Intergenerational Transfers in a Tractable Overlapping-Generations Setting *

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November 14, 2025

Abstract

Motivated by the Generation-Skipping Transfer Tax (GSTT) in the United States, we examine how varying estate-tax rates by the heir's age affects welfare. Methodologically, we introduce a parsimonious constant-elasticity-of-substitution (CES) bequest utility that is markedly more tractable than the altruistic specifications commonly used in the literature, delivering closed-form optimal rules and transparent calibration. Using this new framework, we provide a proof of concept showing how transfers from older to younger generations can enhance equilibrium welfare in a dynamically efficient economy à la Samuelson (1975). We embed the tractable bequest utility in a two-period overlapping-generations model with age-dependent estate-tax schedules. Numerical exercises—calibrated to the fact that estate-tax revenue is small relative to labor-income taxation—indicate that lowering the rate on bequests to younger heirs (grandchildren) relative to older heirs (adult children) raises the present value of lifetime resources and overall welfare, effectively reversing the logic of the current GSTT. The findings highlight a practical avenue for implementing a "reverse social-security" transfer from old to young that can improve welfare in dynamically efficient economies.

JEL Classification: D11, E21, H27

Keywords: consumption, saving, estate taxation, generation-skipping transfer tax

*We would like to thank Frank Caliendo, John Duffy, Mikael Elinder, Oscar Erixson, Carlos Garriga, Miles Kimball, Thijs Knaap, McKinley Nicholas, William Peterman, Marla Ripoll, Chung Tran, Alexander Ueberfeldt, and Greg Whitten as well as participants at the conference on Computing in Economics and Finance, the Iowa Alumni Workshop, the International Institute for Public Finance, the Quantitative Society for Pensions and Savings, and the University of Pittsburgh for their suggestions and comments.

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1 Introduction

A tax on estates is a controversial revenue instrument, often referred to by its detractors as "the death tax". Researchers have paid some attention to the optimal structure of the estate tax, which could be to have no estate tax at all. More precisely, an estate tax can be viewed as a tax on capital, which many researchers argue should be eliminated since it reduces incentives to invest (Atkeson et al., 1999; Foster and Fleenor, 1996; Johnson and Eller, 1998).

However, an estate tax may reduce inequality through multiple channels. From a theoretical perspective, Piketty and Saez (2013) develop an optimal inheritance tax model showing that estate taxation can increase ex ante expected lifetime utility by reducing the concentration of inherited wealth. Complementing this theoretical work, Saez and Zucman (2019) provide institutional and empirical analysis of progressive wealth taxation, documenting the distributional effects of various wealth tax designs using administrative tax data. Together, these studies suggest that appropriately designed estate taxation can serve both efficiency and equity objectives. In support of progressive estate taxation, Piketty et al. (2011) argue for an estate tax rate of 50% or more based on optimal tax theory.

[1]

Two questions that researchers have largely ignored are: 1.) What is the optimal bequest policy? and, 2.) How might the estate tax be employed to achieve such a normative objective? To our knowledge, the only study that attempts to address the first issue is Feigenbaum et al. (2013). In a model without a bequest motive, they document that if accidental bequests are given exclusively to the youngest agents, then a generalized market equilibrium exists in which lifetime utility approaches the maximal feasible utility of the golden-rule allocation, building on the primary concept explored in Feigenbaum et al. (2011). This far exceeds the lifetime utility of the rational competitive equilibrium under the standard assumption that accidental bequests are distributed uniformly across the surviving population.[2]

[1]Kopczuk (2013) gives an overview of the theoretical models and the empirical evidence of the redistributive role of the taxation of wealth in the form of intergenerational transfers, in particular, estate taxation. Among the most recent literature, Gravelle (1997), Gale and Perozek (2001), and Gale and Slemrod (2001a) provide overviews and discussions on estate and gift taxation. For broader perspectives on optimal taxation, see Diamond and Mirrlees (1971), Mankiw et al. (2009), and Shourideh (2024). On the political economy of intergenerational transfers, see Barro and MacDonald (1979). For empirical evidence on bequest motives, see Bernheim (1991), Laitner and Juster (1996), and Kopczuk and Slemrod (2001).

[2]Note that neither the present work nor Feigenbaum et al. (2013) account for human capital accumulation,

We focus on the second question in this study. Namely, what happens to lifetime utility if the tax structure encourages the bulk of a decedent's estate to be transferred to younger heirs (e.g., grandchildren), as opposed to older heirs (e.g., adult children)? We find that lifetime welfare can be increased! Suppose that the estate tax rate is designed to be a function of the age of the heir. If the tax rate on an estate bequeathed to younger heirs is lower than the tax rate on an estate passed to older heirs, then wills ought to be revised in order to shift gifts from older friends and relatives to younger friends and relatives.[3] We were motivated to think about this concept by an existing feature of the current U.S. tax code, the Generation-Skipping Transfer Tax (GSTT). The GSTT taxes an estate that is bequeathed directly to younger heirs (grandchildren) differentially compared to an estate that is passed to older heirs (adult children).[4]

Motivated by the existence of the GSTT, we explore the idea of using a generation-dependent estate tax rate as a means of implementing an age-dependent capital tax to show that it can improve equilibrium welfare compared to a uniform estate tax structure. Moreover, we demonstrate that the current structure of the GSTT is inferior to a uniform estate tax. Likewise, welfare could also be improved by reversing the tax rates so estates bequeathed to older heirs are taxed at a higher rate than estates bequeathed to younger heirs. Thus, we provide a proof of concept that a policymaker's goal of maximizing the total tax revenue from an estate via generational double taxation might undermine a competing normative objective, namely that of using tax policy as an instrument to improve equilibrium welfare.[5]

which Peterfreund and Strawczynski (2023) argue presents a mechanism by which bequests to the young could reduce welfare.

[3]Yoo (2012) similarly argues that the gift tax should be eliminated to encourage more inter vivos transfers from the old to the young. For empirical evidence on how estate and gift taxes affect inter vivos giving behavior, see Poterba (2001).

[4]Specifically, the GSTT was designed and implemented to discourage the passing of an estate directly to grandchildren, instead of first passing it to the surviving adult children of the decedent. The underlying rationale for the creation of the GSTT is to discourage the bequeathing of an estate to grandchildren as a tax avoidance strategy, bypassing an additional incidence of estate taxation in which the surviving estate would be taxed when it is passed from the adult children of the original decedent to their children (who are the grandchildren of the original decedent). The design and implementation of the GSTT implies a normative objective of maximizing the total estate tax revenue generated by an estate in perpetuity without accounting for present value. See Abrams (1987), Plant and Wintriss (1988), and Brunson (2019) for an overview of this normative objective that underlies the creation of the GSTT).

[5]The large body of existing research on the Generation-Skipping Transfer Tax predominantly discusses how to best conduct financial planning and estate planning for tax avoidance purposes given the existing structure of the GSTT (e.g., see Fellows (2006); Gallo (1998); Haneman (2022); Jackson (1977); McCaffery (2023)), as opposed to studying the higher-order question of how the design of the GSTT might achieve or undermine normative objectives. We focus on a higher-order question of how welfare is affected by the

At least since Samuelson (1975), it has been known that the existence of an intergenerational transfer program like social security improves equilibrium welfare in a dynamically efficient economy *only if* the program works in reverse: the program transfers wealth from older generations to younger generations, compared to what is done in real-world social security programs (i.e., transferring wealth from younger working generations to older generations that are retired). Economists typically find the implementation of a reverse social security program to be problematic when evaluated through the lens of the Pareto Criterion. Namely, such a program cannot be implemented in a Pareto-improving way given that the initial older generation would incur a negative transfer and reduction in lifetime resources without ever having received any transfer benefit when they were young. Moreover, acquiring political approval to create and implement a reverse social security program would face non-trivial difficulty, given that older generations vote in much higher proportions during elections or referenda compared to younger generations. We demonstrate that an age-dependent estate tax structure that encourages the passing of some of an estate from a decedent directly to grandchildren (reversing the GSTT) would embody the principle of a reverse social security program.

