

Modelling intrahousehold distribution to study gender inequality & individual poverty

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The **MS in Economics & Development**

- A great program!
- A honor to present some research to you
- A particular conjunction given the topic and the fact that this is the international day of women's rights

1. Motivation & context

- Usual poverty measurement based on monetary concept at household level
 - ex: *per capita* consumption against a poverty line
 - at best, use of equivalence scales to correct for different needs and economies of scale
 - but **no information on who gets what**
- Evidence of some **degrees of intrahousehold inequality**
 - Start with nutrition data (ex: Haddad & Kanbur 1990)
 - Inequity may concern both children vs parents or gender inequality
- Ignoring it may often leads to **policy mistargeting**
 - Especially an **exclusion error** when poor individuals live in non-poor households
 - Broadly documented (Brown, Ravallion & van de Walle, 2019)

1. Motivation & context

How to identify poor individuals in households?

Hard task. Here are a few approaches (from less to more similar to ours):

1-Vignettes

- Ask respondents how similar they are to several types of households
- How identity of decision-makers affect some child and household outcomes (Bernard, Doss, Hidrobo, Hoel & Kieran 2018)

2-Final say variables :

- Who decides about what on a 1-10 scale (subjective)
- Often available in surveys (Reggio 2011, Bergolo & Galvan 2018,...)
- In some contexts (ex: decide about expenses), it might reflect delegation more than power (Baland & Ziparo 2018)

1. Motivation & context

3-Person-specific expenditure (usually health, education, nutrition, etc.) :

- Usually, provide a trace of intra-household inequality
- But specific goods that involve risk, uncertainty and dynamic behavior
(ex: maybe one is deprived today because his household currently invests in his future)
Personal expenses on health/education are hence difficult to interpret
- Sometimes, more instantaneous measures, for ex: individualized food
(Hoddinott & Skoufias 2004; Brown, Calvi & Penglase 2021, etc)

4-Empowerment indices :

- Multidimensional deprivation indicators (IFPRI index, UNICEF indices, ...)
based on education, health, personal income, survey questions on empowerment, etc.
- Cumulate the above material with the aim to define a person's living condition
(but some of it is household-based: shelter, water, etc)

1. Motivation & context

None of the above provides

- a comprehensive view of short-term individual control over resources
- and its [implication for individual poverty](#)

Moreover, fully individualized expenditure is rare and costly (cf. Bargain, Lacroix & Tiberti, 2021)

What to do ? → **attempts to model and identify resource allocation**

2. Methods to estimate intra-household resource sharing

- Early literature on [collective models](#) (from Chiappori 1988 to Bourguignon et al 2009)
 - Test basic rationality: **efficiency** (debatable!)
 - Identify the **marginal sharing rule** (how spouses share an extra \$)
- Interesting results on **distribution factors**
 - factors affecting balance of power only, Ex: divorce rules, sex ratio, etc
 - Maybe most interesting is natural experiments inducing a **pure bargaining effect**
 - For instance Lundberg, Pollak & Wales 1997, Ward-Batts 2008, Bradbury, 2004, etc.)
 - exogenous variation in spouses' control over unearned income
 - emphasize the role of income controls on individual consumption

2. Methods to estimate intra-household resource sharing

- More recently, attempts to [recover the full resource sharing process](#)
- Browning, Chiappori, Lewbel (BCL, 2013)
 - More rigorous than equivalence scale (indifference scales)
 - Living with others implies: **sharing resources** and **consuming jointly**
 - Transparent approach to estimate the sharing function and economies of scales for each good
- Conceptually interesting but tedious implementation
 - Use panel data or repeated cross section for many years (price variation)
 - Identification comes from single individuals, used to estimate individual Engel curves for individuals in couples
 - assumption of preference stability across marital/demographic status), i.e. Rothbarth's flavor

2. Methods to estimate intra-household resource sharing

- More **tractable** approaches
 - Lewbel & Pendakur (2008): require only one cross-section
 - economies of scale simply estimated as an average effect over all goods
- Extensions to households **with children**
 - Bargain & Donni (2012): use single data & the broad stability assumption as BCL
 - Seen as not adapted to developing countries (even though we did for Cote d'Ivoire: Bargain, Donni, Kwenda, 2015)
 - An approach that does not require singles: Dunbar, Lewbel, Pendakur (2013)
 - but use specific functional form
 - & alternative identification assumptions (restrictive!) on preferences
 - & does not identify scale economies

2. Methods to estimate intra-household resource sharing

- Notations:
 - Individuals of type: $i = f, m, c$
 - Household composition $n = (n_f, n_m, n_c)$ with n_i the number of type- i persons in the household
 - W_i : household **budget shares** for goods that can be assigned to type- i persons (ex: women's clothing)
 - w_i : budget share for that same good in the budget of a type- i person
 - x : household consumption
 - p_i : **resource share** (i.e. share of household consumption accruing to type- i person)
- Household budget shares can be written with basic structure (here for women):

$$W_f = n_f \times p_f \times w_f(p_f x)$$

Example: take a household with only $n_f = 1$ woman; she controls $p_f = 40\%$ of household resources; she dedicates $w_f = 20\%$ of her resources to female clothing; then the household dedicates $W_f = 8\%$ of its budget to female clothing.

2. Methods to estimate intra-household resource sharing

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Super easy (compared to early models) !

And does not really require efficiency ... just to assume there is a sharing rule!

2. Methods to estimate intra-household resource sharing

The difficulty remains to identify function p_i

What do we observe?

