The Role of Inter Vivos Giving in General Equilibrium

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Abstract

This paper studies the welfare aspects of inter vivos giving in a dynamic general equilibrium. Although the intergenerational transfer made by a living parent to a liquidity-constrained child is easily found, the welfare aspects of this inter vivos giving have not been widely studied. An applied life-cycle model built on the observed pattern from the micro data can explain the substantial difference in wealth between a recipient and a non-recipient. After comparing the age-wealth distribution produced in a model economy to the corresponding distribution in the US economy, this paper investigates how individual welfare is influenced when giving is encouraged by elimination of the gift tax in the steady-state. The model shows that lowering the gift tax rate is Pareto-improving in the long run by achieving higher average consumption, a smoother lifetime consumption path and an increase in saving.

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1 Introduction

Policy and existing research have focused on the need to help households smooth consumption over their lifetimes, securing income after retirement in particular; there are many studies on the welfare implication of a social security, for example developed for those who are in liquidity-constrained periods. On the other hand, the resolution of the young's constraint has not received much policy and research attention. When it has been explored, it has been its role in impacting the size and the shape of the wealth distribution through the intergenerational transfer. The most often studied form of intergenerational transfer, bequests, however, may not actually aim to resolve the constraint because they are thought of as the result of precautionary saving of parents who are uncertain how long they will need to support themselves, overestimating the savings they need. To study parents as voluntary givers targeting relief of children's financial stress, as it is easily found from micro data, it is necessary to look into the intergenerational transfers that occur while the givers alive, also known as inter vivos giving. This paper focuses on the prominent welfare aspects of inter vivos giving, particularly in relaxing the liquidity-constraints in the long run.

This paper first presents stylized facts indicating Pareto-improving aspects of inter vivos giving from the Survey of Consumer Finance by comparing the saving behaviors of two groups, a gift-recipient and a non-recipient; an individual who receives gifts from a living parent holds more wealth than a person who has not. Particularly, I find that the difference between these groups is significantly bigger than that between a bequest-recipient and a non-bequest-recipient. The pattern continues even after a recipient stops receiving but bears the cost of generating gifts for their own children during old age. Based on the observed pattern of inter vivos giving, I adopt a life-cycle model in which a parent voluntarily transfers the financial support to a child according to their joy of giving. In association with public reinforcement of the gift, this paper proposes a reform of lowering a current gift tax rate by showing the improved welfare from enhanced financial delivery across generations.

A long-run steady-state equilibrium with the elimination of the gift tax supports the welfare-enhancing aspects of inter vivos giving by showing an increase in the aggregate capital stock with the improved average consumption, and a smoother consumption path over lifetime. The first welfare gain is apparent through the income effect which improves the young's resources and consumption instantly, especially when their budget is tight. A release from a borrowing constraint by

parents' liquidity injection contributes to higher saving over children's entire lifetime. Higher saving accrues the welfare of the old generation as well because it is followed by an increase in the social security receipt financed by the heightened output and wage. In addition, the insurance effect of inter vivos giving is emphasized as it is determined by the degree of a parent's utility but is independent from a recipient's idiosyncratic labor income shocks.

The paper is organized as follows: The second section reviews related literature. The stylized facts of inter vivos giving are investigated in the third section based on a series of Surveys of Consumer Finance. After I present the theoretical model in Section 4, the parameters of the model are evaluated in the calibration section. Section 6 discusses the various implications of wealth inequality and welfare resulted by enhanced inter vivos giving associated with the change in a gift tax system. Finally, after the sensitivity analysis in Section 7, Section 8 concludes.

2 Related Literature

For studying the wealth inequality in general equilibrium models with heterogeneous agents, Cagetti and De Nardi (2008) provide an excellent survey on data and models. As surveyed in their work, much macro literature[1] introduces an incomplete market by modeling households who face different realizations of shocks in stochastic labor earnings and ability processes to explain heterogeneity in income or wealth. In addition to modeling stochastic income, some elements of a life-cycle structure, which emphasizes a household's intra-resource allocation or intergenerational risk-sharing, are developed based on the observations from household data[2]. Considerable works model the role of bequests[3] in particular, in describing inequal-

[1]See pioneering works by Hugget (1993), and Aiyagari (1994).

[2]By assuming a number of stages in an individual's life, a life-cycle model provides a theoretical framework which is consistent with empirical evidences on a lifetime saving and consumption pattern. Browning et al. (1985) suggest a hump-shaped labor supply and earnings. Attanasio and Browning (1995) show a hump-shaped consumption over the lifetime by British expenditure data. Common household datasets for observing the patterns in US are Panel Study of Income Dynamics for various income percentiles, Asset and Health Dynamics Study and Health and Retirement Survey for the old generations. For the wealth data, the Survey of Consumer Finances provide excellent source publicly, however, it does not track the same individual over time but collects series of cross-sectional surveys.

[3]Even though the majority amount of intergenerational transfer is held by bequests, the definition of the accumulated wealth is still controversial between the saving by precautionary motive (Carroll (1997) and Palumbo (1999)) and the voluntary inheritance by design of the uncertain survival rate in these works. According to the accidental bequest hypothesis, bequest is a result from a combination of imperfect annuity markets and uncertainty concerning the timing of death (Davies (1981)). In contrast, if bequests are intentional and reflect either altruism (Becker (1974), and Barro (1974)) or strategic interplay between family members (Bernheim et al. (1985), and Perozek (1998)), the timing of them

ity in the US economy. Hugget (1996) adopts a model economy with the features of US data such as stochastic labor earnings shocks and bequests to quantify how much wealth inequality can be generated in a life-cycle framework with uncertain lifespan. A bequest motive is also developed in De Nardi (2004) by introducing the transmission of earnings ability in a self-insured economy against labor earnings shocks, and uncertain life-span risks. In her model of households having both voluntary and accidental motive in leaving bequests, the wealth held by the wealthiest people, however, is not fully realized in their models as much as that from empirical observations although both works are able to benchmark the US Gini coefficient.

Compared to these models, I adopt a general equilibrium, overlapping generation set-up, without the probabilistic survival rate in which the saving behavior of children is influenced by the transfer from a living parent (inter vivos giving). Giving is voluntarily and selfishly made while containing an implicit exchange motive[4] and its impact on the accumulation of wealth and inequality is examined when individuals face a borrowing constraint. In a similar set-up based on De Nardi (2004)'s work, Nishyama (2002) concludes that his OG model with bequests and inter vivos transfers better explains the observed wealth distribution. My model is different from his work by adopting the joy of giving utility so that it is able to analyze the impact of a gift tax on welfare with the explicit amount of aggregate giving. Although the giving presented in this paper does not fully generate the observed wealth concentration among super-rich people, the heterogeneous savings rates and disparate saving-profiles between recipients and non-recipients are consistently examined with the observation from data.

A liquidity-constraint, often seen as a major concern when aiming at a stable consumption path over the lifetime, is important to understand redistributional issues as well. Since seminal papers such as Auerbach and Kotlikoff (1987), and Auerbach et al. (1983) on government intervention for improving welfare of constrained households, current literature has been mostly developed in assessing the current level of social security benefits and other transfers to retirees. Hubbard and Judd (1987) examine the impact of a social security on national saving and individual welfare when there are imperfections such as market failure in private provision of annuities and restrictions on borrowing against future wages. Accord-

could be altered in a form of inter vivos giving according to the price effect of the estate/gift tax. See Bernheim et al. (2004) for evidences of the sensitive timing of intergenerational transfers corresponding to the tax system.

[4]By bringing the social security paid by working generations, inter vivos giving designed in the paper is to be a pseudo-loan rather than a subsidy.

ing to their study, the lifetime welfare increases and national saving decreases by introducing social security when borrowing restrictions are absent. In this paper, the role of a borrowing constraint is also emphasized such as the study of Bernheim et al. (1985) that pure altruism models generate the substantial amounts of inter vivos giving in order to overcome borrowing constraints faced by the recipients. The paper is motivated by an econometric study by Cox and Japelli (1990) on the role of giving as better delivery of liquidity by presenting improved credit rationing scores of those who received inter vivos giving from parents. In addition to the result that giving contributes to the welfare gain from a release of the constraints[5], when an individual faces stochastic labor income shocks, inter vivos giving even plays a role as a stable flow of income as it is pre-determined by the retired. Similarly, Krueger and Kubler (2006) ask questions on the unfunded social security system, whether it reallocates the impact of aggregate shocks across generations so that it reduces the consumption risk in old age while implying a Pareto-improving policy reform. In this paper, an implicit insurance contract between the old and the young is realized under the assumption of no adverse selection or moral hazard of the young generation. Even if the young and the old are not benevolent toward each other, selfishly created giving results in the welfare gains to both generations.

3 Stylized Facts

Inter vivos giving is important not only in accounting aggregate wealth (Gale and Scholz (1994)[6]) but also in shaping the wealth distribution, as wealth holdings are concentrated on a small fraction of households, and the succession of the wealth to the next generation through transfers is more easily found than the one documented for earnings abilities and total income. This observation is exploited by some micro empirical studies in finding higher giving rates by rich households (McGarry (2000) and Poterba (2001)) among many types of intergenerational transfer. This section first disentangles inter vivos giving by investigating the age-characteristic of a giver and a recipient and then discusses its impact on recipients' current income

[5]Cagetti and De Nardi (2008) also explain that the generation of lifetime saving profiles is more consistent with data by the presence of a bequest motive; saving by a precautionary motive (Carroll (1997) and Palumbo (1999)) and saving for retirement are the foremost factors in accumulating wealth for people at the lower tail of the distribution whereas the rich at the upper tail saves to leave bequests significantly.

[6]In their work, Gale and Scholz (1994) estimate that at least 20 percent of aggregate wealth is accounted for by intended transfers. A bequest is estimated to be responsible of 30 percent of the aggregative capital and inter vivos giving is accounted as half of it. Working on measuring US capital stock, Kotlikoff and Summers (1981) emphasize the importance of counting inheritance. They estimate aggregate bequests of $28.9 billion in 1974.

and wealth from statistical evidences.

The summary statistics in this section shed some light on finding a role of inter vivos giving mainly from a recipient's welfare. The statistics are retrieved from the from the Survey of Consumer Finances[7] (SCF), which provides the descriptive information of a household-level balance sheet. The survey is particularly useful in tracing the wealth and income composition of participants in a giving behavior due to its over-sampling of rich households. In addition, as suggested by Curtin et al. (1989) and Cagetti and De Nardi (2006), the total wealth in the SCF closely matches with the aggregate data so that it can be used to calibrate a model in benchmarking aggregates in the real world.

3.1 What is Inter Vivos Giving?

I begin the section by documenting stylized demographic features of participants (both a giver and a recipient) in intergenerational transfer. As parental support is recognized as one of the important sources of income, the SCF asks if the respondent offered support in the previous year to support anyone in section "Income":

1. [Income] During the previous year, did you pay alimony, separation payments, or child support?

2. [Income] Altogether, how much alimony and/or child support did you pay in the previous year?

Table 1 shows the fraction of parent-givers in any form of transfers in the third column and more specific statistics by age when they support their children through financial instruments (i.e. who answered yes to question 1). Since it is surveyed while the respondent is alive, the transfer documented in Table 1 indicates inter vivos giving and it is easily found among the middle-aged parents (between 46 and 65 years old). These gift-givers, whose average net worth is greater than that of all households are consistently observed from McGarry (2000) and Poterba (2001). The net worth distribution of givers is highly skewed to right. Parents, however, do not necessarily belong to a high-income quintile if they make transfers when they are younger than 45 years old according to the median value showing the great portion of population whose net worth is lower than the overall average.

[7] I use five public datasets published between 1995 and 2010 since the SCF is the triennial data. See data appendix for more details

In contrast to a small number of givers, the SCF contains more information in a separate section by surveying transfer-recipients; whether the respondent have received any support from anyone in section "Inheritances and Charitable Contributions"

3. [Inheritances and Charitable Contributions] Including any gifts or inheritances you may have already told me about, have you (or your [husband/wife/partner]) ever received an inheritance, or been given substantial assets in a trust or in some other form?

4. [Inheritances and Charitable Contributions] From whom was it received?
i) Grandparents
ii) Parent(include current or former parents-in-law)
iii) Child
iv) Aunt/Uncle
v) Sibling
vi) Friend
xii) Government Settlement; compensation
xxv) Family, n.e.c.
xxx) Divorced former spouse

Table 2 documents the significant number of households have been remarked in the second column (i.e. who answered *yes* to question 3 and answered (ii) to question 4). I find that the transfer flowing from a parent-unit to a child-unit is nearly 70 percent[8] among various flows. Having included the generational skipping transfers from a grandparent to children, the flow from the old generation to the young becomes even more substantial.

