The Role of Inter vivos giving in General Equilibrium

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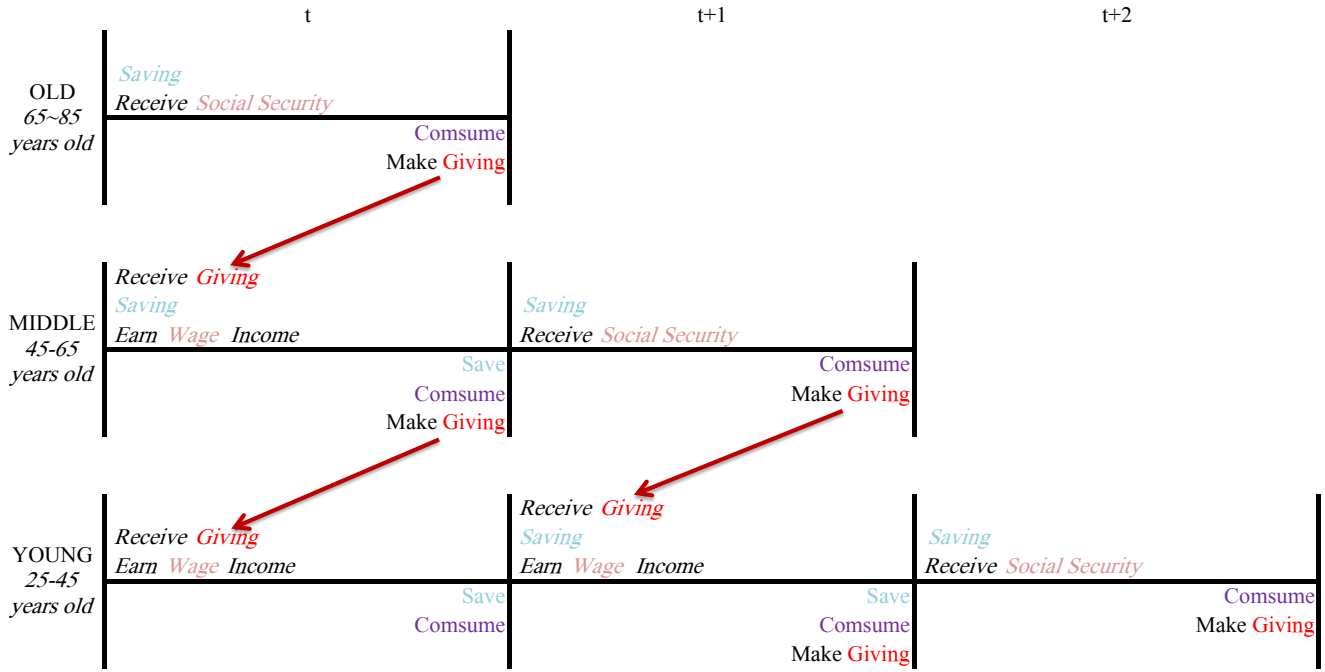
Timeline of Inter Vivos Giving



- Research Questions:

  "What is the role of parents' giving in an economy?"
  - It may generate the substantial "Wealth Inequality"
  - It may improve someone's "Welfare"
  - **Can this gift be "Pareto-improving"?**
- The journey to answer these questions
  - Stylized Facts on intergenerational transfers
  - Previous Literature
  - Model
  - Public Policy Analysis
  - Results

Objective:

- Based on lower bound facts from the microdata, present the theoretical model of inter vivos giving in general equilibrium
- Some useful stylized facts are
  - 72% of intergenerational transfer: given to children by parents
  - 18% of intergenerational transfer: generational-skipping transfer
  - 70% of inter vivos giving is in financial assets including cash
  - Current gift/estate tax scheme is gift-friendly
- In general equilibrium, can we realize the welfare gains by a public reinforcement of inter vivos giving?

SCF: Triennial Household Wealth and Asset Survey(1995-2010)

- Each survey contains wealth profiles of 4000 households
- The total wealth in the SCF closely matches with the aggregate data
- Provides the descriptive wealth composition of rich households
- The Pseudo Panel: Tracking down a representative cohort (64 Cohorts born between 1915 and 1978; 306 observations in each cohort on average)