- Budget x
- Potential determinants z of sharing function $p_i(z)$
- Assignable consumption (female, male and child clothing), hence W_i for $i = f, m, c$

Bargain & Donni (2012):

- In families:
$$W_i = n_i \times p_i \times w_i(p_i x)$$
- The intuition is that for singles:
$$W_i = w_i(x)$$
- So we can estimate $w_i()$ on singles, and assuming preference stability, recover p_i in families
- More info means more identification, i.e. recovering a summary parameter for scale economies

2. Methods to estimate intra-household resource sharing

Dunbar, Lewbel & Pendakur (2013)

- Start from Piglog utility, which gives individual Engel curves of the form:

$$w_{i,n} = \alpha_{i,n} + \beta_{i,n} \log(p_i x)$$

for household of composition n , so that

$$W_{i,n} = \{p_{i,n} \alpha_{i,n} + p_{i,n} \beta_{i,n} \log(p_{i,n})\} + p_{i,n} \beta_{i,n} \log(x)$$

- Then, alternative identifying assumptions:

SAT: “**Similarity across types**”: $\beta_{i,n} = \beta_i$ (individuals have same slope across demographic groups n for households with children only)

> identified but instable (using singles would bring more information)

SAP: “**Similarity across persons**”: $\beta_{i,n} = \beta_n$ (men, women, kids have same slope within each demographic group)

> relatively strong assumption (but tested in a few studies)... what we use hereafter

2. Methods to estimate intra-household resource sharing

- For each n , take the derivative for all three types:

$$\partial W_{f,n}/\partial \log(x) = n_f \times p_{f,n} \times \beta_{f,n}$$

$$\partial W_{m,n}/\partial \log(x) = n_m \times p_{m,n} \times \beta_{m,n}$$

$$\partial W_{c,n}/\partial \log(x) = n_c \times (1 - n_f p_{f,n} - n_m p_{m,n}) \times \beta_{c,n}$$

- SAP means that: $\beta_{i,n} = \beta_n$ for all $i = f, m, c$
- So, for each n , we have 3 equations and 3 unknowns ($p_{f,n}$, $p_{m,n}$ and β_n) -> exact identification

2. Methods to estimate intra-household resource sharing

Resource shares $p_{i,n}(z)$ depends on n and various factors z

- additional demographic factors, ex
 - proportion of boys among children → gender discrimination
- **distribution factors** related to women's employment opportunities
 - or control over labor and nonlabor income, hence on **redistributive policies**
- **distribution factors** related to **culture/norms**
 - **Traditional norms** may influence women's right, child treatment, etc. (and may be accounted for in policy/targeting design: cultural 'tags').

→ applications:

- Individual incidence for policy making (Uruguay)
- Individual poverty & culture (Ghana, Malawi)
- Who contributes to child costs (UK)

3.1 Individual incidence for policy making

- Context: **women's financial power** expected to improve their condition and children's (Doss, 2006; Hoddinott and Haddad, 1995; Lundberg et al., 1997)
- Hence **cash transfers often targeted at women** (e.g. Handa et al., 2009)
- CCT granted to women indeed show positive effects on child-related expenditures (Attanasio and Lechene, 2002; Akresh et al., 2016; Benhassine et al., 2015; Bobonis, 2009; Haushofer and Shapiro, 2016; Armand et al., 2020)
- Encouraging, but little is known about **how gender-targeted tax-benefit instruments affect intra-household resources sharing** (also true for individual earnings)
 - Worse scenario: a gender-targeted transfer might be shared according to the “usual” sharing rule of a household (or worse: backlash)
 - Best scenario: she keeps it all for her and the kidsReality probably in-between → transfers might disproportionately benefit women, but **by how much?**

3.1 Individual incidence for policy making: natural experiments

- Rare possibilities to combine structural model and experiments
 - Households randomly receive a transfer via the wife
 - Ex. of PROGRESA: Tommasi (2019), Sokullu & Valente (2020) and De Rock, Potoms & Tommasi (2020)
- More frequent: combine structural model and natural experiments
 - **DD** approach in Borga & D'Ambrosio (2021)
 - Here **RDD**: Bargain & Colacce (2022): focus on the *Asignaciones Familiares-Plan de Equidad* in Uruguay (AFAM-PE), a gender-based targeting CCT program
 - Generate a **discontinuity** (used in Bergolo & Galvan 2018 who focus on final say data)
- Implementation
 - Encuesta Nacional de Gasto e Ingreso de los Hogares (ENGIH)
 - Score variable S and eligibility threshold \bar{S}
 - z will include smooth function of S and treatment variable (ITT): $T = 1(S > \bar{S})$

3.1 Individual incidence for policy making: natural experiments

Around 6 point
increase in
female+child score

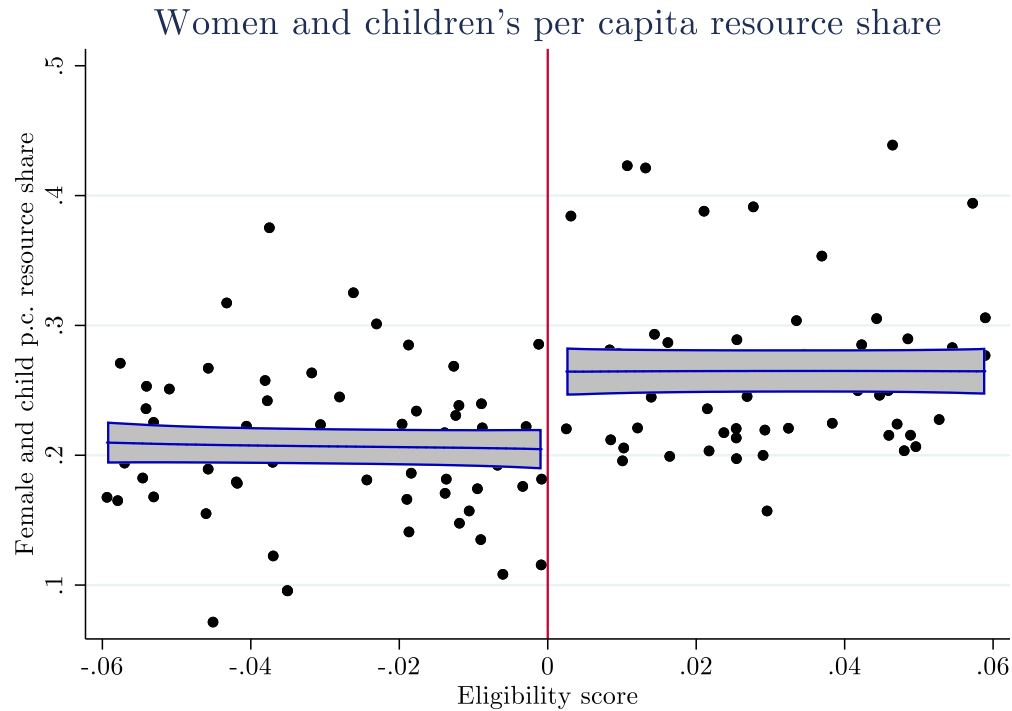
Marginal effects on women+children's share

