Sex imbalances at birth
Trends, consequences and policy implications

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Outline

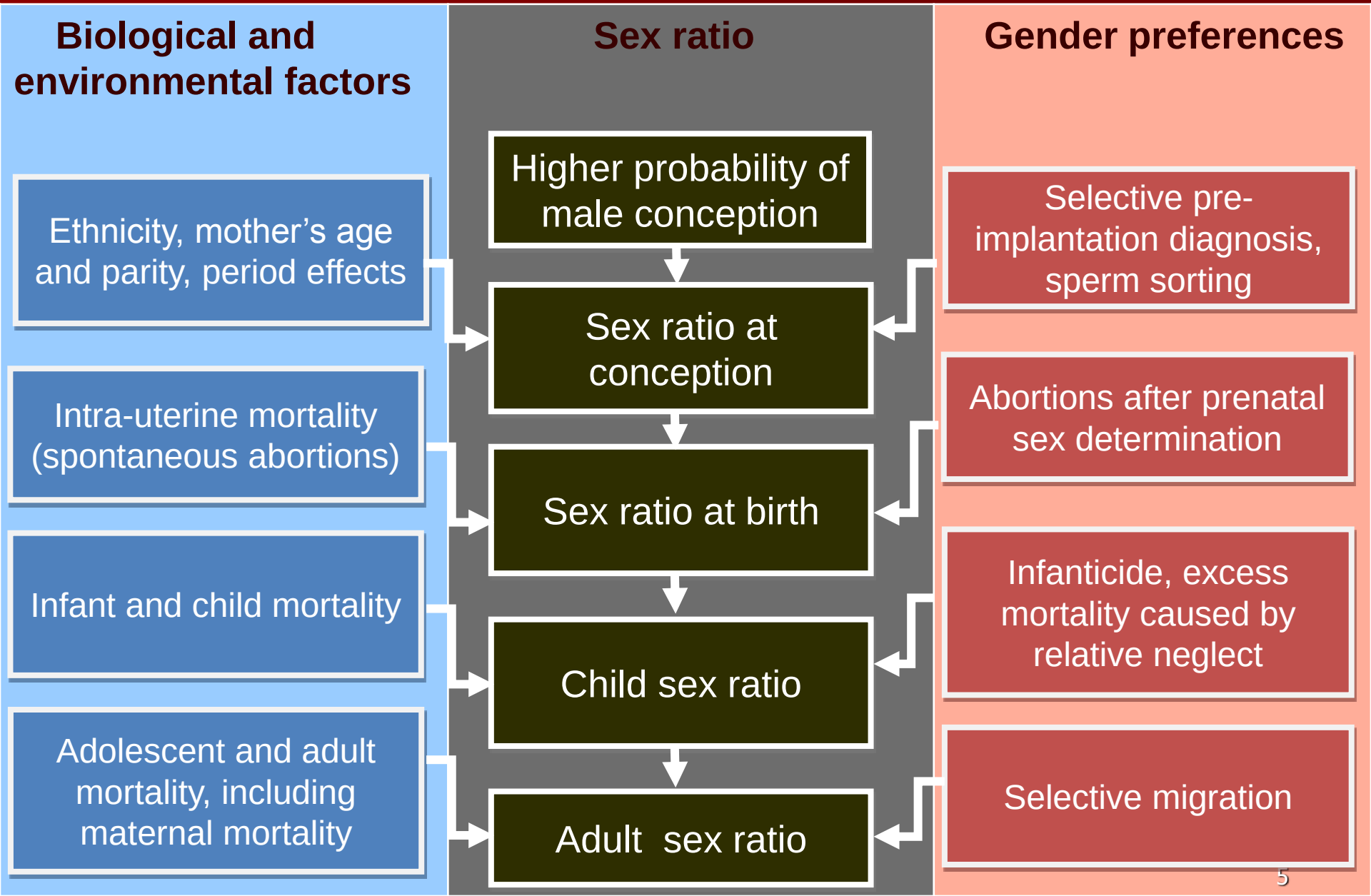
- Sex composition and sex ratios
- Rise in sex ratios at birth (SRB)
- Gender discrimination and its demographic impact
- SRB differentials
- Understanding sex selection
- Sociodemographic prospects
- The social impact of sex imbalances
- The policy responses to sex imbalances
- Current trends and future challenges

About sex ratios

- Sex ratios are measured as number of men per 100 women with e.g. 105 reflecting a 5% excess of men
- Boys are more numerous than girls at birth and the sex ratio at birth (SRB) is around 105 male births per 100 female births
  - Modest biological variations across populations are observed in the sex ratio at birth, within a range of 104-106
- Sex ratios vary by age under the influence of
  - Mortality differentials by sex (higher male mortality)
  - Migration (for studies, marriage, labor, retirement etc.)
- Higher male mortality reduces gradually the sex ratio to values below 100 during adulthood
- Selective underenumeration of people and births may disturb sex ratio estimation

SEX COMPOSITION AND SEX RATIOS

Biology and society



Sex ratio measurements

- The sex ratio at birth is best measured by using *birth records*
  - Birth registration/statistics are often deficient in Asian countries (Pakistan, China etc.)
- Sex ratios can be computed from decennial *censuses*
  - Sex ratio of recent births
  - Population below one (sex ratios by age)
- *Surveys* provide less reliable estimates because of the sensitivity to small samples

RISE IN SEX RATIOS AT BIRTH

Demographic masculinization

- Amartya Sen spoke of "missing women" in 1990
- Missing women are now increasingly "missing girls"
- Surge in sex ratio at birth (SRB) in many Asian countries
- Rising from 105 (normal level) towards 110-130 (5 to 25% excess male births)
- Caused by sex selective abortions: prenatal sex diagnosis followed by abortion of female fetuses
- Selective underenumeration in some cases


1990s
1990s
1980s
1980s
1980s
2000s
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X
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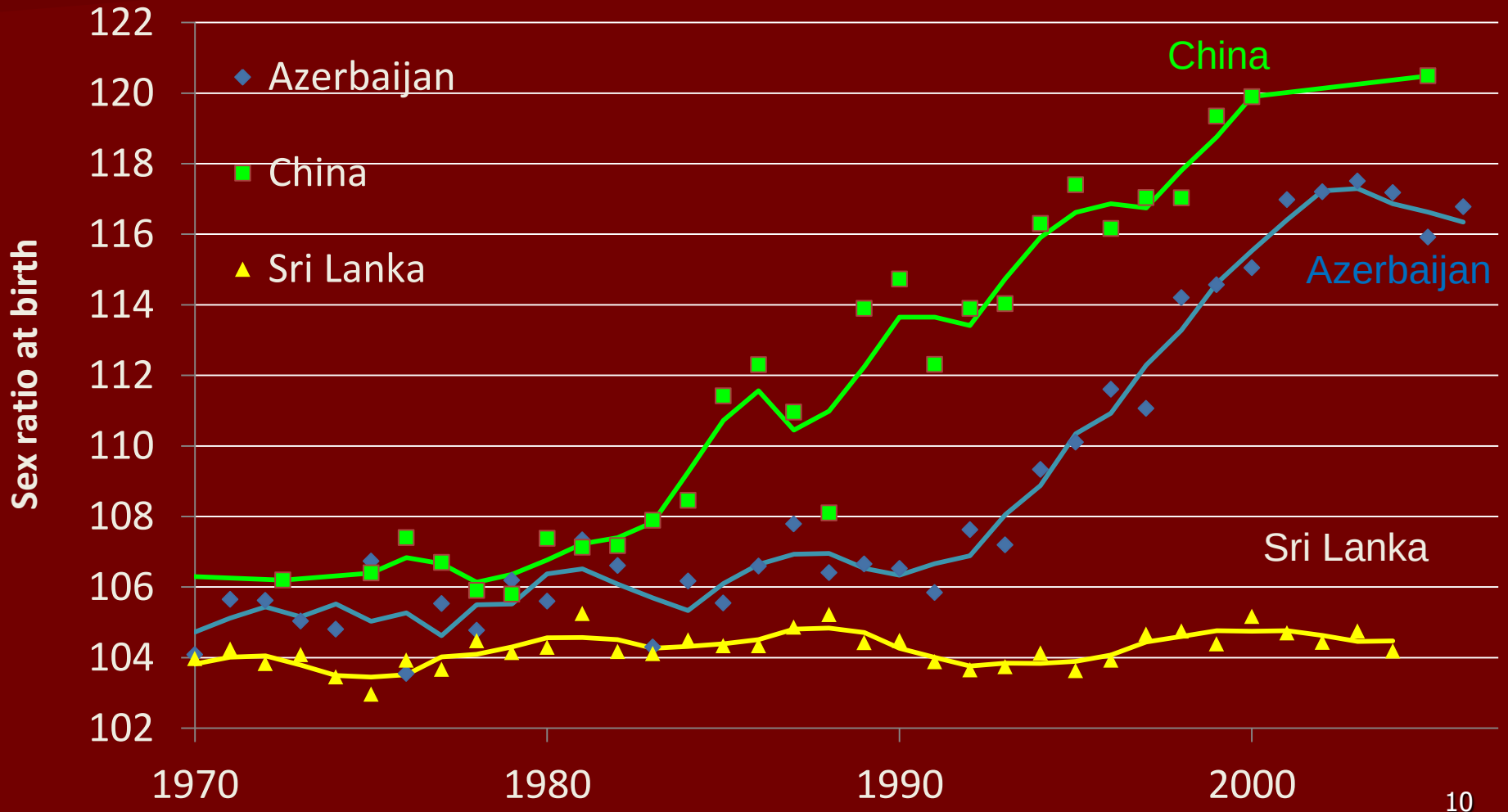
X
RUSSIA
KAZAKHSTAN
MONGOLIA
CHINA
TURKEY
SAUDI ARABIA
AFGHANISTAN
PAKISTAN
INDIA
BURMA
THAILAND
VIETNAM
MALAYSIA
INDONESIA
PHILIPPINES
YEMEN
OMAN
SOMALIA
UKRAINE
ROMANIA
Arabian Sea
Bay of Bengal
Indian Ocean
Black Sea
Caspian Sea
Moscow
Beijing
Tehran
Kabul
Islamabad
New Delhi
Bangkok
Tokyo
Seoul
Manila
Jakarta
Shanghai
Hong Kong
Taipei
Hanoi
Rangoon
Dhaka
Kathmandu
Colombo
Baghdad
Riyadh
Cairo
Athens
Rome
Kiev
Astana
Tashkent
Dushanbe
Ashgabat
Baku
Bishkek
Ulan Bator
P'yongyang
Kuala Lumpur
Phnom Penh
Vientiane
Thimphu
Bombay
Calcutta
Madras
Karachi
Equator