5. [Inheritances and Charitable Contributions] Was that an inheritance, a trust, or what? Thinking about the largest of these, was that an inheritance, a trust, or what?
i) Inheritance; Life insurance
ii) Trust
iii) Transfer/Gift
iv) Inherited Trust

[8]The reports on inter vivos giving panel study prepared by IRS in 2007 also show that 51.4 percent of the total giving population is held by a parent for one's children. The second dominant relationship of donees to donors is grandchildren (24 percent) followed by other donees with 14.1 percent. The giving provided by a child for parents is reported 2.5 percent.

v) Other

I finally define inter vivos giving as a transfer or a gift[9] from a living parent by classifying gift-recipients (i.e. who answered *yes* to either (ii) or (iii) to question 5) from bequest-recipients (i.e. who answered *yes* to either (i) or (iv) to question 5).[10] Table 3 distinguishes statistical characteristics of a gift from those of a bequest and presents that a bequest channel is prevalently used and its size is substantial as well. Given this observation, most of the macroeconomic literature has been encouraged to explain the intergenerational transfer by precautionary motive with mortality risks.

3.2 Why Inter Vivos Giving?

Although there are empirical studies[11] showing that parents are not flexible in substituting a bequest with a inter vivos gift given the tax scheme of which supports a cheaper tax-price for a gift[12] as much as expected by theoretical studies, statistical evidences still imply a significant role of inter vivos giving in improving a recipient's welfare at margin. This section is to provide the statistics in emphasizing the effect of small inter vivos giving on a recipient's lifetime saving and income. Lifetime profiles of income, assets, debt and net worth are derived from the pseudo panel and drawn in two different groups, recipients and non-recipients by a corresponding type of intergenerational transfer.

When we examine the saving behavior of gift-recipients in relative to bequest-recipients, inter vivos giving improves the permanent income of a recipient significantly, particularly when it is transferred when children-recipients are younger than 45 years old. To elucidate the impact of inter vivos giving on a recipient's saving over the lifetime, Figure 1 compares the empirical net worth profiles according to a type; a general transfer-recipient, a bequest-recipient, and a gift-recipient. The

[9] In discussing other types of parental support which is possibly defined as giving, there are some concerns on the data that omits parents' investment in children's education or medical expenses. I exclude them for matching the definition of giving with the suggested by IRS gift tax filing form (I-709) and thus the model can be calibrated by matching with the reported data.

[10] As the survey asks the method for each transfer (respondents are to report the number of transfers in maximum 3), one could indicate the answer more than one if ever received.

[11] See some empirical studies on a estate/gift tax system such as 05.

[12] A major change in the gift tax system for these years is the Taxpayer Protection Act of 1997. TPA phased in an increase in the applicable exclusion amount to $1,000,000. The most recent modification of the gift tax is held by the Economic Growth and Tax Relief Reconciliation Act of 2001 by lowering the rates and increasing the applicable exclusion amount. In Obama administration, it is decided to keep the scheme of 2009 after the estate tax repeal in 2010. Taxpayers may generate any type of intergenerational transfer in a strategic way of considering the tax rule change.

pattern emphasizes giving's contribution when a child receives it at young age (between 25 and 45 years old). Although we exclude the net worth originated from business to avoid over-sampling wealth attributed by ownership of home, a farm with no farm business or a business, the main contribution is observed by a financial asset in amplifying the wealth accumulation for these young gift-recipients (Figure 2). Its welfare gain mostly realizes through the appreciated gains from the inherited financial assets in association with a business ownership such as corporate bonds, and stocks. Particularly, the gains to few outliers who drive the mean wealth to the right tail are dividends, interest income from corporate bonds and mortgage-backed bonds, net annual income from a sole proprietorship or a farm, other businesses, investments, net rent, trusts, and royalties.

Table 4 substantiates these evidences by presenting asset composition of inter vivos giving tabulated from Statistical Bulletin of Panel Study on inter vivos giving published by the Internal Revenue Service. The vast majority of these gifts is held in cash. Real estate is not significantly gifted and it is also shown in the SCF[13] while stock[14] was the second most common asset gifted comprising 17 to 33 percent of the total.

The noteworthy welfare gain at margin is also found from tight liquidity among gift-recipients. In Figure 3, inter vivos giving is easily observed when they are in the need of resolving liquidity-constraints due to negative current income at early point of a lifetime and it actually helps resolving them as shown by the significant improvement in income. This observation supports the empirical study by Cox (1990) who emphasizes the role of inter vivos giving in loosening liquidity constraints in a timely manner. The gain, however, needs to be distinguished from high work efficiency inherited to a gift-recipient according to their wage profile in Figure 4 showing that a lower level of earnings among gift-recipients continues even after young adulthood.

Figure 5 provides some more evidences of faster relief of the constraint by earlier transfer; the lower amounts of debt are held by gift-recipients in relative to those of non-recipients. We may think of implications in Figure 5 in two different cause-

[13]There is no data on asset composition in the inheritances section from the SCF. However, the SCF surveys the origin of real estates, housing and other properties in the section of Housing and the choice of answers include Gifts/Transfer/Inheritance. According to author's calculation, 2 percent of "ever received" population is inherited housing on average over survey years and 17 percent received properties in any type of transfers. Data is available upon request.

[14]IRS report does not provide the detailed information on whether the stock is related with succession of a business ownership or as a financial asset.

and-effect scenarios such that asking help from parents seems the only choice for these people with the borrowing limit imposed by financial intermediaries and that receiving parental support looks like a cheap and prompt credit line before they join an official credit market. Although this section may not conclude which one comes first among a borrowing-constraint and parental support given these statistics, Figure 5 supports the significant collaboration between inter vivos giving and the resolution of liquidity crunch entailed by borrowing restriction.

4 Model

A general equilibrium model is populated by overlapping generations of 3-period-lived individuals[15] facing individual income risk but without aggregate uncertainty. A continuum of individuals in measure 1 is born at each period and the time is discrete. These individuals survive without any mortality risk until age 3, beyond which death is certain. We assume that there is zero growth rate of population.

4.1 Environment

4.1.1 Preferences

All individuals have identical preferences for consumption and inter vivos giving. The utility based on giving comes from the amount of giving by following the joy of giving utility form suggested by Blinder (1975). Individuals value finite streams of consumption and giving $\{c_i, g_i\}_{i=1}^{3}$ according to a constant relative-risk aversion type,

$$\mathbb{E}_0 \sum_{i=1}^{3} \beta^{i-1} [\left(\frac{c_i^{1-\sigma}}{1-\sigma} \right) + \Lambda_i \left(\frac{g_i^{1-\eta}}{1-\eta} \right)] \tag{1}$$

where σ and η are coefficients of relative risk aversion of consumption and giving, respectively and β is the subjective discount factor. $\mathbb{E}_0$ is the expectations operator conditional on information at birth. A normalized weight on the utility from inter vivos giving relative to the utility based on consumption, Λ_i is introduced into a utility function. We assume that the youngest generation does not have utility from gifts generation such as $\Lambda_1 = 0$ whereas other generations have positive utility from making the gift for their children,[16] $\Lambda_2 = \Lambda_3 = \Lambda$

[15] One generation is assumed to be continued for 20 years. An individual is born at 20-year-old and first introduced into a job market. One becomes a parent by having a child at the second period (40-year-old), the difference in age between a parent and a child, subsequently, is set 20 years. For simplicity, an individual represents a household. A family in the context may include more than one household since independent households could be tied in kinship.

[16] There is no generation-skipping intergenerational transfer.

Joy of giving is simple[17] but consistent with data in explaining that consumption of parents and heir is independent of the income distribution among them. This framework also reflects the imperfect substitution of the transfer with debt according to Andreoni (1989) who substantiates this impure altruistic giving by studying the warm-glow effect[18] of the intergenerational transfer. I adopt an additively-separable utility function to disentangle the effect of giving on current consumption from that on the entire utility; we can compare an agent's saving and consumption plans when $\Lambda = 0$ with those with $\Lambda > 0$. When analyzing the welfare effect of lowering the gift tax, the result section presents the welfare gain decomposed into the gain from consumption and that from giving by exploiting this functional form.

4.1.2 Earnings

At the beginning of each period until the retirement age, $i = 3$, individuals receive a draw from nature determining their efficiency in working. A labor endowment given by $\bar{h}$ depends on the individual's age i and on an idiosyncratic labor efficiency shock ε, the capacity to produce income out of labor. The efficiency state $\varepsilon \in E = \{\epsilon_1, ..., \epsilon_N\}$ is assumed to follow finite-state, first-order Markov process with the transition probability matrix $\pi(\varepsilon' \mid \varepsilon)$, where ε' denotes next period's efficiency index drawn by nature. Let $f(\epsilon)$ denote the unconditional probability of $\varepsilon = \epsilon$. Employed individuals earn the efficiency-dependent wage income $w\bar{h}(\varepsilon)$, where w is the marginal product of labor. After retirement, individuals receive social security benefits, ss which are financed by payroll taxes collected from the working generations.

4.1.3 Household budget constraints with inter vivos giving

At the beginning of a given period, individuals learn their income stream which are composed of the after-tax capital income given the market interest rate, the deterministic giving transferred from their parents, and the after-tax wage income earned while working or the social security benefit retained in the retired period. Given the total income in a period, they choose their asset holding, consumption, and giving. The choice of giving is disparate corresponding to the age of each generation for example, the young generation (a child) does not perform the giving

[17] This impure altruistic utility form allows us to directly measure the amount of giving and to estimate values related with the amount of giving such as the aggregate gift tax.

[18] Andreoni (1989) names it a warm glow effect as he finds that parents are unwilling to perfectly substitute the transfer for debt; hence they keep some of their "wealth" for themselves. According to his argument, if people enjoy making gifts or bequests, then the warm-glow effects will always dominate altruism and consumption will increase in the period of the debt is incurred

as he is born without a child whilst the oldest generation (a grandparent) makes gifts but cannot receive it from anybody because his parent is dead. The heir is in debt to the family lineage with an obligation to give back to a child as if inter vivos gifts were made in return for received gifts from one parent. By committing indirect reciprocities between three generations, individuals rely on this process of debt creating and payment in increasing wealth. A flow chart is shown in Figure 6 presents the timeline of individuals' decision making.

Let V_i be the value of the objective function of an age i-individual on a state determined by beginning-of-period asset holdings a_i, the giving from parent $\widehat{g_{i+1}}$ and a realized labor efficiency state ε_i. The optimization problems of the three generations are as follows:

- *The Old Generation's Problem* ($i = 3$)

$$V_3(a_2, ss) = \max_{\{c_3, g_3\}} [U(c_3, g_3)] \tag{2}$$

s.t.

$$c_3 = (1 + r(1 - \tau_k))a_2 + ss - \left(\frac{1}{1 - \tau_g}\right) g_3 \tag{3}$$

where r is the marginal product of capital and τ_k is the capital income tax rate remaining constant throughout periods. A pair of policy functions from solving the problem is $\{c_3(a_2, ss), g_3(a_2, ss)\}$. When generating $g_3(a_3, ss)$, parents are subject to the gift tax rate, τ_g. The distribution of assets is $\Psi_2(a_2)$ inducing the distribution of giving $\Phi_3(g_3)$ while $\psi_2(a_2)$ denoting the density of assets and $\phi_3(g_3)$ describing that of giving.

- *The Middle Generation's Problem* ($i = 2$)

$$V_2(a_1, \hat{g_3}, \varepsilon_2) = \max_{\{c_2, a_2, g_2\}} [U(c_2, g_2) + \beta V_3(a_2, ss)] \tag{4}$$

s.t.

$$c_2 + a_2 \leq (1 + r(1 - \tau_k))a_1 + (1 - \tau_w)w\bar{h}(\varepsilon) + \widehat{g_3} - \left(\frac{1}{1 - \tau_g}\right) g_2 \tag{5}$$

and

$$a_2 \geq 0 \tag{6}$$

where τ_w is the payroll tax rate and remains constant throughout periods. As children of the living grandparent-generation, they receive the giving which is denoted by $\hat{g}$ and exogenously given from the distribution of the gift $\hat{\Phi}(\hat{g_3})$ which is consistent with $\Phi_3(g_3)$. The policy functions determined by solving

(4) are $c_2(a_1, \hat{g_3}, \varepsilon_2), a_2(a_1, \hat{g_3}, \varepsilon_2)$ and $g_2(a_1, \hat{g_3}, \varepsilon_2)$. And $\Phi_2(g_2)$ denotes the distribution of the gift from middle-aged to young while letting $\phi_2(g_2)$ be the density.

- *The Young Generation's Problem* ($i = 1$)

$$V_1(\widehat{g_2}, \varepsilon_1) = \max_{\{c_1, a_1\}} [U(c_1) + \beta \sum_{\varepsilon} \int_{\hat{g}} V_2(a_1, \widehat{g_3}, \varepsilon_2) \pi(\varepsilon_2 \mid \varepsilon_1) d\hat{\Phi}_3] \tag{7}$$

s.t.

$$c_1 + a_1 \leq (1 - \tau_w) w \bar{h}(\varepsilon_1) + \widehat{g_2} \tag{8}$$

and

$$a_1 \geq 0 \tag{9}$$

Given $\hat{g_2}$ and its distribution $\hat{\Phi}(\hat{g_2})$, determined exogenously, the policy functions $c_1(\hat{g_2}, \varepsilon_1)$ and $a_1(\hat{g_2}, \varepsilon_1)$ are solved. Let $\Psi_1(a_1)$ denote the distribution over the end of period assets induced by the policy function $a_2(\hat{g_2}, \varepsilon_1)$ when letting $\psi_1(a_1)$ denote the density. A fraction of $f(\epsilon)$ of the population have the shock ϵ when they are young.

