Parity progression as expressions of gender preferences for children - a global comparative analysis using micro-level data from 97 countries

Martin Kolk[abc] Joseph Molitoris[de], Kieron Barclay[af]

In the current study we take a global perspective on parity progression ratios as an expression of son preferences, daughter preferences, or a preference for a mixed gender composition of children. In countries were fertility is largely planned, the gender composition of previously born children may have an effect of the decision to have an additional child. We use pooled survey data from 77 developing countries using DHS data and 20 contemporary countries using the harmonized histories collection of survey datasets. We give a global overview of gender based parity progression ratios using survival analysis models. This provides further comparative data on parity progressions, as well as introducing a new measure of behavioral gender equality. In addition, we relate gender preferences to other country-level characteristics. We use data on female political empowerment, measures of fertility context (TFR), and macroeconomic condition (GDP/capita), as well as other aspects of gender based preferences such as biased sex ratios both at birth (sex-selective abortion), and later in childhood (gender discrimination).

Stockholm University Demography Unit, Department of Sociology[a], Stockholm University Centre for Cultural Evolution[b], Institute for Future Studies, Stockholm[c], Hungarian Demographic Research Institute[d], Hungary, Center for Economic Demography, Lund University[e], Max Planck Institute for Demographic Research [f]

Manuscript submitted to the 2019 Conference of the Population Association of America, please consult with the authors before circulating or citing

Introduction

In societies where the number of children parents have is a function of their desires, parents may choose to have an additional child based on the sex composition of previous children. If parents have a strong desire for sons, they may be more likely to have an additional child following the birth of one or several daughters, and if they have a desire for daughters they may similarly be more likely to progress to a higher parity if they have predominantly sons. In some contemporary societies, parents instead behave as if desiring a child of either sex, with a higher probability of additional births if the sex of previously children are the same.

In this study, we use micro-level longitudinal fertility histories to analyses how previous birth histories are related to the progression to a next child. We adopt an approach that has been used primarily to study parity progressions in developed contexts, survival analysis models, modelling the age-specific hazard of a new birth based on the sex composition of earlier children.

We focus both on changes across countries, but also on developments within countries over time. As we use multiple pooled surveys for the same countries, we often have access to several decades of birth cohorts of mothers for a single country, and can examine changing fertility behavior over time. We focus on the transition from 2^{nd} to 5^{th} child, as for larger families sizes it is unlikely that the majority of parents deliberately apply stopping behavior based on previous sex composition of children.

The last decades there is increasing evidence of a consistent pattern across developed societies in which parents have a mixed gender preference, where transitions to third births are higher among parents with mixed-sex composition among the first two births (Andersson, Hank, Rønsen, & Vikat, 2006; Hank & Kohler, 2000; Kolk & Schnettler, 2013; Miranda, Dahlberg, & Andersson, 2018). This pattern has also been examined in developing societies (Arnold, 1997; Zhao, 1997), though most research on gender preferences for children have focused on sex-biased discrimination of young children (Coale, 1991; Drixler, 2013) and how sex-selective abortion have biased sex ratios (Christophe Z Guilmoto, 2009).

In the current study, we take a global perspective on gender preferences and aim to examine how such patterns have developed across reproductive regimes (the extent of deliberate control of fertility), developmental levels, societal gender equality, and kinship systems. We do this by

applying comparable statistical micro-level models for a large number of countries and linking the results of such analyses to country- and period-specific indicators. Below we give an overview of earlier research on gender preferences for children, as expressed through fertility behavior in different contexts.

Previous research

Gender preferences in contemporary developing societies

Demography has a long tradition of analyzing sex preferences for children in developing countries, and it has done so using a variety of metrics, including sex inequalities in child mortality, sex ratios at birth, infant feeding practices, expressed desires for sex composition, and parity progression. Much of that body of research was firmly rooted in the family planning movement in the second half of the twentieth century. As a result, it was largely concerned with the demographic implications of son preference, especially its effect on total fertility in pre-transitional and transitional populations (see Arnold, 1985, 1992; Arnold & Zhaoxiang, 1986; Bairagi & Langsten, 1986; Chowdhury & Bairagi, 1990; Haughton & Haughton, 1995; Pong, 1994; Repetto, 1972). The few studies that have compared child sex preferences across populations in developing countries have found that a diversity of preferences prevail, with the majority having either preferences for having children of both sexes or a slight male-biased preference (Arnold, 1997; Filmer, Friedman, & Schady, 2009; Fuse, 2010). A strong preference for sons has generally been found in the large and rapidly growing populations in Southeast Asia, like India, Nepal, Bangladesh, South Korea, and China, and to a lesser extent in the Middle East and North Africa. Recent work has also shown an emerging son preference in the Caucasus (Duthé, Meslé, Vallin, Badurashvili, & Kuyumjyan, 2012). In these populations, a woman's number of sons was positively associated with contraceptive use and abortion rates and negatively associated with continued childbearing (Arokiasamy, 2002; Bairagi, 2001; Christophe Z. Guilmoto, 2012, 2015, 2017; Leone, Matthews, & Zuanna, 2003; Yount, Langsten, & Hill, 2000; Zaidi & Morgan, 2016).

Why a son-preference predominates in these specific populations is thought to be a product of both long-term and short-term influences. To the former belongs the long-term transmission of cultural traditions that places a disproportionate value on boys, examples of which include Confucianist

ideology and the institution of *purdah* frequently found in the Indian subcontinent (Arnold, 1985; Das Gupta et al., 2003). Such influences promote rigidly patrilineal and patrilocal kinship structures traditionally found in these societies and place extraordinary value on having sons for the continued welfare of parents in old age (Das Gupta et al., 2003; Duthé et al., 2012). Yet the expression of son-preference may also be a pragmatic decision during transitory events. Bounded by informal institutions, parents facing greater economic insecurity may also show preference for boys in order to stabilize their household's living standards (Baig-Ansari, Rahbar, Bhutta, & Badruddin, 2006; Rose, 1999). One could therefore expect that as traditional patriarchal institutions are eroded, preferences for sons should also decline, and there is some recent evidence to support this claim. In some these societies, such as Taiwan and Korea, declines in son-preference have been documented in recent years, and are thought to be the result of urbanization and economic development, both of which subverted traditional patrilineal kinship structures and led to normative change (Chung & Das Gupta, 2007; Lin, 2009).

Gender preferences in historical societies

A limited number of studies have examined if sex composition affects parity transitions in historical European societies in the 18th, 19th and early 20th century (Kolk, 2011; Reher, Sandström, Sanz-Gimeno, & van Poppel, 2017; Sandström & Vikström, 2015; Tsuya, Feng, Alter, & Lee, 2010). The effects were generally weak, which is not surprising given that examined societies showed little evidence of parity-specific stopping. Studies indicated a weak preference for sons, with the latest periods showing signs of emerging preferences for a mixed gender preference consistent with the situation in contemporary societies (Kolk, 2011; Reher et al., 2017; Sandström & Vikström, 2015; Tsuya et al., 2010).

