Essays on Son Preference in Pakistan

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ESSAYS ON SON PREFERENCE IN PAKISTAN

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This work is dedicated,

to my beloved country, Pakistan,

to my beloved grandparents, Mr and Mrs Ch Abdul Ghafoor (Late), and to my loving parents, Mr and Mrs Mian Muhammad Arshad.

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Abstract

This thesis is a collection of studies on son preference in Pakistan. The studies analyze the prevalence and strength of son preference and its effects on women's childbearing. The role son preference plays in determining women's participation in intra-household decisionmaking is examined as are its effect on birth spacing, probability of risky births and role of maternal age at marriage in modifying gender-specific reproduction and development outcomes. We find strong evidence for both the revealed and stated preference for male offspring. The probability of continuing childbearing also decreases with the number of sons born. Furthermore, we find that women with at least one son have more say in 'routine' household decisions but not in financial decisions. Female participation in decision-making grows significantly with the number of sons but only up to the third parity. We find that women with at least one son are more likely to delay succeeding births. We obtain strong evidence at parity 1. The impact seems to dissipate beyond the second parity. Moreover, we find that marriage at 18 or later positively influence women's preference for family's sex composition. However, whether or not a woman married early or late does little to modify the male gender bias prevalent in parental investment. In light of these findings, we suggest policy measures that could help improve gender equity in the country.

Résumé

Ce mémoire regroupe différentes études sur la préférence pour les garçons au Pakistan. Celles-ci analysent la fréquence et l'étendue de la préférence pour les garçons et son effet sur la grossesse des femmes. Le rôle que la préférence pour les garçons joue sur la participation des femmes au niveau des décisions au sein du ménage est examiné, tout comme son effet sur l'espacement des naissances, la probabilité d'une naissance à risque, ou l'impact de l'âge auquel une femme se marie sur l'équilibre entre les sexes et le développement de l'enfant né. Nous trouvons qu'il existe une préférence réelle et déclarée pour la progéniture masculine au Pakistan. La probabilité de poursuivre les grossesses diminue avec le nombre de garçons nés. De plus, les femmes qui ont au moins un garcon ont plus d'influence sur les décisions quotidiennes du ménage mais pas sur les décisions financières. La participation des femmes sur les décisions à prendre au sein du ménage augmente avec le nombre de garçons mais seulement jusqu'à la troisième naissance. D'ailleurs, les femmes ayant au moins un garçon attendent plus longtemps avant d'avoir d'autres enfants. Ce constat est plus particulièrement vrai dans le cadre d'une première naissance et il est moins présent à partir de la deuxième naissance. En outre, le fait de se marier à 18 ans ou plus tard influence de façon positive la préférence des femmes sur la composition de sa famille. Pourtant, peu importe qu'une femme se marie avant ou après 18 ans, cela ne modifie pas le biais en faveur des garçons dans leur investissement parental. A partir de ces résultats, nous proposons des préconisations politiques afin de lutter contre les inégalités entre les sexes au Pakistan.

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Chapter 1

Introduction

1.1 Foreword

Son preference i.e. parents wanting one or more sons has been age-old phenomenon and is widespread around the world. Son preference is a dimension of patrilineage in a patriarchal society. There are a number of economic, social and religious reasons for preferring sons over daughters:

Parents consider sons as economic asset and old age insurance as the son stays with the household and significantly contribute to the household economy and provide the parents old age support and care. This is of particular relevance in developing countries where there is lack of insurance markets and social safety nets.

Daughters, in contrast, are considered an economic burden for the household: parents must save for their dowry, and they leave home to join their husbands in a virilocal setup; their financial and human capital thus becoming property of their marital household.

Sons, in contrast, continue the family legacy. In some societies, important religious activities can only be performed by sons (Lin and Adserà, 2013). Moreover, in some cultures only sons are allowed to inherit family assets (Zimmermann, 2012).

This practice of son preference has important economic and demographic consequences. Son preference demonstrates itself in such sex-selection methods as differential stopping behaviour, sex-selective abortion and female infanticide.

In an early study on the issue, A. Sen (1990) pointed to the millions of girls missing and surplus of boys in such societies due to such practices. Since the 1990s a number of countries in East, South and West Asia, have witnessed abnormal rise in the proportion of male births relative to female births (Guilmoto and Tove, 2015). This proportion is called sex ratio at birth (SRB) in demography, which refers to the number of live male births for every 100 female births in a given year. Sex ratio at birth (SRB) in these countries is skewed due to prenatal sex selection, generally in the form of sex-selective abortion (Bongaarts, 2013). Where the sex-selection methods are unavailable or less accessible parent's fertility remains incomplete until and unless the desired number of sons are born. Discontinuity of fertility after attaining at least one son or desired number of sons plays a not unsubstantial role in high population growth rate[1]. Women in such societies who bear sons enjoy higher say within household while those who do not succeed in bearing a son face social stigma and pressure at home leading to domestic violence or divorce.

In son preferring countries daughters fare worse than sons' in many dimensions. According to (Suarez, 2018), Son preference in those countries is visible in parents' underinvestment in their daughters' care in contrast to their sons'. Male children are more likely to have better health and educational outcomes than female children.

Girls receive less health care, less breastfed and less likely to be fully immunized than boys (Basu, 1989; Borooah, 2004; Hafeez and Quintana-Domeque, 2018; Jayachandran and Kuziemko, 2011).

Though son preference is widespread in Pakistan but it remains an under-researched area[2].

In this thesis, we attempt at bridging the gap in empirical literature by taking up some of the empirical questions on son preference in the context of Pakistan.

[1] Developing countries face many problems and high population growth is one of them.

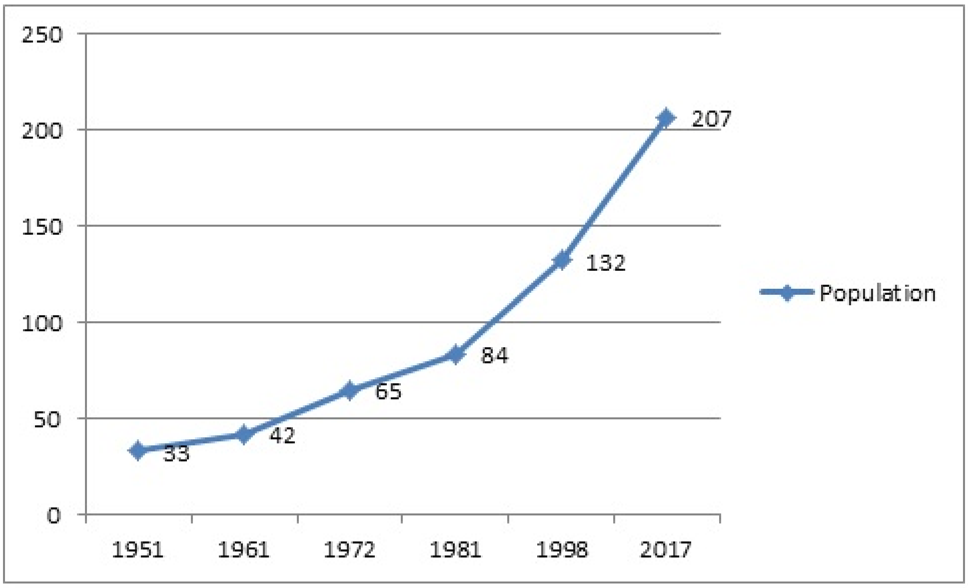
[2] For instance, Google Scholar shows only 12 unique results for studies on son preference in Pakistan during the last five decades.