Effect driven
mainly by rural
households

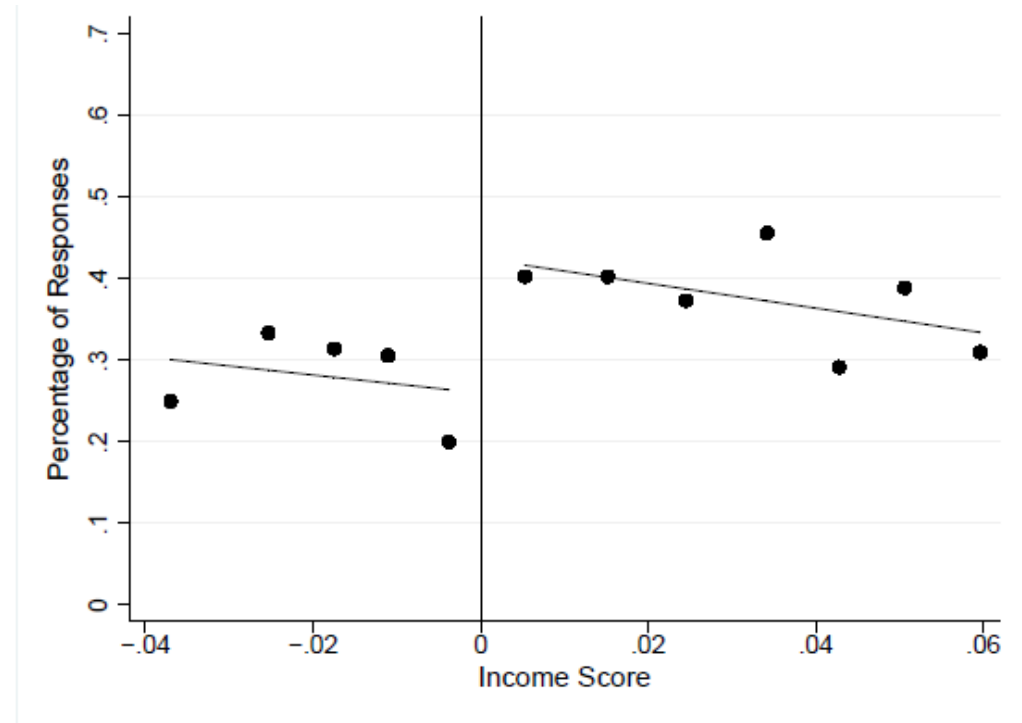
	linear	quadratic	cubic	spline
Eligible	0.058 ** (0.026)	0.057 ** (0.026)	0.056 ** (0.026)	0.056 ** (0.026)
Eligible x urban	0.036 (0.028)	0.045 * (0.028)	0.043 (0.028)	0.039 (0.028)
Eligible x rural	0.087 *** (0.033)	0.090 *** (0.032)	0.090 *** (0.031)	0.088 *** (0.032)

3.1 Individual incidence for policy making: natural experiments

Bargain & Colacce (2022): female+child consumption share



Bergolo & Galvan (2018): « Who decides on food expenses: woman decides »



3.2 Individual poverty: **within-country cultural variation**

- Surge of research on **culture and ethnic norms** in economics
(Baland et al., 2020, Nunn, 2020, Bau and Fernandez, 2022, Giuliano, 2020)
- Often with gender focus and role of crucial dimensions such as education
(Dessy, Tiberti, Zoundi, 2022)
- Possible that culture explain a substantial part of **within-household inequity**
 - if this is the case, policy targeting (individualized PMT) could be improved by ‘cultural tags’
 - i.e. observable demographics/traits associated with prevalence of poverty among specific persons
- Some evidence on women’s resource shares
 - Dowry practice (Calvi and Keskar, 2021) in India
 - Ancestral post-marriage residence norms

→ [Aminjonov, Bargain, Colacce, & Tiberti \(2023\)](#) on Ghana and Malawi

3.2 Individual poverty: **within-country cultural variation**

- We combine micro data
 - Ghana Living Standards Survey 2016/2017
 - Malawi Integrated Household Survey 2016/2017