Moreover, we conjecture that implementation of an age-dependent estate tax structure favoring younger heirs may face fewer political obstacles than a traditional reverse social security program, for several reasons. First, unlike programs that impose explicit taxes on living elderly voters, the estate tax burden falls on decedents who cannot mobilize politically against the policy. Second, the policy creates clear beneficiaries (grandchildren and their families) without imposing obvious costs on identifiable groups of living voters. However, we acknowledge that this conjecture requires empirical validation. Political opposition could emerge from: (i) wealthy families planning estates who foresee disadvantages to their adult children; (ii) older voters who may perceive the reform as disadvantaging their generation; or (iii) concerns about increasing dynastic wealth accumulation. The political economy of estate tax reform remains an important area for future research

Building on the warm-glow framework pioneered by De Nardi (2004), we recast the bequest motive into a constant-elasticity (CES) form that preserves the intuitive altruistic flavour yet delivers closed-form Euler equations and linear policy rules. This additional tractability, not extra preference restrictions, allows us to solve the household problem analytically, calibrate transparently, and run rich comparative statics with minimal computational burden. Therefore, the present paper serves as a demonstration of the new specifica-

design of the tax instrument.

tion within an estate tax setting; a companion study (James Feigenbaum and Raei, 2025) performs the full quantitative 'horserace', comparing the CES formulation against popular alternatives.

To implement our proof of concept, we embed the tractable CES bequest utility in a two-period overlapping-generations economy. Each household allocates its estate between adult children (the generation immediately behind it) and grandchildren (two generations behind). Consistent with the warm-glow approach, household utility depends directly on the amounts bequeathed to heirs, rather than on the heirs' own utility as in the classic altruistic model (Barro, 1974). This structure allows us to investigate how age-dependent estate-tax rates shape bequest allocations and welfare before turning to the numerical experiments that quantify those effects

In numerical exercises, we document that equilibrium welfare increases monotonically as the ratio of estate tax rates on younger heirs (grandchildren) to older heirs (adult children) decreases.[6] Even though the current amount of collected estate taxes constitutes just a small fraction of total tax revenues collected by the U.S. Government in reality, the point of our proof of concept is that a reversal of the GSTT could potentially proxy a reverse social security program with the possibility of associated equilibrium welfare gains, especially if exemptions on what constitutes a taxable estate are also revisited and potentially revised.

The paper proceeds in the following way; section 2 documents key facts about U.S. estate taxation and the GSTT. Section 3 details the new bequest utility and household optimisation. Section 4 derives analytic propositions; Section 5 calibrates the model, and Section 6 presents numerical experiments. Section 7 concludes with policy implications and avenues for using the tractable bequest framework in other intergenerational settings.

[6] One issue that would need to be addressed in any type of real-world implementation is how to ensure that estates bequeathed to grandchildren actually benefit them rather than their parents. Real-world implementation would likely require: (i) mandatory trust structures with age-restricted access; (ii) enforcement mechanisms to prevent parental appropriation; (iii) clear definitions of 'grandchildren' to prevent gaming through adoption or legal designation; and (iv) monitoring systems to track trust compliance. These requirements would impose administrative costs and may face legal challenges. Additionally, wealthy households might circumvent the policy through inter vivos gifts, life insurance products, or family limited partnerships. While these avoidance strategies exist under current law as well, differential treatment by heir age could create new avoidance margins.

2 A Few Facts about Estate Taxation in the U.S.

The estate tax in the United States is a federal tax on the transfer of an estate from a person who dies (a decedent) to a survivor (an heir). The tax applies to property that is transferred by will, or if the person has no will, is transferred according to state laws of intestacy. Other transfers that are subject to the tax can include those made through a trust and the payment of certain life insurance benefits or financial accounts. The estate tax is part of the federal unified gift and estate tax code in the United States. The estate and gift tax, enacted in 1916, is the only wealth tax levied by the U.S. federal government. Over the years, the federal estate tax has undergone a number of changes, including changes to the exclusion amount, the tax rate structure, and the definition of what constitutes a taxable estate.[7] Because of exemptions in the tax code, it is estimated that only the largest 0.2 percent of estates in the U.S. pay the estate tax.[8] In 2017, the estate-tax exemption was $5.49 million, and the exemption doubled in 2018 to $11.18 million as a result of passage of the Tax Cuts and Jobs Act of 2017. Tax revenues collected from the estate and gift tax are relatively small, as is the fraction of estates that pay estate taxes: only 2 percent of the estates of adult decedents pay any estate taxes and tax revenue collected is about 0.3 percent of U.S. output (see, for example, Gale and Slemrod (2001b); Kopczuk and Slemrod (2001)). The small revenue base suggests that estate taxation serves primarily distributive rather than fiscal objectives Piketty (2014); Stiglitz (1978).

One feature of the estate-tax code in the United States is a tax called the "Generation-Skipping Transfer Tax" (GSTT), which is a tax on gifts or bequests to a beneficiary or heir who is two or more generations younger than the transferor or decedent.[9] For example, a gift or bequest is considered to be "generation-skipping" if it is transferred from a grandparent to a grandchild, or from a great-aunt to a great-nephew. Younger beneficiaries or heirs are known in tax parlance as "skip persons", meaning that a beneficiary or heir is considered to be a "skip person" if they are related by blood, by marriage, or by adoption, *and* is the transferor's or decedent's grandchild, grandniece/grandnephew, or first cousin twice removed (or great-grandchild, great-grandniece/grandnephew, first cousin thrice removed, etc.). The

[7]For example, an estate in considered taxable at $5.34 million for decedents in 2014 and $5.45 million in 2015 (effectively $10.90 million per married couple, assuming the deceased spouse did not leave assets to the surviving spouse) for estates of persons dying in 2016. "What's New – Estate and Gift Tax". www.irs.gov

[8]Huang, Chye-Ching; DeBot, Brandon. "Ten Facts You Should Know About the Federal Estate Tax". Center on Budget and Policy Priorities.

[9]The Generation-Skipping Transfer Tax was enacted by section 2006 of the Tax Refom Act of 1976, Pub. L. No. 94-455, 90 Stat. 1879-90 (1976).

GSTT tax rate is the same as the maximum estate-tax rate, which is 40 percent currently.[10]

3 The Model

We consider an overlapping-generations (OLG) model in which agents live for at most two periods, which we refer to as the young and the old. More precisely, an agent born at time t lives through periods t (young) and $t+1$ (old). When this agent dies at the end of period $t+1$, their estate is distributed to heirs from two cohorts: (i) the 'old' cohort born at time $t+1$, who are now in their old age at time $t+2$ (these are interpreted as the decedent's children); and (ii) the 'young' cohort born at time $t+2$, who are in their youth at time $t+2$ (these are interpreted as the decedent's grandchildren). In our notation, b_1 represents the bequest to children (one generation removed) and b_0 represents the bequest to grandchildren (two generations removed).

In each period a new cohort of population 1 is born. Let Q_s be the probability of surviving until age s where $1 = Q_0 \geq Q_1 > Q_2 = 0$. We consider only steady-state equilibria, so macroeconomic variables such as the wage, w, are time-independent. Every young agent supplies n in the labor market for w. This labor income is subject to taxation at rate θ^l.

