Australian National University

EE468: Integrated Public Economics, Development and Political Economics

Lecture 7: Intrahousehold and Gender Discrimination

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Outline

- Overview: disparities in economic outcomes across groups/genders
- Unitary vs. non-unitary intrahousehold models
- How to test these models empirically? What are policy implications?

Why should we care about intrahousehold?

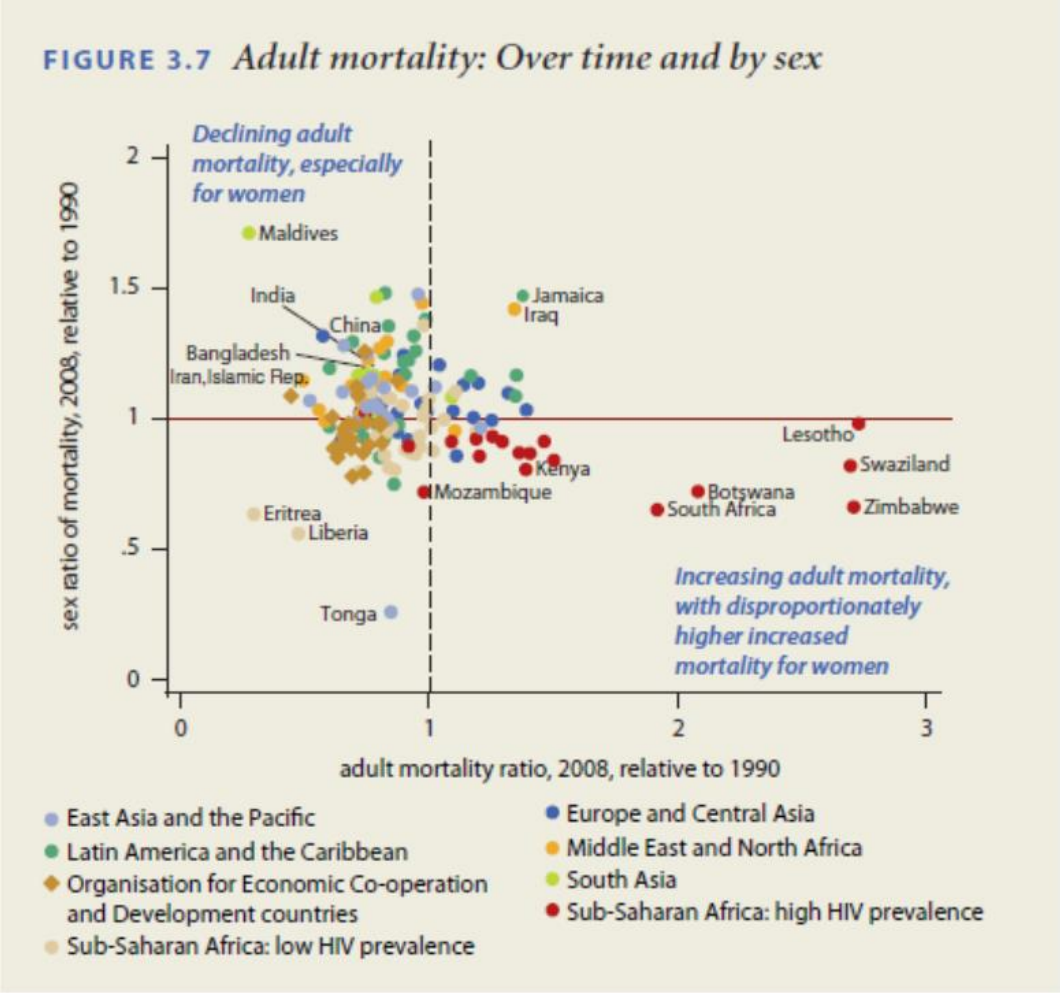
- **Heterogeneous resource allocations and outcomes across HH members**
  - Sen's 'missing women' around the world especially in Asia
  - Gender bias in investment in education and health?
  - But these evidence are not trivially observed and could be underestimated! → some intrahousehold data could be hard to find (how to observe whether girls and boys are fed equally?, do we fail to count the dead?)
- **Different outcomes when policies targeted different members in the HH**
  - Resource in hand of women tend to translate better to HH spending in health and education, and to girls!
- **Key policy questions**
  - How might we explain these intrahousehold heterogeneities theoretically?
  - What do we learn empirically?
  - What might these imply about policy design and targeting to improve HH's welfare or welfare of some subpopulation?

Missing women around the world!

- **In 1999, Amartya Sen found 100 million missing women around the world!**
- 'Missing women' are women who should be alive and are not
  - (current pop.× female/male ratio in SSA) – current number of women
- Female/male ratio in 1999: Europe (1.05), North America (1.06), SSA (1.02), Southeast Asia (1), North Africa (0.96), China (0.94), Bangladesh (0.94), India (0.93), Pakistan (0.91)
  - Missing women in 1999 (million): Southeast Asia (2), China (44), Bangladesh (3.7), India (37), Pakistan (5.2)
- Women die more? Or they were born (survive after they were born) less?
  - Can these be explained by economic development?
  - Other things going on? culture, social status of women, policy reform (one-child policy)?

How might we explain missing women around the world?

- Women die more?
  - No, relative life expectancy of adult women has improved!
- Perhaps, the world seems to lose women when they were very young!
  - At birth (can we observe this in the data?)
  - After birth



Source: World Health Organization 2010.

Note: Adult mortality is expressed as the probability of death between the ages of 15 and 60. The sex ratio of mortality is male adult mortality divided by female adult mortality.

TABLE 3.2 *Skewed sex ratios at birth and excess female mortality persist across the world, leading to females missing at birth and excess female mortality during childhood and the reproductive years*

Missing girls at birth and excess female deaths (in thousands)

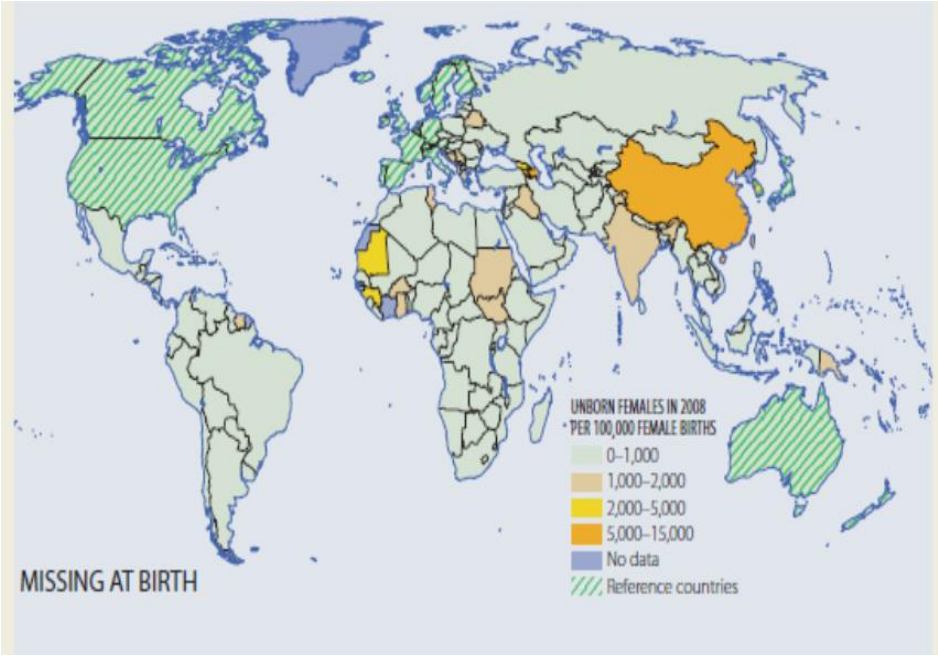
	1990	2008	1990	2008	1990	2008	1990	2008	1990	2008	1990	2008
China	890	1,092	259	71	21	5	208	56	92	30	1,470	1,254
India	265	257	428	251	94	45	388	228	81	75	1,255	856
Sub-Saharan Africa	42	53	183	203	61	77	302	751	50	99	639	1,182
High HIV-prevalence countries	0	0	6	39	5	18	38	328	4	31	53	416
Low HIV-prevalence countries	42	53	177	163	57	59	264	423	46	68	586	766
South Asia (excluding India)	0	1	99	72	32	20	176	161	37	51	346	305
East Asia and Pacific (excluding China)	3	4	14	7	14	9	137	113	48	46	216	179
Middle East and North Africa	5	6	13	7	4	1	43	24	15	15	80	52
Europe and Central Asia	7	14	3	1	0	0	12	4	4	3	27	23
Latin America and the Caribbean	0	0	11	5	3	1	20	10	17	17	51	33
Total	1,212	1,427	1,010	617	230	158	1,286	1,347	343	334	4,082	3,882

