The Economic Organization of Households: An Overview with Evidence from Mali

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Households and Development Economics

- Welfare
- Informal economic activity largely generated by individuals within the household:
  - Household decisions when markets are incomplete
  - Non-separabilities
- Human capital – health, education, fertility – largely produced within households
- Property rights, inheritance, dynamics of accumulation

LDC contexts reveal dimensions of household organization

- Boundaries challenging to define in many LDC contexts
  - Polygamy
  - Extended family co-residence
  - Boundaries of production vs consumption
  - Child fosterage/exchange
- Household formation and dissolution
  - Marriage market, divorce
  - Breakaway households
- Variation in autonomy
  - Individual vs household farms and businesses
  - Individual production informative of household organization

Welfare

- Individuals and households
- Empirical relevance of the EHM
- Dunbar, Lewbel and Pendakur (2013)
  - Cross-section expenditure data from Malawi
  - Collective household model
  - Use Engel curves to estimate collective sharing rule, using a single assignable good
    - Assumptions on preferences
  - Exogenous expenditure, or good instruments

TABLE 4—ESTIMATED RESOURCE SHARES AND POVERTY RATES

		Mean	Standard deviation	Minimum	Maximum	Poverty rate: Unequal	Poverty rate: Equal
One child	man	0.463	0.087	0.245	0.762	0.686	0.850
	woman	0.402	0.071	0.168	0.587	0.766	
	children	0.135	0.047	0.008	0.260	0.954	
	each child	0.135	0.047	0.008	0.260		
Two children	man	0.516	0.078	0.282	0.786	0.547	0.916
	woman	0.273	0.063	0.075	0.475	0.885	
	children	0.211	0.044	0.059	0.326	0.970	
	each child	0.105	0.022	0.029	0.163		
Three children	man	0.521	0.081	0.219	0.795	0.522	0.948
	woman	0.244	0.065	0.002	0.512	0.889	
	children	0.236	0.042	0.112	0.374	0.996	
	each child	0.079	0.014	0.037	0.125		
Four children	man	0.441	0.080	0.170	0.701	0.538	0.972
	woman	0.267	0.066	0.043	0.532	0.838	
	children	0.293	0.037	0.178	0.402	0.989	
	each child	0.073	0.009	0.044	0.101		
All households	man	0.489	0.088	0.170	0.795	0.582	0.913
	woman	0.304	0.093	0.002	0.587	0.842	
	children	0.207	0.070	0.008	0.402	0.974	
	each child	0.103	0.038	0.008	0.260		
All persons	all	0.235	0.177	0.008	0.795	0.855	0.924

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Household Organization

- How do people describe their households?
  - For Africa, rarely does it sound like UHM

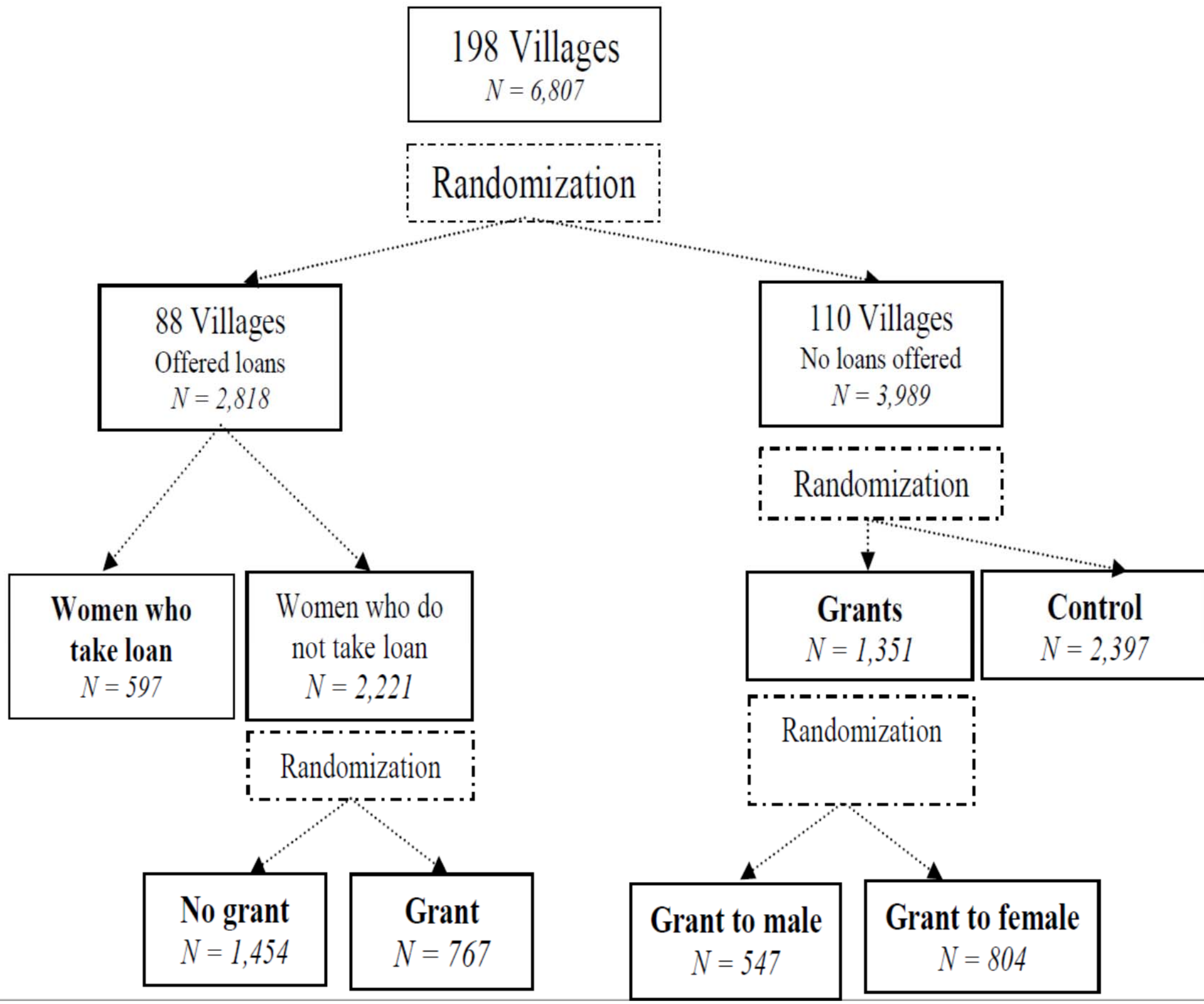
    Guyer (1981) Cooper (1997) Clark(1995) Barber (1993)

    Bucci Emecheta "The Bride Price"
- Mali: Becker (2000), Koenig (1986), Wooten (1997)
- Do these norms bind? Or are they inframarginal?

Household Organization

- In Mali (and West Africa generally)
  - Individuals make decisions on specific plots
  - Same person is residual claimant
  - Land tenure systems are informal, insecure, usufruct-based
  - Assets (esp livestock) also individually-assigned
- Combine consumption and visible production decisions to reveal shape of resource flows w/in the household
  - Randomized allocation of grants to wife/husband