Sex ratio at birth in selected Asian countries



GENDER DISCRIMINATION AND ITS DEMOGRAPHIC IMPACT

Prenatal sex selection

- Prenatal sex selection can never be computed directly from abortion data
- Prenatal sex selection must be inferred from SRB figures
- Biological sex ratio at birth rarely known (104-106 range) for lack of historical series of unbiased birth registration data
- Data used here: sex ratio at birth estimated from birth registration, census figures or surveys

SRB in affected countries

Country / regions	SRB	period	Data type
East and South East Asia			
China (Mainland)	**118.1**	2009	*Census estimate*
Rep. of Korea	**106.7**	2010	*Birth registration*
Viet Nam	**111.2**	2010	*Annual demographic survey*
South Asia			
India	**110.6**	2006-08	*Sample registration*
Pakistan	**109.9**	2007	*Pop. and Demographic Survey*
Eastern and central Europe			
Albania	**111.5**	2008	*Birth registration*
Azerbaijan	**117.6**	2009	*Birth registration*
Armenia	**115.8**	2008	*Birth registration*
Georgia	**111.9**	2006	*Birth registration*
Montenegro	**111.6**	2005-09	*Birth registration*
Europe and North America			
Asian diasporas	**107-110**	2000-09	*Special studies*

Postnatal discrimination against girls

- Mortality is about 20% higher among boys than girls
- But excess mortality among girls is common and linked to neglect of girls (infanticide is rare)
- Excess mortality can be measured by the mortality sex ratio (expected to be above 120)
- Data used here: mortality rates deduced from the number of deaths of children by sex (UN Population Division)

Postnatal discrimination against girls

Country/region	Mortality sex ratio under five (per 100)	Excess female deaths under five per year (in thousands)
Afghanistan	98.0	24
Albania	104.5	*
Armenia	107.9	*
Azerbaijan	104.0	*
Bangladesh	102.6	14
China	71.1	97
Georgia	109.7	*
India	87.9	271
Nepal	93.9	4
Pakistan	105.4	25
Africa	111.6	
Latin America and the Caribbean	*129.1*	
Northern America	*121.7*	
Europe	*125.0*	

- Mortality sex ratios under five computed as ratios of male mortality rates to female rates
- Annual excess female deaths (in thousands) computed by using 120 as normal mortality sex ratio for 2005-10
- *: negligible number

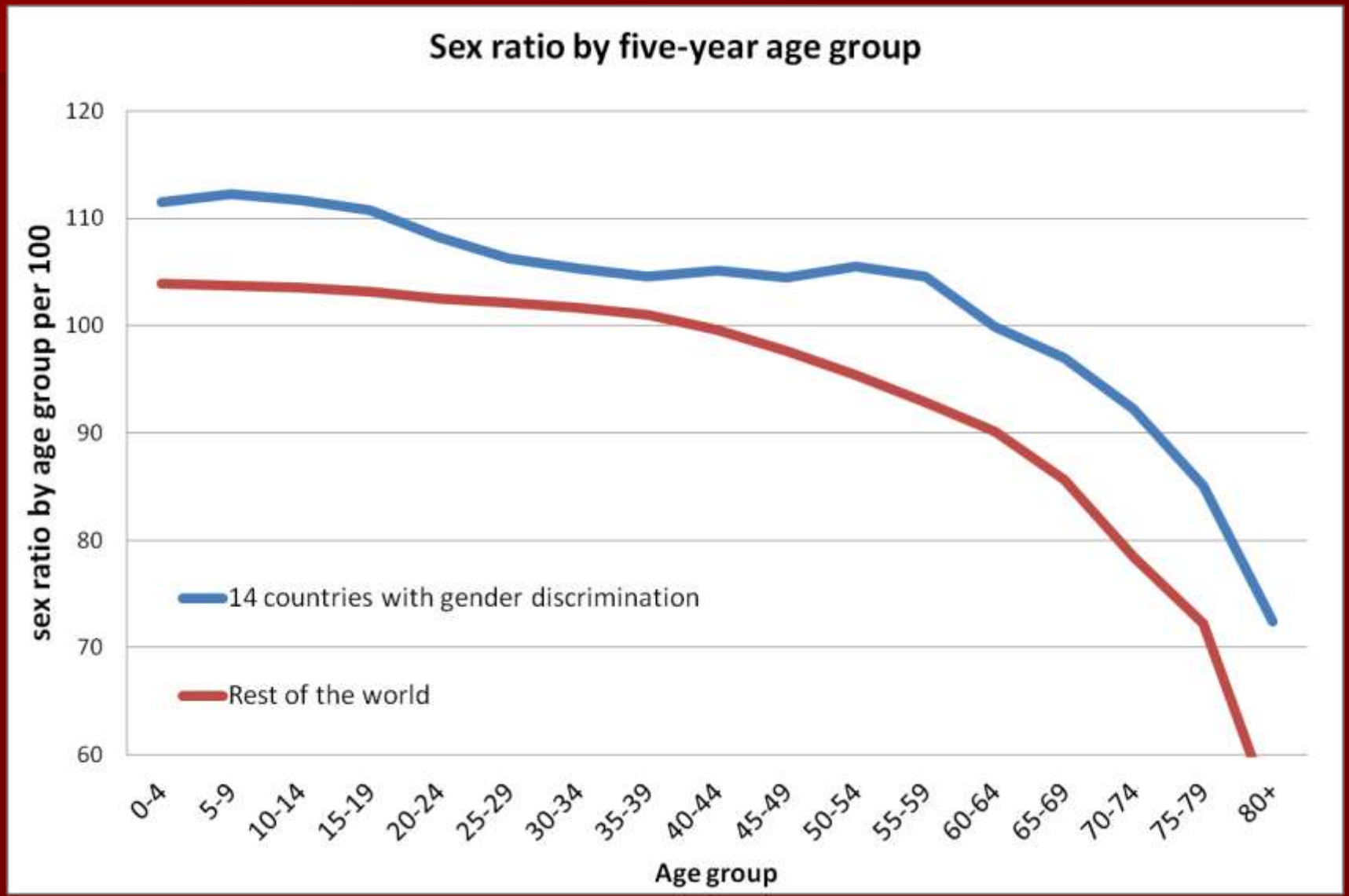
Demographic impact

- Prenatal sex selection is easily detectable in many countries from Asia to Europe
- The observed excess of male births ranges from 5 to 15% of male births
- Postnatal discrimination against girls is still pronounced in several countries (and accounts for almost 20% of all missing girls)
- The number of excess deaths of female children may reach 271,000 in India per year

Gender gap in 2010

- Objectives: to estimate missing women in 2010
- Methodology:
  - Compute sex ratios by age in "normal" countries
  - Infer from these sex ratios the expected number of women in countries with sex discrimination
  - Compute the number of missing women by age by comparing with observed women
- Data source: 2010 World population estimates (UN Population Division)

Sex ratios by age: with or without gender discrimination



Women missing in 2010

	Gender gap		Gender gap: 0-19 yrs	
	Total (000s)	%	**Total (000s)**	%
Afghanistan	**860**	5.7%	**265**	3.0%
Albania	**45**	2.8%	**21**	4.2%
Armenia	*		**35**	8.4%
Azerbaijan	*		**111**	8.3%
Bangladesh	**2 082**	2.8%	**416**	1.4%
China	**67 589**	10.5%	**25 112**	15.0%
Georgia	*		**24**	4.6%
India	**42 687**	7.2%	**12 618**	5.3%
Montenegro	*		**3**	3.6%
Nepal	*		**125**	1.8%
Pakistan	**2 833**	3.3%	**206**	0.5%
Rep. of Korea	**608**	2.5%	**336**	6.2%
Singapore	**124**	4.9%	**21**	3.5%
Viet Nam	*		**139**	1.0%
Total	***116 829***	*8.1%*	***39 467***	*7.7%*

Numbers given in thousands

Percentages of the total corresponding female population in each country

*: no significant gender gap (country also excluded for the total)

Trends in missing women and girls

- The gender gap in these 14 countries has increased from 66 m in 1950 to 117 m today (+72%) and may not diminish before 2020.
- The gap among women below 20 has increased from 16 m in 1950 to 39 m today (+148%).
- 7.7 % of women below 20 are missing in countries affected by gender discrimination
- More than ¾ of girls below 5 that are missing are *unborn girls,* while the remaining gap results from *excess female deaths in childhood*

SRB DIFFERENTIALS

Variations and the context for discrimination against girls

- The sex ratio at birth is never uniform across parities, social classes, regions, or ethnic groups
- Differentials help to understand who practices sex selection, and why, how or when they do it
- Factors combine demographic features and socioeconomic characteristics

