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Individual Retirement Accounts, saving and labor supply☆

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ABSTRACT

This paper builds a general equilibrium model of overlapping generations and studies the effects of tax-deferred saving and alternative retirement saving policies on life-cycle saving and labor supply of households and on the aggregate economy.

1. Introduction

The Individual Retirement Account (IRA) is a retirement saving plan, which features tax-deductible contribution up to a limit, and tax-free earnings until funds are withdrawn. The tax-deferred saving policy is regressive. Since the contribution can be deducted from the income tax base, which is subject to the progressive tax schedule, high income households would benefit more from the deductions.

In this paper, we build a model to quantify and compare the effects of alternative retirement saving policies, including the one that approximates the current IRA policy in the U.S. We use a dynamic equilibrium model of overlapping generations in the tradition of Auerbach and Kotlikoff (1987), to understand how the utility-maximizing households that are heterogenous in age, assets, education and productivity respond to a policy. Our model is closest to that of İmrohoroğlu et al. (1998) in incorporating tax-deferred savings in a life-cycle model. We consider two types of alternative policies that are intended to correct for the regressiveness. The first is to provide a credit, instead of a tax deduction so that the benefit is not directly linked to income level and tax bracket of a household. The second is to make a matching contribution to households' retirement savings accounts. The policies are intended to encourage savings for retirement through non-regressive financial incentives. We examine the policy effects on households' decisions on savings, consumption and labor supply over the life-cycle and how they translate into changes in aggregate variables.

2. Model

The economy is populated by overlapping generations of households. Agents of age j survive until the next period with probability s_j. Agents retire from work at the retirement age j_r. Accidental bequests are collected and distributed as a lump-sum transfer to the entire population and denoted by b. Households enter the economy with no assets and allocate the time endowment for either leisure or work in each period. Earnings are given as $w\varepsilon_j z\eta h$. w is the market wage and h is endogenously chosen hours of work. The labor productivity of households differs along three dimensions. ε_j is the deterministic age-dependent productivity that evolves deterministically over the life-cycle. z represents the difference in education or innate abilities that are fixed throughout his life. Finally, households are subject to an idiosyncratic productivity shock η.

A representative firm produces output according to the technology: $Y=F(K,L)=AK^{\alpha}L^{1-\alpha}$. The constant A normalizes units in the model economy. The firm rents capital and labor in competitive markets and pays factor prices r and w according to their marginal productivities.

The government purchases an exogenous amount of goods and services G, which is financed by the revenue from taxation. The government taxes on income y according to the function $T(y)$ and

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consumption at rate τ_c and it also imposes a tax on withdrawal of savings in the IRAs at rate τ_p prior to the penalty-free age of j_p. The government operates a pay-as-you-go pension program, which provides each retiree with a constant benefit *ss*. The program is assumed to be self-financed by a proportional tax τ_{ss} on earnings.

Households are heterogeneous in five dimensions summarized by a state vector $x=\{j, a, p, z, \eta\}$, where j represents age, a non-IRA assets, p assets in the IRA, z fixed ability type, and η idiosyncratic labor productivity. Markets are incomplete and households cannot perfectly insure against idiosyncratic productivity and mortality risks. They can, however, purchase one-period riskless assets or contribute to the IRAs to imperfectly self-insure against risks. The new contribution to the IRA is the difference between the new IRA balance carried over to the next period and the original balance plus accrued interest, denoted as $\Delta p \equiv p' - (1+r)p$ and a negative value of Δp implies a withdrawal from the account. Every period a household can make a contribution up to the smaller of the contribution limit $\Delta\overline{p}$ or the earnings. The contribution is tax-deductible and return on the IRA is not subject to taxation until it is withdrawn. The withdrawal $-\Delta p>0$ is added to the household's income tax base in the year of the withdrawal.

The value function $V(x)$ of a household in state x is given by

$$V(x) = \max_{c,h,a',p'} \left\{ u(c, 1-h) + \beta s_j E[V(x')] \right\} \quad (1)$$

subject to

$$c + a' + p' = (1+r)(a+b+p) + w\varepsilon_j z \eta h + ss - \Upsilon(x), a' \geq 0, p' \geq 0, \quad (2)$$

where $\Upsilon(x)$ denotes the total tax liabilities a household in state x, which include income, consumption and social security taxes:

$$\Upsilon(x) = \tau_c c + \tau_{ss} w\varepsilon_j z\eta h + T(y), \quad (3)$$

$$y = w\varepsilon_j z\eta h + r(a+b) - \Delta p, \Delta p \leq \overline{p}. \quad (4)$$

If a household withdraws from the IRA account prior to the penalty-free age of j_p, there is an additional payment to the government, $\tau_p \Delta p$ in Eq. (3).