1.2 Overview of Pakistan's Demography

Pakistan is a developing country located in the South Asia and covers the total area of 796,096 square kilometres and 1200 square kilometres of coastline. Pakistan is the sixth most populous country in the world, and the fourth most populous in Asia.

According to 2017 census, Pakistan population was 207 million. Since the first census in 1951, Pakistan's population has grown six-folds.

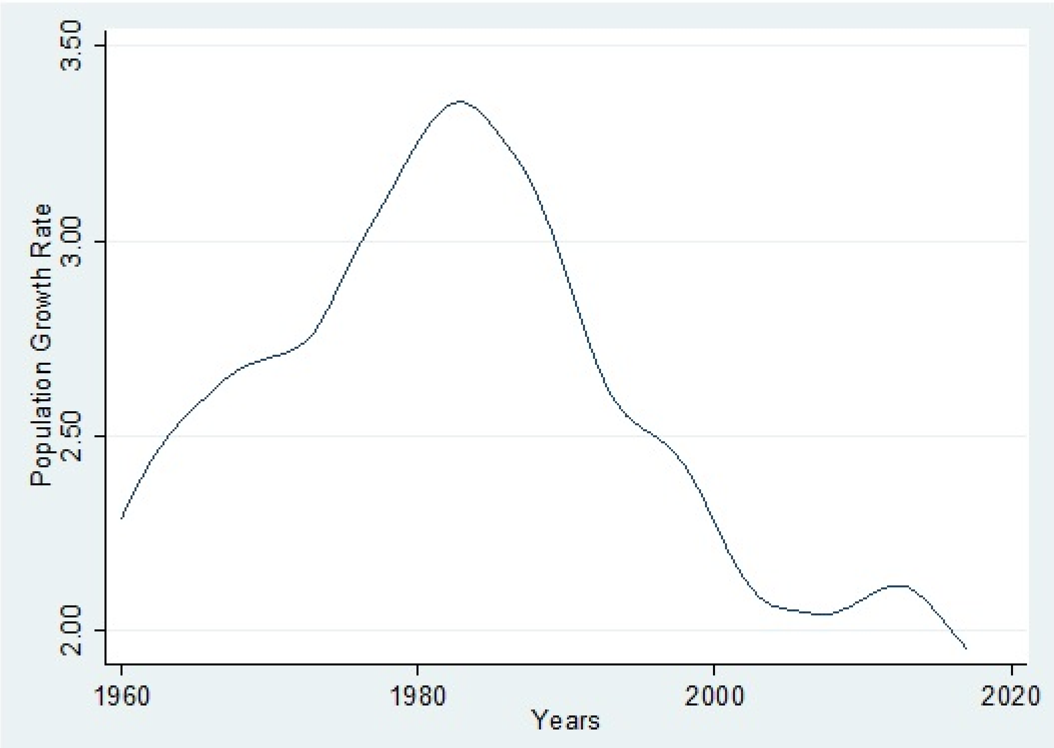
Figure 1.1: Population of Pakistan (1951-2017)



Source: Pakistan Bureau of Statistics 2018.

Figure 1.2 shows the trend of population growth rate (PGR) of Pakistan from 1960 to 2017. The average population growth rate from 1960 to 2017 is a high 2.59 %. The country saw extremely high rates of population growth (close to or above 3%) during the 1960s, 70s and 80s. From the mid-1980s, the PGR began declining, and has gradually dropped to 1.95% now (World Bank 2018). This rate is still high by regional and world standard.

Figure 1.2: Trend of population growth rate Pakistan (1960-2017)



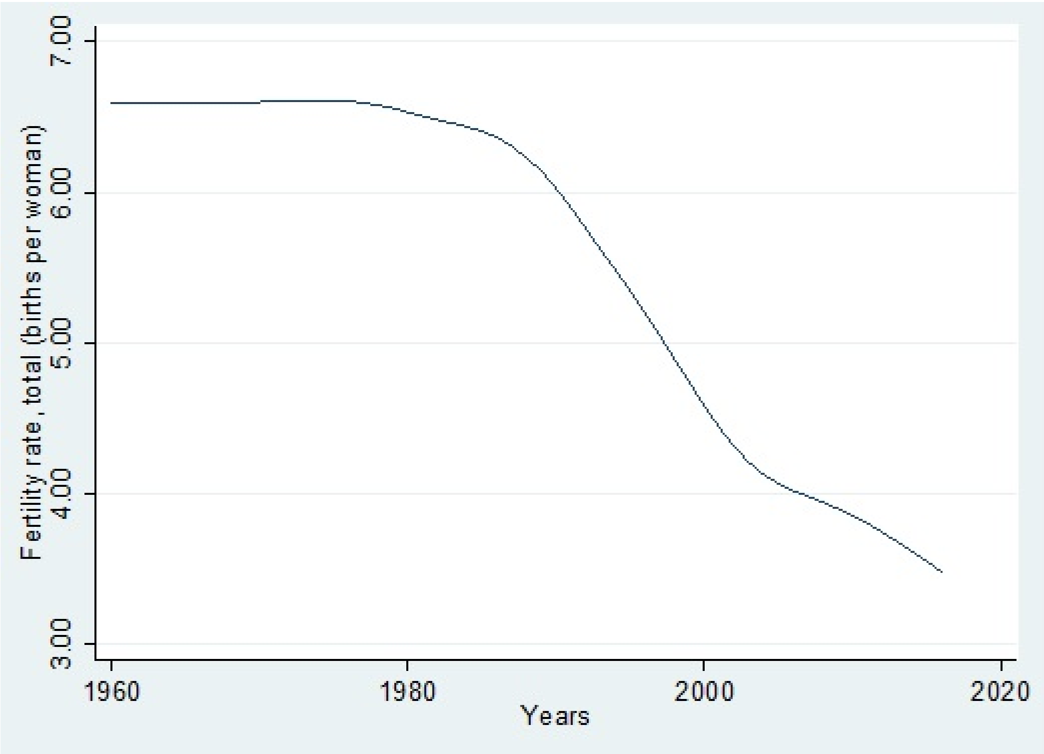
Source: Author's calculations using World Bank World Development Indicators (2017).

Pakistan has seen a notable reduction in total fertility rate (TFR) over last six decades. Trend of Pakistan TFR over the period 1960 to 2017 has shown in figure 1.3. The highest TFR of 6.61 was noted for the period of 1972 to 1976. Since then, the country's TFR has declined to 3.48 today.

The trend of Pakistan's crude birth rate (CBR) is shown in figure 1.4. Pakistan's CBR slowly decline from a high 44.18 in the 1960. The falling trend gained speed during the 1970s and the 80s. The decrease has slowed down since the mid-2000. The country's CBR currently stands at 28.2.

Pakistan's infant mortality rate too remains high (61 in 2017). This rate was close to 200 in the 1960s (Figure 1.5).

Figure 1.3: Trend of total fertility rate (births per woman) 1960-2017



Source: Author's calculations using World Bank World Development Indicators (2017)

1.3 Son Preference in Pakistan

Like many countries in Asia, Pakistan has a strong patriarchal household structure (Sathar et al., 2015). Families in many parts of the country need to pay large dowries at the time of wedding of their daughters. Sex ratio at birth is skewed at 109 boys per 100 girls. According to Pakistan demographic and health survey estimates, Pakistan's sex ratio at birth increased from 105 in 1990-91 to 108 in 2012-13. Sex ratio at last birth, another indicator of son preference, also increased from 117 to 133 during the same period. Bongaarts (2013) study ranked Pakistan is second highest desire son preferring country out of 61 countries examined. Despite this high son preference reflected in different indicators in Pakistan, Zaidi and Morgan (2016) found no evidence of sex-selective abortion. However, they found that parity progression did get affected by son preference.