Figure 1: Experimental Design



Timeline of the study – Treatments implementation and surveys

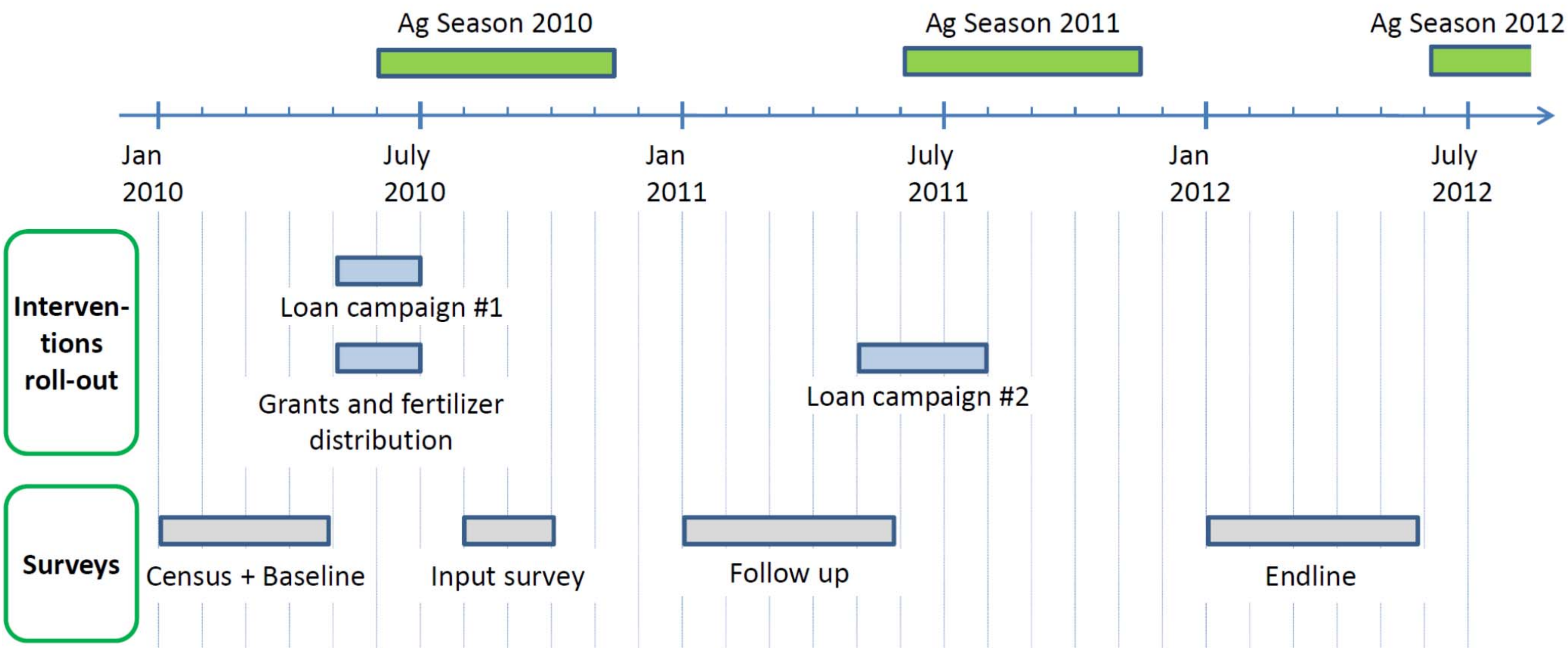


Table 1:Summary Statistics

for Primary Male, Primary Female and Non-primary Female, respectively

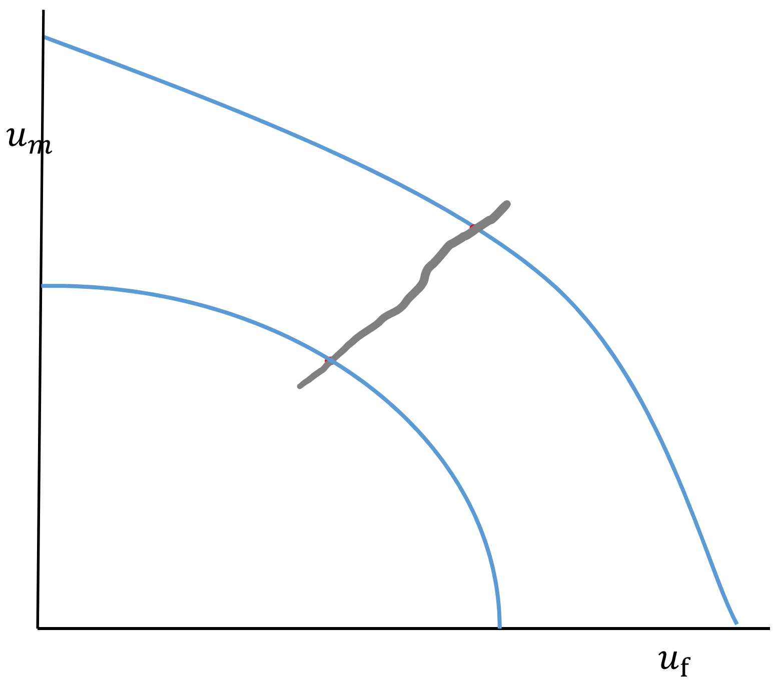
	Primary Male		Primary Female		Non-primary Female	
	mean	s.d.	mean	s.d.	mean	s.d.
Panel A: Individual Level						
Number of Plots	1.09	(1.49)	1.47	(0.93)	1.17	(0.96)
Cultivated Area	1.44	(2.42)	0.54	(0.56)	0.42	(0.49)
Family Labor (days)	71.61	(117.29)	54.99	(46.91)	43.26	(44.85)
Hired Labor (days)	4.47	(15.45)	5.84	(11.81)	4.68	(10.85)
Fertilizer Expense	68.63	(192.56)	7.74	(33.35)	6.20	(19.82)
Other Input Expense	25.54	(73.28)	9.43	(18.93)	7.78	(15.54)
Total Input Expense	112.90	(280.22)	35.42	(65.96)	28.32	(52.93)
Output Value	385.74	(771.12)	174.20	(193.41)	136.34	(164.91)
Net Revenue	272.68	(577.83)	138.65	(171.36)	107.94	(143.47)
Panel C Individual Level						
Owns Livestock (0/1)	0.61	(0.49)	0.24	(0.43)	0.18	(0.39)
Value of Livestock	1645.08	(3975.59)	100.48	(493.94)	71.39	(306.06)
Owns A Business (0/1)	0.31	(0.46)	0.36	(0.48)	0.21	(0.40)
Busines Profits	177.30	(666.92)	64.45	(251.17)	32.52	(154.31)
Panel D						
Age	46.83	(13.57)	34.79	(11.33)	36.21	(11.72)
Married (0/1)	0.99	(0.07)	0.96	(0.20)	0.99	(0.10)
First Wife (1/0)	.	.	0.75	(0.43)	0.45	(0.50)

All $ in 2011 USD

Thinking about households…

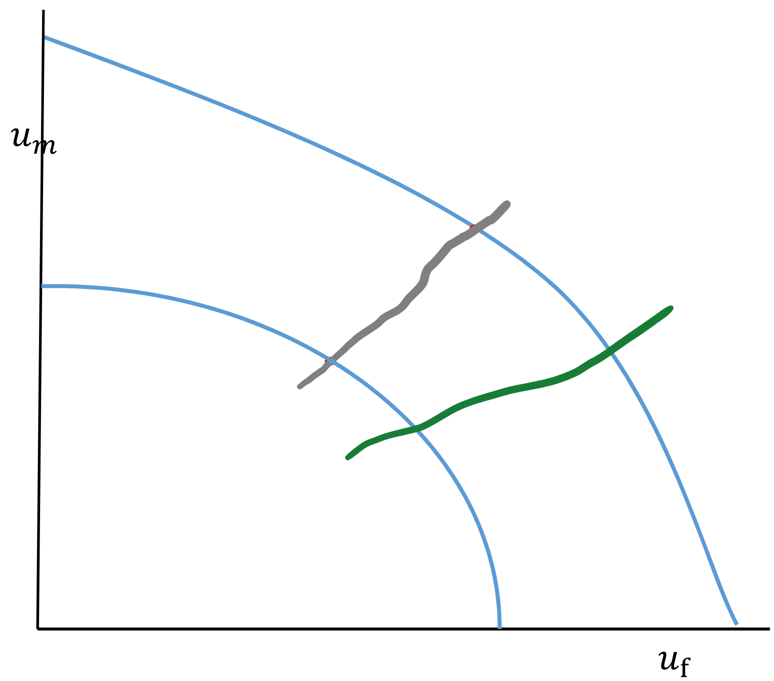
3 dimensions of allocation

1) Static allocation of consumption ("Intrahousehold")
2) Production and public goods ("Resource")
3) Dynamic allocation over states and time ("Intertemporal")



UHM

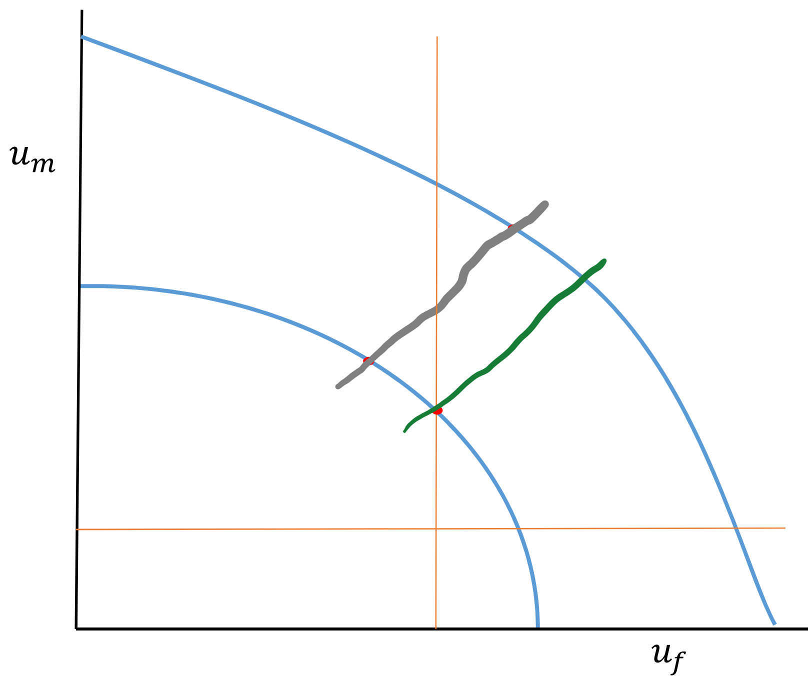
- Static allocation of c
- Production and public goods
- Dynamic allocation over states and time



FC EHM

- Static allocation of c
- Production and public goods
- Dynamic allocation over states and time

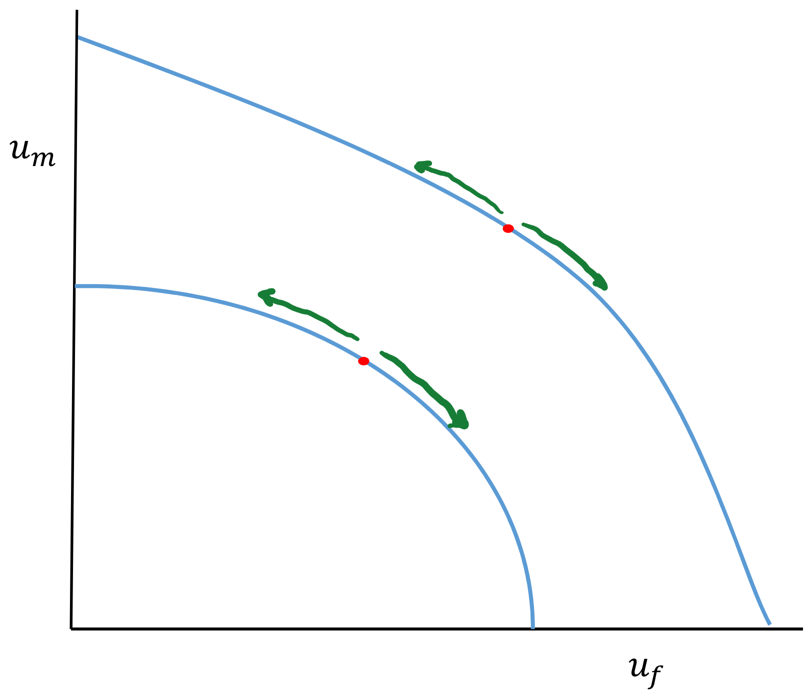
- $\lambda(Z,)$, with Z at marriage



LC EHM

- Static allocation of c
- Production and public goods
- Dynamic allocation over states and time

