The Lion's Share: an Experiment on Polygamy in Northern Nigeria.

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UKaid from the Department for International Development

Introduction: Polygny

- Polygyny is common
- Usually 2 wives, 1 husband
- Some evidence of decline, but the rate is slow
- And there is much variation between countries and within countries

Table 1. Polygyny in sub-Saharan Africa

	% Wives with one or more co-wives						
Country	Year			Country	Year		
Benin	**1996**	**2001**	**2006**	**Malawi**	**1992**	**2000**	
	49.4	45.4	42.6		20.4	17	
Burkina Faso	**1993**	**1998-9**	**2003**	**Mali**	**1987**	**2001**	**2006**
	50.9	54.6	48.4		45	42.4	39.2
Cameroon	**1991**	**1998**	**2004**	**Mauretania**			**2001**
	38.2	32.7	30				11.2
Chad		**1998**	**2003**	**Namibia**	**1992**	**2000**	**2005**
		39.1	39		24.2	12.4	5.5
Cote d'Ivoire	**1994**	**1998**		**Niger**	**1992**	**2001**	**2006**
	36.4	34.8			36	37.6	35.7
Eritrea		**1995**	**2002**	**Nigeria**	**1990**	**2003**	**2008**
		6.9	9.3		40.8	35.7	32.7
Ethiopia			**2000**	**Rwanda**	**1992**	**1999**	**2005**
			13.6		14.2	12.1	11
Ghana	**1988**	**2000**	**2008**	**Senegal**	**1987**	**1997**	**2005**
	32.6	22.5	18.6		46.5	46	39.5
Guinea		**1999**	**2005**	**Tanzania**		**1992**	**1997**
		53.3	53			26.9	28
Kenya	**1988**	**2003**	**2008**	**Togo**	**1988**	**1998**	
	23.4	16.4	13.3		52.3	42.8	
Liberia		**1986**	**2007**	**Uganda**	**1988**	**2001**	**2006**
		38	16.3		34.1	32.2	28.1
Madagascar	**1992**	**2003**	**2007**	**Zambia**	**1992**	**2001**	**2007**
	5.9	3.1	3.1		17.6	15.8	14.4

Aims.

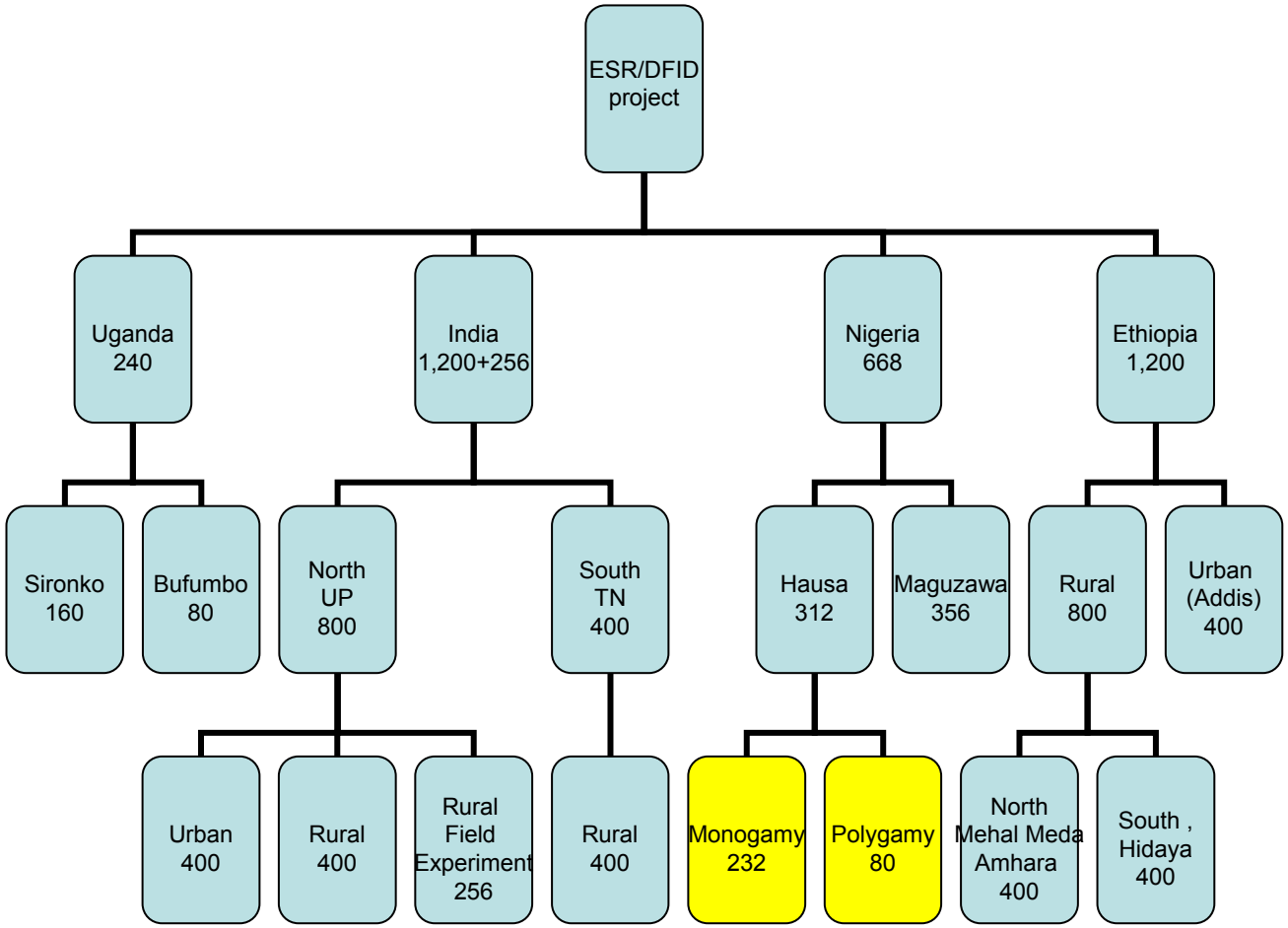
- Little theory and economic evidence on polygyny so our aims are simple:
  - To compare the decision-making behaviour of monogamous and polygynous households
  - To test the efficiency of polygynous households
  - To test some simply theories of resource allocation in polygynous households