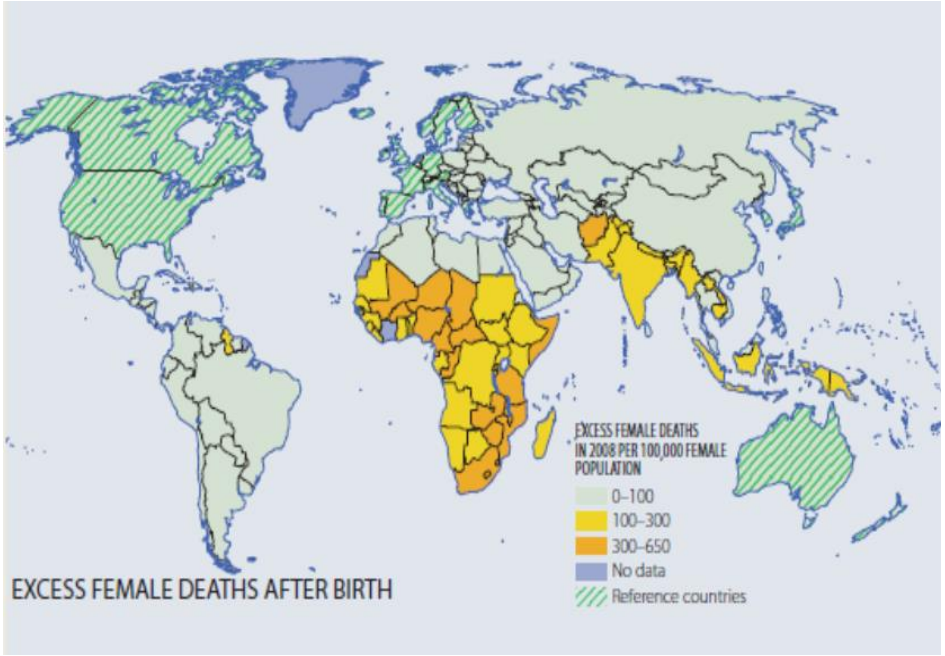
Source: WDR 2012 team estimates based on data from the World Health Organization 2010 and United Nations Department of Economic and Social Affairs 2009.

Note: Totals do not necessarily add up due to rounding.

How might we explain missing women around the world?

- The number of girls missing at birth remains high in China and India (sex-selective abortion?)
- Africa and south Asia still experience large increases in excess under-five female mortality during 1990-2008