Gender preferences in contemporary high-income societies

In the last few decades, an increasing number of studies have shown evidence of that gender preferences also affect fertility behavior in developed societies (Andersson et al., 2006; Hank, 2007; Kolk & Schnettler, 2013; Mills & Begall, 2010; Miranda et al., 2018; Pollard & Morgan, 2002). In nearly all of the societies that have been studied, the dominant pattern has been a preference for a mixed-sex composition (Andersson et al., 2006; Hank & Kohler, 2000; Mills & Begall, 2010). Typically, there is little evidence of differences in progression to a second child, based on the sex of the first child. However, a large number of countries show a pattern in which

the transition/intention towards a third birth is higher among parents with either 2 sons or 2 daughters. In countries with more traditional gender norms, a boy preference is more common (Mills & Begall, 2010). There is some evidence of the emergence of a weak daughter preference in some Scandinavian countries (Andersson et al., 2006) and Japan (Fuse, 2013). Much comparative research has been based on surveys on the intention to have a child (Hank & Kohler, 2000; Mills & Begall, 2010), with some exceptions (Andersson et al., 2006), which differs from our approach that is based on observed fertility histories. A recent study found that fertility intentions and stated sex preferences overlap with observed fertility behavior (Miranda et al., 2018). There is little evidence of a socioeconomic gradient within societies in gender preferences as expressed through fertility behavior (Andersson, Hank, & Vikat, 2007; Kolk & Schnettler, 2013).

Data and Methods

We analyze the gender preferences for children using micro-level fertility histories. We use longitudinal data with monthly records of each birth of a mother, which also includes records of the sex of the child. As such our measure is entirely behavioral, unlike attitudinal approaches to measure gender preferences of children. We use and pool data from 2 sets of data sources, both containing data for multiple countries, and often multiple surveys for the countries.

Demographic and Health Surveys

The data on developing countries comes from the Demographic and Health Surveys (DHS). The DHS are nationally representative samples of women in childbearing ages that collect information on women's reproductive history, education, contraceptive use, health, and material circumstances, among other things. The surveys ask women to report their birth histories starting with the most recent live birth and then sequentially backwards in time. Stillbirths, miscarriages, and induced abortions are omitted from the histories. The fertility histories include information about each child's date of birth, sex, and survival status. This study includes data on 77 countries and 207 surveys from Latin America, the Caribbean, Africa, Europe, and Asia.

Harmonized histories data

Our second data set which includes high-income counties, and upper-middle income countries are the harmonized histories collection of surveys (Perelli-Harris, Kreyenfeld, & Kubisch, 2010). It includes data from 20 countries in the Generations and Gender Programme (GGP, wave 1) with data from Spain (Spanish Fertility Survey), United Kingdom (British Household Panel Study), Uruguay (the ENCoR survey) and United States (National Survey for Family Growth). We use the version available on the GGP homepage (https://www.ggp-i.org/data/) as of July 2018. The dataset includes detailed fertility histories, which we apply from the perspective of a woman, including information on the sex of previously born children.

Methods

We use survival analyses methods to estimate the if the hazard of transitioning from parity *j* to *j+1* (i.e. 2 to 3, 3 to 4, 4 to 5) is dependent on the sex composition of previous children. We base our birth records on women where all previously born children are alive at the time of the interval under study and we exclude birth histories with twin births. Women enter the population at-risk upon reaching parity *j* and exit the population at-risk upon reaching parity *j+1*, age 50, an interval length of eight years, or the survey year. Our main independent variable of interest is the sex composition of the previously born children and is defined categorically (see Table 1 for categorization). The models control for country fixed-effects, year, maternal age, and maternal education. In the first part of the analysis, we estimate pooled models for all countries and also stratified by WHO region. To examine changes in the risk of parity progression over time within regions, we then interact the sex composition with calendar year.

Table 1: Independent variable indicating the sex of previous children in regression models

	parity 1-2	parity 2-3	parity 3-4	parity 4-5	parity 5-6	parity 6-7	parity 7-8
Covariates							
	s	ss	Sss	dsss	sssss	sssss	sssss
	d	ds	Ssd	dssd	ssssd	ssssd	ssssd
		dd	dds	dsdd	mixed sex	mixed sex	mixed sex
			ddd	dddd	ddddd	ddddd	ddddd
				dddd	ddddd	ddddd	ddddd
s indicate previous birth is a son, d indicates previous birth is a daughter							

We then estimate separate models for each country stratified by decade at-risk. Country-decades with less than 100 observations in any category of sex composition are excluded from the analysis. These country-decade-specific estimates are then linked to macro-level indicators from the Varieties of Democracy project dataset. The dataset includes measures of the total fertility rate (TFR), as well as GDP/capita of the countries of our data. It also includes a measure of gender equality, Women's Political Empowerment Index (WPEI), which is based on yearly information and is a multifaceted measure on women's civil liberties, civil society participation, and political participation across the world. For a further description of the index, see Sundström, Paxton, Wang, and Lindberg (2017)). For each decade, we calculate the average value of WPEI, TFR, and GDP/capita. We then present bivariate plots in which we plot the relative risk of parity progression based on the sex of previous children, indicating gender preferences, against the macro-level variables for each decade of a country. The plots are then fit using a regression models with country-year as our unit of analysis. Because some of our countries had relatively few observations, especially after subdividing by period, we inversely weight our data by the size of the standard error from our regression models to give higher weight to more precise country-year observations. In further analyses, we will additionally collect data on kinship systems, and demographic data on sex ratios to reveal if our measures are related to sex-selective abortion, or mortality related to parental gender discrimination.

Results

We begin by presenting overall estimates of parity progression from the pooled sample. We then demonstrate trends in the transition to third births based on the sex composition of children. This is followed by a section where we correlate our coefficients for the transition to third births from our micro-level data, with macro-level country and period indicators. This has been a common transition to examine parity progressions at, as a large share of parents have children of only one sex, while parity biased transitions have only been rarely observed for the transition to a 2nd child. At this stage, the bivariate associations are only examined for developing countries and for the transition to third births, but the final version will also look at higher-order transitions and include developed countries as well.

Overall trends in parity progressions based on sex of children

First, we examine the relationship between the sex composition of previous births with the transitions to third, fourth, and fifth births for the pooled sample of 77 countries (Table 2). For all birth intervals, there was a higher risk of progressing to the next birth if the previously born children were predominantly girls. In the progression to third births, having two girls was associated with an increase in the risk of the next birth by about 15%. As parity increased, having *only* girls was associated with larger and larger risks of continued childbearing. Having three girls led to an increase in fourth birth risks of about 25% and four girls an increase in fifth birth risks of about 28%. Even when the sex composition merely female-biased, but not exclusively female, we saw a larger increase in risks than in the opposite case. In a three-child family, having two girls was associated with an increase in fourth birth risks by 10% compared to having two boys. In four-child families, there was almost no greater risk of having a fifth child if three children were boys, while there was an 11% increase in the risk if three children were girls.

