Tough love and Intergenerational Altruism

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Tough Love-A New Theoretical Framework for Intergenerational Altruism

Motivation

- Link (or lack of) between generations in a family can have significant macro implications.
  - Barro(JPE,1974) found that as long as there is some form of intergenerational transfer connecting current generations and future generations there will be no net wealth effect of a marginal change in government debt.
- Empirical evidence for the standard altruism model (Becker,1974) is at best mixed.
  - Cox(*JPE*,1987),Altonji,Hayashi & Kotlikoff(*JPE*,1997),Laitner & Juster (*AER*,1996).

Motivation

- Our introspection indicates that the standard altruism model may be missing some aspects of the parent's love for the child.
- One aspect that is missing in the standard altruism model is pecuniary or nonpecuniary punishment studied by Weinberg (2001, *JPE*), Hao, Hotz, and Jin (forthcoming, *Economic Journal*), and Bhatt (2008).
- In Osaka University COE Survey data, many parents show tough love in which a parent let the child suffer in the short-run for the long-run benefit of the child as reported by Horioka, Ogaki, Ohtake, and Takenaka (work in progress).

29. Imagine that you have a 2-year old child that has a high fever and is in pain. The child's doctor tells you that both the fever and pain are harmless. He can give you a medicine that cures the sickness but slightly weakens the child's immune system when the child becomes 50 years old. (X ONE Box)

1. I would give the medicine to the child if the sickness is known to last for one day.
2. I would give the medicine to the child if the sickness is known to last for two days.
3. I would give the medicine to the child if the sickness is known to last for one week.
4. I would give the medicine to the child if the sickness is known to last for one month.'
5. I would not give the medicine to the child.

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1. I would give the medicine to the child if the sickness is known to last for one day. (US 10.4%, Japan 9.9%)
2. I would give the medicine to the child if the sickness is known to last for two days. (US 7.6%, Japan 11.4%)
3. I would give the medicine to the child if the sickness is known to last for one week. (US 13.6%, Japan 30.6%)
4. I would give the medicine to the child if the sickness is known to last for one month. (US 14.8%, Japan 16.5%)
5. I would not give the medicine to the child. (US 53.5%, Japan 31.6%)

30. Imagine that you have a 16-year old child that has been working at a restaurant for the last month. The child has been doing so to earn money to buy a concert ticket. You agreed that it would be all right for the child to buy the ticket as long as the child earns the necessary money. The child just got fired, and asked you to help by providing one tenth of the necessary money. The tickets will be sold out if you do not provide the money. (X ONE Box)

1. I would provide the money regardless of the reason why the child got fired.
2. I would provide the money if the child is not at fault for being fired.
3. I would not provide the money because it is not good for my chld.
4. I would not provide the money because it will be a waste of money.

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1. I would provide the money regardless of the reason why the child got fired. (US 13.5%, Japan 16.8%)
2. I would provide the money if the child is not at fault for being fired. (US 67.4%, Japan 69.6%)
3. I would not provide the money because it is not good for my chld. (US 14.4%, Japan 11.7%)
4. I would not provide the money because it will be a waste of money. US 4.7%, Japan 1.8%)

- Extending the standard altruism model may help to better explain observed family behavior for some parents.
- How can we incorporate tough love?

Introduction

We introduce parental tough love by modifying the standard altruism model in two ways :

- The discount factor of the child is endogenously determined so that lower present consumption would lead to a higher discount factor later on in life.
  - Theoretical Models with Endogenous Discounting : Uzawa (1968), Becker and Mulligan (1997,QJE).
  - Empirical Evidence for Endogenous Discounting : Lawrance (1991,JPE), Ogawa (1993, JDE), Atkeson & Ogaki (1996,JME), Ogaki & Atkeson (1997,ReSTAT), Ikeda,Ohtake & Tsutsui (2005), Kagel, Battalio, Greene (1995).

Introduction

- Parent evaluates child's life time utility using a constant (high) discount factor.
  - Theoretical Models with higher social discount factor vis-a-vis individual discount factor:
    Caplin and Leahy (2004,JPE), Sleet and Yeltekin (2005), Sleet and Yeltekin (2007), Phelan (2006 Rev. of Eco. Studies), Farhi and Werning (2007, JPE).
  - A paper with Becker-Mulligan and the parent with a higher dicount factor:
    Akabayashi(2006, JEDC).

