Online Appendix for

The More the Poorer? Resource Sharing and Scale Economies in Large Families

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Contents

A Proofs

A.1 Proof of Lemma 1

From the definition of indifference scales in Equation (7),

$$V_j(\alpha_t + p, x + \ln \eta_{j,t}) = V_j(\alpha_{t'} + p, x + \ln \eta_{j,t'} - \ln I_{j,t',t}).$$

It follows from Equation (4) that

$$V_j(\alpha_t + p, x + \ln \eta_{j,t}) = V_j(\alpha_{t'} + p, x + \ln \eta_{j,t} - \ln s_{j,t} + \ln s_{j,t'}).$$

Thus,

$$V_j(\alpha_{t'} + p, x + \ln \eta_{j,t'} - \ln I_{j,t',t}) = V_j(\alpha_{t'} + p, x + \ln \eta_{j,t} - \ln s_{j,t} + \ln s_{j,t'}). \tag{A1}$$

For Equation (A1) to hold, the following needs to be true

$$\ln I_{j,t',t} = \ln \eta_{j,t'} - \ln \eta_{j,t} + \ln s_{j,t} - \ln s_{j,t'}.$$

A.2 Proof of Theorem 1

We rewrite the Engel curves in terms of expenditure (instead of log expenditure) since identification will come in the neighborhood of zero. Let y be household expenditure with $x = \ln y$. Define $\Omega^{k_j}_{j,n}(y) = W^{k_j}_{j,n}(x)$, $\omega^{k_j}_{j,n}(y\eta_{j,n}/s_{j,n}) = w^{k_j}_{j,n}(x + \ln \eta_{j,n} - \ln s_{j,n})$. Identification will come from the derivates of the Engel curves, so let $v^{k_j}_{j,n}(y) = \nabla_y \omega^{k_j}_{j,n}(y)$ and $\zeta^{k_j}_{j,n}(y) = \nabla^2_y \omega^{k_j}_{j,n}(y)$.

Consider a one-child household, i.e., a nuclear household with one adult man m, one adult woman f, and one child c ($n = 1$). From Equation (5),

$$w^{k_j}_{j,1}(\alpha_1 + p, x + \ln \eta_{j,1}(\alpha_1, p)) = \lambda^{k_j}_{j,1}(\alpha_1, p) + w^{k_j}_{j,1}(p, x + \ln \eta_{j,1}(\alpha_1, p) - \ln s_{j,1}(\alpha_1, p)).$$

for $j = m, f, c$. We use one-child households as the reference household for all person types. Under a single price regime, Assumption 4, and appropriate normalizations, the household-level budget shares for private assignable goods k_j for one-child households are given by

$$\Omega^{k_j}_{j,1}(y) = \eta_{j,1} \omega^{k_j}_{j,1}(\eta_{j,1} y). \tag{A2}$$

Recall that $\Omega^{k_j}_{j,1}$ is observed. Given Assumptions 2.i and 2.ii, resource shares and the second derivatives of the individual budget shares are identified by the following set of four equations in four unknowns:

$$\nabla^2_y \Omega^{k_j}_{j,1}(y)\big|_0 = \eta_{j,1} \zeta^{k_j}(0),$$

for $j = m, f, c$ with $\eta_{c,1} = 1 - \eta_{m,1} - \eta_{f,1}$. Then, taking the first derivative of Equation (A2) with respect to y and applying Assumption 2.i yields:

$$\nabla_y \Omega^{k_j}_{j,1}(y)\big|_0 = \eta_{j,1} v^{k_j}_j(0),$$

which identifies $v_j^{k_j}(0)$, for $j = m, f, c$.

Moving onto n-child couples with $n > 1$ (nuclear households with one man (m) one woman (f), and $n > 1$ children), the household-level budget shares for private assignable goods k_j are given by:

$$\Omega_{j,n}^{k_j}(y) = \eta_{j,n}\left[\lambda_{j,n}^{k_j} + \omega_{j,n}^{k_j}\left(\frac{\eta_{j,n}y}{s_{j,n}}\right)\right], \tag{A3}$$

for $j = m, f$, and

$$\Omega_{c,n}^{k_c}(y) = n\eta_{c,n}\left[\lambda_{c,n}^{k_c} + \omega_{c,n}^{k_j}\left(\frac{\eta_{c,n}y}{s_{c,n}}\right)\right], \tag{A4}$$

for children. Differentiating Equations (A3) and (A4) with respect to y:

$$\nabla_y \Omega_{j,n}^{k_j}(y)\big|_0 = \frac{\eta_{j,n}^2}{s_{j,n}} v_j^{k_j}(0) \tag{A5}$$

for $j = m, f$, and for children

$$\nabla_y \Omega_{c,n}^{k_c}(y)\big|_0 = n\frac{\eta_{c,n}^2}{s_{c,n}} v_c^{k_c}(0). \tag{A6}$$

Differentiating again yields:

$$\nabla_y^2 \Omega_{j,n}^{k_j}(y)\big|_0 = \frac{\eta_{j,n}^3}{s_{j,n}^2} \zeta^{k_j}(0) \tag{A7}$$

for $j = m, f$, and for children

$$\nabla_y^2 \Omega_{c,n}^{k_c}(y)\big|_0 = n\frac{\eta_{c,n}^3}{s_{c,n}^2} \zeta^{k_c}(0). \tag{A8}$$

Since $v_j^{k_j}(0)$ and $\zeta_j^{k_j}(0)$ are known, the ratio of the second and first derivatives identifies $\kappa_{j,n} = \frac{\eta_{j,n}}{s_{j,n}}$:

$$\frac{\nabla_y^2 \Omega_{j,n}^{k_j}(y)\big|_0}{\nabla_y \Omega_{j,n}^{k_j}(y)\big|_0} = \frac{\eta_{j,n}\zeta^{k_c}(0)}{s_{j,n} v_j^{k_c}(0)} = \kappa_{j,n}\frac{\zeta^{k_c}(0)}{v_j^{k_c}(0)}.$$

Substituting $\kappa_{j,n}$ into equations Equations (A5) and (A6) yields:

$$\nabla_y \Omega_{j,n}^{k_j}(y)\big|_0 = \eta_{j,n}\kappa_{j,n} v_j^{k_j}(0).$$

for $j = m, f$, and for children

$$\nabla_y \Omega_{c,n}^{k_c}(y)\big|_0 = n\eta_{c,n}\kappa_{c,n} v_c^{k_c}(0),$$

which identify $\eta_{j,n}$ and, in turn, $s_{j,n}$ from $\kappa_{j,n}$.

A.3 Proof of Theorem 2

Let $\tau = 1$ denote the household where one of all J person types are present. This will be our reference household. Scale economies will then be measured relative to this household. We start by proving identification in the reference household. Next, we prove identification in a household with a different composition and generalize this to all other household types. So, the structure of the proof follows closely

the proof of Theorem 1.

We rewrite the Engel curves in terms of expenditure as follows. Let y be household expenditure with $x = \ln y$. Define $\Omega_{j,\tau}^{k_j}(y) = W_{j,\tau}^{k_j}(x)$, $\omega_{j,\tau}^{k_j}(y\eta_{j,\tau}/s_{j,\tau}) = w_{j,\tau}^{k_j}(x + \ln\eta_{j,\tau} - \ln s_{j,\tau})$. Identification will come from the derivates of the Engel curves, so let $\nu_{j,\tau}^{k_j}(y) = \nabla_y \omega_{j,\tau}^{k_j}(y)$ and $\zeta_{j,\tau}^{k_j}(y) = \nabla_y^2 \omega_{j,\tau}^{k_j}(y)$.

Let $\tau = 1$ denote the reference household, where all J person types are present. From Equation (5),

$$w_{j,1}^{k_j}(\alpha_1 + p, x + \ln\eta_{j,1}(\alpha_1, p)) = \lambda_{j,1}^{k_j}(\alpha_1, p) + w_{j,1}^{k_j}(p, x + \ln\eta_{j,1}(\alpha_1, p) - \ln s_{j,1}(\alpha_1, p)).$$

Under a single price regime, Assumption 4, and appropriate normalizations, the household-level budget share functions for private assignable goods k_j for person type j in the reference household is given by:

$$\Omega_{j,1}^{k_j}(y) = \eta_{j,1}\omega_{j,1}^{k_j}(\eta_{j,1}y). \tag{A9}$$

Given Assumptions 2.i and 2.ii, resource shares and the second derivatives of the individual budget share functions are identified by the following set of $J+1$ equations in $J+1$ unknowns:[1]

$$\nabla_y^2 \Omega_{j,1}^{k_j}(y)\big|_0 = \eta_{j,1}\zeta^{k_j}(0),$$

with $\sum_j n_j\eta_{j,1} = 1$. Taking the first derivative of Equation (A9) with respect to y and applying Assumption 2.i yields:

$$\nabla_y \Omega_{j,1}^{k_j}(y)\big|_0 = \eta_{j,1}\nu_j^{k_j}(0),$$

which identifies $\nu_j^{k_j}(0)$ for all j.