We then examined the evolution of the relationship between the sex composition of the first two children and parity progression within WHO regions (Figure 1). Specifically, this figure shows the percentage change in the risk of a third birth when the first two births were the same sex compared to if they were mixed sex. Thus, zero would indicate that there was no difference between the risk of parity progression when children were the same sex or mixed sex (i.e. no preference). In the figure, the line marked FF should be interpreted as an indicator of degree of son preference and MM the degree of daughter preference. Positive values indicate a preference and negative values would indicate an aversion for a given sex relative to mixed sex children. There are several interesting patterns worth discussing here. First, a common trend present in all regions was that there was little change over time in parents' probability of parity progression when the first two children born were boys. In other words, preference for daughters compared to preference for mixed sex children remained largely unchanged throughout the world during the latter half of the twentieth century. Apart from short-term fluctuations, having two boys was not associated with an additional increase in fertility any different from if the first two children were the same sex. This was consistent in all regions.

Second, sex preferences for children were heterogeneous across regions. In Africa and Latin America, the sex of the first two children had seemingly little impact on the decision to continue

childbearing. In the Eastern Mediterranean, Europe, and Southeast Asia, a clear son preference was found.

Finally, in the regions where son preference was present, we see a striking evolution over time in which it becomes stronger. The extent to which these preferences were strengthened varied between the regions. In Southeast Asia and the Eastern Mediterranean, son-preference grew at similar rates. In these regions, preference for boys was present but moderate before 1960, but continued to grow throughout the subsequent decades. Ultimately, it reached its apex in the mid-1990s, at which time having two girls was associated with an increase in the risk of a third birth by about 30%. In Europe, on the other hand, a much more dramatic evolution of son-preference took place. In the 1960s, preference for boys was already strong. Having two girls increased the risk of a third birth by around 30%. The expression of this preference grew rapidly into the 1980s, by which time having two girls was associated with an increase in third births of more than 100%. After this point, there was a rapid reduction in son-preferential fertility risks, though it remained strong in relative terms at around 30%.

In order to better understand the heterogeneity in sex preferences for children in the developing world, even within regions, we then examined the distribution of son and daughter preference across all developing countries for which we had data (Figure 2). The numbers in the figure are the absolute difference in the probability of progressing from the second to third birth for combinations of MM and FF children, $\Delta p_{2\to3} = (p_{2\to3}^{MM} - p_{2\to3}^{FF})$. Thus, a positive difference indicates a preference for daughters, a negative difference a preference for sons, and zero indicates no difference. As an arbitrary cutoff point, we can classify a country as demonstrating a gender preference if $\Delta p_{2\to3} > |0.01|$.

Here we can see great diversity in sex preferences for children across the developing world. In the majority of countries, the difference in probabilities is negligible, indicating no distinct expression of sex preferences in fertility. In a small number of countries (9%), there is a relatively higher probability of parity progression when both children were sons, indicating a daughter preference. These included Cote D'Ivoire, the Dominican Republic, Trinidad and Tobago, Nicaragua, Gambia, Paraguay, and Guyana. This finding is consistent with the recent comparative work on attitudinal preferences for the sex of children (Fuse, 2010).

Almost one-third of countries demonstrated a son preference instead of a daughter preference, however. Populations demonstrating a son preference were geographically heterogeneous and included countries from all continents represented. Some form of son preference was generally found throughout Eurasia and Northern Africa, and much of Latin America. The most extreme expressions of son preference were found in Armenia and Azerbaijan, where the absolute differences in probabilities were more than 0.15. This finding is consistent with recent work showing an inordinate rise in the sex ratio at birth in the Caucasus, which has been attributed to widespread sex-selective abortion (Duthé et al., 2012). Interestingly, we also find that these preferences clearly translate to parity progression as well. The differences in probabilities were nearly double the next highest country, India. While still showing signs of son preference, many of the countries which have been the most intensely studied with regard to sex preferences, such as Sri Lanka, Pakistan, and Bangladesh, had far smaller differences in probabilities of parity progression based on the sex of previous children compared to the leading son-preference countries, Turkey, India, Azerbaijan and Armenia.

Bivariate relationship between gender preferences to WPEI, GDP,TFR at the macro level

For our second sets of analyses, we calculate the country-specific relative risks of progressing to a 3rd child, based on the sex of previous children, for every decade of that country. We link that data with country-period level data on the gender equality, fertility, and GDP/capita in that country for that period. We then examine the relationship between gender preferences and our macro indicators across periods and countries.

In figure 3, we have plotted the relative risk ratio of mothers with 2 daughters over 2 sons on the progression to a 3rd child. A positive value can be interpreted as a son preference relative a daughter preference. Each point represents a country for a 10-year period. In figure 4, we instead plot the relative risk ratio of mothers with 2 daughters, over those with 1 son and 1 daughter, where a positive value reflects either a son preference or a mixed sex preference. Overall, the results are largely similar, as for the countries in the DHS data the coefficients of a daughter-daughter, and a son-daughter is largely similar.

For the measure of gender equality, no clear pattern emerges, though we see that a son preferences appears to be more common at intermediate and possibly higher levels of gender equality (top panels). We look forward to explore how these patterns look when we include additional high-income countries with higher levels of gender equality.

The explanation for the absence of gender preferences is clear when we related gender preferences to overall fertility levels in a society (middle panels). In societies with high fertility we find no evidence of sex selective parity progressions at parities 2 to 3, which makes sense in a context in which either fertility is largely unregulated, or desired fertility is well above 3 children. Instead we find that gender preferences are clearer in low fertility societies, which is consistent with the temporal trends in sex preferences that we observed within regions.

Finally, we relate gender preferences to overall wealth in the society (bottom panels). Here we find more evidence of gender-based parity progression biases in richer societies, though with some indication that son-preference is weakest in the wealthiest countries. We once again look forward to further explore this pattern with data from high-income countries, where we know that a mixed sex preference is more common, and there is some evidence of daughter preferences over son preferences (Andersson et al., 2006; Fuse, 2013; Hank, 2007).

Conclusions

In this study we have presented some preliminary results on how sex preferences of children affect fertility behavior in developing societies. This is one of the few studies that has been able to examine the effects of sex preferences for children on parity progression from a comparative perspective. We believe this measure has potential as an indicator of overall levels of gender equality in a society, while also providing further information on a significant determinant of fertility in some contexts. Surprisingly, our comparative findings show a general trend of *growing* son-preference during demographic and economic modernization, but we have not yet included an additional 20 developed countries in the analysis. This finding is therefore tentative.