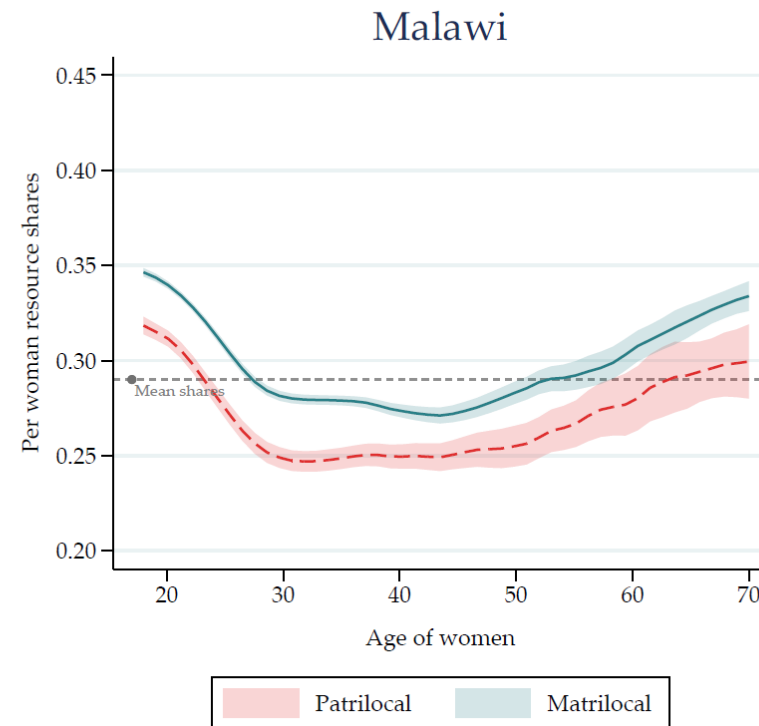
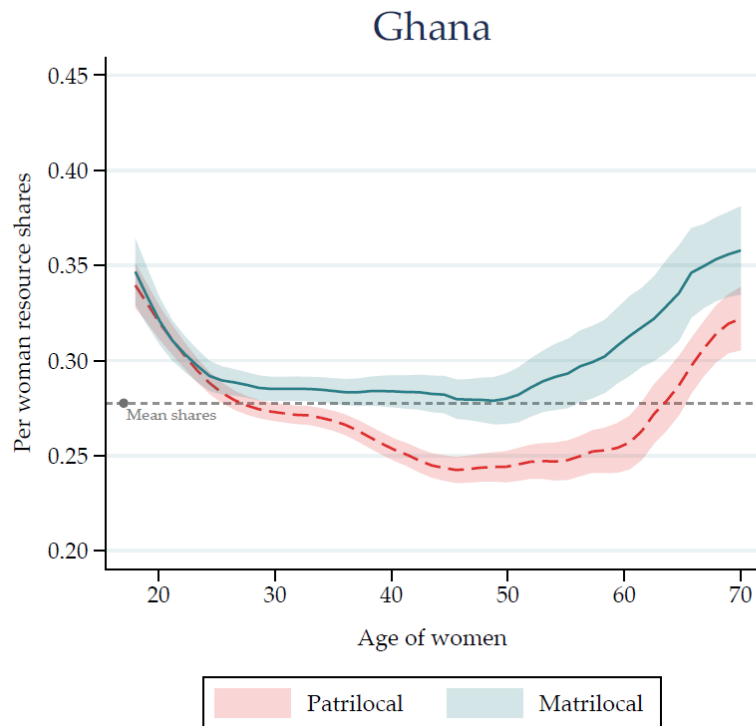
with ethnic- or language-specific ancestral norm (Murdok's Ethnographic Atlas)

- We estimate the model with a Patrilocal dummy in z :

Marginal effects on per-woman's resource share				
	Ghana		Malawi	
Household type:	children, women and men	women and men	children, women and men	women and men