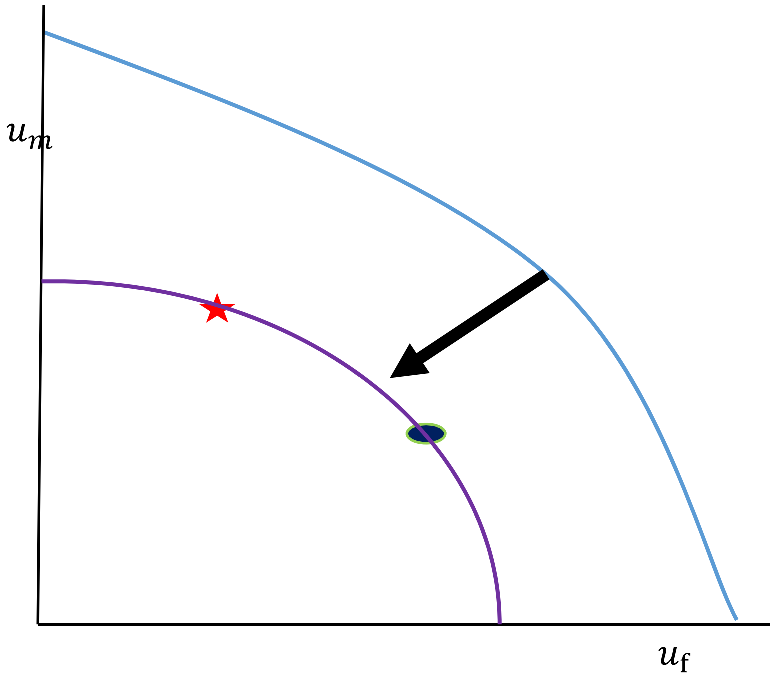
- $\lambda(Z, \mathbb{h}_t)$, with Z at marriage



Static EHM

- Static allocation of c
- Production and public goods
- Dynamic allocation over states and time

λ^{st}



Moral hazard

- Static allocation of c
- Production and public goods
- Dynamic allocation over states and time

AHM/UHM

- Singh, Squire, Strauss (1986)

$i \in \{f, m\}$

$Y_i = \{y^1, y^2, \dots y^N\},$

$e_i = h(\eta_i T_i, b_i, g_i, x_i)$

$p_i^q = p^q(e_i)$

$\frac{\partial p^q\,(e)/\partial\, e}{p^q(e)}$ increasing in q for all e (MLRC)

$F^q(e\,) = \sum_{i=1}^{q} p^i(e)$ strictly convex for all q

$$\max_{\boldsymbol{c},\boldsymbol{g},\boldsymbol{b},\boldsymbol{x},\boldsymbol{T}} \sum_{r=1}^{N} \sum_{q=1}^{N} p^q p^r v(\boldsymbol{c}^{qr}, g, b)$$

$$T_f + T_m = T$$

$$g_f + g_m = g$$

$$b_f + b_m = b$$

$$\sum_k \rho^k c^{qr,k} \equiv c^{qr} = y_f^q + y_m^r - x_f - x_m + G_f + G_m$$

$$Y_i = \{y^1, y^2, \dots y^N\},$$

$$p_i^q = p^q\big(h(\eta_i T_i, b_i, g_i, x_i)\big)$$

1. Neoclassical separation:
   a. If markets for y^r, T, x, g, b are complete, then profit is maximized
   b. Soundly rejected in most LDC contexts: see (LaFave and Thomas, 2016)
2. Grants and output enter the problem additively
   a. Hence neither consumption nor production can depend on identity of grant recipient
   b. Distribution factors, threat points, cooperative bargaining (Clemhout and Wan, 1977; Manser and Brown, 1980; McElroy and Horney, 1981)

Rejecting Income Pooling: "distribution factors" and exclusion from demand systems
Many, many cites: McElroy and Horney (1981) Schultz (1990) Thomas (1990, 1993) Duraisamy and Malathy, 1991 Bourguignon et al. (1993) and Browning et al. (1994) Thomas and Chen (1994) Lundberg et al. (1997)

Table 1: HSA Amendments and Women's Health

	Body Mass Index				Pr(Anaemia)		
	All Sample	$BMI \leq 23$	$BMI > 23$	$\Pr(BMI \leq 18.5)$	Severe	Moderate	Mild
	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) OLS	(7) OLS
HSAA Exposed	0.149*	0.250***	-0.161	-0.0395***	-0.0125***	-0.0306***	-0.0309***
	(0.0774)	(0.0556)	(0.132)	(0.0101)	(0.00315)	(0.00897)	(0.0109)
N	81,534	57,607	23,927	81,534	77,777	77,777	77,777
Mean Dependent Variable	21.42	19.24	26.69	0.2648	0.0154	0.1559	0.5298

Calvi (2016) "Why are Older Women Missing in India?"

Mali Households

Household Consumption and Gender of Grant Recipient

	Male	Female	t(diff)	p
Men Clothing	661	581	1.99	0.05
Woman Clothing	987	881	2.11	0.03
Child Clothing	1143	1099	0.80	0.43
Food	37418	36611	0.55	0.58
Other NonFood	9775	10111	-0.71	0.48

n=1312 Sample restricted to Grant Recipient Households

Identity of Grant Recipient and Aggregate Production

	Land cultivated (ha)	Family labor (days)	Hired labor (days)	Fertilizer expenses	Other chemical expenses	Total input expenses	Value output
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Grant to woman	0.174	5.3	2.9	11.00	8.87	27.93	66.29
	(0.072)	(4.1)	(0.9)	(6.04)	(2.72)	(10.22)	(21.65)
Grant to man	0.107	4.3	-0.7	7.26	1.86	8.28	31.33
	(0.042)	(2.4)	(0.5)	(3.52)	(1.59)	(5.95)	(12.63)
Grant to man = Grant to woman (year 1)	0.374	0.804	0.000	0.552	0.014	0.065	0.121
N	7318	7314	7315	7313	7314	7314	7313
Mean of control (year 1)	2.083	135.16	17.07	71.14	45.83	185.67	501.91
SD (year 1)	2.257	130.22	23.35	143.62	63.57	248.68	595.30

Hence UHM is rejected.

Specific failure: lack of income pooling also implies rejection of

- Many non-cooperative bargaining models with public goods in the household (Doepke and Tertilt, 2014)
- EHM with full commitment (Browning, Chiappori and Weiss, 2014)

The standard EHM with full commitment

Identical, except

$$\max_{\boldsymbol{c},\boldsymbol{g},\boldsymbol{b},\boldsymbol{x},\boldsymbol{T}} \sum_{r=1}^{N} \sum_{q=1}^{N} p^q p^r \left[v\left(\boldsymbol{c}_f^{qr}, g\right) + \lambda(Z) v\left(\boldsymbol{c}_m^{qr}, b\right) \right]$$

Requires:

1. Ex-post efficient consumption allocation

$\sum_k \rho^k c^{qr,k} \equiv c^{qr} = y_f^q + y_m^r - x_f - x_m + G_f + G_m$

and

2. λ fixed over s …forever

A. Full risk sharing:

$$p^{qr}\rho^k\lambda\frac{\partial v(\boldsymbol{c}_m^{qr})}{\partial c_m^{k,qr}} = \mu^{qr} = p^{qr}\rho^k\frac{\partial v\left(\boldsymbol{c}_f^{qr}\right)}{\partial c_f^{k,qr}}$$

and $\boldsymbol{c}_j^{qr} = \boldsymbol{c}_j^{rq}$ for $j \in \{f, m\}$.

Demand functions are

$$c^{k,qr} = c^k(\lambda, c^{qr})$$

Conditional on total expenditure and the Pareto weight, demand for good k is invariant across states.

B. Production decisions are separable Suppose $(\boldsymbol{c}^*, \boldsymbol{g}^*, \boldsymbol{b}^*, \boldsymbol{x}^*, \boldsymbol{T}^*)$ solves (1). Then

$$e_i^* = h(\eta_i T_i^*, b_i^*, g_i^*, x_i^*)$$

and there is a vector of shadow prices of output $(\boldsymbol{\pi}')$ and inputs (w') such that $(\boldsymbol{g}^*, \boldsymbol{b}^*, \boldsymbol{x}^*, \boldsymbol{T}^*)$ solves

$$\max_{\boldsymbol{g},\boldsymbol{b},\boldsymbol{x},\boldsymbol{T}} \sum_{q=1}^{N} \left[\pi^q \left[p^q \left(h\left(g_f, b_f, x_f, T_f\right)\right)\right.\right.$$
$$\left.\left. + p^q(h(g_m, b_m, x_m, T_m)\ )\right]\right] - \boldsymbol{w}'\left(\left(T_f + T_m\right)\middle|\left(\boldsymbol{\chi}_f + \boldsymbol{\chi}_m\right)\right)$$

The EHM implies specific shadow prices for production:

Define $v\left(\boldsymbol{c}_f^{qr}, g\right) + \lambda v\left(\boldsymbol{c}_m^{qr}, b\right) = \nu^{qr}$. Optimality in (1) requires, for example,

$$\sum_{q=1}^{N}\sum_{r=1}^{N} p^q\,\eta_f \frac{\partial p^r}{\partial e}\frac{\partial h}{\partial T_f}\nu^{rq} = \mu_T = \sum_{q=1}^{N}\sum_{r=1}^{N} p^q\,\eta_m \frac{\partial p^r}{\partial e}\frac{\partial h}{\partial T_m}\nu^{qr}$$

And

$$\sum_{q=1}^{N}\sum_{r=1}^{N} p^q \frac{\partial p^r}{\partial e}\frac{\partial h}{\partial b_f}\nu^{rq} = \mu_b = \sum_{q=1}^{N}\sum_{r=1}^{N} p^q \frac{\partial p^r}{\partial e}\frac{\partial h}{\partial b_m}\nu^{qr}$$

define $\pi^r = \sum_{q=1}^{N} p^q \nu^{qr}$. Since $\nu^{rq} = \nu^{qr}$, these can be written

$$\sum_{r=1}^{N} \pi^r \eta_f \frac{\partial p^r}{\partial e} \frac{\partial h}{\partial T_f} = \mu_T = \sum_{r=1}^{N} \pi^r \eta_m \frac{\partial p^r}{\partial e} \frac{\partial h}{\partial T_m}$$

$$\sum_{r=1}^{N} \pi^r \frac{\partial p^r}{\partial e} \frac{\partial h}{\partial b_f} = \mu_b = \sum_{r=1}^{N} \pi^r \frac{\partial p^r}{\partial e} \frac{\partial h}{\partial b_m}$$

and similarly for x and g.