4.1.4 Technology

A firm produces a final good, Y in a production function $F(\cdot)$, strictly increasing in inputs, strictly concave, and homogeneous of degree one. It has decreasing marginal products and obeys the Inada conditions. By following these conditions, Cobb-Douglas production function is introduced with the fixed technology level and capital's share of output α by,

$$Y = F(K, L) = K^{\alpha} L^{1-\alpha} \tag{10}$$

where K and L are aggregate value of factors, capital and labor inputs. With constant returns to scale, the number of firms is assumed to be single without loss of generality. The profit-maximizing firm determines the real return to capital net depreciation, δ and the real wage according to the first order conditions such as,

$$r = F_K(K, L) - \delta = \alpha K^{\alpha - 1} L^{1-\alpha} - \delta \tag{11}$$

$$w = F_L(K, L) = (1 - \alpha) K^{\alpha} L^{-\alpha} \tag{12}$$

4.1.5 Government

Social security is assumed to balance its payroll tax budget every period in the steady state. We also assume that the social security retirement benefits to GDP and the replacement ratio remain constant. At each period, the government finances G of goods and services by revenues collected from the capital income tax and the gift tax. The government spending on goods and services adjusts to the tax revenue so that the budget is balanced at each period. The government's revenue comes from T_k and T_g denoting, respectively the total capital income tax and the aggregative gift tax,

$$G = T_k + T_g \tag{13}$$

4.2 Stationary Equilibria

In order to limit our attention to stationary equilibria in which prices, wages and interest rates are constant across time, we start with describing heterogeneity in the economy at a point in time. At a point in time, individuals are heterogeneous in their age i and in their state s. Let $s = (a, \hat{g}, \varepsilon) \in S = A \times \hat{G} \times E$ where $A \subset R^+$, $\hat{G} \subset R^+$ and $E = \{\epsilon_1, ..., \epsilon_N\}$. For each $S \in S(X)$, where $S(X)$ is the Borel $\sigma - algebra$ on S, let $\Theta_i(S)$ denote the probability measure of i-aged individuals of type $s \in S$ defined on subsets of the state space as a proportion of all age i individuals. By letting μ_i define the fraction of age i individuals in an economy, $\mu_i \Theta_i(S)$ then denotes the measure of age i individuals with $s \in S$ with respect to the entire population of individuals in the economy. The distribution of individual states at birth is determined by the exogenous initial distribution Θ_1 by considering that all individuals start their lives with no assets. For all $S' = A' \times \hat{G}' \times E' \in S(X)$, and all $s = (a, \hat{g}, \varepsilon) \in S$, the distribution of individual states across age $i = 1$ is given recursively as follows:

$$\begin{aligned} &Prob(a_i = a', \widehat{g_{i+2}} = \hat{g}', \varepsilon_{i+1} = \epsilon') \\ &\quad = \int_{\hat{g}} \sum_{\varepsilon} Prob(a_i = a' \mid \widehat{g_{i+1}} = \hat{g}, \varepsilon_i = \epsilon) \\ &\quad \cdot Prob(\widehat{g_{i+2}} = \hat{g}') \cdot \pi(\varepsilon_{i+1} = \epsilon' \mid \varepsilon_i = \epsilon) \cdot Prob(\widehat{g_{i+1}} = \hat{g}, \varepsilon_i = \epsilon) \end{aligned} \tag{14}$$

Or

$$\Theta_{i+1}(S') = \int_{\hat{g}} \sum_{\varepsilon} \pi(\varepsilon' \mid \varepsilon) d\Theta_i(S) \text{ for all } S \in S(X) \tag{15}$$

For the generation $i = 2$:

$$\begin{aligned} &Prob(a_i = a') \\ &\quad = \int_{\hat{g}} \int_{a} \sum_{\varepsilon} Prob(a_i = a' \mid a_{i-1} = a, \widehat{g_{i+1}} = \hat{g}, \varepsilon_i = \epsilon) \\ &\quad \cdot Prob(a_{i-1} = a, \widehat{g_{i+1}} = \hat{g}, \varepsilon_i = \epsilon) \end{aligned} \tag{16}$$

Or

$$\Theta_{i+1}(S') = \int_{\hat{g}} \int_{\{a:a'=a^\star(a,\hat{g},\varepsilon)\}} \sum_{\varepsilon} d\Theta_i(S) \text{ for all } S \in S(X) \tag{17}$$

The transition function describes the probability that an age i individual moves to the set S' next period given that the individual's current state is s. The transition function is imposed in an equal fashion based on the optimal decision rule on asset holding $a^\star$, and the pre-determined distribution of the giving from a parent, $\hat{g}$ and by the transition probabilities on the labor efficiency shock ε with Markov chain $\pi(\varepsilon' \mid \varepsilon)$.

Definition: *Given a set of time-invariant fiscal policy arrangement* $\{\tau_w, \tau_k, \tau_g\}$*, a stationary equilibrium is a collection of value functions, individual policy functions* $\{c_i(\forall i), a_i(\forall i \leq 2), g_i(\forall i \geq 2)\}$*, age-dependent but time-invariant measures of age types* $\Theta_i(S)$*, for each age* $i = 1, \ldots, 3$*, and relative prices of labor and capital* $\{w, r\}$ *for a representative firm, such that individuals solve the problem described above, the government budget constraint is satisfied, and the goods market clears. The following conditions hold in equilibrium:*

- *Given* $\{w, r\}$ *and government fiscal policy* $\{\tau_w, \tau_k, \tau_g\}$*,* $\{c_i(\widehat{g_{i+1}}, \varepsilon_i), a_i(\widehat{g_{i+1}}, \varepsilon_i)\}$ *with* $V_i(\widehat{g_{i+1}}, \varepsilon_i)$ *for* $i = 1$*,* $\{c_i(a_{i-1}, \widehat{g_{i+1}}, \varepsilon_i), g_i(a_{i-1}, \widehat{g_{i+1}}, \varepsilon_i), a_i(a_{i-1}, \widehat{g_{i+1}}, \varepsilon_i)\}$ *with* $V_i(a_{i-1}, \widehat{g_{i+1}}, \varepsilon_i)$ *for* $i = 2$ *and* $\{c_i(a_{i-1}, ss), g_i(a_{i-1}, ss)\}$ *with* $V_i(a_{i-1}, ss)$ *for* $i = 3$ *are policy functions which solve the functional equations (2), (4), (7).*
- *Input prices* $\{w, r\}$ *solve the firm's profit-maximizing problem by satisfying condition (11), and (12).*
- *Markets clear such that:*

$$\sum_i \mu_i \int_s a_i(s) d\Theta_i = K' \tag{18}$$

$$\sum_i \mu_i \int_s \bar{h}(\varepsilon_i) d\Theta_i = L \tag{19}$$

$$\sum_i \mu_i \int_s c_i(s) d\Theta_i = C \tag{20}$$

- *Law of Motion for Capital follows:*

$$C + K' + G = F(K, L) + (1 - \delta)K \tag{21}$$

- *The social security is self-financing by the payroll tax collection such as:*

$$\tau_w = \left(\frac{\sum_{i=3}^{3} \mu_i \int_s ss d\Theta_i}{\sum_{i=1}^{2} \mu_i \int_s w\bar{h}(\varepsilon_i) d\Theta_i} \right) \tag{22}$$

- *The aggregative taxes are*

$$T_k = \tau_k r \sum_i \mu_i \int_s a_i(s) d\Theta_i \tag{23}$$

$$T_g = \tau_g \sum_i \mu_i \int_s g_i(s) d\Theta_i \tag{24}$$

- *Government's budget equation (13) is satisfied.*
- $\forall i = 2, 3, \{g_i : g_i = g^*(\cdot)\}$ *is a sequence of the optimal decision rules on giving,* g^**, which converges in law to* $\hat{g}_i$*, that is,*

$$\lim Ł(g_i(\cdot)) = Ł(\hat{g}_i) \tag{25}$$

By the law of a random vector $(g_i^1, \ldots, g_i^n) = Ł(g_i^1, \ldots, g_i^n)$*, we mean it's joint distribution* $\Phi_i(g_i)$

5 Calibration

Most of parameters in a model economy are evaluated to match with the suggested features of an overlapping generation framework. While referring to the estimation from the literature, for some parameters which need to be estimated, particularly a set of those related with inter vivos giving, my calibration strategy is to match relevant moments of the aggregate data or to follow approaches studied in works on intergenerational transfer.

5.1 Preference

Table 5 lists the parameters of the model. I use the coefficient of relative risk aversion of 1.5, a value estimated and used in Kydland and Prescott (1982), Attanasio et al. (1999), Gourinchas and Parker (2002) and De Nardi (2004). The ratio between two risk aversion parameters, the wealth elasticity of intergenerational transfer $\frac{\sigma}{\eta}$ is set to 1 by referring to Blinder's argument in 1975 that the elasticity is to be 1 when one maximizes a homothetic utility function with the wealth of the current and all future generations as arguments.

I estimate the discount rate by observing the ratio across consumption in each period from Consumer Expenditure Survey (CEX) in the selected years matching with those of Survey of Consumer Finance. By following Laitner (2001)'s method for calibrating his beta, the discount rate is estimated at 0.975 and remains fixed for all periods.[19] Individuals are ex ante identical, in the sense that they share the same utility function and the same discount rate and that they face the same stochastic labor earnings but are ex post heterogeneous because they deal with different realizations of such shocks. I use worker's efficiency shocks process suggested in Cagetti and De Nardi (2006). They take the observations on entrepreneurs by focusing on the fact that households own and manage privately held businesses and thus they make up a large fraction of rich people in the data[20].

In an aggregate economy, the steady state level of the ratio of capital to output is set by 3 following Auerbach and Kotlikoff (1987). With targeting the capital stock, I refer to the measure by Cooley and Prescott (1995) on the depreciation rate of the aggregate capital, 4.8 percent and the endogenous interest rate of 6 percent. The production elasticity of capital is set to 0.36 referring to Prescott (1986), Cooley and Prescott (1995), and Rios-rull (1996).

[19]Some overlapping generation frameworks also suggested the discount rate less than 1 such as 0.9375 in Fernandez-villaverde and Krueger (2004), and 0.9852 in Auerbach and Kotlikoff (1987) and Hubbard and Judd (1987). The discount rate is usually calibrated less than but close to 1 in much of the literature. In particular, the value is similar to the one suggested in Hansen and Singleton (1983) and Hotz et al. (1988) who estimated their beta ranged between 1.0123 and 1.2041.

[20]In contrast to the deterministic efficiency scales suggested in Imrohoroglu et al. (1998) and Hugget (1993), I followed the stochastic efficiency scale with Markov process by matching with observations of entrepreneurship in Cagetti and De Nardi (2006). De Nardi (2004)'s estimation in income quintiles are also related with this estimation.

5.2 Joy of Giving

According to the study by USDA (2011) on the percent of household expenditure attributable to children, husband-wife families contribute to children's consumption by 18 percent on housing, 16 percent on food, and 18 percent on child care & education expenses to children. The similar portion is concluded in Engel and Rothbarth's studies; near 30 percent of an annual income of one-child family aims at the cost of children. The estimates by these studies, however, may imply a different weight on giving in parents' utility of the paper because they mainly focus on the costs of children within a consumption unit (CU), which are typically observed in a family with children younger than 18 years old. To find parents' joy of giving to independent CU of their children older than 25 years, I first find the representative amount of popular forms of inter vivos giving in Table 4, i) cash; ii) real estates; iii) financial assets. By estimating the amount of each form separately, I find that the average fraction of the total amount of gifts is around 21.74 percent of a household's annual income. The procedure on finding the weight of each component is described in Appendix B.

Nishyama (2002) documents the alternative measure of the relative size of the intergenerational transfers by observing the aggregate amount of flow gifts from the SCF published in 1993-1997 and from the adjusted taxable estates in taxable returns in federal estate tax returns for 1997. Both flows show 0.3 percent of the total private wealth in his paper and he argues that this is underestimated as there is a small sample of decedents in data. Referring the similar approach which is also exploited in Gale and Scholz (1994), I first find the physical capital stock[21] of the US between 1947 and 2010, and then transform the suggested share of transfer wealth into a flow value so that the gift amount created from a model economy is easily compared with output or the capital stock. Finally, the calibration target on the aggregate flow of giving is set to generate 20 percent of net worth based upon the aggregate gifts in a model economy.

[21]The aggregate wealth here is quarterly measured between 1964 and 2008 by the cost of net stock of fixed assets and consumer durable goods(equipment, software, and structures including owner-occupied housing) owned by private business and non-profit institutions or by government. (Bureau of Economic Analysis). By calculating the life-cycle wealth share, Kotlikoff and Summers (1981) estimate the intergenerational bequests as much as 17 percent of the aggregate wealth and Modigliani (1988b) adjusted their estimation. Some studies such as Modigliani (1988a) and Hurd and Mundaca (1989) use direct surveys in computing the transfer wealth. Their estimation of transfers is less than 20 percent. All bequests other than intraspousal is estimated by 18.5 percent in Menchik and David (1983). Barlow et al. (1966) analyzes response to survey questions on fraction of wealth transfers, and concludes 1/7 of the total wealth. Finally, the share of inter vivos giving is discussed in Gale and Scholz (1994) by using 1983-1986 survey of consumer finance. Their estimation on intended transfers such as gifts from parents to adult children living in a separate household is at least 20 percent of the aggregate wealth.

