

Health and Civil War in Rural Burundi

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Motivation

- 2/3 of all African countries experienced armed conflict during 1980s and 1990s
 - Limited research measuring microeconomic impacts of war
 - Indirect (health) effects from civil war potentially larger compared to direct casualties
- Link between shocks early in life and long-run negative adult welfare outcomes
 - Limited research on mechanism establishing how early life shocks affects children in the short-run
- Research Question: What is the impact of armed conflict on young children's health status

Literature

- Alderman, Hoddinot and Kinsey (2006) for Zimbabwe healthier children complete more grades
- Alderman, Behrman, Lavy and Menon (2001) for Pakistan healthier children have higher schooling and productivity
- Meng and Qian (2006) long-run adverse effects of China's Great Famine on adult health and work capacity
- evidence of negative effect of prenatal shock
Almond (2006) finds lower educational attainment, increased rates of disability and lower socio-economic status of children who were in utero during the 1918 influenza pandemic

Thus: we expect long-run effects for Burundian children exposed to civil war through the deterioration of child health

Preview of Method

- Empirical identification strategy exploits 2 sources of variation
 - Variation in when and which regions experienced civil war
 - Variation in birth-cohort measuring child's exposure to the shock
- Check for selection effect
- Estimate province and birth-cohort fixed effects regressions
- Control for province-specific trends
- Examine Burundian children born between 1993 and '98
- Use Priority Household Survey data (1998) on a child's height and birth-cohort
- Combine with scholarly sources on intensity and geographic extent of civil conflict

Research Summary

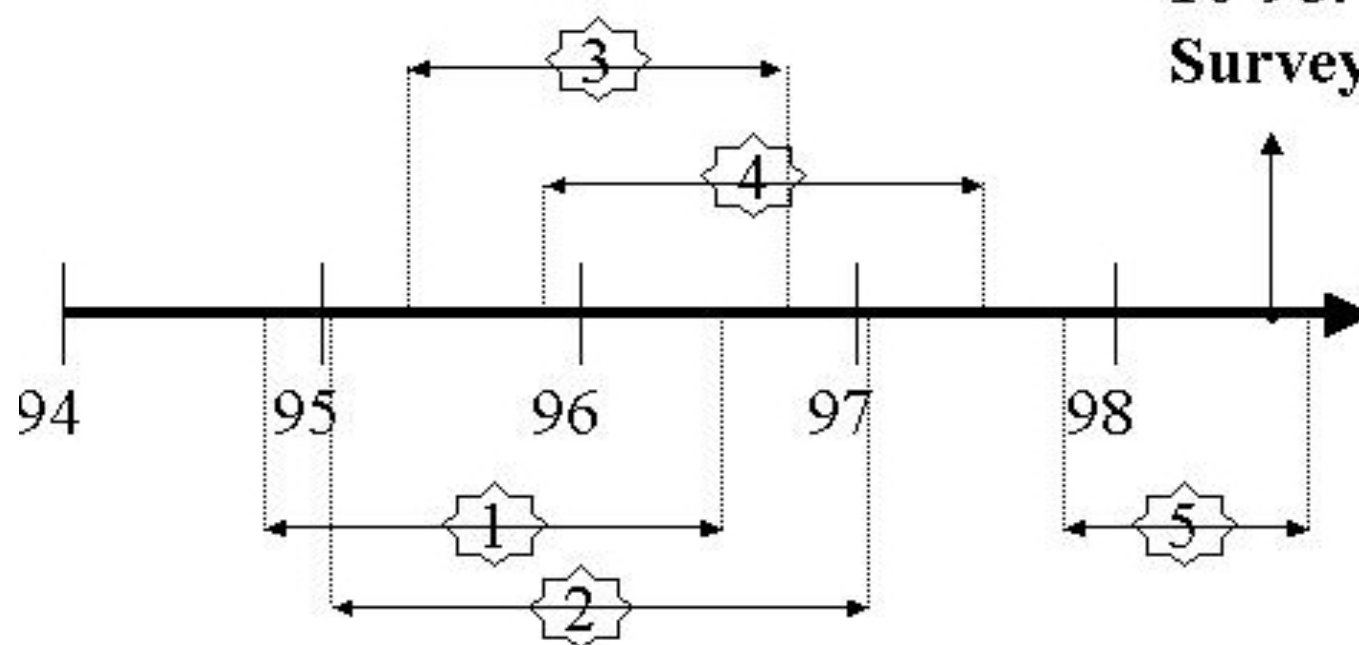
- Health status of Burundian children is very poor
- Civil war negatively impacts child health
- Height for Age z-scores of children exposed to the civil conflict are between 0.44 and 1.0 standard deviations lower, depending on the specification, compared to non-exposed children
- We argue that this is a causal impact of the war and is not due to a spurious correlation
- Policy Implications: Early interventions may yield big impacts