Part of a wider project: Patterns of conjugality

- 4 countries so far (more if we can get some co-authors)
- Testing theories of intra-household behaviour
- Using samples of married couples
- 20 treatments in total – 10 in each location
- Participants do a follow-up socio-economic survey at a later date
- 50 (approx) couples in each location are selected for subsequent in-depth interviews by ethnographers
- Sponsored by UK's ESRC/DfID

This experiment is part of a wider project

- Sites and sample numbers
- In Kano state, northern Nigeria we focus on two groups: Muslim Hausa and non-Muslim Maguzawa

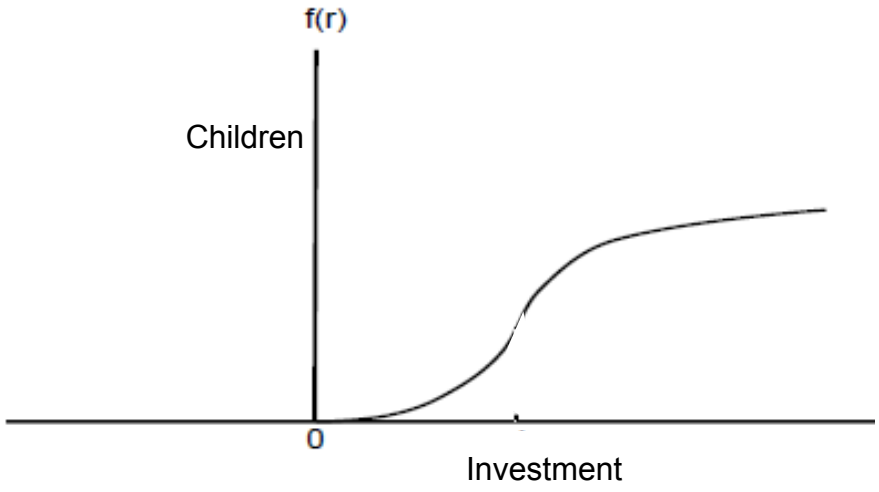


Summary

- This presentation involves 160 households near Kano.
- There are 80 monogamous couples
- And 80 polygynous couples (all the men have 2 wives)
- 2 treatments
- (we have other treatments in Nigeria, but none involving polygyny)

Economic Theory on Polygyny

- Theories of <u>allocation</u> within polygyny are limited:
  - Bergstrom (unpublished)
  - Men with two wives maximize $u(Y - r_1 - r_2) + f(r_1) + f(r_2)$
  - Y = income and f(r) = expected fertility of a wife given resources, r;
  - f(0)=0 and f shows diminishing returns above a certain level
  - The optimal allocation of resources is <u>equality:</u> $r_1=r_2$.
  - (Away from the optimum: if $f(r_i) > f(r_k)$ then wife k should receive more.)



Economic Theory on Polygyny

- Alternatively,
- It is possible to model the household as a game between a principal and two agents.
- If there is asymmetric information and if
- the public outcomes for each agent are informative about the actions of the other agent,
- then rewarding according to relative output can be optimal
- i.e. wives with more children receive more reward.

Economic Theory II: Efficiency

- There are no formal models on the relative efficiency of polygyny
- In models that have a polygyny component (e.g. Becker, 1981, Tertilt 2005 & 2006) there is no production cost (or benefit) to polygamy.

- Alternatively, one might suppose that free-riding might lower the efficiency of polygyny

Economic Theory: summary.

	Efficiency		Allocation
Null	Polygynous households are efficient (*polygynous households are as efficient as monogamous households)*	Null	Equal allocation to wives *(Bergstrom)*
Alternative	Polygynous households are inefficient (*polygynous households are less efficient than monogamous households - free riding)*	Alternates	Husbands favour wives with fewer children (*disequilibrium story)* Husbands favour wives with more children (*principal agent model)*

Design

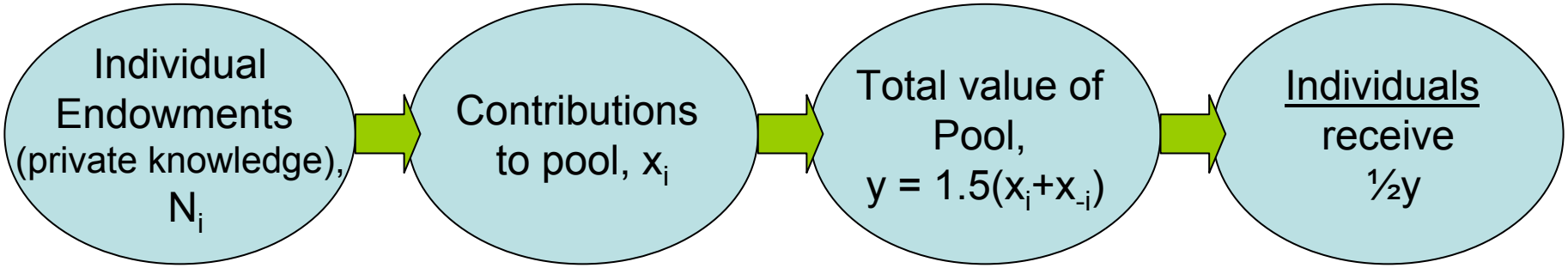
Two treatments:

“baseline game”

“male control game”

The baseline game (shown for 2 people)