3. Calibration

The model period is one year. Households enter the economy at age 20 ($j=1$), retire from work at age 66 ($j_r=47$) and live up to the maximum age of 100 ($J=81$). We use the Social Security Administration's life table for the age-dependent conditional survival probabilities.

The period utility function is defined as $u(c, 1-h) = [c^{\gamma}(1-h)^{1-\gamma}]^{1-\sigma}/(1-\sigma)$, where γ determines the preference weight on consumption relative to leisure and σ determines the risk aversion. We calibrate γ so that workers on average spends one-third of their disposable time for market work. σ is set at 4. The subjective discount factor β is set so that the capital–output ratio in the benchmark model is 2.7.

There are two types of households z, which we call low and high types. The ratio of their productivities is set at 1.8 and the fraction of the high type at 0.3, corresponding to the average college wage premium and a share of college graduates. The age-dependent labor productivity ε_j is taken from Hansen (1993). The idiosyncratic component η is specified as a first-order autoregressive process in log with a persistence parameter $\rho_\eta = 0.97$ and the variance of the white noise $\sigma_\eta^2 = 0.02$, which we approximate with a seven-state discrete Markov process.

The government spending G is set at 20% of the aggregate output. The income tax function $T(\cdot)$ consists a non-linear progressive income tax and a proportional income tax. The non-linear part captures the progressive income tax schedule in the U.S. in the functional form estimated by Gouveia and Strauss (1994) and the proportional part stands in for all other taxes, which for simplicity are lumped together into a tax τ_y on income. The function is given as $T(y) = \kappa_0\{y - (y^{-\kappa_1} + \kappa_2)^{-1/\kappa_1}\} + \tau_y y$. To preserve the shape of the tax function estimated by Gouveia and Strauss, their parameter estimates $\{\kappa_0, \kappa_1\} = \{0.258, 0.768\}$ are used and the scaling parameter κ_2 is chosen within the model to match the share of government expenditures raised by the income taxation. The proportional tax τ_y is chosen in equilibrium to balance the government budget.

4. Results

We now study the effect of alternative tax-deferred saving policies. We focus on the long-run effects and characterize steady states implied by different policies. In all experiments the government spending G is fixed at the benchmark level. The proportional income tax τ_y adjusts so that the government budget is balanced. To quantify the welfare effect of different policies, we compute a consumption equivalent variation (*CEV*). Table 1 summarizes the results.

4.1. Benchmark model and IRA

Before studying alternative policies, we compare economies with and without the IRA. We call the former as "benchmark" and the tax-deferred saving policy we described above as Policy A. Under Policy A, the maximum contribution limit is set at \$5,000 and an early withdrawal penalty of 10% is imposed on withdrawals made, before age $j_p = 60$.

Table 1
Policy experiments.

	Benchmark	A	B	C	D
		Tax deduction	Non-ref. credit	Refund. credit	Matching contri.
Aggregate capital	–	+12.0%	+7.0%	+6.9%	+12.1%
Aggregate labor	–	+0.1%	−3.0%	−3.1%	−0.06%
Aggregate consumption	–	+1.6%	−2.7%	−3.0%	+1.4%
Average work hours	–	+0.1%	−3.7%	−4.2%	−0.12%
– Low type	–	−0.03%	−4.3%	−5.0%	−0.25%
– High type	–	+0.26%	−2.4%	−2.5%	+0.15%
Interest rate	4.2%	3.3%	3.4%	3.4%	3.3%
Wage	–	+3.8%	+3.3%	+3.3%	+3.9%
Tax rate τ_y	4.7%	6.3%	7.7%	7.8%	6.6%
Welfare effect (*CEV*)					
– All	–	+2.2%	+5.5%	+5.6%	+1.6%
– Low type	–	+2.3%	+6.2%	+6.4%	+1.8%
– High type	–	+1.8%	+2.9%	+2.8%	+1.2%