Introduction

- These two features of our model imply that the parent with a tough love motive may want to influence the child's time preference.
- Evidence for the parent's role in shaping the child's economic behavior :
  Maital(1991), Mischel(1961,JASP), Mischel & Bandura(1965,JPSP), Carlson & Grossbart(1988,JCR),Webley & Nyhus(2006,JEP)

Main contribution in a nutshell

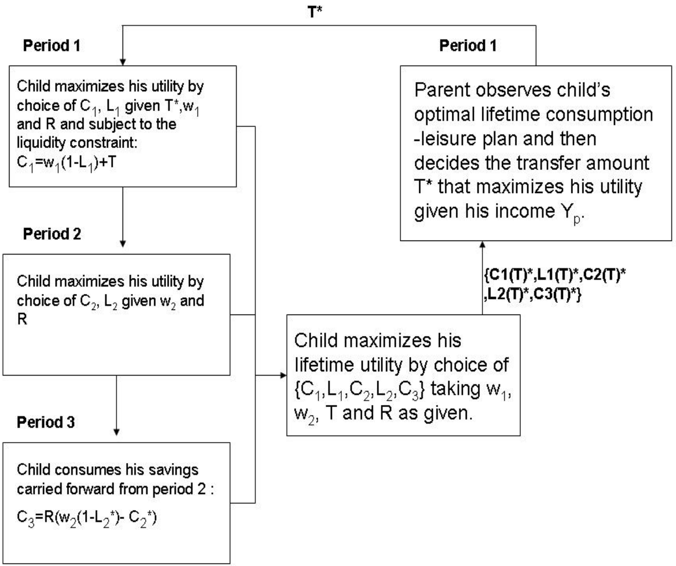
- **We find..** :
  These models are often observationally equivalent i.e., the comparative statics result from a change in an exogenous variable in the tough love model can be obtained by the standard altruism model for a given specification of the preference parameters.
- **But..** :
  This observational equivalence is broken when the child is liquidity constrained and when the child's discount factor changes exogenously.

Model Assumptions

- Consumption good economy.
- 3 period model with two generations–parent and child.
- Parent is an *altruist* derives utility from his own consumption as well as utility level attainable by child.
- There is no uncertainty in the economy.
- Child is borrowing constrained in period 1:

$$C_1 = y_1 + T \tag{1}$$

Timing of the Model



Notations

- $u(c)$: child's and parent's utility function for a year.
- η : weight attached by parent on his own utility.
- $\beta_{t,p}$: discount factor used by parent in period t while evaluating child's lifetime utility.
- $\beta_{t,k}$: child's discount factor.
- y_p : parent's exogenous first period income.
- y_t : child's exogenous period t income... $t = 1, 2$.
- C_t : child's annual consumption in period t ... $t = 1, 2, 3$.
- T : transfer made in first period by parent.
- R : gross nominal interest rate between period 2 and 3.
- τ_t : period duration in years ... $t = 1, 2, 3$.

Standard Altruism Model

Both parent and child discount future using an exogenous(may be constant) factor. So here,

$$\beta_{p,t} = \beta_{k,t} = \beta_t$$

Formally, the parent solves the following maximization problem,

$$\max_{T} \left[\eta\tau_1 u(y_p - T) + (1-\eta)\left[\tau_1 u(y_1 + T) + \tau_2\ \beta_2\ u(C_2^*) + \tau_3\ \beta_3\ u(R(y_2 - C_2^*))\right]\right]$$

$$\textit{where}$$

$$\{C_2^*\} \equiv \arg\max_{C_2} \left[\tau_2 u(C_2) + \tau_3\ \beta_3\ u(R(y_2 - C_2))\right]$$

- From the first order condition for the child's problem we get :

$$\tau_2 u_{C_2}(C_2) - \tau_3 \beta_3 R u_{C_2}(R(y_2 - C_2)) = 0 \tag{2}$$

where,

$$u_x(x) \equiv \frac{\partial u(x)}{\partial x}$$

- Using *implicit function theorem* we get,

$$C_2^* = \psi(y_2, \beta_3, R) \tag{3}$$

Optimal second period consumption for the child is independent of the first period transfers of the parent.