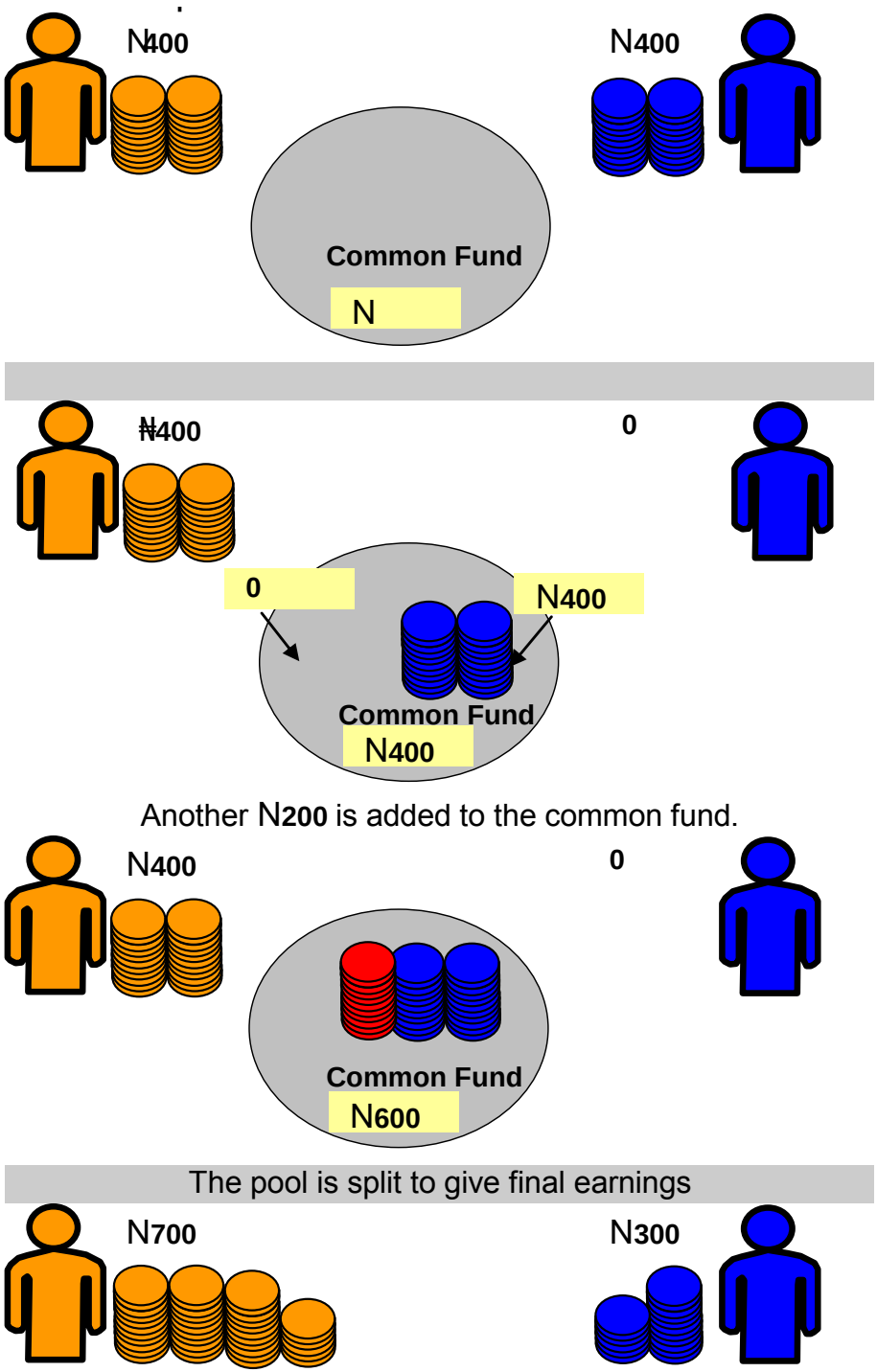
- A one shot common pool game with private information on endowments



- Equal split of pool
- In a unitary model of the household each player should invest everything

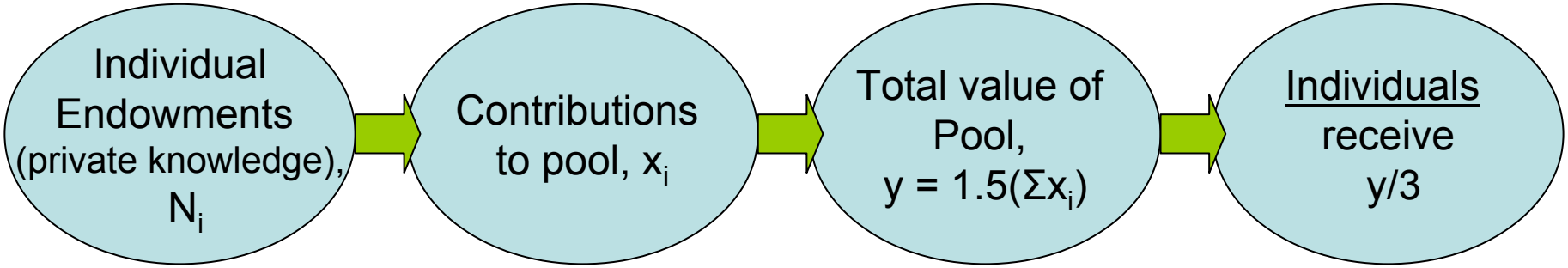
A two person example

1. Endowments per capita are 400 Naira (about 2 day's wages)
2. Investment in units of 100 Naira
3. In these treatments all actual endowments are the same (in other treatments endowments do vary)



The baseline game (for 3 people)

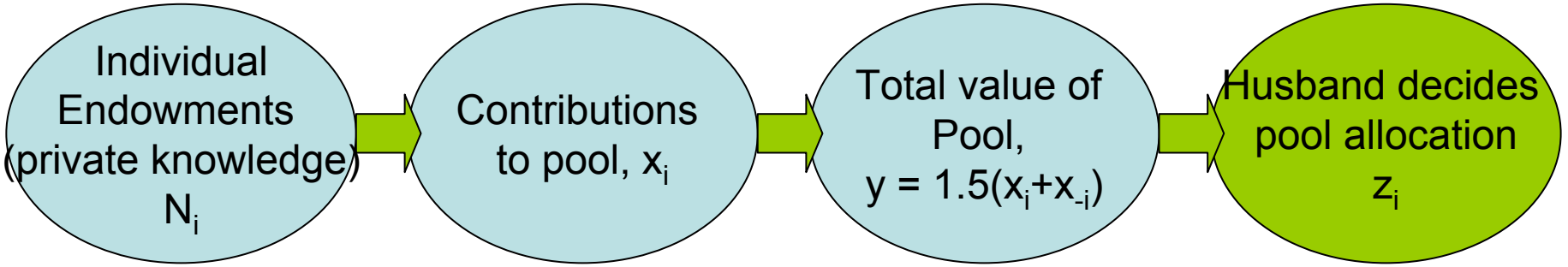
- A common pool game with private information on endowments
- Equal split of pool



