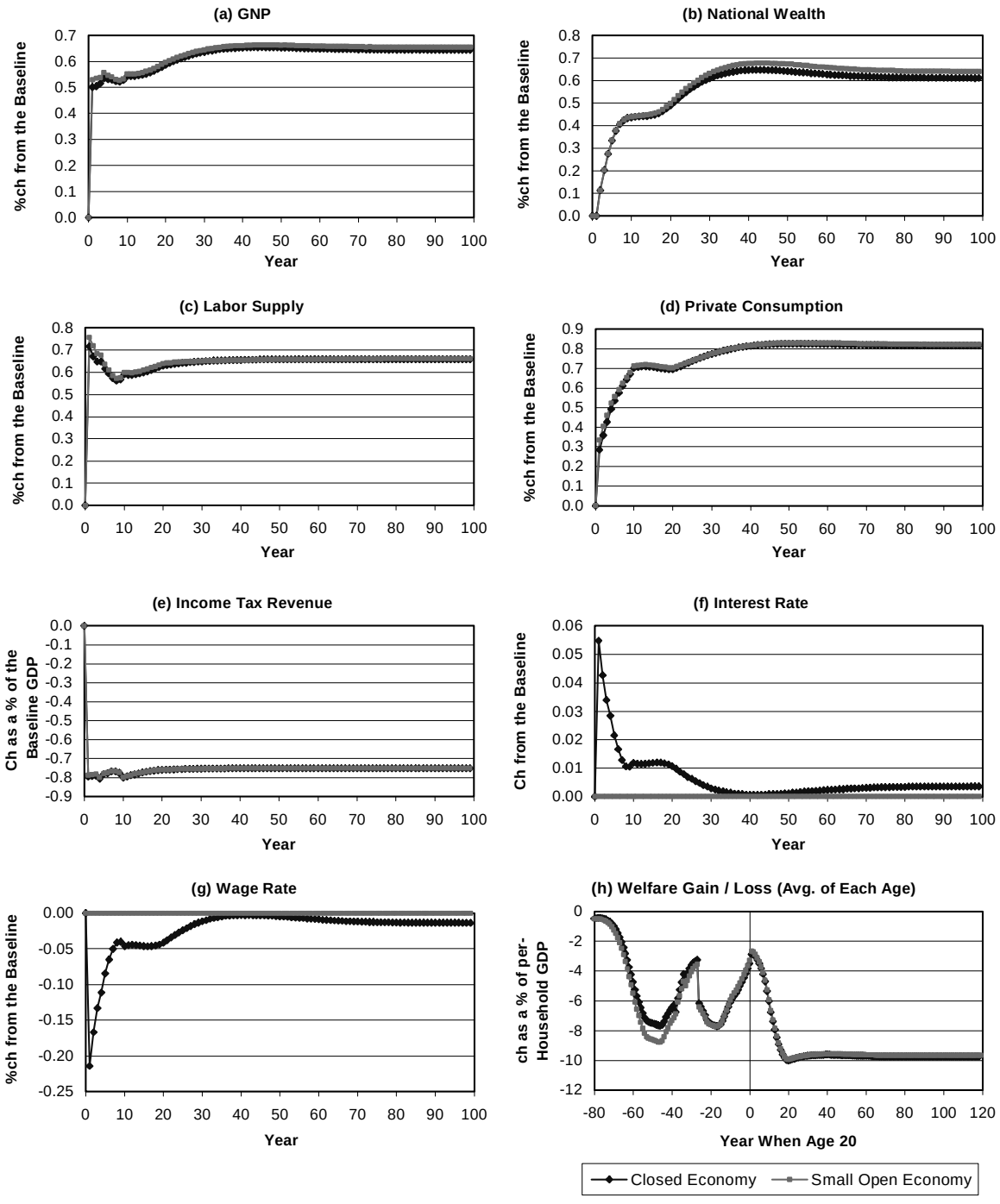


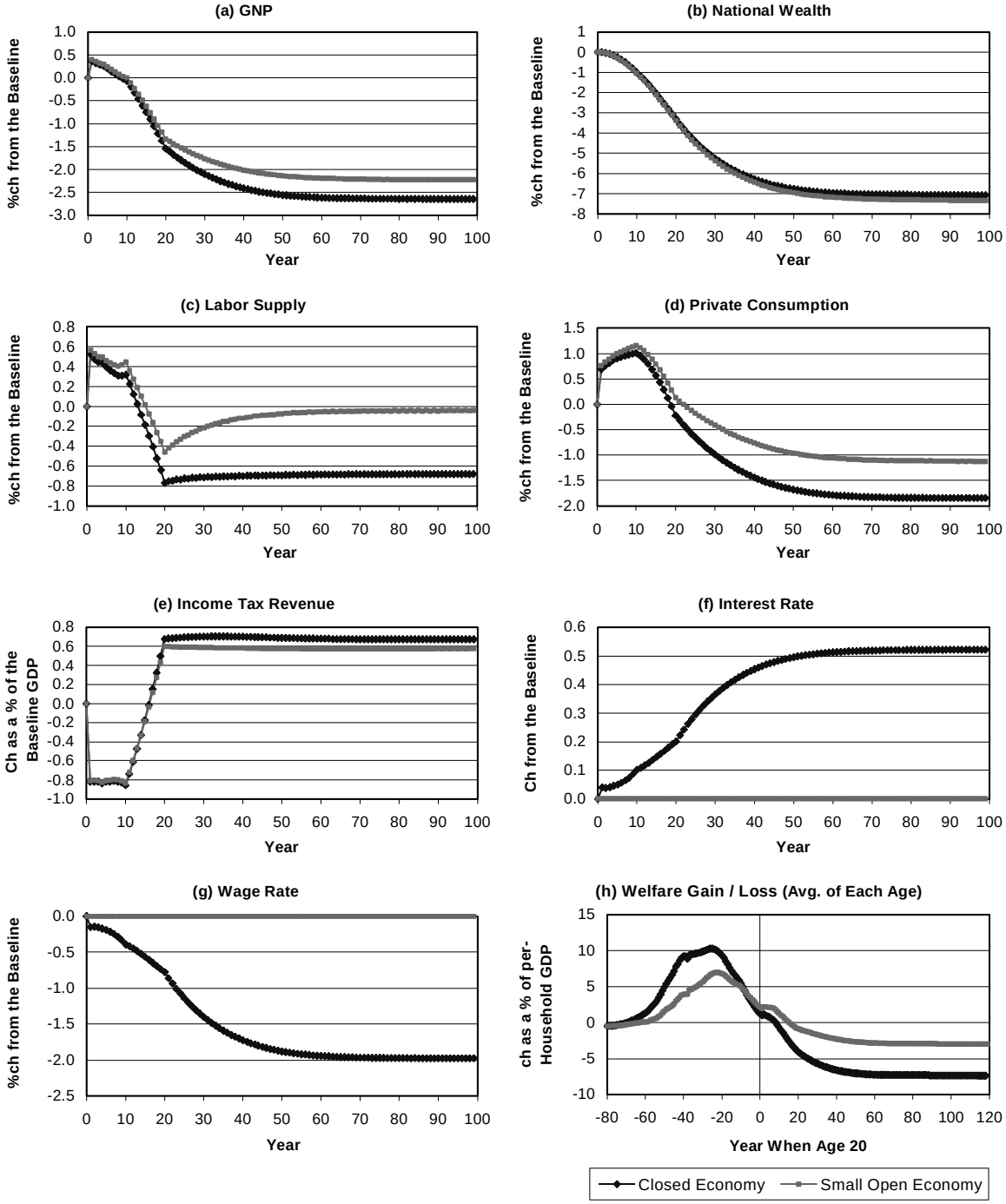
Table A.10 (a). Income Tax Rates Reduced by 10 Percent Proportionally; Income Tax Rates Increased Gradually After 10 Years
Changes in Macroeconomic Indicators from the Baseline---Alternative Assumptions

	Year																Average		
	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	120	01-05	06-10	01-10
(Closed Economy)																			
%ch(National Wealth)	0.0	0.0	-0.1	-0.2	-0.3	-0.4	-0.5	-0.7	-0.8	-1.0	-2.1	-3.3	-4.4	-5.3	-6.3	-7.1	-0.1	-0.7	-0.4
%ch(Labor)	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	-0.2	-0.8	-0.7	-0.7	-0.7	-0.7	0.5	0.3	0.4
%ch(GNP=GDP)	0.4	0.3	0.3	0.3	0.2	0.1	0.1	0.0	0.0	-0.1	-0.8	-1.5	-1.9	-2.1	-2.4	-2.6	0.3	0.0	0.2
%ch(Consumption)	0.7	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	0.6	-0.2	-0.7	-1.0	-1.4	-1.9	0.8	1.0	0.9
%ch(Gross Investment)	-0.4	-0.8	-1.1	-1.5	-1.8	-2.2	-2.6	-2.9	-3.2	-3.5	-5.4	-6.8	-7.0	-7.1	-7.2	-7.1	-1.1	-2.9	-2.0
ch(Lump-Sum Transfer/GDP%)	-0.23	-0.11	-0.07	-0.08	-0.04	-0.02	0.06	0.13	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-0.10	0.07	-0.02
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.82	-0.82	-0.82	-0.84	-0.82	-0.82	-0.81	-0.82	-0.83	-0.86	-0.18	0.68	0.69	0.70	0.70	0.67	-0.82	-0.83	-0.83
ch(Interest Rate%)	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.07	0.09	0.10	0.15	0.20	0.30	0.37	0.45	0.52	0.04	0.08	0.06