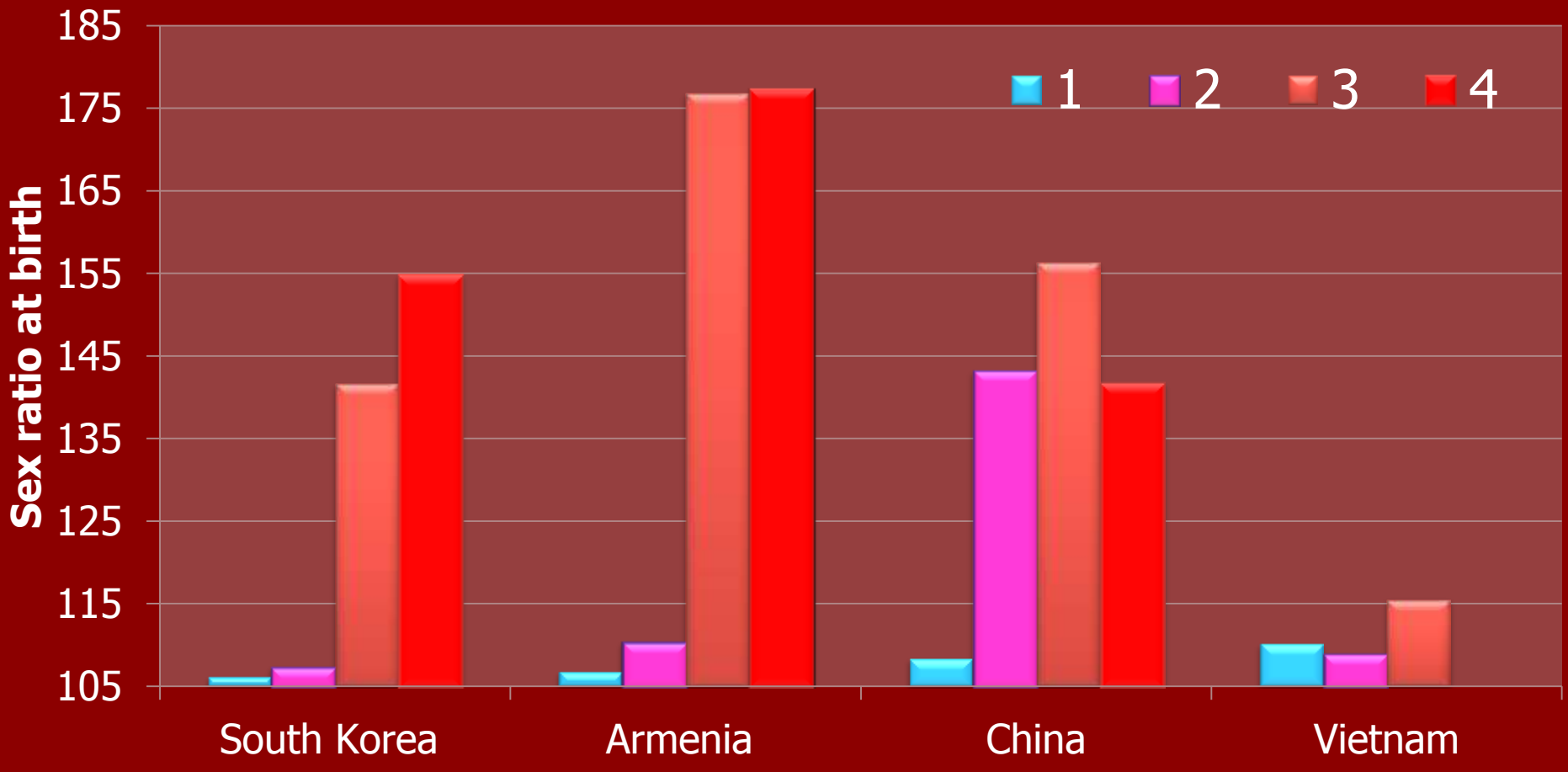
SRB and family composition

- The sex ratio at birth increases with birth order (parity)
  - Relative indifference for the sex of the first child(ren)
  - Higher SRB for later births
- The sex ratio at birth increases in the absence of a previous male birth
- Sex selection is a way to satisfy both fertility limitations and gender composition target: fewer births but with at least one son

Sex ratio at birth and parity

	Birth order			
	1	2	3	4
Rep. of Korea (2000)	106.2	107.4	141.7	154.9
Armenia (2001-08)	106.8	110.4	176.9	177.4
China (2005)	108.4	143.2	156.4	141.8
Vietnam (2009)	110.2	109.0	115.5*	
*: Birth order 3 and above				

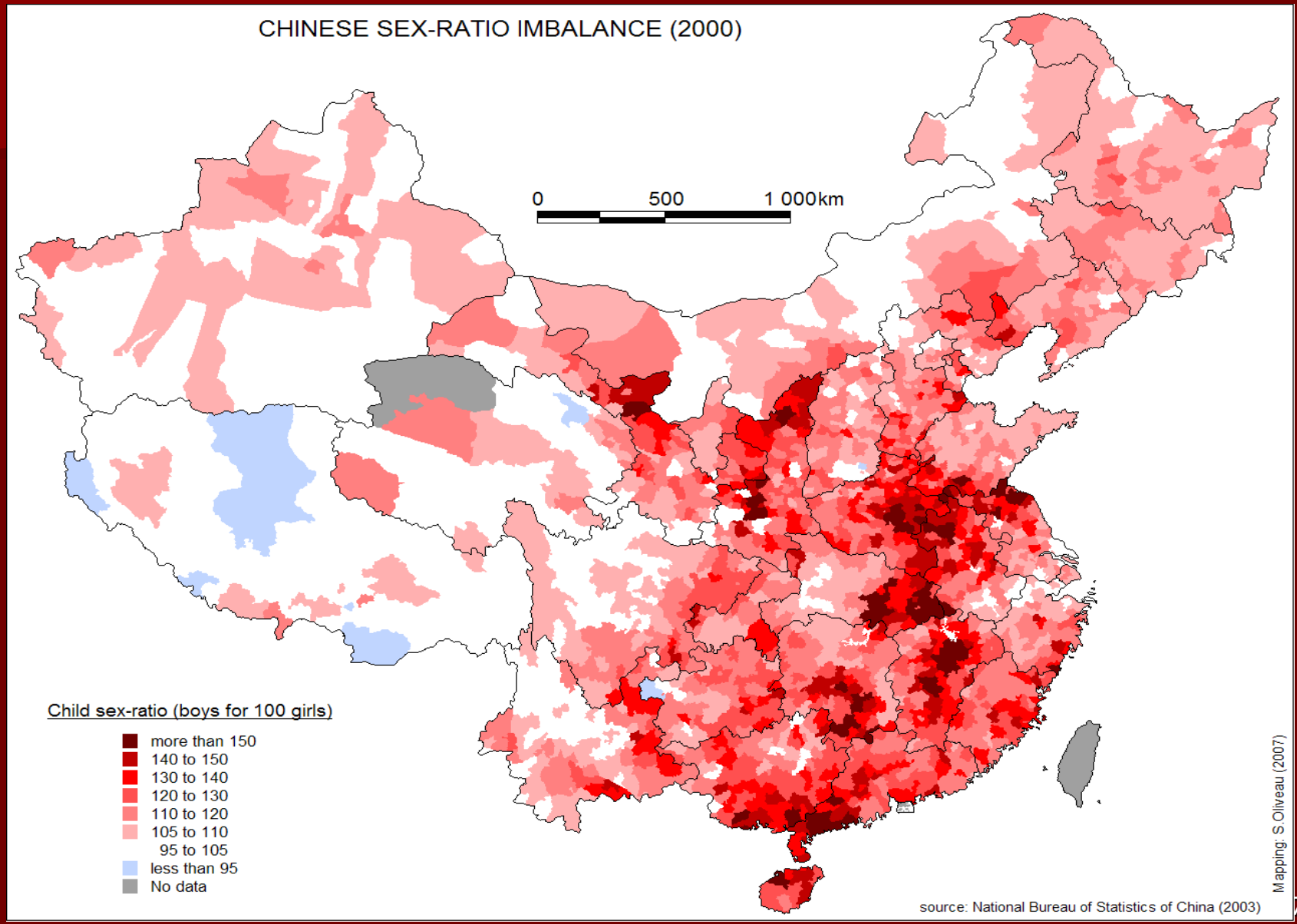
SRB and birth order

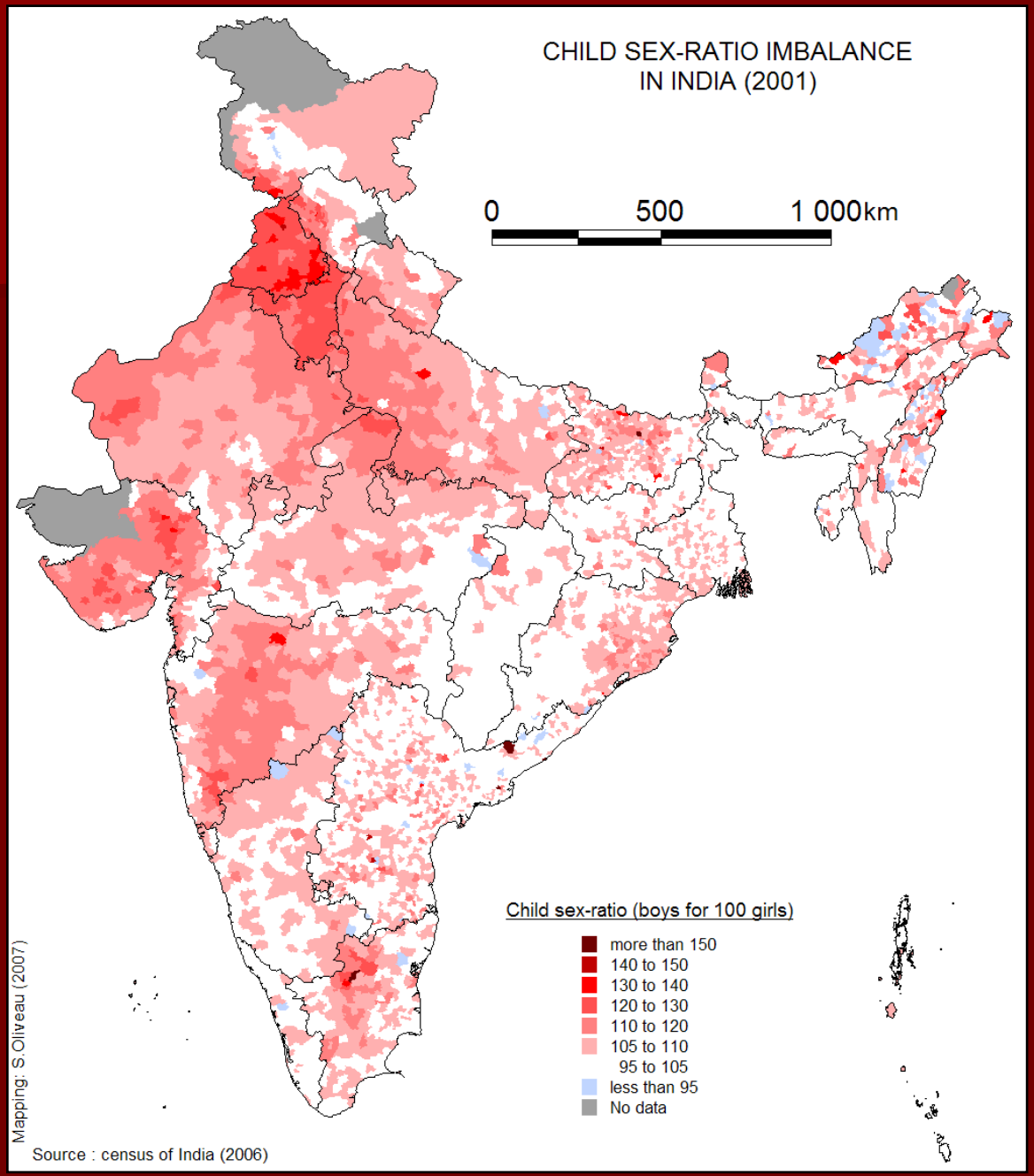


Spatial variations

- Measured between urban and rural areas
- Measured across regions or smaller administrative units (sex ratios ranging often from 105 to 150)
- Geographical variations reflect ethnic composition, development levels, fertility transition, population policies etc.