Hence production is profit-maximizing for state-contingent values of output $\boldsymbol{\pi}'$ and factor shadow costs $\boldsymbol{\mu}'$

So for any input $k \in \chi$,

$$\frac{\frac{\partial h}{\partial k_f}}{\eta_f \frac{\partial h}{\partial T_f}} = \frac{\frac{\partial h}{\partial k_m}}{\eta_m \frac{\partial h}{\partial T_m}}$$

If $h()$ is homothetic, then

$$\frac{k_f}{\eta_f T_f} = \frac{k_m}{\eta_m T_m}$$

- Strong rejections of full commitment in US, UK, Japan consumption data: Aura (2005), Mazzocco (2007), and Lise and Yamada (2014), Voena (2015)

Robinson (2012) -

Experimental variation in individual grant receipt in western Kenya

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	0.169	−0.025	0.048	−0.012	−0.096	0.102
	(0.194)	(0.064)***	(0.089)	(0.041)	(0.032)	(0.102)	(0.068)
Shillings received in experimental shock by spouse	−0.163	−0.027	−0.016	0.057	−0.019	−0.086	−0.069
	(0.192)	(0.069)	(0.087)	(0.045)	(0.030)	(0.111)	(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

- Efficient risk sharing rejected
  - EHM with full commitment & full information not viable
- Cost minimization of production also rejected
  - Kazianga and Wahhaj (2016) show

$$\frac{b_f}{T_f} < \frac{b_m}{T_m}$$

And

$$\left(\frac{\frac{b_f}{T_f}}{\frac{b_m}{T_m}}\right)^{extended} < \left(\frac{\frac{b_f}{T_f}}{\frac{b_m}{T_m}}\right)^{nuclear}$$

with new data from BF.

- Rejection of full risk sharing … LC?

Estimate

$$\ln(Y_{ihvt}) = \alpha_R R_{vt} + \alpha_X X_{ihv} + \alpha_{RX} R_{vt} X_{ihv} + \alpha_S S_{hvt} + \alpha_{SX} S_{hvt} X_{ihv} + \sum_{j \in \{f,m,o\}} \Big(\alpha_j I(i=j) + \alpha_{RM} R_{vt} I(i=j) + \alpha_{SM} S_{hvt} I(i=j) + \alpha_{SXM} S_{hvt} I(i=j) Xhvt + \alpha_{RXM} R_{vt} I(i=j) X_{ivh} \Big) + \mu_{hvt} + \epsilon_{ihvt}$$

Construct, e.g.

$$\widehat{SM}_{hvt} = (\hat{\alpha}_{RM} R_{vt} I(i=j) + \hat{\alpha}_{SM} S_{hvt} I(i=j) + \hat{\alpha}_{SXM} S_{hvt} I(i=j) Xhvt + \hat{\alpha}_{RXM} R_{vt} I(i=j) X_{ivh})$$

No-loan Villages Only					
Tests of Joint Significance of					
Rainfall on:		versus rainfall on:			
		Farms of women	Farms of cowives	Farms of others	
Farms of men	F(18,3748)	15.72	16.29	12.83	
	p	0.00	0.00	0.00	
Farms of women			7.88	14.81	
			0.00	0.00	
Farms of cowives				5.82	
				0.00	
Self-Reported Shocks		versus shocks on:			
on:		Farms of women	Farms of cowives	Farms of others	
Farms of men	F(6,3748)	9.28	2.21	3.30	
	p	0.00	0.04	0.00	
Farms of women			0.74	9.28	
			0.62	0.00	
Farms of cowives				2.48	
				0.02	

Consumption Shares Conditional on Total Expenditure
Grants and Shocks to Harvest

	Men Cloth	Women Cloth	Child Cloth	food	social
Log Exp	-2.142	-1.151	-2.180	23.62	10.04
	(1.42)	(1.76)	(2.86)	(9.21)	(3.60)
Log Exp Sq	0.0747	0.00344	0.0264	-0.904	-0.382
	(0.066)	(0.082)	(0.13)	(0.43)	(0.17)
Grant to Female	-0.0328	-0.197	-0.101	-0.0508	0.318
	(0.11)	(0.14)	(0.13)	(0.75)	(0.39)
Grant to Male	0.133	0.0849	0.0743	0.663	-0.164
	(0.13)	(0.14)	(0.14)	(0.87)	(0.47)
Harvest Shock	-0.0791	0.0480	-0.0293	-0.224	0.520
	(0.059)	(0.058)	(0.077)	(0.48)	(0.26)
Harvest Shock Female	0.0757	0.106	0.105	-0.633	-0.378
	(0.030)	(0.032)	(0.042)	(0.22)	(0.12)
Harvest Shock Male	0.0474	-0.0241	-0.000609	0.560	-0.436
	(0.028)	(0.026)	(0.041)	(0.24)	(0.13)
Observations	10916	10916	10916	10916	10916
year1	0.264	0.136	0.327	0.454	0.361
year2	0.253	0.978	0.743	0.647	0.596
rain	0.0680	0	0.0346	0	0
basemean	1.591	2.563	2.820	71.17	6.378

Consumption risk is not efficiently shared

Especially not idiosyncratic production shocks

Limited Commitment

$$\max_{\boldsymbol{c}_t, \boldsymbol{g}_t, \boldsymbol{b}_t, \boldsymbol{x}_t, \boldsymbol{T}_t} \sum_{t=1}^{T} \sum_{r=1}^{N} \sum_{q=1}^{N} \beta^t p_t^q p_t^r \left[v\left(\boldsymbol{c}_{ft}^{qr}, g_t \right) + \lambda v\left(\boldsymbol{c}_{mt}^{qr}, b_t \right) \right]$$

subject to resource constraints as before, adding

$$c_t^{qr} = y_{ft}^q + y_{mt}^r + G_{ft} + G_{mt} + R_t A_t - x_{ft} - x_{mt} - A_{t+1}$$

and

- Participation constraints that might bind at any τ

$$\sum_{t=\tau}^{T}\sum_{r=1}^{N}\sum_{q=1}^{N}\beta^t p_t^q p_t^r v\left(\boldsymbol{c}_{ft}^{qr}, g_t\right) \geq \bar{v}_{ft}^{qr}$$

$$\sum_{t=\tau}^{T}\sum_{r=1}^{N}\sum_{q=1}^{N}\beta^t p_t^q p_t^r v(\boldsymbol{c}_{mt}^{qr}, b_t) \geq \bar{v}_{mt}^{qr}$$

with LM λ_{ft}^{qr} and λ_{mt}^{qr}

$\boldsymbol{e}_t^*(\mathbb{h}_{t-1})$. But given $\boldsymbol{e}_t^*$ the problem is separable.

$$\min_{\boldsymbol{T},\boldsymbol{\chi}} \boldsymbol{w}'\left(\left(T_f + T_m\right)\middle|\left(\boldsymbol{\chi}_f + \boldsymbol{\chi}_m\right)\right)$$

subject to

$$e_{tf}^* \le h\left(\eta_f T_f, b_f, g_f, x_f\right)$$
$$e_{tm}^* \le h(\eta_m T_m, b_m, g_m, x_m)$$

- LC EHM production decisions minimize costs (but no longer maximize profit – relative output can be distorted)

- LC EHM consumption exhibits static efficiency

Ligon, Thomas and Worrall (2002); Kinnan (2014);
Ligon (2002) – Nash Bargaining LC

Static EHM

- A simple generalization of the EHM discussed above
  - λ not necessarily fixed over states

The standard EHM with full commitment involved

$$\max_{\boldsymbol{c},\boldsymbol{g},\boldsymbol{b},\boldsymbol{x},\boldsymbol{T}} \sum_{r=1}^{N} \sum_{q=1}^{N} p^q p^r \left[v\left(\boldsymbol{c}_f^{qr}, g\right) + \lambda v(\boldsymbol{c}_m^{qr}, b) \right]$$

subject to the resource constraints.

The static EHM involves

$$\max_{\boldsymbol{c},\boldsymbol{g},\boldsymbol{b},\boldsymbol{x},\boldsymbol{T}} \sum_{r=1}^{N} \sum_{q=1}^{N} p^q p^r \left[v\left(\boldsymbol{c}_f^{qr}, g\right) + \lambda^{qr} v(\boldsymbol{c}_m^{qr}, b) \right]$$

and the same resource constraints.

Only *ex-post* Pareto efficient

Note: LC EHM pins down the evolution of λ^{qr}

Production decisions maximize profits subject to individual-specific state-contingent values of output.

