The First Born Burden

Raquel Tsukada

UNU-MERIT and Maastricht University

Supervisor: Arnaud Dupuy

CEPS/INSTEAD and MSM

UNU-MERIT Innovation and Governance in Development Conference

27 November 2014

Research Questions

Is there a disproportionate work burden driven by birth-order?

Could labor-saving technologies reduce the first born burden?

The Literature

- Psychology. Higher intellectual achievement of firstborns: resources dillution vs 'environmental human capital'
  Blank (1981), Horton (1988), Zajonc (1976, 2001), Rodgers et al.(2000)

- Economics. Child labor vs schooling, based on credit constraints
  Basu and Van (1998), Baland and Robinson (2000), Edmonds (2007)

  - Edmonds (2006) examines the effect of sibship composition on child labor
  - Emerson and Souza (2008) show that firstborns are less likely to attend school; later siblings are less likely to do child labor
  - Parental constraints?

Theoretical Framework

max U(C,L)

Consumption=capacity to transform time into 'consumables'

$g(t^j, X; \tau)$ (Becker 1965, Gronau 1986)

s.t.

(i) **Time** endowment: $\sum_i t_i^j + L_i$

(ii) Subsistence: $C \geq n \cdot \underline{c}_i$

parental time or human capital constraint:

$g(t_a^j, X; \tau) < n \cdot \underline{c}_i \Rightarrow$ child work

(iii) **Labor-saving technology** increases the effective labor at home

Equilibria

First Born Burden effect

- No child labor in **non poor households**
- Child labor in **time-poor households**

$$MRT^{child}_{t_i^j, L_i} = MRS_{C_H, L}$$

- Child labor in **HK-poor households**

$$MRT^{child}_{t_i^j, L_i} \geq MRT^{adult}_{t_i^j, L_i}$$

Labor-saving technology effect

- Less child labor with **labor-saving technology**

$$\frac{\partial U_H(C, L; \tau)}{\partial \tau} \geq 0$$

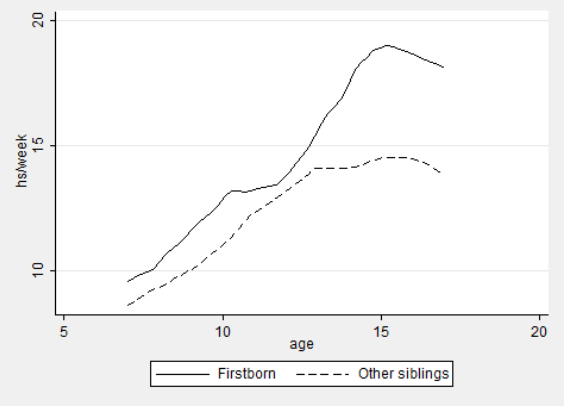
Data

GLSS5 - Ghana Living Standards Survey 5 (2005/06)

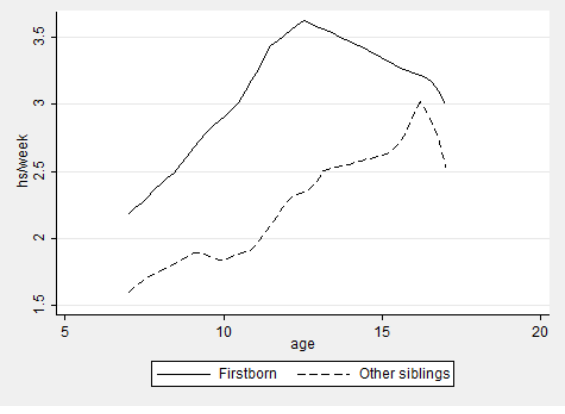
- 5,099 rural households
  Restricted sample: 1,378 children (age 7-17)