China (2000)


CHINESE SEX-RATIO IMBALANCE (2000)
0
500
1 000km
Child sex-ratio (boys for 100 girls)
more than 150
140 to 150
130 to 140
120 to 130
110 to 120
105 to 110
95 to 105
less than 95
No data
source: National Bureau of Statistics of China (2003)
Mapping: S.Oliveau (2007)


CHILD SEX-RATIO IMBALANCE
IN INDIA (2001)
0
500
1 000km
Child sex-ratio (boys for 100 girls)
more than 150
140 to 150
130 to 140
120 to 130
110 to 120
105 to 110
95 to 105
less than 95
No data
Mapping: S.Oliveau (2007)
Source : census of India (2006)

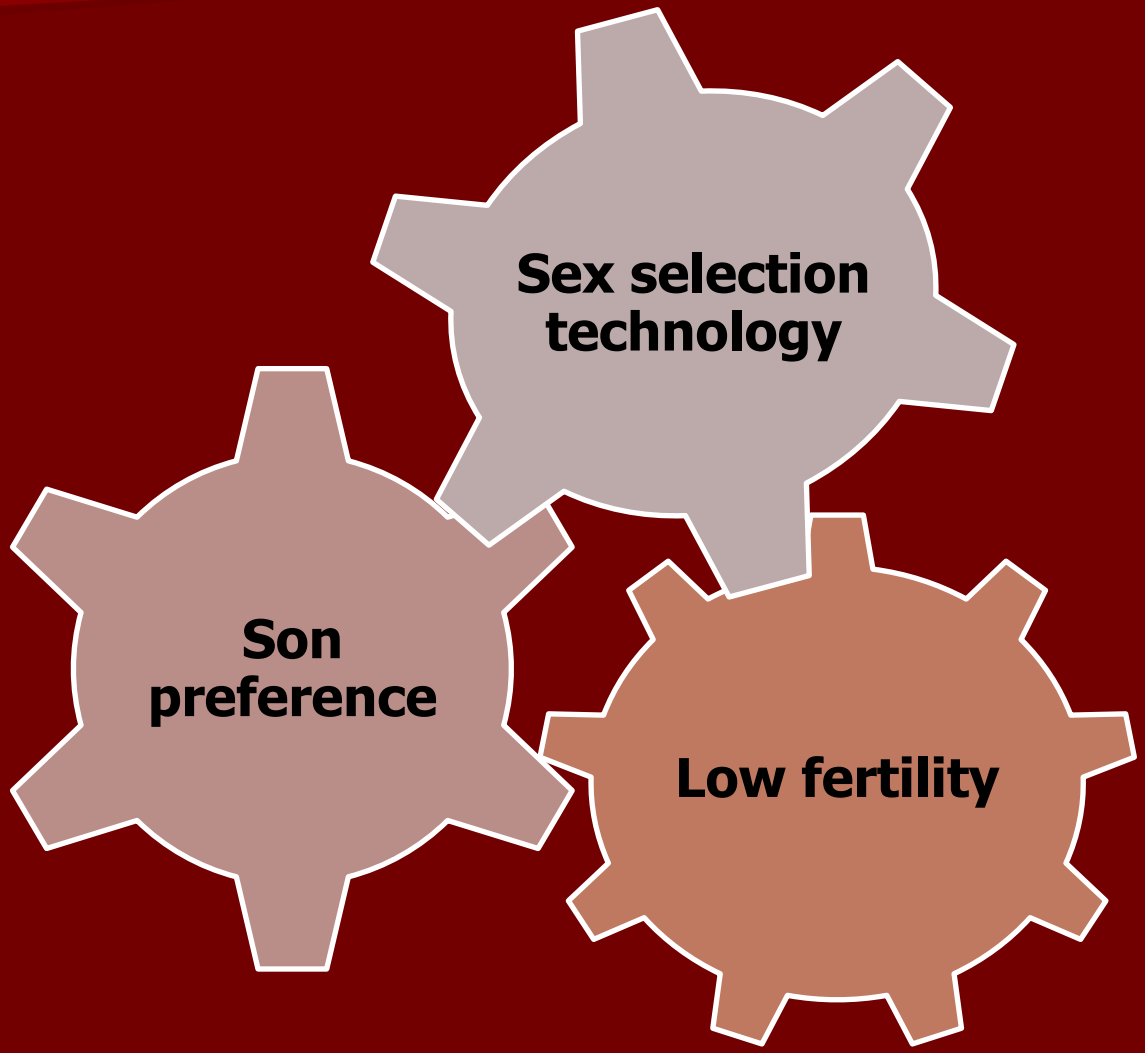
India (2001)

Sources of variation in sex ratios

Factor	Impact on sex ratio at birth	*Country*
Birth order, gender composition	• Sex ratio increases rapidly with higher birth order • Sex ratio highest among final births • Sex ratio highest in families with no previous son	*All countries, diasporas*
Rural/urban	• Moderate variations, with opposite trends across countries	*All countries*
Region	• Geography usually the strongest source of sex ratio variations within the country	*All countries*
Ethnicity	• Ethnic groups exhibit very distinct sex ratio levels • Most minority groups have lower sex ratio levels	*Viet Nam, China, India, Singapore*
Religion	• Hindus, Sikhs, Buddhists, and Jains have comparatively higher sex ratio levels than Muslims or Christians	*India, Rep. of Korea*
Socioeconomic status	• Lower sex ratio among the poorest households • Highest among the richer sections and among the better educated • Decreases among the most affluent in China • Lower sex ratio among women with social insurance in China	*China, India, Viet Nam*

UNDERSTANDING SEX SELECTION

The three preconditions of modern sex selection: ability, readiness and low fertility pressure



"It is possible": access to the new technology

- Old discriminatory technology: infanticide, neglect of girls, rituals for male births, etc.
- Contraception linked to gender composition
- Emergence of modern prenatal diagnosis from the 1980s
  - Better healthcare infrastructures and greater accessibility
  - Lower cost of prenatal technology
  - Improved reproductive health and prenatal care
  - Higher living standards

Sex selective abortions

- A very “efficient” method of sex selection
- A “modern”, medical procedure
- Costs decreasing with time
- Limited social visibility
- More efficient methods available today outside Asia

"It is necessary": the "squeeze" effect of declining fertility

- Fertility decline occurred throughout most of the developing world
- Governments in many countries introduced policies to encourage birth control; a couple imposed it
- It became more difficult to simply have one more pregnancy to get a son
- Lower fertility means higher risks of not having a son

Low fertility and the risk of not having a son

	Number of children per woman			
	6	4	2	1
Probability of not having a son	1%	6%	24%	49%

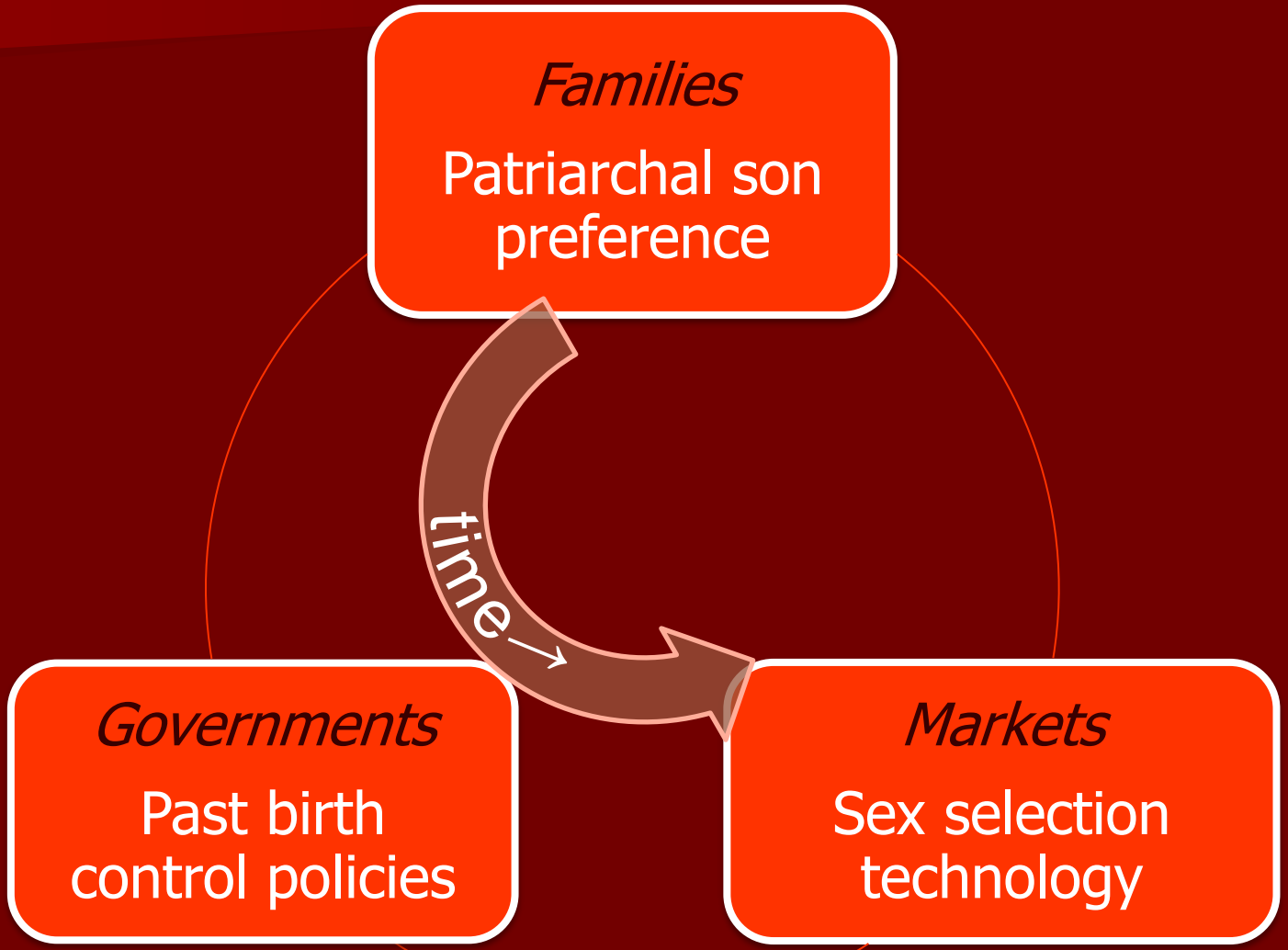
"It is worthwhile": local contexts of son preference

- Sociocultural, economic, demographic, political and spiritual reasons make sons more valuable than daughters
- Reasons vary across regions and social groups, but the common context is the presence of "patriarchal" kinship systems
  - Patrilineal descent groups (clans, patrilineage etc.)
  - Patrilocal systems (residence with or close to the husband's parents)

Local contexts of son preference

- Economic considerations:
  - Cost of education and care for girls
  - Dowry and marriage costs for brides
  - Old age support by sons
- Household considerations:
  - Patrilineal family and clan/caste/lineage
  - Coresidence and common patrilineal property
- Religious and social requirements
  - Funerals, ancestors' worship, etc.