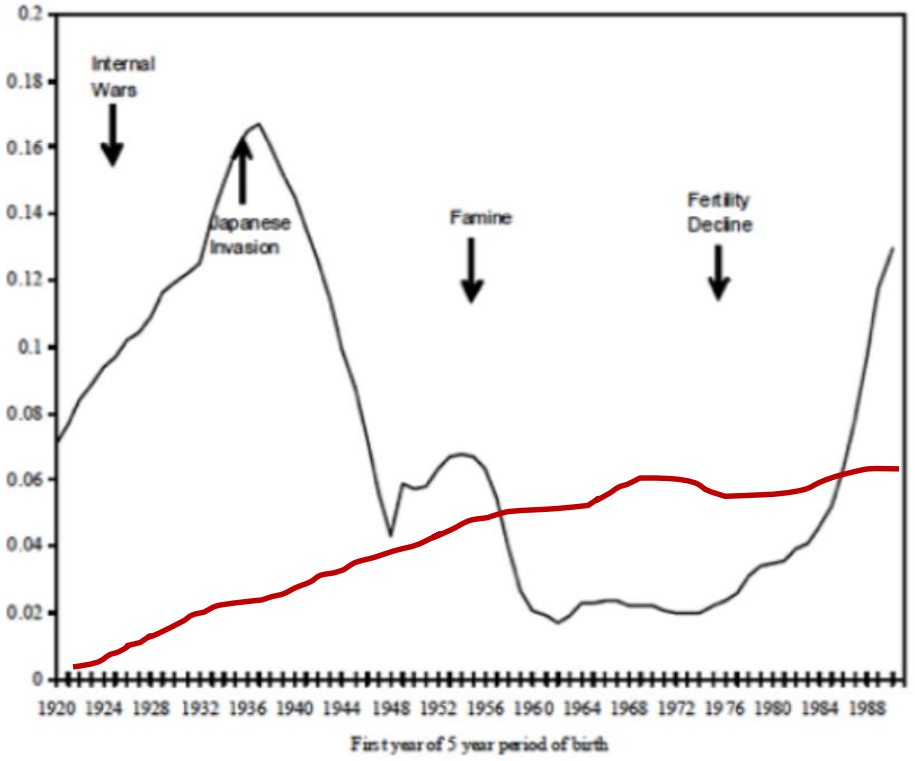


Source: WDR 2012

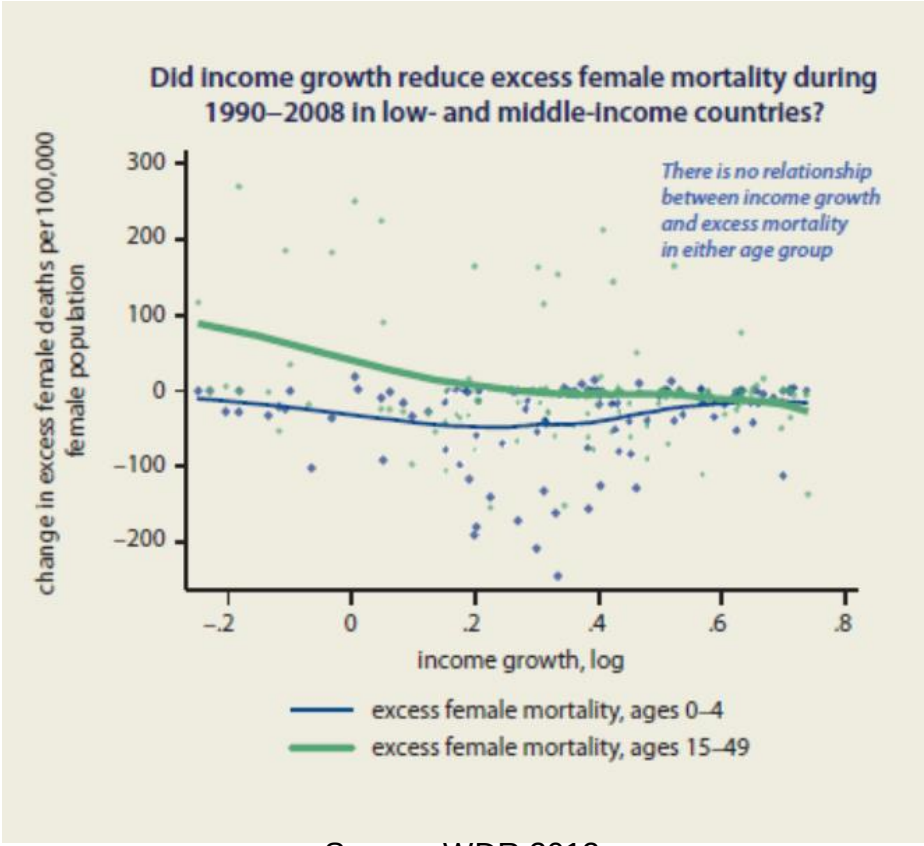
How might number of missing women evolve over time?

- Overtime, no favorable trend in India, worsen in China! (despite growth)
- Income growth clearly did not reduce excess female mortality!

Excess sex ratios (boy/girl) China (black) and India (red) 1920-1995



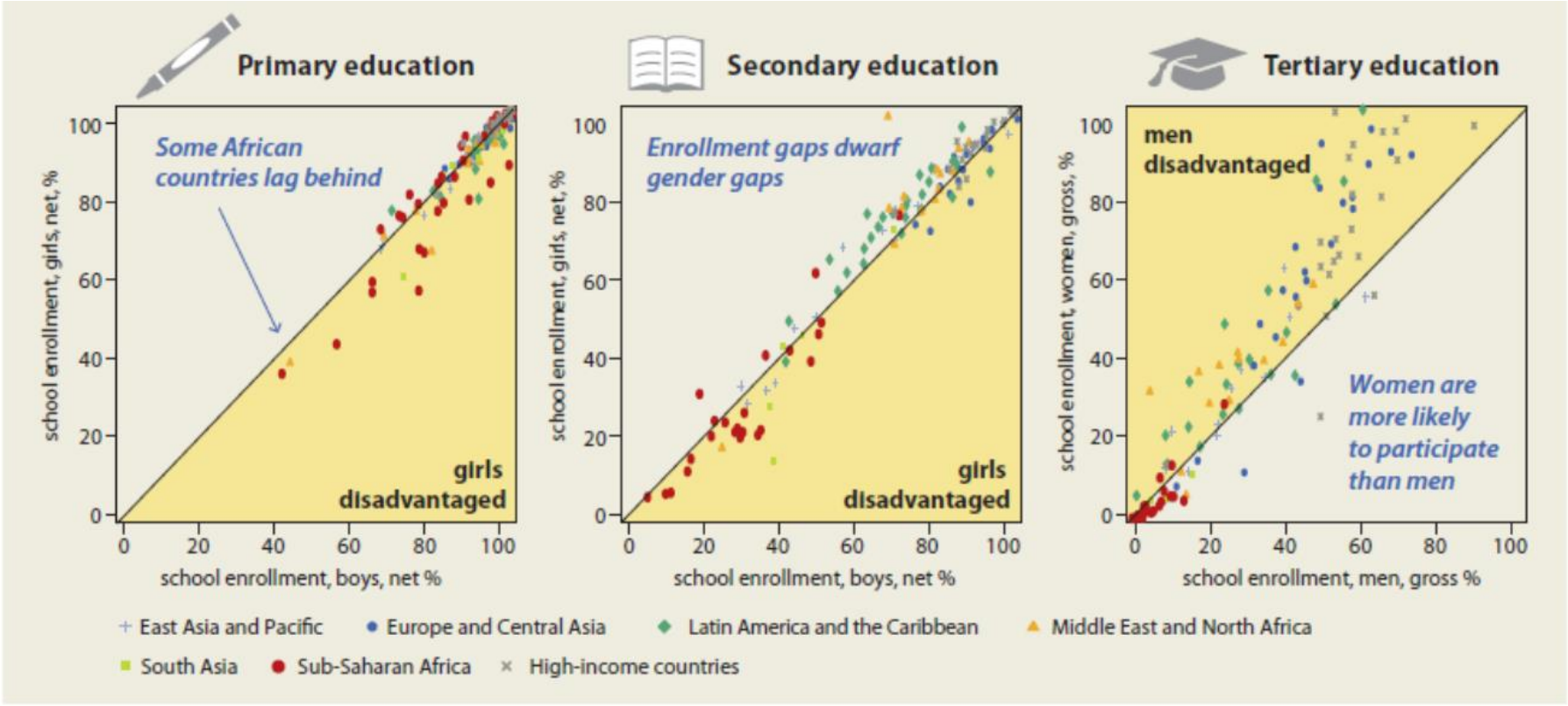
Source: Dasgupta (2009)



Source: WDR 2012

Other evidence of gender bias?

- Girls seem to be disadvantaged in enrollments at lower levels among poor (African) countries in all levels of education!