5.3 Taxes

In a government's problem, I use the value of the replacement ratio for the social security payment in Imrohoroglu et al. (1998) while balancing the revenue from payroll taxes with the aggregate social security benefits.

In this paper, two taxes are introduced in association with changing the price of inter vivos giving. The one is the estate/gift tax obliged for givers and the other is the capital income tax which encourages earlier transfer since a part of the tax base can be shifted to a recipient from a parent's perspective. The aggregate gift tax amount documented in the Budget of the United States Government is not chosen as a calibration target with regards to its small size[22] of collection with all exemption rules and deductions. A strategic motive possibly distorts the decision on a giving decision and its tax return when the decision is encouraged by the predicted changes in a tax scheme. Instead, the tax rate is calibrated by matching it with its historical effective rate, which is applied for the amount of gifts in a progressive style. I use the representative effective rate, 11.30 percent[23] by the weighted fraction of total tax paid given total gifts in an aggregate sense. Each weight equals to the number of files in a corresponding return category relative to the total number of gifts filed in the summary of "Gift Tax Returns Filed" from 2003 to 2010 published by Internal Revenue Service.

6 Results

This section examines the degree to whether a calibrated economy matches the US wealth distribution observations when models contain inter vivos giving and income heterogeneity. Subsequently, in order to find the role of inter vivos giving in wealth accumulation, it analyzes the possible long-run consequences of the elimination of the gift tax by the changes in aggregate capital accumulation and average consumption over the lifetime. The net asset holdings are noted as the concept of wealth without considering human capital in following a typical measure of physical

[22]the ratio of the aggregate gift tax revenue to GDP instead of letting the capital income tax rate to balance out the government budget. According to data in the Budget of the United States Government, Fiscal Year 2001: Historical Tables prepared by White House, the average ratio over 1947 to 2009 is 2.5 percent. The tax revenue, however, is smaller than the revenue designed in a model economy because the exemption level or other credits and deductions are not considered. Since 1945, estate and gift tax receipts have consistently remained near or below 2 percent of federal revenues. In the 2007 receipt, 87 percent ($364 billion) is collected by the estate tax and the 13 percent is of the gift tax ($56 billion) (SOI Bulletin, Summer 2011, IRS).

[23]The statutory gift tax rate has been studied in some public policy literature such as Joulfaian (2005), at 50 percent generating the effective rate of 20 percent.

capital in US data.

6.1 Wealth Distribution

Table 6 compares the US economy with models including inter vivos giving by presenting the results in aggregate capital and the wealth distribution. The results demonstrate that a model economy is capable of generating the US Gini coefficient but not wealth concentration among richest people as the wealth in the upper tail of the distribution is under-estimated. In a model with positive joy of giving, the shape of the distribution is examined according to the statutory gift tax rate, 17 percent and 0 percent, respectively. Although Figure 9 displays a significant increase in giving by eliminating the gift tax, the wealth concentration has not changed substantially. This phenomenon is shown by no changes in the Gini coefficient and the percentage of wealth held by the richest population in Table 6.

Before concluding that these results are based on the limits of the model, such as the assumption of no mortality risks or no "bequest" motive in replicating the substantial size of wealth near death, it is noteworthy to find the role of giving in alleviating inequality. Intuitively, once voluntary inter vivos giving is available in a cheaper price, the fraction of poor young people in the whole population decreases; lowering the Gini coefficient. In the meantime, the wealth added to the liquidity-constrained accounts is offset by a decrease in the wealth of the top wealth-holders. In spite of the change in the individual membership of a certain income quintile, the coefficient may not capture this specific change because it does not measure wealth concentration by quintile or by generation. If it is true that there is no significant change in wealth inequality by eliminating the gift tax, the result motivates us to reconsider the objective of a current gift tax system, aimed at establishing equity by making a gift more costly among rich people for alleviating wealth inequality.

6.2 Wealth Profiles

Figure 8 presents the wealth profiles according to alternative assumptions on joy of giving (With Joy vs. Without Joy) and on the gift tax system (17% rate vs. 0% rate). Regardless of labor efficiency, which tax rate an individual faces or whether one is willing to make inter vivos giving, the wealth profile remains hump-shaped. More importantly, as observed from the empirical profiles of wealth in Figure 1, the simulation results show that one accumulates more wealth with a positive weight on the utility from giving. When giving is encouraged by elimination of the gift tax, one saves even more and provides more gifts resulting in a substantial in-

crease in the aggregate capital and output (Table 6). In Figure 8, individuals at the top quintile who give more as they get older and richer show that there is a higher probability of intergenerational redistribution of wealth within a rich family through giving (Figure 9).

It is worth noting the pattern that the transferred wealth not only increases saving at a young age but also contributes to higher saving even after one stops receiving a gift. Young individuals experience an instant increase in disposable income by receiving a gift from a parent. Subsequently, the income effect relaxes liquidity-constrained individuals from anxiety and even help them achieve particular aims such as purchasing houses, etc. After their disposition is secured, young individuals start to save more resulting in the higher saving rate maintained for the following periods. Although this saving aims at the gift which will be transferred to the next generation when they become a parent, the relative size of the increase is large enough to heighten the aggregate capital by 4.48 percent and the capital to output ratio by 1.6 percent. This is the wealth effect of inter vivos giving. The collaborative relationship between the income effect and the wealth effect is also found from empirical evidences on the long-term behavior of young recipients, for example active participation in a credit market (Figure 5) with more durable/non-financial assets in net worth (Figure 1). The pattern in Figure 1 indicates the role of durable goods, emphasized in Fernandez-villaverde and Krueger (2004), as a collateral in delivering more credits and relaxing a borrowing-constraint.

6.3 Welfare

If individuals decrease their consumption in exchange for generating the gift as a parent, they may be worsened in terms of welfare. In order to clarify mixed evidences on individuals' welfare gains and losses from participating in inter vivos giving (both generating and receiving), this section measures the efficiency gain by presenting compensating equivalent variation in consumption. In Table 7, when the gift tax is eliminated, the model economy experiences a welfare gain of 9.99 percent at the beginning of the young period and a gain also goes to the oldest generation shown of 3.25 percent gain in the last period. Another welfare aspect of a gift is found by a smoother consumption path in Figure 10 mainly attributing to the improved consumption in the young period. By efficiency, if I mean Pareto efficiency defined in Auerbach and Kotlikoff (1987),[24] lowering a gift tax is Pareto-

[24]In their context, Pareto-efficiency is a situation in which no generation can gain without some other generating being made worse off. Even though the study of Judd (1985) and Chamley (1986) for a Ramesy model with an infinitely-lived representative individual where the optimal capital tax rate in a

improving to eliminate the gift tax according to Figure 10 presenting heightened consumption for all generations.

In spite of a potential decrease in the middle generation's income, as they can make the transfer from the gift generated by the old, the analysis on the marginal value of the gift in an economy is closer to measuring its value realized by the young in comparison with that by the old. Even if we add intentional bequests,[25] the model may not undervalue the marginal value of liquidity for the old generation by considering that the gift in the last period includes a "bequest" motive as one plans to transfer in advance before the certain end of the life comes. The gain from the tax reform may be overestimated due to the design of the model without a generation-skipping gift and its tax.[26]

The paper reinforces the realized gain by having a borrowing-constraint because the constraint is usually effective for the young generation and the timing of transfer matters. The resolution of the constraint is entailed by higher asset accumulation of the young who has higher marginal propensity to save than that of a giver. The greater capital resulted by the increase in private saving heightens output, wage income and social security payment in a production economy in which every generation experiences welfare gains.

7 Sensitivity Analysis

As shown in the previous section, there are welfare gains from enhancing transmission of a part of resources from parents to young adults who are liquidity constrained with a non-negativity constraint on saving. The major driving force of making this stimulus reform Pareto-improving is the wealth effect in which an individual accumulates more assets by utilizing a part of future income when his marginal saving propensity is high. As an individual makes a decision by forward looking in the steady state, if one takes care of a possible decrease in consumption

second-best economy is zero in the long run, zero capital taxation need not be optimal in a life-cycle model (Atkinson and Sandmo (1980), Summers (1981), and Auerbach et al. (1983)) or models with incomplete markets with borrowing constraints (Aiyagari (1994), Aiyagari (1995), and Imrohoroglu (1998)).

[25] If bequests are accidental based on precautionary saving under the assumption of uncertain lifetime like suggested by Carroll (1997) and Palumbo (1999), this dissertation may undervalue asset accumulation of the old.

[26] The model's miscount of a generation-skipping gift and the tax on this particular gift may inflate the gain from the reform because the model contains the possibility of double-taxing on the gift transferred from grandparents to children by fixing the scheme between one generation only. However, as presented in Table 2, the generation-skipping gift is only observed among less than 17 percent of the total participants and the results from the model may not necessarily distort the implication from a real world.

in the future more than an increase in current income, a prominent implication of inter vivos giving can be different than what is suggested in the previous section. In finding the robust welfare implication from lowering the gift tax rate, I assess the changes in the capital stock, the output, the market wage, and the welfare measure according to the change in individual preference in future consumption.

This section first provides a sensitivity check on the suggested results by experimenting different values on risk-averseness, σ.[27] In Table 8, the aggregate values such as capital stock, output and wage increase as an individual becomes more risk-averse. With higher risk-averseness, his intertemporal elasticity of consumption becomes lower and he prefers smoother consumption path over the lifetime. Facing uninsurable shocks during working periods, in particular, the marginal value of inter vivos giving is enhanced as his use of the gift boosts precautionary saving and its insurance role. Consequently, this increase in private saving contributes to a substantial increase in the aggregate capital stock and the wage rate. An individual experiences the greater welfare gain with higher σ, shown by an increase in compensating variation in consumption for both a newborn and the old generation in Table 8.

Secondly, the role of the discount rate, β is discussed by measuring welfare gains according to different values of β. There is an obvious decrease in the gains from elimination of the gift tax when an individual is not patient. This is another way of looking at the dominant power of the wealth effect even when an individual whose current consumption is more important than the future consumption evaluates inter vivos giving high in the long run. If he does not save with parental support but spend most of it in consumption, the marginal value of the gift is less than the opportunity cost of making it in the long run with the discount rate lower than the benchmark. The welfare gains from lowering the gift tax rate even disappear as the gift is not transmitted to the accumulated capital stock in an economy because the resource of every generation shrinks by a decrease in the wage rate and the social security payment. Individuals with higher risk-averseness experience only a slight improvement in welfare when old owing to the weaker link from the gift to the output in the steady state.

The welfare gain from lowering the gift tax rate is consistent with the benchmark parameter values on individual tastes, σ greater than one and β around 1.1,

[27]To keep consistency, the wealth elasticity of intergenerational transfer is set 1 at each value of σ by setting η=σ.

respectively. The size of the gain, however, diminishes as the individual has the higher intertemporal elasticity of consumption and the lower discount rate on future consumption. How intensive the link from the gift to private saving and to the total capital stock, the wealth effect is emphasized in measuring the comparative impact of parameters on the welfare gain.

8 Conclusion

This paper examines Pareto-improving aspects of inter vivos giving by studying an applied life-cycle model built on the observed features of giving while generating the wealth inequality resembling the US observation. The main modifications adopted in the model are a relative weight on the utility from making the gift, a borrowing constraint, idiosyncratic labor income shocks and absence of markets for insuring this uncertainty. In order to answer the question whether we need to encourage more inter vivos giving, the elimination of a gift tax shows that the wealth effect contributes to making a smoother lifetime consumption path with greater giving, a higher saving rate, and an increase in the capital stock in the steady state. Pareto-improving aspects of inter vivos giving are emphasized by its role in reallocating idiosyncratic income shocks across generations and in reducing the probability of being liquidity-constrained in the young period. If one's goal is to realize the gain from taxing the inter vivos giving, the model suggests that the current tax system deserves consideration from the steady-state point of view because there is the marginal gain from transferring money to the young generation while the Gini coefficient shows no significant change after eliminating the gift tax. There is still much room for discussion in modeling inter vivos giving as the model does not produce the feature of the US wealth distribution such as wealth in the extreme upper tail of the distribution in spite of the capability of the model in generating the US Gini coefficient.

There are some interesting issues to be studied when extending this research from a public policy maker's point of view. First, it is necessary to model a current tax scheme in a more sophisticated way by including the progressive rate upon the amount of giving, and estate taxes on bequests or the exemption level (De Nardi (2004)). In addition, much of the micro literature[28] finds the strategic motive in making intergenerational transfers between bequests and inter vivos giving. These considerations in modeling the intergenerational transfer are necessary to replicate

[28]Poterba (2001), Bernheim et al. (2004), and Joulfaian (2005) study the empirical evidences in determinants of making intergenerational transfer and choosing the timing of the transfer.

observations and thus to analyze the welfare implication of the transfer realized in a real economy. Secondly, a labor supply choice can be contingent on inter vivos giving. When the labor supply is designed to be chosen endogenously in general equilibrium, the welfare implication of inter vivos giving may be different than what is suggested in this paper. The labor supply decision is also related with the efficiency scale which is tentatively affected by parental support through educational attainment controlled by a parental style (Parsons (1975)) and securing the initial resources for self-financing education in extended periods. In relation with endogenizing the productivity, De Nardi (2004) models inheriting work productivity from parents in describing the wealth inequality. The phenomenon can be considered through a stronger linkage such as parents' shaping children's taste in career choice or modeling entrepreneurs (Doepke and Zilibotti (2008) and Cagetti and De Nardi (2006)). These designs in modeling a parent-child linkage may be capable of producing significant wealth inequality observed from US data and of explaining the welfare implication of parental support.

