Exploring the link between structural adjustment programs, education discontinuities and stalled fertility in Sub-Saharan Africa

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The Demographic Effects of Girls' Education in Developing Countries

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o Outline

- o Background
- o Data and Methods
- o Descriptive Analysis
- o Multivariate analysis Results
- o Conclusion

I. Background

- Starting from the 1980s, quite late compared to other low-income regions, Sub-Saharan African countries have shown clear signs of a general decline in fertility (Bongaarts,2013).
- However, particularly in the second half of the 1990s and early 2000s, they have experienced a levelling off of in their fertility decline and in some cases even a reversal leading to an increase –so called -stalling in the fertility transition.

Figure: Many countries e.g. Congo, Kenya, Tanzania and Zimbabwe have experienced a fertility stall around the year 2000

Source: United Nations 2015

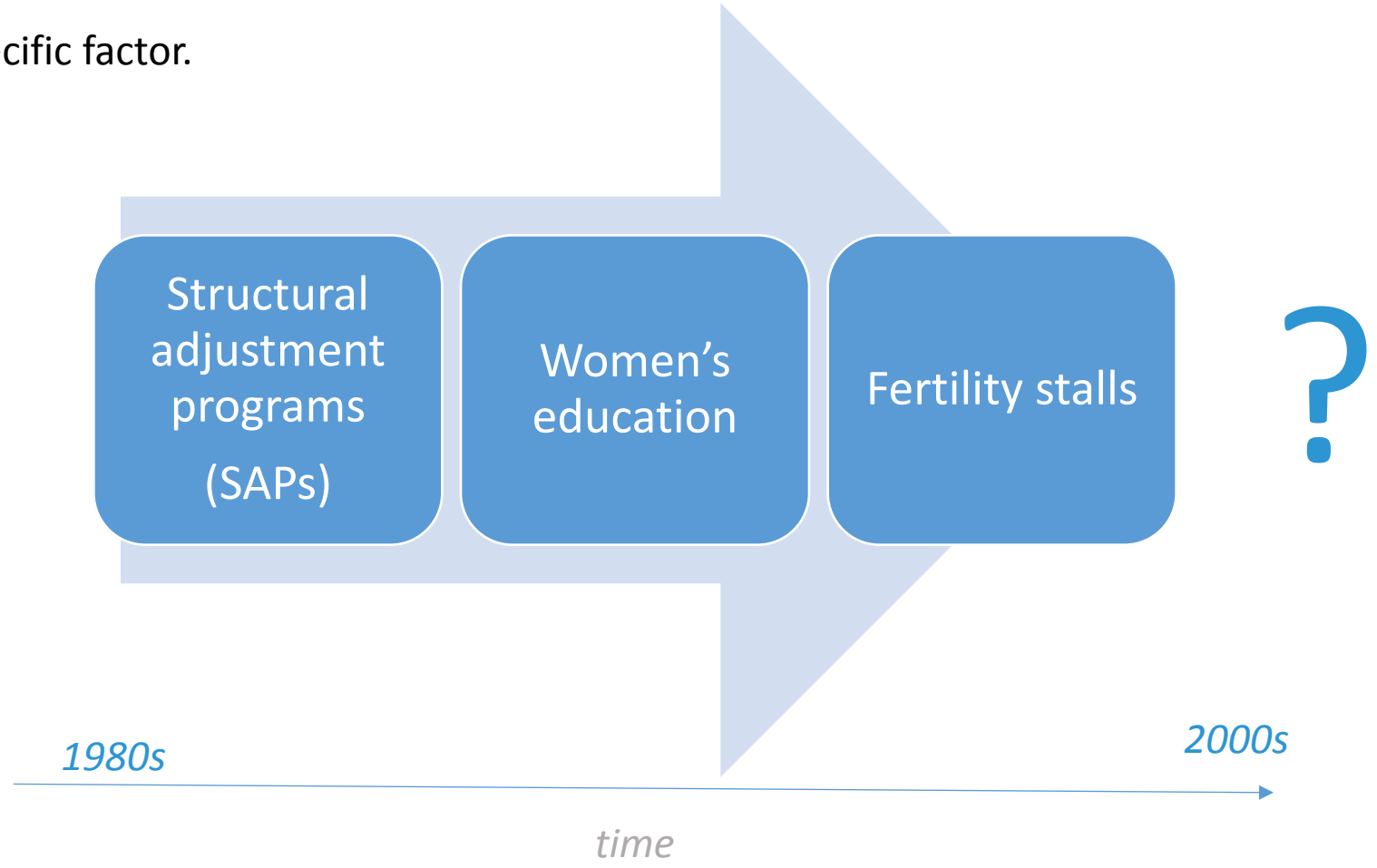
I. Background…

Reasons for the fertility stalls

- The observed fertility stall of the region remains a demographic 'mystery' as little consensus exists on the causes of the stalls.
- Many scholars link the fertility stalls with period specific factors
  - Slower trends in socio economic developments (low level of education of women and GDP growth) and lower priority assigned to family planning programs (Bongaarts 2008; Shapiro and Gebreselassie 2007)
  - Impact of HIV/AIDS mainly through child mortality (Westroff and Cross 2006)
  - No common factor(s) among countries (Garenne 2008)
  - No clear consensus (Moultrie et al. 2008)
  - Other researchers (Schoumaker 2009, Machiyama 2010) claim that the stalls are spurious

I. Background…

There is a plausible and convincing ground to think that the stall would also come from a cohort specific factor.