Civil war in Burundi: overview

- 1965 failed coup followed by purge
- Tutsi dominance of the army
- 1972 Hutu insurgency followed by mass killing of Hutu by the army
- Power concentration in hands of small group from the southern province of Bururi
- 1988 same situation as in 1972, this time condemned by the international community
- 1993 first democratically elected president, Melchior Ndadaye
- Murdered by the army, followed by large-scale massacres of Tutsi civilians by Hutu civilians (in particular in the north). Severe retaliation by the army
- 1993-1998: civil war between army and rebel forces
- The war is described as a struggle for state power where the latter is considered the provider of resources to one's kin



10-98: Survey



- ① Bubanza, Bujumbura Rural, Cibitoke, Ngozi
- ② Kayanza
- ③ Ruyigi, Karuzi, Muyinga, Bururi
- ④ Muramvya, Kirundo, Gitega
- ⑤ Bubanza, Cibitoke, Bujumbura Rural

The 1998 Priority Survey and the key variable

Survey

- Isteebu and WB
- Nationally representative, but 3 provinces not surveyed
- 3.900 rural households
- 1.442 children under 5
- 1.169 children with complete data

Civil war dummy variable

=1 if the child was exposed to the civil war.

We exploit province and cohort-of-birth variation

Province	N	Average Height for Age Z-Score	Not Malnourished (%)	Moderately Malnourished (%)	Severely Malnourished (%)	Poverty Headcount in 1990 (% Poor)
Bururi	105	-1.68	63.8	16.2	20.0	37.7
Cankuzo	43	-2.21	46.5	18.6	34.9	25.1
Cibitoke	34	-1.56	61.8	17.6	20.6	19.6
Gitega	163	-2.40	35.0	35.0	30.0	35.2
Karuzi	85	-2.36	40.0	20.0	40.0	66.8
Kayanza	144	-2.67	25.0	36.8	38.2	44.9
Kirundo	87	-2.45	34.5	32.2	33.3	34.0
Muramvya	109	-1.94	51.4	25.7	22.9	24.0
Muyinga	121	-2.23	43.0	22.3	34.7	27.8
Ngozi	148	-2.58	31.8	29.7	38.5	42.5
Rutana	65	-1.95	47.7	24.6	27.7	58.0
Ruyigi	65	-2.43	38.5	23.0	38.5	41.0
Rural Burundi	1169	-2.29	40.6	26.7	32.7	36.2

Province	Shock = 0 (Not Exposed to Conflict During Life)	Shock = 1 (Exposed to Conflict During Life)	Mean Difference
	(1)	(2)	(1)-(2)
Bururi	-1.185	-1.991	0.806***
Cankuzo	-2.213		
Cibitoke		-1.562	
Gitega	-1.901	-2.610	0.709***
Karuzi	-2.054	-2.591	0.537
Kayanza	-2.316	-2.843	0.527**
Kirundo	-2.248	-2.521	0.273
Muramvya	-1.111	-2.354	1.244***
Muyinga	-1.606	-2.659	1.053***
Ngozi	-2.143	-2.907	0.764***
Rutana	-1.945		
Ruyigi	-1.823	-2.893	1.070***
Rural Burundi	-1.879 n = 478	-2.554 n = 691	0.675*** [0.086]
Child's Age (in months)	18.82	39.58	-20.76***

Effect of age ?

Could be:

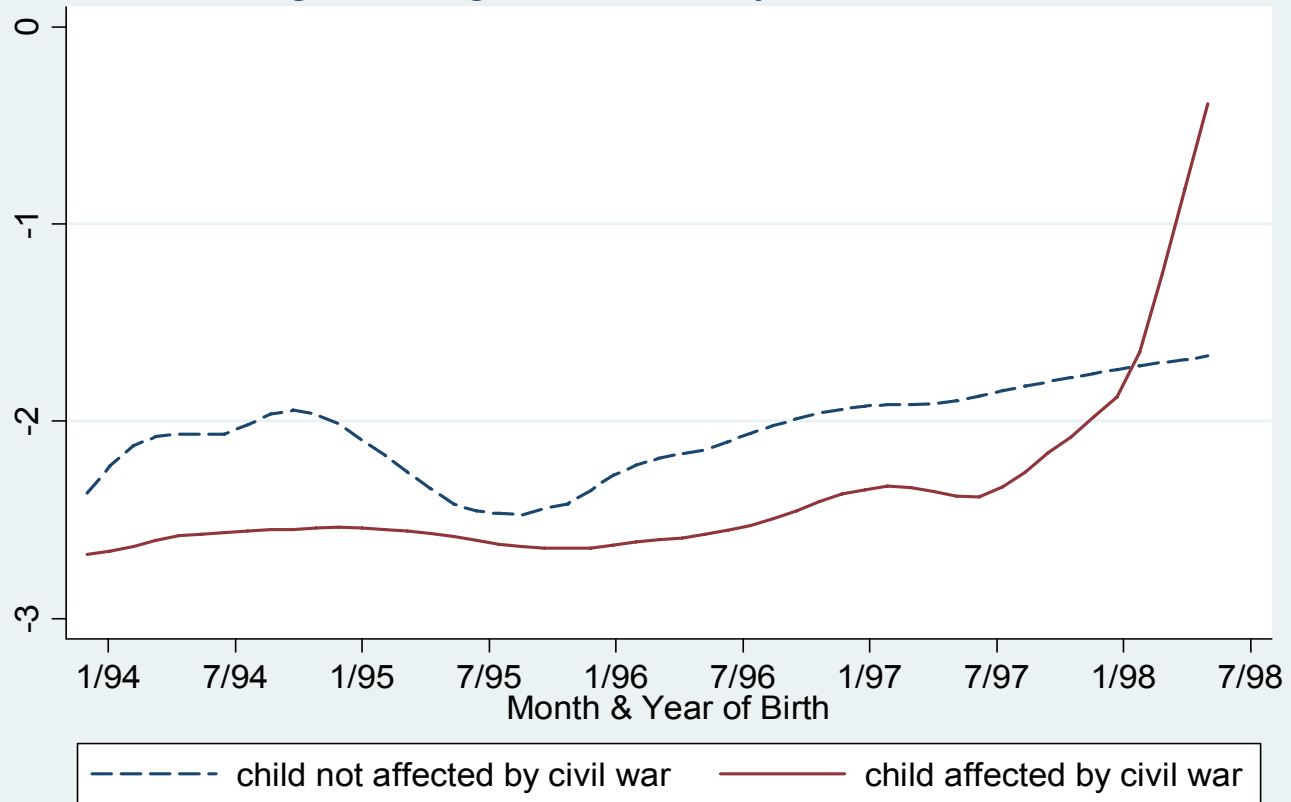
- height for age is a stock variable, reflecting past and current investments
- older children accumulate larger deficits during their lives (non-linear age effect)

But:

- Impact of conflict not due to older children being more likely to be exposed (see table)

Difference-in-Difference table comparing young and old children			
	Old	Young	Difference
Child Not Exposed to Civil War	-2.162	-1.813	-0.350**
	[0.149]	[0.074]	[0.172]
Child Exposed to Civil War	-2.530	-2.274	-0.256
	[0.065]	[0.190]	[0.191]
Difference	-0.368**	-0.461**	0.094
	[0.156]	[0.203]	[0.259]

Height for Age Z-scores by Civil War Shock



Effect of Poverty?

Could be:

- older children in poor regions/households accumulate a larger poverty-induced health deficit than older children in non-poor regions (Duflo 2003)
- younger children in poor and non-poor regions look more alike

But:

- impact of conflict not due to the poverty of the affected regions (see table)

Difference-in-Difference table Comparing poor and non-poor provinces			
	Poor Province	Non-Poor Province	Difference
Child Not Exposed to Civil War	-1.872	-1.888	0.016
	[0.082]	[0.104]	[0.132]
Child Exposed to Civil War	-2.443	-2.600	0.157
	[0.086]	[0.097]	[0.130]
Difference	-0.571***	-0.712***	0.141
	[0.113]	[0.118]	[0.163]