1. In the 3 person household endowments are the same and each person gets 1/3 of pool.
2. This means equal per capita payoffs in the 2 and 3 person games
    1. If everyone contributes all their endowment
    2. If no-one contributes their endowment
3. But it means the marginal personal return to investment is lower with n = 3.
4. It corresponds to a household with no scale economies.

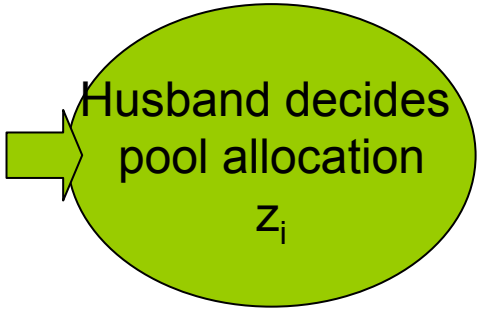
The male control game (shown for 2 people)

- A common pool game with private information on endowments
- Male decides split



- For the allocation process we use a strategy method.
  - With a 2 person game, the husband makes his investment decision
  - He is then given all 5 possible investment levels and must make a binding, conditional allocation for each

The male control game



- For the 3 person game we use a two-stage strategy method.
- Husbands are given some (5) combinations of possible investment levels by wives and asked to give conditional allocations
  - If actual investment levels match these ‘possibles’ then allocation is binding
  - If actual investment level is not in possibles, then husband decides allocation at that point.
- (we do this because otherwise we have to elicit 25 conditional allocations)

Location background

- Polygynous marriages are relatively common in northern Nigeria (around 40% of women in this region report one or more co-wives)
- In the rural Muslim communities of the north, wife seclusion is very common, with adherence greater amongst wealthier families and in larger settlements.
- Wives do not usually work outside the family compound (e.g in fields or fetching water)
- Men are responsible for providing normal consumption goods.
- They engage in various small scale enterprises .
- What money they earn is usually for themselves. There is a large degree of autonomy for women in this regard. Children are used to trade and deliver goods. Girls learn trade by this means.
- Divorce is common and >80% initiated by women.
- It is rare and stigmatising to be unmarried.

Location background

- Population density is relatively high and most farming is intensive.
- Crops include wheat, rice, millet, sorghum, maize, cowpeas and groundnuts.
- There is some livestock farming and vegetables.
- About 80 km south of Kano, 5km to 15km off the main road.

Execution

- Run in 5 villages over 5 days (8 couples/triples per treatment per village)
- Villages selected after prior discussion
- Recruitment within villages based on random invitation after prior visit
- Locally recruited research assistants
- Scripts translated and backtranslated
- 5 days of training
- 1 treatment in morning, 1 in afternoon
- Many subjects have limited literacy
- Oral instructions, 1 on 1
- Couples separated after brief introduction
- Tests of understanding (v. high pass rate)
- Paid separately, in isolation
- Experiment conducted in maize fields (except for a school in one village)
- Detailed socioeconomic survey done in a follow-up exercise