Source: Goujon, Lutz and K.C. 2015

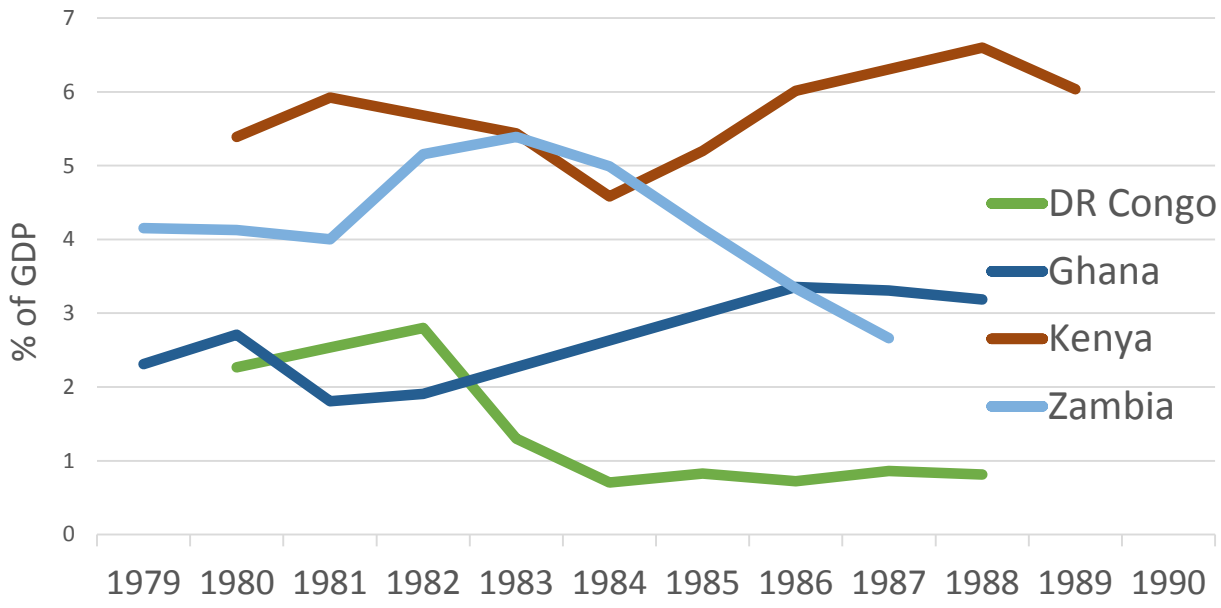
I. Background…

SAPs affected the education sector of SSA

Aims: Restructure economies and stabilize public finances

Tools: reduce the role and the size of government spending i.e. cuts in health & education budgets

Figure: Government expenditure on education as % of GDP (%)



Source: UNESCO Institute for Statistics

I. Background…

Fertility stall - definition and criteria

Different Criteria in determining the stalled countries:

- Bongaarts(2008): Consider countries in mid of transitions (2.5<TFR<5)
  - Stall: Non-significant decline in fertility ($p<0.05$) b/n surveys
- Shapiro and Gebreselassie (2008): consider countries with TFR<7
  - Stall: Absence of a decline between 2 measurements
- Schoumaker (2009): TFR, before the stall, was at least 10% lower than it was in the previous survey
- Garenne (2008): Fertility slope change from negative to nil or positive

- Our criteria:

A country is labelled as "fertility stalled" if the ratio of TFR between two consecutive periods (2000-2005/1995-2000 or 2005-2010/2000-2005) is 0.98 or above.
Congo, Gambia, Kenya, Mali, Mozambique, Niger, Nigeria, Tanzania, Zambia, Zimbabwe

II. Study Objective

- The main objective of this study is to explore the link between SAPs (through their possible impact on cohort-wise discontinuities in educational progress) and observed stalls in the declines of period TFRs in Sub-Saharan Africa.
- To examine the relative impact of period related shocks (slowing of economic advancements) and cohort education in explaining the fertility trends in the region.

III. Data and Methods

- 18 SSA countries are considered in the study-representing about 66 percent of the population of the region in 2015 (United Nations 2015)

Stalled countries according to Goujon et al. and others	Stalled countries according to others*
Congo, Gambia, Kenya[ALL], Niger, Nigeria, Tanzania, Zambia, Zimbabwe	Benin[MA], Cameroon[BO,SH], Côte d'Ivoire[BO], Ethiopia[BO], Ghana[BO,SH,GA] and Uganda[BO]

+

Not stalled according to Goujon et al.
Burkina Faso, Gabon, Guinea, and Senegal

* Others criteria: Bongaarts (2005, 2008--BO), Garenne (2008--GA), Schoumaker (2009--SC), Shapiro and Gebreselassie (2008--SH), Machiyama (2010 -- MA), Shapiro (2011--SH).

III. Data and Methods…

- Data from 64 demographic and health surveys (DHS) collected in the 18 sampled countries over the period 1990-2014.
- Two steps:

First step: Descriptive analysis

  - Trends in ASFR and cohort education have been reconstructed and compared for birth cohorts of women born over the period 1960-1990;
  - Cohort education is measured as the proportion of women in a given 5-year birth cohort with at least some education;
  - Cohort education is referred to as ‘stalled’ if the growth of share of women with some education between two-consecutive 5 years birth cohorts is less than or equal to 1 percent (Goujon et al. 2015)

III. Data and Methods…

Second step: Multivariate analysis

- Objective: To explore the relative impact of period-related factors (slow down of economic developments) and of education on cohort-fertility transitions in SSA
- Discrete time survival models has been estimated to analyze durations to second birth.

- 460,808 second order births were extracted from the pooled DHSs of the 'fertility stalled' countries: Congo, Gambia, Kenya, Niger, Nigeria, Tanzania, Zambia and Zimbabwe.

