Instructor: **Dr. Laura Turner** (Laura)

- Office hours: Kaneff 3262, Th 3:15-5:30pm or by appointment
- Email: lmf.turner@utoronto.ca
- TA: Camille Simardone (camille.simardone@utoronto.ca)

Class hours: Tuesday, 1:10-3:00 pm, DH 2060

Textbook: Gary Becker: *A Treatise on the Family*, Enlarged Edition

Any additional readings will be provided on Blackboard

Evaluation

1. Five assignments (due dates are on syllabus)
   - Highest counts for 30%; others 15% each
   - Late assignments beyond allotted “late days” penalized 4% rate per day, including weekends
   - Students are allowed a combined 30 “late” days beyond the suggested submission dates on syllabus.
   - Group work is fine but with a small penalty (see syllabus)
2. In-class quizzes: 10-12%
   - 7 one-question quizzes, worth 2 points each
   - 1 point for attempting the question and 1 point for getting it right

Course Text

- Gary Becker: *A Treatise on the Family* (Enlarged Edition)
- Originally published: 1981; this edition 1991
- Becker largely pioneered the "post-Malthusian" field of family economics
    - Malthus' model of population growth, in which population growth tracks income growth, broke down in second half of 19th and the 20th C

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   - What are the roles and contributions of **home** vs. **market** production?
   - Male / female wage gaps?
     - Small **intrinsic differences** between men and women or small effects of **discrimination** can have huge consequences if productivity depends on optimal investments in **human capital**

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   - What explains the historical decline of **polygamous** and the relative absence of **polyandrous** marriages?
   - What determines equilibrium sorting in marriage markets? Is this sorting **efficient** in an economic sense?
     - Yes: under some conditions, the privately optimal sorting of partners maximizes *aggregate* output/utility
     - In an efficient marital sorting, it is not possible for a swapping of partners to make somebody better off and nobody worse off (Pareto efficient)

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     - Strategic intergenerational relationships: game theory applications, e.g. merit goods
     - Altruism within families: the "Rotten Kid Theorem"

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    - Can members of couples **contract** or "commit" to avoid divorce?
    - What is the role of the **modern welfare state** in determining family formation and dissolution? Policy implications?

An application of family economics: parents “the prodigal son”

- Basic idea: Parents and children may have very different ideas for the optimal behaviour of children, creating an intergenerational struggle

  1. Parents want to control their children to maximize their “gains” from parenting
  2. Children want to receive transfers (gifts and bequests) from parents

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- Concepts:

  1. Intergenerational conflict and strategic interaction
  2. altruism
  3. dynamics

Parents' preferences

- Parents are **altruistic** with preference function $V(\cdot)$ defined over:
  1. Their own consumption x_3
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- So: $V(\cdot) = V(x_3, U)$ with $V_{x_3} > 0$, $V_U > 0$

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    1. Their own consumption x_3
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- So: $V(\cdot) = V(x_3, U)$ with $V_{x_3} > 0$, $V_U > 0$
    - Technical note: in the lecture notes and the book, you'll see the first derivatives of a given function $U(x, y)$ with respect to x and y written interchangeably as $U_x \equiv \frac{\partial U}{\partial x}$ and $U_y \equiv \frac{\partial U}{\partial y}$. The equivalence symbol $\equiv$ means that the two expressions mean the same thing.

Children's preferences

- Children are **selfish**, with preference function $U = U(x_1, x_2)$, with $U_{x_1} > 0$ and $U_{x_2} > 0$ and:

    1. x_1 is their consumption when young
    2. x_2 is their consumption when older

Setting up the story I

- Each good $i = 1, 2, 3$ costs p_i with $p_1 = 1$ (a *normalization*).
- Parents have income I_P and can give part of this as a gift g to their children. Catch: g can only be spent on x_2
- Children have their own income I_c which they spend on themselves: on x_1 and x_2.

