14.771: The Family

Ben Olken

Decision making within the family

- So far we have abstracted from "households".
- That is we assume a "household" has a single utility function $u(X)$, where X are the various types of things that can be consumed, so the household maximizes the simple problem

$$\max_{X} u(x) \text{ s.t. } pX <= W$$

- This is called the "Unitary Household" model.
- However, the real world is much more complicated.
  - Households usually consist of spouses, who need to bargain over consumption choices. Both statically and dynamically.
  - Different spouses may have differential control over different assets and different consumption decisions within the household - this may affect development.

Chiappori, Browning, Bourguignon...

- Test unitary model $\rightarrow$ reject it in many cases

- Is there an alternative that is
  1. Tractable
  2. Falsifiable
  3. Supported by the data

$\Rightarrow$ This is the "collective" model

Collective model of intrahousehold decisionmaking

- Household maximizes its joint utility function subject to budget constraint
- Joint utility function is a weighted sum of individual utility functions
- Individuals can be altruistic, ie, others' consumption is in their utility function
- This model implies Pareto efficiency. What does this mean? Why is or isn't Pareto efficiency a reasonable assumption?

Setup

- Assume 2 household members, m (male) and f (female)
- Utility of each person is $U_m(q_f, q_m, Q)$ and $U_f(q_f, q_m, Q)$
- q_m, q_f are private consumption and Q is public consumption
- Denote the vector of consumption as $\mathbf{q} = (q_m, q_f, Q)$ and the vector of prices $\mathbf{p} = (p_m, p_f, P)$

Household utility function

- Bargaining weights $\lambda_m + \lambda_f = 1$
- Household's utility is
$$U(\mathbf{q}) = \lambda_m U_m(\mathbf{q}) + \lambda_f U_f(\mathbf{q})$$
- Household solves
$$\max \ \lambda_m U_m(\mathbf{q}) + \lambda_f U_f(\mathbf{q})$$
$$\text{subject to}$$
$$\mathbf{p} \cdot \mathbf{q} = y_f + y_m + y \equiv Y$$

Unitary case

- Suppose identical preferences $U_f = U_m = U$
- This is the unitary case; unitary case is nested within the more general collective model
- What does the household's consumption patterns depend on?
  - Total income Y
  - Prices p
  - Bargaining weights irrelevant

Non-unitary case

- Individuals bargain with each other to determine household consumption bundle
- λ_f and λ_m represent the bargaining weights
- With fixed bargaining weights, this non-unitary case is formally identical to the unitary case

$$\lambda_m U_m(\mathbf{q}) + \lambda_f U_f(\mathbf{q}) = U(\mathbf{q})$$

- These two models are not easy to distinguish unless we have some other way of knowing each individual's preferences
- But our usual way of inferring preferences is from choices, which are generally joint choices

Another prediction of unitary model: income pooling

- Note that we don't observe the weights
- Rather, we make assumptions about what determines them, e.g., increasing in the individual's share of total income, i.e., y_m and y_f matter, not just sum $y_m + y_f$
- Generates an empirical test: Conditional on total income, does identity of income earner affect consumption choices?
- One might imagine that this might affect the bargaining process, and hence the outcomes
- Deviation from standard preferences in which utility function does not depend on income or prices

Making the prediction more precise

- Technically any pattern of consumption depending on income earner is a violation of income pooling, but perhaps then too easy to reject income pooling
- Can make additional assumptions about how consumption should change when person M versus person F gains bargaining power
- Generates a more specific empirical test: Conditional on total income, does item preferred by person M increase when relative income of person M increases?

Sources of variation in bargaining power

- Earned income
- Age gap
- Resources brought to marriage
- Unearned income, temporary or permanent
- Divorce laws
- Scarcity of brides or grooms in the marriage market

Assignable goods

- How can we assign consumption to one person or the other?
- Goods we assume are male versus female goods
- Individual consumption
- Could try to ascertain preferences at individual level

Browning, Bourguignon, Chiappori, Lechene (1994)

- Tests income pooling looking at husbands and wives
- If we had individual-level expenditures or consumption by the household, could look at individual consumption
- But with HH-level data, we can focus on a good that is exclusively consumed by men or by women, e.g., types of clothing

Welfare implications for children

- Thomas (1990) brings this to development economics
  - Improve identification of individual income
  - Welfare implications for children
- Uses data from Brazil and compares effects of mother's versus father's income on child health
  - Nutrient intake
  - Child health
  - Child survival
  - Fertility
- Focuses on *non-labor* income

$$q_{ij} = \alpha_{jf} y_{if} + \alpha_{jm} y_{im} + X_i \beta_j + \epsilon_{ij}$$

Why non-labor income?