Room
1
WIVE

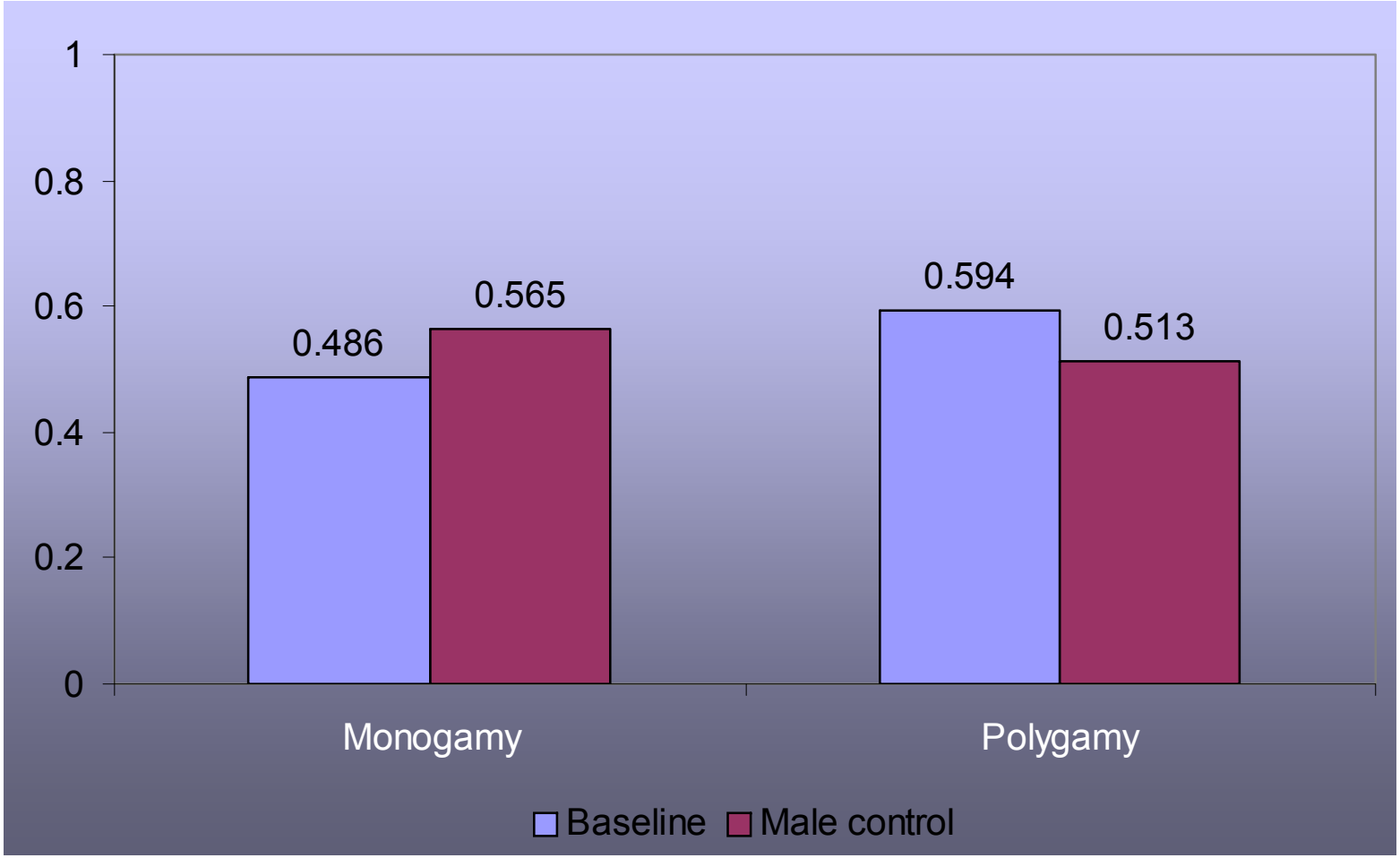

Room
1
WIVES B


CLASS 4

Results

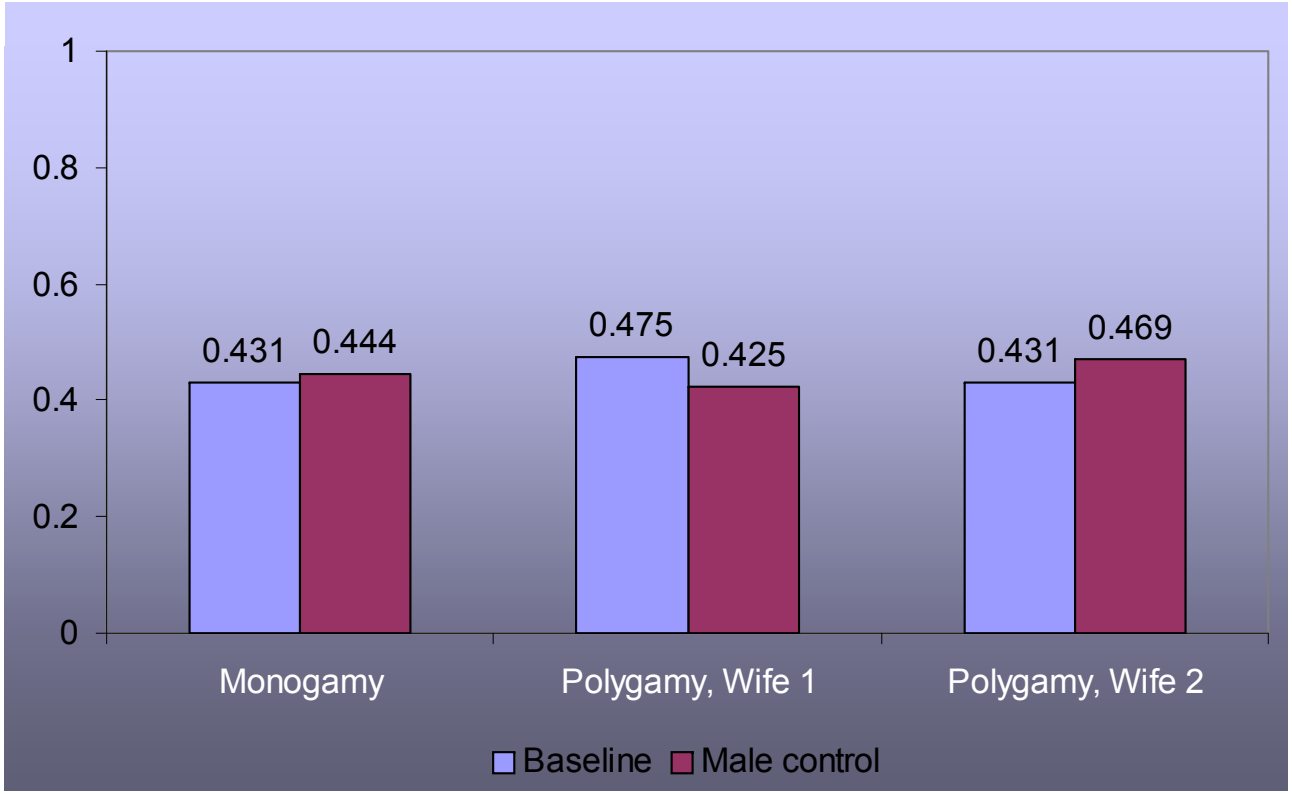
Male investment
(% of endowment invested in common fund)

- Investing less than 100% is a feature of all our sites
- Nigerian figures were generally the lowest out of countries studied