Turning to the non-reference households of types $\tau = t \neq 1$, the household-level budget shares for the private assignable goods k_j are given by:

$$\Omega_{j,t}^{k_j}(y) = n_j\eta_{j,t}\left[\lambda_{j,t}^{k_j} + \omega_{j,t}^{k_j}\left(\frac{\eta_{j,t}y}{s_{j,t}}\right)\right]. \tag{A10}$$

Differentiating Equation (A10) with respect to y and imposing Assumption 2.i:

$$\nabla_y \Omega_{j,t}^{k_j}(y)\big|_0 = n_j\frac{\eta_{j,t}^2}{s_{j,t}}\nu_j^{k_j}(0). \tag{A11}$$

Note that $\nu_j^{k_j}(0)$ does not depend on t. Differentiating again yields:

$$\nabla_y^2 \Omega_{j,t}^{k_j}(y)\big|_0 = n_j\frac{\eta_{j,t}^3}{s_{j,t}^2}\zeta^{k_j}(0).$$

The ratio of the second and first derivatives above identifies $\kappa_{j,t} = \frac{\eta_{j,t}}{s_{j,t}}$:

$$\frac{\nabla_y^2 \Omega_{j,t}^{k_j}(y)\big|_0}{\nabla_y \Omega_{j,t}^{k_j}(y)\big|_0} = \frac{\eta_{j,t}\zeta^{k_j}(0)}{s_{j,t}\nu_j^{k_j}(0)}.$$

[1] Assumption 2.i is generalized such that the similarity across sizes is a similarity across all τ household types. Similarly, Assumption 2.ii is generalized such that the similarity in preferences across men, women, and children is now a similarity in preferences across all J person types.

Substituting $\kappa_{j,t}$ into Equation (A11) for all $j = 1, ...J$ identifies $\eta_{j,t}$ and $s_{j,t}$.

A.4 Proof of Corollary 1

If $w_{j,n}(p, x, \alpha_n)$ are polynomials of degree l in x, then they have a finite number (i.e., l) of non-zero derivatives, and resource shares can be identified by the following set of equations:

$$\nabla_x^l W_{j,n}^{k_j}(x) = 2\gamma_j^{k_j}\eta_{j,n}. \tag{A12}$$

where $\nabla_x^l W_{j,n}^{k_j}(x)$ is the l^{th} derivative of $W_{j,n}^{k_j}(x)$ with respect to x, which is now constant and thus does not depend on x. With three household sizes (e.g., $n = 1, 2, 3$), this results in a system of nine Engel curves with nine unknowns: three preference parameters $\gamma_j^{k_j}$ and six resource shares (since resource shares sum to one, we only need to identify two resource shares for households with children). Then, given $\gamma_j^{k_j}$ and $\eta_{j,n}$, and under the appropriate normalizations to scale economies in the reference households, the $(l-1)^{th}$ derivatives of $W_{j,n}^{k_j}(x)$ in one-child families identifies the preference parameters $\beta_j^{k_j}$ for $j = m, f, c$:

$$\nabla_x^{l-1} W_{j,1} = \eta_{j,1}\left[\beta_j^{k_j} + 2\gamma_j^{k_j}\eta_{j,1}(x + \ln\eta_{j,1})\right], \tag{A13}$$

The $(l-1)^{th}$ derivative equations identify the scale economies parameters $s_{j,n}$, for $j = m, f, c$ and $n > 1$ as $\eta_{j,n}$, $\beta_j^{k_j}$, and $\gamma_j^{k_j}$ have already been identified.:

$$\nabla_x^{l-1} W_{j,n} = \eta_{j,n}\left[\beta_j^{k_j} + 2\gamma_j^{k_j}\eta_{j,n}(x - \ln s_{j,n} + \ln\eta_{j,n})\right], \tag{A14}$$

B Additional Tables and Figures

Table A1: Pre-Estimation Tests of Assignable Goods

	Slope				Curvature			
	Estimate	|t-stat|	Mean	Median	Estimate	|t-stat|	Mean	Median
Bangladesh:								
Men's Food (Cereals, Pulse, Vegetables)	-0.159	5.032	3.454	3.482	0.004	3.281	2.993	3.025
Women's Food (Cereals, Pulse, Vegetables)	-0.086	2.810	3.371	3.351	0.002	1.214	2.958	2.928
Children's Food (Cereals, Pulse, Vegetables)	-0.123	4.082	2.434	2.262	0.004	2.779	2.100	1.913
Men's Food (Meat, Fish, Milk Products)	0.076	2.016	1.781	1.519	-0.002	1.130	1.675	1.435
Women's Food (Meat, Fish, Milk Products)	0.010	0.306	1.536	1.247	0.001	0.605	1.416	1.123
Children's Food (Meat, Fish, Milk Products)	0.077	2.054	1.725	1.594	-0.002	1.166	1.607	1.474
Men's Food (All)	0.019	0.306	0.946	0.857	-0.002	0.624	0.966	0.892
Women's Food (All)	0.041	0.734	1.123	0.943	-0.002	0.931	1.126	0.949
Children's Food (All)	0.012	0.206	1.557	1.380	-0.001	0.208	1.551	1.379
Men's Clothing	0.009	1.235	0.970	0.853	-0.001	1.704	0.979	0.847
Women's Clothing	-0.041	4.995	1.430	1.266	0.002	4.503	1.340	1.189
Children's Clothing	-0.007	0.797	0.955	0.835	0.000	0.560	0.962	0.848
Mexico:								
Men's Clothing	-0.012	4.376	1.116	0.967	0.001	5.197	1.167	1.027
Women's Clothing	-0.015	5.668	1.675	1.489	0.001	6.809	1.758	1.525
Children's Clothing	-0.018	4.336	1.592	1.300	0.001	4.743	1.602	1.308

Notes: OLS estimates. Slope coefficients and curvature parameters of the fully-interacted linear regression model (12). We also report the t-statistics of the slope coefficients and curvature parameters as well as mean and median of the empirical distributions. The predicted values are obtained from a regression of the assignable good budget shares on preference factors $(X_h, X_h^\tau)'$, $(X_h, X_h^\tau)' x_h$, and $(X_h, X_h^\tau)' x_h^2$. We report the predicted curvature of the assignable good Engel curves evaluated at the mean values of $(X_h, X_h^\tau)'$.

Table A2: Resource Shares and Scale Economies: Bangladesh

	Resource Shares				Scale Economies	
	Children		Women			
	Estimate	SE	Estimate	SE	Estimate	SE
	(1)	(2)	(3)	(4)	(5)	(6)
Number of Men	-0.3107***	(0.0374)	-0.0718***	(0.0181)	1.1408***	(0.3673)
Number of Women	-0.3281***	(0.0353)	0.1337***	(0.0229)	1.5042***	(0.3719)
Number of Children	0.1636***	(0.0236)	-0.0508***	(0.0137)	-0.9428***	(0.0940)
Average Age Men	-0.0052***	(0.0019)	-0.0012	(0.0013)	0.0122	(0.0104)
Average Age Women	-0.0095***	(0.0026)	-0.0031*	(0.0016)	0.0827***	(0.0210)
Average Age Children	0.0596***	(0.0077)	-0.0430***	(0.0045)	-0.3789***	(0.0720)
Head Woman Works	-0.1977***	(0.0530)	0.0289	(0.0334)	0.276	(0.2270)
Head Man Works	-0.3587***	(0.0759)	-0.1209***	(0.0427)	1.5598***	(0.3537)
Average Education Women	-0.0664***	(0.0235)	-0.0362***	(0.0116)	0.1593	(0.1091)
Average Education Men	-0.0863***	(0.0206)	-0.0034	(0.0114)	0.1642	(0.1172)
Urban	0.0063	(0.0663)	-0.0024	(0.0392)	0.1671	(0.2727)
Dhaka	-0.0847	(0.0515)	0.0093	(0.0286)	0.7680***	(0.2783)
Year=2011	0.0329	(0.0461)	-0.0559**	(0.0272)	0.0983	(0.2364)
Sample Size	6,442					

Notes: BIHS data (2011/12 and 2015). NLSUR estimates conditional on a set of observable household characteristics and composition variables. Robust standard errors in parentheses. We specify resource shares and scale economies using an inverse logistic function that guarantees that they are bounded between zero and one. We restrict scale economies to be identical across men, women, and children. Age variables are divided by 10 to ease computation.