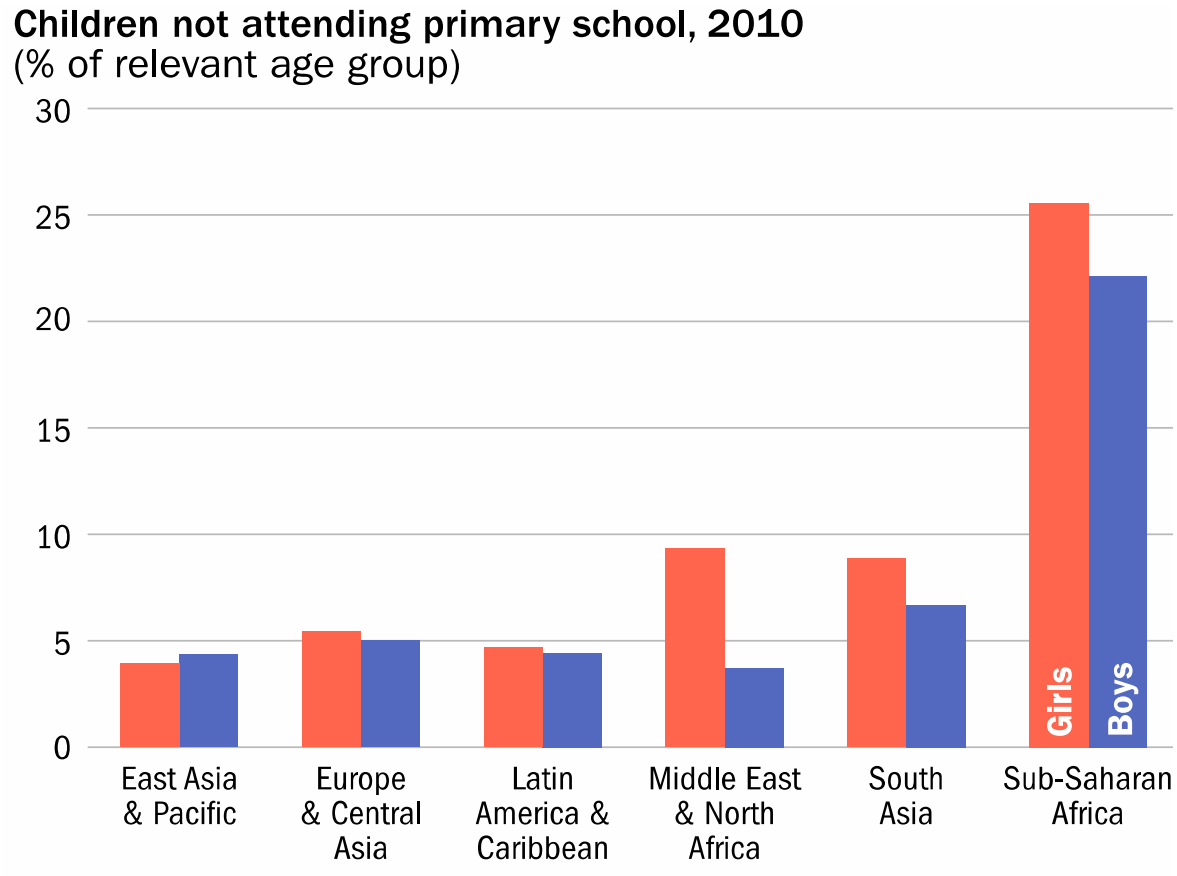


Source: WDR 2012 team estimates based on World Development Indicators.

Note: The 45° line in each figure above shows gender parity in enrollments. Any point above the 45° line implies that more women are enrolled relative to men.

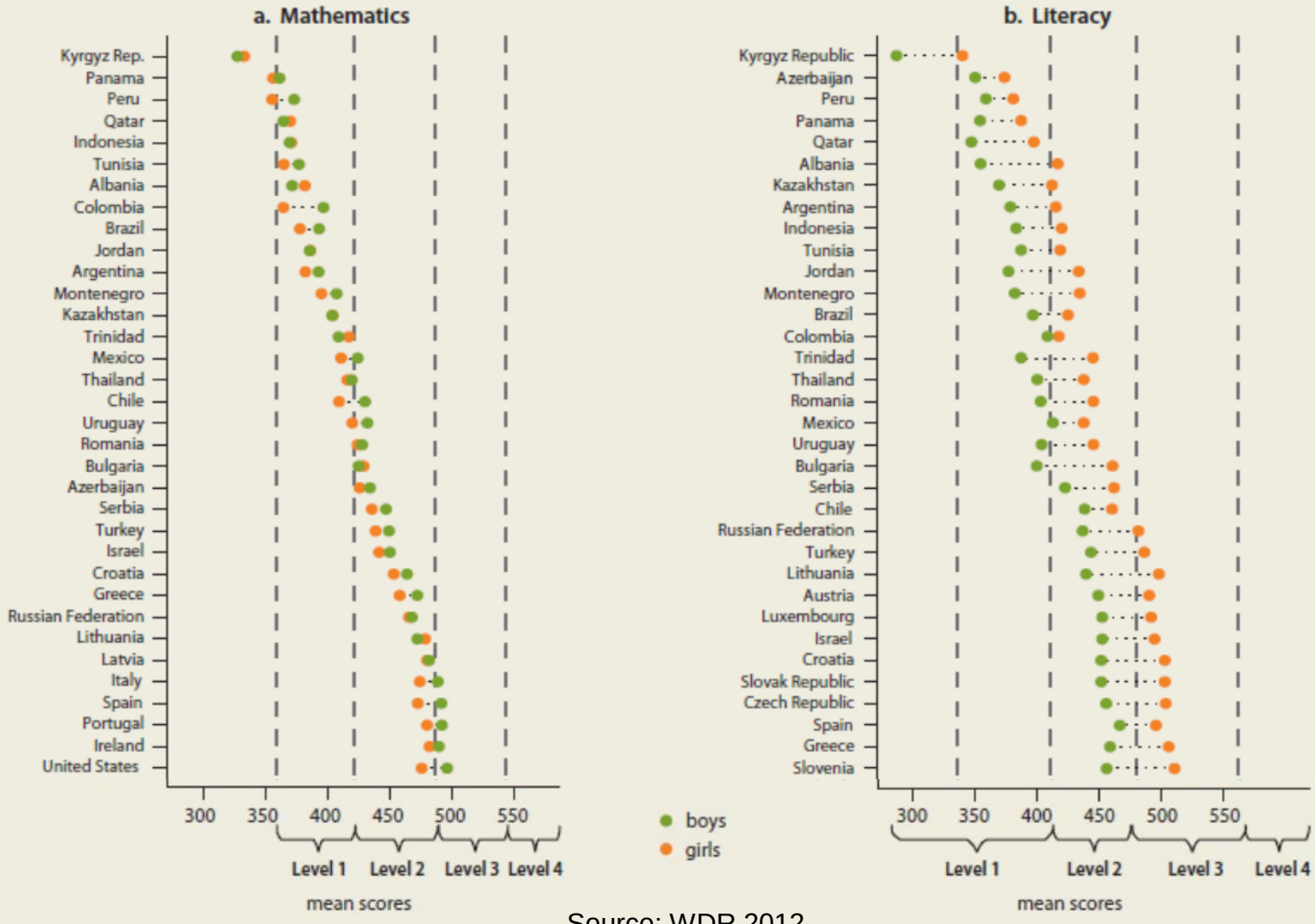
Other evidence of gender bias?

- More girls than boys remain out of school in most regions



Source: WDR 2012

FIGURE 3.5 *Cross-country differences in mean scores on the 2009 PISA dwarf gender differences within countries*



Source: WDR 2012

Why do we observe these gender-biased outcomes?

- Neglect of girls is the tradition? Cultural reason?
- A result of policy reform (one-child policy)?
- Economic reasons (lower expected return? high cost, e.g., dowry?)

Can we explain and test these theoretically?

- How decisions are made within household? How might this explain the observe gender differentials?

Intrahousehold Models: Unitary vs. Non-unitary

- Until now we have assumed that HH maximises utility like an individual. This is called the unitary model of household
- But HH is not one individual, but a collection of individuals living together. Why would the decisions of the group be made exactly like those of an individual?
- Two possible explanations for unitary model:
  - Dictatorial HHs: perhaps decisions are made by one dominating member who maximises according to his/her utility function?

    Does the dominating member ignore the consumption of other members? Preference of the dictator can be altruistic!
  - HHs with "unanimity" in preference: perhaps all the HH members have exactly the same preferences, so they maximise the same functions?
- Do these two cases explain what we observe in reality?