  Child work incidence:
  89% housework, 66% collect water, 23% market work

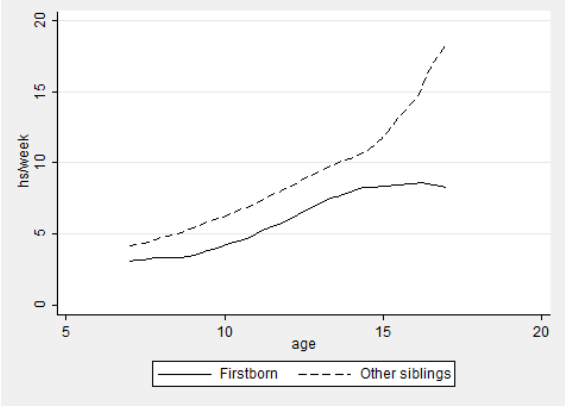
Birth-order and workload along childhood



housework



water collection



market work

Data

Summary statistics

Variable	Mean	SD	Min	Max	n	Unit
housework	12.54	16.76	0	153	1378	hours/week
water collection	2.44	4.53	0	90	1378	hours/week
market work	6.38	15.05	0	105	1378	hours/week
total work	21.36	24.21	0	168	1378	hours/week
attend school	0.83	0.38	0	1	1378	dummy
siblings	3.22	1.59	0	9	1378	scalar
Pipe (own tap)	0.05		0	1	1378	dummy
Public standpipe	0.06		0	1	1378	dummy
Borehole	0.50		0	1	1378	dummy
Wells (protected)	0.06		0	1	1378	dummy
Wells (unprotected)	0.05		0	1	1378	dummy
Rain water	0.02		0	1	1378	dummy
Vendor/truck	0.01		0	1	1378	dummy
Surface water	0.26		0	1	1378	dummy

Source: GLSS5, restricted sample, children 7-17 years.

Data

Parents' time and human capital constraint (%)

	father		
mother	not time-poor	time-poor	total
not time-poor	25.5	6.1	31.7
time-poor	47.0	21.4	68.4
total	72.5	27.5	100

	father		
mother	not HK-poor	HK-poor	total
not HK-poor	31.2	5.7	36.9
HK-poor	33.3	31.0	64.3
total	64.5	36.7	100

Empirical Strategy

- Hours of work

$$t_{ij} = \beta_{0j} + \alpha_{1j} fb_i + \alpha_{2j} P_i + \alpha_{3j} fb \cdot P_i + \gamma_{1j} W_i + \gamma_{2j} fb \cdot W_i + \beta_{1j} D_i + \beta_{2j} R_i + u_{ij} \quad (1)$$

- Deviation from equal workload*

$$z_i^j = \beta_0 + \alpha_1 fb_i + \alpha_2 P_i + \alpha_3 fb \cdot P_i + \gamma_1 W_i + \gamma_2 fb \cdot W_i + \beta_1 D_i + \beta_2 R_i + u_i \quad (2)$$

where i indexes the child and j the time use $j = \{housework, water, market\ work\}$
fb: firstborn dummy
W: water supply labor-saving technologies
P: parental constraints
D: individual and household controls†
R: regional dummies

* $z_i = \frac{h_i}{\sum_i^N h_i} - \frac{1}{N}$ for N = number of children (7-17) in hh

† D: female, age, age^2, school, siblings, adult women, adult men, adult elders, log(Xpc), electricity, distance to source

Results

The Fist Born Burden Effect

	Determinants of hours of work			Deviation from equal workload		
	house work	collect water	market work	house work	collect water	market work
firstborn	6.216**	1.627**	-1.421	0.263***	0.233***	-0.125**
time-poor mother	4.942***	0.387	0.888	0.022	0.040*	0.013
time-poor father	4.894***	0.632	0.082	0.015	0.042	0.047
HK-poor mother	2.144	0.671*	2.162**	0.027	0.041*	-0.023
HK-poor father	1.317	0.257	0.123	0.005	0.013	-0.107***
fb*time-poor mother	1.695	0.703	0.628	-0.043	-0.032	0.007
fb*time-poor father	1.284	-0.772	0.412	-0.025	-0.066*	-0.073*
fb*HK-poor mother	-3.446*	-0.671	-0.733	-0.036	-0.085**	0.042
fb*HK-poor father	-0.033	0.088	0.078	-0.016	-0.010	0.109***
female	5.610***	0.864***	-0.641	0.118***	0.071***	-0.005