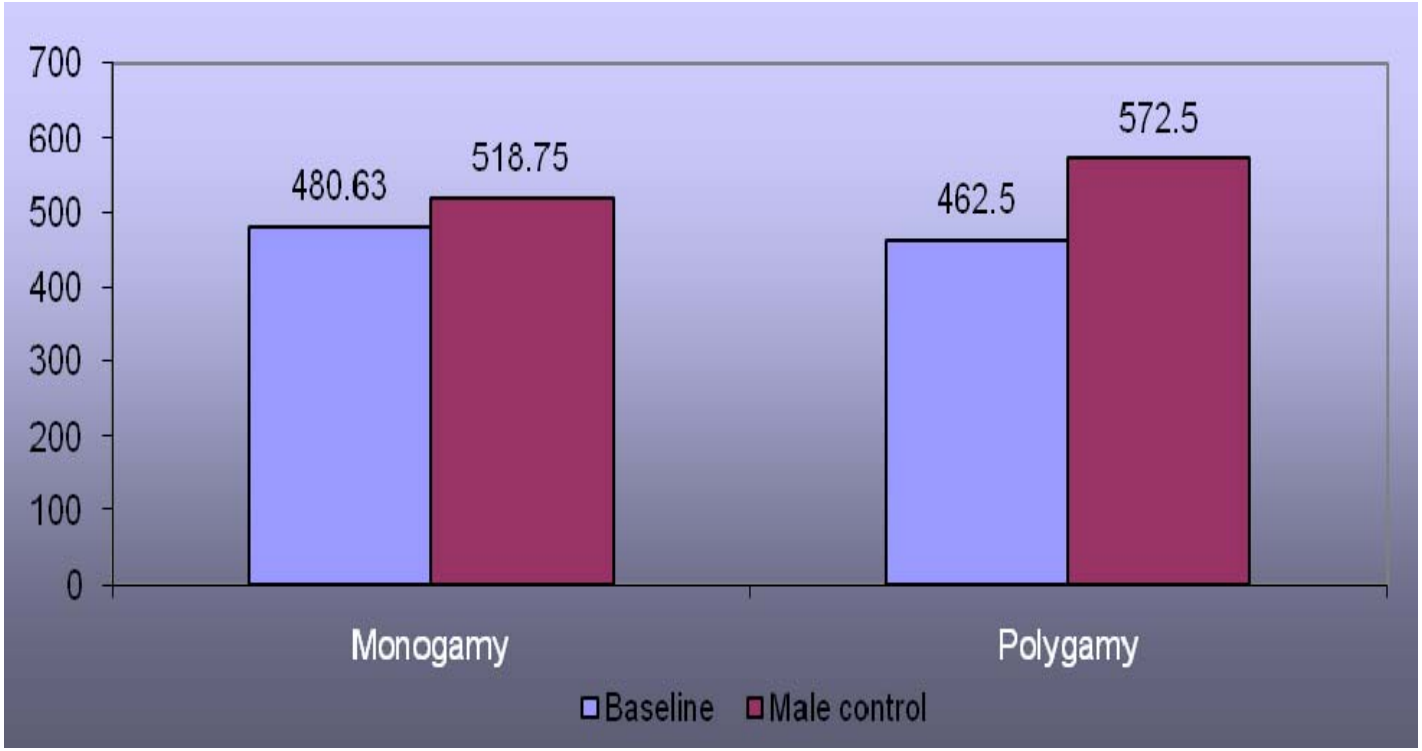
Female investment

- Lower than male in all situations (wife 2 is always the wife with shorter tenure)
- Significantly lower than men in monogamy, male control (p=0.02, Mann-Whitney)
- Significantly lower than men in all polygamy comparisons, except wife 2 - Male control treatment



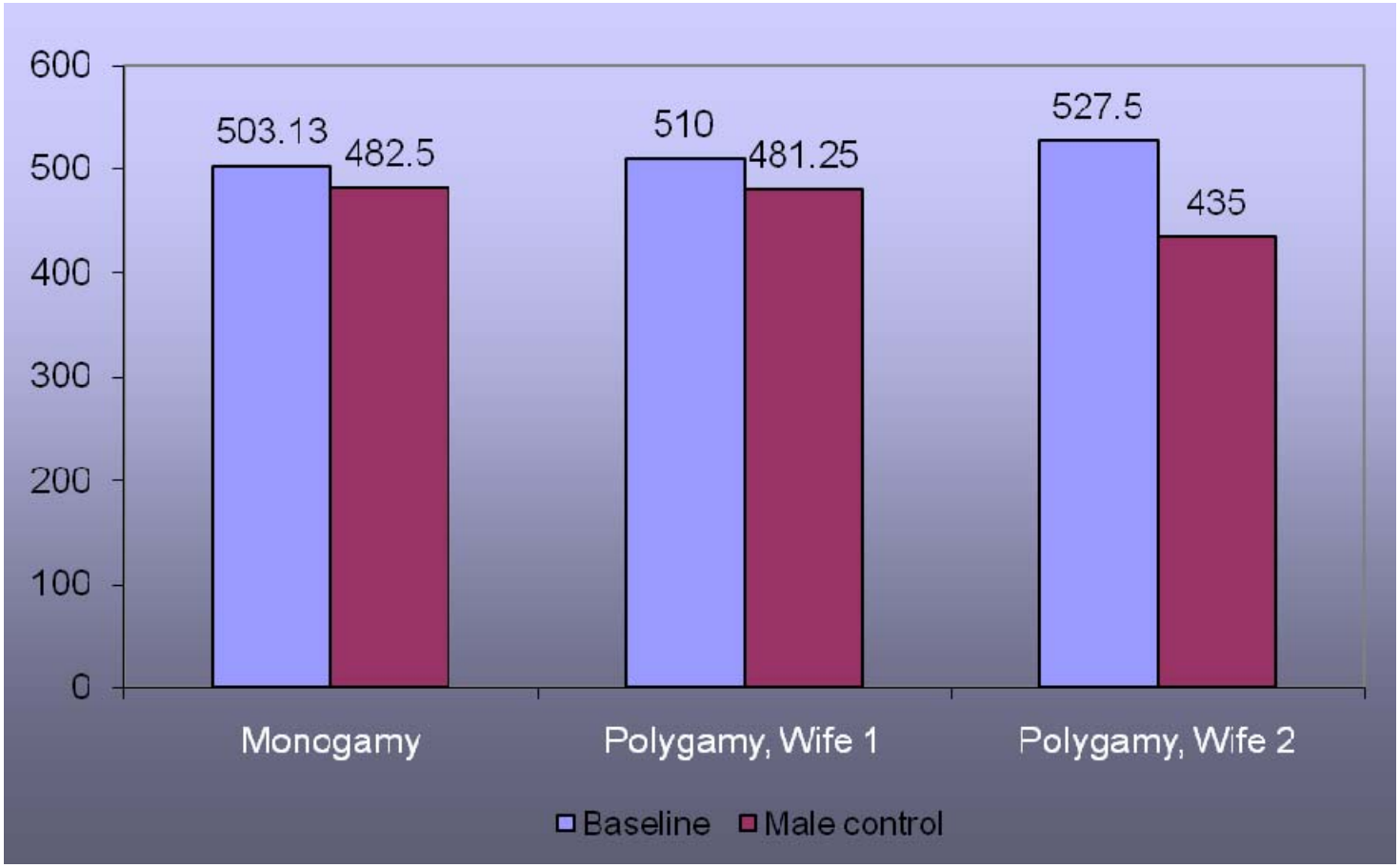
Earnings (Naira)