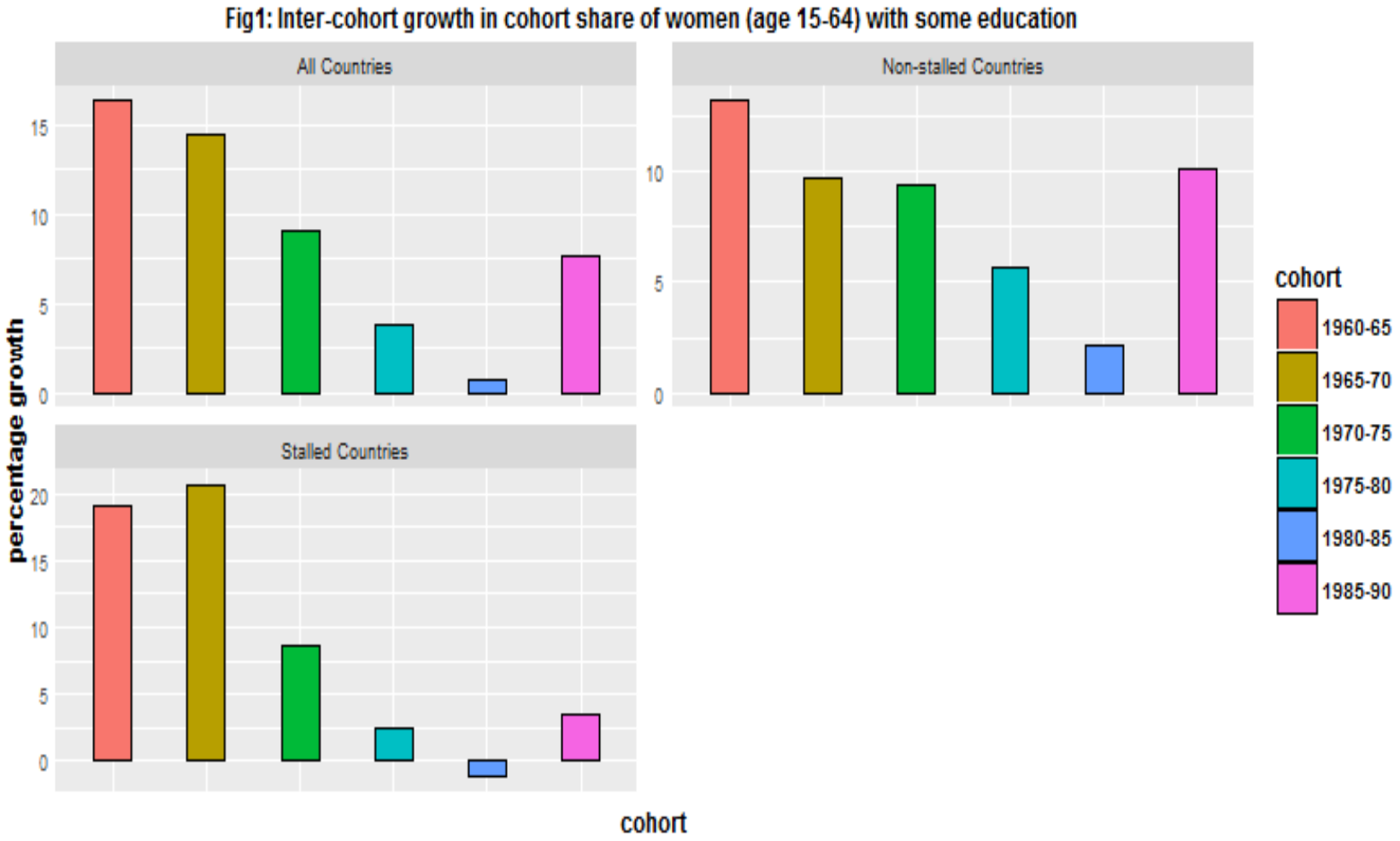
III. Data and Methods…

Multivariate Analysis

- Cohort education from DHSs
  - Proportion of women (15-64) with some education by single year birth cohort
- Real GDP/capita (1960-2011) form Penn World Table 8.1
  - Time varying
- Other background characteristics
  - Age of mother at time of exposure
  - Area of residence of mother (urban/rural)
  - Sex of previous child (0/1)
  - Survival status of previous child

IV. Descriptive Analysis

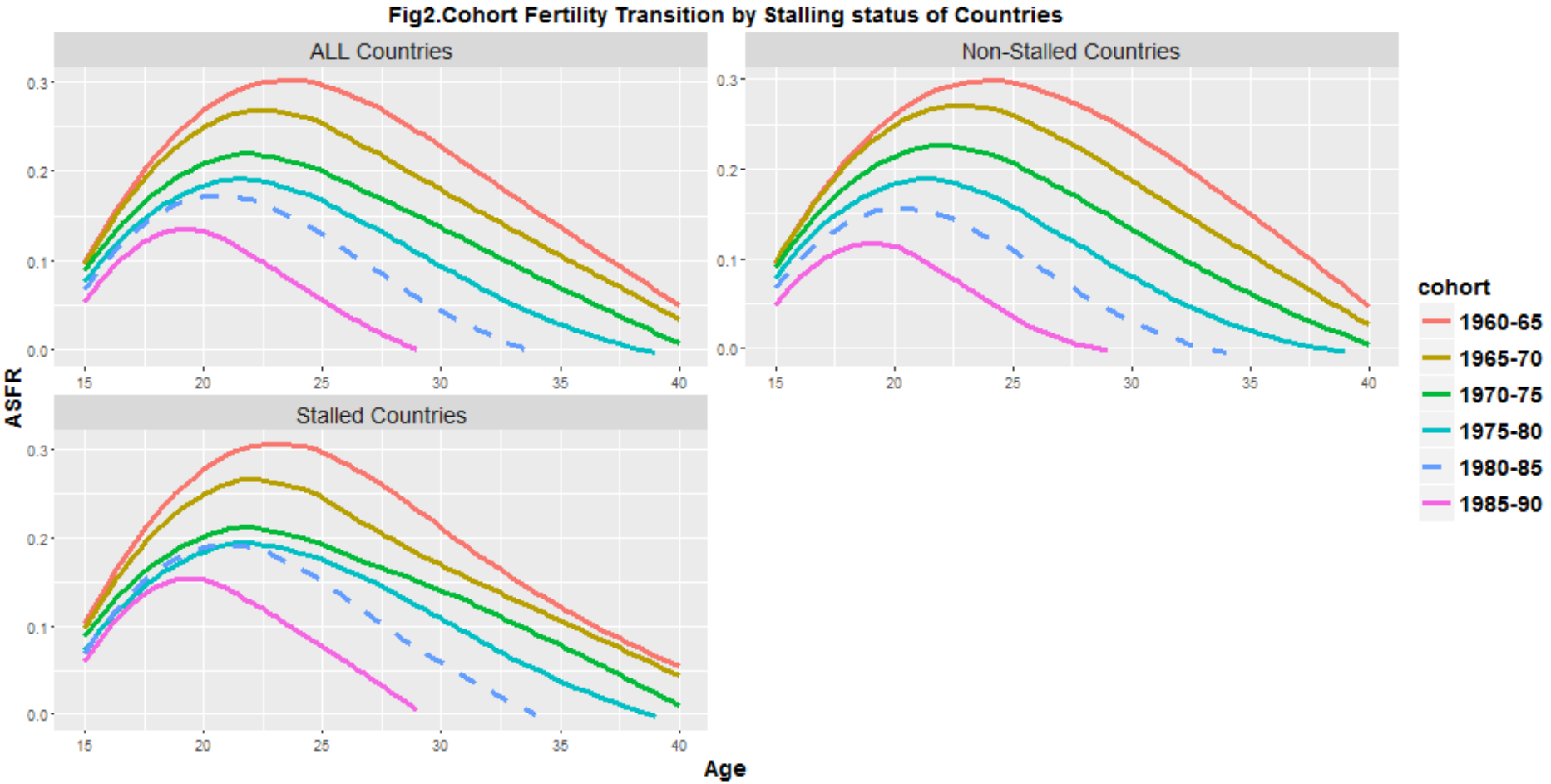
- Inter-cohort educational progress by 'fertility stalling' status of countries