Challenges with this regression?

- Individual level omitted variables

Effects on children of male versus female income

Non-linear Wald Tests for Equality of Ratio of Mother's to Father's Income Effects

	Ratio of Income Effects	Wald Test χ^2	Wald Test p-value
Unearned Income			
Nutrient demand			
Log (per capita calories)	7.23	0.32	(0.85)
Log (per capita protein)	7.16		
Fertility and child survival			
Children ever born	8.05	1.10	(0.58)
Child survival	18.21		
Anthropometrics			
Log (height for age)	8.12	0.53	(0.77)
Log (weight for height)	4.23		
Asset Income			
Nutrient demand			
Log (per capita calories)	6.44	1.24	(0.87)
Log (per capita protein)	3.53		
Fertility and child survival			
Children ever born	2.80	0.00	(1.00)
Child survival	0.93		
Anthropometrics			
Log (height for age)	15.57	0.29	(0.99)
Log (weight for height)	7.04		

Effects on girls versus boys

Testing for Gender Bias: Determinants of Anthropometric Outcomes by Sex of Child

	Weight for Height			Height for Age		
	Females	Males	Difference	Females	Males	Difference
Unearned income						
Mother	1.097	0.198	0.899	0.243	0.094	0.149
	[2.7]	[3.5]	[2.2]	[1.4]	[1.9]	[0.8]
Father	0.006	0.070	−0.064	0.023	0.031	−0.008
	[0.3]	[2.8]	[2.0]	[3.1]	[1.6]	[0.4]
Other	−0.045	2.923	−2.968	0.020	0.793	−0.045
	[6.7]	[3.0]	[3.1]	[4.0]	[1.6]	[1.6]
Education (1) if						
Mother						
Literate	−0.338	0.126	−0.464	1.756	1.261	0.495
	[1.1]	[0.4]	[1.1]	[11.5]	[8.2]	[2.3]
Completed elementary	0.116	0.641	−0.525	2.681	2.322	0.359
	[0.3]	[1.6]	[0.9]	[13.8]	[11.7]	[1.3]
Completed secondary	2.499	1.979	0.520	4.101	3.705	0.396
	[4.3]	[3.8]	[0.7]	[15.8]	[14.6]	[1.1]
Father						
Literate	−0.705	−0.282	−0.423	1.094	1.517	−0.423
	[2.0]	[0.8]	[0.8]	[6.2]	[8.6]	[1.7]
Completed elementary	−0.406	0.411	0.821	2.297	2.671	−0.374
	[0.9]	[1.0]	[1.3]	[10.7]	[12.3]	[1.2]
Completed secondary	0.845	1.949	−1.104	3.558	4.319	−0.761
	[1.5]	[3.6]	[1.4]	[13.5]	[16.6]	[2.1]
Tests of joint significance						
Income	6.71	10.89		2.53	3.54	
	[0.1]	[0.1]		[11.1]	[6.0]	
Education						
Mother	4.59	7.33		275.30	203.20	
Father	0.05	3.32		146.90	201.30	
Tests of equality of effects						
Income						
Mother = father	7.14	4.14		1.51	1.34	
	[0.3]	[4.2]		[21.8]	[24.7]	
Mother = father = other	13.40	11.95		1.67	3.74	
	[0.1]	[0.3]		[43.4]	[15.4]	
Education						
Mother = father	2.78	0.79		7.03	1.93	

“Natural experiment” change in male/female income

- Duflo (2003) examines grandparents’ spending on children
- Policy change in pensions extended benefits to blacks after the end of apartheid
- 17% of children 0 to 5 years old live with a pension earner
- Compare children living with eligible grandparent (age 60 for females or 65 for males) to ones just younger

Identification strategy for Duflo (2003)