- So we can rewrite the parent's problem as :

$$Max_T \left[\eta\, u(y_p - T) + (1-\eta) u(y_1 + T) \right] \tag{4}$$

- The first order condition for the above problem is given by,

$$-\eta u_T(y_P - T) + (1-\eta) u_T(y_1 + T) = 0 \tag{5}$$

Comparative Statics: 1
Exogenous Wealth Redistribution

- A dollar increase in the parent's income, y_p, followed by a dollar decrease in the child's first period income, y_1.

- To address this question,we can rewrite the first order equation as,

$$\frac{u_T(y_p - T)}{u_T(y_1 + T)} = \frac{(1-\eta)}{\eta} \tag{6}$$

This is the *redistributive neutrality* property of the standard Altruism model.

Comparative Statics: 2
Exogenous Shift in the Child's Time Preference

- An increase in child's impatience as captured by a fall in the discount factor β_t.

- From the first order condition we can derive the optimum transfers as,

$$T^* = \zeta(y_P, y_1, \eta) \tag{7}$$

Hence,

$$\frac{\partial T^*}{\partial \beta_t} = 0 \tag{8}$$

Paternalistic Altruism Model

- In this model both parent and child use a constant discount factor to evaluate future utility.
- However, unlike the standard altrusim model, the discount factor used by the parent, $\beta_{t,p}$, is higher than the child's discount factor $\beta_{t,k}$

The parent solves the following maximization problem,

$$Max_T \;\; \eta\tau_1 u(y_p - T) + (1-\eta)\Big[\tau_1 u(y_1 + T) + \tau_2\beta_{2,p}u(C_2^*) + \tau_3\beta_{2,p}\beta_{3,p}u(R(y_2 - C_2^*))\Big] \tag{9}$$

where,

$$\{C_2^*\} \equiv \; argmax_{C_2} \;\; \Big[\tau_2 u(C_2) + \tau_3\beta_{3,k}u(R(y_2 - C_2))\Big] \tag{10}$$

From the first order condition for the child's problem described in (10), we get :

$$\tau_2 u_{C_2}(C_2) - \tau_3 \beta_{3,k} R u_{C_2}(R(y_2 - C_2)) = 0 \qquad (11)$$

Using the *implicit function* theorem we get,

$$C_2^* = C_2(y_2, \beta_{3,k}, R) \qquad (12)$$

Hence,

$$\frac{\partial C_2^*}{\partial T} = 0 \qquad (13)$$

So C_2^* can be dropped from the parent's optimization program.

So, we can rewrite the parent's problem as :

$$Max_T \left[\eta u(y_p - T) + (1-\eta) u(y_1 + T) \right] \tag{14}$$

The first order condition for the above problem is given by,

$$-\eta u_T(y_P - T) + (1-\eta) u_T(y_1 + T) = 0 \tag{15}$$

Using the *implicit function theorem*, we get,

$$T^* = T(y_P, y_1, \eta) \tag{16}$$

Comparative Statistics: 1
Exogenous Wealth Redistribution

Here we consider a dollar increase in the parent's income, y_p, followed by a dollar decrease in the child's period 1 income, y_1.

To address this question,rewrite (15) as,

$$\frac{u_T(y_p - T)}{u_T(y_1 + T)} = \frac{(1-\eta)}{\eta} \tag{17}$$

Hence, for a given η the ratio of marginal utilities of consumption for the parent and the child is constant.

$\Rightarrow$ *Redistributive Neutrality*.

Comparative Statics: 2
Exogenous Shift in the Child's Time Preference

Here we consider an increase in the child's impatience as captured by a fall in the discount factor $\beta_{3,k}$. From (16),

$$\frac{\partial T^*}{\partial \beta_{3,k}} = 0 \tag{18}$$

Hence an exogenous shift in the child's time preference will have no effect on the period 1 transfers made by parents.

Tough Love Altrusim

- Introduces the Tough Love via asymmetric discounting preferences between generations.

- $\beta_{p,(t)}$: a constant(high) discount factor used by parent for evaluating child's lifetime utility.