Patrilocal (=1)	-0.026 *** (0.004)	-0.018 *** (0.005)	-0.032 *** (0.007)	-0.041 *** (0.010)
in % of women's share:	-11%	-6%	-11%	-11%
% of patrilocality	0.675	0.595	0.170	0.169
N	6204	1552	7462	967

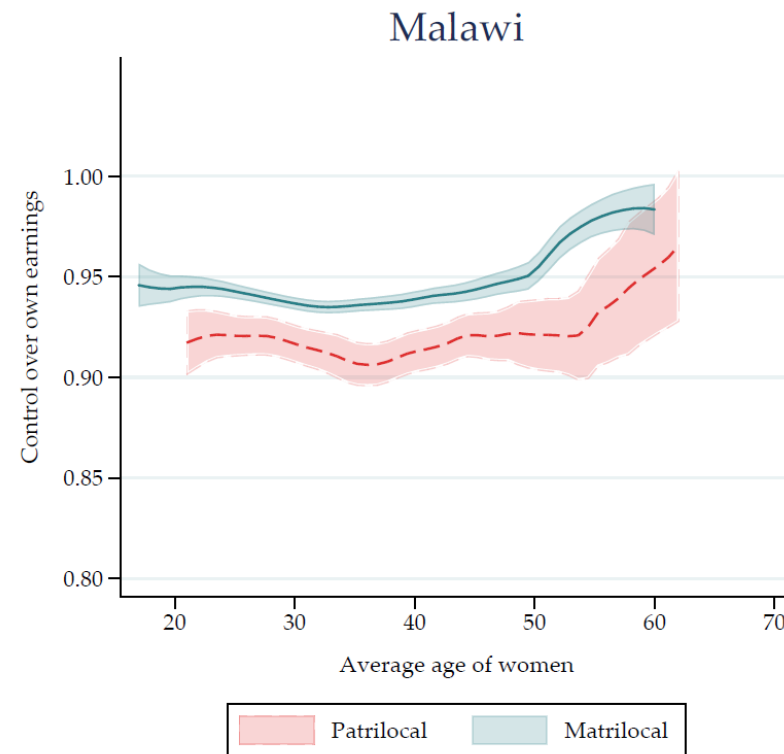
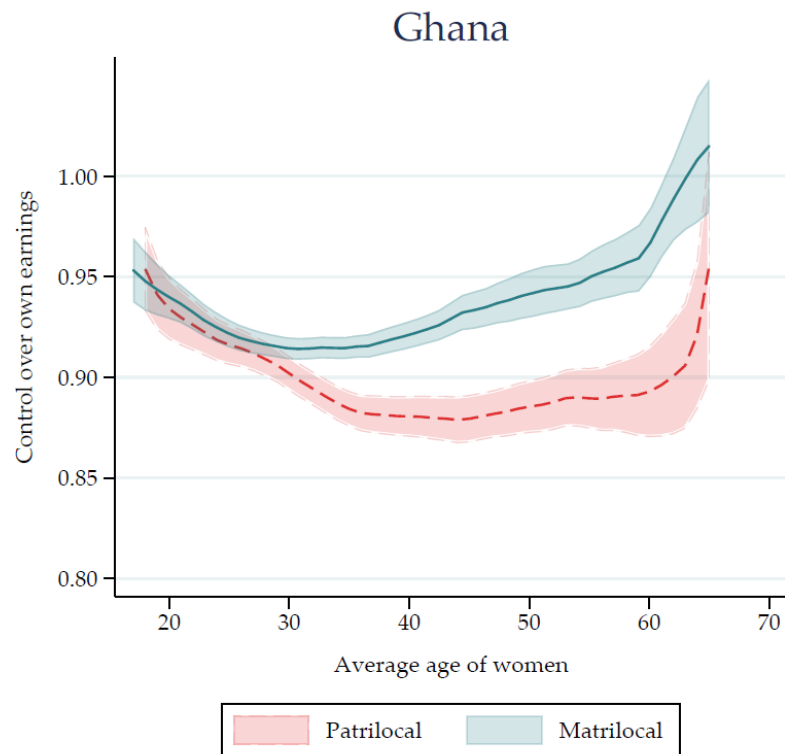
3.2 Individual poverty: **within-country cultural variation**