Table A3: Resource Shares and Scale Economies: Mexico

	Resource Shares				Scale Economies	
	Children		Women			
	Estimate	SE	Estimate	SE	Estimate	SE
	(1)	(2)	(3)	(4)	(5)	(6)
Number of Men	-0.0238	(0.0637)	-0.2210***	(0.0528)	-0.1980	(0.2595)
Number of Women	0.0669	(0.0530)	0.0737	(0.0518)	0.1270	(0.2797)
Number of Boys	-0.1189***	(0.0386)	0.0652**	(0.0325)	1.2568***	(0.4324)
Number of Girls	-0.1241***	(0.0400)	0.0148	(0.0339)	1.3015***	(0.4861)
Average Age Men	0.1101***	(0.0385)	0.1027***	(0.0324)	-0.3784**	(0.1517)
Average Age Women	-0.0924*	(0.0490)	-0.1349***	(0.0390)	-0.1525	(0.2446)
Average Age Children	0.2853***	(0.1029)	-0.1181	(0.0843)	-0.3680	(0.3997)
Head Woman Works	-0.0741	(0.0890)	0.1397**	(0.0670)	0.1404	(0.4776)
Head Man Works	-0.0121	(0.1586)	-0.1352	(0.1219)	0.6907	(0.4891)
Average Education Women	0.0817	(0.1095)	0.0447	(0.0855)	-0.4791	(0.5338)
Average Education Men	0.2195**	(0.1042)	-0.0508	(0.0841)	0.2224	(0.4441)
Urban	-0.0467	(0.0825)	-0.0007	(0.0703)	-0.3926	(0.4332)
Mexico City	0.2776	(0.1776)	-0.4154**	(0.1696)	-1.0679*	(0.6207)
Constant	-1.1538***	(0.2673)	-0.1882	(0.1890)		
Sample Size	36,075					

Notes: ENIGH data (2018). NLSUR estimates conditional on a set of observable household characteristics and composition variables. Robust standard errors in parentheses. We specify resource shares and scale economies using an inverse logistic function that guarantees that they are bounded between zero and one. We restrict scale economies to be identical across men, women, and children. Age variables are divided by 10 to ease computation.

Table A4: Estimated Resource Shares and Scale Economies: Representative Household

	Bangladesh		Mexico	
	Estimate	Std. Error	Estimate	Std. Error
	(1)	(2)	(3)	(4)
A) Resource Shares: $\widehat{\eta}_{j,\tau}$				
Children	0.273	0.012	0.249	0.024
Women	0.323	0.007	0.417	0.021
Men	0.403	0.011	0.334	0.018
B) Scale Economies: $\widehat{s}_{\tau}$	0.969	0.012	0.956	0.033

Notes: The table reports the estimated resource shares and scale economies in a representative non-reference household, defined as non-reference household with all preference factors and household type variables at their median value (see Tables 2 and 3 for a list of these values).

Table A5: Robustness Checks: Endogeneity and Selection

	Mean	St. Dev.	Min.	Median	Max.
	(1)	(2)	(3)	(4)	(5)
A) Bangladesh					
Endogeneity: Household Type					
Children's Resource Share	0.201	0.069	0.032	0.196	0.509
Women's Resource Share	0.397	0.043	0.225	0.392	0.652
Men's Resource Share	0.403	0.066	0.133	0.401	0.705
Scale Economies	0.956	0.075	0.154	0.984	1.000
Endogeneity: Household Expenditure					
Children's Resource Share	0.235	0.122	0.012	0.222	0.703
Women's Resource Share	0.334	0.052	0.197	0.327	0.513
Men's Resource Share	0.431	0.094	-0.001	0.448	0.679
Scale Economies	0.965	0.063	0.170	0.989	1.000
B) Mexico					
Endogeneity: Household Type					
Children's Resource Share	0.250	0.043	0.101	0.246	0.492
Women's Resource Share	0.391	0.055	0.123	0.398	0.620
Men's Resource Share	0.359	0.072	0.000	0.358	0.684
Scale Economies	0.916	0.111	0.163	0.955	1.000
Endogeneity: Household Expenditure					
Children's Resource Share	0.226	0.053	0.050	0.223	0.513
Women's Resource Share	0.405	0.087	0.040	0.423	0.735
Men's Resource Share	0.368	0.112	0.000	0.352	0.841
Scale Economies	0.971	0.076	0.024	0.994	1.000

Notes: This table reported the estimated resource shares and scale economies from specifications that account for endogeneity of household type (e.g., selection) and endogeneity of household expenditure (e.g., measurement error).

Table A6: Poverty Rates by Measure Using Absolute Poverty Line with Age Adjustment

	Obs.	Per-Capita Expenditure (y/n)	Equivalent Expenditure $(y/n_{eq.})$	Individual Expenditure $(\eta_{j,\tau}y)$	Individual Consumption $(\eta_{j,\tau}y/s_\tau)$
	(1)	(2)	(3)	(4)	(5)
A) Bangladesh					
Children	5,827	0.004	0.000	0.398	0.352
Women	4,601	0.129	0.007	0.106	0.103
Men	4,373	0.118	0.006	0.028	0.023
B) Mexico					
Children	72,962	0.007	0.001	0.119	0.116
Women	51,343	0.014	0.003	0.007	0.005
Men	48,831	0.014	0.003	0.007	0.004

Notes: The table presents poverty rates, using relative poverty line, for Bangladesh and Mexico computed using four approaches: household per-capita expenditure, household expenditure adjusted using the OECD equivalence scale, model-based individual expenditure and model-based individual consumption. Per-capita expenditure is obtained by dividing total household expenditure by the number of individuals in the household. Individual expenditure is obtained multiplying total annual household expenditure (PPP dollars) by individual resource shares. Individual consumption is obtained by dividing individual expenditure by scale economies. In Bangladesh, only households surveyed in 2015 are included. Reference lines correspond to the 1.90 dollar/day poverty line. We set the child poverty line to be 0.60 of the prime-age adult poverty line. Similarly, we scale the poverty line for individuals age 46 and older by 0.80.

Table A7: Poverty Rates by Measure Using Relative Poverty Line

	Obs.	Per-Capita Expenditure (y/n)	Equivalent Expenditure $(y/n_{eq.})$	Individual Expenditure $(\widehat{\eta}_{j,\tau}y)$	Individual Consumption $(\widehat{\eta}_{j,\tau}y/\widehat{s}_\tau)$
	(1)	(2)	(3)	(4)	(5)
A) Bangladesh					
Children	5,827	0.031	0.000	0.560	0.515
Women	4,601	0.021	0.000	0.028	0.025
Men	4,373	0.019	0.000	0.002	0.002
B) Mexico					
Children	72,962	0.152	0.050	0.527	0.509
Women	51,343	0.123	0.041	0.076	0.060
Men	48,831	0.122	0.041	0.075	0.054

Notes: The table presents poverty rates, using relative poverty line, for Bangladesh and Mexico computed using four approaches: household per-capita expenditure, household expenditure adjusted using the OECD equivalence scale, model-based individual expenditure and model-based individual consumption. Per-capita expenditure is obtained by dividing total household expenditure by the number of individuals in the household. Individual expenditure is obtained multiplying total annual household expenditure (PPP dollars) by individual resource shares. Individual consumption is obtained by dividing individual expenditure by scale economies. In Bangladesh, only households surveyed in 2015 are included. Reference lines correspond to the 50 percent of median per capita expenditure. We make no age adjustments to any poverty line.

Table A8: Poverty Misclassification Rates

	Poor Based on Individual Consumption ($\widehat{\eta}_{\tau,j}y/\widehat{s}_{\tau}$)			Not Poor Based on Individual Consumption ($\widehat{\eta}_{\tau,j}y/\widehat{s}_{\tau}$)		
	Per-Capita Expenditure (y/n)	Equivalent Expenditure ($y/n_{eq.}$)	Individual Expenditure ($\widehat{\eta}_{j,\tau}y$)	Per-Capita Expenditure (y/n)	Equivalent Expenditure ($y/n_{eq.}$)	Individual Expenditure ($\widehat{\eta}_{j,\tau}y$)
	(1)	(2)	(3)	(4)	(5)	(6)
A) Bangladesh						
Children	0.747	0.985	0.000	0.008	0.003	0.145
Women	0.388	0.933	0.000	0.085	0.002	0.004
Men	0.137	0.878	0.000	0.125	0.005	0.005
Total	0.687	0.976	0.000	0.090	0.003	0.027
B) Mexico						
Children	0.711	0.903	0.000	0.010	0.002	0.038
Women	0.113	0.499	0.000	0.075	0.012	0.018
Men	0.057	0.403	0.000	0.075	0.009	0.022
Total	0.628	0.843	0.000	0.057	0.008	0.025

Notes: The table shows the extent of poverty misclassification, i.e., how many people with individual consumption below the poverty line would be classified as not poor based on their per-capita expenditure, equivalent expenditure, and individual expenditure (or vice-versa). Per-capita expenditure is obtained by dividing total household expenditure by the number of individuals in the household. Individual expenditure is obtained multiplying total annual household expenditure (PPP dollars) by individual resource shares. Individual consumption is obtained by dividing individual expenditure by scale economies. In Bangladesh, only households surveyed in 2015 are included. In Bangladesh, we us a 1.90 dollar / day poverty line. In Mexico, the poverty line corresponds to the 50 percent of median per capita expenditure. We make no age adjustments to any poverty line.