Suppose $(\boldsymbol{c}^*, \boldsymbol{g}^*, \boldsymbol{b}^*, \boldsymbol{x}^*, \boldsymbol{T}^*)$ solves (1). Then there exists some vector of shadow prices of inputs $(\boldsymbol{w}')$ and two vectors of state-contingent values of output $(\boldsymbol{\pi}_j{}')$ such that $(\boldsymbol{g}^*, \boldsymbol{b}^*, \boldsymbol{x}^*, \boldsymbol{T}^*)$ solves

$$\max_{\boldsymbol{g},\boldsymbol{b},\boldsymbol{x},\boldsymbol{T}} \sum_{q=1}^{N} \Big[\pi_f^q p^q \Big(h\big(g_f, b_f, x_f, T_f\big) + \pi_m^q p^q \big(h(g_m, b_m, x_m, T_m)\big)\Big)\Big] - \boldsymbol{w}'\big((T_f + T_m)\big|(\boldsymbol{\chi}_f + \boldsymbol{\chi}_m)\big)$$

The common shadow prices of factors across plots

$$\eta_f \frac{\partial h}{\partial T_f} \sum_{r=1}^{N} \pi_f^r \frac{\partial p^r(e_f)}{\partial e} = \mu_T = \eta_m \frac{\partial h}{\partial T_m} \sum_{r=1}^{N} \pi_m^r \frac{\partial p^r(e_m)}{\partial e}$$

$$\frac{\partial h}{\partial b_f} \sum_{r=1}^{N} \pi_f^r \frac{\partial p^r(e_f)}{\partial e} = \mu_b = \frac{\partial h}{\partial b_m} \sum_{r=1}^{N} \pi_m^r \frac{\partial p^r(e_m)}{\partial e}$$

and similarly for x and g. Hence individual production is profit maximizing for $\boldsymbol{\pi}_j'$ and factor shadow costs $\boldsymbol{\mu}'$. So for any input $k \in \chi$,

$$\frac{\frac{\partial h}{\partial k_f}}{\eta_f \frac{\partial h}{\partial T_f}} = \frac{\frac{\partial h}{\partial k_m}}{\eta_m \frac{\partial h}{\partial T_m}}$$

If $h(.)$ is homothetic, then

$$\frac{k_f}{\eta_f T_f} = \frac{k_m}{\eta_m T_m}$$

Implications for consumption

Household demand for any good $x^k = x_f^k + x_m^k$ can be written (Browning et al, 2009; Attanasio and Lechene, 2014)

1. $x^k(c, \boldsymbol{p}, \lambda^{qr}(\boldsymbol{d}))$ where c is total expenditure and $\boldsymbol{d}$ is a vector of distribution factors
2. $\frac{\frac{\partial x^k}{\partial d^j}}{\frac{\partial x^k}{\partial d^i}} = \frac{\frac{\partial x^l}{\partial d^j}}{\frac{\partial x^l}{\partial d^i}}$

3. $\frac{\partial \theta_k^l(c,p,\boldsymbol{d}_{-1},x^k)}{\partial d^i} = 0$, where θ_k^l is the "d_1-conditional" demand for good l. Derive this by

a. Find a good k and a distribution factor 1 s.t. the demand for x^k is monotonic in d_1
b. Invert the demand function x^k so that $d_1 = \zeta(c, \boldsymbol{p}, \boldsymbol{d}_{-1}, x^k)$
c. Sub back into demand for any other good l

$$x^l(c, p, \lambda^{qr}(d_1, \boldsymbol{d}_{-1})) = \theta_k^l(c, p, \boldsymbol{d}_{-1}, x^k)$$

Current literature

- Most tests of static EHM based on consumption allocations fail to reject
- Attanasio and Lechene (2014): Mexico progressa

Table 10

Effect of distribution factors on the budget, inst:wage

	Starch	Pulses	Fruit	Meat	Other foods
Treatment	0.035	0.0022	-0.017	-0.019	-0.0015
	(0.01)	(0.006)	(0.004)	(0.008)	(0.006)
Family network size	-0.015	0.00	0.01	0.009	-0.004
	(0.005)	(0.002)	(0.0025)	(0.0037)	(0.003)
ln Tot. Exp.Food	-8.96	0.037	4.26	3.39	1.27
	(2.52)	(1.09)	(1.06)	(1.89)	(1.65)
ln Tot.Exp.Food^2	0.88	-0.01	-0.42	-0.32	-0.14
	(0.26)	(0.001)	(0.11)	(0.20)	(0.17)
Nb obs			12361		

Table 13

Collective rationality test with family network distribution factor,

	Starches		Pulses		Fruit		Other foods	
	Uncond.	z cond.	Uncond.	z cond.	Uncond.	z cond.	Uncond.	z cond.
Treat	0.035	0.004	0.0022	0.0023	-0.017	0.004	-0.0015	-0.010
	(0.01)	(0.027)	(0.006)	(0.038)	(0.004)	(0.06)	(0.006)	(0.013)
Meat		-1.61		0.007		1.07		-0.47
		(1.57)		(2.43)		(3.76)		(0.70)
u_{meat}		0.92		-0.13		-1.11		0.32
		(1.57)		(2.43)		(3.76)		(0.69)
u_{meat}^2		0.15		0.00		-0.05		-0.10
		(0.06)		(0.027)		(0.035)		(0.04)
Nb obs				12361				

- Angelucci and Garlick (2016) use almost same data and similar methods to reject static efficiency for younger households, while older households fail to reject

Back to Mali

Recall that efficiency requires for any input $k \in \chi$,

$$\frac{\frac{\partial h}{\partial k_f}}{\eta_f \frac{\partial h}{\partial T_f}} = \frac{\frac{\partial h}{\partial k_m}}{\eta_m \frac{\partial h}{\partial T_m}}$$

If $h(.)$ is homothetic, then adding an h subscript

$$\frac{k_{fh}}{\eta_{fh} T_{fh}} = \frac{k_{mh}}{\eta_{mh} T_{mh}} = \varphi(G_{fh}, G_{mh})$$

And the restriction is

$$\beta_{xf}^{J} = \beta_{xm}^{J} \frac{\alpha_f}{\alpha_m}$$

In

$$\frac{x_{ih}}{T_{ih}} = \alpha_f 1(i = f) + \alpha_m 1(i = m) + \beta_{xf}^{F} 1(i = f) G_{fh} + \beta_{xm}^{F} 1(i = m) G_{fh} + \beta_{xf}^{M} 1(i = f) G_{mh} + \beta_{xm}^{M} 1(i = m) G_{mh} + \epsilon_{ih}$$

because randomization ensures that Gjh is uncorrelated with η_h

Table 2: Plot Level Input Intensity, Yield and Profit (Part A)				
	Land cultivated log(ha)	Hired labor log(days/ha)	Male Family Labor log(days/ha)	Female Family Labor log(days/ha)
	(1)	(2)	(3)	(4)
Grant to Female				
Female Farmer*year 1	0.04	0.11	0.16	-0.10
	0.01	0.06	0.04	0.03
Male Farmer*year 1	0.02	-0.07	-0.14	0.09
	0.01	0.05	0.04	0.06
Grant to Male				
Female Farmer*year 1	0.02	-0.07	0.18	-0.08
	0.01	0.07	0.05	0.04
Male Farmer*year 1	0.04	-0.07	-0.11	0.25
	0.02	0.06	0.04	0.06
heterogeneity in land: F_grantToMale= M_grantToMale*(Female/Male)				
Grant to female				
Female farm = Male farm		0.03	0.00	0.02
Grant to male				
Female farm = Male farm		0.50	0.00	0.00
N	25179	25176	25175	25123
From Baseline Regression				
Constant		0.76	3.94	2.08
		0.03	0.02	0.02
Female Plot		1.10	-1.47	2.22
		0.03	0.02	0.02

Table 2: Plot Level Input Intensity, Yield and Profit (Part A)

	Land cultivated log(ha)	Hired labor log(days/ha)	Male Family Labor log(days/ha)	Female Family Labor log(days/ha)
	(1)	(2)	(3)	(4)
Grant to Female				
Female Farmer*year 1	0.04	0.11	0.16	-0.10
	0.01	0.06	0.04	0.03
Male Farmer*year 1	0.02	-0.07	-0.14	0.09
	0.01	0.05	0.04	0.06
Grant to Male				
Female Farmer*year 1	0.02	-0.07	0.18	-0.08
	0.01	0.07	0.05	0.04
Male Farmer*year 1	0.04	-0.07	-0.11	0.25
	0.02	0.06	0.04	0.06
heterogeneity in land: F_grantToMale= M_grantToMale*(Female/Male)				
Grant to female				
Female farm = Male farm		0.03	0.00	0.02
Grant to male				
Female farm = Male farm		0.50	0.00	0.00
N	25179	25176	25175	25123
From Baseline Regression				
Constant		0.76	3.94	2.08
		0.03	0.02	0.02
Female Plot		1.10	-1.47	2.22
		0.03	0.02	0.02

Table 2: Plot Level Input Intensity, Yield and Profit (Part B)

	Fertilizer expenses log($/ ha)	Total input expenses log($/ ha)	Value output log($/ ha)	Profits log($/ ha)
	(5)	(6)	(7)	(8)
Grant to Female				
Female Farmer*year 1	0.38	0.27	0.16	0.31
	0.06	0.06	0.04	0.11
Male Farmer*year 1	0.06	0.01	-0.14	-0.21
	0.08	0.08	0.05	0.13
Grant to Male				
Female Farmer*year 1	0.21	-0.09	0.16	0.51
	0.07	0.07	0.04	0.13
Male Farmer*year 1	-0.07	0.00	0.02	0.03
	0.09	0.09	0.05	0.14
heterogeneity in land: F_grantToMale= M_grantToMale*(Female/Male)				
Grant to female				
Female farm = Male farm	0.00	0.02	0.00	0.00
Grant to male				
Female farm = Male farm	0.01	0.46	0.03	0.00
N	25167	25179	24299	24299
From Baseline Regression				
Constant	2.45	4.10	5.60	3.46
	0.04	0.04	0.03	0.07
Female Plot	-0.18	1.01	-0.18	-1.09
	0.04	0.04	0.03	0.08

Table 2: Plot Level Input Intensity, Yield and Profit (Part B)