- Rare evidence of gender-age discrimination in terms of intra-hh resource allocation (Calvi, 2020)
 - So we also estimate age-heterogeneous effects
- > growing influence on decision-making with life experience



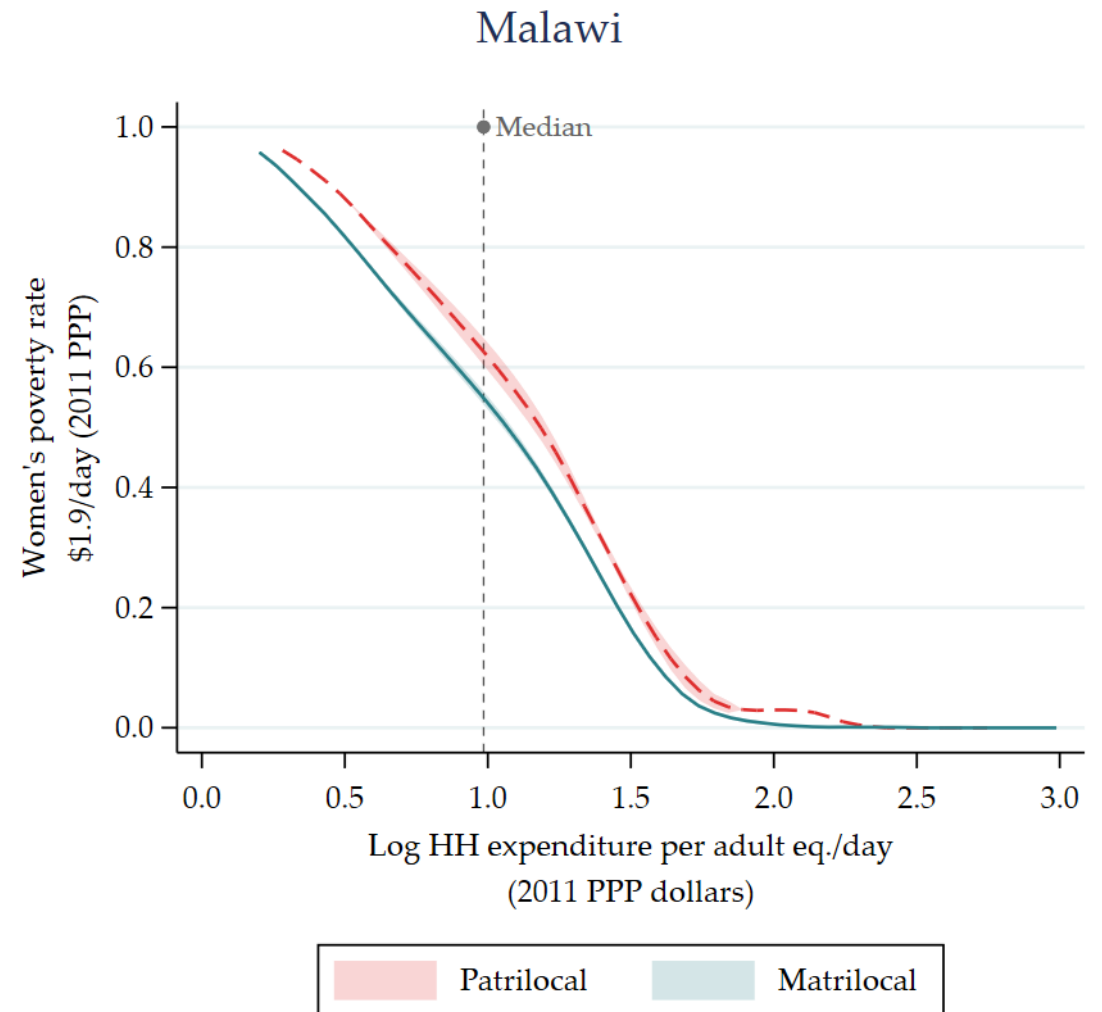
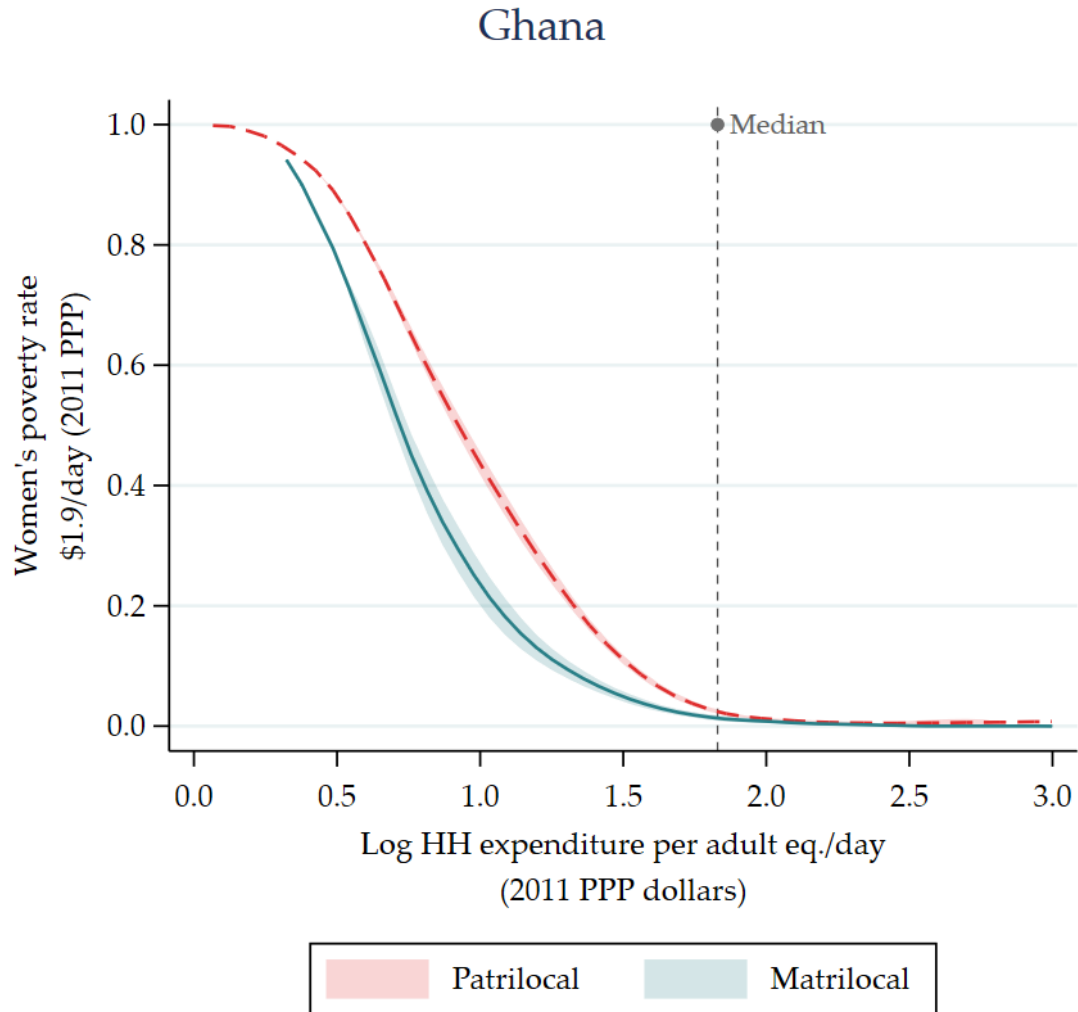
3.2 Individual poverty: **within-country cultural variation**

- Informal check : for working women, use the question on who control the wife's earned income
- overall trend is compelling of women's authority strengthening with age, especially in a context where women have more responsibility due to kinship traditions