%ch(Wage Rate)	-0.2	-0.1	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3	-0.3	-0.4	-0.6	-0.8	-1.1	-1.4	-1.7	-2.0	-0.2	-0.3	-0.2
ch(Private Wealth/GDP%)	0.0	0.4	0.9	1.5	2.0	2.5	3.0	3.5	4.1	4.7	6.6	5.3	2.2	0.0	-2.8	-5.0	1.0	3.5	2.3
ch(Gov't Wealth/GDP%)	0.0	-0.5	-1.2	-1.9	-2.7	-3.5	-4.3	-5.3	-6.4	-7.4	-12.3	-14.4	-14.4	-14.4	-14.4	-14.4	-1.3	-5.4	-3.3
ch(Budget Deficit/GDP%)	0.54	0.69	0.78	0.84	0.91	0.97	1.11	1.25	1.28	1.37	1.05	0.41	0.41	0.41	0.41	0.41	0.75	1.20	0.97
(Small Open Economy)																			
%ch(National Wealth)	0.0	0.0	-0.1	-0.2	-0.3	-0.4	-0.5	-0.7	-0.9	-1.0	-2.1	-3.4	-4.5	-5.4	-6.4	-7.4	-0.1	-0.7	-0.4
%ch(Labor)	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.0	-0.5	-0.3	-0.2	-0.1	0.0	0.5	0.4	0.5
%ch(GNP)	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.0	0.0	-0.6	-1.3	-1.6	-1.8	-2.0	-2.2	0.3	0.1	0.2
%ch(GDP)	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.0	-0.5	-0.3	-0.2	-0.1	0.0	0.5	0.4	0.5
%ch(Consumption)	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.1	1.1	1.2	0.8	0.1	-0.2	-0.4	-0.8	-1.1	0.9	1.1	1.0
%ch(Gross Dom. Investment)	7.7	0.1	0.2	0.5	0.0	0.1	0.2	0.3	0.6	0.8	-1.1	-1.8	0.1	-0.1	-0.1	-0.1	1.7	0.4	1.0
ch(Lump-Sum Transfer/GDP%)	-0.23	-0.11	-0.07	-0.08	-0.04	-0.02	0.06	0.13	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	-0.10	0.07	-0.02
ch(Gov't Consumption/GDP%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ch(Income Tax/GDP%)	-0.81	-0.81	-0.81	-0.83	-0.81	-0.81	-0.80	-0.80	-0.81	-0.84	-0.19	0.60	0.59	0.59	0.58	0.57	-0.81	-0.81	-0.81