- Instrumenting for eligibility with whether living with a grandparent who meets age–gender criterion
- But living with grandparents may be correlated with omitted variables
- In essence, the estimates compare those children living with a 65+ grandfather to those living with a 60 to 65 year old grandfather
- All households in sample then control for presence of a man over age 50, over age 55, over age 60
  - This is a way to control for presence of a grandfather
  - By controlling for man over age 60, also controlling for presence of a quite old grandparent

Grandmothers and granddaughters

Table 3. Effect of the Old-Age Pension Program on Weight for Height: OLS and 2SLS Regressions

	OLS						2SLS
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Girls							
Eligible household	0.14	0.35*	0.34*				
	(0.12)	(0.17)	(0.17)				
Woman eligible[a]				0.24*	0.61*	0.61*	1.19*
				(0.12)	(0.19)	(0.19)	(0.41)
Man eligible[b]				−0.011	0.11	0.056	−0.097
				(0.22)	(0.28)	(0.19)	(0.74)
Observations	1574	1574	1533	1574	1574	1533	1533
Boys							
Eligible household	0.0012	0.022	0.030				
	(0.13)	(0.22)	(0.24)				
Woman eligible[a]				0.066	0.28	0.31	0.58
				(0.14)	(0.28)	(0.28)	(0.53)
Man eligible[b]				−0.059	−0.25	−0.25	−0.69
				(0.22)	(0.34)	(0.35)	(0.91)
Observations	1670	1670	1627	1670	1670	1627	1627
Control variables							
Presence of older members[c]	No	Yes	Yes	No	Yes	Yes	Yes
Family background variables[d]	No	No	Yes	No	No	Yes	Yes
Child age dummy variables[e]	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Policy response to evidence on female versus male spending

- Many policies aim to help children and do so by giving transfers to parents
- Based on these research findings, many transfer programs aimed at helping children explicitly give money to mothers

How strong is the evidence?

- The best identified evidence does not find similar evidence
- RCT of GiveDirectly transfers to households
- 400 USD one-time transfer to households in Kenya

Unconditional GiveDirectly transfers

Treatment Effects: Index Variables

	(1) Control mean (std. dev.)	(2) Treatment effect	(3) Female recipient	(4) Monthly transfer	(5) Large transfer	(6) N
Value of nonland	494.80	301.51***	−79.46	−91.85**	279.18***	940
assets (US$)	(415.32)	(27.25)	(50.38)	(45.92)	(49.09)	
		[0.00]***	[0.52]	[0.28]	[0.00]***	
Nondurable	157.61	35.66***	−2.00	−4.20	21.25**	940
expenditure (US$)	(82.18)	(5.85)	(10.28)	(10.71)	(10.49)	
		[0.00]***	[0.92]	[0.99]	[0.22]	
Total revenue,	48.98	16.15***	5.41	16.33	−2.44	940
monthly (US$)	(90.52)	(5.88)	(10.61)	(11.07)	(8.87)	
		[0.02]**	[0.92]	[0.59]	[0.84]	
Food security index	0.00	0.26***	0.06	0.26**	0.18*	940
	(1.00)	(0.06)	(0.09)	(0.11)	(0.10)	
		[0.00]***	[0.92]	[0.13]	[0.25]	
Health index	0.00	−0.03	0.10	0.01	−0.09	940
	(1.00)	(0.06)	(0.09)	(0.10)	(0.09)	
		[0.82]	[0.72]	[0.99]	[0.72]	
Education index	0.00	0.08	0.06	−0.05	0.05	823
	(1.00)	(0.06)	(0.09)	(0.10)	(0.09)	
		[0.43]	[0.92]	[0.99]	[0.84]	
Psychological well-	0.00	0.26***	0.14*	0.01	0.26***	1,474
being index	(1.00)	(0.05)	(0.08)	(0.08)	(0.08)	
		[0.00]***	[0.43]	[0.99]	[0.00]***	
Female	0.00	−0.01	0.17*	0.05	0.22**	698
empowerment	(1.00)	(0.07)	(0.10)	(0.12)	(0.11)	
index		[0.88]	[0.51]	[0.99]	[0.22]	
Joint test (p-value)		.00***	.11	.04**	.00***	

Are households Pareto-efficient?