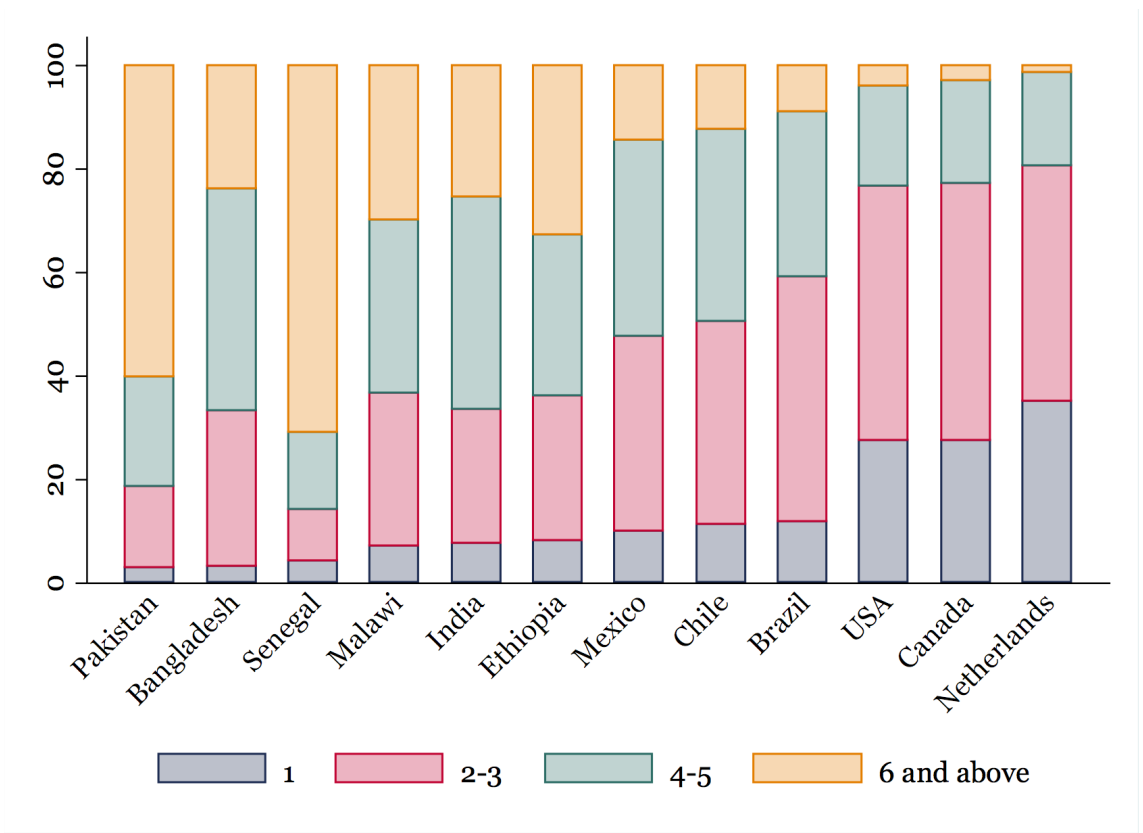
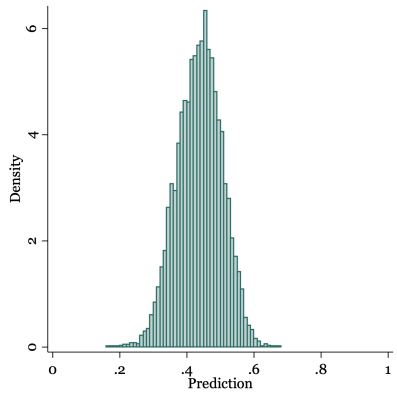


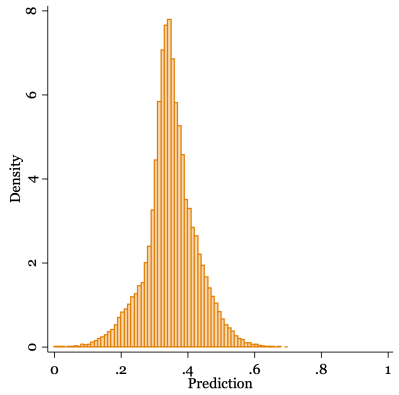
Figure A1: Household Sizes in Selected Countries

Notes: Authors' calculations based on the most recent IPUMS data.

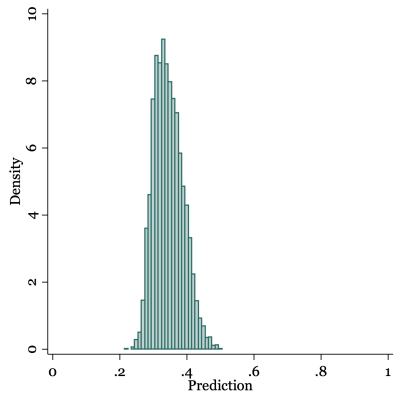
Figure A2: Estimated Resource Shares and Scale Economies: Empirical Distributions



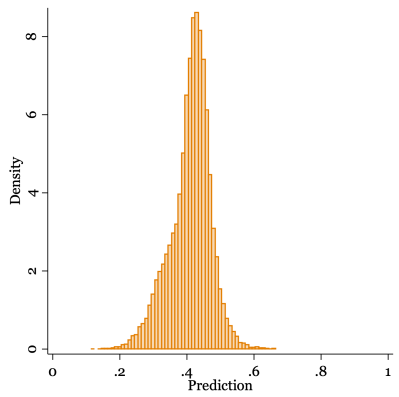
(A.1) Bangladesh: Men's Resource Shares ($M\eta_{m,\tau}$)



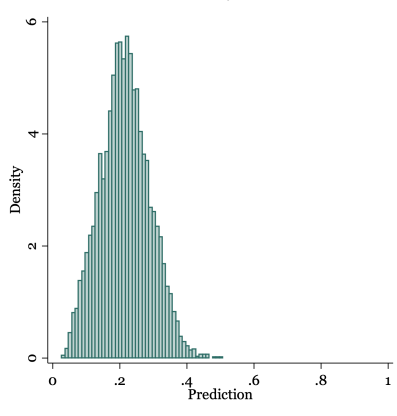
(A.1) Mexico: Men's Resource Shares ($M\eta_{m,\tau}$)



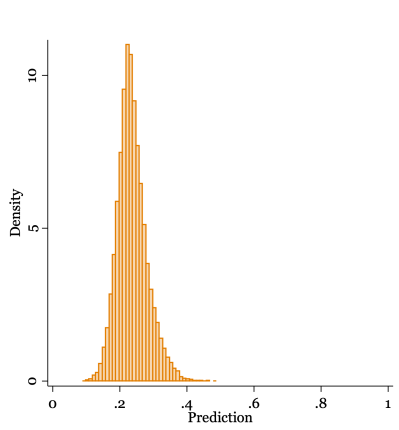
(B.1) Bangladesh: Women's Resource Shares ($W\eta_{w,\tau}$)



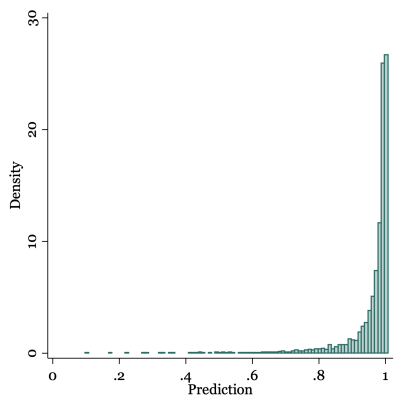
(B.1) Mexico: Women's Resource Shares ($W\eta_{w,\tau}$)



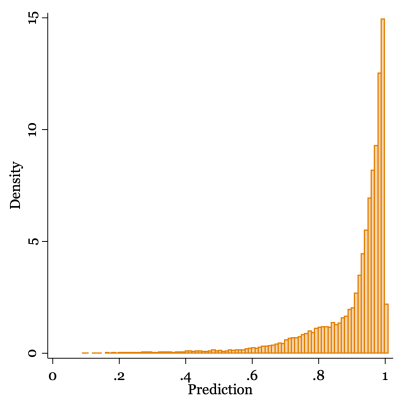
(C.1) Bangladesh: Children's Resource Shares ($C\eta_{c,\tau}$)



(C.1) Mexico: Children's Resource Shares ($C\eta_{c,\tau}$)