	Fertilizer expenses log($/ ha)	Total input expenses log($/ ha)	Value output log($/ ha)	Profits log($/ ha)
	(5)	(6)	(7)	(8)
Grant to Female				
Female Farmer*year 1	0.38	0.27	0.16	0.31
	0.06	0.06	0.04	0.11
Male Farmer*year 1	0.06	0.01	-0.14	-0.21
	0.08	0.08	0.05	0.13
Grant to Male				
Female Farmer*year 1	0.21	-0.09	0.16	0.51
	0.07	0.07	0.04	0.13
Male Farmer*year 1	-0.07	0.00	0.02	0.03
	0.09	0.09	0.05	0.14
heterogeneity in land: F_grantToMale= M_grantToMale*(Female/Male)				
Grant to female				
Female farm = Male farm	0.00	0.02	0.00	0.00
Grant to male				
Female farm = Male farm	0.01	0.46	0.03	0.00
N	25167	25179	24299	24299
From Baseline Regression				
Constant	2.45	4.10	5.60	3.46
	0.04	0.04	0.03	0.07
Female Plot	-0.18	1.01	-0.18	-1.09
	0.04	0.04	0.03	0.08

Table 2: Plot Level Input Intensity, Yield and Profit (Part B)

	Fertilizer expenses log($/ ha)	Total input expenses log($/ ha)	Value output log($/ ha)	Profits log($/ ha)
	(5)	(6)	(7)	(8)
Grant to Female				
Female Farmer*year 1	0.38	0.27	0.16	0.31
	0.06	0.06	0.04	0.11
Male Farmer*year 1	0.06	0.01	-0.14	-0.21
	0.08	0.08	0.05	0.13
Grant to Male				
Female Farmer*year 1	0.21	-0.09	0.16	0.51
	0.07	0.07	0.04	0.13
Male Farmer*year 1	-0.07	0.00	0.02	0.03
	0.09	0.09	0.05	0.14
heterogeneity in land: F_grantToMale= M_grantToMale*(Female/Male)				
Grant to female				
Female farm = Male farm	0.00	0.02	0.00	0.00
Grant to male				
Female farm = Male farm	0.01	0.46	0.03	0.00
N	25167	25179	24299	24299
From Baseline Regression				
Constant	2.45	4.10	5.60	3.46
	0.04	0.04	0.03	0.07
Female Plot	-0.18	1.01	-0.18	-1.09
	0.04	0.04	0.03	0.08

Ordered by increasing generality

	Consumption	Production
AHM/UHM	Income pooling	Profit max @ HH shadow prices
FC EHM	Full risk sharing, λ fixed	Cost minimization at profit maximizing $\boldsymbol{e}^*$ and household shadow prices
LC EHM	Demand may depend on $\lambda(s, \mathbb{h}_{t-1})$	Cost minimization at $\boldsymbol{e}^*$ s.t. LC constraints and household shadow factor prices
Static EHM	Demand may depend on $\lambda(s)$	Profit maximization at individual shadow prices and household shadow factor prices

Empirical "consensus"

	Consumption	Production
AHM/UHM	Income pooling	Profit max @ HH shadow prices
	Rarely a good approximation	Household public good production typically depends on distribution factors
FC EHM	Full risk sharing, λ fixed	Cost minimization at profit maximizing $\boldsymbol{e}^*$ and household shadow prices
	Incomplete pooling, although often joint hyp	Rejected – but mostly for agriculture in Africa
LC EHM	Demand may depend on $\lambda(s, \mathbb{h}_{t-1})$	Cost minimization at $\boldsymbol{e}^*$ s.t. LC constraints and household shadow factor prices
Static EHM	Demand may depend on $\lambda(s)$	Profit maximization at individual shadow prices and household shadow factor prices
	Multiple tests, rarely rejected	Rejected

Rangel and Thomas (2012)

Table 10: Testing Production Efficiency - plot yield per hectare (in % of sample mean)
Household-year-crop fixed effects estimation

	Overall samples			Subsample of mixed gender household-year-crop			
	No controls	Area controls	Area + plot characteristics	All crops	Monocrops	Millet	Maize
	[a]	[b]	[c]	[d]	[e]	[f]	[g]
PANEL A: Senegal, 1989							
Female vs. male plots	-35.16	-58.20	-	-44.64	-44.64	-86.71	-
	(9.14)	(11.00)		(8.52)	(8.52)	(24.46)	
Sample		*956*		*401*	*401*	*112*	
PANEL B: Ghana, 1997-1998							
Female vs. male plots	-19.32	-69.03	-63.10	-133.28	-133.28	-	-139.35
	(22.81)	(31.17)	(28.97)	(52.80)	(52.80)		(57.27)
Sample		*1,549*		*506*	*506*		*470*
PANEL C: Burkina Faso, 1981-1983							
Female vs. male plots	-3.12	-38.51	-37.26	-56.22	-62.71	-46.09	-70.13
	(7.39)	(10.70)	(10.99)	(13.96)	(28.46)	(23.47)	(29.33)
Sample		*3,935*		*1,158*	*554*	*237*	*41*

Rangel and Thomas (2012)

Table 9: Joint tests of the collective model - Wald statistics [p-values]

	Senegal Total Land 1989	Ghana Total Land 1997-1998	Ghana Total Land 1991-1992	Ghana Land with crop sales decision 1997-1998	Ghana Land for which revenue is holder's 1991-1992	Ghana Land in which crop choice is holder's 1991-1992	Ghana Land that is kept after divorce 1997-1998	Ghana Total assets 1997-1998
Inframarginal {$\chi^2(17)$}	6.32	7.49	8.67	4.79	7.52	5.46	6.85	9.80
	[0.991]	[0.976]	[0.950]	[0.998]	[0.976]	[0.996]	[0.985]	[0.912]
Extramarginal {$\chi^2(17)$}	7.56	8.38	11.08	4.07	5.63	7.76	8.41	7.21
	[0.975]	[0.958]	[0.852]	[0.999]	[0.995]	[0.971]	[0.957]	[0.981]
Infra-extramarginal {$\chi^2(34)$}	15.47	22.67	19.03	14.56	15.23	15.00	19.22	16.89
	[0.997]	[0.931]	[0.982]	[0.999]	[0.998]	[0.998]	[0.980]	[0.994]

Note: χ^2(d.o.f). Variance-covariance of parameters estimated by method of infinitesimal jackknife (White robust)

Interpretations

- One approach is misspecified
- Power
  - Dauphin, Fortin and Lacroix (2015)
  - Naidoo (2015)
- Both are correct

Evidence on Information Asymmetries within Households

- Experimental manipulation of information
  - Ashraf (2009)

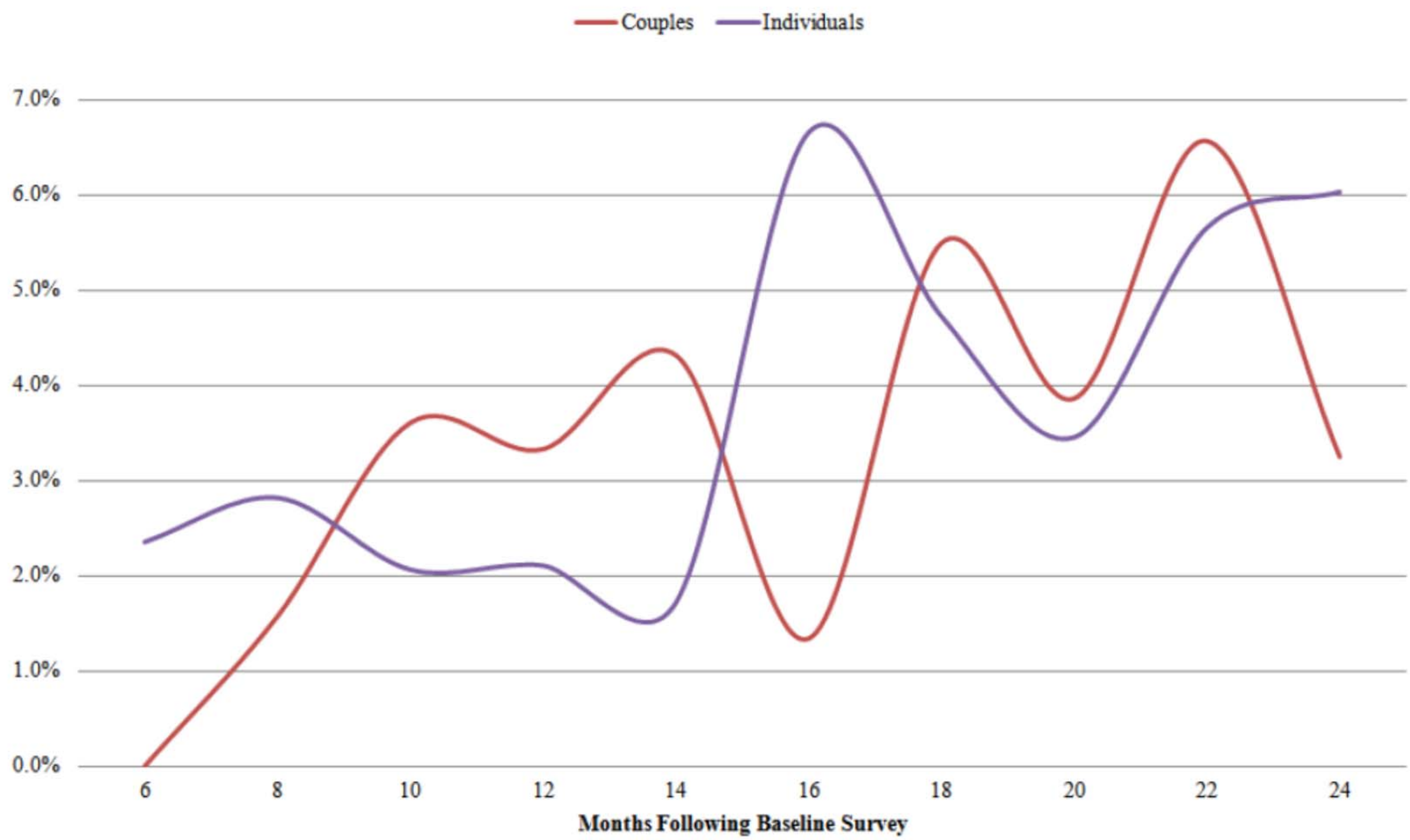
• Ashraf (2009)