Consumption at age $s = 0, 1$ is c_s. Let a_{s+1} be the saving of a household at age s, which will earn the gross rate of return R. The household writes a will that apportions how much of any assets will be given to each surviving cohort in the event of the household dying as planned at age 2. Let b_s be the assets distributed to a household of age s if the deceased household lives a full life.[11] A bequest by a household of age s is subject to estate taxation at rate θ^e_s. We also define B_s to be the bequest actually received by a household at age s. In equilibrium, the bequests B_s inherited from preceding generations by the optimizing household must be consistent with the bequests b_s that they plan to leave to succeeding generations, but the household is not constrained to leave something to its children because its parents left something to them. The b_s are determined by optimization whereas the B_s are determined algebraically from the equilibrium conditions.

Thus an elderly household will divide up its estate a_2 into a portion b_0 that goes to their age-0 grandchildren and a portion b_1 that goes to their age-1 children. The elderly household then gets utility from the after-tax bequest received by its heirs. Namely, $(1 - \theta^e_0)Rb_0$ from

[10] I.R.S. section 2641(a)(1).

[11] The will does not apply to households that die prematurely because the bequest motive would impose a borrowing constraint that complicates the solution of the model.

the after-tax bequest to grandchildren and $(1-\theta_1^e)Rb_1$ to children.[12] We assume a CES aggregator that maps bequests into utility,

$$H(b_0,b_1)=\begin{cases}[(1-\theta_0^e)Rb_0]^{\mu_0}[(1-\theta_1^e)Rb_1]^{\mu_1} & \zeta=1\\ \left[\mu_0((1-\theta_0^e)Rb_0)^{1-\zeta}+\mu_1((1-\theta_1^e)Rb_1)^{1-\zeta}\right]^{\frac{1}{1-\zeta}} & \zeta\neq 1\end{cases}. \tag{1}$$

This has elasticity of substitution ζ^{-1}, where $\zeta>0$. In all of the analytical results and simple numerical results in this paper, we assume $\zeta=1$ for tractability given the focus of this paper as a proof of concept. $\mu_s\geq 0$ is the relative strength of the bequest motive for a household of age s. We also normalize $\mu_0+\mu_1=1$.

To complete the specification of the preferences, we define the period utility function $u(x)$ to be an isoelastic utility function with elasticity $\gamma>0$. The household in each period aggregates consumption and leisure according to $x=c_s^\eta l_s^{1-\eta}$ for $s=0,1$. For the idea of retirement, $l_1=1$ by assumption.

Household problem Let $\beta>0$ be the internal discount factor and $\rho>0$ be the discount factor associated with bequests. The household maximizes

$$U=u(c_0^\eta l_0^{1-\eta})+\beta Q_1\left[u(c_1^\eta)+\rho u(H(b_0,b_1))\right] \tag{2}$$

subject to

$$c_0+a_1=(1-\theta^l)w(1-l_0)+B_0 \tag{3}$$

$$c_1+a_2=Ra_1+B_1 \tag{4}$$

$$b_0+b_1=a_2 \tag{5}$$

$$b_s\geq 0 \quad s=0,1 \tag{6}$$

where c_s is the consumption at age $s=0,1$ and where l_0 is the leisure for young agents. We assume each agent has 1 unit of time at age 0 and therefore the labor supply will be equal to $1-l_0$.

Here, we use a "warm glow" bequest motive as in De Nardi (2004) in which utility is derived from the size of the bequest (after taxes) as opposed to the utility of the heir, although we use a different specification of the bequest utility function than De Nardi so we

[12]In discrete time, there is a period between the allocation of the elderly household's wealth between its consumption and planned bequests and the inheritance of the bequests, so the wealth will earn a gross return R in the meantime. In continuous-time model environment, there would be no accrual of interest.

can obtain analytic results. This approach differs from the dynastic altruism model of Barro (1974) and allows for tractable characterization of optimal bequest behavior. For empirical evidence supporting warm-glow versus pure altruism models, see Laitner and Juster (1996) and Bernheim (1991).

Note that we assume a strictly terminal bequest motive in which the household only gets utility from the bequest left if it survives to the second period. This is a simplification that allows us to obtain an analytic solution for the household's choice functions.[13] While it may seem strange to only get utility from the bequest in one mortality scenario, one should keep in mind that all of the utility comes from the household's expectation about what it will be leaving to its heirs, and it will get expected utility from this possibility regardless of whether it survives to the maximum age. In no circumstance will the household be alive to actually observe the bequest.[14]

Production side On the production side of the economy, there is a firm with a Cobb-Douglas production function that produces aggregate output

$$Y = K^{\alpha} N^{1-\alpha}, \tag{7}$$

where N is the aggregate labor supply

$$N = 1 - l_0, \tag{8}$$

and K is the aggregate capital stock

$$K = a_1 + Q_1 a_2. \tag{9}$$

Factor prices are then

$$w = w(K) \equiv \frac{\partial Y}{\partial N} = (1-\alpha)\left(\frac{K}{N}\right)^{\alpha} \tag{10}$$

[13]This simplification allows us to avoid imposing borrowing constraints. As in Feigenbaum and Gahramanov (2009), we ignore the fact that debts will not be passed on to heirs in reality.

[14]We explore how robust consumption and saving behavior over the lifecycle and the consequent bequests are to various popular formulations of the bequest motive in James Feigenbaum and Raei (2025). Qualitatively, there is not a huge difference in the behavior produced by these different formulations. Due to the difficulty involved in measuring savings and consumption profiles, there is no empirical argument to be made that we should favor a technically more complicated model over the simplest analytical option.

and

$$R = R(K) \equiv \frac{\partial Y}{\partial K} + 1 - \delta = \alpha \left(\frac{K}{N}\right)^{\alpha-1} + 1 - \delta \tag{11}$$

Since there is no bequest motive for agents who die prematurely, we assume their assets are distributed uniformly across all survivors, which is a standard assumption in OLG models with survival uncertainty.

Considering the survival probability structure, the total population is

$$P = 1 + Q_1 \tag{12}$$

Using that we can form the bequest balance equations as in the following

$$Q_s B_s = (1 - \theta_s^e) R \left[(1 - Q_1) \frac{Q_s}{P} a_1 + Q_1 b_s \right] \tag{13}$$

for $s = 0, 1$. The first term in the square brackets of (13) is the mortality-weighted assets to be left accidentally from households that die at age 0 with probability $1 - Q_1$ whereas the second term is the mortality-weighted planned bequest from households that die at age 1 with probability Q_1.

Government The government's total tax revenue in this economy will be the sum of estate tax revenue and labor tax revenue. Estate tax revenue can be calculated as

$$\Theta^e = R \sum_{s=0}^{1} \theta_s^e \left[(1 - Q_1) \frac{Q_s}{P} a_1 + Q_1 b_s \right]. \tag{14}$$

Labor tax revenue is

$$\Theta^l = \theta^l w N. \tag{15}$$

Finally, the government's budget constraint is

$$G = \Theta^e + \Theta^l, \tag{16}$$

where G is exogenous government spending.

Equilibrium In this environment, a steady-state competitive equilibrium consists of a consumption allocation (c_0, c_1), leisure level (l_0) asset holdings (a_1, a_2), planned bequests (b_0, b_1), a capital stock K, actual bequests (B_0, B_1), factor prices R and w, estate tax rates (θ_0^e, θ_1^e), and tax revenues Θ^e and Θ^l such that

(i) the consumption allocation, asset holdings, and planned bequests maximize (2) subject to (3)-(**??**) given the factor prices, actual bequests, and tax rates;

(ii) the factor prices satisfy (10) and (11) given the capital stock;

(iii) the asset holdings are consistent with (9) given the capital stock;

(iv) the estate tax revenues satisfy (14) given the interest rate, estate tax rates, planned bequests, and asset holdings;

(v) the labor tax revenues satisfy (15) given the labor tax rate and wage;

(vi) the actual bequests satisfy (13) given the interest rate, estate tax rates, asset holdings, and planned bequests;

(vii) government spending satisfies (16) given the interest rate and tax revenues.