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

Section X: Inheritance/Trust/Transfer

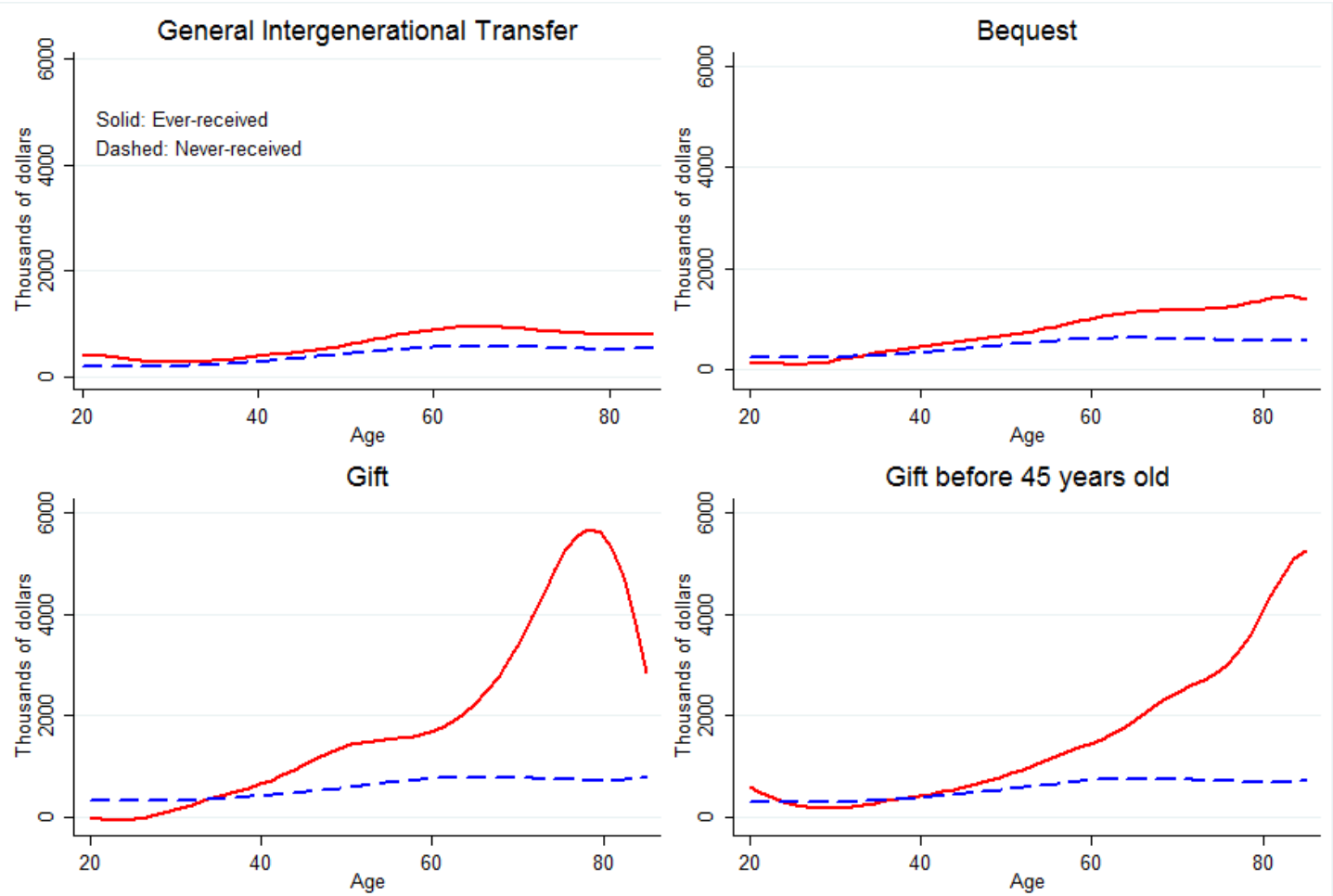
- Have you (or your [husband/wife/partner]) ever received an inheritance, or been given substantial assets in a trust or in some other form?
- Was that an inheritance, a trust, or what?
- In what year did you receive it?

	Households ever Received	Households ever received from parents when they were younger than 25	26 to 35	36 to 45	46 to 55	56 to 65	66 to 75
Inter vivos giving							
Fraction of Observations[a]	0.584	0.095	0.161	0.153	0.102	0.054	0.019
Mean amount [b]	143	144	166	181	256	256	194
Median amount [b]	7.97	6.50	7.98	7.56	11.68	14.49	12.38
Bequest							
Fraction of Observations[a]	2.382	0.190	0.359	0.547	0.696	0.485	0.181
Mean amount[b]	708	686	717	717	766	673	475
Median amount[b]	43.67	29.52	33.74	47.09	49.23	50.33	45.12