A Data

The Survey of Consumer Finance (SCF) is widely used to study US household balance sheet of assets, income, and debt. As it surveys more than 4000[29] households sampled anew every three years, it is not easy to find the dynamic variation of the fixed household. To capture both the dynamic and the cross-sectional variation of the variables, I create the pseudo-panel from the selected surveys published between 1995 and 2010. Another distinctive feature of the data is its multiple imputation for nonresponse. I use all implicates when creating the main variables by taking the weighted average of each implicate in each year. Each variable is inflation-adjusted in 2007 dollars according to the Consumer Price Index for all urban consumers of all items published by the Federal Reserve Bank of St.Louis.

The definition of income in the paper follows the conventional definition suggested by Federal Reserve Board since 1995. In income, I include wages/salaries, earnings from business/farm/sole proprietorship, non-tax investment, interest income/dividends, gains or losses from the sales of stocks and bonds, net rent/royalties, compensation, child support/alimony, SSI, social security, pension, annuities, other disabilities retirement program, and any other earnings. The financial asset contain savings in transaction accounts, certificates of deposit, investments in saving bonds, bonds, stocks (both public and equities associated with business ownership), pooled investment funds, retirement accounts (IRA/Keogh) since 2004, other managed assets and any other saving plans. If a household has made loans in generating financial assets as indicated in the Section N of Financial Assets in the SCF, the loan amount is subtracted from the total asset value. All asset-related values are in market values at the survey year. The market values of brokerage accounts, margin loans, annuity, and cash values of life insurance plans are excluded. Non-financial assets include the market value of vehicles, primary residence, other residence properties, equity in non-residential property except the net worth of businesses such as partnership, sole-proprietorship, subchapter, other corporation and some other kinds. Any loans secured by residential property (mortgage payments), and other properties, lines of credit not secured, installment loans such as student loans and vehicle loans, and credit card balances are included in the amount of debt. Finally, the net worth is defined by subtracting the amount of debts from the sum of financial and non-financial assets.

Li and Yao (2007) provide a simplified procedure how to generate the pseudo

[29]The SCF in 2010 contains 6362 households by resampling the selected same households from those who surveyed in 2007. For details, see the SCF codebook of 2010 survey.

panel from serial cross-sectional data referring to Deaton (1985) and Fernandez-villaverde and Krueger (2004). Beyond connecting separate time-series cross-sectional data to build a certain cohort's weighted average behavior, the pseudo panel construction (so-called, a synthetic cohort technique) has some advantages due to its features such as no attrition problem and minimization of individual variability. I follow the procedure suggested by FRB SCF team with regards to sampling errors from multiple imputation in the construction of the representative statistics of the balanced panel such as mean, median and the coefficients of year and cohort fixed effects. I collected data of 64 cohorts born between 1915 and 1978. Each cohort cell contains 306 observations on average when we count the observations on each imputation.

$$y_{i,t} = \alpha + f(age:\theta) + \beta_{1,i} cohort_i + \beta_{2,t} time_t + \epsilon_{i,t} \tag{A.26}$$

A partial linear model is introduced to generate a non-linear relationship between age and the dependent variables as shown in the suggested equation (A.26). At first, data is kernel-smoothed with a bandwidth 5 to get tentative residuals. After I control constant and fixed effects of time and cohort from the residuals, the fitted $\widehat{y}_{i,t}$ is finally obtained by extracting the fitted residuals from the original dependent variable.

B Calibration: Joy of Giving

Each of three major forms of inter vivos giving implies different weights such as i) cash transfers: 2.4 percent; ii) real estate and financial assets transfers: 17 percent; iii) educational contribution: 1 percent. In total, the parameter estimating joy of giving is 21.74 percent relative to self-consumption, as obtained by the following estimates.

i) Cash Transfers: The average yearly amount of cash transfers reported by givers is \$1,766 for the selected survey years in the SCF. If the household income of an independent unit is assumed by the average income published in the SCF (greater than the average annual income before tax in CEX, for example it is \$62,481 in 2010), each household contributes 2.4 percent of income to children. This contribution is comparable to the cash attribution of total annual expenditures for all consumer units by CEX, 3.5 percent on average over the years of 2007 through 2010.

ii) Real Estate and Financial Assets Transfers: The added values from real estates and financial assets, attributed by parent-CU are from two main flows, the stream of housing services and the flow of income based on financial assets. Financial assets, in particular, mainly represent the ownership of an inherited or gifted business through dividend payments, loyalty and the fixed income from bonds. Since the annual flow of these stock values are important in estimating the size of gifts, both are transformed into the stream of implicit services by a typical hedonic regression.

$$Ln(V_{i,t}) = \beta_t X_{i,t} + e_{i,t} \tag{B.1}$$

With $V_{i,t}$ denoting the value of an i asset at t as in equation (B.1), $V_{i,t}$ is correlated with the traits $X_{i,t}$ of an underlying asset and an error term $e_{i,t}$. The examplary traits of housing are the value as a shelter, public services and operational values embedded in the value of a house. The stream of housing services is well-implied in the rental value $R_{i,t}$, as a portion of the cost of housing $V_{i,t}$ and the fraction C indicates the capitalization rate defined by an annual net income over the cost or value of an asset, at time t as noted in (B.2).

$$R_{i,t} = C_t V_{i,t} \tag{B.2}$$

By having $R_{i,t}$, the hedonic regression can be rewritten by equation (B.3) as the vector γ_t of the estimated percent of rent is associated with individual housing traits where $u_{i,t}$ denoting the residual.

$$Ln(R_{i,t}) = \gamma_t X_{i,t} + u_{i,t} \tag{B.3}$$

As our main objective is to estimate the flow amount of assets contributed by independent parents relative to that of the self-obtained assets, we may compare the capitalization rates without finding what Xs are given the sort of traits remains same no matter what the origin of assets. I first estimate the market value of housing and properties for recipients and non-recipients from the SCF and by finding the rental income from those assets, the capitalization rate for each group is obtained over the survey years. When C_t is a function of the user-cost of asset, which in turn depends upon the mortgage rates, depreciation and the expected future value of properties, the capitalization rate is fixed over time so that we can find the difference by comparing two constants. The average capitalization rate of self-obtained properties is 4.5 percent whereas inherited properties' rate is 10 percent. Having said that, a giver generates the stream of assets 2.2 times greater than a non-giving household. The capitalization rate of an inherited business is obtained by the same procedure and found near 6 percent of the underlying mar-

ket value of the stock. However, this finding is dropped according to higher rates found among self-built businesses which are seriously dominated by few outliers of big entrepreneurs.

Finally, I find the implied weight on the value of a property's stream from the percent distribution of total annual expenditures by major category for all consumer units in CEX 2007-2010. As shown in the summary statistics of the CEX, if a typical consumption unit spends about 34 percent of annual income for housing, a household, who receives housing service from the inherited properties, only needs to spend nearly a half of 34 percent.

iii) Educational Expenses: Although gift tax filers do not need to report the expenses on children's education, with regards to its significance suggested in the study of USDA (2011), I include education expenses of tuition fees, room and board costs for postsecondary institutions of children who are independent . In detailed expenditures files on educational expenses in the diary survey of the CEX (2010 and 2011), I find that CU provides $1,098.784 for educational spending of a person outside of CU on average. Baum et al. (2012) documents the similar amount of the net price for full-time students at public four-year colleges and universities, $1,110[30] for in-state independent students. The amount is nearly a half of the total educational expenses in the distribution of a representative CU, 1 percent of annual income.

C Model Simplifications and Numerical Solutions

An analytical solution for the problem does exist but difficult to be solved manually. I thus derive numerical solutions through value function iterations given the recursive nature of the problem. In order to solve the dynamic programming problem I put a logarithmically placed grid on the space of asset holdings at the middle period and at the old period, respectively. The number of grid points of each variable is 1000 for five-discrete-space Markov chains of labor efficiency. The algorithm for computing equilibrium solved in backward is referred to the endogenous grid algorithm described in Hugget (1993), Aiyagari (1994), Barillas and Fernandez-Villaverde (2007) and Carroll (2011). In writing Matlab codes, I

[30]This number excludes the net price for full-time students at public two-year colleges and universities. According to their report, the net price is $0 in two-year colleges by the substantial amount of grants from federal and state governments, institutions and private sources

referred the Matlab program written by Ravn, and Gauss code by Heer and Maussner (2007).

i) Guess the initial capital income tax rate
ii) Choose r
iii) Set K and w according to competitive input market conditions
iv) Pick the choice of saving at middle-aged, a_2^0 from the distribution spanned on 1000 grids on the asset space
v) As we already know that saving at old is known zero such as $a_3 = 0$ by no mortality risk assumption, solve the choice of giving at old, $g_3(a_2^0)$ according to the first order condition.
vi) Guess the choice of saving at young, a_1^0 from another distribution on 1000 grids of the asset space. Get $a_2(a_1^0, \hat{g_3}(a_2^0), \varepsilon_2)$ from the Euler condition and $g_2(a_1^0, \hat{g_3}(a_2^0), \varepsilon_2)$ according to the first order condition.
vii) Interpolate the distribution of $\hat{g_2}$ spanned on 1000 fixed grid points from the distribution of $g_2(a_1^0, \hat{g_3}(a_2^0), \varepsilon_2)$
viii) If $a_2(a_1^0, \hat{g_3}, \varepsilon_2)$ is approximately equal to a_2^0 such that such as $\mid a_2(a_1^0, \hat{g_3}, \varepsilon_2) - a_2^0 \mid \leq \epsilon$, for any small ϵ, stop. Otherwise, adjust the initial guess a_2^0 and go back to iv)
ix) Interpolate the distribution of $\hat{g_3}$ spanned on 1000 fixed grid points from the distribution of $g_3^\star(a_2^0 = a_2(a_1^0, \hat{g_3}, \varepsilon_2))$
x) Solve for $a_1(\hat{g_2}, \varepsilon_1)$ by solving the Euler condition
xi) If $a_1(\hat{g_2}, \varepsilon_1)$ is approximately equal to a_1^0 such that $\mid a_1(\hat{g_2}, \varepsilon_1) - a_1^0 \mid \leq \epsilon$, for any small ϵ, stop. Otherwise, adjust the initial guess a_1^0 and return to vi)
xii) Interpolate the distribution of $\hat{g_2}$ spanned on 1000 grid points from the distribution of $g_2^\star(a_1^0 = a_1(\hat{g_2}, \varepsilon_1))$
xiii) Get the wealth distribution at each period until it converges to the fixed distribution and get the new capital stock K'
xiv) If $r'(K', K)$ is approximately equal to r, $\mid r'(K', K) - r \mid \leq \epsilon$, stop. Otherwise, adjust the interest rate according to the Bisection method and return to ii)
xv) If the government budget is balanced stop. Otherwise, adjust the capital income tax rate according to Bisection method and go back to i)

The wealth distribution $(\Theta_1, \ldots, \Theta_3)$ is stationary and calculated by iterating on the law of motion for the age-wealth distribution (16). The initial guess for know Θ_1 is assumed to be Gamma distribution and it is normalized to sum to one at each update due to imperfect linear interpolation.

References

Aiyagari, R. (1994). Uninsured idiosyncratic risk and aggregate saving. *The Quarterly Journal of Economics*, 109(3):659–684.

Aiyagari, S. R. (1995). Optimal capital income taxation with incomplete markets, borrowing constraints, and constant discounting. *The Journal of Political Economy*, 103(6):1158–1175.

Andreoni, J. (1989). Giving with impure altruism: Applications to charity and ricardian equivalence. *The Journal of Political Economy*, 97(6):1447–1458.

Atkinson, A. and Sandmo, A. (1980). Welfare implications of the taxation of savings. *The Economic Journal*, 90(359):529–549.

Attanasio, O., Banks, J., Meghir, C., and Weber, G. (1999). Humps and bumps in lifetime consumption. *The Journal of Business & Economic Statistics*, 17(1):22–35.

Attanasio, O. P. and Browning, M. (1995). Conumption over the life cycle and over the business cycle. *The American Economic Review*, 85(5):1118–1137.

Auerbach, A. J. and Kotlikoff, L. J. (1987). *Dynamic fiscal policy*. New York, N.Y.: Cambridge University Press.

Auerbach, A. J., Kotlikoff, L. J., and Skinner, J. (1983). The efficiency gains from dynamic tax reform. *International Economic Review*, 24(1):81–100.

Barillas, F. and Fernandez-Villaverde (2007). A generalization of the endogenous grid method. *The Journal of Economic Dynamics and Control*, 31(8):2698–2712.

