

# Identifying National Level Education Reforms in Developing Settings: An Application to Ethiopia

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# Types of National Education Reforms

- Removal of School Fees
- Compulsory School
- Changing of Education Structure
  - For example: 6-3-3 to 8-4 (Chile)
  - Bolivia; Brazil; Chile; Dominican Republic; El Salvador
- Removal of Promotion Exam

# Identifying Reforms: Difficulty in Developing Settings

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# Identifying Reforms: Difficulty in Developing Settings

- National Level Reforms
  - Cannot exploit sub-national variation in law
- No discrete change in effect of reform across birth cohorts
  - Generally used when examining reforms in developed countries.
    - Norway (Black et al., 2005, 2008; Monstad et al., 2008)
    - Italy (Fort, 2012)
    - U.K. (Geruso et al., 2014)
    - Sweden (Holmlund et al., 2011; Lundborg et al., 2014)
    - U.S. (McCrary and Royer, 2011)

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  - Distribute this effect across birth cohorts (Temporal Variation)
- Apply this method to Ethiopia

# Ethiopia: Introduction





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- **Population (1994):** 55 million (2nd largest in SSA)
- **GDP per capita (1990; current USD):** \$253
- **Avg. Years of Schooling (1994):** 1.33
- **Percent of Population in Rural Areas (1994):** 85%

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- **Avg. Years of Schooling (1994):** 1.33
- **Percent of Population in Rural Areas (1994):** 85%
- **Government:**
  - Post-Communist Transitional Gov't 1991 to 1995
  - Federal Republic from 1995 to today

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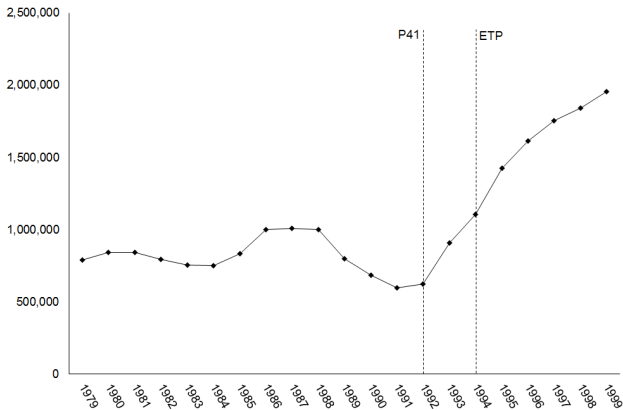
- Proclamation 41 (1993)

- Distributed power/responsibility of administration and provision of primary and secondary school to regional education bureaus.

*This proclamation acted as de facto implementation of forthcoming education policy.*

Negash, 1996; UNESCO, 2007; Oumer, 2009; World Bank, 2009

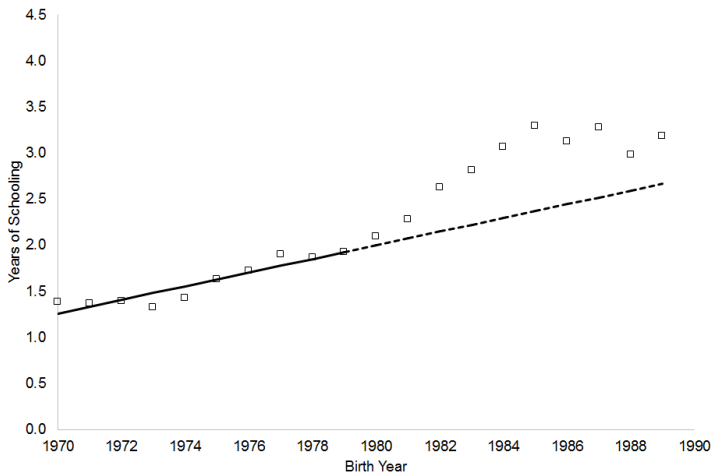
# Education Reform in Ethiopia



Grade One Enrollment, Number of Students by Academic Year

Source: UNESCO Institute for Statistics

# Years of Schooling: 1993 Regions



Years of Schooling, by Birth Cohort

# Years of Schooling: 1995 Regions



Years of Schooling, by Birth Cohort

# Reform's Effect: Maximum Magnitude

Prior to the reform, in each zone ( $z$ ):

- $F_{z,g}$ 
  - Fraction of population completing  $g$  years of schooling
  - Reform impact for this group:  $(10 - g)$



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$$M_z(G) = \frac{1}{6} \sum_{g=0}^9 (10 - g) \cdot F_{z,g}$$

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*Fraction of Pre-Reform Population Never Attending School ( $F_{z,0}$ )*

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	⋮		
1994	11	G1	$S_{z,pre,11}$
1995	12	G2	
1996	13	G3	
	⋮		
2002	19	G9	
2003	20	G10	