- Child uses a discount factor which is endogenously determined as a decreasing function of his first period consumption.

$$\beta_{k,t}(C_1) \quad ; \quad \beta'_{k,t}(C_1) < 0$$

The parent solves the following optimization problem,

$$Max_T \;\; \eta u(y_p - T) + (1-\eta)\Big[\tau_1 u(y_1 + T) + \tau_2\beta_{2p}u(C_2^*) + \tau_3\beta_{2p}\beta_{3p}u(R(y_2 - C_2^*))\Big] \tag{19}$$

where,

$$\{C_2^*\} \equiv argMax_{C_2} \;\; \Big[\tau_2 u(C_2) + \tau_3\beta_3(y_1 + T)u(R(y_2 - C_2))\Big] \tag{20}$$

- From the first order condition for the child's problem, we get :

$$\tau_2 u_{C_2}(C_2) - \tau_3 \beta_3 (y_1 + T) R u_{C_2}(R(y_2 - C_2)) = 0 \qquad (21)$$

where,

$$u_x(x) \equiv \frac{\partial u(x)}{\partial x}$$

- Using the *implicit function theorem*

$$C_2^* = \widehat{\psi}(y_2, \beta_3(y_1 + T), R) \tag{22}$$

Optimal second period consumption for the child is not independent of the first period transfers of the parent.

Comparative Statistics: 1
Exogenous Wealth Redistribution

Here we consider a dollar increase in the parent's income, y_p, followed by a dollar decrease in the child's period 1 income, y_1.

It can be proved that in this model,

$$\frac{\partial T^*}{\partial y_p} - \frac{\partial T^*}{\partial y_1} = 1 \tag{23}$$

$$\Leftrightarrow \textit{Redistributive} \quad \textit{Neutrality}$$

Comparative Statics: 2
Exogenous Shift in the Child's Time Preference

Here we consider an exogenous increase in the child's impatience.

We parameterize and solve the model numerically and trace out the response of parent in terms of change in transfers.

Parameterization:

We assume that the period utility function is of the following form:

$u(c) = \frac{c^{1-\sigma}-1}{1-\sigma}$

The discount factors are given by,

$$\beta_2(y_1+T) = (\beta_0 + \frac{1}{1+a(y_1+T)})^{\frac{\tau_1+\tau_2}{2}} \tag{24}$$

$$\beta_3(y_1+T) = (\beta_0 + \frac{1}{1+a(y_1+T)})^{\frac{\tau_2+\tau_3}{2}} \tag{25}$$

where $a > 0$.

We make the child impatient by decreasing the preference parameter β_0.

The gross interest rate is given by,

$$R = r^{\frac{\tau_2+\tau_3}{2}} \tag{26}$$

Table 1. Tough Love Altruism Model

Global Parameters

$\eta = 0.5$; $\sigma = 1.5$; $r = 1.03$; $\beta_p = 1$; $a = 0.01$

$y_1 = 0.4$; $y_2 = 4$; $y_p = 4$; $\tau_1 = 18$; $\tau_2 = 40$; $\tau_3 = 20$;

Optimum	$\beta_0 = 0$	$\beta_0 = -0.05$	$\beta_0 = -0.1$	$\beta_0 = -0.2$
T^*	1.6798	1.3901	1.0614	0.3740
C_1^*	2.0798	1.7901	1.4614	0.7740
C_2^*	3.0521	3.5854	3.8415	3.9823
C_3^*	2.3007	1.0064	0.3848	0.0431
$\beta(C_1^*)$	0.9796	0.9324	0.8856	0.7923

Table 2. Tough Love Altruism Model

Global Parameters

$\eta = 0.5; \sigma = 0.8; r = 1.03; \beta_p = 1; a = 0.01$

$y_1 = 0.4; y_2 = 4; y_p = 4; \tau_1 = 18; \tau_2 = 40; \tau_3 = 20;$

Optimum	$\beta_0 = 0$	$\beta_0 = -0.01$	$\beta_0 = -0.03$
T^*	1.4099	1.2820	1.1341
C_1^*	1.8099	1.6820	1.5341
C_2^*	3.1550	3.3575	3.6598
C_3^*	2.0511	1.5596	0.8257
$\beta(C_1^*)$	0.9822	0.9735	0.9549

Endogenous Discounting Altruism Model

- The discount factor used by the child is endogenously determined as a decreasing function of his period 1 consumption.

$$\beta_{t,k}(c_1) \quad ; \quad \frac{\partial \beta_{t,k}}{\partial C_1} < 0$$

  With the borrowing constraint faces by child in period 1, the discount factor is given by $\beta_{t,k}(y_1 + T)$.