A Unitary Model

- HH with 2 members with preferences over consumption $U_1(c_1, c_2)$ and $U_2(c_1, c_2)$
- If HH decisions are unitary (e.g., member 1 is a dominating mother or both have similar preference → $U_1(c_1, c_2) = U_2(c_1, c_2) = U(c_1, c_2)$), household's problem:

$$\max_c U(c_1, c_2)$$

subject to $p(c_1 + c_2) = y_1 + y_2$

We can define optimal condition from FOC as $U_{c_1}(c_1, c_2) = U_{c_2}(c_1, c_2)$

- Using implicit function theorem, we can show that

$$\frac{\partial c_i}{\partial y_1} = \frac{\partial c_i}{\partial y_2} = \frac{\partial c_i}{\partial (y_1 + y_2)}$$

- Unitary model implies that all HH resources are pooled and so income effects will be identical across income sources (regardless of who own or earn them)!
- Ex1) $U(c_1, c_2) = lnc_1 + lnc_2$ Would this always mean that resources will always be distributed equally across members? Ex2) $U(c_1, c_2) = 2lnc_1 + lnc_2$ → outcomes depend on household preference…

Do unitary HHs imply equal outcomes across members?

- Pitt et al (1990) → Men are better fed and in better health because this maximises household income and their welfare of the children…
- Household cares about health h_i and consumption c_i of members
- Wage function is determined by health; and health outcomes are determined by consumption and unobserved health/capacity endowment
- Household's problem is

$$\max_{h_i, c_i} U(h_1, h_2, c_1, c_2)$$

subject to $p(c_1 + c_2) = w_1 + w_2$

$$w_i = w(h_i) \ , \ h_i = h(c_i, \mu_i)$$

FOC. $\frac{\partial U}{\partial h_i}\frac{\partial h_i}{\partial c_i} + \frac{\partial U}{\partial c_i} = \lambda[p - \frac{\partial w_i}{\partial h_i}\frac{\partial h_i}{\partial c_i}]$ → optimal consumption vary across i

- As labor productivity effects and health status vary across members, these result in intrahousehold variations of health and consumption
- This is called 'lifeboat problem' when poor household have to allocate scarce resource toward members who are more productive and chance to survive!

A non-unitary model

- Is unitary model realistic? Is it always the case that income effects will be identical regardless of who own or earn them?
  - Children nutrition often response positively to women's share in income, girls benefit more if pensions given to grandmother as compared to grandfather, giving aid to HH head benefit less to children than do maternal targeting
- What happen if the two distinct members 1 and 2 are trying to maximise the joint welfare of both members? Household's problem:

$$\max_{c_i} \mu_1 U_1(c_1, c_2) + \mu_2 U_2(c_1, c_2)$$

subject to $p(c_1 + c_2) = y_1 + y_2$

where μ_i reflects relative weight of member *i*'s preference in HH decisions

- What might be determinants of μ_i (or bargaining power of each member)?
  - It is sensible to assume that $\mu_i = \mu(y_i, X_i)$ → bargaining power depends on income each individual bring into the household and other characteristics X_i
- $\frac{\partial c_i}{\partial y_1} \neq \frac{\partial c_i}{\partial y_2}$ → HH's allocations might vary depending on who own resources!

A non-unitary model

- Ex) Suppose the bargaining weigh is given by $\mu_i = \begin{cases} 1 & if\ y_i > y_j \\ 0.5 & if\ y_i = y_j \\ 0 & if\ y_i < y_j \end{cases}$

And 1 cares about consumption of both members, while 2 only care about himself

$U_1(c_1, c_2) = lnc_1 + lnc_2$ and $U_2(c_1, c_2) = lnc_2$

- If $y_1 = y_2$, the optimal allocations → $c_1^* = \frac{1}{3}(\frac{y_1+y_2}{p})$ and $c_2^* = \frac{2}{3}(\frac{y_1+y_2}{p})$
- If y_1 increases, the optimal allocations → $c_1^* = \frac{1}{2}(\frac{y_1+y_2}{p})$ and $c_2^* = \frac{1}{2}(\frac{y_1+y_2}{p})$
- If y_2 increases, the optimal allocations → $c_1^* = 0$ and $c_2^* = \frac{y_1+y_2}{p}$

It is clear that $\frac{\partial c_1}{\partial y_1} > 0$, $\frac{\partial c_1}{\partial y_2} < 0$ and thus HH's allocations will vary depending on who own resources!

A non-unitary model

- Now suppose further 1 also cares about consumption of both members and their children, while 2 only care about himself

$$\max_{c_i} \mu_1 U_1(c_1, c_2, c_3) + \mu_2 U_2(c_1, c_2) \quad \text{subject to } p(c_1 + c_2 + c_3) = y_1 + y_2$$

$$U_1(c_1, c_2, c_3) = lnc_1 + lnc_2 + lnc_3,\ U_2(c_1, c_2) = lnc_2 \text{ and } \mu_i = \begin{cases} 1 & if\ y_i > y_j \\ 0.5 & if\ y_i = y_j \\ 0 & if\ y_i < y_j \end{cases}$$

It can be derived that $\frac{\partial c_3}{\partial y_1} > 0$, $\frac{\partial c_3}{\partial y_2} < 0$!

With non-unitary model, resource allocation will depend on the preference of those holding bargaining power!

So who should we target intervention to if we want to improve economic outcome of the children within this household?

Testing unitary vs. non-unitary models empirically

- Do HH make collective unitary decision or bargaining under non-unitary model?

  Do individual bargaining powers matter? → Reject unitary model if individual allocations are affected by changes in members' bargaining power

  - Would the impacts on girls' mortality be different when reform leads to increase in female or male earning opportunity? (Qian 2008)
  - Would the impacts on grandchild's health be different depending on who in the HH gets the pension? (Duflo 2003)

Girls mortality and price of tea in China (Qian 2008)

- Liberalization of agriculture of 1979 has led to increase in support of cash crop especially tea and orchard
- Tea cropping is women's comparative advantage (and orchard is for men)
  - This results in rising earning opportunity for women in areas suitable for tea
- Research question: What might be the effect on girl mortality in areas where earning for tea increases for women? Might the effect be the same in areas where earning for orchard increases for men?
- Data: observe only one-shot cross sectional of households post program, restrict to girls born during 1963-1990
- Identifications problem: do not directly observe individual's exposure to reform and high potential that pre-program outcomes were higher in tea growing areas
  - girls' mortality might already be low in areas suitable for tea … areas that already recognizes high return to women!

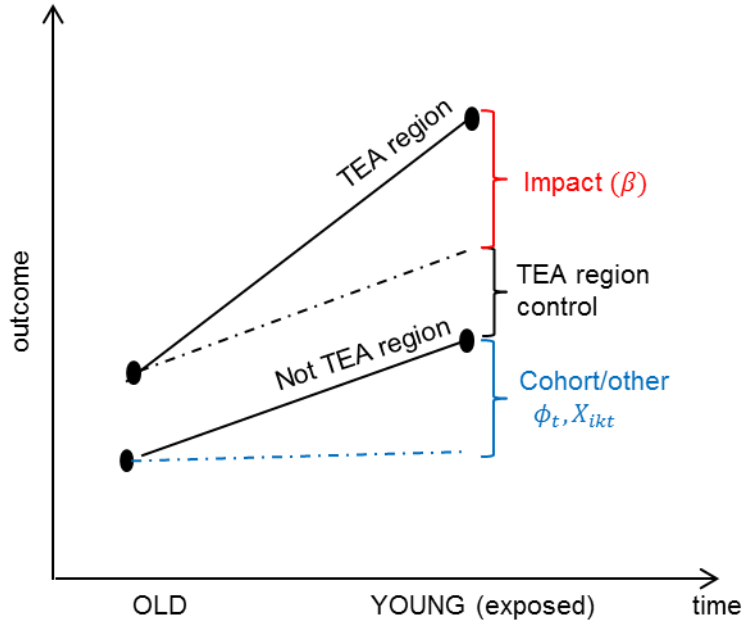
Girls mortality and price of tea in China (Qian 2008)