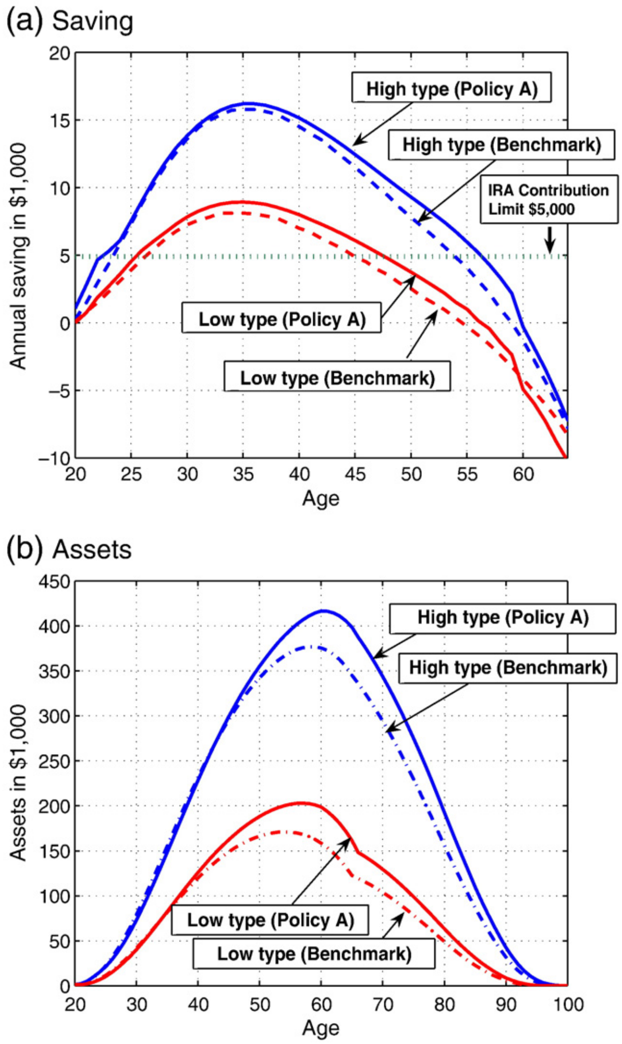

Fig. 1. Saving and assets over the life-cycle.

As shown in column A of Table 1, capital stock increases significantly by 12.0% with the introduction of the IRAs. A rise in the capital–labor ratio lowers the interest rate by about one percentage point and the wage increases by 3.8%.

The decrease in the tax base due to the deductions for the IRA contributions is partially offset by a rise in the wage and the labor income. As a result, the fiscal cost of the tax-deferral reflected in the rise of the tax rate τ_y is not so significant, in the order of 1.6 percentage points.

Fig. 1 shows the average saving and assets of households at each age and type (low and high) in the benchmark economy without the IRAs and the economy under Policy A.[1] Although the average saving in the benchmark exceeds the contribution limit for the middle-aged households and especially for high type ones, many of very young and old households save less than the limit in the benchmark economy and the effects of the IRA policy on saving is particularly strong for them.

The direct effect of the IRA policy on saving comes from an increase in the net return from savings. One of the arguments against the current policy is that it has little effect on households who save anyway more than the maximum contribution since the return from saving at the margin is not affected. Note that, however, as shown in Fig. 1(a), the saving also rises among the households who would save more than $5,000 even without the IRAs. While the substitution effect at the margin does not operate on them, there is also a level effect on both consumption and saving associated with a rise in the wage and life-time labor income. These effects together contribute to the rise in the capital stock.

The fraction of the total IRA balance that represents the incremental saving is 15%, which lies in the range of recent estimates in the literature, including Attanasio and DeLeire (2002) and İmrohoroğlu et al. (1998). As Fig. 1(b) demonstrates, both low and high type households accumulate more wealth along the life-cycle and they are much more financially secured as they approach the retirement age. The average saving at age 65 is higher by $39,000 and $53,000 for low and high type households respectively, than in the benchmark economy, which correspond to a rise in financial wealth by 31.8% and 15.5% for each type.

Welfare effects of introducing the IRAs are positive. Although households work slightly longer on average, the rise in consumption dominates the net welfare effect. Both low and high types benefit from the IRA policy but the welfare gain is larger among low type households. Although the low type agents do not benefit from the tax deduction and tax-free accrual of interests as much as the high type agents with more earnings, they greatly benefit from a rise in the wage and labor income.

4.2. Credit policy

Next we study the effect of a policy that provides a one-on-one credit for each dollar of a household's contribution to the IRA, up to a certain limit set by the government. The credit policy is less regressive than the deduction policy since the benefit is not linked to the progressive marginal tax, but only to the contribution made by each household, irrespective of its income level.