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1982	Born		
1983	0		
	⋮		
1994	11	G1	$S_{z,pre,11} \cdot M_z(1)$
1995	12	G2	
1996	13	G3	
	⋮		
2002	19	G9	
2003	20	G10	

$$M_z(1) = \frac{1}{6} \sum_{g=1}^9 (10 - g) \cdot F_{z,g}$$

# Intensity of Reform: Birth Cohorts

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Year	Age	Grade	Probability of Entering School
1982	Born		
1983	0		
	⋮		
1993	10	G1	$S_{z,pre,10} \cdot M_z(2)$
1994	11	G2	$S_{z,pre,11} \cdot M_z(1)$
1995	12	G3	
	⋮		
2001	18	G9	
2002	19	G10	

$$M_z(2) = \frac{1}{6} \sum_{g=2}^9 (10 - g) \cdot F_{z,g}$$

# Intensity of Reform: Birth Cohorts

- 1982 Birth Cohort

Year	Age	Grade	Probability of Entering School
1982	Born		$S_{z,pre,6} \cdot M_z(6)$
1983	0		$\vdots$
	$\vdots$		
1989	6	G1	$S_{z,pre,10} \cdot M_z(2)$
1990	7	G2	$S_{z,pre,11} \cdot M_z(1)$
1991	8	G3	
	$\vdots$		
1997	14	G9	
1998	15	G10	

  
$$M_z(6) = \frac{1}{6} \sum_{g=6}^9 (10 - g) \cdot F_{z,g}$$

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- $S_{z,post,a} - S_{z,pre,a} \geq 0$

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1982	Born		$S_{z,pre,6} \cdot M_z (6)$
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1995	12	G1	$S_{z,pre,10} \cdot M_z (2)$
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1996	13	G2	$S_{z,pre,11} \cdot M_z(1)$
1997	14	G3	$S_{z,post,12}$
1998	15	G4	$\cdot M_z(0)$
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1997	14	G3	$\left[ S_{z,post,12} + \frac{1}{e^{12-7}} \sum_{a=6}^{11} (S_{z,post,a} - S_{z,pre,a}) \right]$
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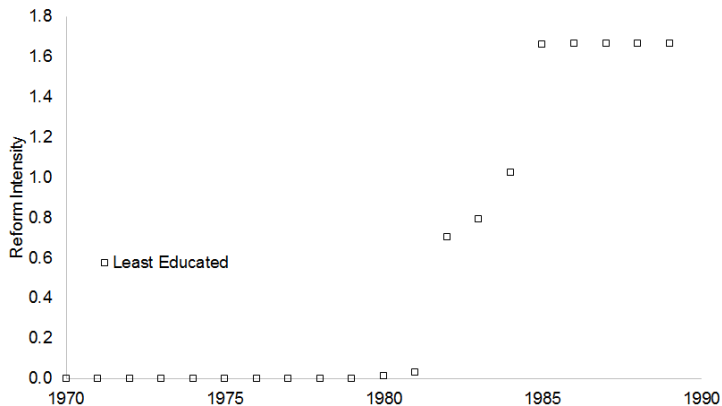
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Sum all products to calculate reform intensity:  
 $I_{z,1982}$

# Intensity of Reform



Predicted Reform Intensity, by Birth Cohort

Regional Timing

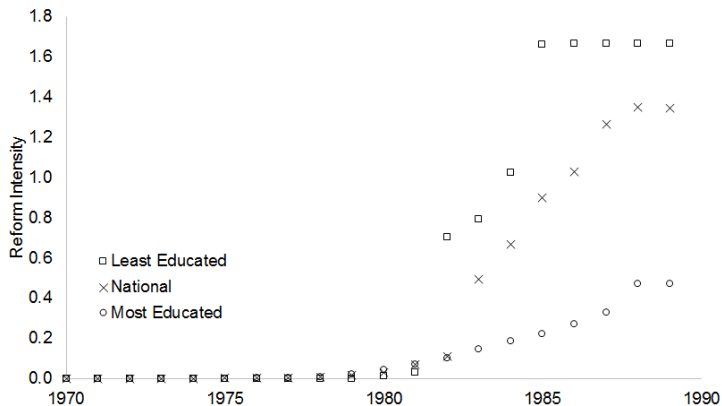
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Predicted Reform Intensity, by Birth Cohort

Regional Timing

- Census - 2007
  - Sample size
  - Location Data
- Demographic and Health Survey - 2005 / 2011 (DHS)
  - Detailed Health Information (Children, Women, Adult Siblings)
  - GPS Location
- Living Standards and Measurement Study - 2014 (LSMS)
  - Detailed Consumption Data
  - Location Data

# Ethiopia: Regions





# Ethiopia: Zones



# Summary Statistics: Schooling

Birth Year	Full Sample		Men		Women	
	1970	1989	1970	1989	1970	1989
Reform Intensity	0.00	1.36	0.00	1.23	0.00	1.47
Years of Schooling	1.73	3.83	2.67	4.32	1.15	3.48
Completed at Least 1 Year	0.32	0.62	0.49	0.70	0.20	0.56
Literacy	0.26	0.55	0.43	0.65	0.15	0.47
Completed at Least 8 Years	0.08	0.20	0.11	0.23	0.06	0.18
Completed at Least 9 Years	0.06	0.15	0.08	0.16	0.05	0.14

# Estimating Equation

$$Y_{izy} = \alpha + I_{zy}\beta + \tau_y + \delta_z + \delta_z \text{Trend}_y + X_{izy}\theta + \epsilon_{izy}$$

- $Y_{izy}$ : Outcome of interest for person  $i$ , from zone  $z$ , born in year  $y$ .

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- $I_{zy}$ : Reform Intensity
- $\tau_y + \delta_z$ : Sets of birth year ( $y$ ) and zone ( $z$ ) fixed effects.
- $\delta_z Trend_y$ : District specific linear trends

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- $\delta_z Trend_y$ : District specific linear trends
- $X_{izy}$ : Individual controls that include a cubic for age, dummy variable for sex, or region of birth.