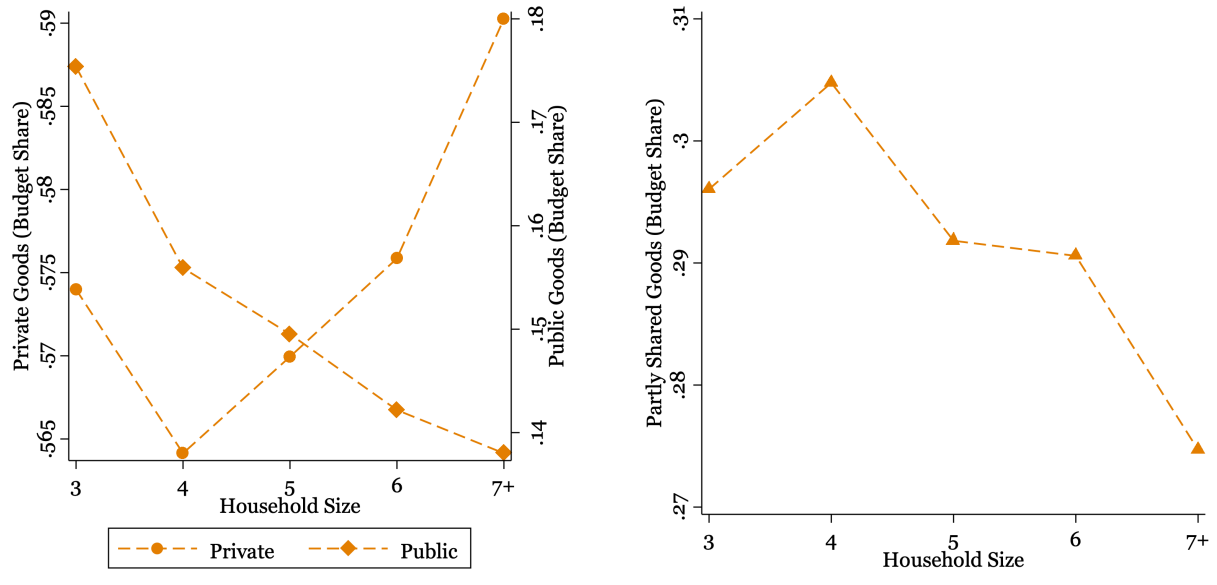
(D.1) Bangladesh: Economies of Scale (s_τ)



(D.2) Bangladesh: Economies of Scale (s_τ)

Note: Empirical distribution of the estimated resource shares and scale economies. The summary statistics are presented in Table 4.

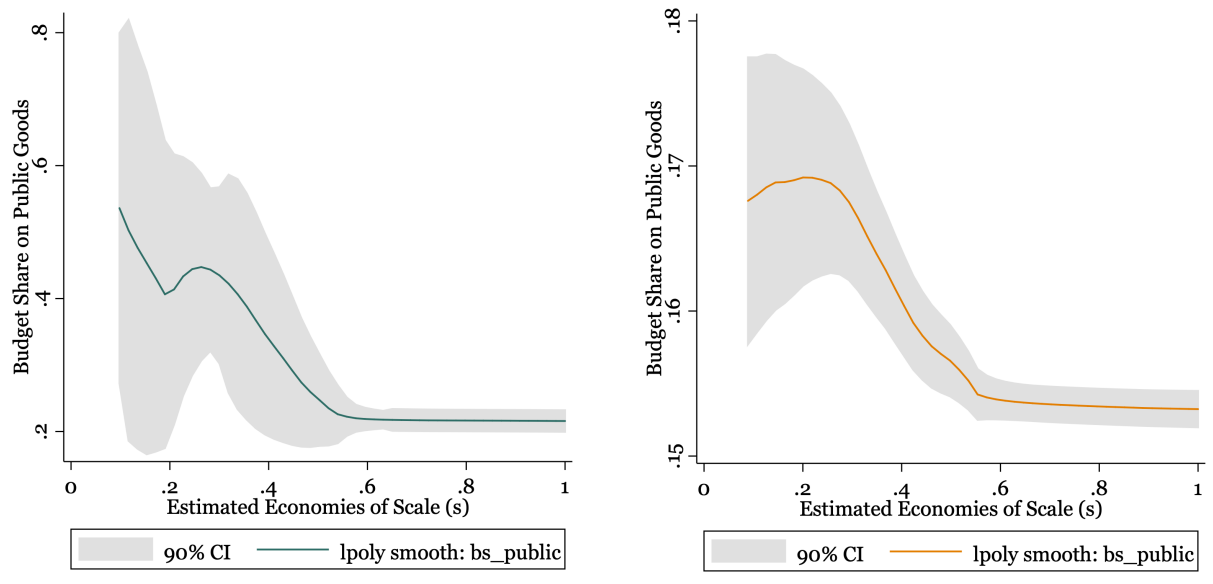
Figure A3: Budget Shares on Private, Public, and Sharable Goods: Mexico



(A) Public and Private Goods (B) Sharable Goods

Note: Share of budget allocated to private and public goods in Mexico. Private goods include food, clothing, footwear, and personal accessories. Public goods include rent, house/residence expenditure, and energy. Sharable goods include fuel for transportation and other expenses on vehicles (excl. purchase).

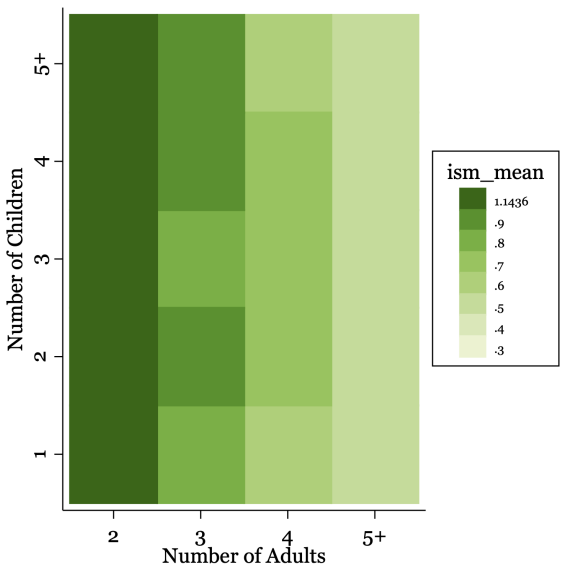
Figure A4: Public Goods and Estimated Economies of Scale



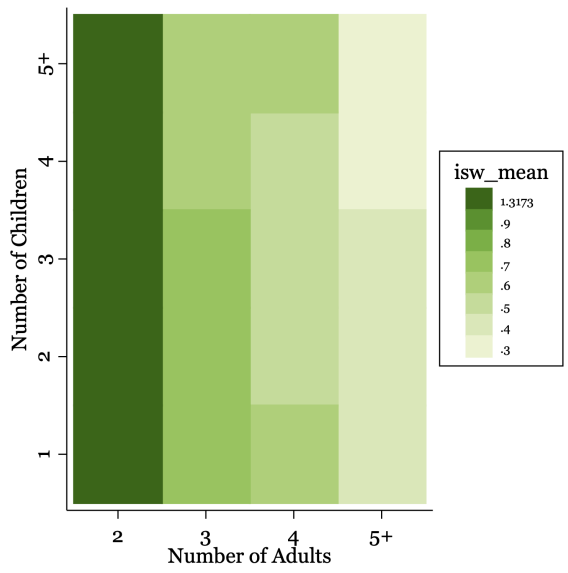
(A) Bangladesh (B) Mexico

Note: Local polynomial regressions to examining the correlation between scale economies and the consumption of public goods. Public goods include rent, house/residence expenditure, and energy. It is reassuring that we estimate larger scale economies (lower $\widehat{s}_\tau$) when the budget share on public goods is large.