ch(Net Foreign Assets/GDP%)	-1.5	-1.5	-1.6	-1.8	-2.0	-2.3	-2.6	-3.0	-3.5	-4.1	-5.9	-8.0	-11.6	-14.1	-17.3	-20.0	-1.7	-3.1	-2.4
ch(Private Wealth/GDP%)	0.0	0.4	0.9	1.4	1.8	2.3	2.7	3.2	3.8	4.3	6.0	4.5	1.4	-1.0	-3.9	-6.4	0.9	3.3	2.1
ch(Gov't Wealth/GDP%)	0.0	-0.5	-1.1	-1.9	-2.6	-3.4	-4.2	-5.1	-6.2	-7.2	-11.8	-13.8	-13.8	-13.8	-13.8	-13.8	-1.2	-5.2	-3.2
ch(Budget Deficit/GDP%)	0.52	0.67	0.76	0.81	0.88	0.94	1.07	1.21	1.23	1.31	0.99	0.39	0.39	0.39	0.39	0.39	0.73	1.15	0.94

Table A.10 (b). Income Tax Rates Reduced by 10 Percent Proportionally; Income Tax Rates Increased Gradually After 10 Years
Compensating Variations in Wealth as Percentages of Per-Household GDP---Alternative Assumptions

	The Year When Age 20 (Top) / the Age in Year 1 (Bottom)																
	-88	-79	-69	-59	-49	-39	-29	-19	-9	1	11	21	41	61	81	101	120
	109	100	90	80	70	60	50	40	30	20	10	0	-20	-40	-60	-80	-99
(Closed Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.5	0.1	1.5	1.9	0.0	2.1	1.8	0.3	-0.4	-0.1	-0.6	-1.2	-1.4	-1.4	-1.4	-1.5
20-40 percentile					2.2	2.3	3.7	3.7	1.4	-0.1	-0.6	-2.5	-4.3	-4.8	-4.9	-4.9	-5.0
40-60 percentile					2.6	4.5	5.7	5.6	2.7	0.4	-1.1	-3.9	-6.4	-7.0	-7.1	-7.1	-7.2
60-80 percentile					4.4	9.0	10.0	9.2	5.3	1.1	-1.7	-5.6	-8.7	-9.5	-9.5	-9.6	-9.6
80-90 percentile					7.5	14.1	15.3	13.6	8.9	2.1	-2.3	-7.5	-11.0	-11.7	-11.8	-11.8	-11.9