- Identification strategy: Use 2 sources of variation (similar to Duflo 2001) to determine exposure to the program
  - DOB: only girls born after 1979 were be exposed to the program (POST)
  - Areas with high tea sowing potentials were experiencing reform (TEA region)

$$sex_{ijt} = \beta_1(TEA_j \times POST_t) + \beta_2(ORCHARD_j \times POST_t) + \beta_3(cashcrop_j \times POST_t) + X'_{ijt}\delta + \phi_t + \alpha_j + \varepsilon_{ijt}$$

- Assumption: Differences of POST-PRE outcomes between TEA and not TEA regions should only be due to the program
- Difference in difference framework:

	TEA region	Not TEA
YOUNG (exposed)	C	D
OLD (not exposed)	A	B



Girls mortality and price of tea in China (Qian 2008)

$$sex_{ijt} = \beta_1(TEA_j \times POST_t) + \beta_2(ORCHARD_j \times POST_t) + \beta_3(cashcrop_j \times POST_t) + X'_{ijt}\delta + \phi_t + \alpha_j + \varepsilon_{ijt}$$

Table III – OLS and 2SLS Estimates of The Effect of Planting Tea and Orchards on Sex Ratios Controlling for County Level Linear Cohort Trends

Coefficients of the Interactions between Dummies Indicating Whether a Cohort was Born Post Reform and the Amount of Tea Planted in the County of Birth

	Dependent Variables					
	Fraction of Males			Tea*Post	Fraction of Males	
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	1st	IV	IV
Tea * Post	-0.012	-0.013	-0.012		-0.072	-0.011
	(0.007)	(0.006)	(0.005)		(0.031)	(0.007)
Orchard * Post	0.005					
	(0.002)					
Slope * Post	-0.002			0.26		
	(0.002)			(0.057)		
Linear Trend	No	No	Yes	Yes	No	Yes
Observations	28349	37756	37756	37756	37756	37756

Girls mortality and price of tea in China (Qian 2008)

$$sex_{ijt} = \sum_{1963}^{1990} \beta_{1l}(TEA_j \times d_l) + \sum_{1963}^{1990} \beta_{2l}(ORCHARD_j \times d_l) + \sum_{1963}^{1990} \beta_{3l}(cashcrop_j \times d_l) + X'_{ijt}\delta + \phi_t + \alpha_j + \varepsilon_{ijt}$$

Figure V – The Effect of Planting Tea and Orchards on Sex Ratios
Coefficients of the Interactions of Birth Year * Amount of Tea Planted & Birth Year * Amount of Orchards Planted Controlling of Year and County of Birth FEs

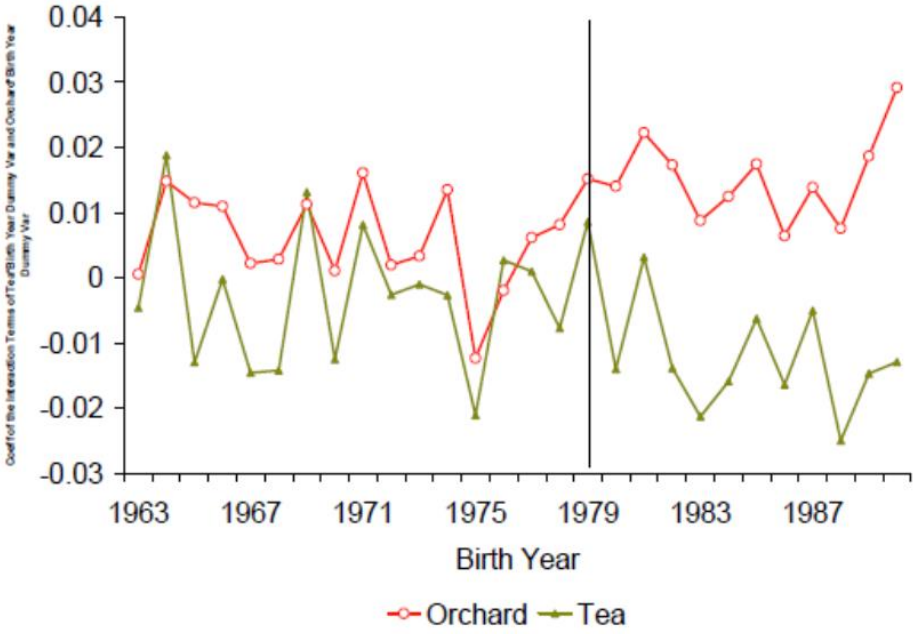
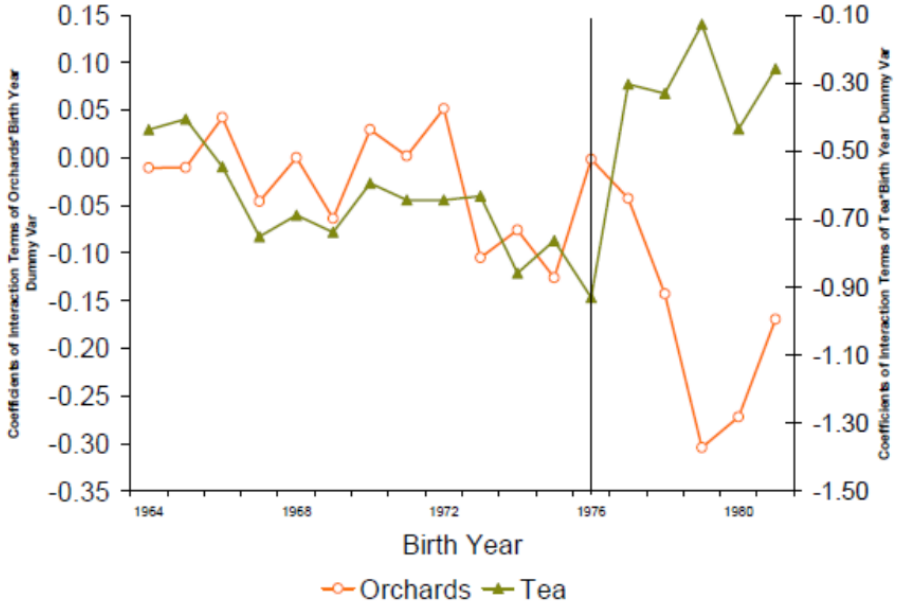