In further analyses, we look forward to including a broader settings of countries, including large high-income societies. With such data we aim to explore if some of the patterns we find of increasing son preferences in low fertility, wealthy, and high gender equality societies just reflect

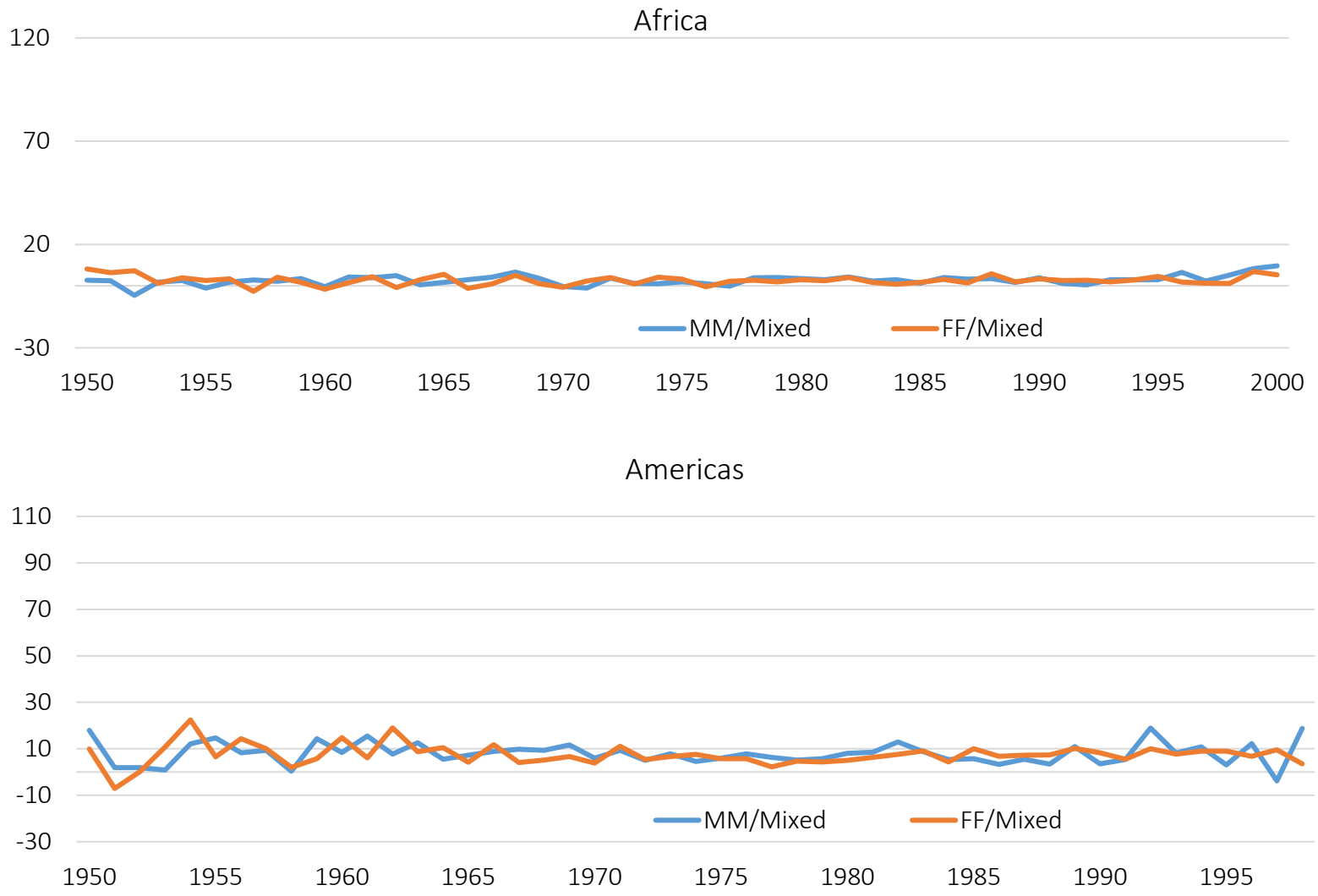
a sub-sample of upper-middle income countries with DHS data. Tracing the change and development over time, across all levels of development will be possible once we add further data. We will also expand our focus on more parity transitions, potentially allowing us to examine gender preferences also in high fertility contexts.

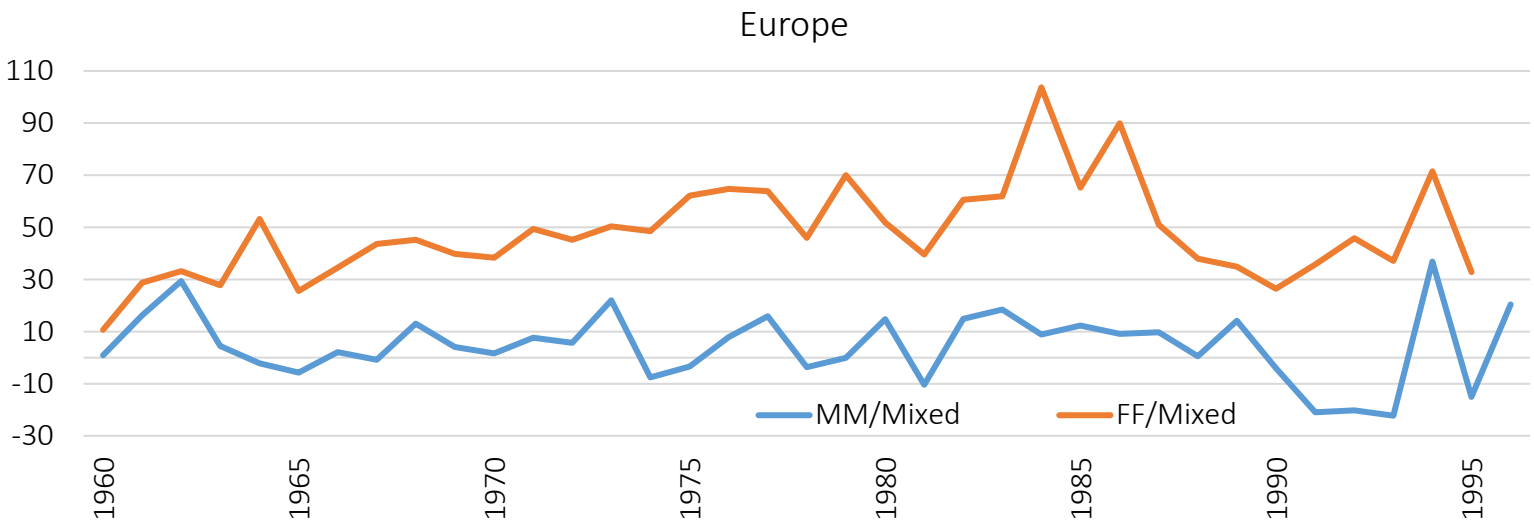
Table 2. Cox Models Estimates of Parity Progression based on the Sex Composition of Previous Births for Pooled Sample of 77 DHS Countries.