Figure 1.4: Trend of Birth Rate, Crude (per 1,000 people) 1960-2017

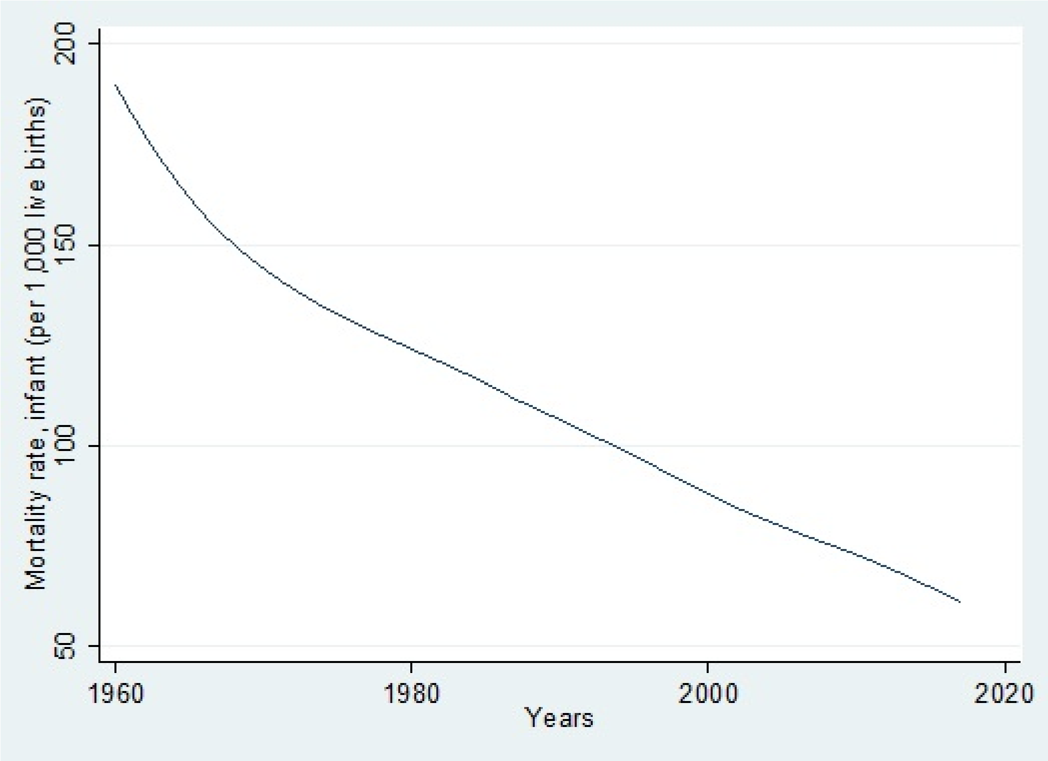
Source: Author's calculations using World Bank World Development Indicators (2017)

1.4 Overview of Related Literature

Written accounts of female infanticide in the Indian Subcontinent go as far back as the late eighteenth century (Bhatnagar, Dube, and Dube, 2005). From the mid-nineteenth century, officers of the British East India Company began identifying Indian tribes and castes practicing traditions of female infanticide. The 1921 population census carried out by the colonial British India government classified castes into two categories, namely, castes having "a tradition" of female infanticide and castes without such a tradition' (Vishwanath, 2004).

The province of Punjab, which extends over large parts of today's central Pakistan and north-western India, was considered the land of missing girls (Purewal, 2010). In 1851, it was reported that 400 Sikh Khatri families had destroyed all

Figure 1.5: Trend of mortality rate, infant (peer 1,000 live births) 1960-2015



Source: Author's calculations using World Bank World Development Indicators (2017)

their female children from the last 400 years[3]. Female infanticide was reported to be common among the Kharral tribe in Montgomery district (present-day Sahiwal in Pakistani Punjab).

The practice of female infanticide was considered to be less common among Muslims. M. Gubbins, a British colonial official, stated: "The Mussulman is found to sympathize least with child-murder" (S. Sen, 2002). The 1870 Female infanticide act declared the practice of female infanticide as illegal.

Although female infanticide is practically inexistent in present-day Pakistan, other manifestations of son preference persist. In an early empirical study on

[3]In the words of Purewal (2010): "The Bedis, a Sikh khatri caste who claimed direct des cendancy to Guru Nanak and who were ranked highly among other Sikh khatri families, received girls from other lower- ranking khatri families but refused to marry their daughters to boys from lower-ranked families and hence resorted to female infanticide"

the country, Khan and Sirageldin (1977) analysed data from a national survey conducted in 1968-1969 and reported the presence of strong son preference both among men and women.

Ali (1989) employed the Pakistan national survey 1979-80 for his analysis and suggested that having at least one son in the family influenced the demand for additional children. In the same vein, Hussain, Fikree, and Berendes (2000) concluded that sex of surviving children in Karachi, Pakistan was strongly correlated with subsequent fertility and contraceptive behaviour.

Zaidi and Morgan (2016) found no significant evidence for large-scale sex-selective abortion in Pakistan and suggested that couples mainly relied on continuing fertility to attain the desired number of sons.

In another recent study, Hafeez and Quintana-Domeque (2018) examined gender-biased breastfeeding patterns in Pakistan and showed that breastfeeding duration increased monotonically with the birth order of the child and at every birth order, boys were breastfed longer than girls. Saeed (2015) concluded that being an agricultural or non-agricultural households, family type, urban or rural residence, women's education and inter-cousin marriages were the major factors determining son preference in Pakistan.

Although some of the aforementioned studies discuss fertility outcomes of son preference, there is need for a comprehensive analysis of the son preference phenomenon prevalent in Pakistan and its effect on fertility based on detailed nationwide data.

1.5 Objectives

In this thesis, I examine a number of questions to understand manifestations of son preference in Pakistan:

What is the extent and strength of son preference in the country? What are its effects on women's childbearing? What is the role of son preference in determining women's participation in intra-household decisionmaking? Does preference for sons affect birth spacing or increase the probability of risky births? Does female age at marriage modify gender-specific reproduction and development outcomes? This study aims at analyzing these questions in the light of recent evidence.

1.6 Data

The data used in this thesis is obtained from the Pakistan Demographic and Health Survey (PDHS). PDHS are nationally- representative household-level surveys. This survey contains comprehensive information about fertility and reproductive behaviour of ever-married Pakistani women aged 15-49. The primary objective of this survey to provide national and provincial level data on population and health in Pakistan. These household surveys are conducted by the National Institute of Population Studies, Islamabad (NIPS) with technical and financial assistance from United States Agency for International Development (USAID).

The first round of the survey (PDHS 1990-91) is based on interviews with 6,611 women from 7,193 households. A two-stage stratified sample design was adopted with 407 primary sample units (PSU), 225 of which were from urban areas and 182 from rural areas. The second round (PDHS 2006-07) was the largest household based survey ever conducted in Pakistan. This round interviewed 10,023 women from 95,441 households and it adopted a two-stage, stratified, random sample design with 1000 primary sample units (PSU)- 390 in urban areas and 610 in rural areas. The third round (PDHS 2012-13) covers 13,558 women from 12,943 households. This sample adopted two-stage stratified sample design with 500 PSU, 248 from urban areas and 252 from rural areas.