- The parent also uses the above discount factor for evaluating the child's future utility, i.e., $\beta_{t,p}(x) = \beta_{t,k}(x)$.

Now, the parent optimizes by solving the following optimization problem,

$$
\begin{aligned}
& Max_T \;\; \eta \tau_1 u(y_p - T) + \\
& (1-\eta)\Big[\tau_1 u(y_1 + T) + \tau_2 \beta_{2,p}(y_1 + T) u(C_2^*) \\
& + \tau_3 \beta_{2,p}(y_1 + T)\beta_{3,p}(y_1 + T) u(R(y_2 - C_2^*))\Big]
\end{aligned}
\tag{27}
$$

where,

$$
\{C_2^*\} \equiv argmax_{C_2} \;\; \left[\tau_2 u(C_2) + \tau_3 \beta_{3,k}(y_1 + T) u(R(y_2 - C_2))\right]
\tag{28}
$$

From the first order condition for the child's problem,

$$\tau_2 u_{C_2}(C_2) - \tau_3 \beta_{3,k}(y_1 + T) R u_{C_2}(R(y_2 - C_2)) = 0 \quad (29)$$

Using the *implicit function theorem*,

$$C_2^* = \widehat{\psi}(y_2, y_1 + T, R) \quad (30)$$

So the optimal period 2 consumption for the child is not independent of the period 1 transfers of the parent and hence cannot be dropped from the parent's optimization program.

Comparative Statistics: 1
Exogenous Wealth Redistribution

Here we consider a dollar increase in the parent's income, y_p, followed by a dollar decrease in the child's period 1 income, y_1.

It can be proved that in this model,

$$\frac{\partial T^*}{\partial y_p} - \frac{\partial T^*}{\partial y_1} = 1 \tag{31}$$

$$\Leftrightarrow \textit{Redistributive} \quad \textit{Neutrality}$$

Comparative Statics: 2
Exogenous Shift in the Child's Time Preference

Here we consider an increase in the child's impatience.

We parameterize and solve the model numerically and trace out the response of parent in terms of change in transfers.

As β_0 decreases, the tranfer increases or decreases, depending on parameter values as in the following tables.

Table 3. Endogenous Altruism Model

Global Parameters

$\eta = 0.5$; $\sigma = 1.5$; $r = 1.03$; $a = 0.01$

$y_1 = 0.4$; $y_2 = 4$; $y_p = 4$; $\tau_1 = 18$; $\tau_2 = 40$; $\tau_3 = 20$;

Optimum	$\beta_0 = 0$	$\beta_0 = -0.05$	$\beta_0 = -0.1$	$\beta_0 = -0.2$
T^*	0.7364	1.5658	1.7423	1.7966
C_1^*	1.1364	1.9658	2.1423	2.1966
C_2^*	2.9114	3.5987	3.8626	3.9875
C_3^*	2.6424	0.9741	0.3334	0.0303
$\beta(C_1^*)$	0.9888	0.9307	0.8790	0.7785

Table 4. Endogenous Altruism Model

Global Parameters

$\eta = 0.5$; $\sigma = 0.8$; $r = 1.03$; $a = 0.01$

$y_1 = 0.4$; $y_2 = 4$; $y_p = 4$; $\tau_1 = 18$; $\tau_2 = 40$; $\tau_3 = 20$;

Optimum	$\beta_0 = 0$	$\beta_0 = -0.01$	$\beta_0 = -0.03$
T^*	0.1732	0.4881	1.0472
C_1^*	0.5732	0.8881	1.4472
C_2^*	2.8099	3.1808	3.6494
C_3^*	2.8888	1.9884	0.8511
$\beta(C_1^*)$	0.9943	0.9812	0.9557