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Results

Labor-Saving Technology Effect

	Determinants of hours of work			Deviation from equal workload		
	house work	collect water	market work	house work	collect water	market work
firstborn	6.216**	1.627**	-1.421	0.263***	0.233***	-0.125**
piped (own tap)	2.774	-2.398***	-0.474	0.012	0.517***	0.097*
public standpipe	-2.621	-0.078	-0.772	-0.012	0.044	-0.168*
borehole	-0.680	-0.260	1.646	0.028	0.028	-0.029
protected well	8.688***	-0.819	1.440	0.072	-0.002	0.066
unprotected well	1.774	-0.432	2.289	0.038	0.000	-0.042
rainwater	-1.707	-1.426	-0.420	0.039	-0.035	0.097
vendor/truck	-3.902	-0.481	0.448	0.067	-0.060	0.090
fb*piped (own tap)	-7.313*	-0.728	-0.540	-0.056	-0.373***	-0.124
fb*standpipe	1.512	-1.310	1.568	0.063	-0.108	0.081
fb*borehole	-3.548*	-1.001	-0.238	-0.037	-0.024	0.035
fb*protected well	-18.167***	0.769	-0.123	-0.116	0.063	-0.151*
fb*unprotect. well	-4.251	-1.496	-1.858	-0.042	-0.036	0.019
fb*rainwater	-10.530	-1.116	-1.358	-0.212***	0.056	-0.035
fb*vendor or truck	6.124	-2.558	0.185	-0.059	0.155	-0.216

Note: surface water is base category.

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Note: surface water is base category.

Conclusion

Is there a disproportionate work burden driven by birth-order?

- Yes
- The FBB can be a little "softer" depending on the nature of parental constraint that led to child work

Fist Born Burden Effect	hours of work	deviation from equal workload
firstborn	+	+
time-poor mother	+	.
time-poor father	+	
HK-poor mother	+	.
HK-poor father		.
fb*time-poor mother		
fb*time-poor father		-
fb*HK-poor mother	-	-
fb*HK-poor father		+

Conclusion

Can labor-saving technologies reduce the firstborn burden?

- Yes (water supply labor-saving technology)
- Piped water (own tap), borehole and protected well, in particular, seem to benefit the firstborns.

Labor-Saving Technology Effect	hours of work	deviation from equal workload
firstborn	+	+
piped (own tap)	-	.
public standpipe		.
borehole		
protected well	+	
unprotected well		
rainwater		
vendor/truck		
fb*piped water	-	-
fb*standpipe		
fb*borehole	-	
fb*protected well	-	-
fb*unprotected well		
fb*rainwater		-
fb*vendor or truck		

Implications for policy...

How could social policies address the *First Born Burden*?

- Intensity of child labor can be explained by time and human capital constraints of parents.
- Regressive targeting in social protection vs. infrastructure building?
- Watch out for changes in the hh equilibrium: benefiting firstborns could pass the burden ahead.


Thank you...

Determinants of child's hours of work (other controls)