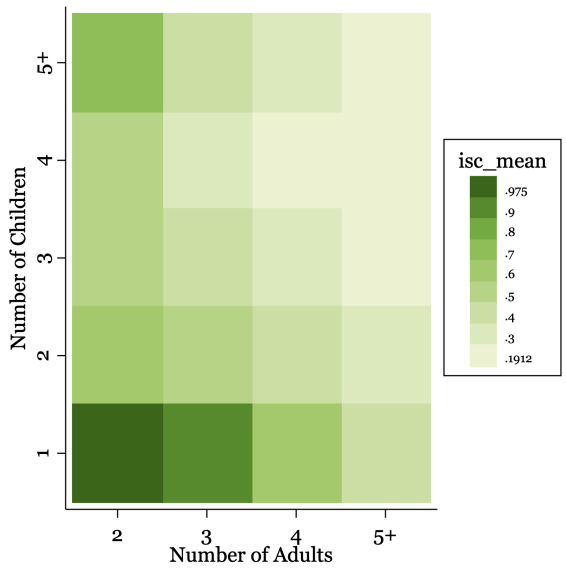
Figure A5: Indifference Scales by Household Composition: Bangladesh



(A) Men



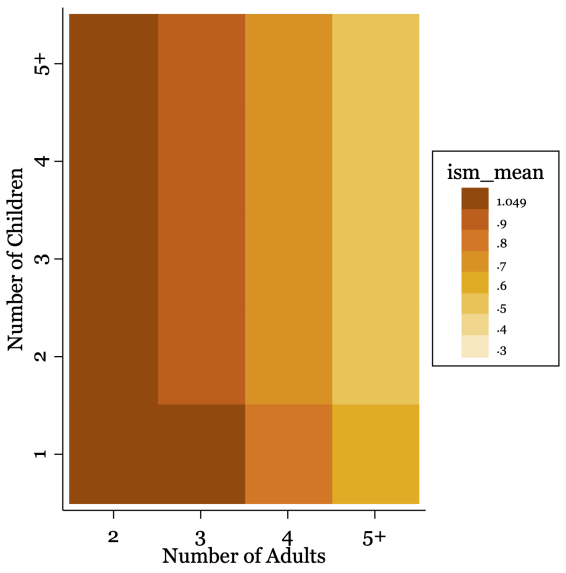
(B) Women



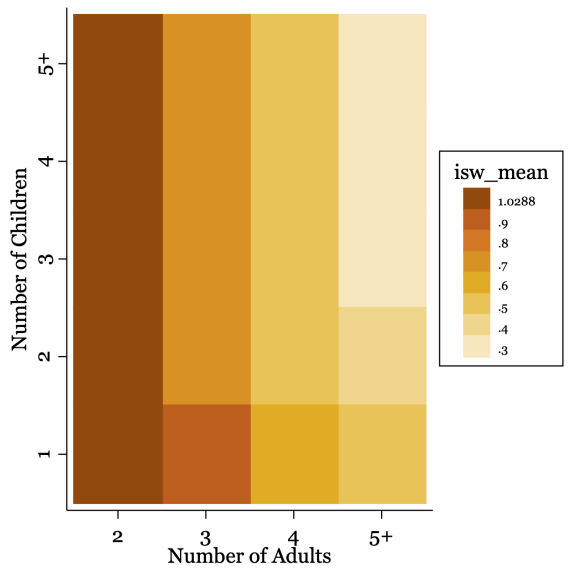
(C) Children

Note: The figure shows how the average indifference scales for children, women and men vary by the number of children and adults in the family. Indifference Scales are computed following Lemma 1. The reference household is defined as having one of each person type (here, this implies one man, one woman, one child) Adults' indifference scales decline substantially as the number of adults increases. By contrast, for a given number of adults, the decline is minimal as the number of children increases. Children's indifference scales decline in both the number of children and adults.

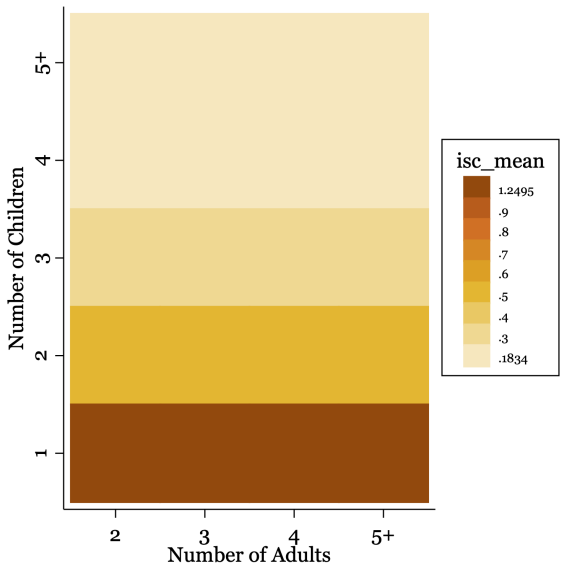
Figure A6: Indifference Scales by Household Composition: Mexico



(A) Men



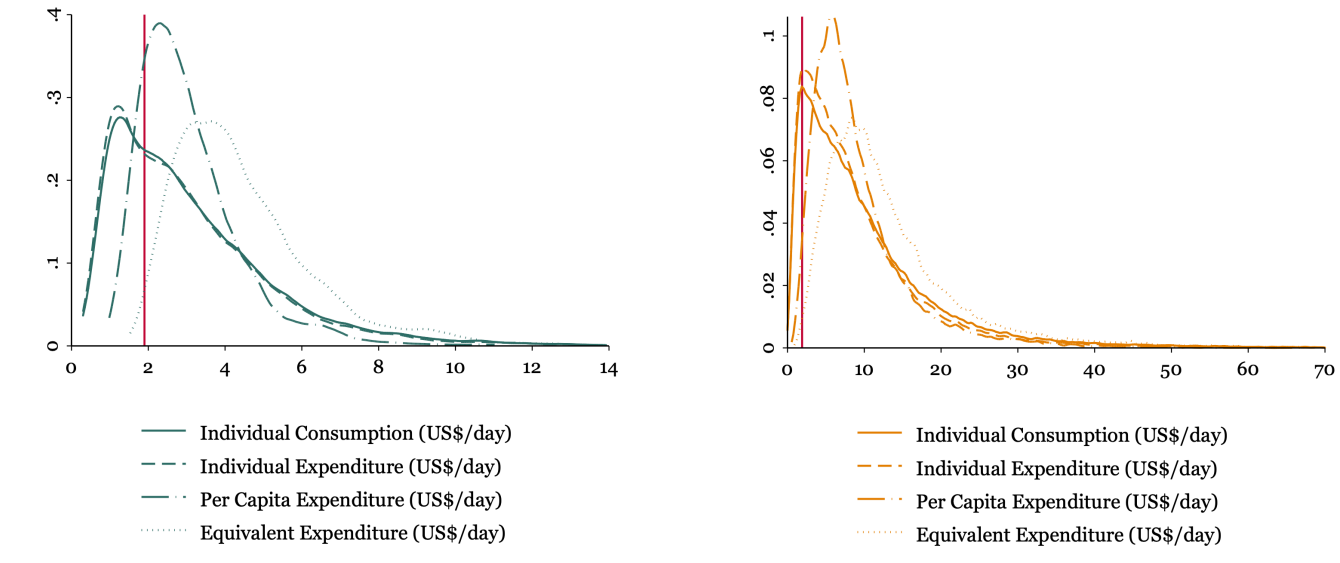
(B) Women



(C) Children

Note: The figure shows how the average indifference scales for children, women and men vary by the number of children and adults in the family. Indifference Scales are computed following Lemma 1. The reference household is defined as having one of each person type (here, this implies one man, one woman, one child) Adults' indifference scales decline substantially as the number of adults increases. By contrast, for a given number of adults, the decline is minimal as the number of children increases. Children's indifference scales decline in the number of children.

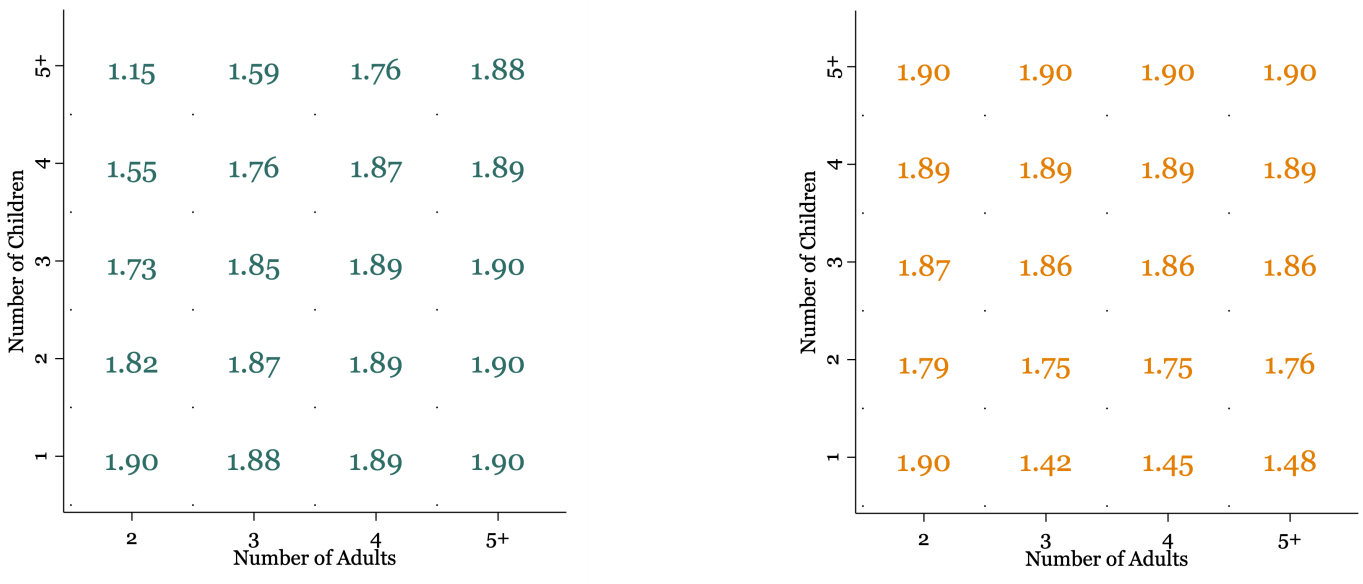
Figure A7: Empirical Distributions



(A) Bangladesh (B) Mexico

Note: The figure presents the empirical distributions of household per-capita expenditure, household expenditure adjusted using the OECD equivalence scale, model-based individual expenditure and model-based individual consumption for Bangladesh and Mexico. Per Capita expenditure is computed by dividing household expenditure by household size. To compute individual expenditure, we multiply household expenditure by each person type's resource share. Individual consumption is equal to equal to expenditure divided by scale economies. In Bangladesh, only households in 2015 are included. The vertical line corresponds to the percentile of the US$1.90/day poverty line.