Source: DHS rounds, 18 countries

IV. Descriptive Analysis…

- Inter-cohort Fertility patterns by 'fertility stalling' status of countries



Source: DHS rounds, 18 countries

IV. Descriptive Analysis…

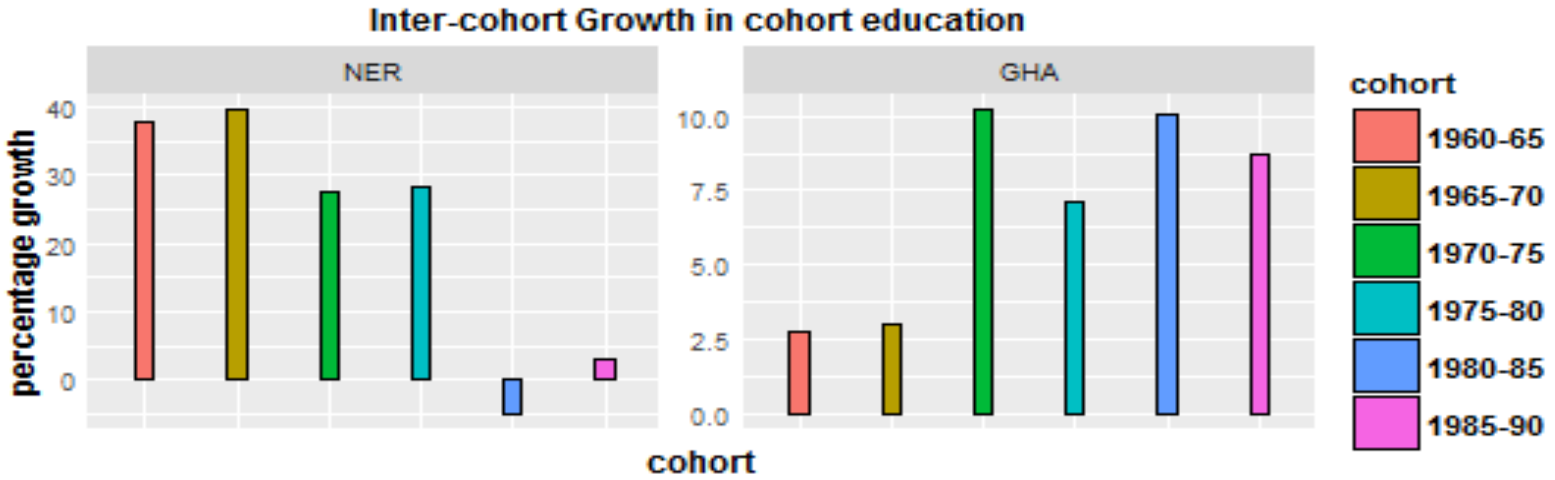
- Education and fertility stalls at country level

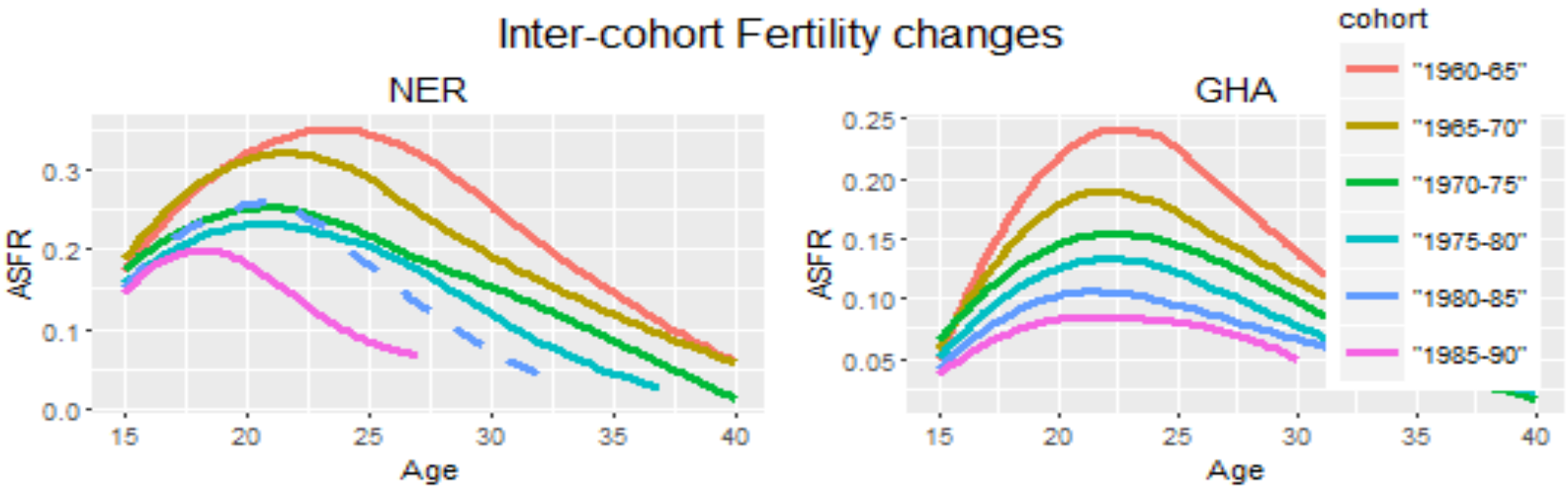
	% Inter-cohort Growth in cohort share of women(15-64) with some education						Educational Stall between cohorts 1975- 1985	Ratio of period TFRs		Period Fertility Stall
Cohorts:	1960/ 1965	1965/ 1970	1970/ 1975	1975/ 1980	1980/ 1985	1985/ 1990		2000-05/ 1995-00	2005-10/ 2000-05	
Benin	9.82	36.18	4.23	2.89	16.57	39.90	No	0.94	0.92	No
Burkina Faso	35.02	19.43	25.97	38.20	9.61	36.06	No	0.96	0.95	No
Côte d'Ivoire	4.16	29.26	22.84	15.48	-11.04	8.88	Yes	0.94	0.94	No
Cameroon	12.76	4.310	5.499	4.841	1.613	5.174	No	0.95	0.95	No
Ethiopia	61.63	26.31	37.24	17.16	11.95	51.11	No	0.90	0.86	No
Gabon	**6.62**	**5.53**	**1.18**	**-0.36**	**1.94**	**1.23**	**Yes**	**0.91**	**0.95**	**No**
Ghana	2.74	2.98	10.25	7.09	10.03	8.71	No	0.95	0.94	No
Guinea	17.90	4.96	13.83	5.91	66.57	43.4	No	0.95	0.94	No
Senegal	**17.64**	**1.84**	**8.59**	**16.16**	**-11.41**	**1.48**	**Yes**	**0.93**	**0.96**	**No**
Uganda	8.65	10.01	10.68	6.62	5.50	7.40	No	0.97	0.95	No
Congo	21.24	12.47	2.65	1.81	-0.16	1.53	Yes	1.00	0.99	Yes
Gambia	**-10.4**	**118.5**	**22.46**	**26.04**	**24.27**	**37.38**	**No**	**0.98**	**0.99**	**Yes**
Kenya	19.67	14.50	2.75	2.41	-1.14	-1.94	Yes	0.99	0.96	Yes
Niger	37.67	39.73	27.69	28.10	-4.875	1.931	Yes	1.00	1.00	Yes
Nigeria	28.41	23.01	12.31	1.0	3.620	5.14	Yes	0.98	0.98	Yes
Tanzania	33.77	23.66	4.45	2.31	-1.12	0.54	Yes	0.98	0.99	Yes
Zambia	5.47	3.34	1.22	3.07	0.29	2.31	Yes	0.98	0.98	Yes
Zimbabwe	4.53	13.62	4.84	1.70	0.122	0.791	Yes	0.96	1.00	Yes