	2->3				3->4				4->5		
	HR	SE	*p*		HR	SE	*p*		HR	SE	*p*
Sex Composition:				Sex Composition:				Sex Composition:			
MF	1.00			MFM	1.00			MFMF	1.00		
MM	1.02	0.003	0.000	FMF	1.10	0.004	0.000	MMMF	1.01	0.005	0.002
FF	1.15	0.003	0.000	MMM	1.06	0.005	0.000	FFFM	1.11	0.005	0.000
				FFF	1.25	0.006	0.000	MMMM	1.08	0.008	0.000
								FFFF	1.28	0.010	0.000
Birth Year	0.97	0.000	0.000	Birth Year	0.97	0.001	0.000	Birth Year	0.97	0.001	0.000
Birth Year^2	1.00	0.000	0.000	Birth Year^2	1.00	0.000	0.000	Birth Year^2	1.00	0.000	0.000
Birth Year^3	1.00	0.000	0.319	Birth Year^3	1.00	0.000	0.000	Birth Year^3	1.00	0.000	0.000
Age:				Age:				Age:			
15-19	1.81	0.008	0.000	15-19	1.93	0.023	0.000	15-19	2.10	0.072	0.000
20-24	1.00			20-24	1.00			20-24	1.00		
25-29	0.58	0.002	0.000	25-29	0.57	0.002	0.000	25-29	0.56	0.003	0.000
30-34	0.36	0.001	0.000	30-34	0.34	0.002	0.000	30-34	0.33	0.002	0.000
35-39	0.20	0.002	0.000	35-39	0.19	0.001	0.000	35-39	0.19	0.002	0.000