3.2 Individual poverty: within-country cultural variation

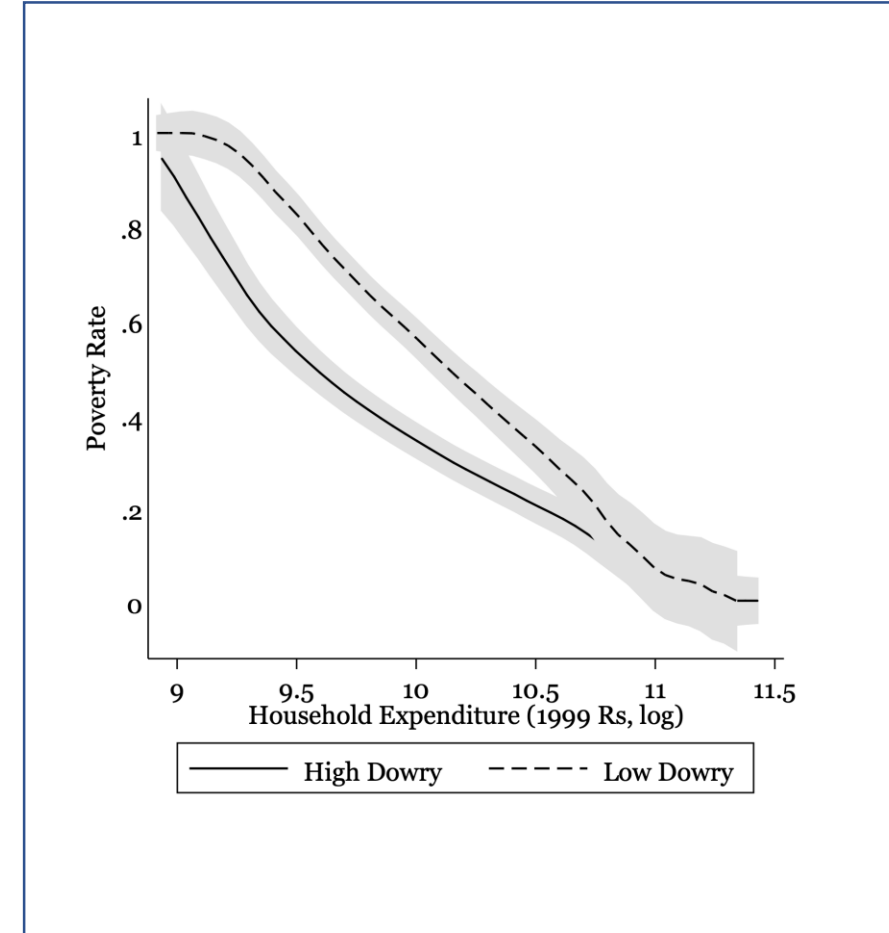
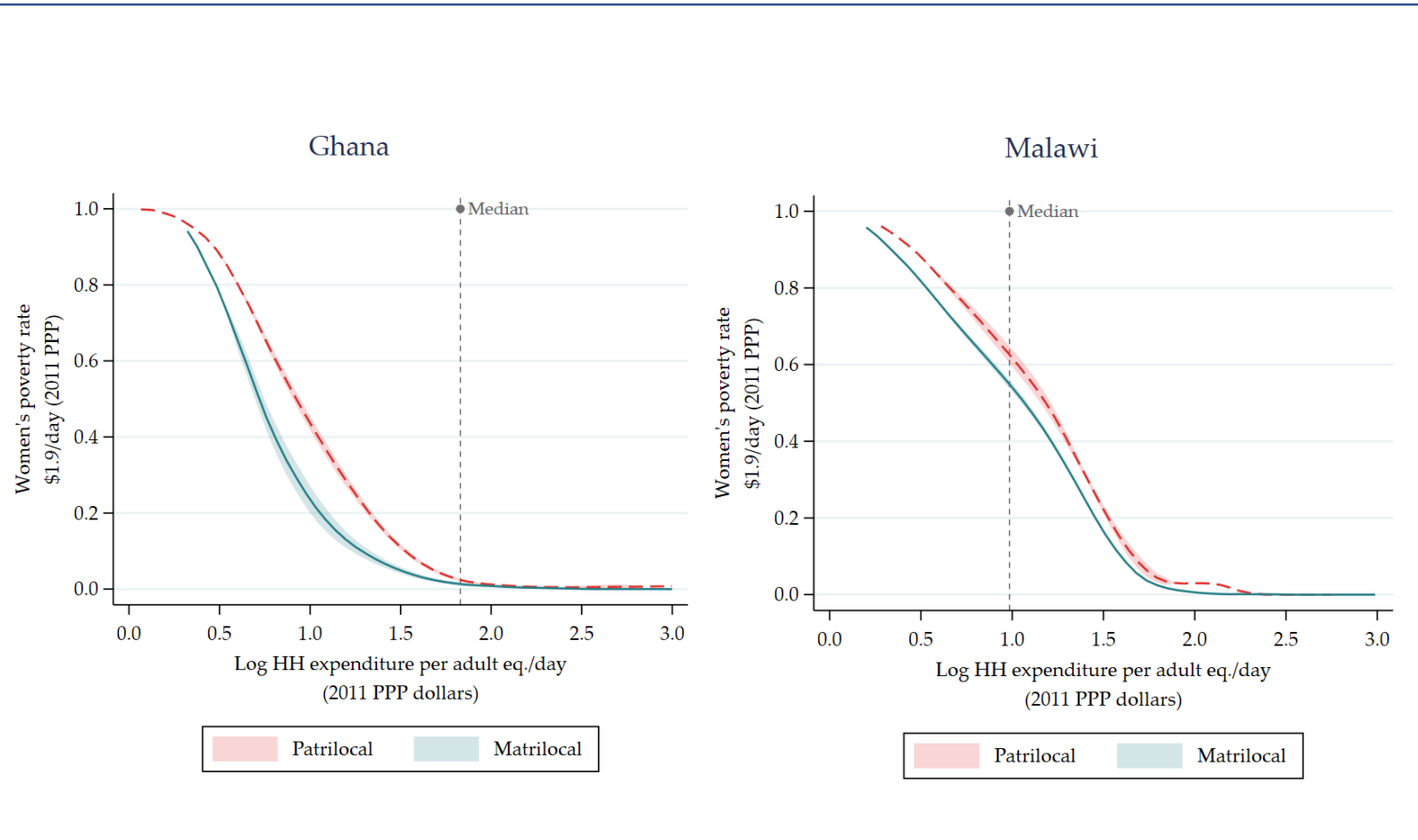
Implication for poverty



3.2 Individual poverty: within-country cultural variation

Implication for poverty

Similar results for India regarding dowry practice (Calvi & Keskar, 2021)



3.3 Who contributes to child cost?

- Extended model:
 - BCL 2013 with children → Bargain, Donni, Hentati (2022)
 - Using price variation over many years
 - This way, identifying ‘price effects’ that correspond to scale economies of different goods (ex: consume the car 50% of the time with your wife → ‘actual’ price divided by 1.5)
- Evidence from the UK
 - UK Family Expenditure Survey over the period 1978-2007
 - Clothing is used as an exclusive good
- Identification:
 - Sharing rule **depends on total resources**
 - Scale economies are identified
 - **Contribution of each parent to child resources!**
 - .. and assessment **over time**