Source: DHS rounds, 18 countries

IV. Descriptive Analysis…

- The inter-cohort educational patterns are reflected in the inter-cohort ASFR patterns: The example of Niger and Ghana

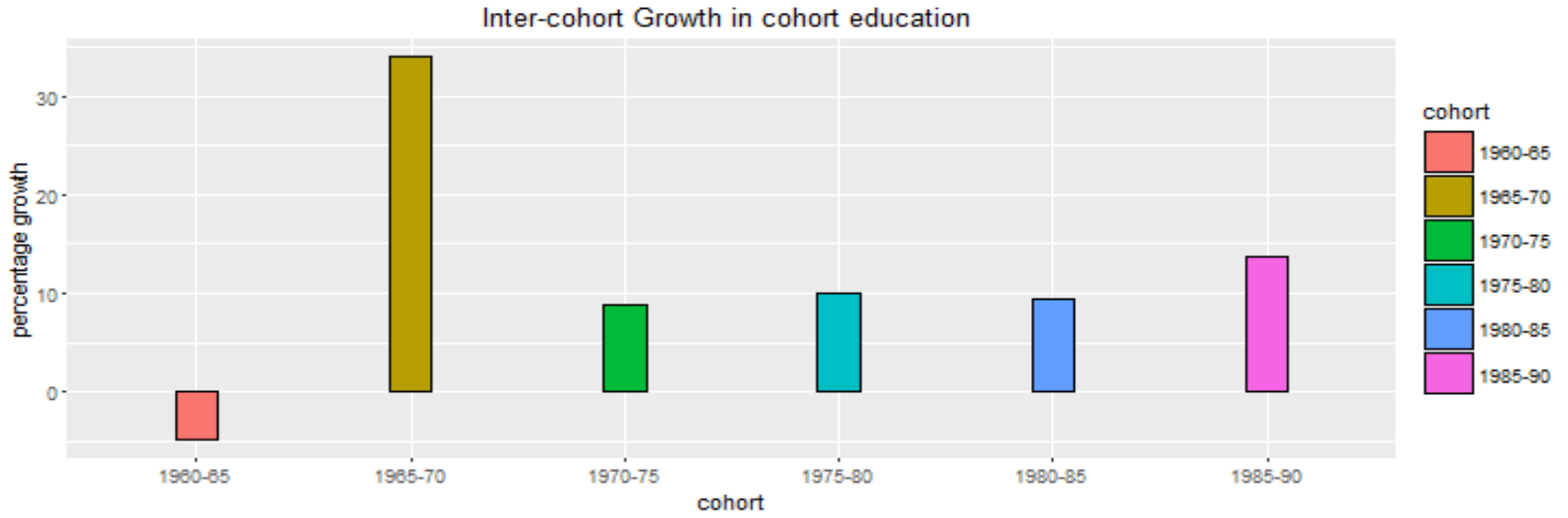


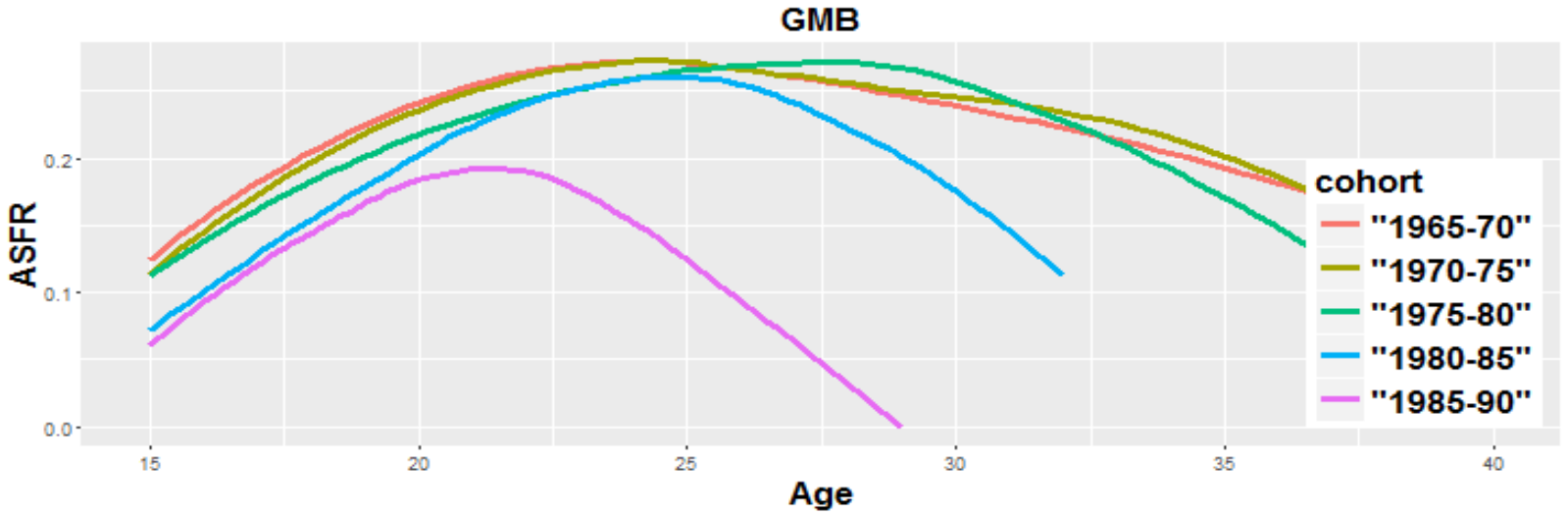


Source: DHS rounds, Niger and Ghana

IV. Descriptive Analysis…

- Gambia experienced a fertility stall despite smooth progress in inter-cohort education, due to period-related shocks