Prenatal sex selection : families, governments and markets



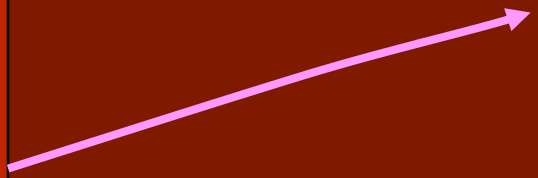
Temporal changes that made sex selection happen

Son preference

Unchanging preference for son proceeding from patriarchal norms: only boys are permanent household members, offer labor and support, perform after-life rituals, etc.

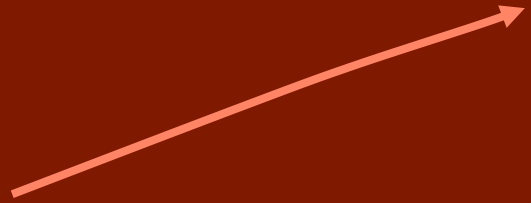
Fertility "squeeze"

Fertility decline and birth control reduce the average biological number of boys and increase the risk of remaining without a male heir



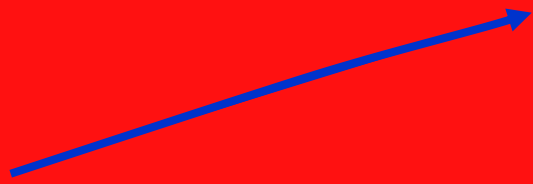
Prenatal technology

Combined with abortion, prenatal technology offers an effective sex selection method—that the private healthcare market can deliver at ever decreasing costs.

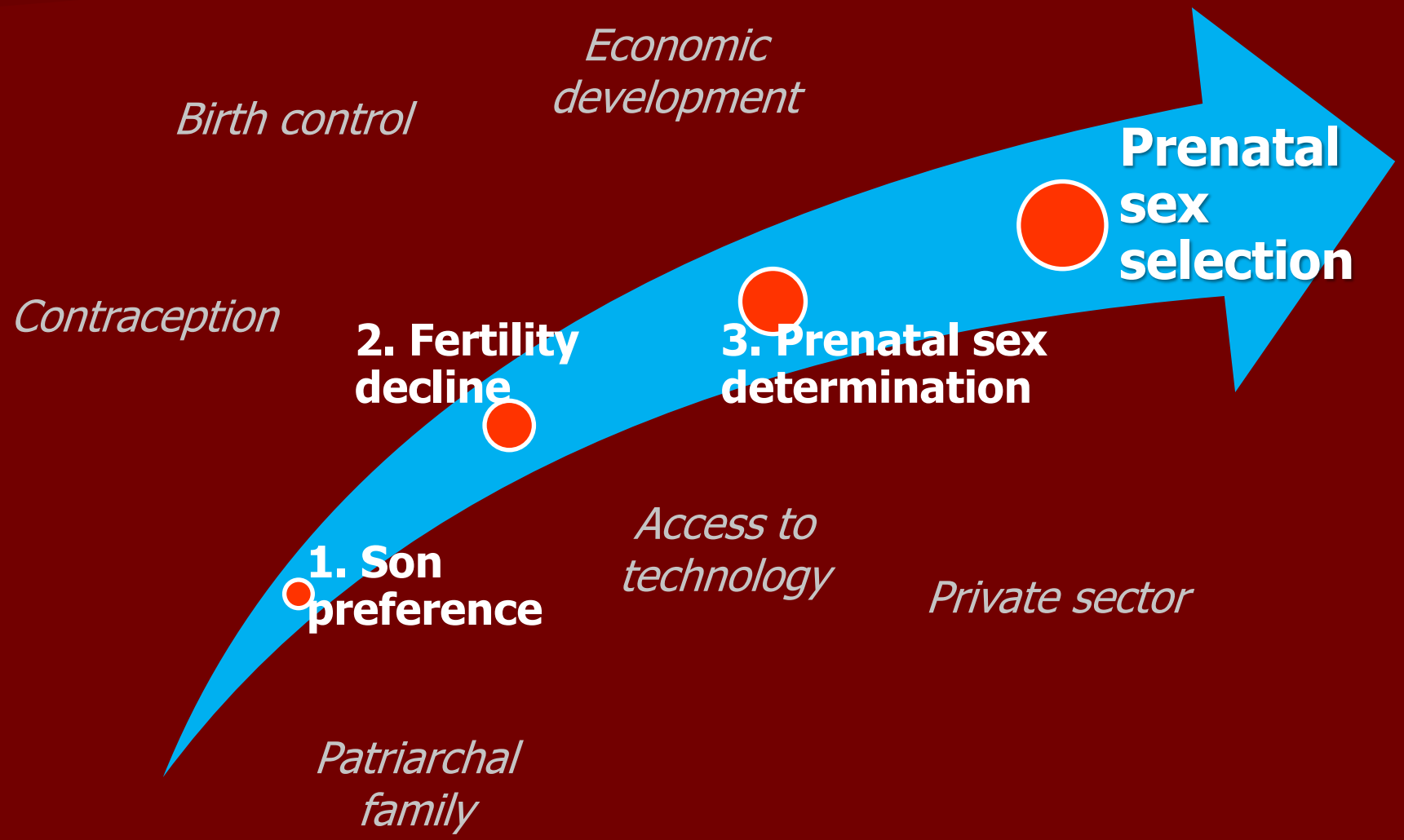


Sex ratio at birth

The demand for sex selection grows under the effect of fertility decline and is met by the new prenatal technology



Rising sex ratios at birth



SOCIODEMOGRAPHIC PROSPECTS

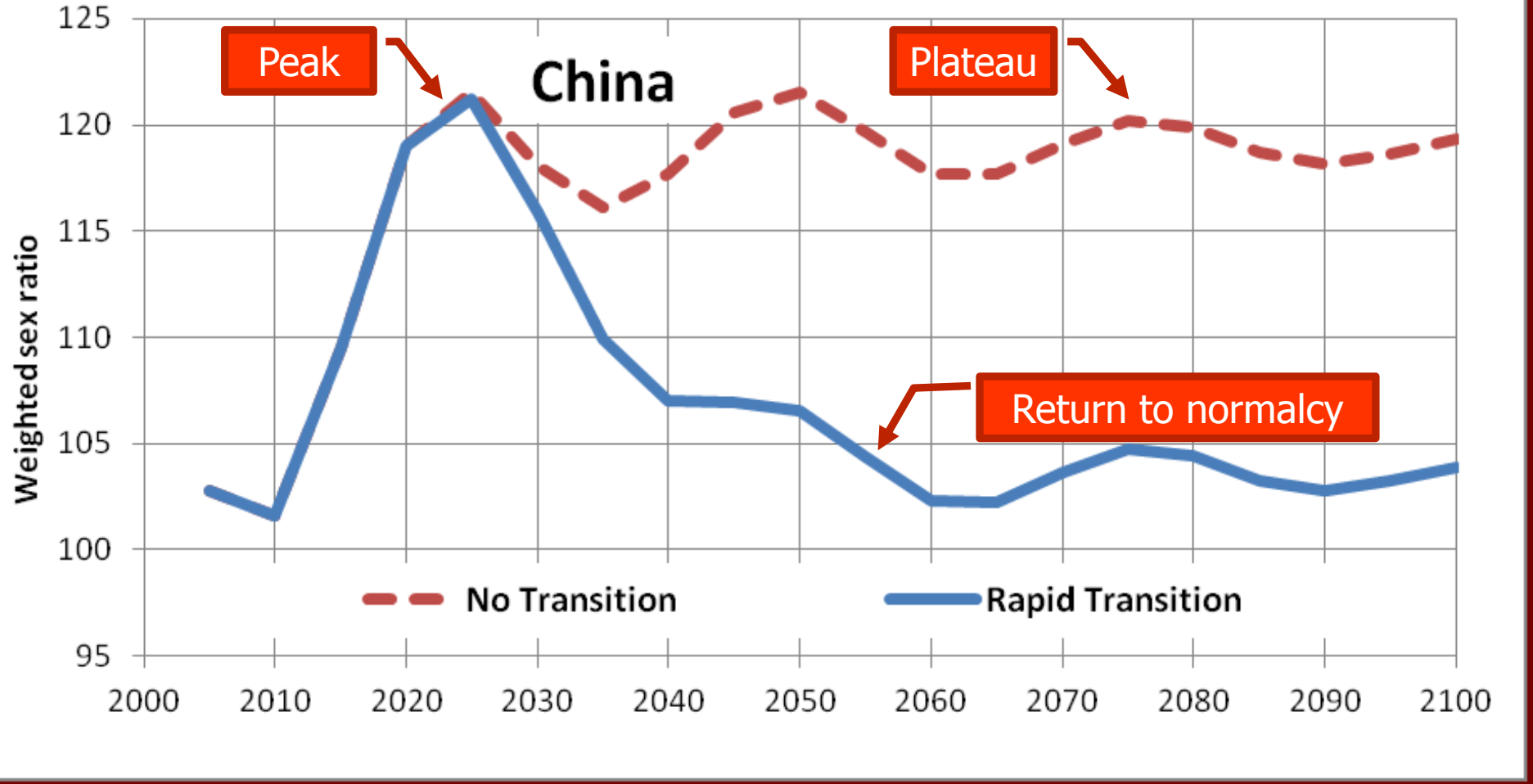
Population projections

- Examination of the largest contributors to sex imbalances: *China and India*
- Use of standard demographic parameters (UN world population prospects)
- Addition of 2 scenarios based on SRB variants
  - *No transition*: no change in high sex ratio at birth
  - *Rapid transition*: rapid SRB decline achieved by 2020 (SRB= 105)
- Use of marriage schedules for each country