40+	0.07	0.002	0.000	40+	0.07	0.001	0.000	40+	0.07	0.001	0.000
Education:				Education:				Education:			
None	1.00			None	1.00			None	1.00		
Primary	0.90	0.003	0.000	Primary	0.86	0.003	0.000	Primary	0.84	0.004	0.000
Secondary	0.71	0.002	0.000	Secondary	0.65	0.003	0.000	Secondary	0.64	0.004	0.000
Tertiary	0.59	0.003	0.000	Tertiary	0.55	0.005	0.000	Tertiary	0.54	0.008	0.000

Country FE	YES	Country FE	YES	Country FE	YES
Mothers	1,254,877	Mothers	796,562	Mothers	466,917
Births	863,742	Births	508,054	Births	288,181
Exposure	4,235,880	Exposure	2,799,167	Exposure	1,645,410
	312,622		210,074		110,983
LR Chi2		LR Chi2		LR Chi2	

Figure 1. Probability of another birth given a MM or FF combination as a percentage of a mixed-sex child composition, by WHO region across maternal birth cohorts.




Europe
110
90
70
50
30
10
-10
-30
1960
1965
1970
1975
1980
1985
1990
1995
MM/Mixed
FF/Mixed

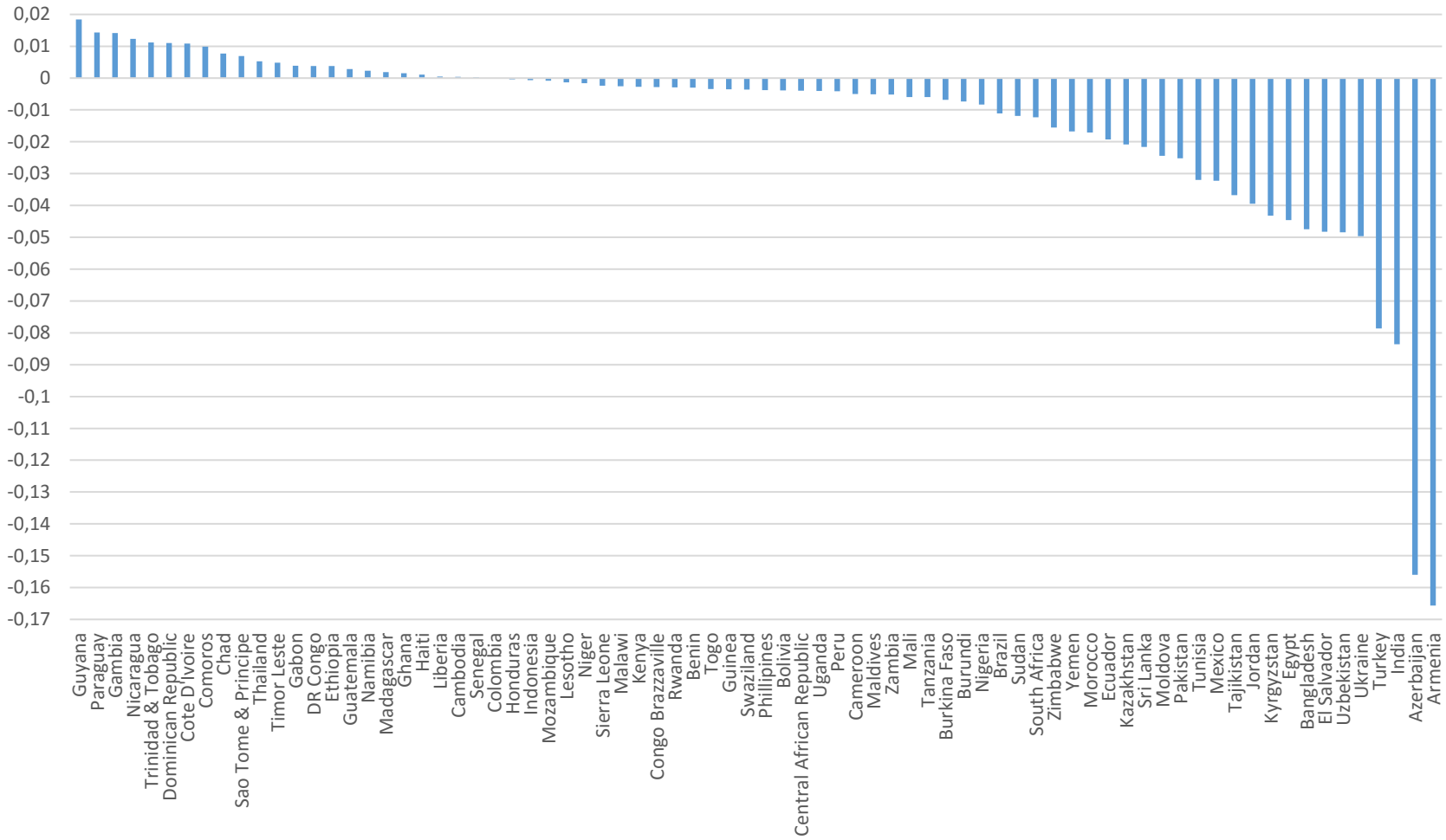
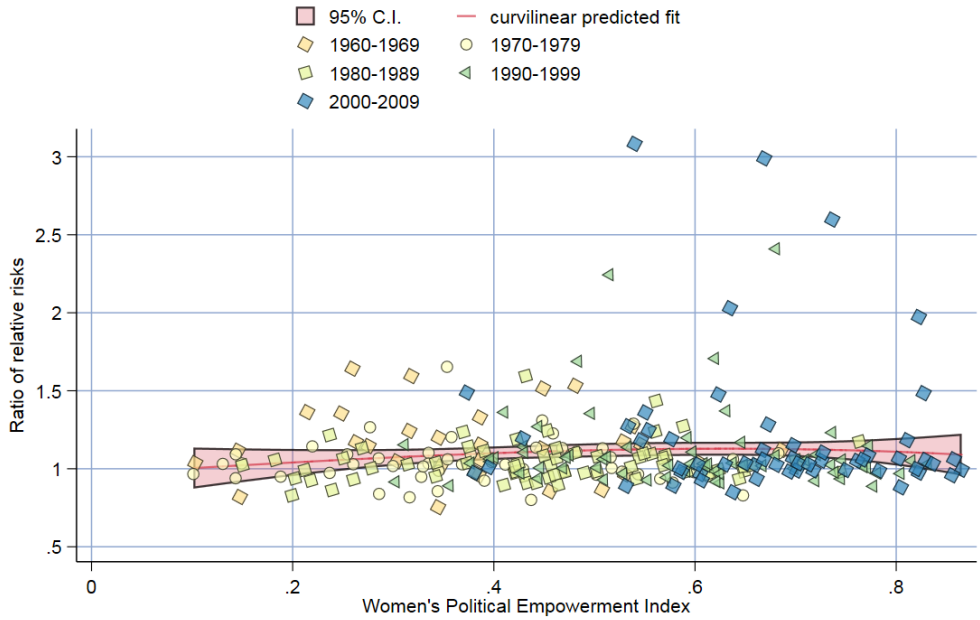
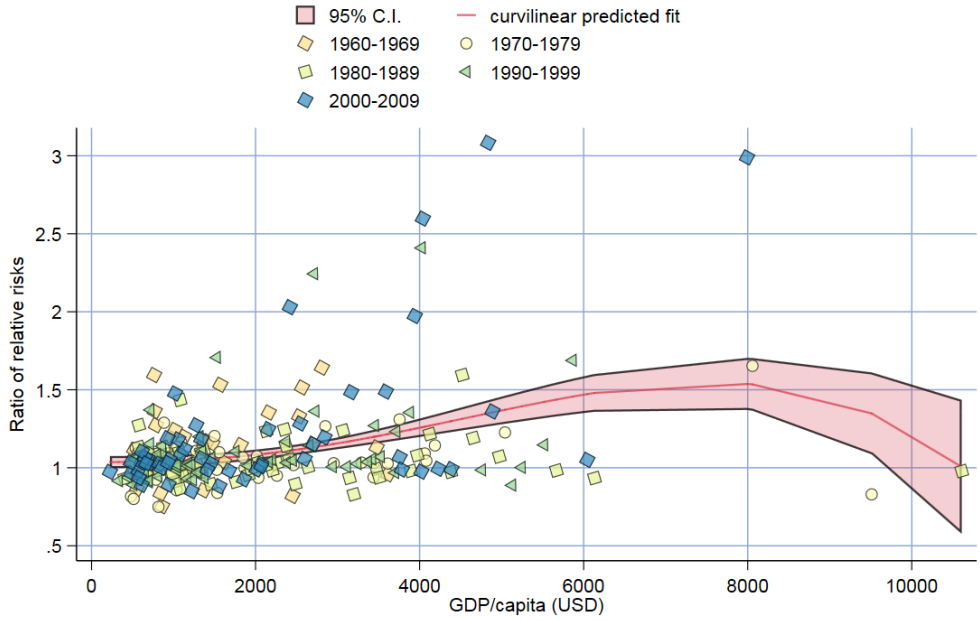