In this thesis, we employ all three rounds of PDHS.

1.7 Definitions and Measurement of Son Preference Indicators

The measurement of son preference has been a challenging task. A number of indicators have been used in this thesis according to nature of research question. Both stated and revealed indicators of son preference are employed in light of objectives of the study:

The presence of at least one son (Binary form, takes the value of 1 if female have at least 1 son, 0 otherwise, son ratio (Proportion of boys in the total number of children), number of sons (Categorical form, number of sons at parity n (Number of sons at given parity n in total number of children born to a woman), and ideal sex composition (Dummy variable, takes the value of 1 if ideal number of boys is reported to be greater than ideal number of girls, 0 otherwise) have been used as a proxies of son preference. Sample is restricted according to nature of research question and survey weights used to ensure the representativeness of the survey.

1.8 Thesis Outlines

There are total six chapters of this thesis. Chapter 1 and 6 are the introductory and concluding chapters while Chapters 2-5 contain empirical analysis.

After a brief introduction in Chapter 1, Chapter 2 examines the prevalence and strength of the son preference phenomenon and its effect on Pakistani women's fertility transition. Chapter 3 analyze the effects of observed preference for sons on women's participation in intra-household decisionmaking. Chapter 4 addresses how preference for sons affects subsequent birth-spacing. Chapter 5 examine the effect of maternal age at marriage on son preference and gender bias. The last chapter 6 sums up the discussion and considers some policy implications.

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Chapter 2

My Son, My Moon: Son Preference and Demand for Male Child in Pakistan

A version of this paper is under review in a peer-reviewed journal. This study beneted from discussions with the participants of the 2019 British Society for Population Studies conference, Cardiff, UK. We are grateful to Charlotte Fontan Sers for her French translation of the abstract.

Abstract

Son preference is widespread in Pakistan. This study examines the prevalence and strength of the phenomenon and its effect on Pakistani women's fertility transition. We employed data from nationwide demographic and health surveys for the years 1990-91 and 2012-13 and used probit and matching econometric techniques. We generated a number of indicators to chart the change in revealed and stated preference for male children over time. We find strong evidence for both the revealed and the stated preference for male offspring. Son preference persists in Pakistan and its impact on actual and stated fertility is still strong. Although the country's overall sex ratio has fallen, the sex ratio at birth and sex ratio at last birth have increased indicating an increased reliance on differential birth stopping. Son preference decreases with couple's level of education. It is more intense among middle-class and rural households. The stated desire for sons has also come down. The likelihood of second birth does not vary with the sex of the first-born. In contrast, women with one or more sons at higher parities are upto 14% less likely to pursue additional fertility compared with women with no sons. The probability of continuing childbearing also decreases with the number of sons born. Besides, women with one or more sons are 29 to 34% more likely to desire no more children. These findings help explain the country's skewed sex ratios and the slow rate of demographic transition.

Keywords: Son preference; Subsequent birth; Fertility; Parity progression; Pakistan.

JEL codes: D13; J13; O15; C13; Z13.

Résumé

Cette étude cherche à mesurer la prévalence et l'intensité de la préférence pour les garçons ainsi que son impact sur la transition en matière de fertilité des femmes au Pakistan. L'analyse a été réalisée à partir d'enquêtes démographiques et de santé sur les années 1990-91 et 2012-13 en utilisant des methods économétriques de probit et d'appariement. Nous avons créé plusieurs indicateurs afin de suivre l'évolution de la préférence réelle et déclarée pour les garçons. Nous trouvons qu'il existe une préférence réelle et déclarée pour la progéniture masculine au Pakistan. La préférence pour les garçons est toujours présente dans ce pays et son impact sur la fertilité observée et déclarée est forte. Bien que pour l'ensemble du pays le ratio global des sexes et la volonté déclarée d'avoir des garçons aient diminué, le ratio des sexes à la naissance et à la dernière naissance a augmenté, indiquant une dépendance accrue pour l'arrêt de reproduction différencié. Nous constatons que la préférence pour les garçons diminue en fonction du niveau d'éducation des parents. De plus elle est plus forte auprès des classes moyennes et des ménages ruraux. La probabilité d'une deuxième naissance ne varie pas en fonction du sexe du premier né. En revanche, par la suite, les femmes avec au moins un garçon ont jusqu'à 14% moins de chances de poursuivre leur fertilité par rapport aux femmes sans garçons. La probabilité de poursuivre une grossesse diminue également selon le nombre de garçons nés. De plus les femmes avec au moins un garçon ont entre 29 et 34% plus de chances de ne plus vouloir d'enfants. Ces résultats permettent d'expliquer le ratio de sexe biaisé du pays et son faible taux de transition démographique.

Mots clés: Préférence pour les garçons; Naissance suivante ; Fertilité; Evolution de la parité; Pakistan.

JEL codes: D13; J13; O15; C13; Z13.

2.1 Introduction

"Early harvest and early sons are always better". (A Pakistani proverb)

The practice of preferring sons over daughters is widespread in South and East Asia. In the patriarchal societies of Asia, sons are considered an asset: sons carry forward the family name, take up family business, care for parents in their old age and protect and provide for the dependent members in the extended family. In societies with a dowry-based virilocal setup, sons add to family assets through marriage. Daughters, in contrast, are conceived as a financial liability as the family is required to prepare sufficient dowry for their wedding. They represent femininity and thus weakness and will one day belong to the home of another man and should thus be seen as a futile investment (Purewal, 2010).

Once married, women in such traditional societies are expected to bear sons which could have important consequences for themselves and for existing girl children. Having a first-born son improves the mother's nutrition intakes and reduces her likelihood of being underweight in China and India (Kishore and Spears, 2014; Li and Wu, 2011). Likewise, women in Pakistan with at least one son are reported to have significantly more say in everyday household decisions (Javed and Mughal, 2018).

Son preference manifests itself in abnormally high sex ratios through sex-selective abortions, female infanticide and benign neglect of girl child's health and nutritional needs (Sen, 1990). World Bank (2011) reported that around two million girls under the age of five were estimated to be missing every year, most of them in Asia.

In societies where sex-selective abortion is not deemed acceptable, parents continue their fertility as long as the desired number of sons is not attained (Basu and De Jong, 2010). In this study, we examine the phenomenon of son preference and its fertility implications for women of childbearing age in one such society, namely that of Pakistan. Pakistan is the world's sixth most populous country with a population of 207 million according to the 2017 population census (Government of Pakistan, 2017). The country has a skewed sex ratio of 105 male per 100 female. This ratio, though lower than the high level of 116 reported in the 1951 census, still remains above the world average of 101.

Using data from two rounds of Pakistan Demographic and Health Survey carried out in 1990-91 and 2012-13, we look to answer the following questions: What is the extent and strength of son preference in the country? what are its effects on women's childbearing? and to what extent does it impact the couple's desire to continue fertility thereby determining the size of the family?

We examine various aspects of both the revealed and the stated preference for son prevalent in the country. We study the country's sex ratio, sex ratio at birth (SRB), parity progression ratio (PPR) and sex ratio at last birth (SRLB) as well as the desired sex ratio (DSR) and the desired preference indicator.