- Assumption that households maximize a weighted sum of their individual utilities might be wrong
- Seems more reasonable to assume household outcomes are Pareto optimal compared to other settings of non-cooperative games
- Long-term relationship
- More is observable and verifiable
- But maybe there are inefficiencies...
  - Imperfect information about income
  - Imperfect information about effort (moral hazard)
  - Limited commitment

Udry (1996)

- In Burkina Faso, individuals control different plots
- Pareto optimal behavior would be to maximize total income and then share income according to weights
- However, if man has control over output from his plot and woman over her plot, each might want to enlarge his/her output even if it lowers total output

Deviation from the collective model

- Compared to collective setup, individual's income is now endogenous
- Combined with lack of income pooling, this may lead to inefficiencies on production side
- A couple would like to commit to not make the λ's depend on the endogenous (not predetermined) component of "his" output versus "her" output if there is a tradeoff between maximizing my output and maximizing total household output

Extending model to production side

Extend collective model to include individualized production

- K is private goods
- Z is public goods
- $\mathbf{C}_j$ is consumption by j
- Labor supply by j is N_j
- A^i is area of plot i
- $P^k = \{i | i \text{ planted to crop } k\}$

Model (cont'd)

- $Y^k = \sum_{i \in P^k} G^k(N_f^i, N_m^i, A^i)$
- $G^k()$ is the production function which is the same for all individuals
- $Z = Z(N_f^Z, N_m^Z)$
- No labor market
- $N_J = \sum_i N_J^i + N_J^Z$
- $\mathbf{p} \cdot \mathbf{C} \leq \mathbf{p} \cdot \mathbf{Y}$

Pareto efficiency

- A Pareto efficient allocation solves

$$\max_{C_J, N_J^i, P^k} \lambda_f u_f(.) + \lambda_m u_m(.)$$

subject to the budget constraint and production functions

- Production decisions independent of preferences $\rightarrow$ labor allocation solves

$$\max_{N_J^i} \sum_{i \in P^k} G^k(N_f^i, N_m^i, A^i)$$

$$\text{subject to} \sum_i N_J^i = N_{Jk}$$

- $G^k()$ concave and increasing in inputs, so $A^i = A^j$ implies

$$G^k(N_f^i, N_m^i, A^i) = G^k(N_f^j, N_m^j, A^j).$$

Empirical implication

- Define yield

$$Q^k(A^i) = \frac{G^k(N_f^i, N_m^i, A^i)}{A^i}$$

- Let $\bar{A}^k$ be avg area of plots planted by this household to crop k
- Then

$$Q^k(A^i) - Q^k(\bar{A}) \approx \frac{\partial Q^k(\bar{A})}{\partial A} \cdot (A^i - \bar{A})$$

- This gives us the within (household-time-crop) estimator

$$Q_{htci} = \beta Area_{htci} + \lambda_{htc}$$

- Why not use between-crop comparisons?

Empirical implication

$$Q_{htci} = X_{htci}\beta + \gamma F_{htci} + \lambda_{htc} + \varepsilon_{htci}$$

- Deviation of plot yield from mean yield as a function of deviation of plot characteristics from mean characteristics
- Q_{htci} is yield on plot i for crop c in time t for household h
- λ_{htc} is the household-time-crop FE
- X are plot characteristics (expanded beyond area)
- F is dummy for female
- ε is error term (unobserved plot quality or yield shocks)
- Test of Pareto efficiency: Is $\gamma = 0$?

Data

- Key feature of Burkina Faso is that men and women control different plots
  - Make production decisions
  - Nominal control of output from your plot

Distribution of Primary Crops across Plots

Primary Crop	Women's Plots	Men's Plots
White sorghum	20.4	20.4
Red sorghum	8.6	8.7
Millet	8.4	22.8
Maize	1.9	19.2
Groundnuts	15.6	5.11
Cotton	.7	11.1
Okra	12.4	.6
Earth peas/fonio	26.0	2.1
Others	6.0	10.0

Data

- ICRISAT panel survey of 150 HHs in 6 villages in Burkina Faso
- Uses 1981-3 data
- Surveyors visited each HH every 10 days to collect detailed agricultural data
- 432 household-years and data on 4655 plots
- For half of HHs (243), man and wife/wives harvest same crop on different plots in same year
- 1723 plots in this subsample