4 The Analytic Case

While we have kept the model relatively simple, including only what we need to separately consider taxes on estates inherited by older heirs (children) versus younger heirs (grandchildren), it is still complicated enough to be fairly opaque about the cause of our main results. To further explicate our findings, in this section we will consider a special case that yields analytic results.

In this case we assume $\gamma = \delta = \eta = \zeta = Q_1 = 1$, and as such, labor is supplied exogenously such that $N = 1$. In this case, lifetime utility is

$$\begin{aligned} U &= \ln(c_0) + \beta\left[\ln(c_1) + \rho\left[\ln R + \mu_0 \ln\left((1-\theta_0^e)b_0\right) + \mu_1 \ln((1-\theta_1^e)b_1)\right]\right] \\ &= (1+\beta+\beta\rho)\ln W + \beta\rho\left[\ln R + \mu_0 \ln(1-\theta_0^e) + \mu_1 \ln(1-\theta_1^e)\right] + U_0, \end{aligned} \tag{17}$$

where U_0 is a function of exogenous variables. The consumptions and planned bequests are proportional to lifetime wealth

$$W \equiv w_{at} + B_0 + \frac{B_1}{R}, \tag{18}$$

where

$$w_{at} = (1 - \theta^l)w \tag{19}$$

is the after-tax wage. The marginal propensity to consume when young out of lifetime wealth is

$$m_0 \equiv \frac{1}{1 + \beta(1 + \rho)} \in [0, 1]. \tag{20}$$

Then we have

$$c_0 = m_0 W, \tag{21}$$

$$c_1 = \beta R m_0 W, \tag{22}$$

$$b_0 = \mu_0 \beta \rho R m_0 W, \tag{23}$$

and

$$b_1 = \mu_1 \beta \rho R m_0 W. \tag{24}$$

The reason why assuming $\zeta = 1$ simplifies the model is that the policy rules do not depend on the estate tax rates in this special case. The government then has no ability to encourage households to leave their wealth to their grandchildren rather than their children by manipulating estate tax rates. However, it still maximizes social welfare for the government to extract revenue by taxing bequests received by older heirs (children) and to eliminate taxes on bequests inherited by younger heirs (grandchildren).

Meanwhile, assuming $Q_1 = 1$ eliminates premature mortality. Since the only people who die are those who have reached the end of their natural lifespan of two, young people only receive planned bequests from their grandparents and old people only receive planned bequests from their parents, where the parents and grandparents are the same people. Thus the bequest balance equations simplify to

$$B_s = (1 - \theta_s) R b_s, \quad s = 0, 1. \tag{25}$$

Combining (23), (24), and (25), we get that the inherited bequests are allocated according to the ratio

$$\frac{B_1}{B_0} = \frac{\nu_1}{\nu_0}, \tag{26}$$

where

$$\nu_s = \mu_s(1 - \theta_s^e), \quad s = 0, 1. \tag{27}$$

Since it is the inherited bequests that directly determine household behavior, for $s = 0, 1$, the effect of the estate tax rate θ_s^e is communicated to households via ν_s.

Except in the knife-edge case when the interest rate is such that the system of bequest balance equations is singular and more exotic equilibria are possible, the B_s will be proportional to the after-tax wage. That is to say, all wealth in the model will derive from the after-tax income of a past or present cohort. The aggregate capital stock must satisfy

$$K = a_1 + a_2. \tag{28}$$

Both a_1, the saving of young households, and a_2, the planned estate of old households, will be the product of the after-tax wage and propensities to consume, save, and bequeath. The latter depend only on one endogenous variable, the gross interest rate R. Moreover, with Cobb-Douglas production and full depreciation, the wage is proportional to KR. This means that the capital stock cancels out of (28) and what is left is an equation in the interest rate. In the familiar case of a two-period OLG model with the same parameter choices, i.e. $\gamma = \delta = Q_1 = 1$, and no altruism, the capital equation is linear in the interest rate.[15] Incorporating altruism in this analytic case results in the capital equation becoming quadratic.[16]

Proposition 1. *If $\gamma = \delta = \eta = \zeta = Q_1 = 1$, given tax rates θ_l, θ_0^e, and $\theta_1^e \in [0, 1]$, there is a unique steady state equilibrium with gross interest rate*

$$R = \frac{-\Psi - \sqrt{\Psi^2 - 4\Gamma\Omega}}{2\Gamma}, \tag{29}$$

that solves

$$\Gamma R^2 + \Psi R + \Omega = 0, \tag{30}$$

[15] With solution $R = \frac{1-m_0}{\sigma_l}$.

[16] All proofs are in the appendix.

where

$$\begin{aligned}\Omega = \sigma_l &= \frac{1}{1-\theta^l}\frac{\alpha}{1-\alpha} > 0 \\ \Psi &= -[1 - m_0 + \beta\rho m_0 \sigma_l \nu_1] < 0 \\ \Gamma &= -m_0\beta\rho[1 - \nu_1 + \sigma_l \nu_0] < 0.\end{aligned}$$

In the ensuing sections, we will consider numerically how different policies regarding the estate tax rates affect various macroeconomic observables and welfare. In the analytic case, all of these variables are functions of the interest rate, which we have a formula for. The following proposition establishes comparative statics results regarding the estate tax rates and the interest rate. Note that capital, wages, and output will be decreasing functions of the interest rate. And if we hold θ^l fixed, the after-tax wage will also be a decreasing function of the interest rate.

Proposition 2. *If $\gamma = \delta = \eta = \zeta = Q_1 = 1$, given tax rates θ_l, θ_0^e, and $\theta_1^e \in [0, 1]$, we have the comparative statics results*

$$\frac{\partial R}{\partial \theta_0^e} = -\frac{m_0\beta\rho\sigma_l\mu_0 R^2}{2R\Gamma + \Psi} > 0 \tag{31}$$

and

$$\frac{\partial R}{\partial \theta_1^e} = \frac{m_0\beta\rho\mu_1 R(R - \sigma_l)}{2R\Gamma + \Psi}. \tag{32}$$

The latter derivative is of ambiguous sign but will be negative if $R > \sigma_l$.

Thus we find that output and wages unambiguously decrease with the tax rate on estates inherited by young households (grandchildren) whereas the effect of the tax rate on estates inherited by old households (children) has an ambiguous effect on output and wages.

How do we account for the very different effects of estate taxes on children versus grandchildren? From (28), there are two components to the capital stock. There is the saving a_1 of young households to finance their retirement and planned bequests, and then there is the planned estate a_2 of older households.

In maximizing its lifetime utility, the household divvies up its lifetime wealth, which comes from both its endowment of after-tax wages and the present value of its own inheritance, $B_0 + \frac{B_1}{R}$. Both the inheritance and lifetime wealth end up being increasing functions of

$$\overline{\nu} = \nu_0 + \frac{\nu_1}{R}, \tag{33}$$

the "present value" of the ν_s, which are in turn decreasing functions of the corresponding estate tax rate θ_s^e. The effect of θ_1^e on lifetime wealth is discounted relative to the effect of θ_0^e because the present value of a dollar inherited when old is less than the present value of a dollar inherited when young. Thus an estate tax will reduce lifetime wealth and thereby reduce what the household plans to leave to future generations a_2, but an estate tax levied on older households will have a smaller effect than an estate tax levied on younger households.

But while the saving a_2 is an end in itself that gives the household utility in its own right, the saving a_1 is merely a means to an end, transferring income from the first period to the second period. a_1 is an increasing function of the income received when young, which includes B_0, and a decreasing function of the income received when old, i.e. B_1. Increasing the tax rate θ_0^e will have the same effect on a_1 and a_2 since it will lower lifetime wealth and lower income while young. But increasing the tax rate θ_1^e has opposite effects on a_1 and a_2 since it will reduce lifetime wealth but incentivize saving when young to make up for a smaller inheritance to be received when old. Thus the effect of θ_1^e on the capital stock (and R) is ambiguous while the effect of θ_0^e on capital is strictly negative. If θ_1^e is increased, the negative effect on lifetime wealth is discounted by a factor of R relative to the positive effect on saving while young. Thus the positive effect will outweigh the negative effect for large interest rates.