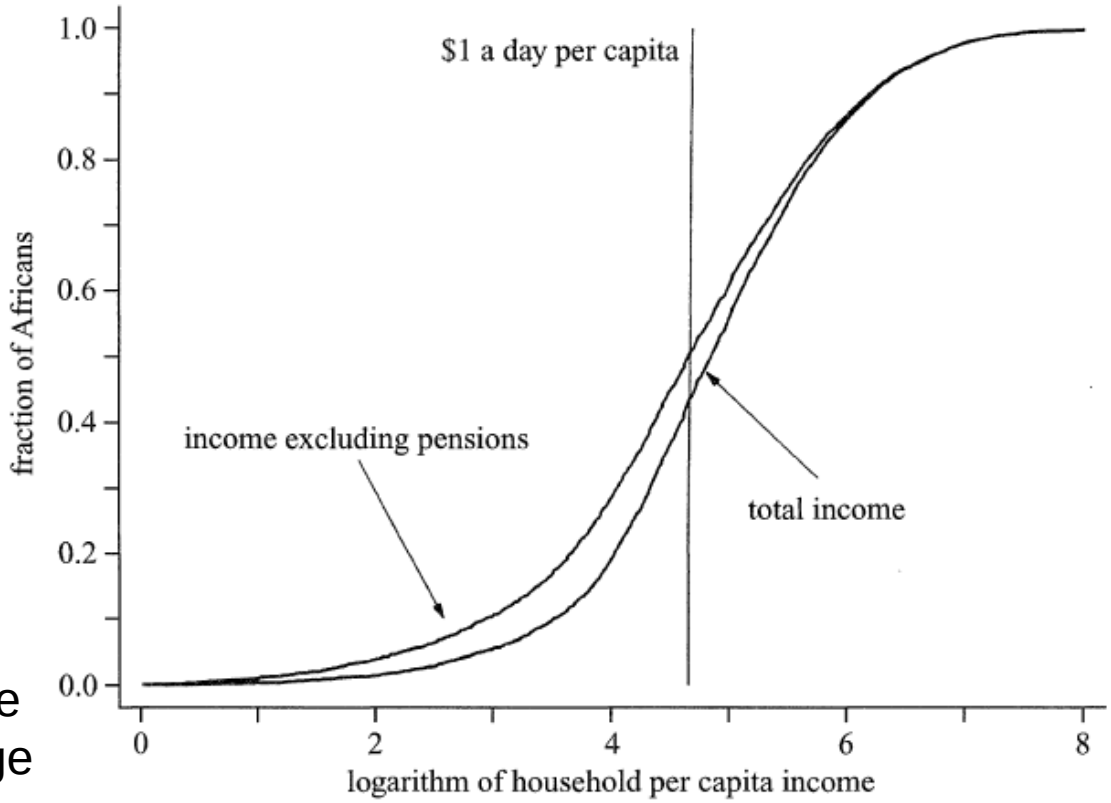
Figure VI – The Effect of Planting Tea and Orchards on Girls' Education Attainment
Coefficients of the Interactions Birth Year * Amount of Tea Planted and Birth Year * Amount of Orchards Planted Controlling for Year and County of Birth FEs



Increase tea income for women results in increase survival rate and education for girls!

Pensions for Black in South Africa in 1993 (Duflo 2003)

- Substantial and regular cash pension (>2 median income in the area, 3.6 times poverty line) were distributed for men (>65 yrs), women (>60 yrs) using age as targeting device (also mean tested)
  - This should increase bargaining power of recipient in the HH
- Research question: What might this pension affect health of grandchildren living in the HH? Might the effects depend on who gets it?
- Data: cross sectional of HH and children's health information of 9,000 households post program
- Identifications problem: eligible households tend to be poorer and have disadvantage grandchildren



Pensions for Black in South Africa in 1993 (Duflo 2003)

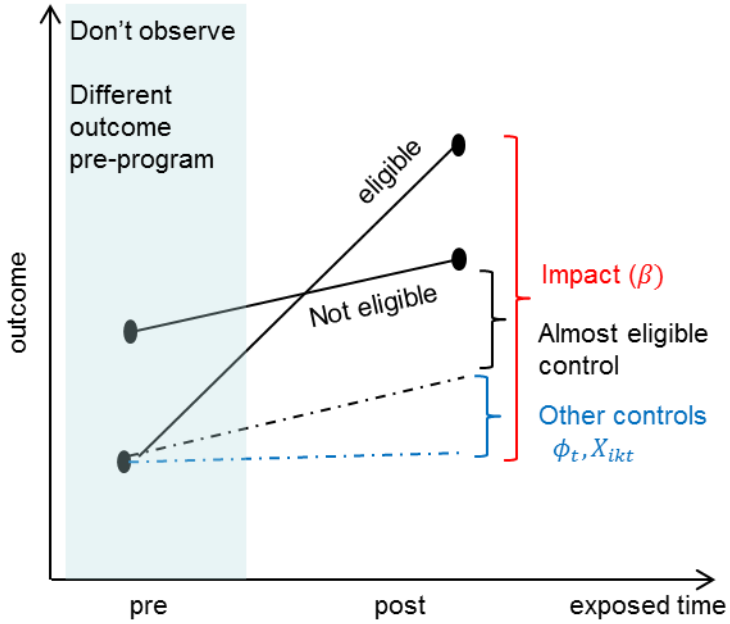
- Identification strategy 1: discontinuity of eligibility rules (non-eligible HH with members closed to being eligible should have similar outcome as eligible)

$$wh_{it} = \beta_f E_{fi} + \beta_m E_{mi} + \gamma D_{almost(50,55,60)i} + X'_{it}\delta + \phi_t + \varepsilon_{it}$$

- E_f, E_m dummy of eligible female or male, ϕ_t cohort control, X'_{it} other controls
- Assumption: Controlling for outcome of almost eligible HHs (those with member f50-55, m55-60), there is no difference in pre-program outcome

	Share of age group receiving pension
Men by age (years)	
50–54	2.8
55–59	4.7
60–64	22.0
65 and over	60.0
Women by age (years)	
50–54	13.6
55–59	16.4
60 and over	77.0

Source: Author's calculation from the 1993 SALD



Pensions for Black in South Africa in 1993 (Duflo 2003)

$$wh_{it} = \beta_f E_{fi} + \beta_m E_{mi} + \gamma D_{almost(50,55,60)i} + X'_{it}\delta + \phi_t + \varepsilon_{it}$$