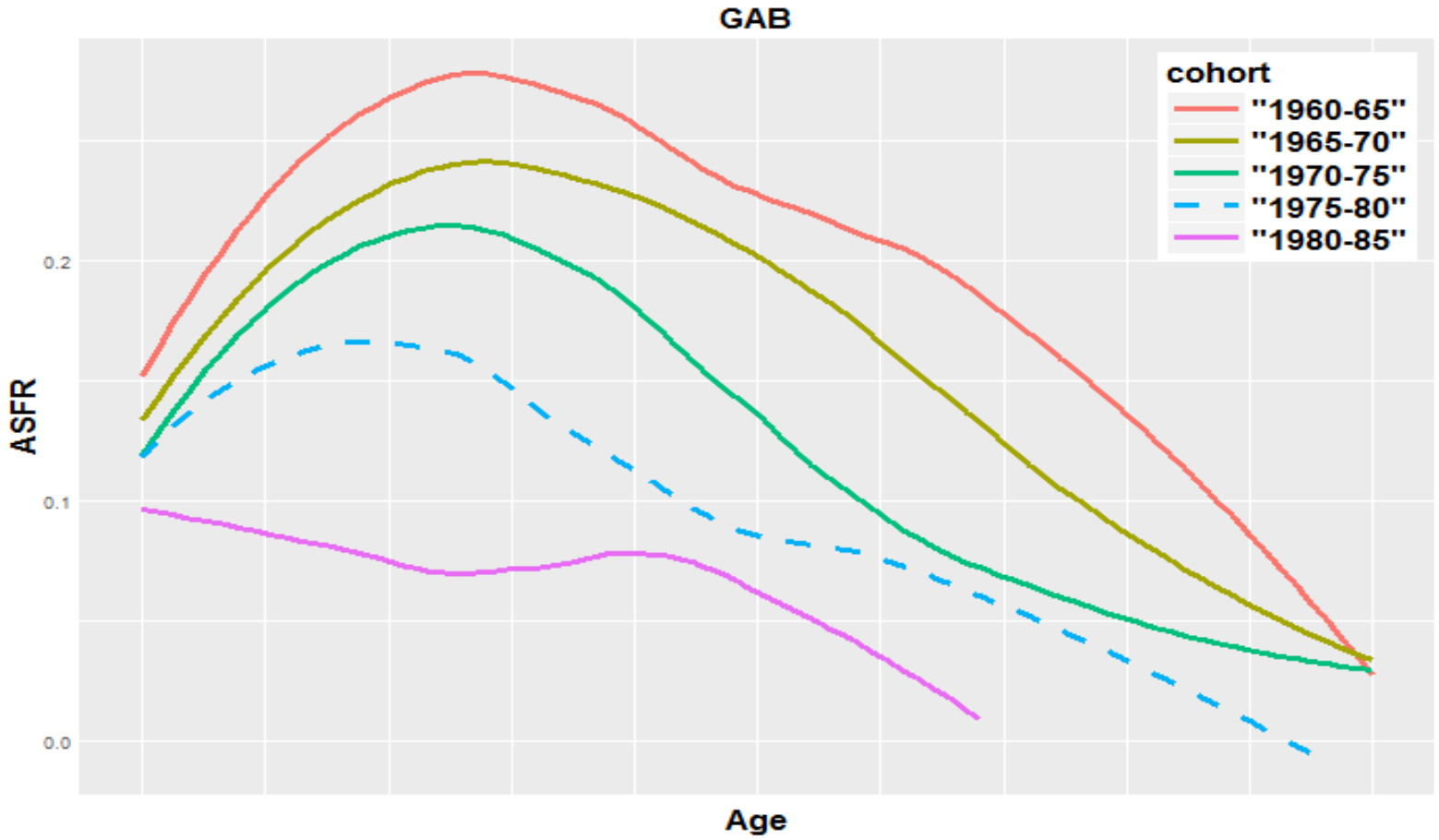




Source: several DHS rounds, Gambia

IV. Descriptive Analysis…

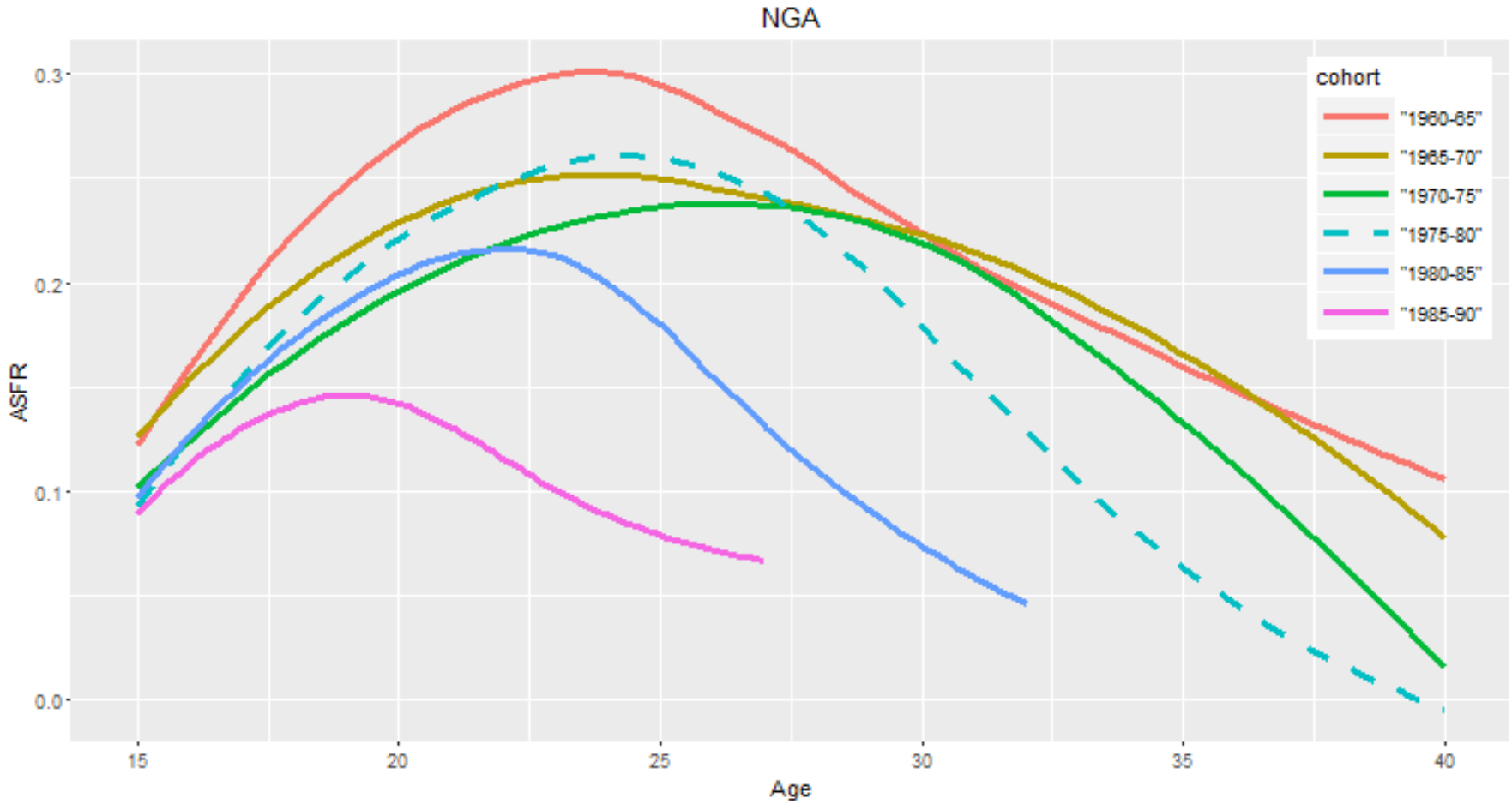
- Gabon shows no signs of stalling fertility despite stalling in inter-cohort educational progress