For a typical parameterization of the production function with a share of capital on the order of 1/3, $\frac{\alpha}{1-\alpha}$ will be on the order of 1/2. Thus the labor-tax rate would need to be more than about 50% in order for σ_l to be greater than 1. Assuming we do not have that, the condition that $R > \sigma_l$ will be less stringent than the condition $R > 1$ for dynamic efficiency that commonly appears in propositions of this sort. If this usually looser condition is satisfied, we will have that R decreases with the estate tax rate levied on older heirs (children).

The effect on welfare will be more complicated since the bequest utility depends on the after-tax bequest rather than the before-tax bequest, so the effect of a higher θ_1^e on capital may be offset by the loss of utility via the bequest motive. In Section 6, we show for a typical calibration that shifting the inheritance tax from young heirs to old heirs does increase welfare.

5 Parameterization

This is, by design, a very stylized model that is only meant to demonstrate the mechanism of using age-dependent estate tax rates as a new dimension for policymakers. We will leave a serious calibration of the model to future work that will, in particular, account for the fact that most US households do not pay the estate tax, which the present model does not have enough heterogeneity to do. Instead, we use off-the-shelf values of most of the parameters, choosing a few to loosely match targets in the data.

The labor tax becomes a non-distortionary, lump-sum tax if labor is supplied exogenously. Since the inclusion of such a tax might raise concerns that the gains we report from fine-tuning the estate tax may come from this unrealistic lump-sum tax, we generalize from the parameterization used in Section 4 to allow for endogenous labor. Thus, we set $\eta < 1$, though we maintain the simplifying assumption that $\gamma = \zeta = Q_1 = 1$.

Since this is an OLG model where households live for two periods, we will follow the standard convention of treating a period as thirty years. That is to say, what we consider a young household will correspond to a household from ages 20 to 50. An old household will correspond to a household from ages 50 to 80, which is roughly the average American lifespan. We then choose our discount factor $\beta = (0.96)^{30}$, where 0.96 is a common value used in the literature. The one standard preference parameter that we do loosely calibrate to match a target in the data is the share η of leisure in the period utility function since the common work time in America of 40 hours per week is more of a behavioral norm than a data point. With $\eta = 0.2$ in our baseline calibration, we get that $N = 0.227$, which corresonds to 38 hours per week if we assume the unit endowment of time corresponds to a weekly allotment of 168 hours.

We maintain the assumption from Section 4 of full depreciation of capital with $\delta = 1$ since any annual depreciation rate greater than around 2.3% will yield a period depreciation rate that is greater than 50%. Moreover, given that a large number of macroeconomic models assume that annual rates of capital depreciation fall within the range of 5% to 15%, then the rate of capital depreciation over a 30-year period would be very close to one for the upper one-half to one-third of this range, given the mapping $1 - \delta_p = (1 - \delta_a)^T$ where δ_p is the period depreciation rate, δ_a is the annual depreciation rate, and where $T = 30$ is the number of years in a period. Thus, in addition to providing analytical tractability, it is not unreasonable to approximate δ as 1. We also set the share of capital to $\alpha = 1/3$ that is typically used in the macroeconomics literature.

It remains to set the parameters of the bequest motive and the baseline tax rates. The parameters of the bequest motive are especially difficult to calibrate because few studies have addressed the allocation of bequests between different generations of a family. We have four such parameters: the already discussed ζ, the intergenerational discount factor ρ, and the relative weights μ_0 and μ_1 on bequests to grandchildren and children respectively. Of these parameters, ρ is the only one that can be easily pinned down based on the existing literature.[17] However, for simplicity, we just equate the two discount factors ρ and β. The inverse elasticity ζ can only be extrapolated without doing the kind of experiment that we consider in the next section, so we assume $\zeta = 1$ also for simplicity. Finally, with $\zeta = 1$, the planned ratio of bequests to grandchildren to bequests to children should equal $\frac{\mu_0}{\mu_1}$. Based on anecdotal evidence, it seems reasonable to suppose this ratio ought to be about a quarter, so we set $\mu_0 = 0.2$.

The ratio of government spending on public goods and services to GDP has varied between 0.15 and 0.2 in the 21st Century, so we set $G/Y = 0.2$ in our baseline model. To be precise, in our counterfactual numerical exercises, we will adjust tax rates while fixing G, though Y will remain endogenous. Since the estate tax brings in a negligible amount of revenue compared to other taxes, and the labor tax is the only other tax in this model, we set

$$\theta^l wN \approx G. \tag{34}$$

Since we have Cobb-Doulgas production, we have the identity $wN = (1-\alpha)Y$. This implies

$$\theta^l = \frac{1}{1-\alpha}\frac{G}{Y}, \tag{35}$$

so we calibrate $\theta^l = 0.3$.

We use data from the White House's historical tables to estimate $\Theta^e/Y = 0.0025$.[18] For our baseline model, we assume $\theta_0^e = 2\theta_1^e$, consistent with the current legal provision of the GSST. Setting $\theta_0^e = 0.02$ and $\theta_1^e = 0.01$, we find that $\Theta^e/Y = 0.002$.

6 Numerical Exercises and Insights

After exploring the analytical framework of our model, where we delineated specific propositions under certain functional forms, we now turn our attention to some simple nu-

[17]For example, Hurd and Smith (2003) report that households between the age of 70 and 75 consume about 60% of cash on hand, which in the present context corresponds to the sum of income and financial wealth. With our assumption that $\gamma = 1$, this ratio should correspond to $\frac{1}{1+\rho}$.

[18]https://www.whitehouse.gov/omb/budget/historical-tables/

merical experiments. These are designed to provide deeper insights and complement the intuitions derived from the analytical case. Importantly, these experiments incorporate an elastic labor supply to offer a more nuanced understanding of how tax structure changes influence labor behavior. Note that we are comparing various tax structure with a benchmark tax system which is designed to incorporate one of the stark features of the current tax system of United States (i.e. the GSTT).

In our first experiment, we aim to investigate the effects of removing the generation-skipping clause from the estate tax structure. Specifically, we equalize the estate tax rate for both the young and old generations in the model, denoted as $\tilde{\theta}^e$. We keep the labor income tax unchanged in this exercise. To ensure comparability, we calibrate the uniform estate tax rate such that the government's tax revenue remains at the level observed in the benchmark economy. Building on the initial experiment, we then pivot to explore the implications of redistributing the estate tax burden exclusively to one generation at a time. In one scenario, the estate tax is entirely shouldered by the old generation, i.e. the children, while it is entirely removed for the young generation, or grandchildren. In an alternate scenario, we flip this arrangement, removing the estate tax for the old generation and applying it solely to the young generation. In both of these redistributive exercises, the estate tax rates are calibrated to ensure that the government's tax revenue remains at the level observed in the benchmark economy. Finally, in a last experiment, we remove the estate tax for both generations and find the labor income tax to keep the government's tax revenue constant. This exercise aims to gauge the extent to which estate taxation is distortionary when compared to other forms of income taxation. The primary objective of these numerical experiments is to assess the welfare impact of different estate tax structures, highlighting the implication of using estate taxation as a form of age-dependent/generation dependent capital taxation. Welfare changes are measured as an Equivalent Variation, defined as the percentage change to consumption each period that equilibrates lifetime utility across alternative steady-state equilibria which differ with respect to the introduction of alternative policy experiments.