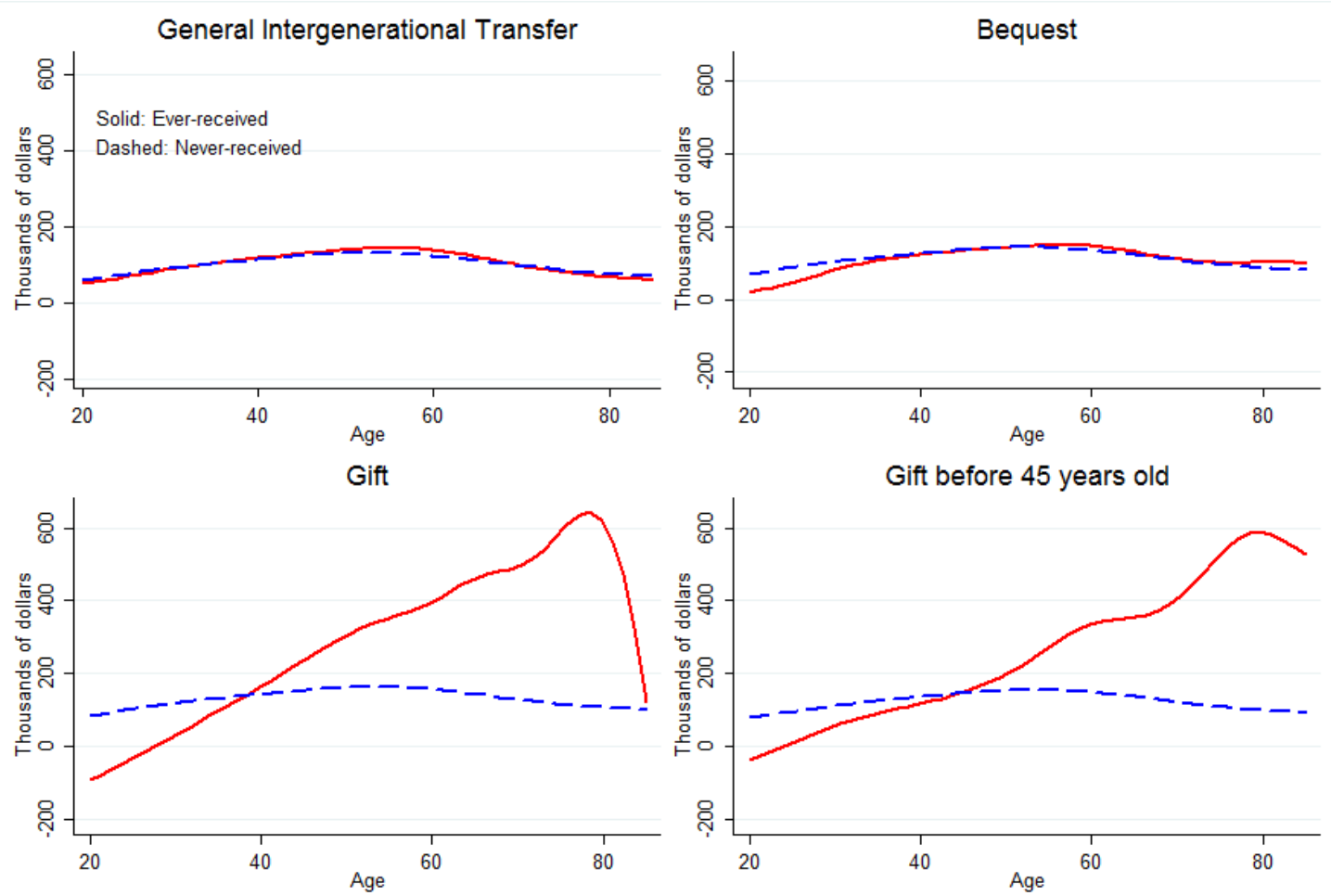
[a] in Percentage

[b] in Thousands of Dollars

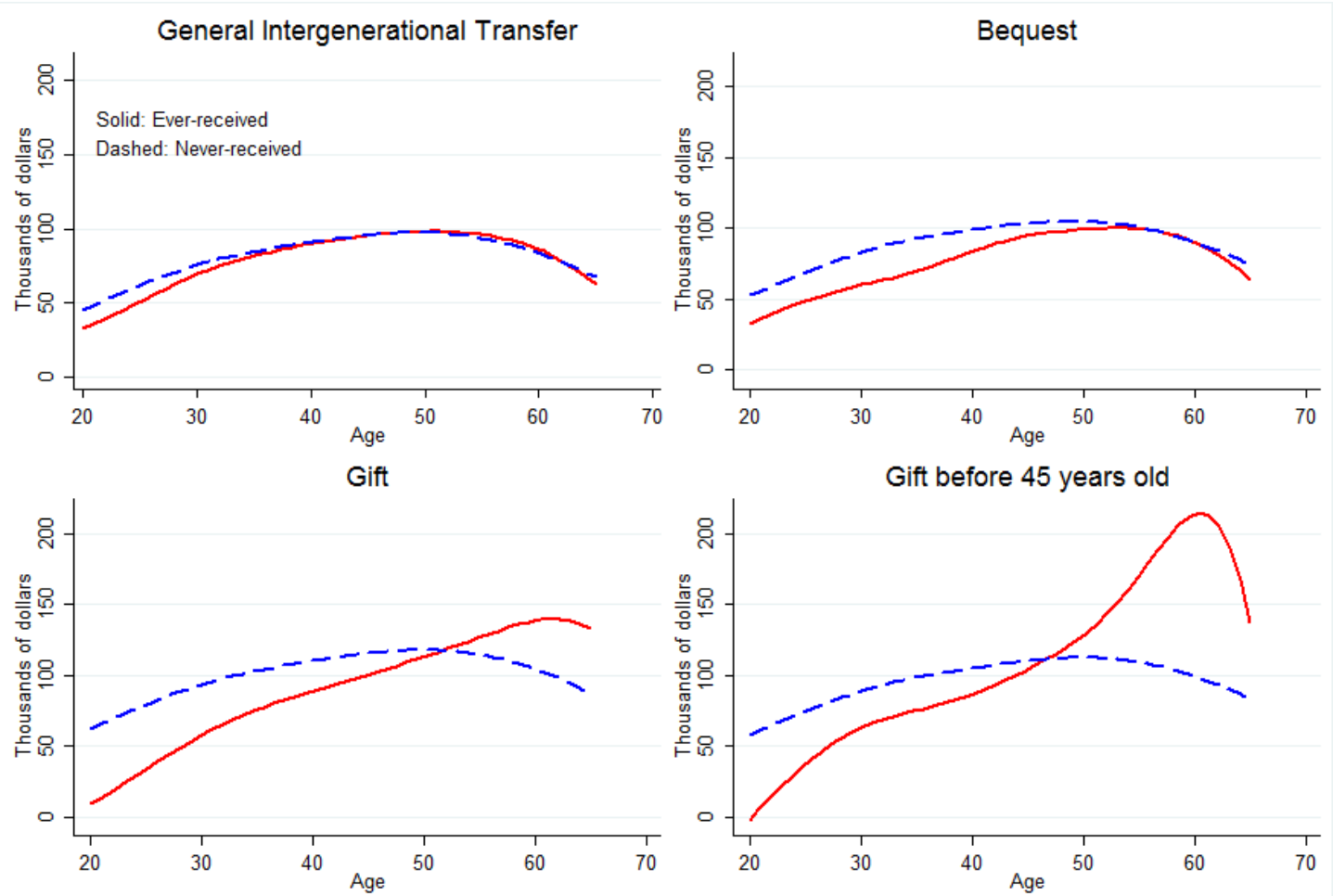
Empirical Results: Wealth Profiles



Empirical Results: Income Profiles



Empirical Results: Wage Profiles



Literature review

- Macro Literature with Heterogeneous Agents: Wealth Inequality and the Intergenerational Transfers
  Huggett (1996); De Nardi (2004); Nishiyama (2002); Cagetti and De Nardi(2008)
- Public Finance Literature on Social Security: Welfare Analysis on the Intergenerational Transfers
  Auerbach et al. (1983); Auerbach and Kotlikoff (1987); Hubbard and Judd (1987); Imrohoroglu, Imrohoroglu, and Joines (1995); Krueger and Kubler (2006)
- Some Empirical Evidences on the Role of Inter Vivos Giving
  Cox and Jappelli(1990); Cox(1990)

Preference: Joy of Giving Utility (Blinder, 1975)

$$\mathbb{E}_0 \sum_{i=1}^{3} \beta^{i-1} \left[\left(\frac{c_i^{1-\sigma}}{1-\sigma} \right) + \Lambda_i \left(\frac{g_i^{1-\eta}}{1-\eta} \right) \right] \tag{2}$$

$\Lambda_1 = 0$ and $\Lambda_2 = \Lambda_3 = \Lambda$: a normalized weight on utility from the inter vivos giving relative to utility based on consumption