We describe the prevalence of son preference among different demographic and geographical subgroups and chart its evolution over time. We employ Probit as well as three matching routines (PSM, IPW and AIPW) to estimate the role of son preference in determining Pakistani women's reproductive behaviour. Three indicators of son preference (presence of at least one son at parity n, proportion of sons at parity n and number of sons at parity n) are used to determine the incidence and strength of son preference's impact on subsequent fertility at the first four parities. We also determine the probability of differential birth-stopping decision resulting from actual and stated preference for male offspring.

We find that the probability to have a second child does not depend on the sex of the first-born. In Pakistan's high-fertility environment, voluntary birth stopping after the first birth is not a common occurrence. The sex of preceding children is a significant factor in driving subsequent births at higher parities. Women with one or more sons at higher parities are significantly less likely to continue childbearing. The probability of discontinuing childbearing also increases in the number of sons born. Furthermore, women with at least one son are significantly more likely to want no more children than women with no son. This differential stopping behavior has grown in strength over time.

In the following, data and empirical methodology are discussed in Section 2.2. Section 2.3 describes son preference in light of revealed and stated preference measures. Section 2.4 presents our empirical analysis: parity-wise effects of son preference on additional fertility are reported and the role of son preference in determining the desire for having no more children is estimated. The final section interprets the results and draws conclusions.

2.2 Data and Methodology

2.2.1 Data Description

Data for this study come from two rounds of the nationally representative Pakistan Demographic and Health Survey (PDHS). The first round (PDHS 1990-91) is based on interviews with 6,611 women from 7,193 households. The latest round (PDHS 2012-13) covers 13,558 women from 12,943 households. The survey data is briefly described in the appendix.

For the purpose of our analysis, we restrict the sample to women who have completed their childbearing and have at least one child. Women with multiple births are excluded from the sample.

Table 2.1 describes relevant variables in the dataset. In 2012-13, 50% of the women reported their first-born to be a boy. 76% of the women reported having at least one son at parity 2, 89% had at least one son at parity 3 and 95% had at least one son at parity 4. The figures for the 1990-91 dataset are similar: 52% of the women had a first-born son, 77% had at least one son at parity 2, 89% had at least one son at parity 3 and 95% had at least one son at parity 4.

In 2012-13, 13% of the women at parity 3 reported having three sons, 37% having two sons while 37% reported having one son. Corresponding figures in 1990-91 were 15%, 38% and 35% respectively. At parity 4, 7% of the women in 2012-13 report having sons only, 26% having three sons, 38% having two sons and 22% having just one son. Corresponding figures in 1990-91 were 8%, 25%, 40% and 20% respectively.

Majority of the women in the samples possessed no formal education (61% in 2012-13, 77% in 1990-91). In contrast, a lower proportion of husbands (35% in 2012-13, 48% in 1990-91) reported possessing no formal education. Likewise, 7% of the women in 2012-13 reported having acquired tertiary-level education compared with only 1% in 1990-91. In comparison, 15% and 5% of the husbands in 2012-13 and 1990-91 possessed higher education. Average household size during the period was over eight (8.3 in 2012-13, 8.4 in 1990-91). About two-thirds of the households (64% in 2012-13, 64% in 1990-91) lived in rural areas, while over 80% were reported to be nuclear families.

2.2.2 Methodology

The analysis proceeds as follows:

In the first step, we present measures of revealed and stated son preference. Revealed son preference is measured through population sex ratio (i.e. the number

Table 2.1: Data description

Variables	Description	Proportion/Mean PDHS 1990-91	Proportion/Mean PDHS 2012-13
Birth			
1	Dummy variable, takes the value of 1 if the woman has more than one children, 0 otherwise	0.96 0.03	0.96 0.03
2	Dummy variable, takes the value of 1 if the woman has more than two children, 0 otherwise	0.90 0.09	0.88 0.11
3	Dummy variable, takes the value of 1 if the woman has more than 3 children, 0 otherwise	0.79 0.20	0.73 0.26
4	Dummy variable, takes the value of 1 if the woman has more than four children, 0 otherwise	0.66 0.33	0.54 0.45
Son Preference			
1	Dummy variable, takes the value of 1 if female have at least 1 son at parity 1, 0 otherwise	0.52 0.47	0.05 0.49
2	Dummy variable, takes the value of 1 if female have at least 1 son at parity 2, 0 otherwise	0.77 0.22	0.76 0.23
3	Dummy variable, takes the value of 1 if female have at least 1 son at parity 3, 0 otherwise	0.89 0.10	0.89 0.10
4	Dummy variable, takes the value of 1 if female have at least 1 son at parity 4, 0 otherwise	0.95 0.04	0.95 0.04
Son Ratio			
1	Proportion of sons in total number of children at parity 1	0.52	0.50
2	Proportion of sons in total number of children at parity 2	0.53	0.51
3	Proportion of sons in total number of children at parity 3	0.53	0.51
4	Proportion of sons in total number of children at parity 4	0.53	0.52
Number of sons			
1	Dummy variable, takes the value of 1 if the woman has a son at parity 1, 0 otherwise	0.52 0.47	0.50 0.49
2	Categorical variable, takes the value of 0 if the woman has no son at parity 2, 1 if 1 son, 2 if 2 sons	0.22 0.48 0.29	0.23 0.50 0.26
3	Categorical variable, takes the value of 0 if the woman has no son at parity 3, 1 if 1 son, 2 if 2 sons, 3 if 3 sons	0.1 0.35 0.38 0.15	0.10 0.37 0.37 0.13
4	Categorical variable, takes the value of 0 if the woman has no son at parity 4, 1 if 1 son, 2 if 2 sons, 3 if 3 sons, 4 if 4 sons	0.04 0.20 0.40 0.25 0.08	0.04 0.22 0.38 0.26 0.07
Age	Age of the female in completed years	35.92	36.77
Age difference	Age difference between husband and wife in years	7.07	5.71
Education	Categorical variable, takes the value of 0 if the woman has no education, 1 if the woman possesses primary education, 2 if the woman possesses secondary education, 3 if the woman possesses higher education	0.77 0.09 0.12 0.01	0.61 0.15 0.16 0.07
Spouse education	Categorical variable, takes the value of 0 if the husband possesses no education, 1 if the husband possesses primary education, 2 if the husband possesses secondary education, 3 if the husband possesses higher education	0.48 0.15 0.30 0.05	0.35 0.15 0.32 0.15
Women employed	Dummy variable, takes the value of 1 if the woman is employed, 0 otherwise	0.16 0.83	0.29 0.70
Media exposure	Dummy variable. PDHS 1990-91: takes the value of 1 if the woman listens radio or watches television once a week, 0 otherwise; PDHS 2012-13: takes the value of 1 if the woman watches television occasionally, weekly or daily, 0 otherwise	0.45 0.54	0.68 0.31
Family structure	Dummy variable, takes the value of 1 if the family is nuclear, 0 otherwise	0.83 0.16	0.80 0.19
Household size	Total number of family members in the household	8.40	8.33
Place of residence	Dummy variable, takes the value of 1 if the household resides in urban area, 0 otherwise	0.38 0.61	0.35 0.64
Region	Categorical variable (PDHS 1990-91: takes the value of 1 if the household lives in Balochistan, 2 if the household lives in Punjab, 3 if the household lives in Sindh, 4 if the household lives in KPK; PDHS 2012-13: takes the value of 1 if the household lives in Balochistan, 2 if the household lives in Punjab, 3 if the household lives in Sindh, 4 if the household lives in KPK, 5 if the household lives in Islamabad, 6 if the household lives in Gilgit Baltistan	0.01 0.63 0.21 0.14	0.03 0.59 0.21 0.15 0.005 0.007
Wealth Status	Categorical variable, takes the value of 1-5 for households belonging to poorest, poorer, middle, rich and richest household quintiles.	0.14 0.14 0.17 0.24 0.29	0.16 0.19 0.21 0.20 0.22

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Sample is restricted to women with complete fertility. Sample weights are used.

of males per 100 females), sex ratio at birth (the number of boys born alive per 100 girls born alive), sex ratio at last birth (SRLB) and parity progression ratio (i.e. the proportion of women at a given parity who proceed to a higher parity)[1]. Stated son preference is measured using two indicators: desired sex ratio (ideal number of sons to ideal number of daughters) and desired son preference (indicates son preference if the ideal number of sons given by the woman exceeds the ideal number of daughters, suggests equal desired preference if the two numbers are equal, and suggests no son preference if the ideal number of daughters exceeds the ideal number of sons).