Setting up the story II

- $V(.)$ and $U(.)$ are standard/well behaved preference functions in the following sense:

  1. we can always take their derivatives
  2. they are increasing in each argument: more of x_i is always better
  3. they are concave in each argument: the *marginal* utility of x_i is decreasing as x_i increases, holding other arguments of U and V constant

Setting up the story II

- $V(.)$ and $U(.)$ are standard/well behaved preference functions in the following sense:
  1. we can always take their derivatives
  2. they are increasing in each argument: more of x_i is always better
  3. they are concave in each argument: the *marginal* utility of x_i is decreasing as x_i increases, holding other arguments of U and V constant
- Almost all utility functions we encounter in economics have these three properties, which keeps the math simple

Setting up the story III

Parents and their children play a three-stage game:

1. Children choose the amount of consumption when young x_1
2. Parents observe child's choice of x_1 and choose g and x_3
3. Children receive g and choose the amount of consumption when old x_2

Setting up the story III

Parents and their children play a three-stage game:

1. Children choose the amount of consumption when young x_1
2. Parents observe child's choice of x_1 and choose g and x_3
3. Children receive g and choose the amount of consumption when old x_2

- Solve by **backward induction**: solve the child's problem at stage 3; then the parent's problem at stage 2; then the child's problem at stage 1.
- In later stages of the "game", individuals take choices made by themselves or others in earlier stages as given

Final stage: children receive g and consume x_2

- After receiving g, children have total income $I_c + \overline{g} - \overline{x_1}$ where bars indicate that these choices have previously been made (g by parents and x_1 by children) and are now taken as given.

- Since U is always increasing in x_2 (technically, there is *non-satiation* in x_2), children spend their whole remaining income on x_2, i.e.

$$p_2 x_2 = I_c + \overline{g} - \overline{x_1}$$

Second stage: parents choose g and x_3

- Parents have income I_P and choose how much to spend on x_3 and how much to give as a gift (or bequest) g to their children, given that their children have chosen $\overline{x_1}$ at the first stage of the game

- To solve this problem, write out the parents' Lagrangian with Lagrangian multiplier (shadow value of resource constraint) λ_p:

$$\mathcal{L} = \max_{x_3, g} V\big(x_3, U(x_1, x_2)\big) + \lambda_P[I_P - p_3 x_3 - g]$$

- First order condition (FOC) for x_3 is standard: $\frac{\partial V}{\partial x_3} - \lambda_P p_3 = 0$

- FOC for g is $\frac{\partial V}{\partial U}\frac{\partial U}{\partial x_2}\frac{\partial x_2}{\partial g} - \lambda_p = 0$

- By dividing out λ_P and using the fact that $\frac{\partial x_2}{\partial g} = \frac{1}{p_2}$, we get:

$$\frac{\partial V}{\partial x_3} p_2 = \frac{\partial V}{\partial U}\frac{\partial U}{\partial x_2} p_3$$

Second stage cont.

- Alternatively, we can use the fact that parents will use up all of their income on g and x_3 (why?) to rewrite the parents' optimization problem as:

$$\max_g V\left(\frac{I_P - g}{p_3}, U\left(\overline{x_1}, \frac{I_c + g - \overline{x_1}}{p_2}\right)\right) \tag{1}$$

- Solving (1) for g such that $\frac{\partial V}{\partial g} = 0$, easy to find the FOC:

$$\frac{\partial V}{\partial x_3}/p_3 = \frac{\partial V}{\partial U}\frac{\partial U}{\partial x_2}/p_2$$

  exactly as on the previous slide using the Lagrangian.

- Note: because utility is well-behaved and the budget constraints are linear, we know our FOC describes a maximum rather than a minimum.

First stage: children choose x_1

- Children buy and consume x_1 taking account of their life-time income constraint: $I_c + g(x_1) = x_1 + p_2 x_2$:

$$\mathcal{L} = \max_{x_1, x_2} U(x_1, x_2) + \lambda_c[I_c + g(x_1) - x_1 - p_2 x_2] \tag{2}$$

- FOC for x_1 is:

$$\frac{\partial U}{\partial x_1} - \lambda_c[1 - \frac{\partial g}{\partial x_1}] = 0$$

- ...or substituting for λ_c (using the FOC for x_2 which we can derive from (2)):

$$p_2 \frac{\partial U}{\partial x_1} = \frac{\partial U}{\partial x_2}[1 - \frac{\partial g}{\partial x_1}]$$

Notes on solution

- Children's FOC for x_1 differs from the "standard" FOC by the term $(-\frac{\partial g}{\partial x_1})$
- Suppose $\frac{\partial g}{\partial x_1}$ is positive. Then at the child's optimal x_1, $\frac{\partial U}{\partial x_1}$ is *lower* than it would be in the absence of g. Since U is concave in x_1, this in turn implies that the child's optimal x_1 is *higher*, and children consume more when young than they would if $\frac{\partial g}{\partial x_1} = 0$.
- This is what is known as the "prodigal son" problem!