- Models of Giving
  - Altruism: Barro(1974), Becker(1974)
  - Uncertain Lifetime: Huggett(1996), De Nardi(2004)
  - Strategic Motive: Bernheim, Shleifer and Summers(1985)
  - **Joy of Giving (A warm glow or Impure Altruism)**: Blinder(1975), Andreoni(1989)

- *The Old Generation's Problem, i=3*

$$V_3(a_2, ss) = \max_{\{c_3, g_3\}} [U(c_3, g_3)] \tag{3}$$

s.t.

$$c_3 = (1 + r(1 - \tau_k))a_2 + ss - \left(\frac{1}{1 - \tau_g}\right) g_3 \tag{4}$$

- Policy functions: $c_3(a_2, ss)$, $g_3(a_2, ss)$
- Distributions defined: $\Phi_3(g_3)$

- *The Middle Generation's Problem, i=2*

$$V_2(a_1, \hat{g_3}, \varepsilon_2) = \max_{\{c_2, a_2, g_2\}} [U(c_2, g_2) + \beta V_3(a_2, ss)] \quad (5)$$

s.t.

$$c_2 + a_2 \leq (1 + r(1-\tau_k))a_1 + (1-\tau_w)w\bar{h}(\varepsilon) + \widehat{g_3} - \left(\frac{1}{1-\tau_g}\right) g_2 \quad (6)$$

and

$$a_2 \geq 0 \quad (7)$$

- Policy functions: $c_2(a_1, \hat{g_3}, \varepsilon_2)$, $a_2(a_1, \hat{g_3}, \varepsilon_2)$, $g_2(a_1, \hat{g_3}, \varepsilon_2)$
- Distributions defined: $\Psi_2(a_2)$, $\Phi_2(g_2)$

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

$$V_1(\hat{g_2}, \varepsilon_1) = \max_{\{c_1, a_1\}} [U(c_1) + \beta \sum_{\varepsilon} \int_{\hat{g}} V_2(a_1, \hat{g_3}, \varepsilon_2) \pi(\varepsilon_2 \mid \varepsilon_1) d\hat{\Phi}_3] \tag{8}$$

s.t.

$$c_1 + a_1 \leq (1 - \tau_w) w \bar{h}(\varepsilon) + \hat{g_2} \tag{9}$$

and

$$a_1 \geq 0 \tag{10}$$

- Policy functions: $c_1(\hat{g_2}, \varepsilon_1)$, $a_2(\hat{g_2}, \varepsilon_1)$
- Distributions defined: $\Psi_1(a_1)$
- A fraction of $f(\epsilon)$ of the population have the shock ϵ

At a point in time, individuals are heterogeneous in their age i and in their state $s = (a, \hat{g}, \varepsilon) \in S = A \times \hat{G} \times E$ where $A \subset R^+$, $\hat{G} \subset R^+$ and $E = \{\epsilon_1, ..., \epsilon_N\}$

- The distribution of individual states across age $i = 1$

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

- For the generation $i = 2$:

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

Consistency Condition of Giving Distribution

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

$$\lim Ł(g_i(\cdot)) = Ł(\hat{g}_i) \tag{11}$$

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* $\Phi_i(g_i)$

- Capital Market Clears: $\sum_i \mu_i \int_s a_i(s) d\Theta_i = K'$
- Labor Market Clears: $\sum_i \mu_i \int_s \bar{h}(\varepsilon_i) d\Theta_i = L$
- Goods Market Clears:
  $\sum_i \mu_i \int_s c_i(s) d\Theta_i + K' + G = F(K, L) + (1 - \delta)K$
- The social security is self-financing
- The aggregative taxes are
  $T_K = \tau_k r \sum_i \mu_i \int_s a_i'(s) d\Theta_i$,
  $T_g = \tau_g \sum_i \mu_i \int_s g_i(s) d\Theta_i$
- Government's budget equation is satisfied: $G = T_K + T_g$

Table : Summary of Parameters

Parameters	Values	References
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	**11.30% in effective** (17% in statutory)
Efficiency Scale		Cagetti and De Nardi (2006)
The Transition matrix		Cagetti and De Nardi (2006)

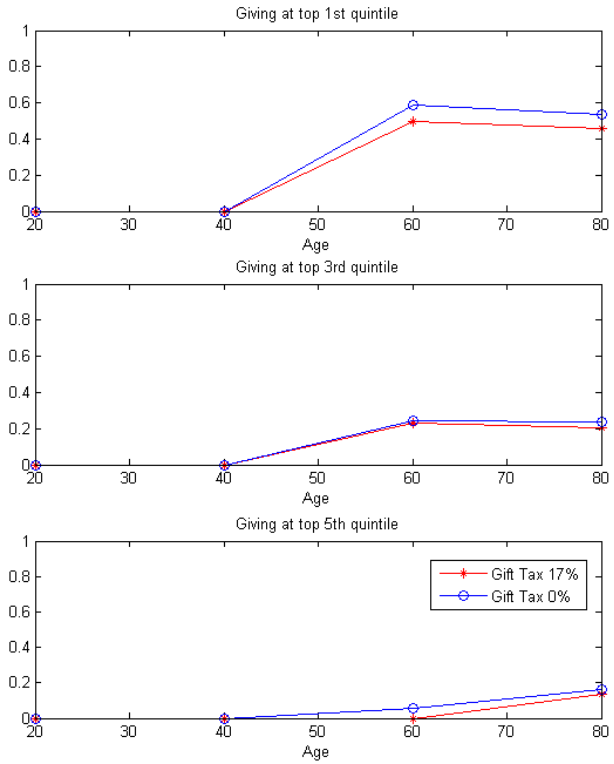
Calibration: Giving Weight, Λ

- Estimation: 21.74% of an independent CU's annual income
  - Cash Transfers: The average yearly amount of cash transfers to children in the independent CU, \$1,766 (SCF) **(2.4% of annual income, CEX)**
  - Real Estate and Financial Assets Transfers: The capitalization rate of the inherited assets (Rental Value/Market Value: Housing and Other Properties) attributed by parent-CU has 2.2 times greater than that of self-obtained properties **(17% of annual income, CEX)**
  - Educational Expenses: The CU provides \$1,098.784 for educational spending of a person outside of CU on average, every year **(1% of annual income, CEX)**
- Calibration Target
  - Kotlikoff and Summers(1981), Modigliani(1988b), Hurd and Mundaca(1989), Menchik and David(1983), Barlow et al.(1966); Gale and Scholz(1994): **at least 20% of the aggregate wealth**