Barlow, R., Brazer, H. E., and Morgan, J. N. (1966). *Economic behavior of the affluent*. Greenwood Press.

Barro, R. J. (1974). Are government bonds net worth? *The Journal of Political Economy*, 82(6):1095–1117.

Baum, S., Ma, J., and Payea, K. (2012). Trends in public higher education: Enrollment, prices, student aid, revenues, and expenditures. *Analysis Brief, College Board Advocacy & Policy Center*, (May).

Becker, G. S. (1974). A theory of social interactions. *The Journal of Political Economy*, 82(6):1063–1093.

Bernheim, B. D., Lemke, R. J., and Scholz, J. K. (2004). Do estate and gift taxes affect the timing of private transfers? *The Journal of Public Economics*, 88(12):2617–2634.

Bernheim, B. D., Schleifer, A., and Summers, L. H. (1985). The strategic bequest motive. *The Journal of Political Economy*, 93(6):1945–1976.

Blinder, A. S. (1975). Distribution effects and the aggregate consumption function. *The Journal of Political Economy*, 83(3):447–475.

Browning, M., Deaton, A., and Irish, M. (1985). A profitable approach to labor supply and commodity demand over the life-cycle. *Econometrica*, 53(3):503–544.

Cagetti, M. and De Nardi, M. (2006). Entrepreneurship, frictions, and wealth. *The Journal of Political Economy*, 114(5):835–970.

Cagetti, M. and De Nardi, M. (2008). Wealth inequality: Data and models. *Macroeconomic Dynamics*, 12(2):285–313.

Carroll, C. D. (1997). Buffer-stock saving and the life cycle/permanent income hypothesis. *The Quarterly Journal of Economics*, 112(1):1–55.

Carroll, C. D. (2011). Solution methods for microeconomic dynamic stochastic optimization problems. *Lecture Notes, Department of Economics, Johns Hopkins University*.

Chamley, C. (1986). Optimal taxation of capital income in general equilibrium with infinite lives. *Econometrica*, 54(3):607–622.

Cooley, T. F. and Prescott, E. C. (1995). *Economic growth and business cycles*. Princeton: Princeton University Press.

Cox, D. (1990). Intergenerational transfers and liquidity constraints. *The Quarterly Journal of Economics*, 105(1):187–217.

Cox, D. and Japelli, T. (1990). Credit rationing and private transfers: Evidence from survey data. *The Review of Economics and Statistics*, 72(3):445–454.

Curtin, R. T., Juster, F. T., and Morgan, J. N. (1989). *Survey estimates of wealth: An assessment of quality*. University of Chicago Press.

Davies, J. B. (1981). Uncertain lifetime, consumption, and dissaving in retirement. *The Journal of Political Economy*, 89(3):561–577.

De Nardi, M. (2004). Wealth inequality and intergenerational links. *The Review of Economic Studies*, 71(3):743–768.

Deaton, A. (1985). Panel data from time series of cross-sections. *The Journal of Econometrics*, 30(1-2):109–126.

Doepke, M. and Zilibotti, F. (2008). Occupational choice and the spirit of capitalism. *The Quarterly Journal of Economics*, 123(2):747–793.

Fernandez-villaverde, J. and Krueger, D. (2004). Consumption and saving over the life cycle: How important are consumer durables? *Meeting papers from Society for Economic Dynamics*.

Gale, W. G. and Scholz, J. K. (1994). Intergenerational transfers and the accumulation of wealth. *The Journal of Economic Perspectives*, 8(4):145–160.

Gourinchas, P.-O. and Parker, J. A. (2002). Consumption over the life cycle. *Econometrica*, 70(1):47–89.

Hansen, L. P. and Singleton, K. J. (1983). Stochastic consumption, risk aversion, and the temporal behavior of asset returns. *The Journal of Political Economy*, 91(2):249–265.

Heer, B. and Maussner, A. (2007). *Dynamic general equilibrium modelling: Computational methods and applications*. Springer.

Hotz, V. J., Kydland, F. E., and Sedlacek, G. (1988). Intertemporal preferences and labor supply. *Econometrica*, 56(2):335–360.

Hubbard, G. R. and Judd, K. L. (1987). Social security and individual welfare: Precautionary saving, borrowing constraints, and the payroll tax. *The American Economic Review*, 77(4):630–646.

Hugget, M. (1993). The risk-free rate in heterogeneous-agent incomplete-insurance economies. *The Journal of Economic Dynamics and Control*, 17(5-6):953–969.

Hugget, M. (1996). Wealth distribution in life-cycle economies. *The Journal of Monetary Economics*, 38(3):469–494.

Hurd, M. D. and Mundaca, B. G. (1989). *The importance of gifts and inheritances amoung the affulent*. University of Chicago Press.

Imrohoroglu, A., Imrohoroglu, S., and Joines, D. H. (1998). The effect of tax-favored retirement accounts on capital accumulation. *The American Economc Review*, 99(4):749–768.

Imrohoroglu, S. (1998). A quantitative analysis of capital income taxation. *International Economic Review*, 39(2):307–328.

Joulfaian, D. (2005). Choosing between gifts and bequests: How taxes affect the timing of wealth transfers. *The Journal of Public Economics*, 89(11):2069–2091.

Judd, K. L. (1985). Redistributive taxation in a simple perfect foresight. *The Journal of Public Economics*, 28(1):59–83.

Kotlikoff, L. J. and Summers, L. H. (1981). The role of intergenerational transfers in aggregate capital accumulation. *The Journal of Political Economy*, 89(4):706–732.

Krueger, D. and Kubler, F. (2006). Pareto-improving social security reform when financial markets are incomplete!? *The American Economic Review*, 96(3):737–755.

Kydland, F. E. and Prescott, E. C. (1982). Time to build and aggregate fluctuations. *Econometrica*, 50(6):1345–1370.

Laitner, J. (2001). Secular changes in wealth inequality and inheritance. *The Economic Journal*, 111(474):691–721.

Li, W. and Yao, R. (2007). The life-cycle effects of house price changes. *The Journal of Money, Credit, and Banking*, 39(6):1375–1409.

McGarry, K. (2000). Inter vivos transfers or bequests? estate taxes and the timing of parental giving. *Tax Policy and the Economy*, 14(0):93–121.

Menchik, P. L. and David, M. (1983). Income distribution, lifetime savings, and bequests. *The American Economic Review*, 73(4):672–690.

Modigliani, F. (1988a). *Measuring the contribution of intergenerational transfers to total wealth: conceptual issues and empirical findings*. Oxford: Clarenton Press.

Modigliani, F. (1988b). The role of intergenerational transfers and life cycle saving in the accumulation of wealth. *The Journal of Economic Perspectives*, 2(2):15–40.

Nishyama, S. (2002). Bequests, inter vivos transfers, and wealth distribution. *Review of Economic Dynamics*, 5(4):892–931.

Palumbo, M. G. (1999). Uncertain medical expenses and precautionary saving near the end of the life cycle. *Review of Economic Studies*, 66(2):395–421.

Parsons, D. O. (1975). Intergenerational wealth transfers and the educaitonal decisions of male youth. *The Quarterly Journal of Economics*, 89(4):603–617.

Perozek, M. G. (1998). A reexamination of the strategic bequest motive. *The Journal of Political Economy*, 106(2):423–445.

Poterba, J. (2001). Estate and gift taxes and incentives for inter vivos giving in the us. *The Journal of Public Economics*, 79(1):237–264.

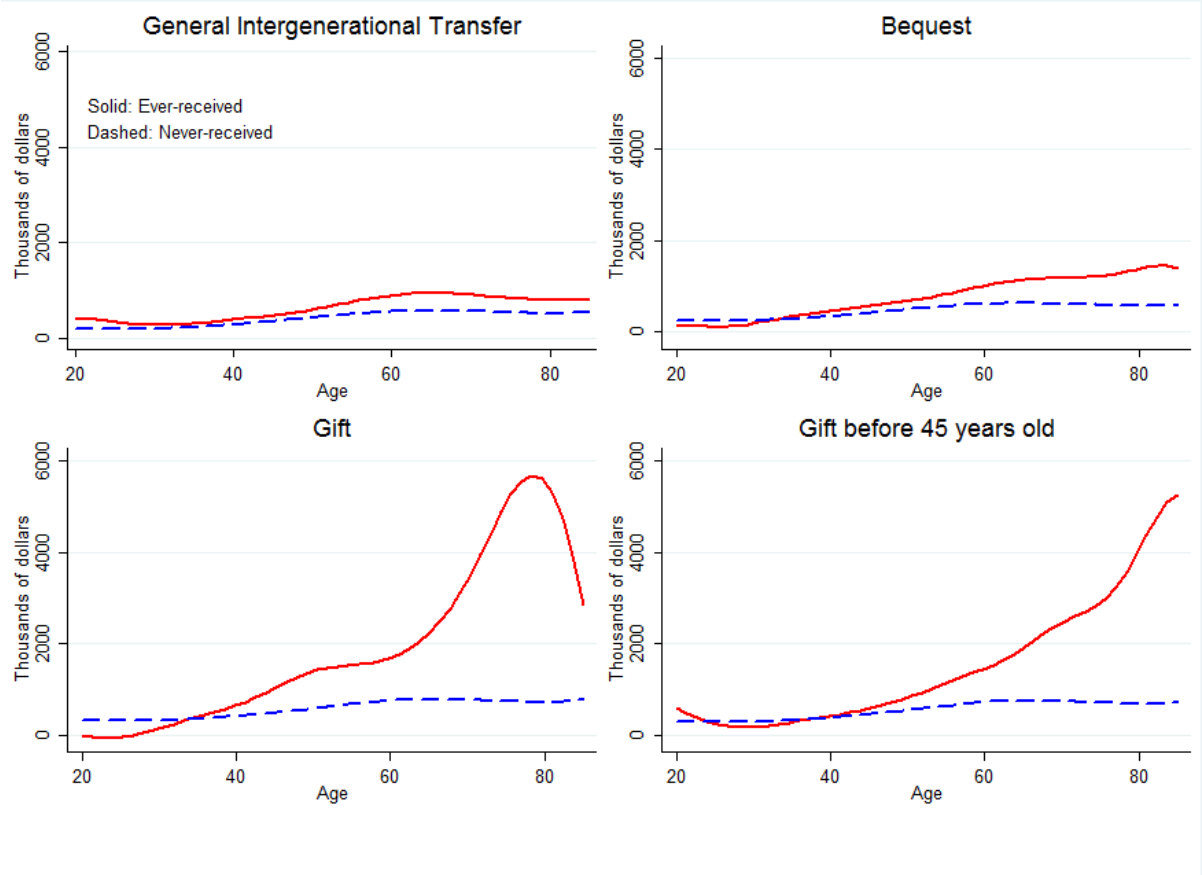
Prescott, E. C. (1986). Theory ahead of business cycle measurement. *Carnegie-Rochester Conference Series on Public Policy*, 25(1):11–44.

Rios-rull, J.-V. (1996). Life-cycle economies and aggregate fluctuations. *The Review of Economic Studies*, 63(3):465–489.

Summers, L. H. (1981). Capital taxation and accumnulation in a life cycle growth model. *The American Economic Review*, 71(4):533–544.

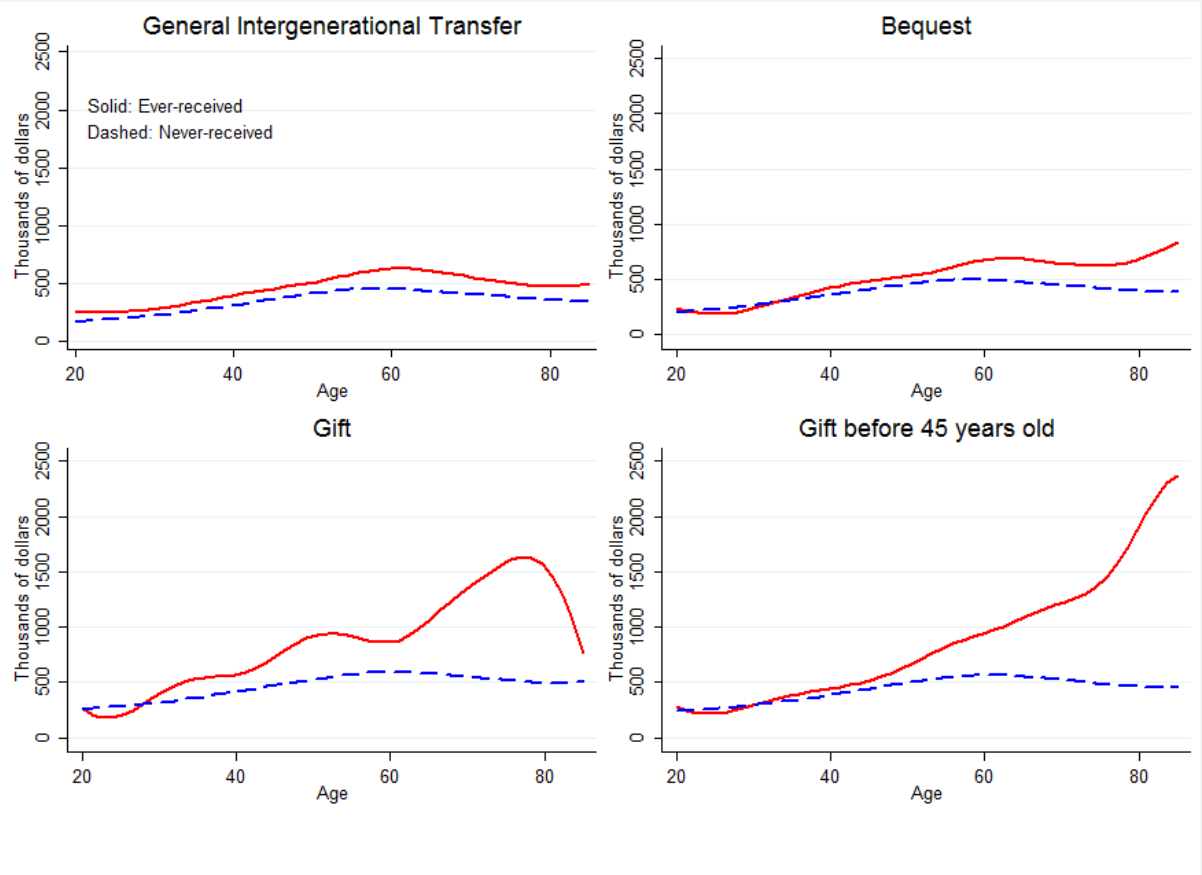
USDA (2011). Expenditures on children by families. *Miscellaneous Publication, Center for Nutrition Policy and Promotion*, 1528-2011.