The stated preference indicators are based on the following questions in the survey pertaining to desired fertility: "If you could go back to the time you did not have any children and could choose exactly the number of children to have in your whole life, how many would that be?" and " How many of these children would you like to be boys and how many would you like to be girls?"

In the second step, we estimate the impact of son preference on the probability of subsequent birth at parity n. Here, three indicators are used to represent son preference, namely presence of at least one son, proportion of sons in the total number of children at parity n and the number of sons at parity n. The three indicators each pertain to a different aspect of son preference. We restrict our parity-wise analysis to the first four live births. The outcome variable is subsequent birth at the parity n. This is a binary variable which takes the value of 1 if a women has more than n children and 0 otherwise.

Finally, we estimate the impact of having one or more sons on the stated desire to discontinue reproduction. Here, the outcome variable is complete fertility which is based on the response "want no more" to the question: "After the child you

[1] PPR can be calculated as following, PPR= (Women with $n+1$ children)/(Women with n children)

are expecting now, would you like to have another child, or would you prefer not to have any more children"?

In both sets of estimations, we control for individual, household and locational factors which influence fertility decisions. The control factors considered include the respondent woman's age, age difference with the husband, woman's and husband's education level, woman's employment status, exposure to electronic media, family structure[2], household size, household wealth status[3], and the region and area of residence. The base line model can be given as,

$$Y_{ij} = \alpha + \beta(SP)_{ij} + \delta X_j + \varepsilon_{ij} \tag{2.1}$$

Where Y_{ij} represents fertility choice (subsequent birth at parity i / complete fertility) for woman j, SP stands for son preference at parity i for woman j, X_j represents the set of household characteristics that can affect reproductive behaviour and ε_{ij} is the error term.

2.2.3 Techniques Employed

Our baseline estimations are carried out using Probit model. Additionally, we use three matching techniques, namely Propensity Score Matching (PSM), Inverse Probability Weighting (IPW) and Augmented Inverse Probability Weighting (AIPW) to account for the possibility that households with sons may differ from those without in ways that could be considered non random. These match-

[2] A household whose head is neither the woman nor her husband is considered an extended household, nuclear otherwise.

[3] The household wealth variable is generated by constructing a principal component analysis index of household assets such as home ownership, floor type, water source, electricity availability, durable consumer goods etc. The quintiles of the generated variable indicate the economic status of the household.

ing estimators are based on the Rubin Causal Model with assumptions of unconfoundedness and overlap (Rosenbaum and Rubin, 1983). For this purpose, the sample is divided into two groups: treatment (based on the variable of interest) and control (non-treatment) group.

The first matching technique PSM matches the treated individuals to the non-treated based on a propensity score for participation given observable characteristics of the individual.

The second technique IPW improves on PSM by according a higher weight to individuals receiving an unlikely treatment. This reweighting helps assign higher weights to individuals lying in the middle of the probability distribution and lower weights to those at the extremes (Wooldridge, 2007).

The last matching technique AIPW combines both the properties of the regression based estimator and the IPW estimator, requiring either the propensity or outcome model (but not necessarily both) to be correctly specified (Cao, Tsiatis, and Davidian, 2009).

For each of the three matching routines, we obtain average treatment effect (ATE) which provides difference between the expected outcomes with and without treatment. We use appropriate weights to ensure the representativeness of the sample.

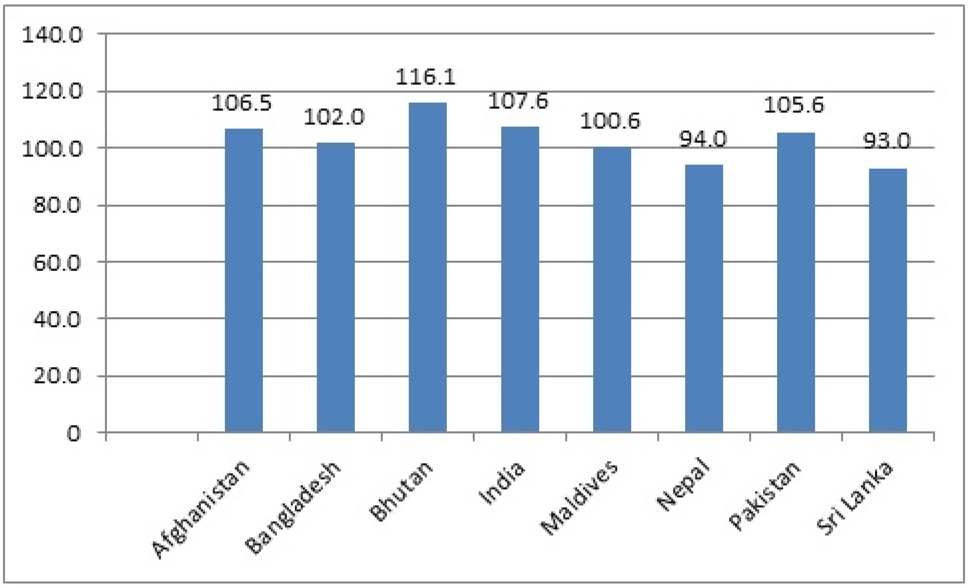
After the PSM estimations, balancing of the treatment groups is checked using Kernel density plots. Plots for the first set of estimations (based on the presence or otherwise of at least one son at parity n) are given in the appendix. The covariates of the two groups are found to be well balanced.