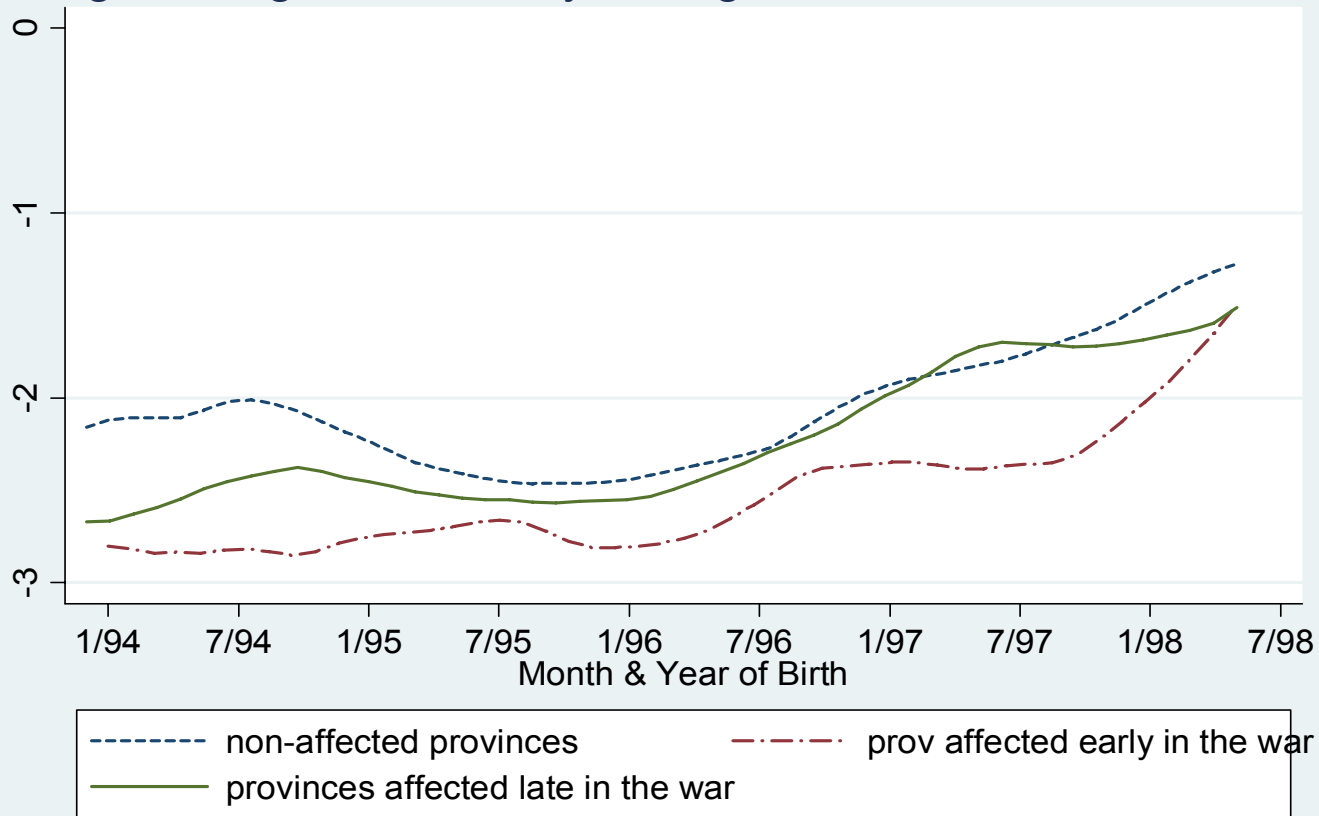
Table 4: Percentage of Children Affected by Civil War by Province Poverty Status

Province Poverty Status	Number of Children	Percent of Children Exposed to Civil War
Poor Province	620	59.8
Non-Poor Province	549	58.3

Table 5: Observable Characteristics Across Regions

Variables	Early civil war	Late civil war	No civil war
Percentage of Household Heads with Any Education	32.8	36.3	36.1
Percentage of Literate Mothers	30.7	28.4	28.7
Pre-War Poverty Headcount (% Poor in 1990)	31.16	37.99	47.85

Height for Age Z-scores by Timing of Civil War-Province Shock



Econometric specification

Baseline specification

$$HAZ_{ijt} = \alpha_j + \beta_1 (\text{Conflict Province}_j * \text{Alive During Conflict}_t) + \delta_t + \varepsilon_{ijt}$$

Other specifications:

Include other shock measures : shock=1 if child alive in province affected by civil war between 6 and 24 months of age

Include household characteristics: gender of the child; education, gender, age and marital status of the head

Include Province Trend $_{jt}$: (1) interaction between δ_t and poverty
(2) Interaction between δ_t and α_j

Table 6: Determinants of Anthropometric Outcomes in Rural Burundi

Dependent variable: Children's Height for Age Z-Score	Alternative Conflict Shock Definition				
	(1)	(2)	(3)	(4)	(5)
Civil War Conflict Shock	-0.443**	-0.340*	-0.442**	-0.599***	-1.047*
	[0.201]	[0.191]	[0.183]	[0.215]	[0.541]
Province Fixed Effects?	Yes	Yes	Yes	Yes	Yes
Birth Cohort Fixed Effects?	Yes	Yes	Yes	Yes	Yes
Poor Province * Birth Cohort Fixed Effects?	No	No	No	Yes	No
Province * Birth Cohort Fixed Effects?	No	No	No	No	Yes
Number of children	1169	1169	1169	1169	1169

Households in Conflict Network

www.hicn.org