In Policy B, the government provides a non-refundable credit up to the limit of $2,000.[2] In Policy C, the credit is refundable, that is, the amount of credit is not bounded by the tax liabilities of a household. One could receive a net subsidy from the government if the credit exceeds the tax payment. In both types of credit policies, a household's own contribution is capped by the minimum of the earnings and the contribution limit of $5,000 and early withdrawal is subject to a 10% penalty as in Policy A.

As shown in column B and C of Table 1, the effect on the aggregate capital stock is not as large as the deduction policy A. The fiscal cost, however, in terms of the rise in the tax rate is greater. The effect on the work incentives and the aggregate labor supply is significantly negative. The greater benefit provided as a disposable credit in cash (unlike the matching contribution that we discuss below) generates a stronger income effect and reduces work effort. The effect is especially large for low type households, who benefit much more from the credit policy than from the deduction policy. As a result, the income tax base shrinks and the proportional tax rate must rise to 7.7% or 7.8%.

Given a moderate increase in the capital stock and a decline in the labor supply, the interest rate falls from 4.2% in the benchmark economy without the IRA to 3.4% under Policy B and C. The decline in the interest rate coupled with the rise in the income tax lowers the optimal growth rate of consumption and flattens the life-cycle profiles of consumption and labor supply in the same way as in Policy A. With the credit policies, however, young agents can lower work hours and enjoy more leisure while not having to sacrifice consumption much

[1] The saving is defined as the change in the total assets of a household between two periods; $(a'-a)$ in the benchmark and $(a'+p')-(a+p)$ in the economy with the IRAs.

[2] The policy is similar to the Retirement Savings Contributions Credit (known as Saver's Credit), which is a non-refundable credit provided to low-income households as a reward for contributing to the tax-favored plans such as IRAs and 401(k). The formula, however, is more complicated than the simple mechanism considered here and the amount of credit is a declining function of the modified adjusted gross income (AGI).

since they receive larger benefit provided by the government. With the reduction in hours worked and an improvement in the distribution of labor supply and consumption over the life-cycle, the welfare gain is larger than in Policy A. The credit policy provides more benefit to low-income households, and the welfare gain is greater for them.

When we make the credit refundable in Policy C, the welfare gain becomes even larger for low type households, since they can receive the full amount of credit even when it exceeds their tax liabilities. As a result of the income effect from the higher credit, the work hours of low type households decline further.

4.3. Matching contribution

Finally we consider a policy to provide a matching contribution to the IRAs. The amount of the matching contribution is determined as a fixed fraction of a household's contribution. Maximum own contribution of a household is set at $5,000 and early withdrawal penalty at 10% as before and we consider a matching rate of 40%, which implies the maximum matching contribution of $2,000 provided by the government. The contribution from the government is combined with households' assets in the IRA and interests accrue tax-free.

Results are summarized in column D of Table 1. There is a strong effect on savings and aggregate stock of capital, in the order comparable to the deduction policy A. As in the credit policies, the dollar benefit for each household is larger than in the deduction policy for most of households making a maximum contribution. Unlike under the credit policies, however, work disincentive from the income effect is not so strong since the benefit is added to the IRA balance, which agents cannot withdraw immediately for consumption without paying the early withdrawal penalty.

Quantitative effects on savings are very similar to those of deduction policies. Policies A and D raise the aggregate capital stock by 12.0% and 12.1%, at the cost of the tax increase from 4.7% in the benchmark to 6.3% and 6.6%, respectively. The wage rises by a similar magnitude and both policies generate a welfare gain, with a larger benefit falling on low type households.

5. Conclusion

In this paper we studied the effects of tax-deferred saving policies on life-cycle savings and labor supply of households and on aggregate economy. A policy increases the effective after-tax return of savings and can have a significant impact on aggregate capital. Alternative ways to give a saving incentive are studied, including provision of tax deductions, refundable/non-refundable credit and matching contributions. Although the current deduction policy may look regressive as it gives more direct benefit to high income households that face a higher marginal tax, we have shown that a higher wage from the general equilibrium effects benefits low-income households as well. A deduction policy does not have a negative effect on labor supply as a credit policy does through the income effect, since the funds are not free to be withdrawn until a certain age. Additional savings make households more financially secured at retirement and the welfare effects of the policies are positive in general.

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