Table 3

OLS Fixed-Effect Estimates of the Determinants of Plot Yield and Ln(Plot Output) (× 1,000 FCFA)

Dependent Variable: Value of Plot Output/Hectare

	Household-Year-Crop Effects: All Crops	Household-Year Effects		Household-Crop-Year Effects	
		Millet Only	White Sorghum	Vegetables	All Crops: CES*
	(1)	(2)	(3)	(4)	(5)
Mean of dependent variable	89	31	41	134	1.67
Gender: (1 = female)	−27.70 (−4.61)	−10.36 (−2.53)	−19.38 (−4.43)	−34.27 (−2.21)	−.20 (−3.56)
Plot size:					
1st decile	133.99 (3.50)	−28.35 (−2.67)	−17.90 (−1.92)	237.10 (4.66)	
2d decile	69.10 (4.38)	8.64 (.82)	52.30 (3.16)	63.97 (2.38)	
3d decile	63.45 (5.52)	16.95 (1.81)	47.68 (4.77)	35.87 (1.52)	
4th decile	34.08 (2.88)	9.79 (1.12)	26.73 (3.12)	4.21 (.18)	
6th decile	−2.04 (−.29)	−.99 (−.11)	−6.38 (−1.16)	−6.65 (−.26)	
7th decile	−13.44 (−1.78)	−13.01 (−1.73)	−11.31 (−1.69)	−33.54 (−.90)	
8th decile	−17.23 (−2.59)	−12.97 (−1.34)	−28.58 (−4.82)	31.04 (.73)	
9th decile	−26.68 (−3.81)	−21.50 (−2.65)	−28.65 (−4.98)		
10th decile	−31.52 (−4.49)	−20.56 (−2.55)	−37.70 (−6.03)		
Ln(area)					.78 (29.52)
Toposequence:					
Uppermost	−41.35 (−2.18)	2.50 (.24)	−14.60 (−1.73)	−131.34 (−1.82)	−.46 (−2.71)
Top of slope	−26.35 (−1.27)	9.53 (.96)	−11.27 (−1.47)	−121.05 (−1.85)	−.29 (−1.92)
Mid-slope	−24.38 (−1.19)	5.39 (.64)	−8.62 (−1.15)	−119.68 (−1.88)	−.28 (−1.97)
Near bottom	−21.70 (−.90)	4.48 (.40)	−5.36 (−.71)	−93.96 (−1.30)	−.18 (−1.27)
Soil types:					
11	−32.20 (−.93)	−6.13 (−.92)			−.89 (−2.34)
12	41.82 (1.11)	4.92 (1.18)	47.04 (5.26)		.23 (.74)
13	102.92 (1.10)	7.43 (1.11)	−21.08 (−1.82)		.69 (1.01)
31	1.86 (.36)	10.65 (1.55)	−.00 (−.00)	−36.66 (−.66)	.08 (.83)
32	6.38 (.99)	10.26 (1.23)	−.37 (−.06)	−19.36 (−.38)	.07 (.74)
33	29.42 (2.14)	8.56 (.67)	21.29 (1.52)		.18 (1.14)
37	7.69 (1.37)	6.20 (.80)	−.87 (−.17)	−76.60 (−.49)	.13 (1.36)
45	5.66 (1.03)	7.42 (1.15)	1.36 (.26)	52.92 (.46)	.06 (.67)
46	−17.03 (−1.20)	−25.95 (−1.98)	−7.16 (−.73)		−.32 (−1.16)
51	8.57 (.90)	43.77 (1.72)	−10.35 (−1.20)	12.96 (.26)	.05 (.42)
Location:					
Compound	1.54 (.19)	9.69 (2.67)	−4.98 (−1.04)	32.48 (.38)	.23 (3.02)
Village	−1.82 (−.40)	6.07 (1.45)	−1.68 (−.62)	50.37 (1.58)	.16 (2.35)

Why is yield lower

- Women are less efficient cultivators?
- Different input intensity for male versus female plots?