Figure 2. Difference between the predicted probability of female preference and predicted probability of male preference. A positive difference means the probability of progressing from 2 to 3 births was greater when both previous births were male (i.e. Female Preference), Negative difference means the probability of progressing from 2 to 3 births was greater when both previous births were female (i.e. Male Preference). The larger the absolute value, the greater the preference in either direction.

Figure 3: Ratio of relative risk of progression to a third child for mothers with 2 daughters over mothers with 2 sons (male preference). Event history models on progression to third child, by period of study. 10-year & country observations with curvilinear predicted fit. Top panel gender equality, middle panel GDP/capita, bottom panel TFR.





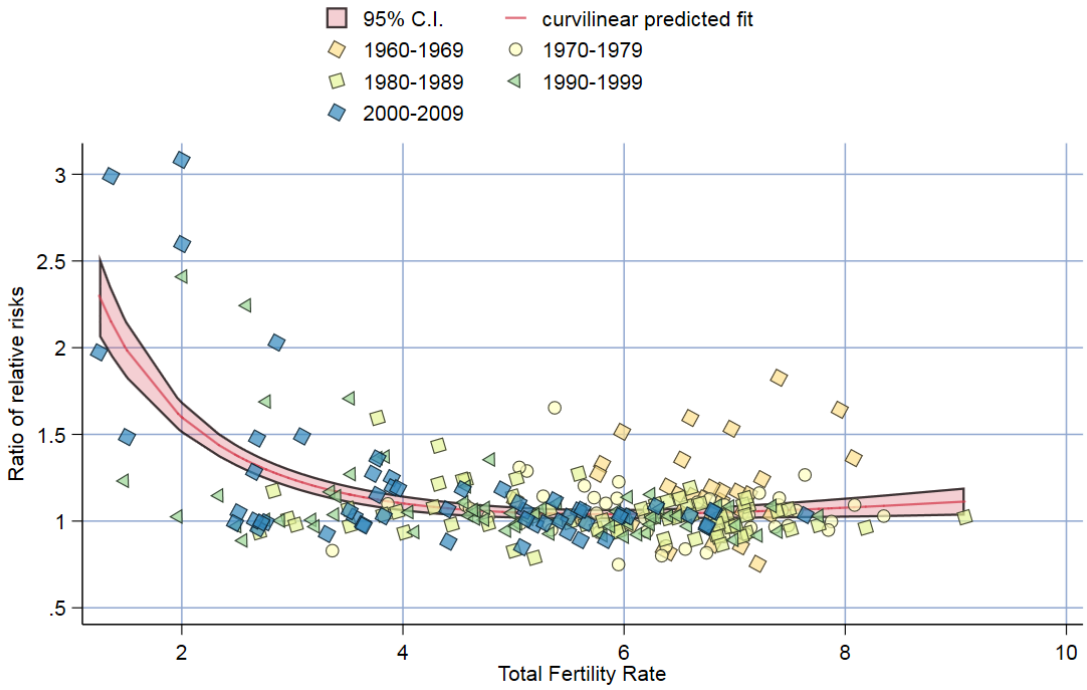
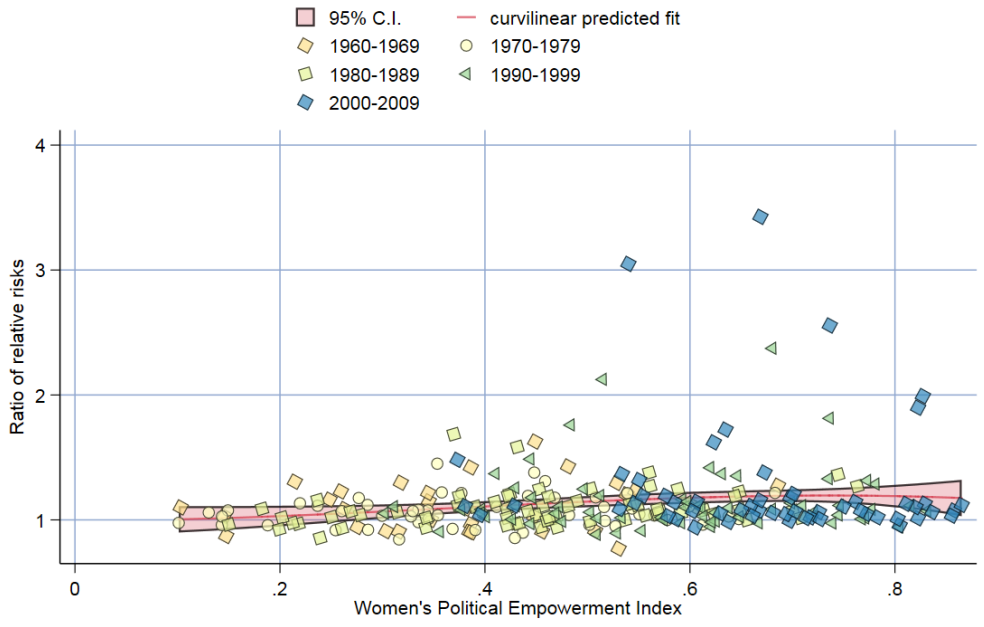
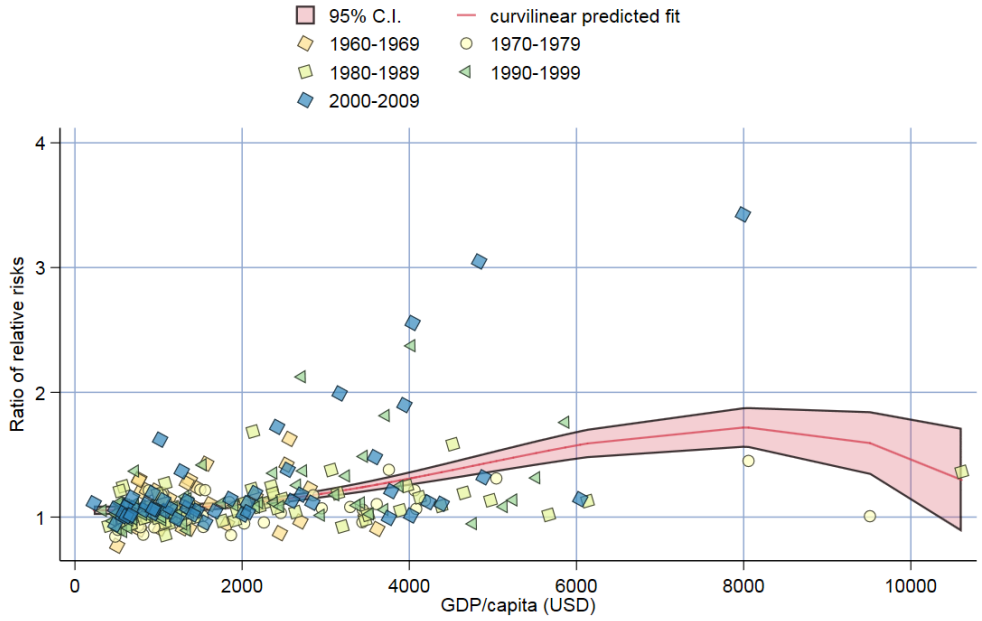
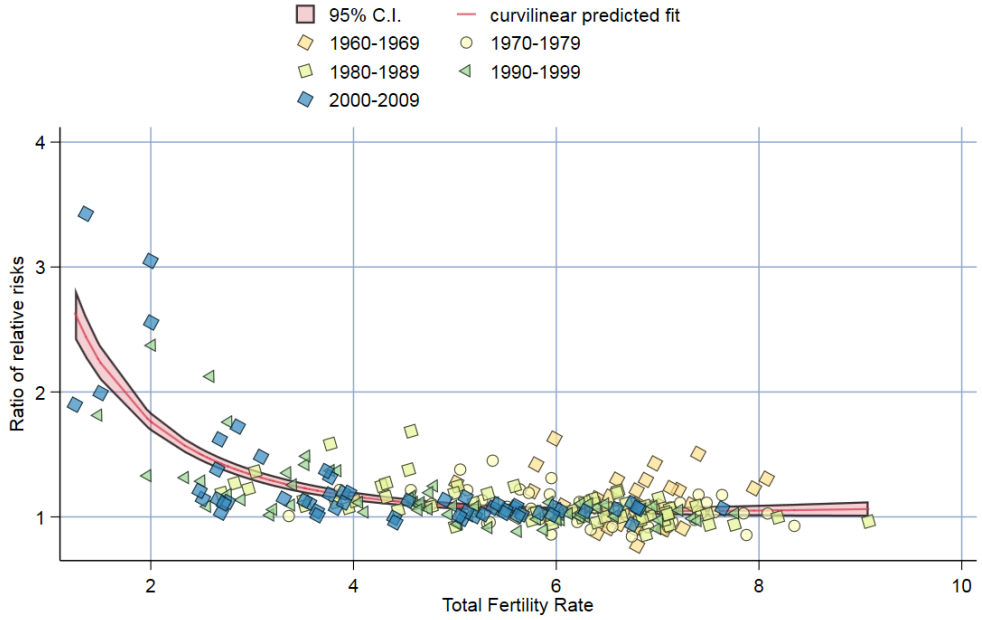


Figure 4: Ratio of relative risk of progression to a third child for mothers with 2 daughters over mothers with 2 sons (male preference). Event history models on progression to third child, be period of study. 10-year & country observations with curvilinear predicted fit. Top panel gender equality, middle panel GDP/capita, bottom panel TFR.




95% C.I.
curvilinear predicted fit
1960-1969
1970-1979
1980-1989
1990-1999
2000-2009
Ratio of relative risks
1
2
3
4
0
2000
4000
6000
8000
10000
GDP/capita (USD)


95% C.I.
curvilinear predicted fit
1960-1969
1970-1979
1980-1989
1990-1999
2000-2009
Ratio of relative risks
1
2
3
4
2
4
6
8
10
Total Fertility Rate

References

Andersson, G., Hank, K., Rønsen, M., & Vikat, A. (2006). Gendering family composition: Sex preferences for children and childbearing behavior in the Nordic countries. *Demography 43*(2): 255-267.

Andersson, G., Hank, K., & Vikat, A. (2007). Understanding parental gender preferences in advanced societies: Lessons from Sweden and Finland. *Demographic Research 17*: 135-156.

Arnold, F. (1985). Measuring the effect of sex preference on fertility: the case of Korea. *Demography 22*(2): 280-288.