	(A) housework	(B) hwater	(C) hmarket
female	5.610***	0.864***	-0.641
	(0.89)	(0.25)	(0.65)
age	2.786**	0.772**	2.720***
	(1.26)	(0.36)	(0.92)
age^2	-0.075	-0.028*	-0.086**
	(0.05)	(0.02)	(0.04)
attend school	0.144	0.236	-13.607***
	(1.33)	(0.38)	(0.96)
no siblings (base category)			
1 sibling	-1.233	-0.944	-5.706**
	(3.52)	(1.00)	(2.56)
2 siblings	-2.325	-0.405	-5.409**
	(3.38)	(0.96)	(2.45)
3 siblings	0.149	-0.731	-5.597**
	(3.41)	(0.97)	(2.48)
4 siblings	-0.291	-0.234	-3.641
	(3.45)	(0.98)	(2.51)
5 or more siblings	-0.055	-0.907	-5.950**
	(3.53)	(1.00)	(2.56)
adult women	0.835	-0.066	1.201
	(1.33)	(0.38)	(0.97)
adult men	-1.776**	-0.034	-0.454
	(0.85)	(0.24)	(0.62)
adult elders	1.828	-0.126	0.373
	(1.25)	(0.36)	(0.91)
logXpcR	0.504	0.439***	-0.217
	(0.60)	(0.17)	(0.43)
electricity	0.602	0.019	-1.546*
	(1.09)	(0.31)	(0.79)
distance to source	-0.901	1.346**	
	(2.20)	(0.63)	
region dummies	Yes	Yes	Yes
N	1295		
r2	0.181	0.107	0.370
F	5.862	3.174	15.945

Determinants of deviation from equal workload (other controls)

	(A) housework	(B) collect water	(C) market work	(D) total work
female	0.118***	0.071***	-0.005	0.074***
	(0.01)	(0.02)	(0.02)	(0.01)
age	0.123***	0.145***	0.054**	0.131***
	(0.02)	(0.02)	(0.03)	(0.02)
age^2	-0.004***	-0.005***	-0.001	-0.005***
	(0.00)	(0.00)	(0.00)	(0.00)
attend school	-0.011	-0.026	0.088***	-0.053***
	(0.02)	(0.03)	(0.03)	(0.02)
1 sibling	-0.039	0.003	-0.240***	-0.027
	(0.03)	(0.03)	(0.04)	(0.03)
2 siblings	-0.012	0.003	-0.169***	-0.011
	(0.02)	(0.03)	(0.03)	(0.02)
3 siblings	-0.013	0.016	-0.073**	-0.007
	(0.02)	(0.03)	(0.03)	(0.02)
4 siblings	-0.005	0.056**	-0.064**	-0.000
	(0.02)	(0.03)	(0.03)	(0.02)
5 or more siblings (base category)				
adult women	0.002	0.038	-0.067***	0.003
	(0.02)	(0.02)	(0.02)	(0.01)
adult men	0.013	0.011	0.045**	0.007
	(0.01)	(0.02)	(0.02)	(0.01)
adult elders	0.006	0.015	-0.028	0.004
	(0.02)	(0.02)	(0.03)	(0.02)
logXpcR	-0.001	-0.012	0.004	0.000
	(0.01)	(0.01)	(0.01)	(0.01)
electricity	-0.010	0.009	0.093***	-0.002
	(0.02)	(0.02)	(0.02)	(0.01)
distance to source	-0.000	0.006	-0.000	-0.000
	(0.00)	(0.01)	(0.01)	(0.00)
region dummies	Yes	Yes	Yes	Yes
N	1346	1346	1346	1346
r2	0.300	0.231	0.306	0.324
F	12.573	8.996	21.926	13.820

The FBB effect

No child labor in **non poor households**

Child labor in **time constrained households**

$$\begin{aligned} MRS_{C_H,L} &= MRT_{t_i^j,L_i} \\ \frac{\partial U_H(t^j,L;\tau)/\partial C_H}{\partial U_H(t^j,L;\tau)/\partial L} &= \frac{\partial R(L_i)/\partial L_i}{\partial g_i(t^j,X;\tau)/\partial t_i^j} \end{aligned}$$

Child labor in **capacity constrained households**

$$\begin{aligned} MRT^{adult}_{t_i^j,L_i} &\leq MRT^{child}_{t_i^j,L_i} \\ \frac{\partial R(L_{adult})/\partial L_{adult}}{\partial R(L_{child})/\partial L_{child}} &< \frac{\partial g_{adult}(t^j,X;\tau)/\partial t^j_{adult}}{\partial g_{child}(t^j,X;\tau)/\partial t^j_{child}} \end{aligned}$$