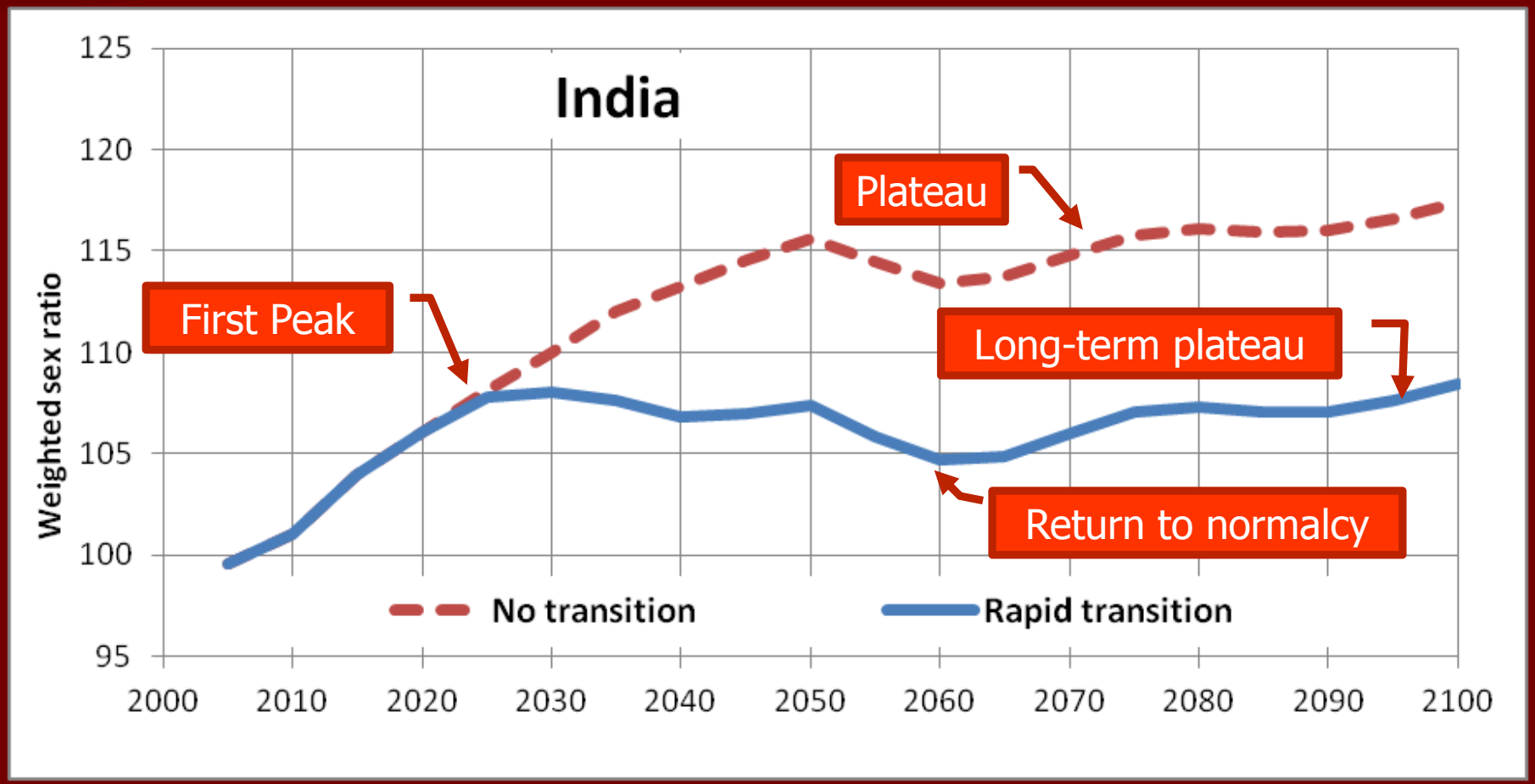
Projection results

- Population sex ratios in China and India remain above 100 during the entire 21st century, even when the SRB returns to normalcy by 2020
- The world sex ratio remains above 100 also
- One important is the increase in adult sex ratios (weighted by marriage rates) according to the two different scenarios

Adult sex ratios: China



Adult sex ratios: India



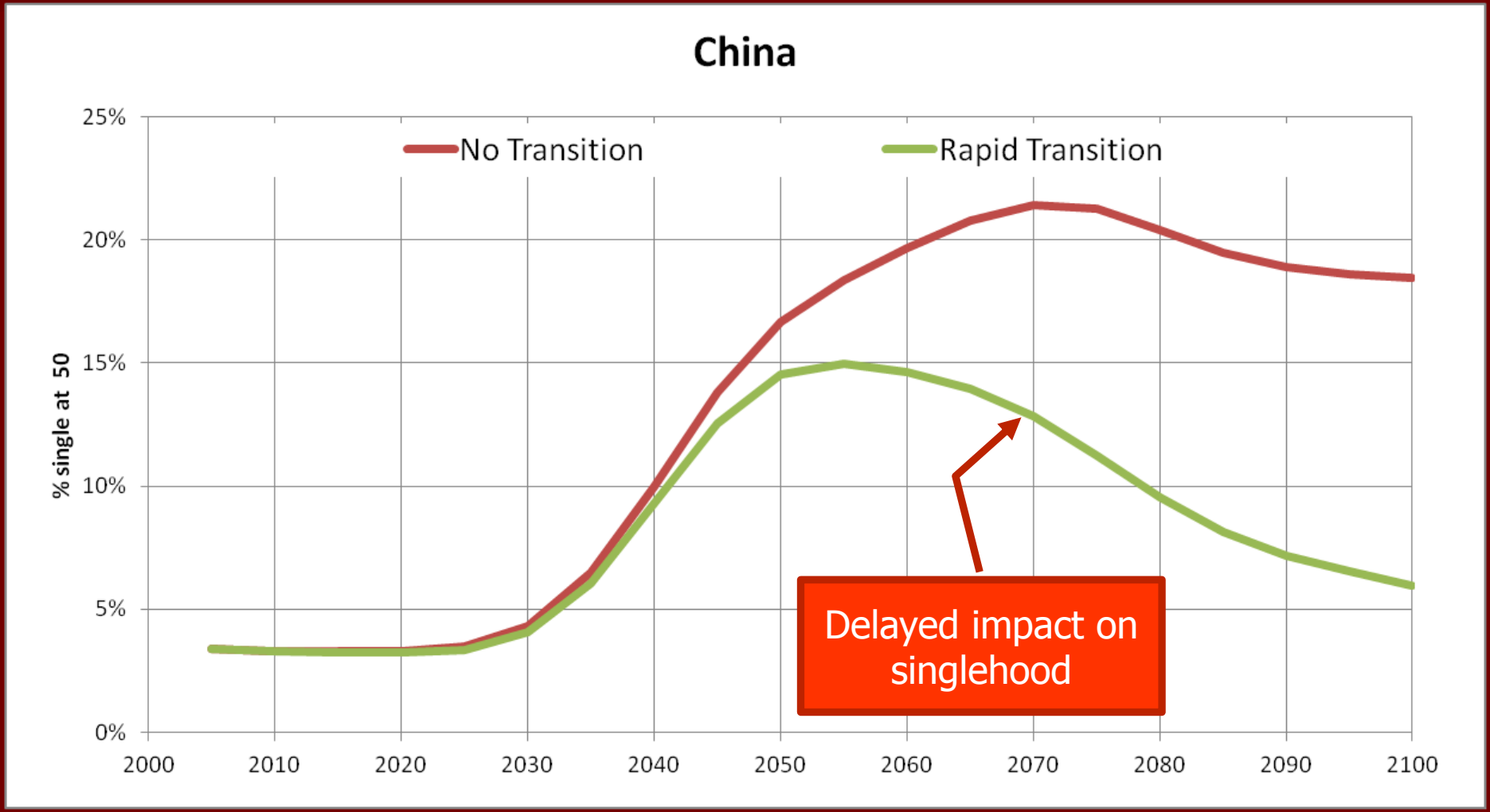
The extent of the marriage squeeze

- Adult sex ratios reflect the number of "new" prospective brides and grooms in each period, but do not factor the backlog of previously unmarried men who will try again to marry
- This backlog of single men will fast accumulate and throng the "marriage market" for years

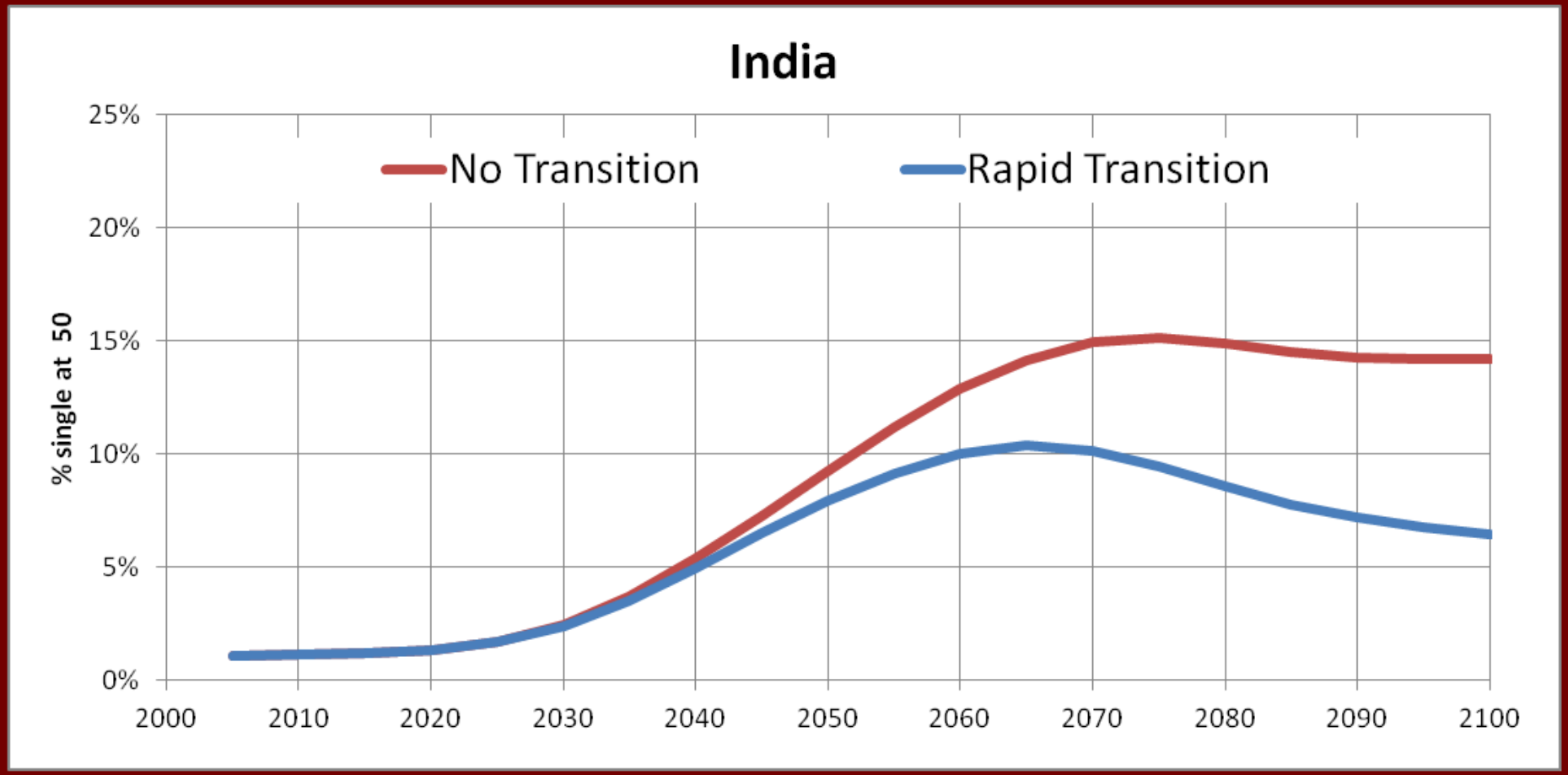
Marriage simulations

- Estimation method: marriage simulation
- Results (rapid transition scenario):
  - Unmarried men may outnumber unmarried women by around 60% in China (2020-55) and in India (2040-60)
  - Age at marriage among men will increase faster than that of women (greater age difference)
  - The proportion of men forced to stay single will increase from 3 to 15% in China and from 1 to 10% in India after 2050