Inputs used on male versus female plots

Least-Squares Tobit Fixed-Effect Estimates of the Determinants of Plot Input Intensities

	Household-Year-Crop Effects									
	Male Labor per Hectare (1)		Female Labor per Hectare (2)		Child Labor per Hectare (3)		Nonhousehold Labor per Hectare (4)		Manure (1,000 kg per Hectare) (5)	
Gender (1 = female)	−668.47	(−9.60)	70.23	(1.53)	−195.46	(−2.34)	−428.41	(−1.70)	−16.33	(−2.54)
Plot size:										
1st decile	1,209.72	(2.53)	1,462.21	(5.71)	740.80	(1.17)	193.35	(.43)	24.79	(2.42)
2d decile	417.18	(3.25)	1,131.01	(5.82)	143.12	(1.11)	487.39	(1.28)	7.99	(.96)
3d decile	245.94	(2.74)	799.12	(6.72)	133.16	(1.53)	689.39	(1.27)	2.58	(.48)
4th decile	96.53	(1.71)	407.87	(5.02)	72.51	(.68)	378.18	(1.07)	−6.18	(−1.12)
6th decile	−.55	(−.01)	−69.25	(−1.36)	−72.15	(−.98)	57.48	(.80)	−2.14	(−.33)
7th decile	−153.12	(−2.97)	−306.51	(−5.96)	−59.53	(−.60)	65.51	(.64)	−11.08	(−1.54)
8th decile	−375.53	(−6.23)	−386.78	(−6.61)	−184.61	(−1.61)	−43.81	(−.30)	−11.01	(−1.61)
9th decile	−413.36	(−6.79)	−373.57	(−5.16)	−269.99	(−1.83)	−255.15	(−.87)	−11.64	(−1.80)
10th decile	−490.11	(−7.72)	−418.06	(−6.08)	−219.27	(−1.86)	−220.64	(−1.07)	−16.41	(−2.45)
Toposequence:										
Uppermost	41.62	(.35)	−1.92	(−.02)	−55.52	(−.51)	20.20	(.12)	−9.22	(−.62)
Top of slope	29.36	(.30)	91.02	(1.07)	35.15	(.38)	144.02	(.83)	.26	(.02)
Mid-slope	36.08	(.38)	.57	(.01)	.10	(.00)	−15.45	(−.11)	1.14	(.11)
Near bottom	16.42	(.18)	75.94	(.86)	−98.03	(−1.05)	23.27	(.17)	2.88	(.27)
Soil Types:										
3	103.49	(.60)	−31.68	(−.23)	235.74	(.86)	175.29	(.50)	−11.80	(−1.18)
7	−65.79	(−.85)	−30.39	(−.28)	21.88	(.44)	66.04	(.47)	−.07	(−.01)
11	−28.77	(−.09)	−52.06	(−.34)	−778.86	(−4.36)	262.71	(.70)	−.70	(−.08)
12	1,051.98	(.82)	367.34	(1.63)	62.36	(.44)	368.47	(1.13)	16.32	(1.48)
13	274.48	(1.33)	−38.50	(−.29)			−187.07	(−.89)		
21	196.37	(.95)	−43.41	(−.49)	−42.87	(−.35)	37.73	(.27)	2.86	(.18)
31	83.16	(1.59)	68.24	(.92)	205.90	(2.29)	115.56	(1.00)	6.43	(1.29)
32	24.77	(.50)	−10.36	(−.15)	173.14	(1.07)	−51.08	(−.44)	.73	(.12)
33	250.40	(2.57)	163.76	(1.36)	206.68	(.78)	−113.92	(−.37)	17.28	(1.61)
35	179.46	(1.50)	303.86	(1.90)	248.38	(2.60)	195.14	(.58)	−12.75	(−.94)
37	82.49	(.70)	50.84	(.30)	114.53	(1.19)	31.14	(.20)	8.34	(1.44)
45	78.13	(1.34)	−8.33	(−.10)	79.85	(1.02)	41.90	(.25)	8.00	(1.83)
46	−187.14	(−1.84)	141.73	(.76)	42.70	(.09)	223.23	(1.27)	−15.45	(−.79)
51	95.73	(1.83)	−27.01	(−.33)	2.93	(.05)	126.70	(1.05)	.80	(.17)
Location:										
Compound	35.35	(.78)	37.16	(.90)	−18.82	(−.31)	−162.88	(−1.38)	.99	(.24)
Village	19.69	(.70)	12.18	(.45)	42.92	(.93)	25.80	(.30)	5.86	(1.60)
Mean of dependent variable	427.39		466.18		85.55		84.88		1.70	
when >0	506.62		517.17		202.88		213.11		7.78	

Interpretations

- Manure is known to have diminishing returns
- Almost no manure used on female plots
- Could raise output by moving fertilizer from male plots to female plots

Omitted variable?