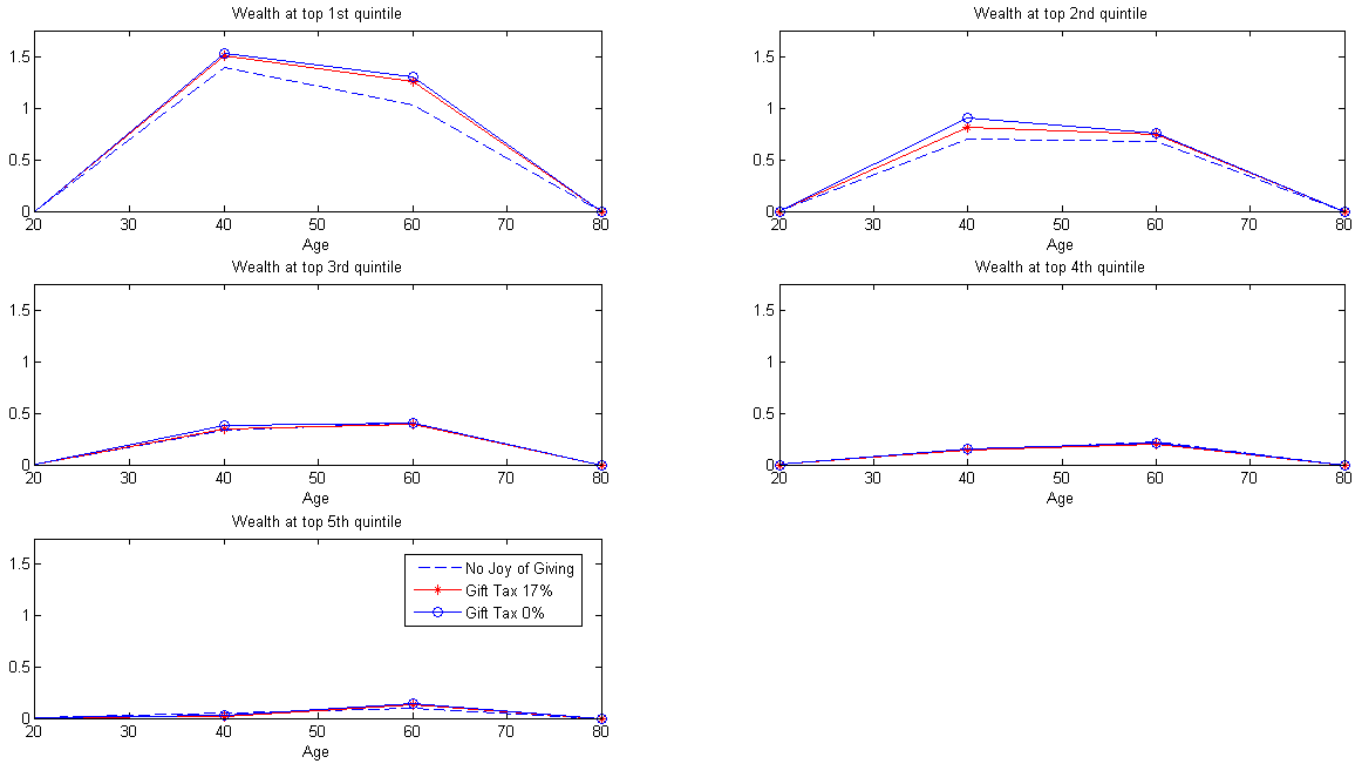
- I. Wealth Distribution:
  No significant change by eliminating the gift tax

	Wealth Gini	Percentage Wealth in the top				
		1%	5%	10%	20%	50%
US data	0.78	29	54	81	94	98
Baseline model with Gift Tax 17%	0.7264	6	27	48	75	100
A model with Gift Tax 0%	0.7262	6	27	48	75	99