Panel 1: Male						
	Gift for Self over Any Savings		Own Savings over Gift for Self or Spouse's Savings		Spouse Savings over Own Savings or Gift for Self	
	(1)	(2)	(3)	(4)	(5)	(6)
Private	-0.201*	-0.334***	0.230**	0.303	-0.028	0.030
	(0.122)	(0.105)	(0.102)	(0.100)	(0.092)	(0.097)
Negotiation	0.149	-0.262**	0.024	0.099	0.125	0.162*
	(0.117)	(0.106)	(0.111)	(0.091)	(0.095)	(0.095)
Wife Controls Savings*Private	-0.452**		0.318		0.135	
	(0.195)		(0.203)		(0.200)	
Wife Controls Savings*Negotiation	-0.521***		0.397*		0.124	
	(0.217)		(0.196)		(0.202)	
Wife Controls Savings Decisions	0.288*		-0.142		-0.146	
	(0.157)		(0.118)		(0.121)	
Husband Controls Savings*Private		0.176		0.005		-0.180
		(0.309)		(0.326)		(0.209)
Husband Controls Savings*Negotiation		-0.017		0.074		-0.057
		(0.326)		(0.373)		(0.262)
Husband Controls Savings Decisions		0.004		-0.027		0.023
		(0.235)		(0.272)		(0.170)
Constant	0.222	0.200	0.192	0.256	0.586	0.544**
	(0.299)	(0.293)	(0.267)	(0.274)	(0.243)	(0.245)
Account, Education and Wage Variables	YES	YES	YES	YES	YES	YES
Observations	143	143	143	143	143	143
R-Squared	0.197	0.164	0.229	0.201	0.182	0.181

Evidence on Information Asymmetries within Households

- Experimental manipulation of information
  - Ashraf (2009)
  - Ashraf and Field (2014)

- Ashraf and Field (2014)



Frequency of births by month

Evidence on Information Asymmetries within Households

- Experimental manipulation of information
  - Ashraf (2009)
  - Ashraf and Field (2014)
  - Seitz McCarthy (2015) family planning in Tanzania

Evidence on Information Asymmetries within Households

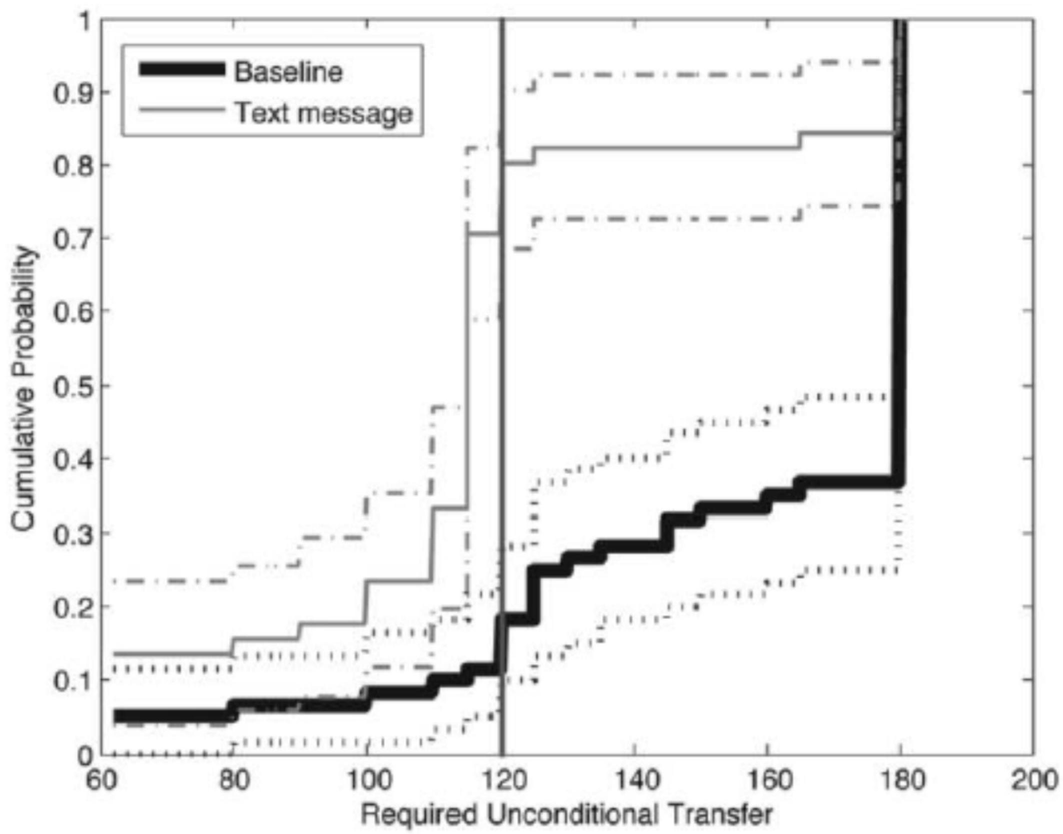
- Experimental manipulation of information
  - Ashraf (2009)
  - Ashraf and Field (2014)
  - Seitz McCarthy (2015)
  - Castilla and Walker (2013)
    - Grants public/private randomized to husbands/wives in Akwapim
    - Expenditures on public goods dramatically shaped by both dimensions
    - Private observable vs unobservable consumption

Evidence on Information Asymmetries within Households

- Experimental manipulation of information
  - Ashraf (2009)
  - Ashraf and Field (2014)
  - Seitz McCarthy (2016)
  - Castilla and Walker (2013)
- Testing implications for consumption of moral hazard
  - Dubois and Ligon (2011) – data on individual consumption in the Philippines
    - Reject risk sharing: shocks to individual income correlated with individual demand
    - Not just nutrition: food quality increases
    - Consistent with moral hazard + nutrition-productivity link

Evidence on Information Asymmetries within Households

- Willingness to pay for information
  - Burzstyn and Coffman (2012)



Evidence on Information Asymmetries within Households

- Willingness to pay for information
  - Burzstyn and Coffman (2012)
- Implications of MH for productivity variation
  - Guirkinger et al (2015) on “production in teams” in Mali

Moral Hazard

$$\max_{\boldsymbol{c},\boldsymbol{g},\boldsymbol{b},\boldsymbol{x},\boldsymbol{T}} \sum_{r=1}^{N} \sum_{q=1}^{N} p^q p^r \left[v\left(\boldsymbol{c}_f^{qr}\right) - d(g) \right.$$
$$\left. + \lambda\left(v\left(\boldsymbol{c}_m^{qr}\right) - d(b)\right)\right]$$

Plus resource constraints and

$$g_f \in \arg\max_{g_f} \sum_r \sum_q p^q p^r v\left(c_f^{rq}\right) - d(g)$$

$$b_m \in \arg\max_{b_m} \sum_r \sum_q p^q p^r v\left(c_m^{qr}\right) - d(b)$$

$$\sum_r \sum_q p^q(e_m) \frac{\partial p^r}{\partial e_f} \frac{\partial h}{\partial g_f} \nu\left(c_f^{rq}\right) = d'(g)$$

and similarly for the man.

$$\sum_r \sum_q p^r(e_f) \frac{\partial p^q}{\partial e_m} \frac{\partial h}{\partial b_m} \nu(c_m^{rq}) = d'(b)$$

Full insurance of course cannot hold. If $r' > r$,

$$\frac{\nu'\left(c_f^{q,r}\right)}{\nu'\left(c_m^{q,r}\right)} = \frac{\left(\lambda + \lambda_{em}\frac{\partial p^r}{\partial e_m}\frac{\partial h}{\partial b_m}\frac{p^q(e_f)}{p^q(e_f)p^r(e_m)}\right)}{\left(1 + \lambda_{ef}\frac{\partial p^q}{\partial e_f}\frac{\partial h}{\partial g_f}\frac{p^r(e_m)}{p^q(e_f)p^r(e_m)}\right)}$$

$$< \frac{\nu'\left(c_f^{q,r'}\right)}{\nu'\left(c_m^{q,r'}\right)}$$

because $\frac{\frac{\partial p^{r'}}{\partial e_m}}{p^{r'}} > \frac{\frac{\partial p^r}{\partial e_m}}{p^r}$.

Consumption is increasing in own output, conditional on total output.

As a consequence, we face the usual incentive-insurance tradeoff. EHM level of output could be generated by

$$\frac{\partial h\left(\eta_f T_f^E \middle| \chi_f^E\right)}{\partial g_f} \sum_r \sum_q p^q(e_m^E) \frac{\partial p^r(e_f^E)}{\partial e_f} \nu\left(c_f^{rq}\right) = d'(g^E)$$

$$v\left(c_f^{rq}\right) - v\left(c_f^{r'q}\right) = \lambda^{rq}(E) - \lambda^{r'q}(E)$$
$$= v\left(c_f^{rq}(E)\right) + \lambda v\left(c_m^{rq}(E)\right) - v\left(c_f^{r'q}(E)\right)$$
$$- \lambda v\left(c_m^{r'q}(E)\right)$$

…but that's too much risk

- Suppose DRRA, and $\lambda > 1$
- Male consumption > female consumption
- In the extreme, risk neutral male, risk averse female

$$e_m(MH) > e_f(MH)$$

More importantly

$$\eta_f \frac{\partial h}{\partial T_f} \sum_{q=1}^{N} \sum_{r=1}^{N} p^q \frac{\partial p^r}{\partial e} \nu^{rq} = \mu_T$$

And

$$\frac{\partial h}{\partial b_f} \sum_{q=1}^{N} \sum_{r=1}^{N} p^q \frac{\partial p^r}{\partial e} \nu^{rq} = \mu_b$$