Unmarried men at age 50 in China



Unmarried men at age 50 in India



Synthesis of the demographic simulations

- Men will remain more numerous than women
- Rapidly increasing surplus of unmarried men (up to 60% greater than prospective brides)
- Further delay in marriage among men
- Rise in involuntary non-marriage, with 10-15% of men forced to remain unmarried
- Delayed impact of marriage squeeze felt even among cohorts with normal sex ratio at birth

THE SOCIAL IMPACT OF SEX IMBALANCES

Understanding potential consequences of sex imbalances

- A situation of an extent never experienced by human societies in the past
- Imbalances felt today only in a few areas of China and India, but the full effects emerging only from 2025 onwards
- Reflection still based on limited field evidence from China and India and therefore partly speculative

Possible consequences on men

- Delayed marriage among men
  - Increased resort to prostitution, trafficking, etc.
- Increasing competition among unmarried men
  - Impact on savings and education investments
- Increase in involuntary non-marriage
  - Impact stronger among the vulnerable men: poorer, less educated, from remote areas, etc.
  - Inability to perpetuate the family line

Possible consequences on women and society

- Increased frequency of exploitation of women, female trafficking, gender-based violence.
- Pressure on women to marry and bear children
- Less political voice

- Change in marriage patterns and family structures
- Rise in the number of "bare branches"
  - Potential increase in antisocial behavior, social unrest, crime, aids prevalence, uncontrolled migrations, violence, etc.

Potential responses by communities

- Reduced caste, regional and ethnic endogamy
- In-migration of prospective brides
- Out-migration of unmarried grooms
- These are minor adjustments unlikely to offset significantly the marriage squeeze

POLICY RESPONSES TO SEX IMBALANCES

The sex ratio crisis as a tragedy of the commons

- A tragedy of the commons is a situation in which perceived individual interests prevail over long-term collective interests
  - Families respond rationally to fertility decline, technological change and son preference by artificially rising the proportion of boys
  - High SRB will cause a collective crisis (a demographic *malus*) decades later
  - Individual interest gradually destroys a “public good” such as balanced sex ratios
  - Everybody gets affected

Government's leverage on the intermediary factors of sex selection

- Low fertility pressure:
  - Ending drastic birth planning regulations
- Technology:
  - Regulating access to sex determination and emerging technologies
  - Controlling illegal abortions
- Son preference:
  - Subsidizing girls: conditional cash transfers and affirmative action
  - Promoting gender equity: campaigns and laws on family, inheritance, employment etc.

Access to technology

- Measures
  - Prohibitions of sex selective abortions
  - Banning prenatal sex determination
- Illustrations
  - Bans introduced early in China, India and Rep. of Korea, reinforced in India for sex determination
- Impact and issues
  - Sex selection made more risky for both practitioners and customers
  - Serious enforcement limitations
  - Very few condemnations/fines imposed on doctors and families
  - Potential negative impact on access to abortions, where legal

Support to girls

- Rationale:
  - Offsetting the apparent economic disadvantage of girls by offering support to girls and their parents
- Illustrations:
  - Conditional cash transfer schemes or scholarships linked to schooling, immunization, delayed marriage, pension benefits (parents), etc. "Care for girls" campaign, numerous initiatives in Indian States
- Impact and issues
  - Potential rapid impact on lower-income households
  - Multiplier effects on education, health behaviour etc.
  - Significant implementation and monitoring costs

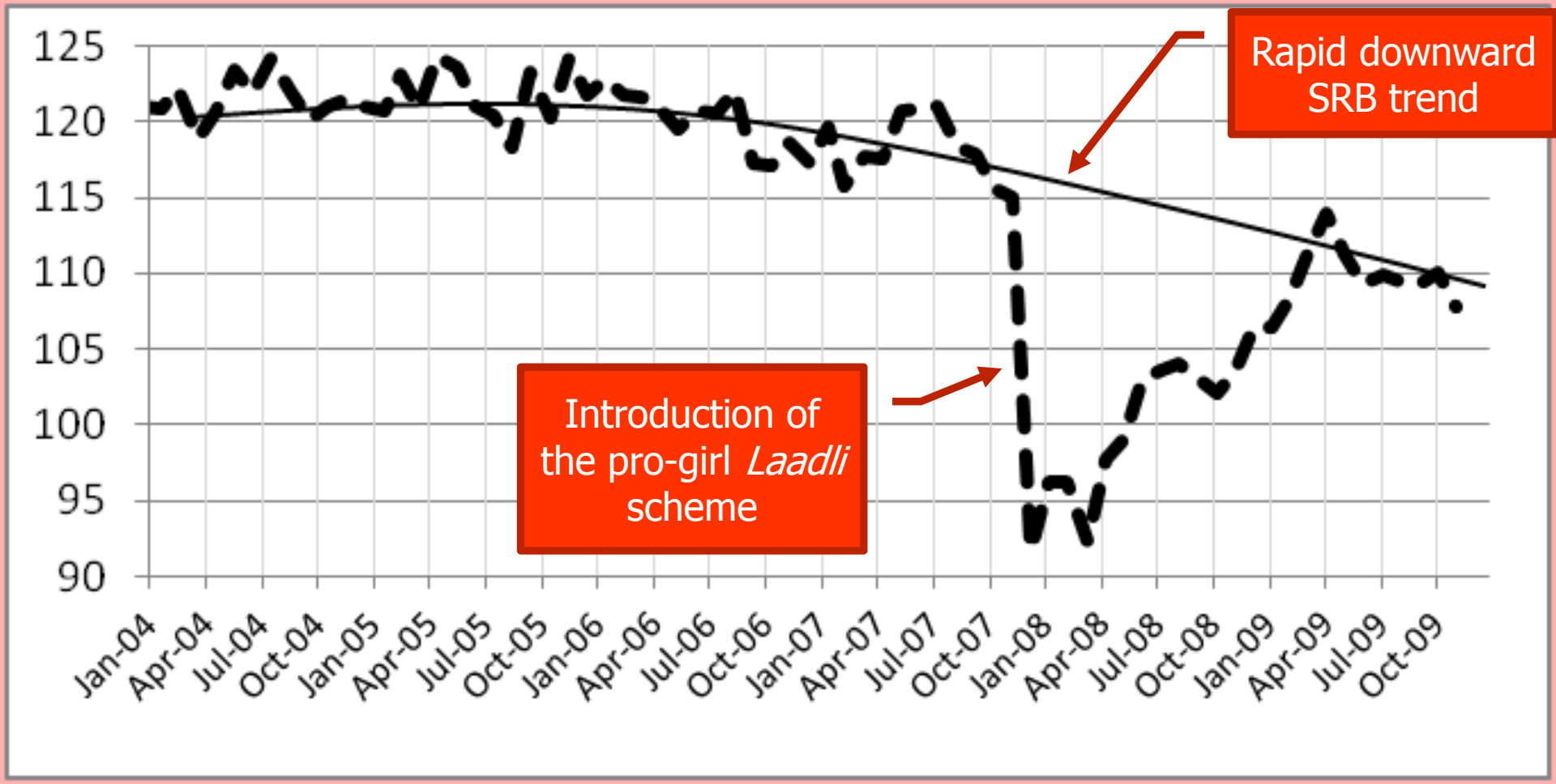
Promotion and communication

- Rationale:
  - Changing the mindsets on the girl child
  - Publicizing existing laws
  - Documenting the negative effects of sex selection on society
- Illustrations:
  - Advocacy campaigns on gender equity targeting specific groups: leaders, schoolchildren, young adults, medical community etc. "Care for girls" campaign in China, initiatives in India
  - Studies, statistics, press reports on sex selection and its consequences
- Impact and issues
  - Lasting impact difficult to monitor

Gender equity

- Rationale:
  - Ensuring the introduction or proper implementation of gender-equity laws: employment, family, land property, domestic violence, etc.
  - Addressing gender bias in traditional institutions: family, religion, marriage, etc.
- Illustrations:
  - New or amended land, employment, inheritance, family laws through gender mainstreaming in Rep. of Korea and India.
  - Interventions targeting traditional customs and institutions
- Impact and issues
  - Slow process of change
  - Strong social and political resistance
  - Difficulty to change "sticky norms"