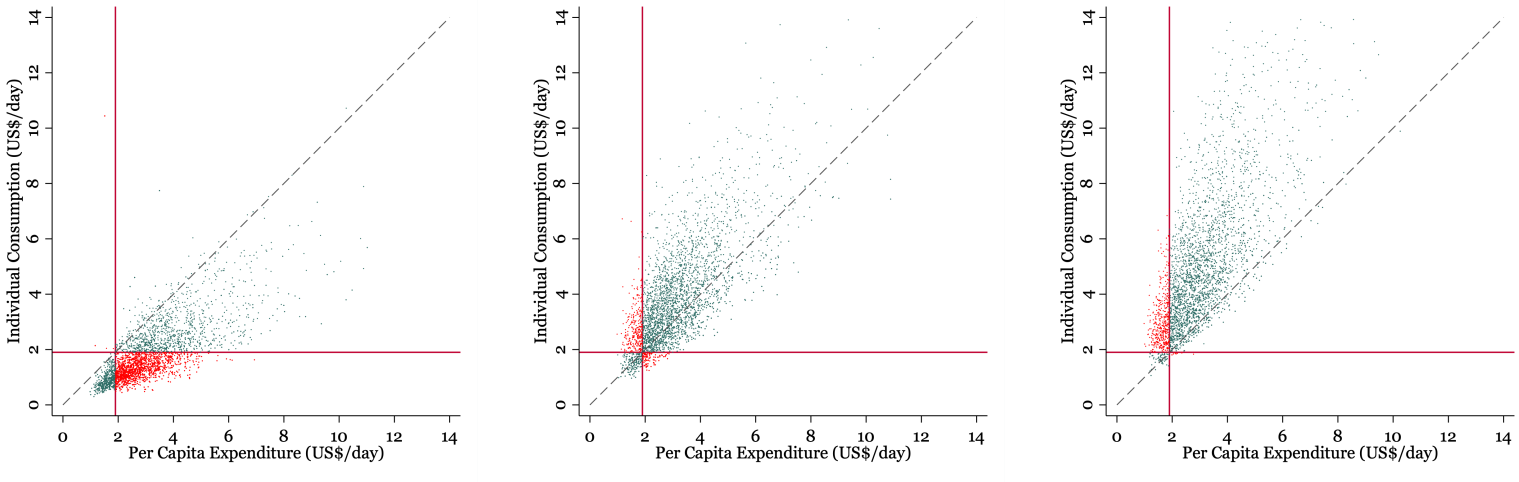
Figure A8: Model-based Poverty Lines: US$/day Adjusted for Scale Economies



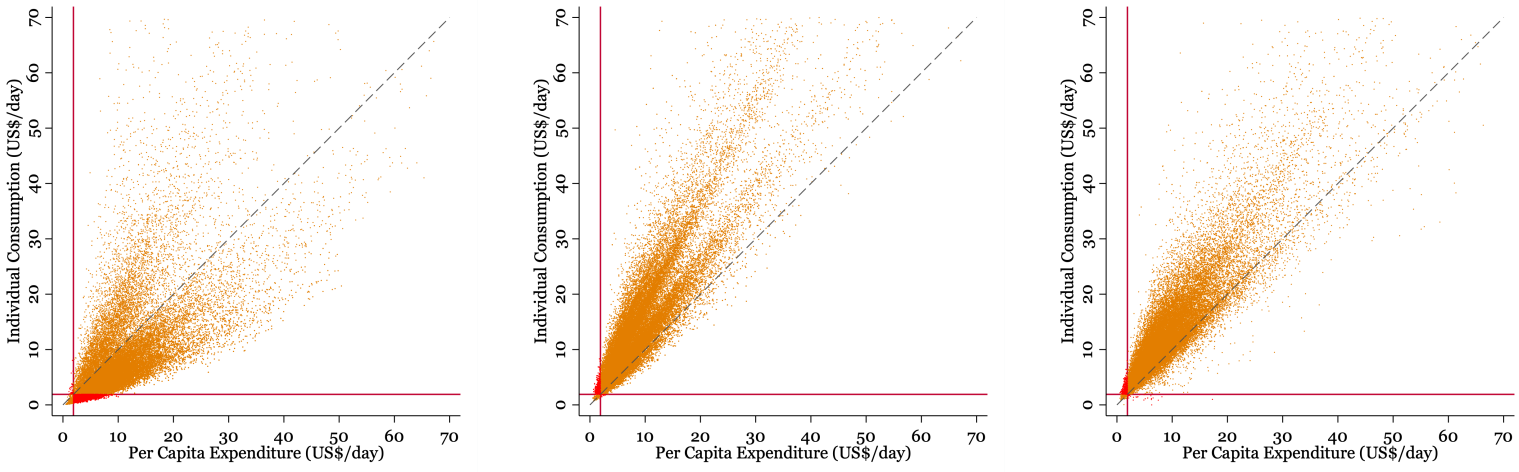
(A) Bangladesh (B) Mexico

Note: The figure shows how the poverty lines for Bangladesh (Panel A) and Mexico (Panel B) should vary by number of children and adults to account for joint consumption based on our estimates. In the figure, for each household composition, the US$1.90/day poverty line is multiplied by the average level of scale economies $\widehat{s}_\tau$.

Figure A9: Per Capita Expenditure and Consumption



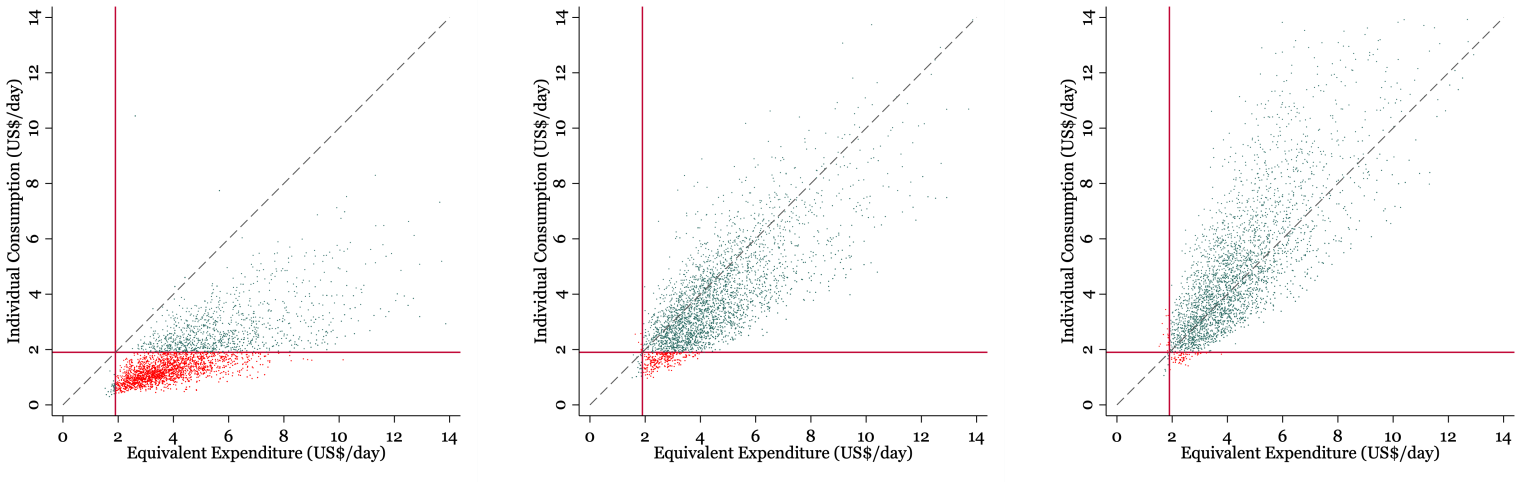
(A) Bangladeshi Children (B) Bangladeshi Women (C) Bangladeshi Men