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

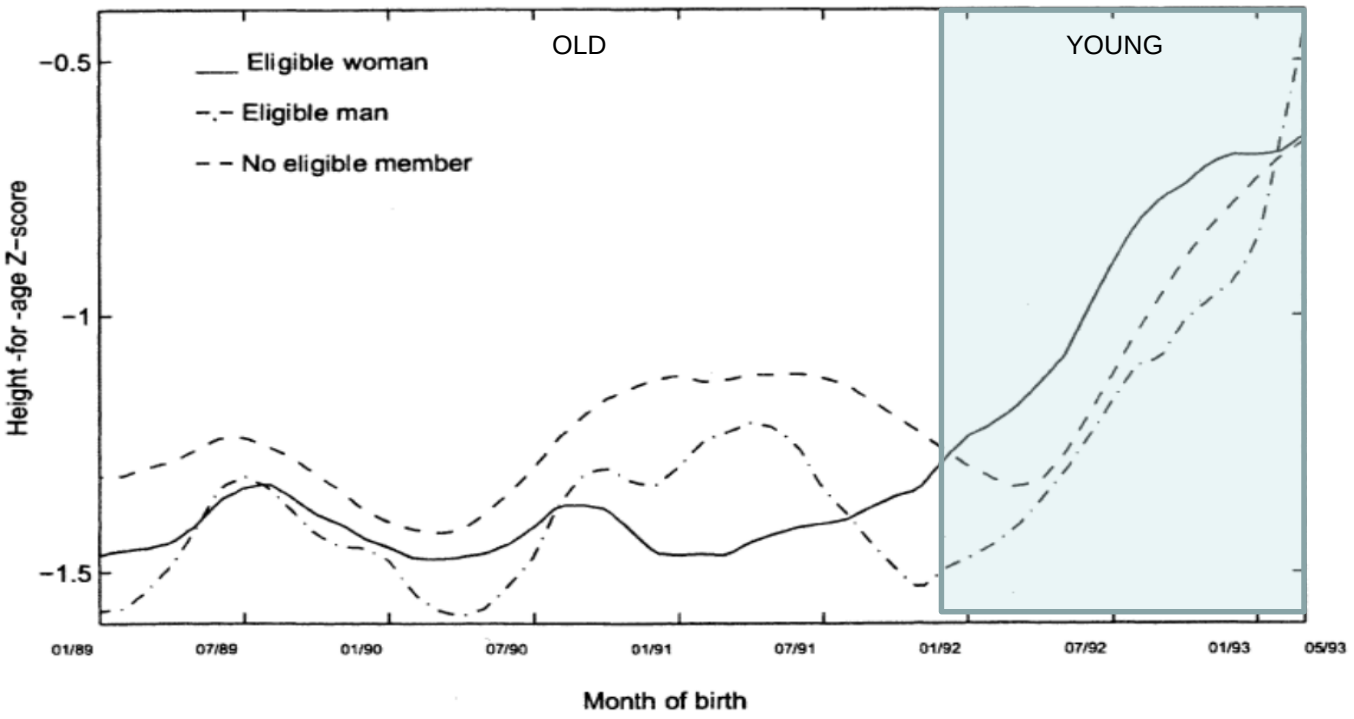
	OLS						2SLS
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Girls							
Eligible household	0.14	0.35*	0.34*				
	(0.12)	(0.17)	(0.17)				
Woman eligible[a]				0.24*	0.61*	0.61*	1.19*
				(0.12)	(0.19)	(0.19)	(0.41)
Man eligible[b]				–0.011	0.11	0.056	–0.097
				(0.22)	(0.28)	(0.19)	(0.74)
Observations	1574	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

Pensions for Black in South Africa in 1993 (Duflo 2003)

- Identification strategy 2: 'OLDER' kid's height for age will no longer response to the program in 1993. Only 'YOUNG born>1991' will be exposed to program

$$ha_{it} = \beta_f YOUNG_t \times E_{fi} + \beta_m YOUNG_t \times E_{mi} + b_f E_{fi} + b_m E_{mi} + X'_{it}\delta + \phi_t + \varepsilon_{it}$$

FIGURE 1. Height for Age of Children Living with Eligible Women, Eligible Men, No Eligible Member



Pensions for Black in South Africa in 1993 (Duflo 2003)

- Identification strategy 2: 'OLDER' kid's height for age will no longer response to the program in 1993. Only 'YOUNG born>1991' will be exposed to program

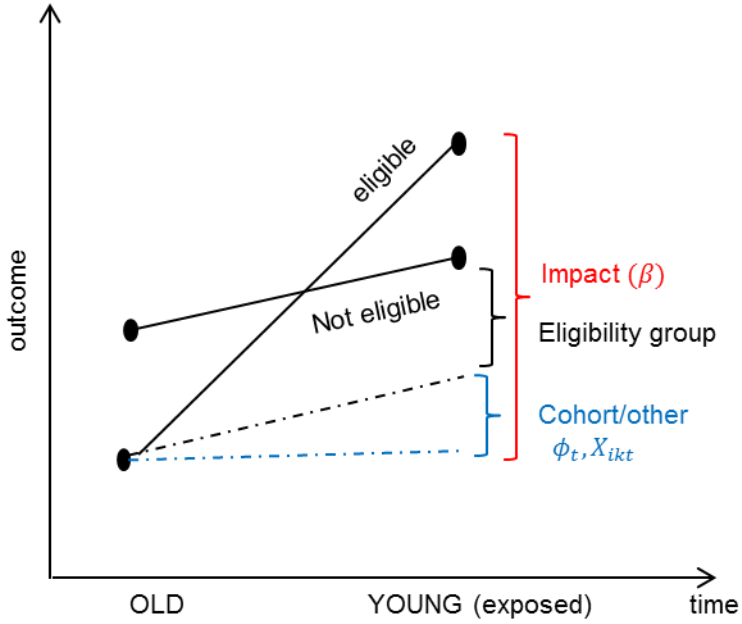
$$ha_{it} = \beta_f YOUNG_t \times E_{fi} + \beta_m YOUNG_t \times E_{mi} + b_f E_{fi} + b_m E_{mi} + X'_{it}\delta + \phi_t + \varepsilon_{it}$$

  - Assumption: Difference of YOUNG-OLD outcomes between eligible and not eligible groups should only be due to the program

  - Difference in difference setting

    with two variations

	Eligible	Not eligible
YOUNG (exposed)	C	D
OLD (not exposed)	A	B



Pensions for Black in South Africa in 1993 (Duflo 2003)

$$ha_{it} = \beta_f YOUNG_t \times E_{fi} + \beta_m YOUNG_t \times E_{mi} + b_f E_{fi} + b_m E_{mi} + X'_{it}\delta + \phi_t + \varepsilon_{it}$$

TABLE 5. OLS and 2SLS Regressions of the Effect of Pension Eligibility, Presence of an Old Grandparent, and Pension Receipt

	Eligibility OLS (1)	Eligibility OLS (2)
Girls		
Eligible household × *YOUNG*	0.68*	
	(0.37)	
Woman treatment variable × *YOUNG*		0.71*
		(0.34)
Man treatment variable × *YOUNG*		0.097
		(0.57)
Eligible household	−0.17	
	(0.16)	
Woman pension variable		−0.15
		(0.17)
Man pension variable		−0.11
		(0.24)
Observations	1533	1533

	Eligibility OLS (1)	Eligibility OLS (2)
Boys		
Eligible household × *YOUNG*	0.11	
	(0.31)	
Woman pension variable × *YOUNG*		0.18
		(0.32)
Man pension variable × *YOUNG*		−0.30
		(0.32)
Eligible household	−0.15	
	(0.15)	
Woman pension variable		−0.14
		(0.32)
Man pension variable		−0.073
		(0.21)
Observations	1627	1627

Pension received by women makes larger impact on child's health and on girls in particular → reject unitary assumption. Whoever has more power make decision!

Conclusions

- Gender bias in development outcomes are largely evidenced especially on excess girl mortality at or after birth…same for health and education
- With unitary model, intrahousehold differential outcomes could result from each member's differential in productivity and contribution to HH's maximised utility
- Intrahousehold outcome differences could largely result from the empirical fact that HHs do not make collective unitary decision → resource allocations will thus depend on the preference of those holding bargaining power!
  - As women tend to care more about others in the HH, improvement in women's bargaining power in the HH seems to yield better allocation of HH resources especially to the disadvantage group (girls)!
- Policy intervention should target to enhance women's capacity and bargaining power (increase earning opportunity, education, owned resources, ability, etc.)
- Women could be appropriate to target expansion of distributive development program (we already have seen this working in CCT, MFIs, self-help groups)