While for women

$$\sum_{q=1}^{N}\sum_{r=1}^{N} p^q \, \eta_f \frac{\partial p^r}{\partial e}\frac{\partial h}{\partial T_f} v^{rq} = \mu_T$$

and

$$\sum_{q=1}^{N}\sum_{r=1}^{N} p^q \frac{\partial p^r}{\partial e}\frac{\partial h}{\partial g_f} v^{rq} = \mu_b + \lambda_{ef} d''(g)$$

so

$$\frac{\dfrac{\partial h}{\partial g_f}}{\eta_f \dfrac{\partial h}{\partial T_f}} = \frac{\mu_b + \lambda_{ef} d''(g)}{\mu_T} > \frac{\dfrac{\partial h}{\partial g_m}}{\eta_m \dfrac{\partial h}{\partial T_m}}$$

Empirical Implications

- Own consumption positively covaries with own output conditional on household production
  - LIMU
- Input choice no longer minimizes cost conditional on (e_f, e_m)
  - Labor per acre lower on farm of more risk averse member
  - Input intensity increases with grants
  - Increase concentrated on the plot of the poorer of the pair
  - Identity of grant recipient irrelevant
  - In this model $\frac{x_k}{\eta_k T_k}$ reduced if $Y^r(x_k)$

Unconditional Demand System

Village fixed effects, Control function estimates

	Ln(Exp)	Men Cloth	Women Cloth	Child Cloth	Food	Non Food
Ln(Exp)		1.837	3.292	9.432	-39.18	12.78
		(1.46)	(1.64)	(2.28)	(10.4)	(6.20)
Ln(Exp)^2		-0.117	-0.130	-0.494	2.058	-0.765
		(0.067)	(0.071)	(0.10)	(0.48)	(0.30)
Harvest Shock	0.126					
	(0.015)					
Grant 1	0.115					
	(0.026)					
Grant 2	0.0795					
	(0.026)					
Harvest Shock F	-0.00865	0.0170	-0.0804	-0.0512	0.338	-0.219
	(0.0065)	(0.014)	(0.015)	(0.021)	(0.12)	(0.081)
Harvest Shock M	0.0172	0.0346	-0.00807	0.0795	-0.408	0.450
	(0.0083)	(0.025)	(0.026)	(0.034)	(0.20)	(0.13)
Grant to F 1	-0.0593	-0.0103	-0.163	-0.137	-0.582	0.287
	(0.028)	(0.071)	(0.071)	(0.085)	(0.56)	(0.41)
Grant to F 2	-0.0298	-0.0429	0.0446	-0.0654	-0.806	-0.111
	(0.028)	(0.058)	(0.079)	(0.075)	(0.64)	(0.40)
Resid exp eq		0.0945	-1.544	-0.413	-0.593	0.702
		(0.26)	(0.32)	(0.32)	(2.43)	(1.78)
Resid^2 exp eq		0.257	0.239	0.753	-4.250	2.793
		(0.14)	(0.12)	(0.21)	(0.65)	(0.50)
Observations	10916	10916	10916	10916	10916	10916
Instruments	0					
Distribution	0.0107	0.542	0	0	0	0
DistribSetR		0.468	0.123	0.0329	0.105	0.012
DistribSetO		0.218	0	0.0187	0	0.008

d_1 - Conditional Demand System

Village fixed effects, Control function estimates

	Men Cloth	Women Cloth	Child Cloth	Non Food
Ln(Exp)	3.506	-6.510	2.688	-9.420
	(2.11)	(1.94)	(3.35)	(7.52)
Ln(Exp)^2	-0.207	0.382	-0.145	0.424
	(0.11)	(0.10)	(0.17)	(0.42)
Harvest Shock F	0.0496	-0.114	0.00309	0.244
	(0.034)	(0.036)	(0.048)	(0.14)
Grant to F 1	0.0139	-0.309	-0.239	-0.0369
	(0.075)	(0.067)	(0.093)	(0.27)
Grant to F 2	-0.00145	-0.146	-0.186	-0.641
	(0.068)	(0.082)	(0.083)	(0.39)
Food	0.0439	-0.248	-0.169	-0.580
	(0.040)	(0.043)	(0.059)	(0.16)
Observations	10916	10916	10916	10916
DistribSetR	0.456	0	0	0.0289

Akresh, Chen and Moore (2015) find a striking pattern

- Monogamous vs Polygamous
- Husband-wife vs wife-co-wife

Attribute to

(a) Greater altruism HW

(b) Stronger altruism can shift equilibrium from cooperative to noncooperative in their game (Bernheim and Stark 1988; contrast Foster and Rosenzweig 2001)

Table 3. Fixed Effects Estimates of the
Effect of Cultivator Characteristics on Plot Yield[a], Pairwise Groupings

	Head and Wives (I)	Other Cultivators (II)	Men Only (III)	Women Only (IV)	Head and Wives (V)
Gender (1=female)	-151.97 ***	-160.72 ***			-63.60
	(40.47)	(54.01)			(66.14)
Gender*Add'l Female[b]					-132.29 *
					(78.33)
Other Male			-74.78 **		
			(36.06)		
Other Female				18.16	
				(20.77)	
Gender*Polygynous	118.52 **	131.04 **			33.67
	(47.32)	(61.80)			(75.20)
Gender* Poly*Add'l Female					126.61
					(88.86)
Other Male*Polygynous			69.99 *		
			(42.05)		
Other Female*Polygynous				-18.87	
				(23.23)	
Observations	3629	1597	2478	2748	3629

Table 4: Plot Level Input Intensity, Yield and Profit ; Comparing Polygamy & Monogamy (Part A)

	Land cultivated log(ha)		Male Family Labor log(days/ha)	
	Polygamy	Monogamy	Polygamy	Monogamy
Grant to Female	(1)	(2)	(3)	(4)
Female Farmer*year 1	0.04	0.04	0.17	0.14
	0.01	0.01	0.06	0.06
Male Farmer*year 1	-0.01	0.04	-0.13	-0.14
	0.02	0.02	0.05	0.05
Grant to Male				
Female Farmer*year 1	0.03	0.02	0.19	0.16
	0.01	0.01	0.07	0.07
Male Farmer*year 1	0.05	0.02	-0.08	-0.15
	0.03	0.02	0.05	0.05
heterogeneity in land: F_grantToMale= M_grantToMale*(Female/Male)				
Grant to Female			0.00	0.00
Grant to Male			0.00	0.00
N	13139	12040	13136	12040
From Baseline Regression				
Constant			3.94	3.95
			0.03	0.03
Female Plot			-1.54	-1.40
			0.03	0.03

Table 4: Plot Level Input Intensity, Yield and Profit ; Comparing Polygamy & Monogamy (Part C)

	Fertilizer expenses log($/ha)		Total input expenses $/ha	
	Polygamy	Monogamy	Polygamy	Monogamy
Grant to Female	(9)	(10)	(11)	(12)
Female Farmer*year 1	0.31	0.46	0.28	0.28
	0.08	0.08	0.08	0.08
Male Farmer*year 1	-0.06	0.20	0.03	0.03
	0.11	0.11	0.11	0.11
Grant to Male				
Female Farmer*year 1	0.33	0.10	0.02	-0.17
	0.09	0.09	0.10	0.10
Male Farmer*year 1	0.06	-0.20	0.07	-0.07
	0.13	0.12	0.12	0.12
heterogeneity in land: F_grantToMale= M_grantToMale*(Female/Male)				
Grant to Female	0.00	0.03	0.13	0.10
Grant to Male	0.06	0.04	0.71	0.67
N	13134	12033	13139	12040
From Baseline Regression				
Constant	2.55	2.31	4.15	4.02
	0.05	0.06	0.05	0.06
Female Plot	-0.21	-0.17	1.07	0.96
	0.06	0.06	0.05	0.06

Table 4: Plot Level Input Intensity, Yield and Profit ; Comparing Polygamy & Monogamy (Part C)

	Fertilizer expenses log($/ha)		Total input expenses $/ha	
	Polygamy	Monogamy	Polygamy	Monogamy
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Female Farmer*year 1	0.31	0.46	0.28	0.28
	0.08	0.08	0.08	0.08
Male Farmer*year 1	-0.06	0.20	0.03	0.03
	0.11	0.11	0.11	0.11
Grant to Male				
Female Farmer*year 1	0.33	0.10	0.02	-0.17
	0.09	0.09	0.10	0.10
Male Farmer*year 1	0.06	-0.20	0.07	-0.07
	0.13	0.12	0.12	0.12
heterogeneity in land: F_grantToMale= M_grantToMale*(Female/Male)				
Grant to Female	0.00	0.03	0.13	0.10
Grant to Male	0.06	0.04	0.71	0.67
N	13134	12033	13139	12040
From Baseline Regression				
Constant	2.55	2.31	4.15	4.02
	0.05	0.06	0.05	0.06
Female Plot	-0.21	-0.17	1.07	0.96
	0.06	0.06	0.05	0.06

- Pattern not due to polygamy ($\approx 40\%$ of households)
- Strongest in cotton, grains, and "other" crops

Speculation

1. We find in Mali
    1. Powerful barriers to efficient resource allocation over states, in production, and in the allocation of consumption
    2. Not limited to polygamous or extended households
    3. Are Mali households unusual? Are the tests more stringent?

Where do we expect the least damage?

- Static consumer demand of private goods
- Poverty and inequality

2. We use the concept of “household” too easily
    a. Data needn’t come in household-size bits
    b. What about household public goods?
    c. Yet another tradeoff in data collection –
        i. Optimize for a specific question
        ii. Stick with conventional units for comparability, breadth of use

Multiple frictions in Mali make the elegant simplicity of the collective model fundamentally misleading. For what questions is this likely vital?

a. Human capital investment
   - Some characteristics of a public good in a family
   - Forward looking, uncertain and heterogeneous returns
   - Interacts with household formation and dissolution
   - Subject to incentive problems
   - Multiple agents with possible decision making roles
   - If organizing rice production is a challenge…

b. Social organization of production
   - Separate spheres, parallel enterprises, spatial dispersion
   - Migration

Marriage, breaking away, and transitions

- Matching, bride price and dowry
- Polygamy (Reynoso 2016)
- Extended family, co-residence decisions
  - Fostering, child exchange
  - Permanent workers, family houses
- New households

- These are the areas in which the (LC) EHM has yielded the most fruit