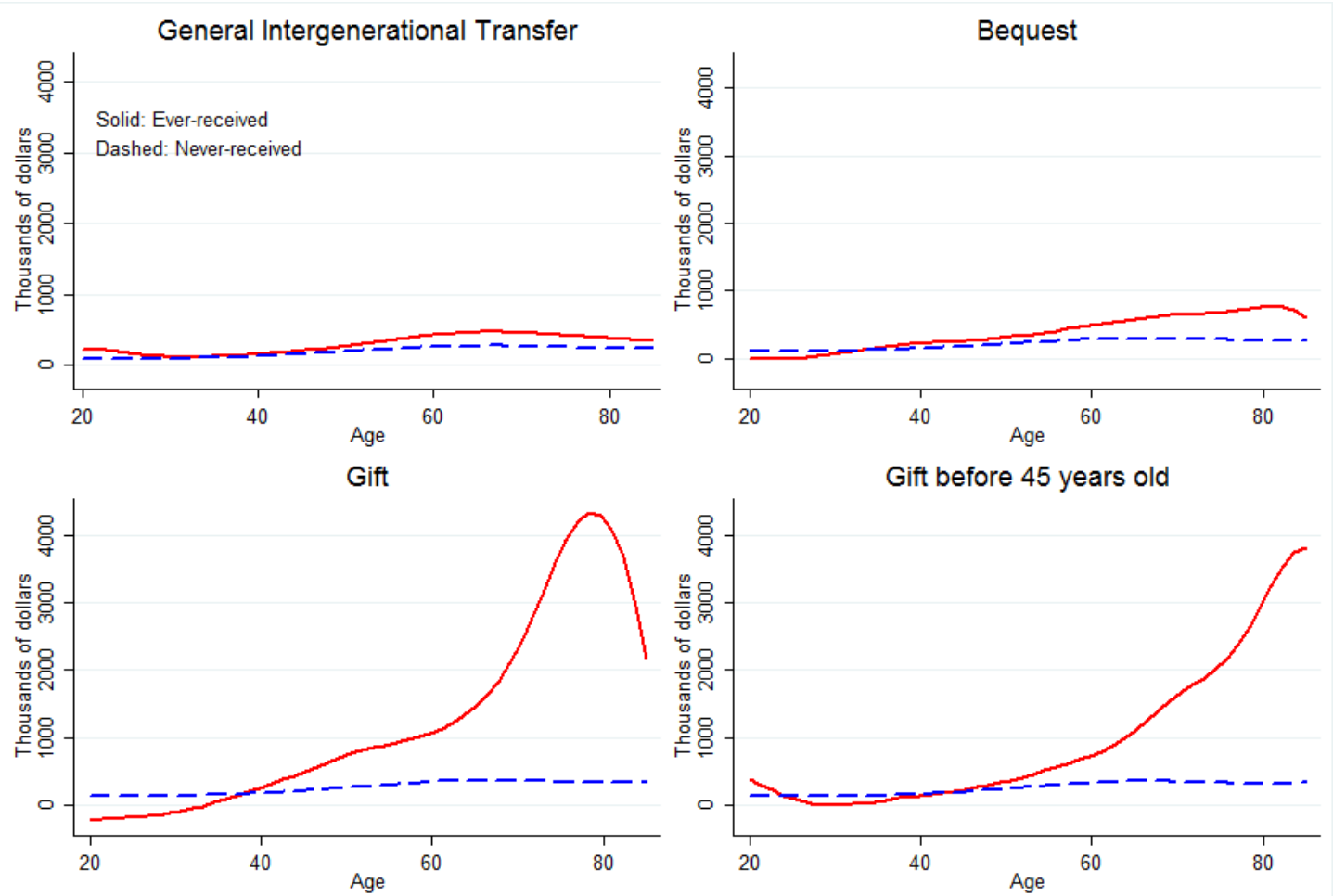
II. Changes in Lifetime Giving



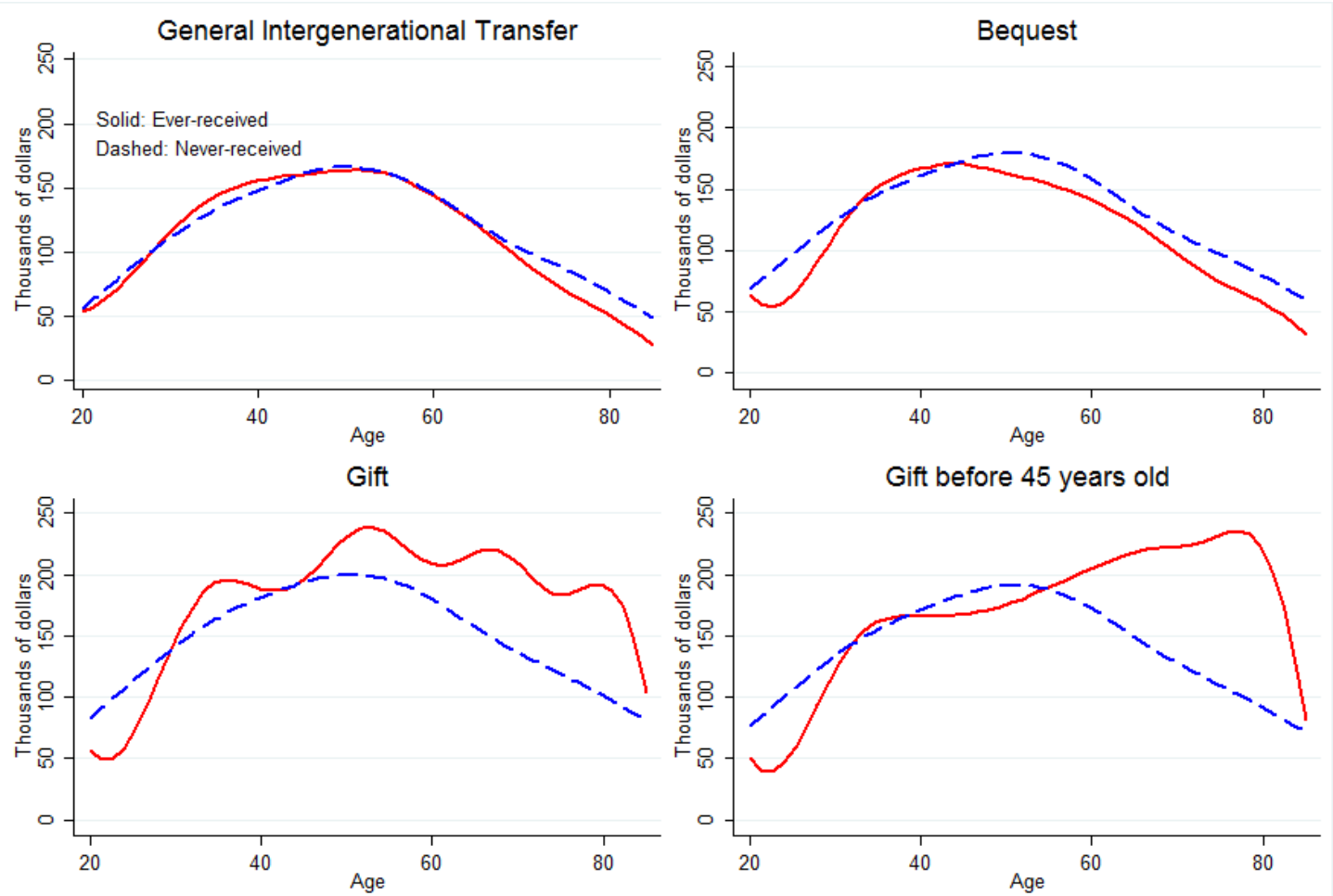
II. Changes in Lifetime Asset



Empirical Results: Financial Assets Profiles



Empirical Results: Debt Profiles



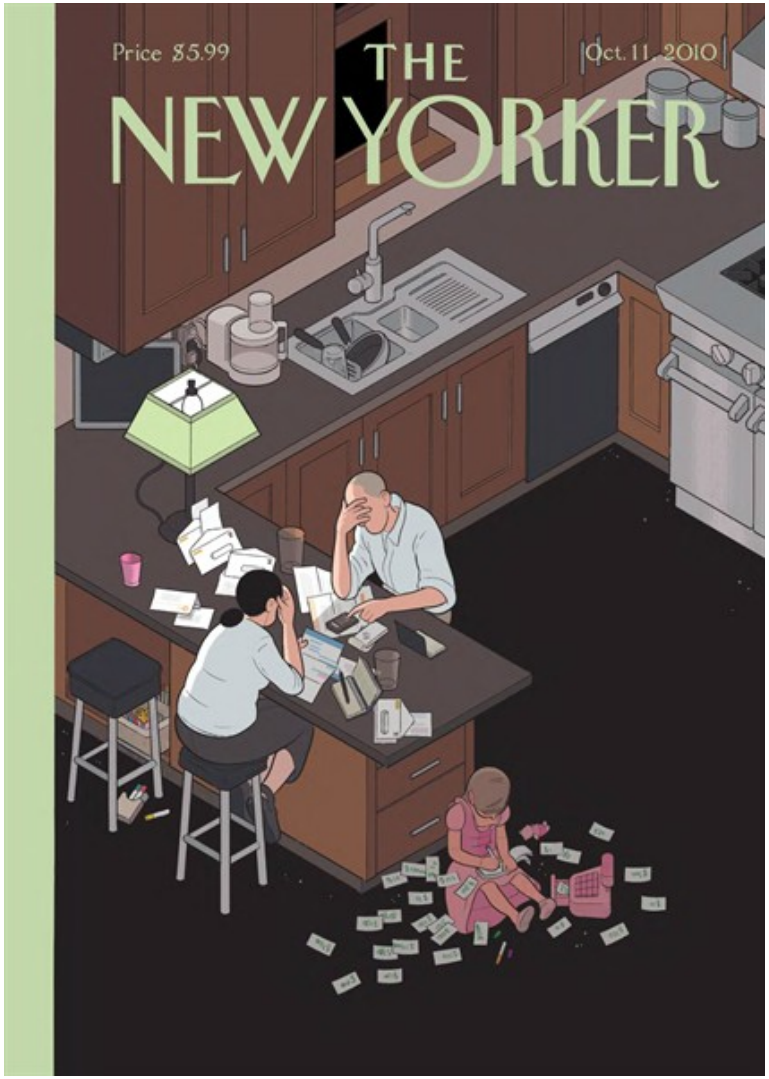
III. Changes in an Aggregate Economy