6.1 Uniform estate tax across generations

In the first numerical experiment, we undertake an analysis of an alternative steady-state economy where the estate tax is stripped of its generation-skipping feature. In this exercise, a uniform estate tax rate is imposed on both the young and old generations of heirs, i.e. children and grand children, denoted as $\theta_0^e = \theta_1^e = \tilde{\theta}^e$. Through an iterative process, the tax rate $\tilde{\theta}^e$ was calculated to ensure that the government's revenue remains consistent with its level at the benchmark economy.

The findings from this experiment are laid out in Table 2 and compared with the benchmark economy for a more nuanced understanding. As seen in the data presented in the "uniform estate tax" column, the act of equalizing the estate tax rate across generations leads to notable welfare gains for the economy's agents. Specifically, while the old generation experiences a marginal uptick in their estate tax obligation, the young generation enjoys a substantial benefit from a reduced tax rate, established at $\tilde{\theta}^e = 1.17\%$.

This decrease in the estate tax for the young generation effectively increases the capital they inherit at the start of their lives, thereby enhancing its lifetime wealth. This increase in initial capital is reflected in the elevated investment-to-output ratio, suggesting a heightened propensity for the young generation to save and invest. We do have a marginal decline in labor supply, which can be attributed to the income effect induced by the increased initial capital. However, the overall positive welfare gains indicate that the advantages of receiving higher initial capital more than compensate for this reduction in labor supply. Given that the government's tax revenue is not adversely affected by this tax structure change, the experiment provides compelling evidence that the generation-skipping feature does not offer any inherent advantages in the context of the estate tax structure.

6.2 Tax-free estate for young generation

Following our initial examination of a uniform estate tax, the second experiment takes a different approach by exempting the young generation from the estate tax entirely while imposing it solely on the old generation. This is, in essence, a reversal of the traditional generation-skipping tax structure, where the burden usually falls on the younger heirs. Specifically, we set the estate tax rate for the young generation, θ_0^e, to zero and iteratively determine the old generation's estate tax rate θ_1^e that yields the same level of government tax revenue as in the baseline scenario.

The outcomes of this experiment are detailed in the fourth column of Table 2. When evaluating the steady state of this modified tax structure against the benchmark economy, a nuanced picture emerges. We note a decrease in labor supply by precisely 0.02 percentage points, a trend that mirrors what was observed in the first experiment. This decline can largely be ascribed to the income effect instigated by the tax alterations. With the young generation no longer burdened by an estate tax, they start their adult lives with an increased amount of capital relative to the benchmark economy. This spike in initial capital endows them with higher lifetime wealth, a change that manifests itself in altered labor supply behaviors. This increased initial wealth is also evident in the increase in investment-to-output ratio, indicating a shift in savings and investment behavior among the young generation.

Moreover, the 0.09 percentage points increase in capital leads to a 0.02 percentage point increase in output. When compared to the first experiment, where estate taxes were equalized but not eliminated for the young, the impact on capital and investment is more pronounced in this scenario. This aligns with the idea of reversing the social security system by facilitating a transfer from the old to the young, a move identified as welfare-improving in existing literature.

6.3 Tax-free estate for old generation

In this third experiment, we explore an alternative tax structure that amplifies the traditional generation-skipping transfer tax to its most extreme form. In this configuration, the old generation is completely exempt from the estate tax, and the entire tax burden is levied on the young generation. This setup serves as a drastic extension of typical estate tax arrangements.

To preserve a constant level of tax revenue, we calculate the estate tax rate for the young generation that would yield the same revenue as the benchmark scenario. Specifically, we set $\theta_1^e = 0$ for the old generation and determined $\theta_0^e = \tilde{\theta}^e$ for the young generation.

The findings of this third experiment are specifically detailed in the fifth column of Table 2. Contrary to our expectations, agents born into the steady state of this economy actually experience a welfare loss when compared to those in the baseline scenario. Interestingly, the estate tax rate for the young generation required to maintain consistent government revenue was calculated to be $\tilde{\theta}^e = 6.9\%$, a figure that represents a more than threefold increase over the baseline estate tax rate for this group.

This drastic increase in tax rate for the young generation manifests in various economic indicators. We observe an increase in labor supply, likely as a response to the heavier tax burden. Alongside this, there is a noticeable decline in both capital and the investment-to-output ratio. Given the increased level of the consumption-to-output ratio, it can be inferred that resources have been reallocated from saving to consumption, thereby explaining the reduced levels of aggregate output. Note that when we compare these results against the benchmark economy and the first two experiments, the significance of the old generation's contributions to estate tax revenue becomes increasingly evident

6.4 Eliminating estate tax

In our final experiment, we take the bold step of setting the estate tax rates for both young and old generations to zero. To compensate for this loss in tax revenue, we adjust the labor income tax rate, θ^l, to maintain a constant level of government revenue. The outcomes of this intriguing exercise are presented in the last column of Table 2. Unsurprisingly, the elevated level of labor income tax leads to a welfare loss, a finding that aligns with existing literature on the subject (seeDe Nardi (2004) as an example).

Upon examining various economic indicators, we find that the increase in labor income tax has a dampening effect on both labor supply and capital formation. This contraction in labor and capital subsequently results in a decline in the aggregate level of output, which in turn negatively impacts both consumption and investment levels. These dynamics help explain the welfare loss reported in the table for this experiment.

Notably, when we consider these results in the context of our previous experiments and the benchmark economy, an important inference emerges: estate taxes in our model appear to be relatively less distortionary compared to labor income taxes. This observation suggests a nuanced role for estate taxes in the overall tax policy landscape, potentially serving as a less disruptive alternative to labor income taxes for achieving revenue goals.

7 Conclusion

The existing tax code in the United States levies a Generation-Skipping Transfer Tax (GSTT) on estates that are passed directly to younger heirs (e.g., grandchildren) as opposed to the older heirs (e.g., surviving adult children) of a decedent. The typical rationale for this feature of the tax code is that the government loses out on estate tax revenue when the estate of a decedent passes directly to grandchildren, instead of following the norm in which an estate passes first to adult children, who will then in time pass along the estate to their own children (i.e., to the grandchildren of the original decedent). This particular feature of the tax code in the United States led us to consider a differential estate tax rate as a means to shift or transfer resources from older generations to younger generations. Indeed, we provide a proof of concept to demonstrate that a reversal of the GSTT could operationalize an inverted social security program (an intergenerational transfer program from older generations to younger generations) such that equilibrium welfare could be increased in economies that are dynamically efficient, consistent with the literature initiated by Samuelson (1975).

In providing our proof of concept as a first step on this topic, we construct a two-period overlapping-generations model to examine how revenue-neutral variation of the estate tax rate imposed on younger heirs (grandchildren) versus older heirs (adult children) can affect welfare in equilibrium. In numerical exercises, we find that equilibrium welfare increases as the ratio of the estate tax rate levied on younger heirs to older heirs decreases. And despite the fact that the current amount of collected estate tax revenues constitutes a small fraction of all tax revenues collected, the take-home lesson of our proof of concept is that if estates are bequeathed directly to younger heirs (e.g., grandchildren), skipping older heirs (e.g., surviving adult children), then the present value of lifetime resources is higher in equilibrium. This expands the choice sets of individuals resulting in higher levels of well-being. In addition, we find that heirs who receive inheritances when they are young are able to save over a longer remaining span of time, potentially leading to favorable equilibrium outcomes such as a larger capital stock, which can provide a secondary channel for enhanced welfare in equilibrium.

We point out that under the current normative objective of policymakers to maximize collected tax revenues, wherein an estate is taxed twice on its way to grandchildren (once when it is passed from a decedent to surviving children, and then once again when the estate is passed from those adult children to their own children, who were the grandchildren of the original decedent), undermines another important normative objective: using tax policy as an instrument to improve the welfare of individuals (or, at a minimum, to avoid damaging the welfare of individuals). To the best of our knowledge, the existing economics and public finance literature on optimal taxation completely overlooks the idea of taxing the inheritances of children and grandchildren differentially. This is not surprising given that the GSTT is not that well known. In fact, almost all of the existing academic literature on the GSTT is prescriptive and is aimed at the field of wealth management practitioners such that the primary question of interest is how to best structure and legally design an estate for tax avoidance purposes.