# Effect of Reform on Years of Schooling

Combined Datasets	Full Sample	
	Uniform Implementation (1)	Staggered Implementation (2)
Reform Intensity <sub>zy</sub>	1.122*** (0.234)	1.282*** (0.262)
Evaluated at Mean Intensity	1.52 $[\bar{I}_{iz,1989} = 1.354]$	1.74
F-Statistic	23.00	23.88
N	420,184	420,184

Alternative Zones

# Effect of Reform on Years of Schooling

Combined Datasets	Full Sample			
	Uniform Implementation (1)	Staggered Implementation (2)	Men (3)	Women (4)
Reform Intensity <sub>zy</sub>	1.122*** (0.234)	1.282*** (0.262)	1.110** (0.502)	1.236*** (0.283)
Evaluated at Mean Intensity	1.52 $[\bar{l}_{iz,1989} = 1.354]$	1.74	1.36 $[\bar{l}_{iz,1989} = 1.223]$	1.81 $[\bar{l}_{iz,1989} = 1.223]$
F-Statistic	23.00	23.88	4.88	19.13
N	420,184	420,184	197,041	223,143



# Effect of Reform on Years of Schooling: By Dataset

	Census (1)	DHS (2)	LSMS (3)
Reform Intensity <sub>zy</sub>	0.698*** (0.188)	1.663*** (0.440)	1.579*** (0.550)
F-Statistic	13.81	14.28	8.23
N	392,702	22,202	5,280

# Effect on Years of Schooling: Additional Results

- For each sample: Uniform/Staggered Implementations, Without Trends, and Alternative Cohorts
- Combined Sample
  - Full Sample
  - Men
  - Women
- Census
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- Alternative Cohorts: Removing the 1970s
- Placebo Estimates: Kenya, Tanzania, Zambia, Mali Placebo Estimates

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<b>LSMS Only</b>	Baseline (1)	Birth Region Fixed Effects (2)	Only Non-Movers (3)	Migration Adj. Intensity (4)
Reform Intensity <sub>zy</sub>	1.579*** (0.550)	1.556** (0.616)	1.508** (0.735)	1.503** (0.588)
N	5,280	5,276	4,581	5,276

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    - 0.115 (1993 to 1996) and -0.022 (1993 to 2001)

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  - Small correlation between pre-reform schooling and change in post-reform spending on primary education
    - 0.115 (1993 to 1996) and -0.022 (1993 to 2001)
  - Pupil-teacher ratios in urban and rural areas similar in 1994
    - More than doubled in rural parts of the country (~30 to 70+ ppt.)
    - Less than 50% increase in urban areas (~35 to 50 ppt.)

Ministry of Education (1995, 1996, 2000); World Bank (2005)

## ● Pre-treatment Trends Pre-Treatment Trends



# Effect of Reform on Grade 1 and Literacy

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<b>Combined</b>	Grade 1 Completion (1)	Literacy (2)
Reform Intensity <sub>zy</sub>	0.148*** (0.032)	
Evaluated at Mean Intensity	0.200 $[\overline{I}_{iz,1989} = 1.354]$	
N	419,769	

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Separated Datasets

Men/Women

Grades 8 and 9

# Effect of Reform on Grade 1 and Literacy

<b>Combined</b>	Grade 1 Completion (1)	Literacy (2)
Reform Intensity <sub>zy</sub>	0.148*** (0.032)	0.157*** (0.039)
Evaluated at Mean Intensity	0.200 $[\bar{I}_{iz,1989} = 1.354]$	0.213
N	419,769	419,769

Separated Datasets

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# Conclusion

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	<b>Malawi - Census</b> No Fees: 1994+		<b>Tanzania - LSMS</b> No Fees: 1969 - 1977	
	Birth Place (1)	Today (2)	Birth Place (4)	Today (5)
Years of Schooling <sub>zy</sub>	2.261*** (0.564)	1.487*** (0.285)	4.677*** (0.835)	4.164*** (0.800)
N	271,721	271,721	3,918	3,918

# Effect of Reform on Years of Schooling

- Prior to the reform, the average student completed 1.73 years of school.
- The reform is estimated to increase schooling by about 1.5 years.
- Average level of schooling increased by 2.1 years for Ethiopians born between 1970 (1.73) and 1989 (3.83).

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- The reform is estimated to increase schooling by about 1.5 years.
- Average level of schooling increased by 2.1 years for Ethiopians born between 1970 (1.73) and 1989 (3.83).
  - The reform explains about 71% of the increase during this period.

# Effect of Reform on Years of Schooling

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$$3.2 = (1 - x) \cdot 1.7 + 8x$$

*where  $x$  is fraction of students enrolled*

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- Would need to enroll 23.8 percent of all primary aged students.
  - Today, there are 16 million children between 7 and 15.
  - Need to enroll 3.8 million students in our program.