2.3 Son Preference

2.3.1 Sex Ratio

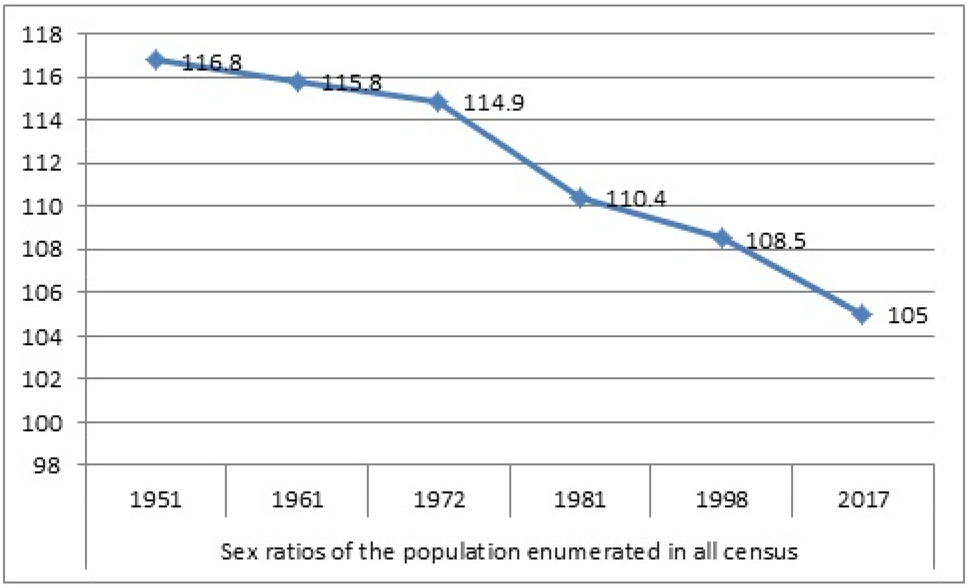
Pakistan's sex ratio for total population is 105 males per 100 females according to the 2017 population census. This figure, though lower than that found in some other countries of South Asia (for example, Bhutan: 116, India: 107, Afghanistan: 106), is largely above the worldwide average of 101 males per 100 females (figure 2.1). The country's sex ratio has steadily come down over the decades from a high of 116 recorded in 1951 in the country's first census to 105 today (Figure 2.2).

Figure 2.1: Sex ratio of South Asian countries



Source: United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, DVD Edition.

Figure 2.2: Evolution of population sex ratio



Sources: Pakistan Bureau of Statistics. Population Association of Pakistan

If we limit our sample to women of childbearing age with complete fertility[4], we trace a minor change in child sex ratios: 114 in 1990-91, 115 in 2012-13 (Table 2.2). In 2012-13, women with primary or secondary education had a higher sex ratio compared to those without any schooling. Likewise, sex ratios among women without a job and those living in joint families are higher compared to those found among working women or those living in nuclear families. The ratio is the highest among middle-income households (those lying in the third or the fourth quantile of the household wealth distribution). At the regional level, the ratio is more biased in rural areas (118 male births per 100 female births) compared with urban areas (107 in 1990-91, 111 in 2012-13). The most populous province of Punjab has the highest sex ratio of all the country's provinces and territories.

Sex ratio for women respondents with one to four living children shown in Table

[4]This corresponds to the subsample of women who gave the answer "want no more children" in response to the question "Do you desire more children?"

2.3 ranges from 126 to 191 in 1990-91 and from 125 to 174 in 2012-13. These abnormally high sex ratio figures give a strong indication of differential birth stopping[5]. The ratio is the highest among women with two children (191 in 1990-91, 174 in 2012-13) suggesting that women stop child-bearing more often when one or both of their two children are boys compared to the situation where they only have girls. This behaviour does not depend on women's employment status or whether they live in a nuclear or joint family setup. Women living in urban areas have comparatively lower sex ratios than those living in rural areas. Besides, women with some education often have lower sex ratios compared with women with little or no education.

The figures for the 2012-13 sample are generally lower than those for the 1990-91 sample reflecting a declining preference for sons.

Table 2.2: Child sex ratio

	PDHS 1990-91			PDHS 2012-13		
	Total Sons	Total Daughters	Sex Ratio	Total Sons	Total Daughters	Sex ratio
Overall	8027	7065	113.62	17560	15233	115.28
Education						
No Education	6516	5719	113.94	12042	10501	114.67
Primary	676	603	112.11	2494	2091	119.27
Secondary	777	686	113.27	2198	1909	115.14
Higher	-	-	-	835	732	114.07
Spouse Education						
No Education	4127	3724	110.82	7084	6114	115.87
Primary	1304	1078	120.96	2867	2444	117.31
Secondary	2224	1957	113.64	5334	4600	115.96
Higher	335	287	116.72	2262	2056	110.02
Woman employed						
No	6736	5799	116.16	12178	10396	117.14
Yes	1288	1264	101.9	5371	4795	112.01
Family type						
Joint	1047	754	138.86	2735	2246	121.77
Nuclear	6979	6311	110.58	14834	12986	114.23
Place of Residence						
Rural	5113	4339	117.84	12051	10251	117.56
Urban	2913	2726	106.86	5519	4981	110.8
Province/Region						
Punjab	5076	4438	114.38	10414	8720	119.43
Sindh	1771	1584	111.81	3738	3464	107.91
KPK	1092	963	113.4	2607	2328	111.98
Balochistan	86	78	110.26	591	521	113.44
Economic status						
Poorest	1194	1090	109.54	3425	3024	113.26
Poorer	1225	1035	118.36	3684	3117	118.19
Middle	1420	1224	116.01	3894	3316	117.43
Richer	1877	1669	112.46	3404	3009	113.13
Richest	2309	2045	112.91	3161	2765	114.32

Source: Authors' calculations using PDHS 1990-91 and 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Subgroups with less than 100 observations are omitted.

[5] An alternative explanation could be under reporting of girls in the survey. See for reference (Sathar et al., 2015).

Table 2.3: Sex ratio by number of children born

	PDHS 1990-91			PDHS 2012-13		
	Total Children			Total Children		
	2	3	4	2	3	4
Overall	191.18	144.64	126.26	174.1	149.12	125.44
Education						
No Education	252.83	151.74	132.03	158.74	165.57	130.73
Primary	125	137.21	126.67	177.19	166.85	136.08
Secondary	120.69	137.97	112.75	200	127.56	117.63
Higher	-	-	-	170.41	126.78	99.16
Spouse Education						
No Education	184.62	171.84	132.51	151.58	142.58	138.28
Primary	-	-	134.21	135.94	179.76	143.29
Secondary	170.27	150.38	118.33	208.62	154.02	120.49
Higher	-	104.69	121.82	177.88	127.48	107.33
Women employed						
No	202.35	155.08	128.38	168.06	154.36	121.77
Yes	-	-	144.28	193.07	133.8	137.43
Family type						
Joint	-	186.41	144.73	168.28	167.6	114.29
Nuclear	200	131.93	120.47	177.14	143.04	128.72
Place of Residence						
Rural	257.14	157.4	136.09	183.67	156.36	135.29
Urban	145.76	132.57	114.39	162.76	140.68	111.76
Province/Region						
Punjab	253.19	158.41	134	179.91	159.29	130.47
Sindh	-	110.23	113.74	160.58	121.74	108.93
KPK	-	147.5	109.72	177.78	148.89	126.23
Balochistan	-	-	-	-	-	-
Economic status						
Poorest	-	147.82	127.43	-	125.45	141.47
Poorer	-	-	120.83	200	188.97	148.38
Middle	-	-	165	163.83	148.41	138.82
Richer	-	143.22	104.45	179.21	136.55	120.99
Richest	-	158.58	120.26	177.33	150.4	103.66

Source: Authors' calculations using PDHS 1990-91 and 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Subgroups with less than 100 observations are omitted.

Table 2.4 shows sex ratios for the subsamples of women who suffered the death of one or more of their children and those who did not. Sex ratios for the former group of women are considerably below those belonging to the latter group. Women with one or more deceased children had an overall sex ratio of 107 boys per 100 girls in 1990-91 and 111 boys per 100 girls in 2012-13. In contrast, women with no child death had a higher sex ratio of 117.

These differences persist regardless of women's level of education, employment status, family type or place of residence and point to low gender preference among women with child loss.