- What if women have plots with lower quality?
- Lower input intensity could be efficient if complementary with quality
- But based on observable plot quality, women have better plots
- Drop quality measures from yield estimate and gender differential gets smaller
- Unobservable plot quality would have to differ in opposite way

Other interpretations?

- Women can only do low-intensity farming while they do child care
  - Hard to square with less child labor on female plots
- Non-convex production technology (increasing returns to scale), for example, because of fixed cost of arriving at plot
  - But same findings for plots equidistant and near to home
- Different production technology available to men versus women
  - Production function estimates suggest that male and female labor are equally productive

Magnitude of the inefficiency

- Household output could increase by 6% by reallocating across plots controlled by different people
- Also analogous inefficiencies across households in a village
  - Less surprising since no labor market or land rental market
  - But still big: could increase village output by 13% by reallocating plots across households

Why can't HH achieve Pareto efficiency?

- Why this system of control over plots?
- At marriage, women are given plots as a commitment to transfer sufficient resources to her
- Would be Pareto-improving to give land to the man and compensate the women but man cannot commit to that
- Women worry that if they let men work on their plots, they will lose property rights to it
- Similar reason there is no village land rental market: Insecurity of property rights

Frictions inside the household

- Limited commitment/enforcement
- Hidden information (effort, income)

Pareto efficiency in consumption

- In general, we cannot make many normative judgments about consumption patterns in economics
- Consumption is inefficient if there is a way that utility of each HH member could be increased
- Concave utility means we'd like to intertemporarally smooth consumption: Household members should insure each other against idiosyncratic fluctuations in income

Testing intrahousehold insurance: Duflo and Udry (2003)

- Duflo and Udry (2003) test this in Cote d'Ivoire where no separate plots for men and women, but income from some crops is the "man's income" and from other crops is the "woman's income"
- Use different rainfall sensitivity by crop to instrument for men's and women's income
- With limited commitment to maintain the quid-pro-quo insurance, individual consumption should fluctuate with own income shocks, not just shocks to aggregate household income
- Is own consumption sensitive to fluctuations in own income, conditional on household income? Yes

Testing intrahousehold insurance: Robinson (2012)

- Robinson (2012) tests the same idea using an RCT in Kenya
- Sampled couples who are daily earners (so that weekly fluctuations in income were more realistic to them)
- Each week, each spouse had a 50% chance of receiving a 150 Kenyan shilling ($2) positive income shock; 1.5 days' income for men, 7 days' income for women
- Announced publicly – full information
- Weekly surveys of expenditures, income, labor supply, transfers, by individual
- What is the prediction of perfect insurance?

Test of Pareto efficiency

- Prediction is that shocks received by the husband have the same effect on the ratio of marginal utilities as equally sized shocks received by wife
- Requires assumptions about utility function to test; assumes constant absolute risk aversion
- He estimates this regression, by gender, where i is self and j is spouse; S is windfall income

$$c^i_{ht} = \gamma S^i_{ht} + \delta S^i_{ht} + \nu_i + \mu_t + \epsilon^i_{ht}$$