# Intensity of Reform: Birth Cohorts

- Last Pre-Reform Cohort (1995 Reform): 1972

Year	Age	Grade	
1972	Born		Probability of Entering School
	⋮		$S_{z,pre,6} \cdot 0$
1985	12	G1	$S_{z,pre,7} \cdot 0$
	⋮		⋮
1989	16	G5	$S_{z,pre,12} \cdot 0$
	⋮		
1992	19	G8	$I_{z,1972} = 0$
1993	20	G9	
1994	21	G10	

# Intensity of Reform: Birth Cohorts

- 1981 Birth Cohort

Year	Age	Grade
1981	Born	
	⋮	
1994	12	G1
1995	13	G2
1996	14	G3
1997	15	G4
	⋮	
2002	20	G9
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Probability of Entering School

$$S_{z,pre,6} \cdot M_z (7)$$

⋮

$$S_{z,pre,10} \cdot M_z (3)$$

$$S_{z,pre,11} \cdot M_z (2)$$

$$S_{z,pre,12} \cdot M_z (1)$$

Sum above to get:

$$I_{z,1981}$$

# Intensity of Reform: Birth Cohorts

- First Post-Reform Cohort: 1988

# Intensity of Reform: Birth Cohorts

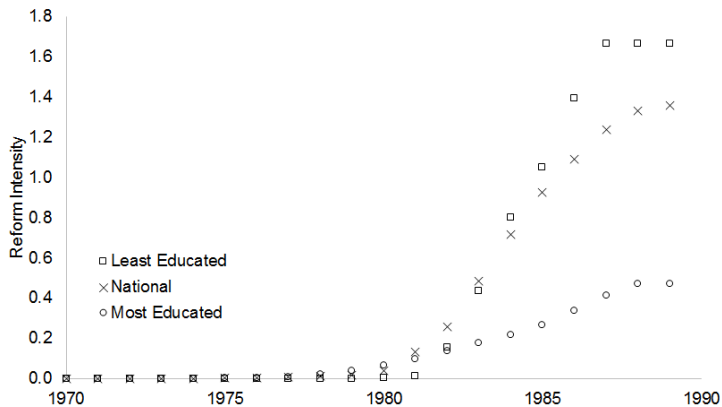
- First Post-Reform Cohort: 1988

Year	Age	Grade
1988	Born	
	⋮	
1995	6	G1
1996	7	G2
1997	8	G3
1998	9	G4
	⋮	
2003	14	G9
2004	15	G10

Probability of Entering School

$$I_{Z,1988} = \sum_{a=6}^{12} S_{Z,post,a} \cdot M_Z(0)$$
$$= M_Z(0)$$

# Intensity of Reform: Staggered Implementation



Predicted Reform Intensity, by Birth Cohort

Back



# Intensity of Reform: Regional Timing

- (1) 1993: Proclamation No.41; (2) 1995: Education and Training Policy; (3) 1996: Late Implementation

# Intensity of Reform: Regional Timing

- (1) 1993: Proclamation No.41; (2) 1995: Education and Training Policy; (3) 1996: Late Implementation
- Use Administrative Grade 1 Enrollment Data
  - Construct a trend using pre-reform 1989 to 1992 enrollments
  - Calculate percentage above enrollment trend for each academic year (1993 to 1996)

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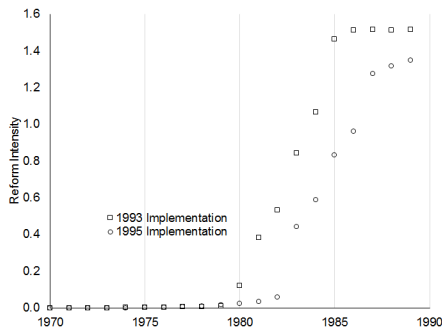
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- ① Set largest distance above trend to be full implementation.
  - Any previous years calculated to be the fraction relative to “full implementation”

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  - Calculate percentage above enrollment trend for each academic year (1993 to 1996)
- ① Set largest distance above trend to be full implementation.
  - Any previous years calculated to be the fraction relative to “full implementation”
- ② Set the largest one time increase to be full implementation
  - All previous years to zero.

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# Intensity of Reform: Regional Timing



- 1 Larger and more rapid increase in early adopting regions
- 2 Five cohort final tier, relative to three cohort tier

Predicted Reform Intensity For Each Implementation Group, by Birth Cohort

Schooling Growth

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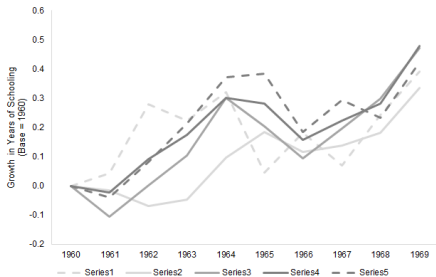
# Intensity of Reform: Regional Timing



Growth in Schooling For Each Implementation Group, by Birth Cohort

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# Examining Pre-Reform Trends



## Growth in Pre-Reform Schooling (Base = 1960)

### 1 Pre-Reform Intensity Quintiles

Grade 1 Completion

Literacy Rate

Grade 8 Completion

Grade 9 Completion

### 2 Pre-Reform Schooling Quintiles

Grade 1 Completion

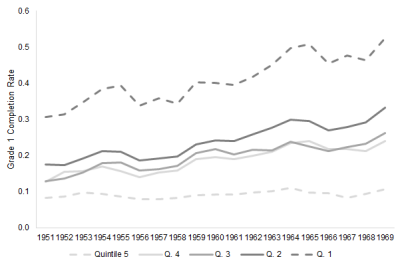
Literacy Rate

Grade 8 Completion

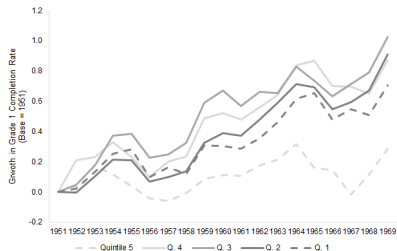
Grade 9 Completion

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# Examining Pre-Reform Trends: Grade 1 Completion