	Capital Output Ratio	Interest rate	Wealth Gini	Agg Giving Capital Ratio	Wage rate
US data	3	6%	0.78	0.5%	
Baseline model with Gift Tax 17%	3	6%	0.7264	44.78%	1.2928
A model with Gift Tax 0%	3.07	5.1%	0.7262	50.32%	1.3420

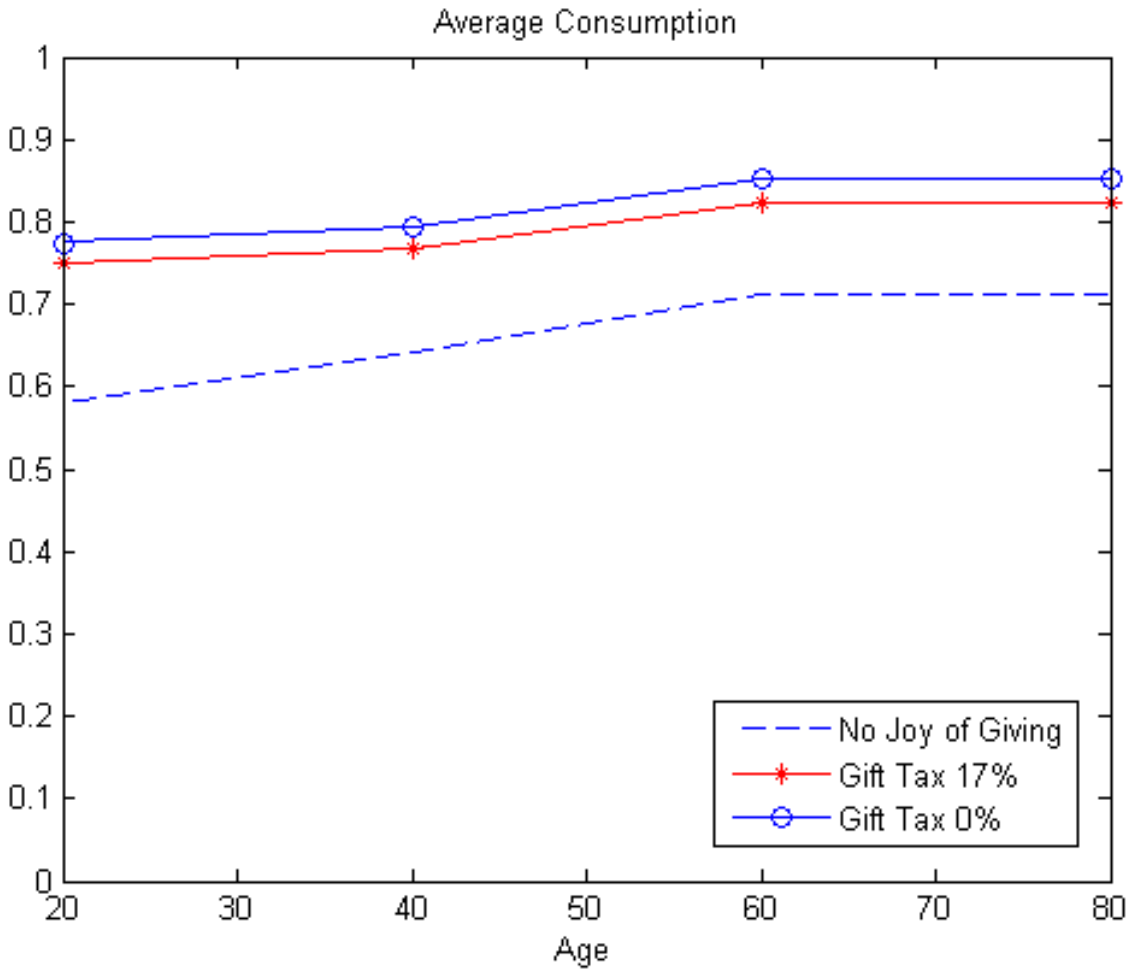
(Comparison I) Gift Tax 17% vs. 0%: Wealth Profile