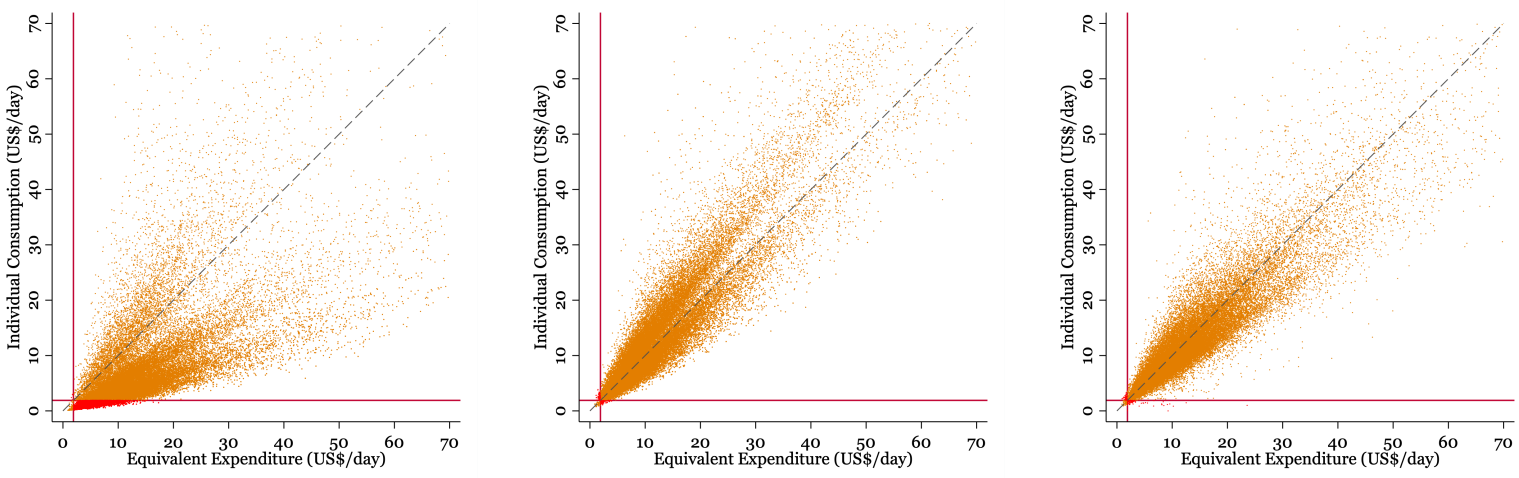
(D) Mexican Children (E) Mexican Women (F) Mexican Men

Note: Per capita expenditure is obtained by dividing total annual household expenditure (PPP dollars) by household size. Individual consumption is obtained by dividing individual expenditure by scale economies. In Bangladesh, only households surveyed in 2015 are included. Reference lines correspond to the 1.90 dollar/day poverty line. Dash lines identify the 45 degree lines.

Figure A10: Per Equivalent Expenditure and Consumption



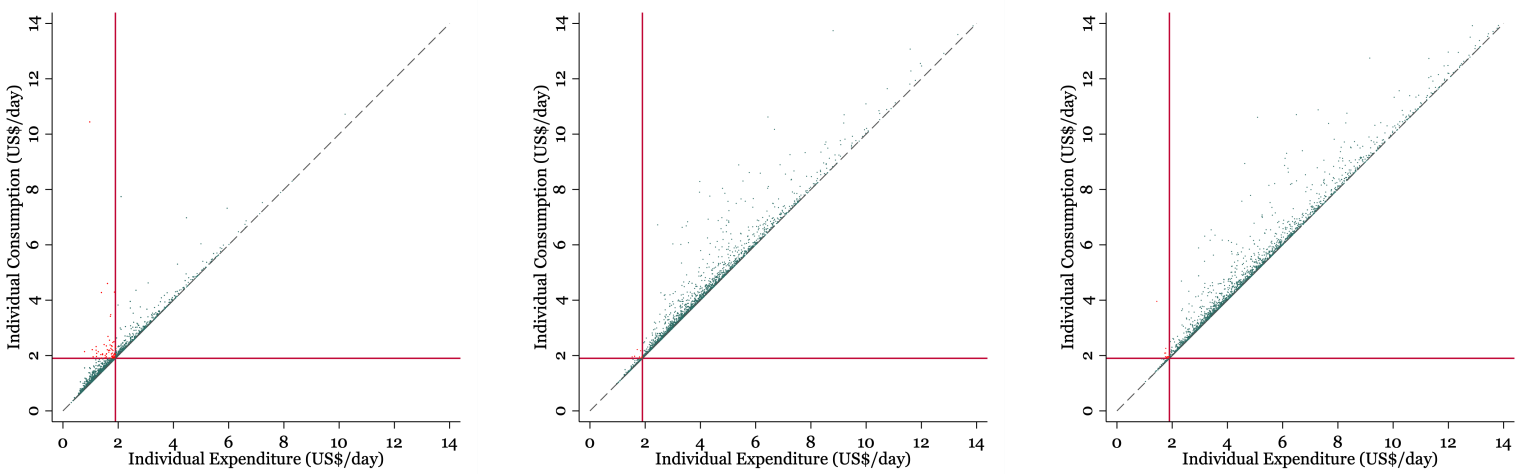
(A) Bangladeshi Children (B) Bangladeshi Women (C) Bangladeshi Men



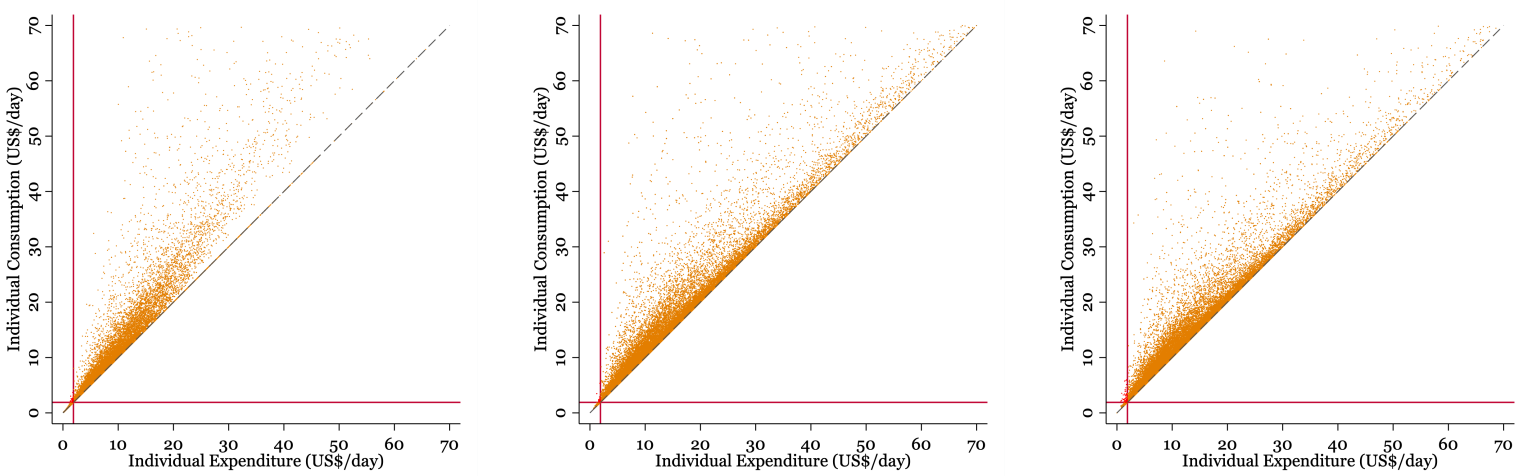
(D) Mexican Children (E) Mexican Women (F) Mexican Men

Note: Per equivalent expenditure is obtained by dividing total annual household expenditure (PPP dollars) by equivalent household size $(1+0.7*(n_m+n_w)+0.5*n_c)$. Individual consumption is obtained by dividing individual expenditure by scale economies. In Bangladesh, only households surveyed in 2015 are included. Reference lines correspond to the 1.90 dollar/day poverty line. Dash lines identify the 45 degree lines.

Figure A11: Individual Expenditure and Consumption



(A) Bangladeshi Children (B) Bangladeshi Women (C) Bangladeshi Men



(D) Mexican Children (E) Mexican Women (F) Mexican Men

Note: Individual expenditure is obtained multiplying total annual household expenditure (PPP dollars) by individual resource shares. Individual consumption is obtained by dividing individual expenditure by scale economies. In Bangladesh, only households surveyed in 2015 are included. Reference lines correspond to the 1.90 dollar/day poverty line in Bangladesh. The poverty line is computed as 50 percent of the sample median per-capita expenditure in Mexico. Dash lines identify the 45 degree lines.