(a) Pre-Reform Grade 1 Completion;  
by Birth Year



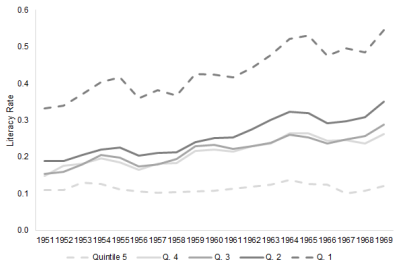
(b) Growth in Pre-Reform Grade 1  
Completion

Pre-Reform Trends by Pre-Reform Intensity Quintiles (Q.5 = Low; Q.1=High)

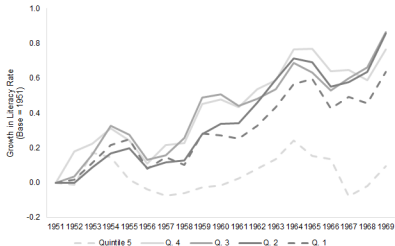
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# Examining Pre-Reform Trends: Literacy



(a) Pre-Reform Literacy; by Birth Year

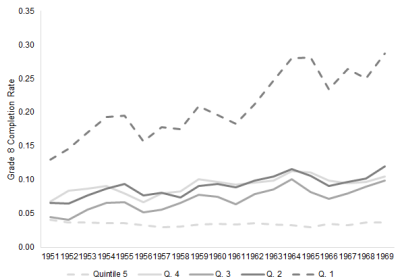


(b) Growth in Pre-Reform Literacy

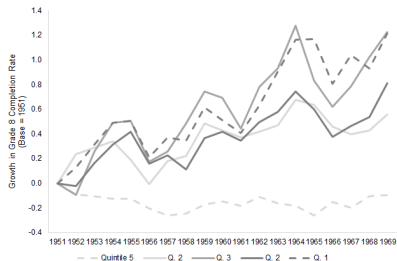
Pre-Reform Trends by Pre-Reform Intensity Quintiles (Q.5 = Low; Q.1=High)

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# Examining Pre-Reform Trends: Grade 8 Completion



(a) Pre-Reform Grade 8 Completion; by Birth Year

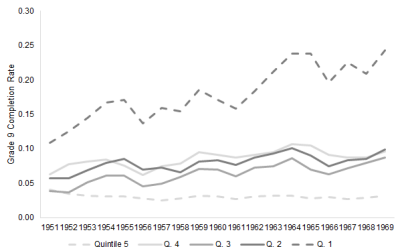


(b) Growth in Pre-Reform Grade 8 Completion

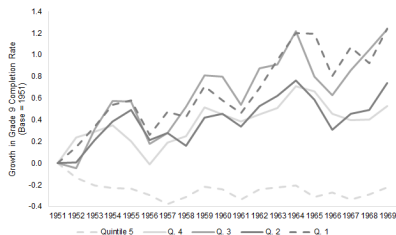
Pre-Reform Trends by Pre-Reform Intensity Quintiles (Q.5 = Low; Q.1=High)

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# Examining Pre-Reform Trends: Grade 9 Completion



(a) Pre-Reform Grade 9 Completion; by Birth Year

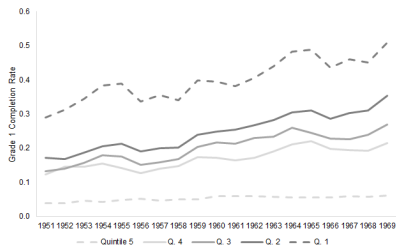


(b) Growth in Pre-Reform Grade 9 Completion

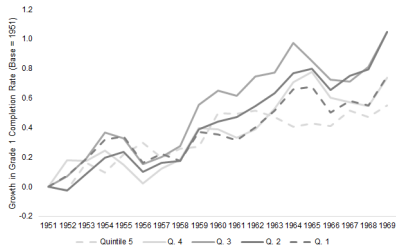
Pre-Reform Trends by Pre-Reform Intensity Quintiles (Q.5 = Low; Q.1=High)

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# Examining Pre-Reform Trends: Grade 1 Completion



(a) Pre-Reform Grade 1 Completion; by Birth Year

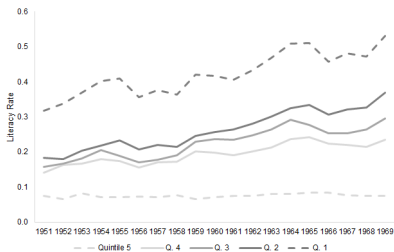


(b) Growth in Pre-Reform Grade 1 Completion

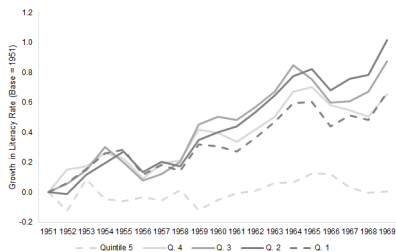
Pre-Reform Trends by Pre-Reform Schooling Quintiles (Q.5 = Low; Q.1=High)

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# Examining Pre-Reform Trends: Literacy