Source: DHS rounds, Gabon

IV. Descriptive Analysis…

- Some countries e.g. Nigeria and Côte D'Ivoire are affected by both educational discontinuity and period-related shocks that co-appeared at the same time



Source: Several DHS rounds, Nigeria

IV. Descriptive Analysis - Main Findings

- Most countries that experienced a 'stall' in period fertility declines also experienced a 'stall' in inter-cohort educational progress for those cohorts of women who were of primary school age during SAP implementation period.
- The observed fertility stall is cohort-wise and occurred only among the younger age-groups.
- **Three possible explanations:**
  I. Cohort related factors(cohort education through SAP)
  II. Age-selective periodic shocks
  III. A combination of both

- Understanding the relative impact of the educational stall and period-related shocks requires a **multivariate analysis.**

V. Econometrics Results…

Risk of having the next birth: Model selection

	Model 1	Model 2
	OR(SE)	OR(SE)
Birth cohort (ref=1950-55)		
cohort1955-60	0.91 ***	0.92 ***
	(1.02)	(1.02)
cohort1960-65	0.86 ***	0.86 ***
	(1.02)	(1.02)
cohort1965-70	0.78 ***	0.77 ***
	(1.02)	(1.02)
cohort1970-75	0.71 ***	0.71 ***
	(1.02)	(1.02)
cohort1975-80	0.70 ***	0.70 ***
	(1.02)	(1.02)
cohort1980-85	0.70 ***	0.69 ***
	(1.02)	(1.02)
cohort1985-90	0.66 ***	0.66 ***
	(1.02)	(1.02)
Survival status of prev. child (Ref= survive)		
Died within two years	1.89 ***	1.79 ***
	(1.01)	(1.01)
Residence (ref=Urban)		
rural	1.34 ***	1.33 ***
	(1.01)	(1.01)
Age at risk	0.98 ***	0.98 ***
	(1.00)	(1.00)
Sex of index Child	YES	YES
Interval (years)	YES	YES
Constant	0.04 ***	0.04 ***
	(1.03)	(1.08)
AIC	686508.99	682351.47
BIC	686739.56	682593.57
Log Likelihood	-343234.49	-341154.74
Deviance	686468.99	
Num. obs.	750595	750595
Num. groups: country		8
Var: country (Intercept)		0.04

*** p < 0.001, ** p < 0.01, * p < 0.05

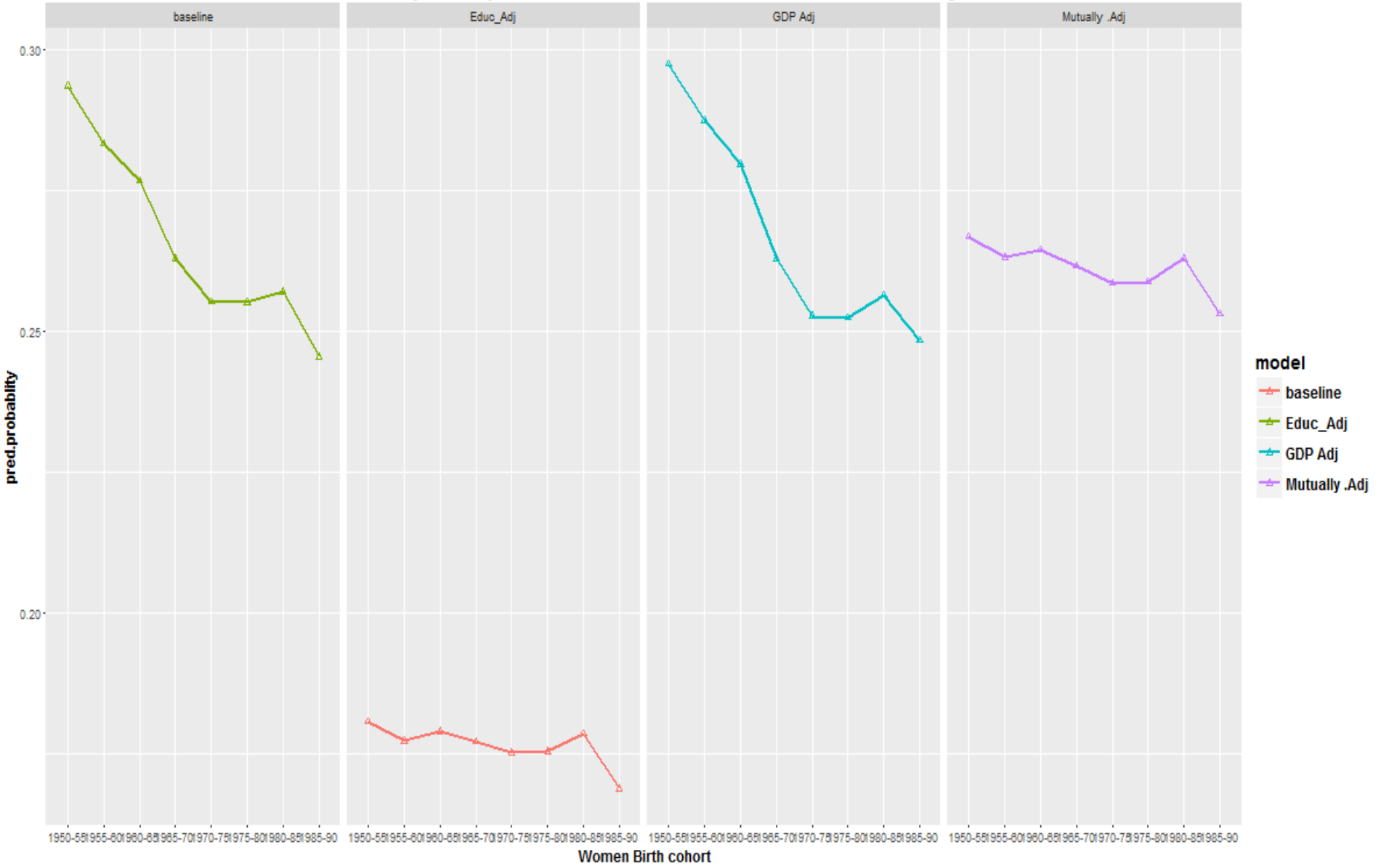
Weighted logistic regression results - Odds of giving 2nd birth (odds ratios)