- The income effect (Short-term):
  - An instant increase in income during the young period
  - An increase in saving by the young with their high saving rates
  - An increase in saving by the middle for preparing with gifts/by receiving gifts
- The wealth effect (Long-term):
  - An increase in the capital stock improves production with lower interest rates
  - Social security for the old generation improves by an increase in wages

Consumption in exchange of Giving?



IV. Average Lifetime Consumption



(Comparison II) Gift Tax 17% vs. 0%: The insurance effect: Smoother consumption over lifetime

- Improvement in consumption during the young period
- An increase in aggregate saving is shown by higher marginal propensity to save of the young generation
- An increase in the lifetime wealth reflects
  - Gifts from parents as insured income
  - Gifts for children as insured income

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

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

Sensitivity Analysis

	$\sigma = 1.5$			$\sigma = 3$		
	$\beta = 0.5$	$\beta = 0.9$	$\beta = 1.1$	$\beta = 0.5$	$\beta = 0.9$	$\beta = 1.1$
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%						
%△ CV consumption, last period	-6	3	4	1.3	21	28
%△ Welfare of Newborns	-12	16	17	-10	57	67

- Lowering the gift tax rate does not necessarily aggravate wealth inequality
- Lowering the gift tax rate is Pareto-improving in the steady state
- Future research
  - A more sophisticated design of the gift/estate tax system
  - Modeling private intergenerational transfer in analyzing the Social Security
  - Modeling various types of parental support: Education, Housing (New Dynamic Public Finance)
  - Endogenous labor supply decision
  - Add stochastic survival probability
  - Comparing the model with giving distributed in a lump sum style

Figure : Wealth Profile by Wage Efficiency

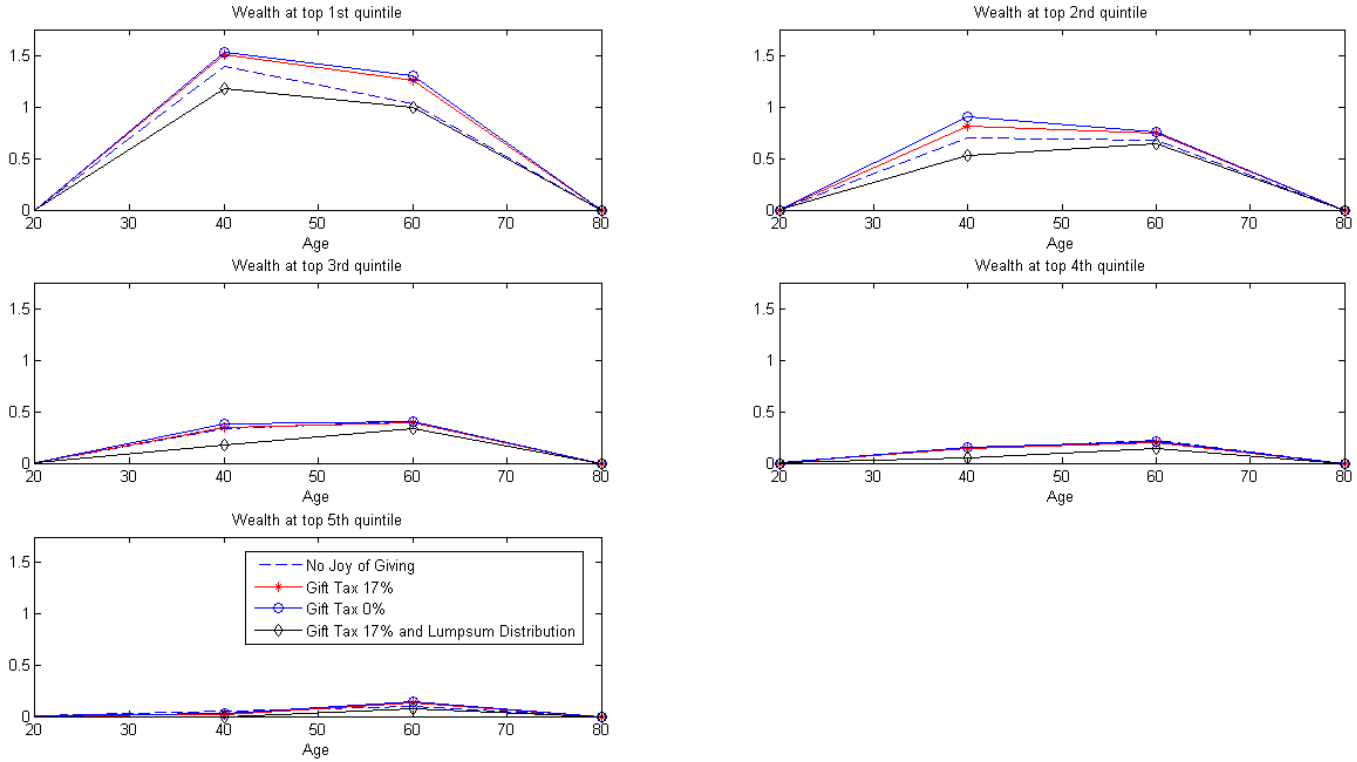


Figure : Giving Profile by Wage Efficiency