(a) Pre-Reform Literacy; by Birth Year

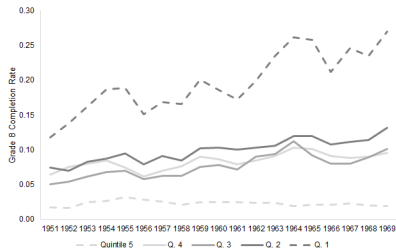


(b) Growth in Pre-Reform Literacy

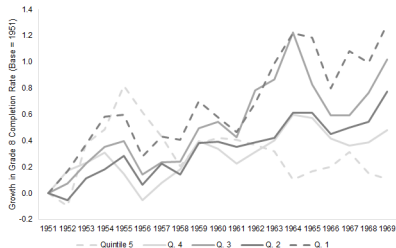
Pre-Reform Trends by Pre-Reform Schooling Quintiles (Q.5 = Low; Q.1=High)

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# Examining Pre-Reform Trends: Grade 8 Completion



(a) Pre-Reform Grade 8 Completion;  
by Birth Year

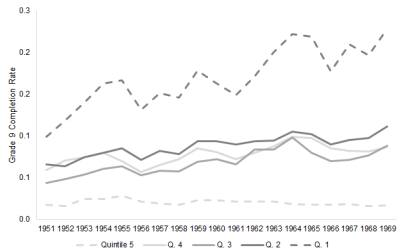


(b) Growth in Pre-Reform Grade 8  
Completion

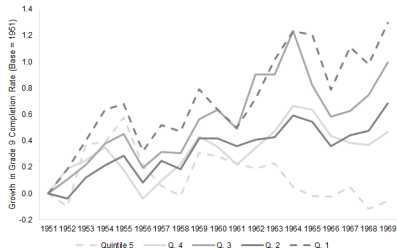
Pre-Reform Trends by Pre-Reform Schooling Quintiles (Q.5 = Low; Q.1=High)

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# Examining Pre-Reform Trends: Grade 9 Completion



(a) Pre-Reform Grade 9 Completion; by Birth Year



(b) Growth in Pre-Reform Grade 9 Completion

Pre-Reform Trends by Pre-Reform Schooling Quintiles (Q.5 = Low; Q.1=High)

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# Effect of Reform on Schooling: Combined Datasets

<b>Combined</b>	Full Sample			
	Uniform Implementation (1)	Staggered Implementation (2)	Men (3)	Women (4)
	A. Zones in At Least Two Datasets			
Reform Intensity <sub>zy</sub>	1.159*** (0.243)	1.333*** (0.271)	1.194** (0.524)	1.250*** (0.290)
N	411,368	411,368	192,435	218,933
	B. Zones in All Three Datasets			
Reform Intensity <sub>zy</sub>	1.203*** (0.254)	1.384*** (0.279)	1.304** (0.550)	1.284*** (0.296)
N	401,551	401,551	187,701	213,850

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# Effect on Years of Schooling: Combined - Full

<b>Combined</b>	Uniform Implementation	Without Trend	Birth Years	1969 1990	1968 1991	1967 1992	1966 1993
	(1)	(2)		(3)	(4)	(5)	(6)
Reform Intensity <sub>zy</sub>	1.122*** (0.234)	1.654*** (0.329)		1.171*** (0.238)	1.249*** (0.238)	1.294*** (0.227)	1.313*** (0.230)
N	420,184	420,184		456,283	493,259	562,336	597,015
	Staggered Implementation	Without Trend	Birth Years	1969 1990	1968 1991	1967 1992	1966 1993
Reform Intensity <sub>zy</sub>	1.282*** (0.262)	1.779*** (0.369)		1.303*** (0.277)	1.372*** (0.276)	1.404*** (0.275)	1.420*** (0.276)
N	420,184	420,184		456,283	493,259	562,336	597,015

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# Effect on Years of Schooling: Combined - Full

	1971	1972	1973	1974	1975	1976	1977	1978	1979
Birth Years	1989	1989	1989	1989	1989	1989	1989	1989	1989
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Reform Intensity <sub>zy</sub>	1.270*** (0.284)	1.336*** (0.278)	1.233*** (0.299)	1.231*** (0.305)	1.208*** (0.297)	1.091*** (0.321)	1.119*** (0.290)	1.178*** (0.330)	1.122*** (0.354)
N	411,931	402,720	370,591	363,991	355,363	339,731	333,546	290,187	281,511

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# Effect on Years of Schooling: Combined - Men

	Uniform Implementation (1)	Without Trend (2)	Birth Years	1969 1990 (3)	1968 1991 (4)	1967 1992 (5)	1966 1993 (6)
Reform Intensity <sub>zy</sub>	1.126** (0.453)	1.547*** (0.331)		1.120** (0.430)	1.208*** (0.431)	1.130*** (0.394)	1.167*** (0.392)
N	197,041	197,041		215,072	234,186	268,259	286,319
	Staggered Implementation	Without Trend	Birth Years	1969 1990	1968 1991	1967 1992	1966 1993
Reform Intensity <sub>zy</sub>	1.110** (0.502)	1.569*** (0.377)		1.057** (0.473)	1.155** (0.476)	1.069** (0.436)	1.111** (0.430)
N	197,041	197,041		215,072	234,186	268,259	286,319

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# Effect on Years of Schooling: Combined - Women

	Uniform Implementation (1)	Without Trend (2)	Birth Years	1969 1990 (3)	1968 1991 (4)	1967 1992 (5)	1966 1993 (6)
Reform Intensity <sub>zy</sub>	0.860*** (0.222)	1.655*** (0.401)		0.930*** (0.229)	0.990*** (0.219)	1.084*** (0.238)	1.105*** (0.239)
N	223,143	223,143		241,211	259,073	294,077	310,696
	Staggered Implementation	Without Trend	Birth Years	1969 1990	1968 1991	1967 1992	1966 1993
Reform Intensity <sub>zy</sub>	1.236*** (0.283)	1.957*** (0.407)		1.301*** (0.291)	1.335*** (0.279)	1.413*** (0.304)	1.428*** (0.301)
N	223,143	223,143		241,211	259,073	294,077	310,696