VARIABLES	(1) Baseline	(2) Educ Adjust[i].	(3) Period Adj1[ii].	(4) Mutual Adj1[iii].
Birth cohort(ref=1950-55)				
1955-60	0.940**	0.977	0.942**	0.977
	(0.0273)	(0.0284)	(0.0273)	(0.0284)
1960-65	0.903***	0.988	0.898***	0.985
	(0.0236)	(0.0261)	(0.0235)	(0.0261)
1965-70	0.829***	0.976	0.809***	0.968
	(0.0211)	(0.0255)	(0.0207)	(0.0257)
1970-75	0.789***	0.963	0.758***	0.949*
	(0.0199)	(0.0251)	(0.0195)	(0.0257)
1975-80	0.789***	0.964	0.757***	0.951*
	(0.0200)	(0.0253)	(0.0196)	(0.0260)
1980-85	0.798***	0.986	0.777***	0.976
	(0.0203)	(0.0259)	(0.0199)	(0.0262)
1985-90	0.741***	0.921***	0.738***	0.917***
	(0.0194)	(0.0248)	(0.0193)	(0.0248)
Survival status of index child (Ref=survive)				
Died within two years	1.936***	1.903***	1.933***	1.903***
	(0.0274)	(0.0270)	(0.0273)	(0.0270)
Residence(ref=Urban)	1.185***	1.185***	1.183***	1.185***
	(0.0111)	(0.0111)	(0.0110)	(0.0111)
z_some_educ		0.841***		0.843***
		(0.00465)		(0.00490)
z_logrgdpc_lag			0.980***	0.994
			(0.00382)	(0.00399)
Age at risk	0.982***	0.982***	0.982***	0.982***
	(0.00115)	(0.00115)	(0.00115)	(0.00115)
Interval(years)	YES	YES	YES	YES
Sex of index Child	YES	YES	YES	YES
Constant	0.0368***	0.0311***	0.0375***	0.0313***
	(0.00144)	(0.00122)	(0.00147)	(0.00124)
Observations	676,246	676,246	676,246	676,246
Log pseudo likelihood	-19357357	-19325083	-19355509	-19324934

i) The education coefficient is standardized
ii) The coefficient for real GDP/capita is standardized
iii) Education and GDP/capita coefficients are standardized

V. Econometrics Results…

The relative impact of period- versus cohort-wise effects on cohort fertility trends

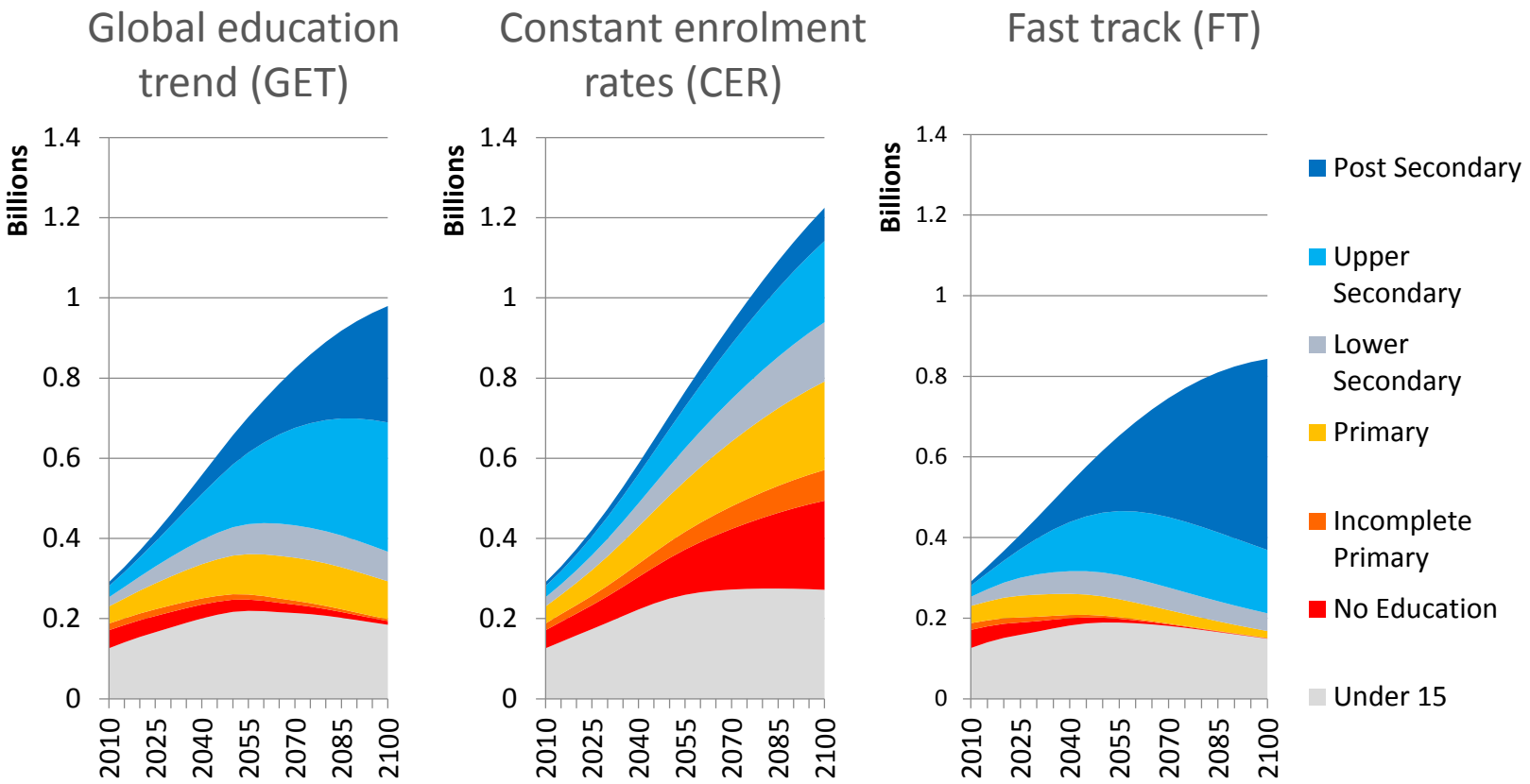


VI. Conclusion and Discussion

- Existence of cohort specific stall in inter-cohort educational progress.
- Fertility stalls come from a cohort that experienced a ‘stall’ in inter-cohort educational progress.
- Inter-cohort fertility patterns were mainly detected by women education.
- Further improvements in education could lead the population of SSA countries to increase less rapidly than expected.

Importance for future population projections

Population by education according to three scenarios, 8 stalled countries, 2010-2100



Source: Wittgenstein Centre Data Explorer Version 1.2

Thank you!

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