Figure 1: Empirical Net Worth Profile[a]



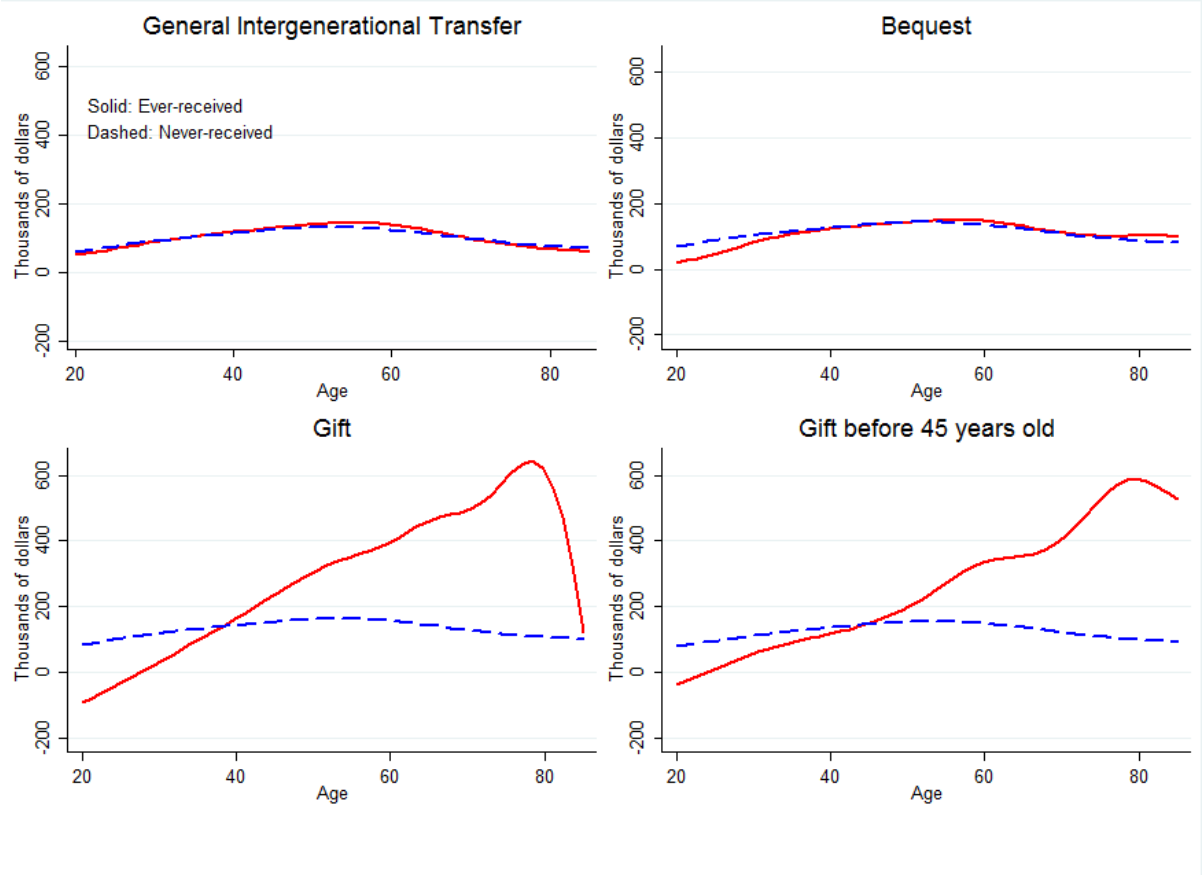
[a]Source: Author's pseudo panel constructed from the Survey of Consumer Finances. Despite the fact that the net worth of a business owned by a household is not counted, the market values of financial assets in association with business ownership and related income are included in the panel. The statistics in the Figure is sensitive with a few outliers at the right tail by the structure of the panel.

Figure 2: Empirical Non-financial Assets Profile[a]



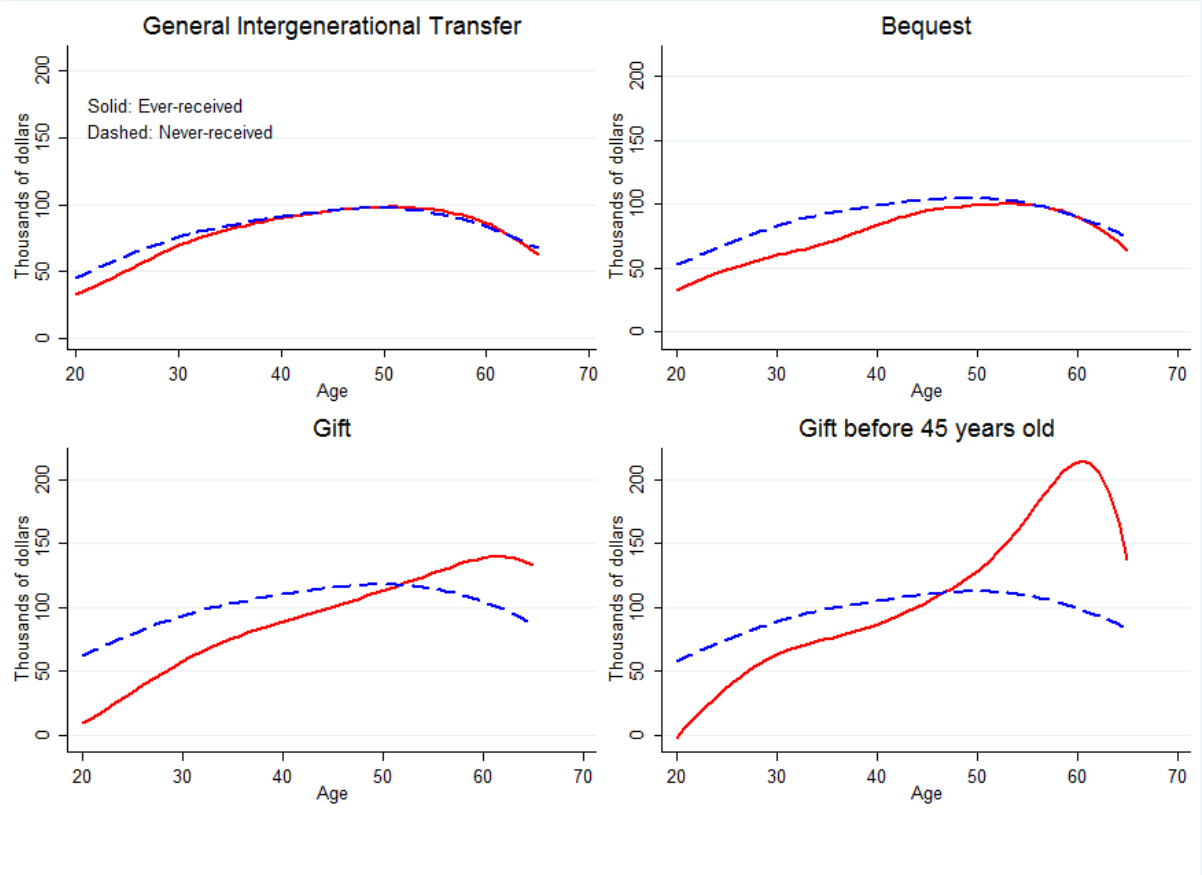
[a]Source: Author's pseudo panel constructed from the Survey of Consumer Finances. Despite the fact that the net worth of a business owned by a household is not counted, the market values of miscellaneous assets or other properties in association with business ownership are included in the panel. The statistics in the Figure is sensitive with a few outliers at the right tail by the structure of the panel.

Figure 3: Empirical Income Profile[a]



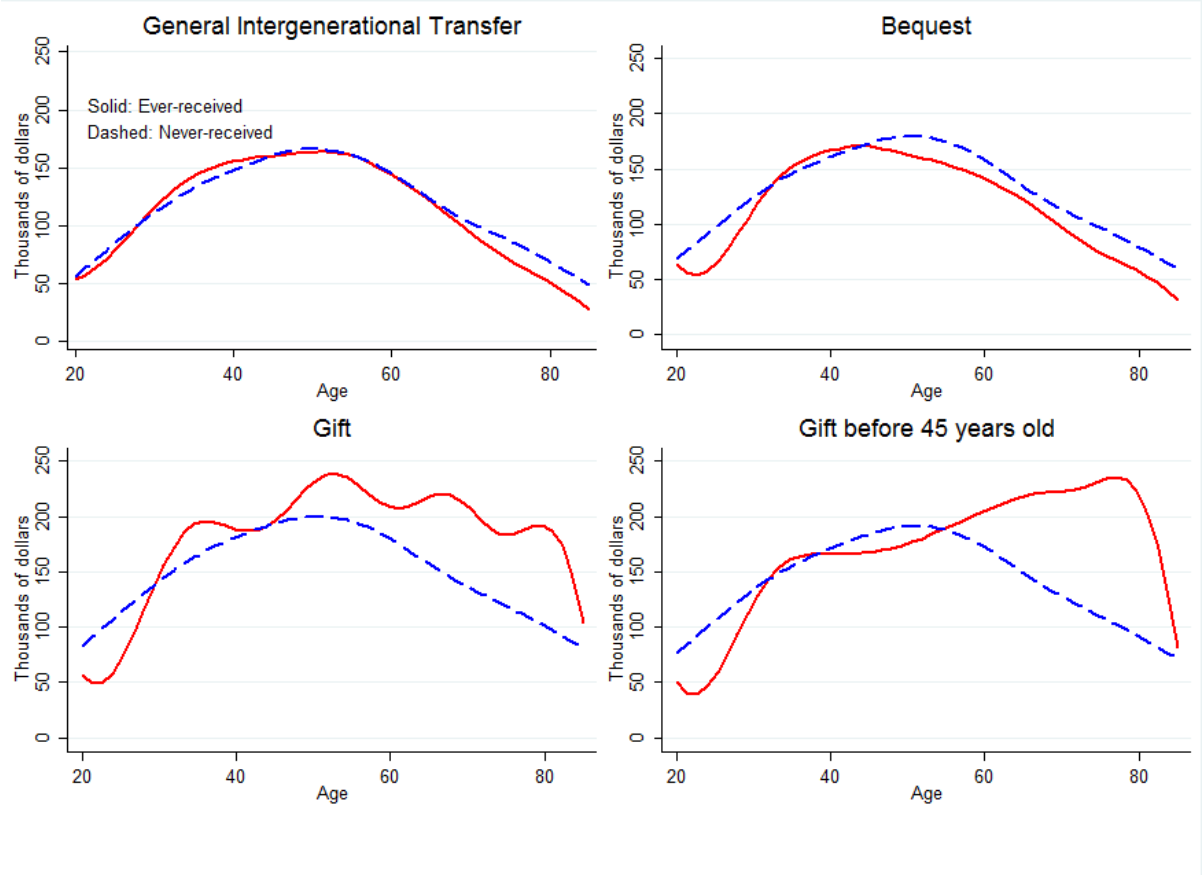
[a]Source: Author's pseudo panel constructed from the Survey of Consumer Finances. Despite the fact that the net worth of a business owned by a household is not counted, the market values of financial assets in association with business ownership and related income are included in the panel. The statistics in the Figure is sensitive with a few outliers at the right tail by the structure of the panel.

Figure 4: Empirical Wage Profile[a]



[a]Source: Author's pseudo panel constructed from the Survey of Consumer Finances. Despite the fact that the net worth of a business owned by a household is not counted, wage earnings and income in association with business ownership are included in the panel. The statistics in the Figure is sensitive with a few outliers at the right tail by the structure of the panel.

Figure 5: Empirical Debt Profile[a]



[a]Source: Author's pseudo panel constructed from the Survey of Consumer Finances.