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# Effect of Reform on Years of Schooling: Census - Full

	Uniform Implementation (1)	Without Trend (2)	Birth Years	1969 1990 (3)	1968 1991 (4)	1967 1992 (5)	1966 1993 (6)
Reform Intensity <sub>zy</sub>	0.714*** (0.160)	1.257*** (0.446)		0.815*** (0.161)	0.846*** (0.166)	1.049*** (0.209)	1.018*** (0.218)
N	392,702	392,702		426,256	461,414	528,450	561,373
	Staggered Implementation	Without Trend	Birth Years	1969 1990	1968 1991	1967 1992	1966 1993
Reform Intensity <sub>zy</sub>	0.698*** (0.188)	1.381*** (0.512)		0.932*** (0.225)	0.974*** (0.224)	1.218*** (0.281)	1.189*** (0.287)
N	392,702	392,702		426,256	461,414	528,450	561,373

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# Effect of Reform on Years of Schooling: Census - Men

	Uniform Implementation (1)	Without Trend (2)	Birth Years	1969 1990 (3)	1968 1991 (4)	1967 1992 (5)	1966 1993 (6)
Reform Intensity <sub>zy</sub>	0.647** (0.245)	1.054** (0.445)		0.711*** (0.254)	0.691** (0.266)	0.786*** (0.271)	0.712** (0.282)
N	185,848	185,848		202,813	221,066	254,166	271,435
	Staggered Implementation	Without Trend	Birth Years	1969 1990	1968 1991	1967 1992	1966 1993
Reform Intensity <sub>zy</sub>	0.675** (0.301)	1.096** (0.505)		0.730** (0.305)	0.717** (0.315)	0.838** (0.321)	0.768** (0.332)
N	185,848	185,848		202,813	221,066	254,166	271,435

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# Effect on Years of Schooling: Census - Women

	Uniform Implementation (1)	Without Trend (2)	Birth Years	1969 1990 (3)	1968 1991 (4)	1967 1992 (5)	1966 1993 (6)
Reform Intensity <sub>zy</sub>	0.606*** (0.164)	1.367*** (0.448)		0.710*** (0.170)	0.764*** (0.155)	1.027*** (0.244)	1.030*** (0.234)
N	206,854	206,854		223,443	240,348	274,284	289,938
	Staggered Implementation	Without Trend	Birth Years	1969 1990	1968 1991	1967 1992	1966 1993
Reform Intensity <sub>zy</sub>	0.833*** (0.228)	1.640*** (0.485)		0.973*** (0.236)	1.045*** (0.218)	1.375*** (0.329)	1.381*** (0.315)
N	206,854	206,854		223,443	240,348	274,284	289,938

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# Effect of Reform on Years of Schooling: DHS - Full

	Uniform Implementation (1)	Without Trend (2)	Birth Years	1969 1990 (3)	1968 1991 (4)	1967 1992 (5)	1966 1993 (6)
Reform Intensity <sub>zy</sub>	1.414*** (0.441)	2.115*** (0.345)		1.417*** (0.435)	1.492*** (0.413)	1.406*** (0.378)	1.439*** (0.374)
N	22,202	22,202		24,156	25,528	26,952	28,282
	Staggered Implementation	Without Trend	Birth Years	1969 1990	1968 1991	1967 1992	1966 1993
Reform Intensity <sub>zy</sub>	1.663*** (0.440)	2.305*** (0.351)		1.614*** (0.437)	1.687*** (0.407)	1.559*** (0.373)	1.587*** (0.369)
N	22,202	22,202		24,156	25,528	26,952	28,282

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# Effect of Reform on Years of Schooling: DHS - Men

	Uniform Implementation (1)	Without Trend (2)	Birth Years	1969 1990 (3)	1968 1991 (4)	1967 1992 (5)	1966 1993 (6)
Reform Intensity <sub>zy</sub>	1.145 (0.783)	1.868*** (0.328)		1.130 (0.730)	1.092 (0.682)	0.883 (0.616)	0.988 (0.625)
N	8,754	8,754		9,581	10,233	10,909	11,508
	Staggered Implementation	Without Trend	Birth Years	1969 1990	1968 1991	1967 1992	1966 1993
Reform Intensity <sub>zy</sub>	1.139 (0.783)	1.895*** (0.352)		1.038 (0.736)	0.979 (0.683)	0.746 (0.607)	0.880 (0.617)
N	8,754	8,754		9,581	10,233	10,909	11,508

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# Effect of Reform on Years of Schooling: DHS - Women

	Uniform Implementation (1)	Without Trend (2)	Birth Years	1969 1990 (3)	1968 1991 (4)	1967 1992 (5)	1966 1993 (6)
Reform Intensity <sub>zy</sub>	1.207*** (0.325)	2.116*** (0.420)		1.272*** (0.339)	1.360*** (0.352)	1.292*** (0.343)	1.315*** (0.341)
N	13,448	13,448		14,638	15,358	16,106	16,837
	Staggered Implementation	Without Trend	Birth Years	1969 1990	1968 1991	1967 1992	1966 1993
Reform Intensity <sub>zy</sub>	1.675*** (0.361)	2.517*** (0.406)		1.715*** (0.378)	1.813*** (0.392)	1.687*** (0.382)	1.685*** (0.383)
N	13,448	13,448		14,638	15,358	16,106	16,837