- Control is good for men (this is often not the case in other countries), particularly in polygamy



Earnings

- The chart shows female earnings by treatment
- Male control lowers earnings for the second wife



Polygyny allocation: male control

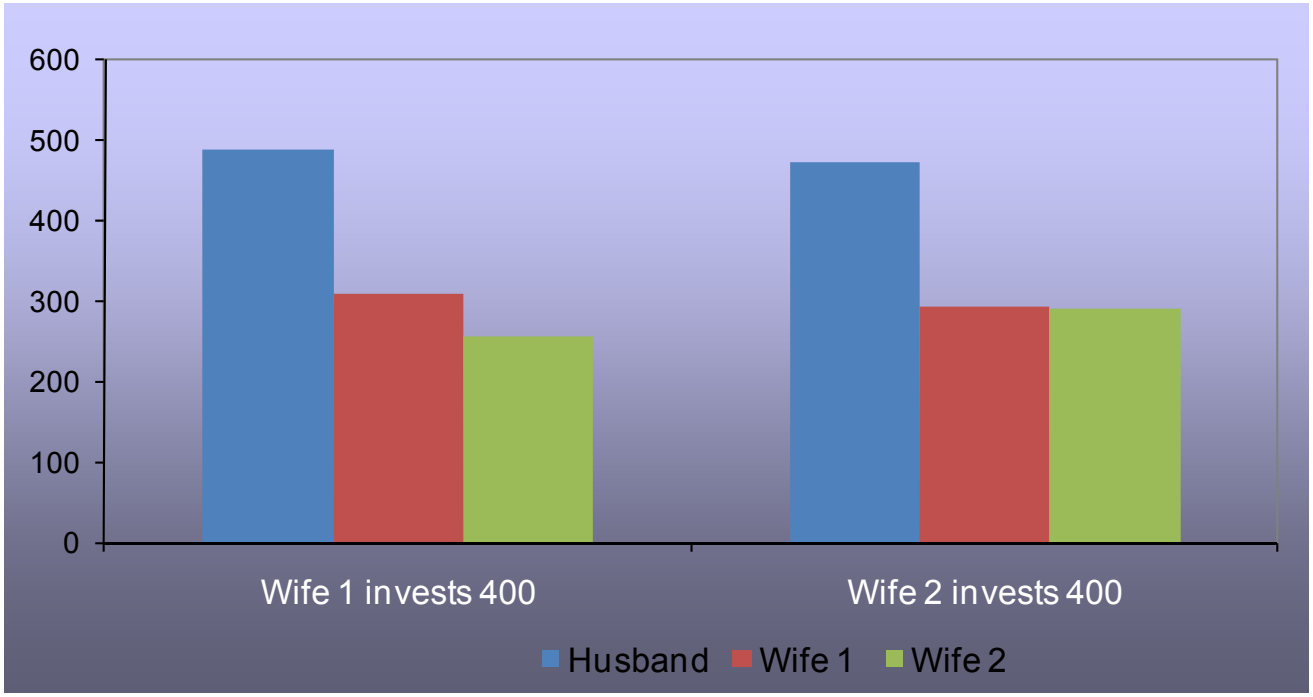
- H0: equal allocation to wives (Bergstrom).
- In only one case does second wife actually receive more than first wife.
- In 19 cases they are allocated the same;
- In 20 cases more is given to the first wife.
- We reject the null
- First wives' return on investment is higher than second wives'.

	N	Wife 1's investment	Wife 2's investment
Polygamy			
Return to wife 1	40	0.433	0.432
Return to wife 2	40	0.317	0.382
Return to husband	40	0.742	0.683
Monogamy:			
Return to wife	40	0.690	-
Return to husband	40	0.810	-

Note: table shows mean marginal return from investment of 1 more Naira.

Earnings

- For instance compare 2 conditional allocations Total wife investment = 500
- Case 1. Wife 1 invests 400 (all her endowment);
- Case 2: wife 2 invests 400
- In both cases wife 1 is allocated more