7.1 Policy Implications

Our findings carry several concrete implications for estate tax policy design. First, and most directly, our analysis suggests that the current Generation-Skipping Transfer Tax is counterproductive from a welfare perspective. Policymakers should consider reversing its logic to encourage rather than discourage bequests to younger generations. Rather than penalizing transfers that skip a generation, the tax code could incentivize such transfers through preferential rates.

Second, rather than maintaining a binary distinction between generations, an optimal policy might feature continuously decreasing tax rates by heir age, providing maximum relief for the youngest beneficiaries. Such a graduated structure would better align incentives with the welfare-maximizing allocation of bequests across generations and could be implemented through a smooth age-based adjustment factor applied to the statutory estate tax rate.

Third, our revenue-neutral experiments demonstrate that welfare improvements need not come at the cost of reduced government revenue. The restructuring of estate taxation can be designed to maintain fiscal balance while improving allocative efficiency. As Diamond and Mirrlees (1971) emphasize in their seminal work on optimal taxation, holding government spending fixed, tax structure should minimize distortions. Our results show this principle applies directly to the age-structure of estate taxation.

Fourth, current high exemption levels ($11.18 million as of 2018) mean the GSTT affects very few estates—only the wealthiest 0.2 percent of decedents. Lowering exemptions while simultaneously restructuring rates to favor younger heirs could expand both the scope and welfare benefits of reform. This combination would broaden the tax base while improving the intergenerational allocation of resources, potentially increasing both revenue and welfare.

7.2 Limitations and Directions for Future Research

We emphasize that this paper provides a proof of concept rather than a full quantitative assessment. Several important limitations warrant discussion and suggest promising avenues for future research.

First, our two-period structure abstracts from the full lifecycle and continuous age distribution. Extensions to multi-period overlapping-generations models could provide richer dynamics and allow for more realistic modeling of saving behavior, mortality risk, and bequest timing decisions over the lifecycle.

Second, we abstract from heterogeneity in wealth, income, and mortality across households. Incorporating these dimensions would allow analysis of distributional effects and enable assessment of how estate tax reforms affect inequality Piketty (2014); Shourideh (2024). A quantitative heterogeneous-agent model calibrated to match the empirical wealth distribution would provide more precise welfare estimates and illuminate the distributional trade-offs inherent in estate tax reform.

Third, we do not model strategic tax avoidance behavior, trust structures, or inter vivos gifting. These strategic responses could either amplify or diminish the welfare effects we identify. Poterba (2001) and Kopczuk and Slemrod (2001) provide empirical evidence on such avoidance behavior, documenting substantial responsiveness of estate planning to tax incentives. Future extensions should explicitly model these margins, as they may significantly affect the revenue and welfare implications of age-dependent estate taxation.

Fourth, following Peterfreund and Strawczynski (2024), we acknowledge that early-life transfers might reduce human capital investment if recipients substitute inherited wealth for education. Our model abstracts from this channel entirely. Incorporating endogenous human capital accumulation would provide a more complete picture of how bequest timing affects welfare through both physical and human capital formation.

Fifth, our analysis holds government spending fixed and focuses on revenue-neutral reforms. A full normative analysis would consider the optimal reallocation of any revenue windfall from estate tax restructuring. The welfare effects we document might be amplified if revenue changes were allocated optimally across public goods, transfers, or reductions in more distortive taxes.

Sixth, our steady-state analysis ignores transition dynamics and the intergenerational redistribution that occurs during reform implementation. Any reform creates winners and losers across cohorts. A complete welfare analysis following Atkeson et al. (1999) would require evaluating the transition path and potentially considering compensation mechanisms for cohorts adversely affected by the reform.

These limitations notwithstanding, our proof of concept establishes an important principle: the age-structure of estate taxation matters fundamentally for welfare, and encouraging transfers to younger generations can yield welfare gains in dynamically efficient economies. Future research incorporating the extensions outlined above would sharpen the quantitative magnitudes and distributional implications, but the basic insight—that the current GSTT operates in the wrong direction from a welfare perspective—appears robust. The political economy considerations suggest that reversing the GSTT may be more feasible than implementing traditional reverse social security programs, making this a practically relevant avenue for welfare-improving policy reform.

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A Appendix: Solving the Analytic Case

This appendix provides a detailed and transparent derivation of the analytic case results. Our goal is to explicitly show how the household's optimization problem leads to closed-form expressions for consumption, saving, bequests, and the steady-state interest rate R. Each step is explained both algebraically and intuitively so that the reader can follow the logical progression from the household's problem to the aggregate equilibrium conditions.

1. Household Problem

Households maximize lifetime utility with the assumption of $\gamma = 1$,

$$U = \ln c_0 + \beta \left[\ln c_1 + \rho \ln \left([(1-\theta^{e_0})Rb_0]^{\mu_0} [(1-\theta^{e_1})Rb_1]^{\mu_1} \right) \right], \tag{A.1}$$

subject to

$$c_0 + a_1 = (1-\theta_l)w + B_0, \tag{A.2}$$

$$c_1 + a_2 = Ra_1 + B_1, \tag{A.3}$$

$$b_0 + b_1 = a_2. \tag{A.4}$$

Here, b_0 and b_1 denote planned bequests to the subsequent-old (children) and subsequent-young (grandchildren) cohorts, respectively. The parameters μ_0 and μ_1 capture the relative strength of the bequest motives, normalized so that $\mu_0 + \mu_1 = 1$.

2. Lagrangian and First-Order Conditions

The household's Lagrangian is

$$\begin{aligned}\mathcal{L} = {} & \ln c_0 + \beta \left[\ln c_1 + \rho \ln \left([(1-\theta^{e_0})Rb_0]^{\mu_0} [(1-\theta^{e_1})Rb_1]^{\mu_1} \right) \right] \\ & + \lambda_0[(1-\theta_l)w + B_0 - c_0 - a_1] + \lambda_1[Ra_1 + B_1 - c_1 - a_2] + \lambda_2[a_2 - b_0 - b_1]. \end{aligned} \tag{A.5}$$

in which the subscript on λ_0, λ_1, and λ_2 only denotes that each is a uniquely different lagrange multiplier.

Taking first-order conditions with respect to each variable:

$$\frac{\partial \mathcal{L}}{\partial c_0}: \quad c_0^{-1} = \lambda_0, \tag{A.6}$$

$$\frac{\partial \mathcal{L}}{\partial c_1}: \quad \beta c_1^{-1} = \lambda_1, \tag{A.7}$$

$$\frac{\partial \mathcal{L}}{\partial b_0}: \quad \beta \rho \mu_0 b_0^{-1} = \lambda_2, \tag{A.8}$$

$$\frac{\partial \mathcal{L}}{\partial b_1}: \quad \beta \rho \mu_1 b_1^{-1} = \lambda_2, \tag{A.9}$$

$$\frac{\partial \mathcal{L}}{\partial a_1}: \quad -\lambda_0 + \lambda_1 R = 0, \tag{A.10}$$

$$\frac{\partial \mathcal{L}}{\partial a_2}: \quad -\lambda_1 + \lambda_2 = 0. \tag{A.11}$$

From these relationships, we derive two key results:

(a) Euler Equation for Consumption

$$c_1 = \beta R c_0. \tag{A.12}$$

(b) Proportional Bequest Rule

$$\frac{b_1}{b_0} = \frac{\mu_1}{\mu_0} \quad \Rightarrow \quad b_0 = \mu_0 a_2, \quad b_1 = \mu_1 a_2. \tag{A.13}$$

Thus, bequests are allocated proportionally to the relative utility weights μ_s.