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- This is what is known as the "prodigal son" problem!
- Questions:
  1. Why do we expect that it is in fact the case that $\frac{\partial g}{\partial x_1} > 0$?
  2. From the point of view of a social planner who cares equally about the welfare of children and parents, are the choices of x_1, x_2 and g likely to be *efficient*?

Question 2: Some comments

- A social planner (in this case a family planner) has a social welfare function $S(U, V)$ where S is the planner's "utility" or objective function, which depends on the welfare of the children and the parents.
- If the social planner cares equally about the parents and the children, then the obvious candidate for S is:

$$S(U, V) = U(x_1, x_2) + V(x_3, U)$$

Since the planner is happiest if he can maximize the sum of parents' and

childrens' welfare, it makes sense for him to assume an equally weighted sum of their own preferences.

Question 2: Some comments

- Typically, we assume the planner could control the resources in the family but not increase them.
- He allocates I_c and I_p so as to maximize S, a constrained optimization problem similar in structure the ones solved by the parents and children.
  - Note that the family doesn't determine the prices of the goods, so the planner must take them as given just like the family members (parent and children) do.
- "Social efficiency" means that the x_1, x_2 and x_3 of the family members coincide with the choices of x_1, x_2 and x_3 of the planner. This is the same as saying that the children and parents playing the three-stage game make the choices that maximize their joint welfare.

A possible complication: Merit goods

- The prodigal son problem arises because children exploit their parents for resources and therefore lower their parents' utility.
- This exploitation could be reduced (at the cost of some complications to the algebra) if children are also altruistic toward their parents.
- Another way of solving (or at least mitigating) the prodigal son problem is if x_1 is a *merit good*: that is a good that provides direct utility to parents.
  - See the discussion in Becker Introduction: note that x_1 and x_2 are reversed there.

Merit goods

- In the presence of merit goods, the parental utility function becomes:

$$V \equiv V(x_3, U, x_1)$$

- Note that the "merit good" x_1 provides utility *to parents* in two ways:
  1. directly, as an argument of V
  2. indirectly through its effect on U
- In our story, merit goods are equivalent to "consumption when young". Parents may get direct utility from their kids' consumption while the kids are living with the parents so that they "enjoy" being exploited by their kids.
- Alternatively, we could think of x_1 as being a specific thing, like marrying rich, that both parents and their kids like.

Marrying a rich doctor as a merit good

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- Note that the "merit good" x_1 provides utility *to parents* in two ways:

    1. directly, as an argument of V – bragging to my friends that my kid married a rich doctor
    2. indirectly through its effect on U – I am happy that my kid is happy that he married a rich doctor

Merit goods cont.

- Other interpretations of the problem are also possible, with minor variations in the formulation. Suppose it is x_2 (adult or stage-3 consumption) rather than x_1 that is the merit good to parents. In this case, would the existence of the merit good solve the prodigal son problem (the disharmony between what parents want and children want) or make it worse?
- What if parents and children can *contract* on a level of x_1 and g? Would such an (informal) contract be credible?
- What if, at stage 1, children choose between two goods x_1 and y_1 where x_1 is the merit good and y_1 a regular (non-merit) good. Would children have an incentive to consume more of the merit good than they would if parental transfers were fixed?

Merit goods cont.

- The simple model of intergenerational transfers has implications for (1) relative power of rich vs. poor parents over their children (2) intergenerational mobility (3) “battle of the generations”, just to give a few examples of concepts we will encounter later in the class.
- Though simple, it is also a very *flexible* model, which is good and bad. Part of the goal of economists is to write tractable models that capture basic ideas about what people want and how and make decisions, together and separately. Another goal is to *test* these models to see which variants are most consistent with evidence from the real world.
  - Is the prodigal son problem a real problem? Do merit goods really exist?
- In ECO 433, we will mostly be looking at the theoretical side: but always remember that a model is only as good as its predictions!