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# Effect of Reform on Years of Schooling: LSMS - Full

	Uniform Implementation (1)	Without Trend (2)	Birth Years	1969 1990 (3)	1968 1991 (4)	1967 1992 (5)	1966 1993 (6)
Reform Intensity <sub>zy</sub>	1.340*** (0.469)	1.674*** (0.439)		1.331** (0.534)	1.442*** (0.449)	1.355*** (0.449)	1.375*** (0.403)
N	5,280	5,280		5,808	6,254	6,871	7,297
	Staggered Implementation	Without Trend	Birth Years	1969 1990	1968 1991	1967 1992	1966 1993
Reform Intensity <sub>zy</sub>	1.676*** (0.604)	1.709*** (0.510)		1.620** (0.666)	1.607*** (0.575)	1.403** (0.590)	1.429*** (0.524)
N	5,280	5,280		5,808	6,254	6,871	7,297

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# Effect of Reform on Years of Schooling: LSMS - Men

	Uniform Implementation (1)	Without Trend (2)	Birth Years	1969 1990 (3)	1968 1991 (4)	1967 1992 (5)	1966 1993 (6)
Reform Intensity <sub>zy</sub>	2.410** (1.039)	2.287*** (0.452)		2.184** (0.856)	2.520*** (0.914)	2.312*** (0.835)	2.328** (0.791)
N	2,439	2,439		2,678	2,887	3,184	3,376
	Staggered Implementation	Without Trend	Birth Years	1969 1990	1968 1991	1967 1992	1966 1993
Reform Intensity <sub>zy</sub>	2.607*** (1.303)	2.273*** (0.531)		2.325** (1.045)	2.689** (1.104)	2.350** (0.995)	2.357** (0.927)
N	2,439	2,439		2,678	2,887	3,184	3,376

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# Effect on Years of Schooling: LSMS - Women

	Uniform Implementation (1)	Without Trend (2)	Birth Years	1969 1990 (3)	1968 1991 (4)	1967 1992 (5)	1966 1993 (6)
Reform Intensity <sub>zy</sub>	0.427 (0.990)	1.007 (0.699)		0.331 (1.043)	0.272 (0.990)	0.315 (0.791)	0.408 (0.755)
N	2,841	2,841		3,130	3,367	3,687	3,921
	Staggered Implementation	Without Trend	Birth Years	1969 1990	1968 1991	1967 1992	1966 1993
Reform Intensity <sub>zy</sub>	0.914 (0.1.168)	1.137 (0.747)		0.811 (1.195)	0.570 (1.102)	0.465 (0.872)	0.555 (0.827)
N	2,841	2,841		3,130	3,367	3,687	3,921

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# Effect of Reform on Years of Schooling: Placebo

	Kenya (1)	Tanzania (2)	Zambia (3)	Mali (4)
A. Both 1993 and 1995 Implementation Regions				
Reform Intensity <sub>zy</sub>	0.144 (0.287)	-1.406** (0.673)	-0.189 (0.144)	-0.200 (0.196)
N	37,855	13,097	338,175	267,179
B. 1993 Implementation				
Reform Intensity <sub>zy</sub>	0.293 (0.305)	-1.681*** (0.541)	-0.192 (0.140)	-0.849*** (0.234)
N	37,855	13,097	338,175	267,179
C. 1995 Implementation				
Reform Intensity <sub>zy</sub>	0.162 (0.300)	-1.781*** (0.582)	0.397*** (0.146)	-0.761*** (0.114)
N	37,855	13,097	338,175	267,179

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# Effect of Reform on Grade 1 and Literacy

	Census		DHS		LSMS	
	Grade 1 Completion (1)	Literacy (2)	Grade 1 Completion (3)	Literacy (4)	Grade 1 Completion (5)	Literacy (6)
Reform Intensity <sub>zy</sub>	0.095*** (0.021)	0.098*** (0.020)	0.162*** (0.048)	0.157*** (0.058)	0.249*** (0.090)	0.300*** (0.091)
N	392,702	392,702	21,788	21,788	5,279	5,279

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# Effect of Reform on Grade 1 and Literacy: By Sex

	Men		Women	
	Grade 1 Completion (1)	Literacy (2)	Grade 1 Completion (3)	Literacy (4)
Reform Intensity <sub>zy</sub>	0.110* (0.057)	0.154** (0.066)	0.159*** (0.029)	0.130*** (0.031)
N	196,861	196,861	222,908	222,908

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# Effect of Reform on Grade 8 and Grade 9 Completion

	Combined		Census		DHS		LSMS	
	Grade 8 Completion (1)	Grade 9 Completion (2)	Grade 8 Completion (3)	Grade 9 Completion (4)	Grade 8 Completion (5)	Grade 9 Completion (6)	Grade 8 Completion (7)	Grade 9 Completion (8)
Reform Intensity <sub>zy</sub>	0.088*** (0.025)	0.057*** (0.017)	0.063*** (0.019)	0.038** (0.016)	0.119*** (0.041)	0.077** (0.032)	0.095* (0.053)	0.076 (0.053)
N	420,184	420,184	392,702	392,702	22,202	22,202	5,280	5,280

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