3. Lifetime Budget Constraint

Combining both period budget constraints and substituting $a_2 = b_0 + b_1$ and defining the after-tax wage $_{at} = (1 - \theta^l)w$, we obtain:

$$c_0 + \frac{c_1 + b_0 + b_1}{R} = w_{at} + B_0 + \frac{B_1}{R}. \tag{A.14}$$

Using the relationships $c_1 = \beta R c_0$ and $b_0 + b_1 = \beta \rho R c_0$, we solve for c_0:

$$c_0 = \frac{1}{1 + \beta(1 + \rho)} \left[w_{at} + B_0 + \frac{B_1}{R} \right]. \tag{A.15}$$

This provides the marginal propensity to consume out of lifetime wealth in closed form.

4. Closed-Form Policy Rules

Given c_0, all other decisions follow linearly in lifetime wealth:

$$c_1 = \beta R c_0, \tag{A.16}$$

$$b_0 = \mu_0 \beta \rho R c_0, \tag{A.17}$$

$$b_1 = \mu_1 \beta \rho R c_0. \tag{A.18}$$

The CES bequest specification ensures tractability: each decision rule is linear in W, simplifying equilibrium analysis.

5. Steady-State Equilibrium

In the analytic case, the bequest balance equations simplify to

$$B_s = (1 - \theta_s^e) R b_s \tag{A.19}$$

for $s = 0, 1$. Inserting (23) and (24), we obtain a linear system in the B_s:

$$B_s = n u_s \beta \rho R m_0 \left[w_{at} + B_0 + \frac{B_1}{R} \right] \tag{A.20}$$

for $s = 0, 1$. Let us define

$$\overline{\nu} = \nu_0 + \frac{\nu_1}{R} \tag{A.21}$$

to be the present value of ν_0 and ν_1. Then the solution to (A.20) is[19]

$$B_s = \frac{\nu_s \beta \rho m_0 R^2}{1 - \overline{\nu} \beta \rho m_0 R^2} w_{at}. \tag{A.22}$$

Lifetime wealth then reduces to

$$W = \frac{w_{at}}{1 - \overline{\nu} \beta \rho m_0 R^2}. \tag{A.23}$$

[19] In the event that $\overline{\nu} \beta \rho m_0 R^2 = 1$, and the system is singular, households will behave like in Barro (1974). See **?** for details.

In the analytic case, the firm's first-order conditions imply:

$$w = (1-\alpha)K^{\alpha}, \tag{A.24}$$
$$R = \alpha K^{\alpha-1}. \tag{A.25}$$

Combining these we obtain,

$$w_{at} = (1-\theta^l)w = \frac{RK}{\sigma_l}, \tag{A.26}$$

where

$$\sigma_l = \frac{\alpha}{1-\alpha}\frac{1}{1-\theta_l}. \tag{A.27}$$

Aggregating across identical households gives the total capital stock:

$$K = a_1 + a_2 = w_{at} + B_0 - c_0 + \beta\rho R m_0 W. \tag{A.28}$$

Since everything on the right-hand side is proportional to w_{at} and w_{at} is itself proportional to RK, the Ks cancel out of (A.28) leaving an equation that is quadratic in R:

$$\Gamma R^2 + \Psi R + \Omega = 0, \tag{A.29}$$

where

$$\Omega = \sigma_l, \tag{A.30}$$
$$\Psi = -[1 - m_0 + \beta\rho m_0 \sigma_l \nu_1], \tag{A.31}$$
$$\Gamma = -m_0\beta\rho[1 - \nu_1 + \sigma_l \nu_0]. \tag{A.32}$$

The steady-state interest rate is the positive root:

$$R = \frac{-\Psi - \sqrt{\Psi^2 - 4\Gamma\Omega}}{2\Gamma}. \tag{A.33}$$

This closed-form expression makes comparative statics transparent: an increase in θ^{e_0} (tax on estates to the young, i.e. grandchildren) raises R, while an increase in θ^{e_1} (tax on estates to the old, i.e. children) reduces R, thereby influencing capital accumulation and welfare.

6. Comparative Statics

Differentiating (A.30)-(A.32), we obtain

$$\frac{\partial \Omega}{\partial \theta_s^e} = 0 \tag{A.34}$$

for $s = 0, 1$,

$$\begin{aligned} \frac{\partial \Psi}{\partial \theta_0^e} &= 0 && \text{(A.35)} \\ \frac{\partial \Psi}{\partial \theta_1^e} &= \beta \rho m_0 \sigma_l \mu_1, && \text{(A.36)} \end{aligned}$$

and

$$\begin{aligned} \frac{\partial \Gamma}{\partial \theta_0^e} &= m_0 \beta \rho \sigma_l \mu_0 && \text{(A.37)} \\ \frac{\partial \Gamma}{\partial \theta_1^e} &= -m_0 \beta \rho \mu_1. && \text{(A.38)} \end{aligned}$$

Totally differentiating the R equation by θ_s^e for $s = 0, 1$, we get

$$R \frac{\partial \Psi}{\partial \theta_s^e} + \Psi \frac{\partial R}{\theta_s^e} + R^2 \frac{\partial \Gamma}{\partial \theta_s^e} + 2\Gamma R \frac{\partial R}{\partial \theta_s^e} = 0 \tag{A.39}$$

Then we obtain

$$\frac{\partial R}{\partial \theta_0^e} = -\frac{m_0 \beta \rho \sigma_l \mu_0 R^2}{2\Gamma R + \Psi} > 0, \tag{A.40}$$

and

$$\frac{\partial R}{\partial \theta_1^e} = \frac{m_0 \beta \rho \mu_1 R(R - \sigma_l)}{2\Gamma R + \Psi}, \tag{A.41}$$

which is of ambiguous sign.

Parameter	explanation	value
γ	inverse intertemporal elasticity	1.0
ζ	inverse elasticity of bequest substitution	1.0
η	share of consumption in period utility	0.2
β	discount factor	$0.294 = (0.96)^{30}$
α	share of capital	1/3
ρ	bequest discount factor	$0.294 = (0.96)^{30}$
μ_0	share of grandchildren in bequest utility	0.2
μ_1	share of children in bequest utility	0.8 = 1 - μ_0
θ_l	baseline tax rate on labor	0.3
θ_0^e	baseline tax rate on bequests to grandchildren	0.02
θ_1^e	baseline tax rate on bequests to children	0.01

Table 1: Parameter

Table 2: Welfare Implications of Alternative Estate Tax Structures: Numerical Results

Panel A: Imposed Tax Rates					
	Benchmark (Current GSTT)	**Uniform Estate Tax** ($\theta_0^e = \theta_1^e$)	**Tax-free for Young Heirs** (Grandchildren)	**Tax-free for Old Heirs** (Children)	**No Estate Tax** (Both Generations)
θ_0^e	2%	$\tilde{\theta}^e = 1.17\%$	0	$\tilde{\theta}_0^e = 6.9\%$	0
θ_1^e	1%	$\tilde{\theta}^e = 1.17\%$	$\tilde{\theta}_1^e = 1.4\%$	0	0
θ^l	30%	30%	30%	30%	$\tilde{\theta}^l = 30.4\%$
Panel B: Steady State Comparison					
Capital	100	100.09	100.23	99.41	99.22
Output	100	100.02	100.05	99.87	99.45
Labor	100	99.98	99.97	100.06	99.71
C/Y	100	99.98	99.97	100.05	99.96
I/Y	100	100.06	100.15	99.61	99.47
EV	—	+0.026%	+0.065%	−0.16%	−0.30%

Note: Each column represents a different estate tax structure. All scenarios maintain constant government revenue by adjusting tax rates as shown in Panel A. Benchmark values in Panel B are normalized to 100. EV = Equivalent Variation measuring welfare changes relative to the benchmark economy.