- Test of Pareto efficiency is whether $\gamma = \delta$

Robinson (2012) results

Table 3—Experimental Shocks and Expenditures

	Expenditures						
	Total (1)	Private (2)	Shared food (3)	Medical (4)	Children (5)	Other shared (6)	Transport (7)
Panel A. Men							
Shillings received in experimental shock by respondent	0.190 (0.194)	0.169 (0.064)***	−0.025 (0.089)	0.048 (0.041)	−0.012 (0.032)	−0.096 (0.102)	0.102 (0.068)
Shillings received in experimental shock by spouse	−0.163 (0.192)	−0.027 (0.069)	−0.016 (0.087)	0.057 (0.045)	−0.019 (0.030)	−0.086 (0.111)	−0.069 (0.060)
Observations	898	898	898	898	898	898	898
Number of households	142	142	142	142	142	142	142
p-value for *F*-test of equality	0.21	0.05**	0.93	0.84	0.88	0.95	0.09*
Mean of dependent variable (Ksh)[a]	889.32	135.66	413.77	56.95	24.09	144.77	114.55
SD of dependent variable (Ksh)	557.30	122.24	298.74	143.25	84.40	250.88	106.76
Proportion of weeks dependent variable = 0	0.00	0.12	0.03	0.52	0.86	0.12	0.18
Panel B. Women							
Shillings received in experimental shock by respondent	0.180 (0.148)	−0.020 (0.042)	0.056 (0.067)	0.079 (0.041)*	0.032 (0.026)	0.041 (0.059)	−0.007 (0.047)
Shillings received in experimental shock by spouse	−0.058 (0.123)	−0.026 (0.039)	−0.051 (0.064)	0.015 (0.034)	−0.025 (0.024)	0.050 (0.041)	−0.021 (0.039)
Observations	898	898	898	898	898	898	898
Number of households	142	142	142	142	142	142	142
p-value for *F*-test of equality	0.14	0.91	0.23	0.07*	0.1*	0.88	0.77
Mean of dependent variable (Ksh)	428.51	47.28	227.98	28.43	18.25	68.51	38.07
SD of dependent variable (Ksh)	482.65	123.77	262.65	94.87	65.80	119.21	101.60
Proportion of weeks dependent variable = 0	0.03	0.61	0.08	0.64	0.84	0.28	0.72

Parents and kids

- This discussion has been about husband and wife bargaining among themselves
- Another dimension of inefficiency could be parents and children
- That is, what if parents don't necessarily maximize their kids' utility? What if they take advantage of the fact that parents have control over what kids do to shape them to help them more in their old age?

This is universal

"Here's the deal: we call the shots when you're young, you call the shots when we're old, and everything in between is a non-stop battle for control."

Jensen and Miller 2017: Keepen 'em down on the farm

- This is the idea of Jensen and Miller
- They examine how parents respond to the (random) introduction of recruiting for outsourcing jobs
- Parents who at baseline said they wanted their kids not to migrate *decrease* their educational investments in these kids after introduction of this
- Opposite of this for kids who parents want to migrate
- Implication: parents are behaving strategically in their investments in their children
- Important dimension for future research

References

- Browning, Martin, François Bourguignon, Pierre-André Chiappori and Valérie Lechene (1994). "Incomes and Outcomes: A Structural Model of Intrahousehold Allocations." *Journal of Political Economy*, 102(6): 1067-1096.
- Duflo, Esther (2003). "Grandmothers and Granddaughters: Old Age Pension and Intra-household Allocation in South Africa." *The World Bank Economic Review*, 17(1): 1-25.
- Duflo, Esther and Christopher Udry (2004). "Intra-household Resource Allocation in Côte d'Ivoire: Social Norms, Separate Accounts and Consumption Choices." NBER Working Paper No. 10498.
- Haushofer, Johannes and Jeremy Shapiro (2016). "The Short-term Impact of Unconditional Cash Transfers to the Poor: Experimental Evidence from Kenya." *The Quarterly Journal of Economics*, 131(4): 1973–2042.
- Jensen, Robert and Nolan H. Miller (2017). "Keepin' 'em Down on the Farm: Migration and Strategic Investment in Children's Schooling." *NBER Working Paper No. 23122*.
- Robinson, Jonathan (2012). "Limited Insurance Within the Household: Evidence from a Field Experiment in Kenya." *American Economic Journal: Applied Economics*, 4(4): 140–164.
- Sipress, David. "Call the shots." Cartoon. *The New Yorker*, October 19, 2015.
- Thomas, Duncan (1990). "Intra-Household Resource Allocation: An Inferential Approach." *The Journal of Human Resources*, 25(4): 635-664.
- Udry, Christopher (1996). "Gender, Agricultural Production and the Theory of the Household." *Journal of Political Economy*, 104(5), 1010-1046.