Table 5. Endogenous Altruism Model

Global Parameters

$\eta = 0.5$; $\sigma = 1.5$; $r = 1.03$; $a = 0.01$

$y_1 = 0.1$; $y_2 = 0.4$; $y_p = 0.4$; $\tau_1 = 18$; $\tau_2 = 40$; $\tau_3 = 20$;

Optimum	$\beta_0 = 0$	$\beta_0 = -0.05$	$\beta_0 = -0.1$	$\beta_0 = -0.2$
T^*	0.1704	0.1522	0.1501	0.1500
C_1^*	0.2704	0.2522	0.2501	0.2500
C_2^*	0.2770	0.3450	0.3795	0.3980
C_3^*	0.2986	0.1335	0.0497	0.0049
$\beta(C_1^*)$	0.9973	0.9475	0.8975	0.7975

Table 6. Child's Utility Comparison

β_0 (1)	$\beta(C^*_{TL})$ (2)	$V_{TL}(\beta(C^*_{TL}))$ (3)	$V_{END}(\beta(C^*_{TL}))$ (4)
0	0.9975	-131.6684	-278.4951
-0.05	0.9476	-51.3465	-122.0620

For each simulation $\eta = 0.5$, $\sigma = 1.5$, $r = 1.03$, $a = 0.01$, $y_1 = .1$, $y_2 = .4$, $y_p = .4$, $\tau_1 = 18$, $\tau_2 = 40$, $\tau_3 = 20$

Tough Love Altrusim with Leisure

We introduce leisure into the tough love model. Parent optimizes by solving the following problem,

$$Max_T \quad \eta\tau_1 u(y_p - T) + (1-\eta)\Big[\tau_1 u(w_1(1-L_1^*) + T, L_1^*) + \tau_2\beta_{2,p}u(C_2^*, L_2^*) + \tau_3\beta_{2,p}\beta_{3,p}u(R(w_2(1-L_2^*) - C_2^*))\Big] \tag{32}$$

where,

$$\{C_2^*, L_1^*, L_2^*\} \equiv argMax_{C_2,L_1,L_2} \Big[\tau_1 u(w_1(1-L_1) + T, L_1) + \tau_2\beta_{2,k}(w_1(1-L_1)+T)u(C_2, L_2) + \beta_{2,k}(w_1(1-L_1)+T)\beta_{3,k}(w_1(1-L_1)+T)u(R(w_2(1-L_2) - C_2))\Big] \tag{33}$$

Parameterization

For the purpose of simulation we impose the following parametrization:

$$U(C, L) = Log(C) + d\frac{L^{1-\gamma}}{1-\gamma} \tag{34}$$

We use the same parameterization for the discount factors as before by replacing y_1 by $w_1(1 - L_1) + T$.

Table 7. Tough Love Altruism Model with Leisure

Global Parameters

$\eta = 0.5; \gamma = 0.7; r = 1.03; a = 0.01$

$w_1 = 1; w_2 = 2; y_p = 2; \tau_1 = 18; \tau_2 = 40; \tau_3 = 20;$

Optimum	$\beta_0 = 0$	$\beta_0 = -0.01$
T^*	0.7085	0.6769
Child's First Period Income	9.3802	9.1318

Conclusion

1. *Observational equivalence*
   - An illustration is an exogenous wealth redistribution.
2. *Exogenouse shift in the time preference*
   - In the tough love altrusim model with liquidity constraints for the child, parent may reduce the transfers in response to an exogenous negative change in the child's discount factor.
   - On the other hand, in the standard altruism model and paternalistic altruis model with liquidity constraints for the child, the parent does not respond to the increasingly impatient behavior of the child.
   - In the endogenous discount altruism model, the parent may increase or reduce the transfer, depending on the parameter values.

Future research

The worldview of the parent may be a factor in determining whether or not a parent shows tough love.

- If a parent has a worldview in which suffering is considered meaningless (such as the Naturalisitc worldview), the parent is unlikely to show tough love.
- If a parent has a worldview in which suffering is considered meaningful (such as the Theistic worldview), the parent is likely to show tough love.

There are some worldview quesotions in the Osaka University COE data.