SRB decline in Delhi, India



CURRENT TRENDS AND FUTURE CHALLENGES

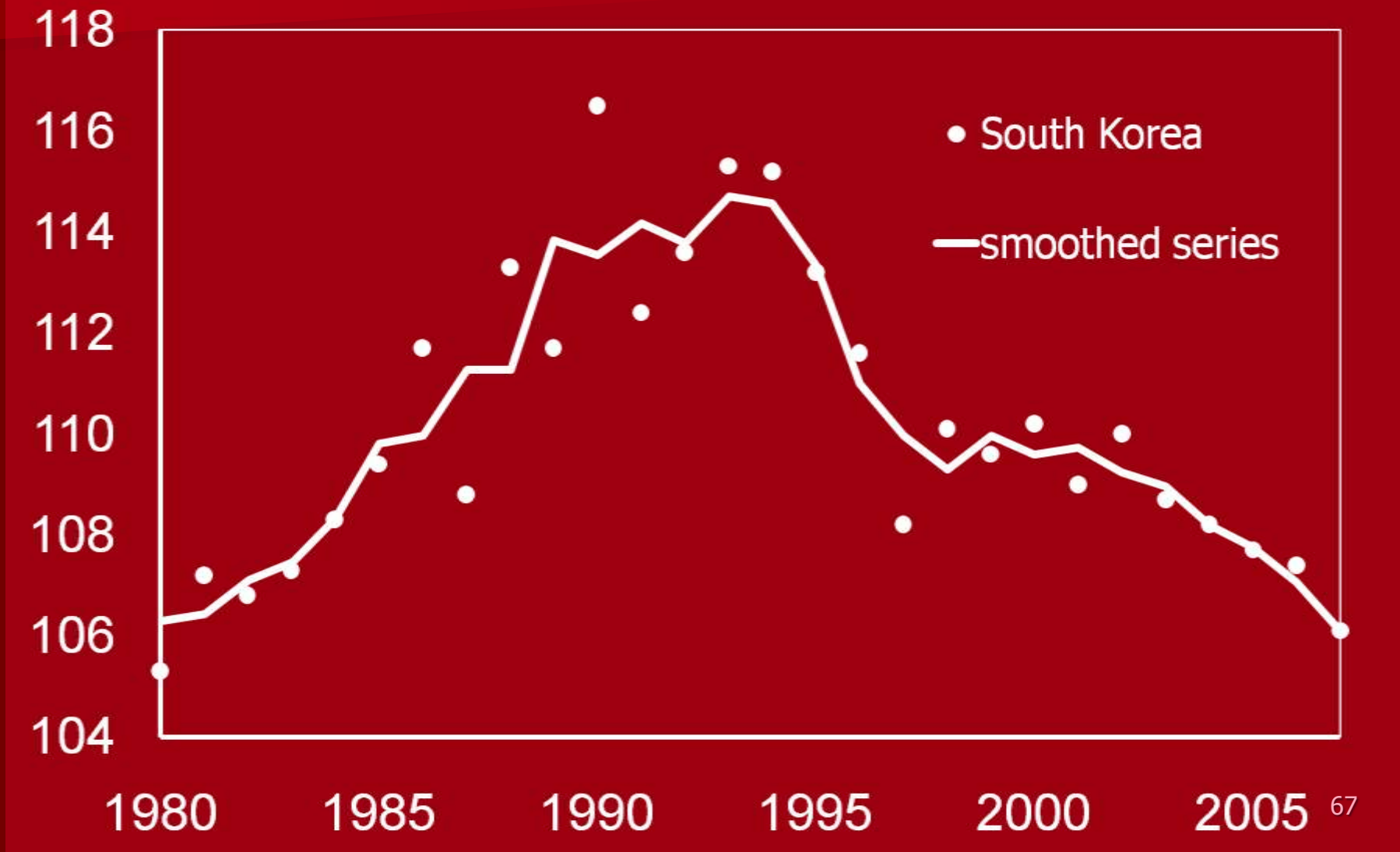
Worrying trends

- Diffusion of sex selective behaviour to new regions and to lower-income groups
  - Consequence of further fertility decline
  - Consequence of economic growth
  - Urbanization, private healthcare system
- Illustrations
  - Viet Nam, Central India, West China.
- Potential emergence in new countries
  - South Asia, Eastern Europe, Central Asia

Signs of a turnaround

- The experience of the Rep. of Korea
- Plateau or slow decline reached in Coastal China, South Caucasus, Northwest India
- Plateau or decline among higher-income groups

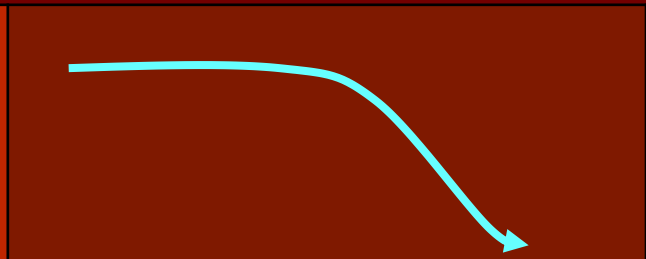
Rep. of Korea, 1980-2007



Pathway to a gradual reduction of sex selection

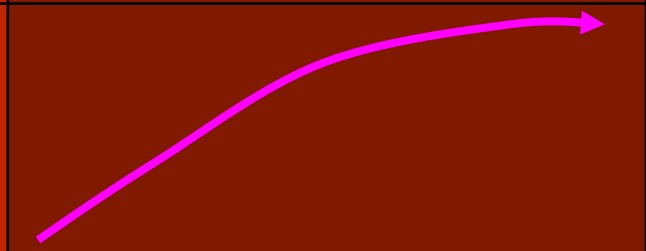
Son preference

Son preference diminishes under the impact of the growing market irrelevance of patriarchy, new schemes supporting girls, gender equity laws, and the marriage squeeze crisis



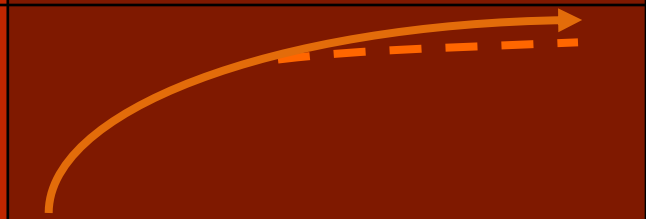
The fertility "squeeze"

The impact of the fertility "squeeze" (risk of not having a son) continues to increase, except in areas where drastic birth control regulations are relaxed. Yet fertility doesn't rebound.



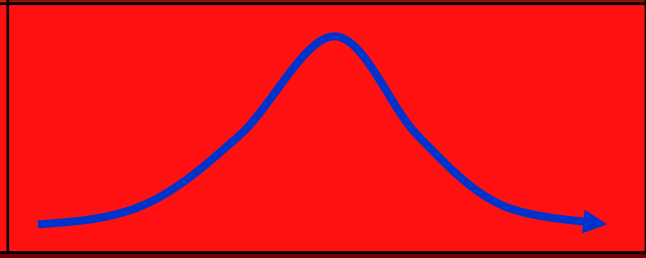
The supply factor (technology)

Access to discriminatory technology continues to improve thanks to new sex selection technology unless governments can effectively ban sex determination testing

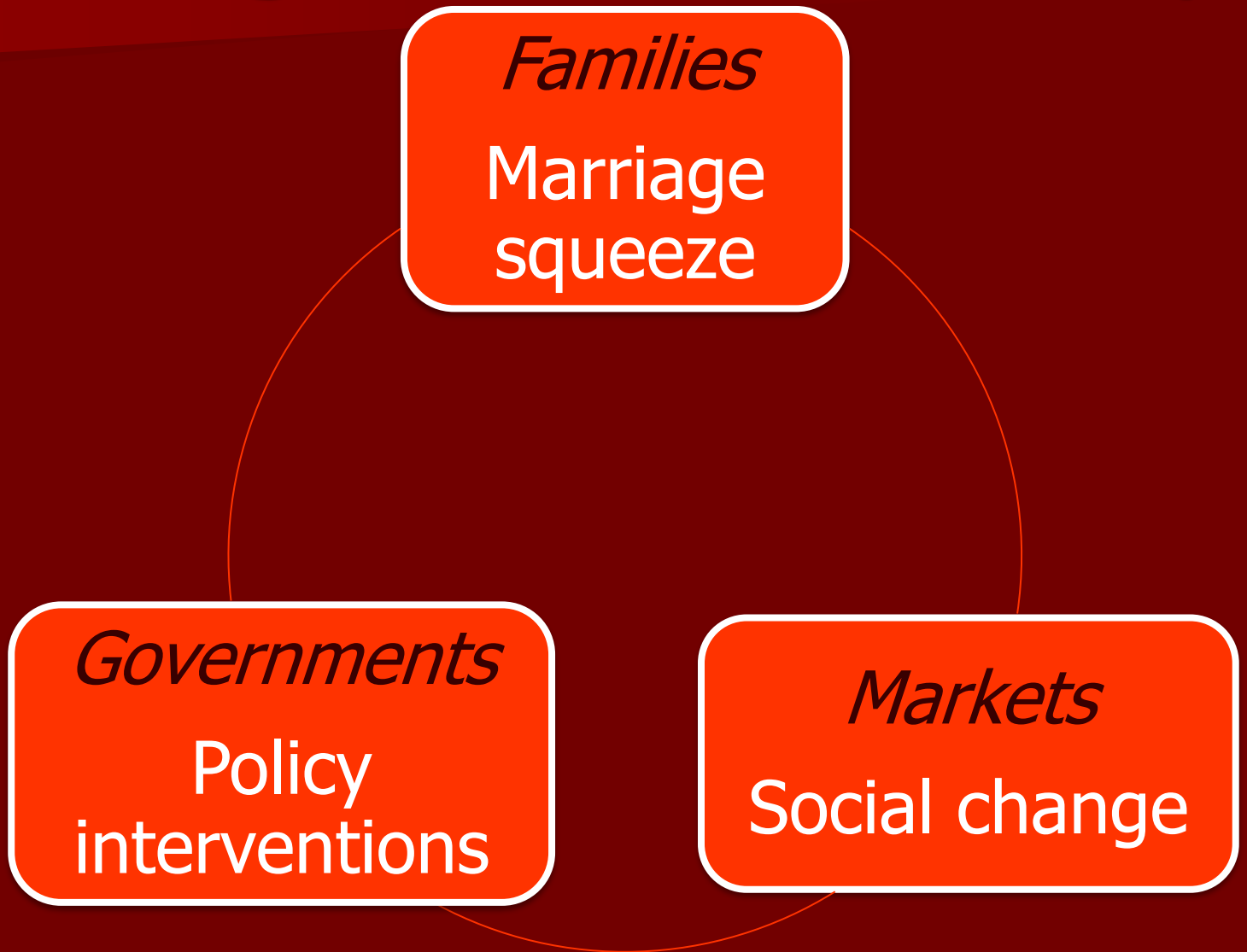


Sex ratio at birth

The downturn in birth masculinity trends results from the rapid decline of son preference as a result of market-driven social changes and further support to gender equity by the State



The main levers of the future change in birth masculinity



The main levers of the future change in birth masculinity

- Government intervention:
  - Regulation of sex selection, advocacy campaigns, cash transfers, changes in gender laws
- Patriarchal predicament:
  - Sex selection resulting in unmarried sons and prospering daughters
- Social and economic change:
  - New value systems, growing women's autonomy , Weakening of patriarchal structures

Patriarchal predicament

- Sex selection as a tragedy of the commons:
  - Individual benefits of sex selection, but looming marriage squeeze (NW India, Central China)
- Skewed sex ratios becoming a threat to
  - Endogamic norms (caste, ethnicity, regions etc.)
  - Universal marriage of men
  - Patrilineal dominance
  - Family reproduction
  - Lineage, ancestors' worship, family name etc.

Social and economic change

- Rapidly changing value systems
- Lesser demographic burden for women:
  - Lower fertility, delayed marriage, increasing agency in demographic decisions etc.
- Growing women's autonomy:
  - Impact of female employment, education, legal protection, etc
- Weakening of patriarchal structures
  - Growth of the non agricultural sector, equal inheritance, access to insurance and pension, etc.

Challenges ahead

- Better understanding patriarchy's weak spots" (inheritance, marriage constraints, etc.) for intervention
- Monitoring deterioration in birth masculinity in new vulnerable regions or countries
- Assessing the effectiveness and the direct and indirect impact of policy interventions

Faleminderit, շնորհակալություն, Çox sağ ol, ধোন্নোবাদ, 謝謝 , გმადლობთ, ધન્યવાદ, ಧನ್ಯವಾದ, धन्यवाद, ਧਨਵਾਦ, شكريه , Cảm ơn ông, thank you