Figure 6: Lifetime

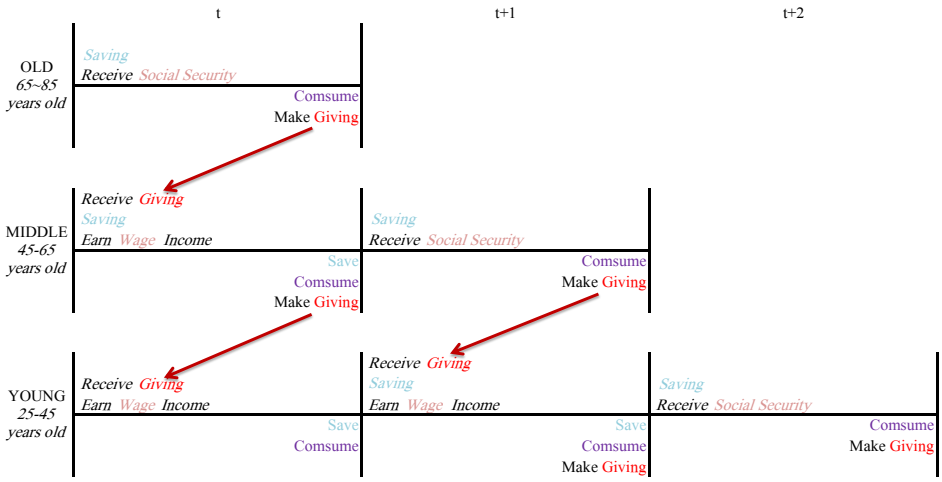


Figure 7: Lifetime Wealth Profile with Gift tax

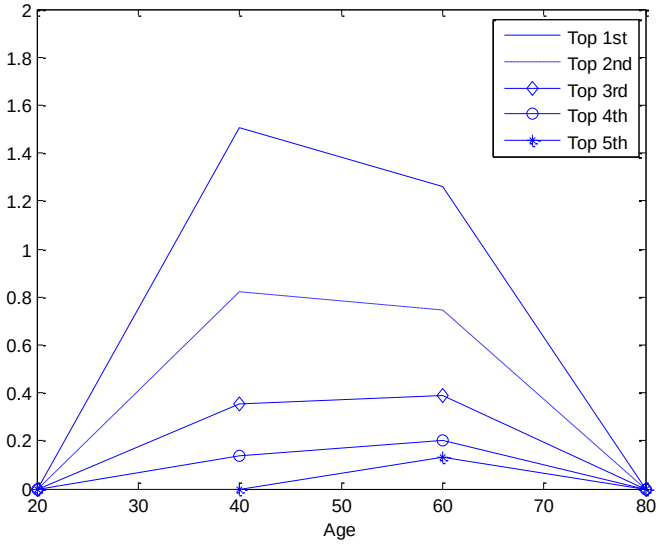


Figure 8: Wealth Profile by Wage Efficiency

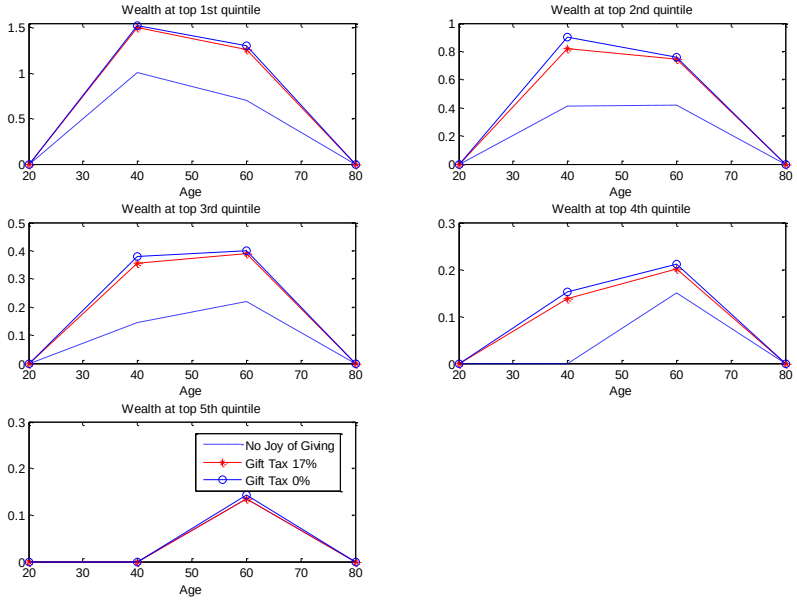


Figure 9: Giving Profile by Wage Efficiency

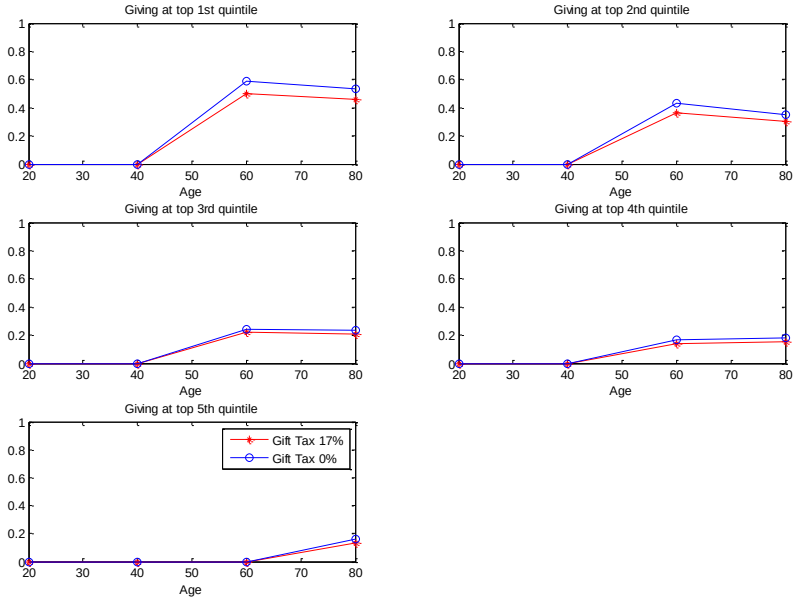


Figure 10: Average Consumption Profile

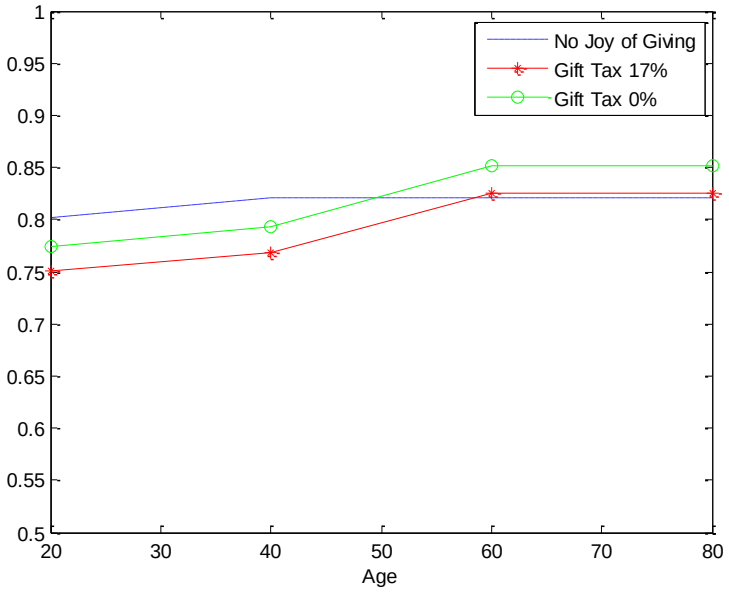


Table 1: Giver's Profile

	All Households (SCF[a])	All Households	Households Provided	Households who have made parental transfer when they are 26 to 35 years old	36 to 45 years old	46 to 55 years old	56 to 65 years old	66 to 75 years old	76 to 85 years old
Fraction of Observations[a]			0.217	0.166	0.286	0.325	0.162	0.081	0.052
Mean amount of Transfer[b]			8	4	9	16	7	3	0
Median amount of Transfer[b]			7	3	5	4	7	3	4
Average Net Worth[b]	442	317	375	45	90	170	121	151	753
Median Net Worth[b]	95	63	60	10	23	26	59	159	397
Average Income[b]	78	73	94	45	76	105	120	320	111
Median Income[b]	47	44	18	31	41	41	51	58	53

Source: The pseudo panel created from the Survey of Consumer Finance 1995 - 2010. Despite the fact that the market values of business ownership its income streams are excluded in the statistics, The values implied in this table may be sensitive with the outliers at the right tail by the structure of the panel.

[a] This column refers to the mean over the selected years of the corresponding label from the summary statistics published by the Federal Reserve System

[b] Fraction is in Percentage of the number of observations who made the specific transfer to the whole sample size

[c] in Thousands of Dollars. Both mean and median values are the average value of all survey years.

The values of each year are calculated over all sample values and implicate replicates.

Table 2: Relationships of Recipients to Givers (as a share conditioned on ever received population, in percent)

	Children	Grandchildren	Parents	Others
1995	71.03	16.87	2.34	9.76
1998	74.30	18.16	0.40	7.15
2001	75.13	17.76	0.45	6.66
2004	71.96	18.23	0.31	9.50
2007	76.45	18.57	0.28	4.70
2010	78.22	18.67	0.14	2.97

Source: The Survey of Consumer Finances
1995, 1998, 2001, 2004, 2007, 2010
The fractions are calculated as a share conditional on
"ever-received-population".

Table 3: Receiver's Profile

	Households ever Received	Households who have received parental transfers when they are younger than 26 years old	26 to 35 years old	36 to 45 years old	46 to 55 years old	56 to 65 years old	66 to 75 years old
Inter vivos giving							
Fraction of Observations[a]	0.584	0.095	0.161	0.153	0.102	0.054	0.019
Mean amount [b]	29	29	36	36	52	55	41
Median amount [b]	3.77	6.49	8.17	7.85	11.84	15.34	7.53
Bequest							
Fraction of Observations[a]	2.382	0.190	0.359	0.547	0.696	0.485	0.181
Mean amount[b]	21	29	29	29	31	28	19
Median amount[b]	4.13	5.71	6.85	9.42	10.25	10.22	9.37

Source: The pseudo panel created from the Survey of Consumer Finance 1995 - 2010.

The values implied in this table may be sensitive with the outliers at the right tail by the structure of the panel.

[a] Fraction is in percentage of the number of observations who made the specific transfer to the whole sample size

[b] in Thousands of Dollars. In the transfer section, the survey reports a number of (at most three) transfers of each household.

Both mean and median values are the average value of all survey years. The values of each year are calculated over all sample values and implicate replicates.

Table 4: Asset Composition of Inter Vivos Giving (in percent)

	Cash	Real estate	Stock	Others[b]
1997	36.4	14.6	33.7	15.3
1998	35.4	14.4	33.5	16.7
2005	49	20.8	17.5	12.7
2007	46.2	17	23.5	13.3

Source: Gifts Statistics of Income Bulletin

[a] 1997, 1998, 2005, and 2007 Internal Revenue Services

[b] Others includes hedge funds, partnerships, bonds, farm assets, other non-corporate businesses, mortgage and notes

Table 5: Summary of Parameters

Parameters		Values
Discount rate	β	0.975
Production elasticity of capital	α	0.36
Coefficient of relative risk aversion for Consumption	σ	1.5
Coefficient of relative risk aversion for Giving	η	1.5
Rate of depreciation	δ	0.048
Replacement Ratio		0.45
Giving Weight	Λ	21.74%
Capital tax rate	τ_k	See Text
Gift tax rate	τ_g	11.3% in effective
		17% statutory
Efficiency Scale		Cagetti and De Nardi (2006)
The Transition matrix		Cagetti and De Nardi (2006)

Table 6: Comparing Inequality: Data and Baseline Models

	Capital Output Ratio	Interest rate	Wealth Gini	Agg Giving Capital Ratio	Percentage Wealth in the top				
					1%	5%	10%	20%	50%
US data	3	6%	0.78	0.5%	29	54	81	94	98
Baseline model with Gift Tax 17%	3	6.9%	0.7264	44.78%	6	27	48	75	100
A model with Gift Tax 0%	3.07	6%	0.7262	50.32%	6	27	48	75	99

Table 7: Changes in Aggregate Values and Welfare (in percent)

	From Gift Tax rate 17% to 0%
$\triangle$ K	4.48
$\triangle$ Y	1.06
$\triangle$ CV consumption, last period	3.25
$\triangle$ Welfare of Newborns	9.99

Table 8: Sensitivity Analysis on Parameters

	$\sigma = 1.5$			$\sigma = 3$		
	$\beta = 0.5$	$\beta = 0.9$	$\beta = 1.1$	$\beta = 0.5$	$\beta = 0.9$	$\beta = 1.1$
With the Gift Tax rate 0%						
K/Y	1.1	2.8	3.13	1.95	3.67	3.73
Flow G/Y	51%	30%	28%	61%	48%	52%
Wage	0.5708	1.0708	1.0708	0.7919	1.1298	1.1403
From Gift Tax 50% to 0%						
%$\triangle$ CV consumption, last period	-6	6	4	1.3	21	28
%$\triangle$ Welfare of Newborns	-12	16	17	-10	57	67