3.3 Who contributes to child cost?

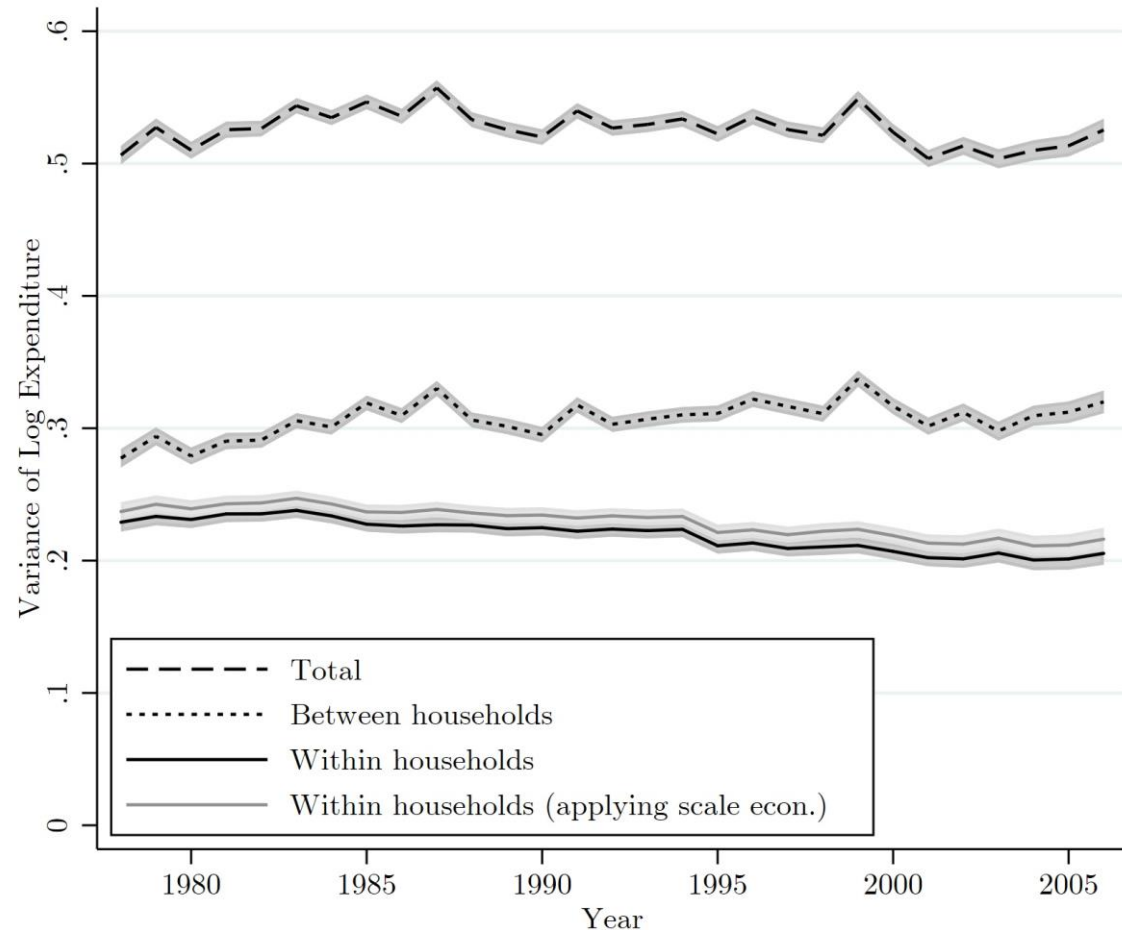
Results:

- children command from 14% (1 child) to 11% (families of 3) per child
- resource shares relatively balanced between spouses when there are no children
- however, **women's contribution to children is around 40% larger than men's**
 - makes their share lower than their husband's in large families.
- women's shares increase slightly, but significantly, with total expenditure
 - contributes to raise child resources since women are bigger providers

3.3 Who contributes to child cost?

With increased living standard **over time** :

- **non-negligible redistribution from men to women**
- progress in education levels plays a role in the reduction of intra-household inequality over time



Total, between- and within-household decomposition of trends in the variance of log expenditure. Shaded area represents 95% confidence bounds.

Conclusions

- Applications are motivating, and the overall approach seems promising
- Yet, empirically, it looks that
 - we are mainly able to capture the effect of some determinants (culture, policy)
 - slightly less to estimate the full shares in a precise enough way
- More **validation** needed
 - **Comparing actual and estimated shares** (Bangladesh : Bargain, Lacroix & Tiberti, 2021)
 - next for rich countries but accounting for scale economies (WTP)...
 - Also against nutrition data (Brown, Calvi, & Penglase, 2021)
 - **Comparing gradient of the shares** (traces with the UK experiment?)
- More creativity on exclusive/assignable goods
 - experiments on how parents decide on child vs adult goods
(Boutin & Filipkowi, 2022, Dizon-Ross & Jayachandran, 2022, Lichand & Thibaud 2020, Cherchye, Chiappori, de Rock, Ringdal & Vermeulen, 2021)

Thanks a lot

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Discussion

- Implementation hinges on somewhat **strong assumptions**
 - Here SAP (Dunbar, Lewbel & Pendakur): reducing heterogeneity ..at the source of the collective model)
 - Recent attempts to make things more tractable via linearization of the model (Lechene, Pendakur & Wolf, 2022): simplification of a simplification (!) and sharing rule determinants not recoverable
 - Bargain & Donni : requires singles & broad preference stability, but possible to use all the variation in demographic groups ?
- **Exclusive goods** for identification: not many choices
 - Clothing : one of the rare assignable goods in standard surveys
 - Pass tests (Bargain, Lacroix & Tiberti, 2021) but may vary across cultural contexts
 - Need for creative views regarding assignable goods
- And possibly need for **better identification strategies** that work in various contexts
 - Also confront the different approaches
(for that, we need to observe the sharing rule + a large dataset)