Arnold, F. (1992). Sex preference and its demographic and health implications. *International family planning perspectives*: 93-101.

Arnold, F. (1997). Gender preferences for children *DHS Comparative Studies* (Vol. No. 23). Calverton, Maryland: Macro International Inc.

Arnold, F., & Zhaoxiang, L. (1986). Sex preference, fertility, and family planning in China. *Population and Development Review*: 221-246.

Arokiasamy, P. (2002). Gender preference, contraceptive use and fertility in India: Regional and development influences. *Population, Space and Place 8*(1): 49-67.

Baig-Ansari, N., Rahbar, M. H., Bhutta, Z. A., & Badruddin, S. H. (2006). Child's gender and household food insecurity are associated with stunting among young Pakistani children residing in urban squatter settlements. *Food and Nutrition Bulletin 27*(2): 114-127.

Bairagi, R. (2001). Effects of sex preference on contraceptive use, abortion and fertility in Matlab, Bangladesh. *International family planning perspectives*: 137-143.

Bairagi, R., & Langsten, R. L. (1986). Sex preference for children and its implications for fertility in rural Bangladesh. *Studies in Family Planning 17*(6): 302-307.

Chowdhury, M. K., & Bairagi, R. (1990). Son preference and fertility in Bangladesh. *Population and Development Review 16*(4): 749-757.

Chung, W., & Das Gupta, M. (2007). The decline of son preference in South Korea: The roles of development and public policy. *Population and Development Review 33*(4): 757-783.

Coale, A. J. (1991). Excess female mortality and the balance of the sexes in the population: an estimate of the number of" missing females". *The Population and Development Review*: 517-523.

Das Gupta, M., Zhenghua, J., Bohua, L., Zhenming, X., Chung, W., & Hwa-Ok, B. (2003). Why is son preference so persistent in East and South Asia? A cross-country study of China, India and the Republic of Korea. *The Journal of Development Studies 40*(2): 153-187.

Drixler, F. F. (2013). *Mabiki: Infanticide and Population Growth in Eastern Japan, 1660-1950* Berkeley: University of California Press.

Duthé, G., Meslé, F., Vallin, J., Badurashvili, I., & Kuyumjyan, K. (2012). High sex ratios at birth in the Caucasus: Modern technology to satisfy old desires. *Population and Development Review 38*(3): 487-501.

Filmer, D., Friedman, J., & Schady, N. (2009). Development, modernization, and childbearing: The role of family sex composition. *The World Bank Economic Review 23*(3): 371-398.

Fuse, K. (2010). Variations in attitudinal gender preferences for children across 50 less-developed countries. *Demographic Research 23*: 1031-1048.

Fuse, K. (2013). Daughter preference in Japan: A reflection of gender role attitudes? *Demographic Research 28*: 1021-1052.

Guilmoto, C. Z. (2009). The sex ratio transition in Asia. *Population and Development Review 35*(3): 519-549.

Guilmoto, C. Z. (2012). Son Preference, Sex Selection, and Kinship in Vietnam. *Population & Development Review 38*(1): 31-54. doi: 10.1111/j.1728-4457.2012.00471.x

Guilmoto, C. Z. (2015). Mapping the diversity of gender preferences and sex imbalances in Indonesia in 2010. *Population Studies 69*(3): 299-315. doi: 10.1080/00324728.2015.1091603
Guilmoto, C. Z. (2017). Gender bias in reproductive behaviour in Georgia, Indonesia, and Vietnam: An application of the own-children method. *Population Studies 71*(3): 265-279. doi: 10.1080/00324728.2017.1330489
Hank, K. (2007). Parental gender preferences and reproductive behaviour: A review of the recent literature. *Journal of biosocial science 39*(5): 759-767.
Hank, K., & Kohler, H.-P. (2000). Gender preferences for children in Europe: Empirical results from 17 FFS countries. *Demographic Research 2*.
Haughton, J., & Haughton, D. (1995). Son preference in Vietnam. *Studies in family planning*: 325-337.
Kolk, M. (2011). Deliberate birth spacing in nineteenth century northern Sweden. *European Journal of Population 27*(3): 337-359.
Kolk, M., & Schnettler, S. (2013). Parental status and gender preferences for children: Is differential fertility stopping consistent with the Trivers–Willard hypothesis? *Journal of biosocial science 45*(5): 683-704.
Leone, T., Matthews, Z., & Zuanna, G. D. (2003). Impact and determinants of sex preference in Nepal. *International family planning perspectives 29*(2): 69-75.
Lin, T.-c. (2009). The decline of son preference and rise of gender indifference in Taiwan since 1990. *Demographic Research 20*: 377.
Mills, M., & Begall, K. (2010). Preferences for the sex-composition of children in Europe: A multilevel examination of its effect on progression to a third child. *Population Studies 64*(1): 77-95.
Miranda, V., Dahlberg, J., & Andersson, G. (2018). Parents' Preferences for Sex of Children in Sweden: Attitudes and Outcomes. *Population Research and Policy Review*: 1-17.
Perelli-Harris, B., Kreyenfeld, M., & Kubisch, K. (2010). Harmonized histories: Manual for the preparation of comparative fertility and union histories. *MPIDR Working Papers WP-2010-011*.
Pollard, M. S., & Morgan, S. P. (2002). Emerging parental gender indifference? Sex composition of children and the third birth. *American Sociological Review 67*(4): 600.
Pong, S.-l. (1994). Sex preference and fertility in Peninsular Malaysia. *Studies in family planning*: 137-148.
Reher, D. S., Sandström, G., Sanz-Gimeno, A., & van Poppel, F. W. (2017). Agency in Fertility Decisions in Western Europe During the Demographic Transition: A Comparative Perspective. *Demography 54*(1): 3-22.
Repetto, R. (1972). Son preference and fertility behavior in developing countries. *Studies in family planning 3*(4): 70-76.
Rose, E. (1999). Consumption smoothing and excess female mortality in rural India. *Review of Economics and Statistics 81*(1): 41-49.
Sandström, G., & Vikström, L. (2015). Sex preference for children in German villages during the fertility transition. *Population Studies 69*(1): 57-71.
Sundström, A., Paxton, P., Wang, Y.-T., & Lindberg, S. I. (2017). Women's Political Empowerment: A New Global Index, 1900–2012. *World Development 94*: 321-335.
Tsuya, N. O., Feng, W., Alter, G., & Lee, J. Z. (Eds.). (2010). *Prudence and pressure*. Cambridge: MIT Press.
Yount, K. M., Langsten, R., & Hill, K. (2000). The effect of gender preference on contraceptive use and fertility in rural Egypt. *Studies in family planning 31*(4): 290-300.
Zaidi, B., & Morgan, S. P. (2016). In the Pursuit of Sons: Additional Births or Sex-Selective Abortion in Pakistan? *Population and Development Review 42*(4): 693-710.
Zhao, Z. (1997). Deliberate birth control under a high-fertility regime: Reproductive behavior in China before 1970. *Population and Development Review*: 729-767.