90-95 percentile					12.8	25.4	23.8	22.1	13.1	3.7	-2.0	-8.9	-12.8	-13.7	-13.8	-13.8	-13.9
95-99 percentile					26.0	46.7	42.4	37.7	22.3	7.9	0.1	-10.4	-14.7	-15.6	-15.7	-15.8	-15.9
99-100 percentile					74.9	145.7	119.8	94.5	56.4	14.7	3.3	-12.2	-17.0	-17.9	-18.0	-18.1	-18.2
Average	-0.3	-0.5	0.1	1.5	5.4	9.2	9.9	9.0	4.9	1.1	-1.0	-4.3	-6.6	-7.2	-7.3	-7.3	-7.3
(Small Open Economy)																	
Temporary Hourly Wage Class																	
0-20 percentile	-0.3	-0.5	-0.2	0.1	0.3	-1.2	1.6	1.8	0.8	-0.2	0.4	0.2	-0.1	-0.3	-0.3	-0.3	-0.3
20-40 percentile					0.4	0.5	2.7	3.6	2.2	0.8	1.1	0.2	-1.0	-1.5	-1.6	-1.6	-1.6
40-60 percentile					0.3	1.7	4.0	5.0	3.6	1.6	1.3	-0.3	-1.7	-2.3	-2.4	-2.4	-2.4
60-80 percentile					0.6	3.6	6.3	7.3	5.5	2.5	1.2	-1.0	-2.8	-3.4	-3.5	-3.5	-3.5
80-90 percentile					2.0	5.9	8.9	9.8	7.9	3.8	1.2	-2.2	-4.2	-4.9	-5.1	-5.1	-5.1
90-95 percentile					4.6	11.6	12.1	14.3	10.4	5.1	1.2	-3.5	-5.7	-6.5	-6.7	-6.7	-6.7
95-99 percentile					13.7	23.9	20.9	22.3	16.0	8.1	1.7	-6.5	-9.0	-9.8	-10.0	-10.0	-10.0
99-100 percentile					50.8	88.9	64.0	51.5	35.7	12.4	1.9	-11.2	-13.8	-14.6	-14.8	-14.8	-14.8
Average	-0.3	-0.5	-0.2	0.1	1.8	3.9	5.9	6.6	4.7	2.0	1.1	-0.9	-2.3	-2.8	-2.9	-3.0	-3.0

Figure A.10. Income Tax Rates Reduced by 10 Percent Proportionally; Income Tax Rates Increased Gradually After 10 Years---Alternative Assumptions



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