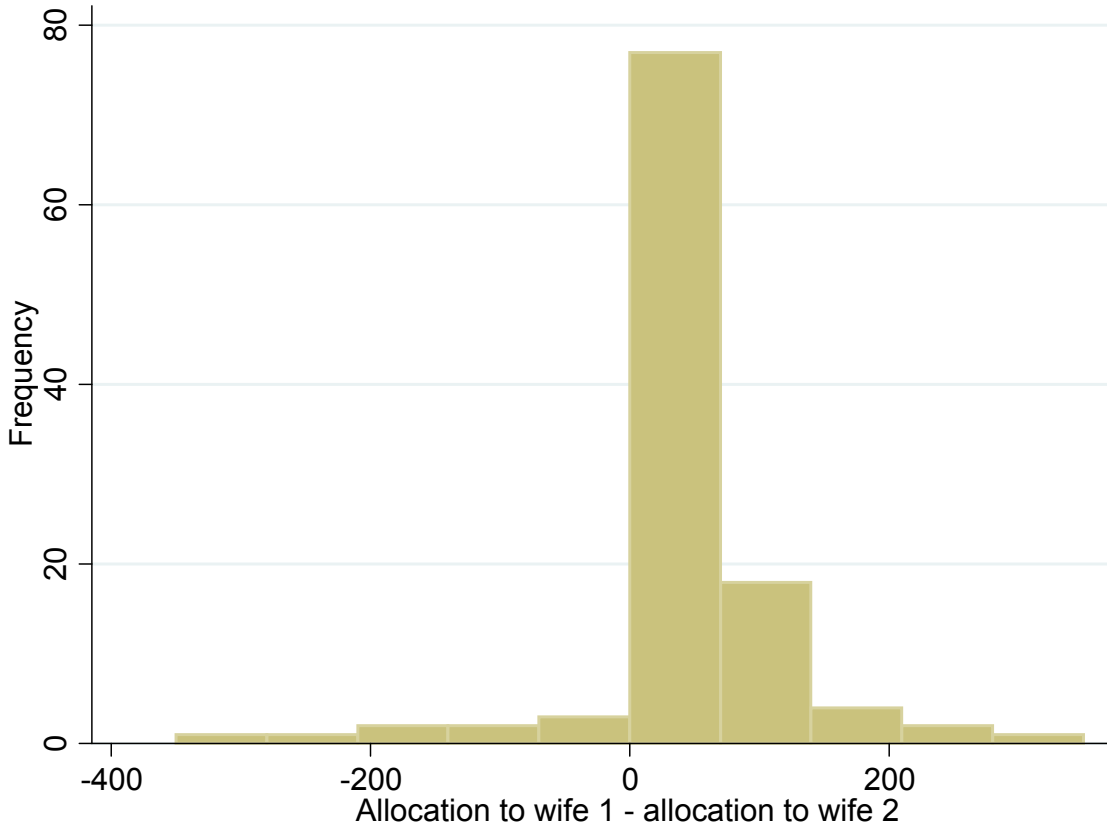


Regression results.

- Investment decisions: regression equations add little more.
- For women higher investment is positively and significantly correlated with
  - Husband's income
  - More equal leisure time ('who has more leisure time?')
- For men:
  - Male having formal education
  - % clothing spending on women's clothing
  - But lower income and education is correlated with lower investment.
  - Husband's age

Regression results.

- If we look at male allocation behaviour in polygyny we find 40% men always split the wives' allocation equally.
- It suggest a mixture model
  - 'equal splitters'
  - 'non-equal splitters'



Husband's allocation to self

Table 11. One-way random effect estimation on polygynous husband's allocation

	Non-equal splitters	Equal splitters
	Husband's allocation to self, y_h	
Constant	**170.531**	**216.968**
	(0.072)	(0.375)
Male investment	**1.284**	**0.082**
	(0.000)	(0.824)
Wife 1 investment	**0.638**	**0.628**
	(0.000)	(0.000)
Wife 2 investment	**0.515**	**0.595**
	(0.000)	(0.000)
Husband income x 1000	**-0.126**	**0.014**
	(0.000)	(0.809)
No. children, 1st	**-3.366**	**7.879**
	(0.565)	(0.752)
No. children, 2nd	**-32.280**	**16.548**
	(0.004)	(0.256)
Years married, 1st	**7.009**	**5.466**
	(0.073)	(0.472)
Years married, 2nd	**2.266**	**-0.220**
	(0.515)	(0.108)
Male age	**-7.826**	**-5.596**
	(0.00)	(0.488)

Husband' allocation to wives

Table 11. One-way random effect estimation on polygynous husband's allocation		
Equation 2. Difference in husband's allocation to wives, (y_{w1} - y_{w2})		
Constant	23.489	
	(0.256)	
Difference in female investment (DI)	0.408	
	(0.000)	
Difference in children (DC)	6.397	
	(0.201)	
DI x DC	-0.084	
	(0.000)	
Difference in years married	-0.726	
	(0.405)	
Chi-squared	4.450	
Independence test probability	0.035	
N	129	101
No. groups	23	15

Numbers in parentheses are p-values for two-sided t-tests of the null hypothesis that a coefficient is zero. Chi-squared value reported is for a Breusch-Pagan test of independence between the equations (1 d.f.). The p-value for this test is reported in the subsequent row.

Interpretation of the allocation equations

- Husbands favour themselves
- For each Naira invested by a first wife, she receives 0.64 Nairas back, while the second wife gets just 0.22 Naira. Husband gets the rest.
- When the second wife puts in 1 more Naira, the husband receives 0.515, the first wife gets 0.28 and the second wife receives 0.70.
- The more children a first wife has, the lower her differential return on investment. Conversely, as a second wife has more children, her return on marginal investments rises.

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- The more children a first wife has, the lower her differential return on investment. Conversely, as a second wife has more children, her return on marginal investments rises.
- When all equations are evaluated at the mean values of the right-hand side variables, the predicted gross return (= predicted allocation/mean investment) for the first wife is 1.42, compared to 1.12 for the second wife (and 1.94 for men).
- If, both marriages were of the same duration, both wives made the same investment and had the same number of children, the first wife's predicted mean return would still be 0.13 higher than that for the second wife.

Summing up.

Efficiency		Allocation	
Null	Polygynous households are efficient **NO** (*polygynous households are as efficient as monogamous households* **YES** *)*	Null	Equal allocation to wives **NO** *(Bergstrom)*
		Alternates	Husbands favour wives with fewer children **NO** (*disequilibrium story)* Husbands favour wives with more children (*principal agent model)* **NO?**

- First wives do better than second wives, but men do best of all.

Summing up:

- We find
  - a large deviation from the efficient outcome in both monogamy and polygyny
  - no efficiency penalty for polygyny
- In polygyny with male control,
  - second wives do worst in the allocation.
  - second wives also do worse in total income - refuting the Bergstrom story
  - The disadvantage of second wives is not related directly to the number of children
- First wives do better, but men do best of all.

Summing up:

- Implications
  - Efficiency results mean that macro models of polygyny do not need to be recalibrated.
  - But, models of allocation need to be rethought.
- Questions :
  - Why don’t men invest more?
  - Why be a second wife?
- Design issues:
  - Small sample sizes
  - Possible value of other treatments (e.g. female control, different marginal returns)
  - Semi-public behaviour - did being watched alter allocation rules?


Leaving the experiment...