2.3.2 Sex Ratio at Birth

Sex ratio at birth (SRB) is another useful indicator of son preference. Pakistan's SRB, at 109 male births per 100 female births, is the second highest in the region

Table 2.4: Sex ratio by child loss

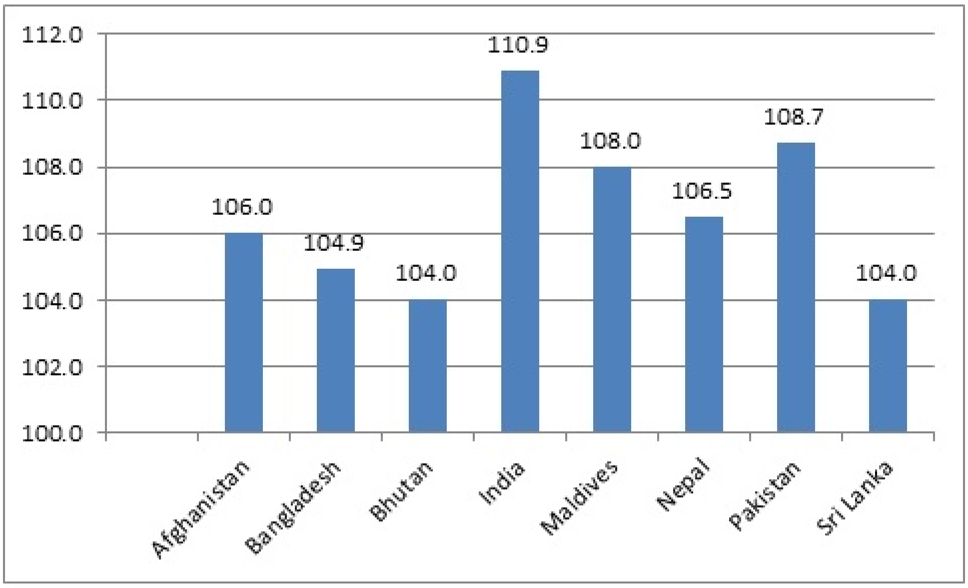
	PDHS 1990-91		PDHS 2012-13	
	No	Yes	No	Yes
Overall	117.41	106.76	117.02	110.96
Education				
No Education	118.09	107.17	116.32	111.46
Primary	118.7	99.5	120.4	115.18
Secondary	113.26	113.28	118.94	84.98
Higher	102.08	75	111.52	210.53
Spouse Education				
No Education	116.18	102.53	117.02	113.79
Primary	121.84	119.45	124.52	101.69
Secondary	118.32	102.73	117.09	111.59
Higher	110.57	190.91	109.85	111.11
Woman employed				
No	119.96	108.97	117.97	114.55
Yes	104.41	98.26	115.46	105.62
Family type				
Joint	144.36	124.88	123.49	114.98
Nuclear	113.77	105.08	115.75	110.47
Place of Residence				
Rural	106.12	108.14	113.51	100.84
Urban	124.66	105.87	118.92	114.43
Province/Region				
Punjab	118.21	107.96	121.44	114.54
Sindh	112.73	109.79	106.42	112.01
KPK	121.49	94.88	116.36	96.06
Balochistan	115.52	90	120.5	96.88
Economic status				
Poorest	111.08	106.91	111.71	115.65
Poorer	123.76	108.38	121.73	111.37
Middle	123.52	102.1	120.4	108.4
Richer	115.61	106.86	116.21	104.17
Richest	115.55	108.12	114.27	114.4

Source: Authors' calculations using PDHS 1990-91 and 2012-13. Sample is restricted to women with complete fertility. Sample weights are used.

after India's ratio of 110.9 (Figure 2.3). This ratio is above the normal biological ratio of 105 male per 100 female births.

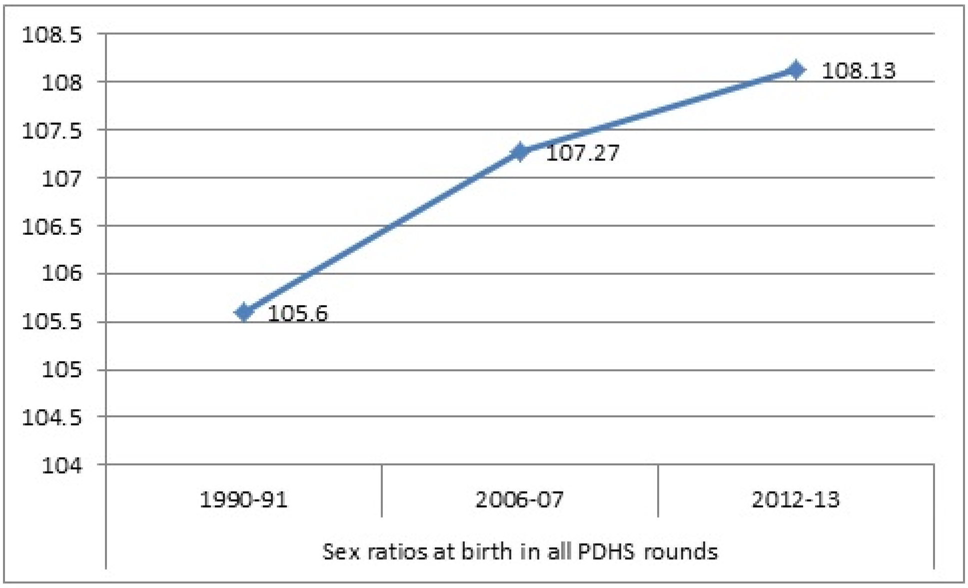
According to PDHS data, the country's SRB increased from 105 in 1990-91 to 109 in 2012-13 (Figure 2.4).

Figure 2.3: Sex ratio at birth - South Asian countries



Source: United Nations, Department of Economic and Social Affairs, Population Division (2017). World Population Prospects: The 2017 Revision, DVD Edition.

Figure 2.4: Sex ratios at birth - 1990-91 – 2012-13



Sources: Authors' calculations using PDHS 1990-91, 2006-07 and 2012-2013.

2.3.3 Sex Ratio at Last Birth

Another way of looking at the prevalence of son preference is the sex ratio at last birth (SRLB). The ratio would be above the normal biological ratio of 105 in societies where son preference reflects in differential birth-stopping.

Overall and group-wise SRLB figures shown in Table 2.5 highlight this feature of son preference. Overall SRLB increased from 117 in 1990-91 to 133 in 2012-13 suggesting that Pakistani couples are increasingly resorting to differential birth-stopping in the presence of persistent preference for male offspring.

Location-wise differences in this context have evolved over time. In 1990-91, women living in rural areas had a higher SRLB compared with women living in urban areas (124 vs 108). This difference had disappeared by 2012-13 with women in both locations showing a high SRLB of about 133.

The ratios with respect to women's employment status show interesting variation: In 1990-91, women with no employment had a sex ratio at last birth of 118 compared with 114 for working women. This trend has reversed in 2012-13 with the latter now showing a higher ratio than the former (141 vs 131).

SRLB with respect to household wealth has also evolved: In 1990-91, households belonging to the middle (third) wealth quintile had the highest ratio at last birth (153) of all the wealth groups. In 2012-13 in contrast, the highest ratio of 150 male births per 100 live female births was found among the wealthier group of households (second quintile).

2.3.4 Parity Progression Ratio

In societies with higher preference for sons, the decision to continue fertility depends on the sex of children present. Couples having attained the desired number of sons are therefore less likely to proceed to next parity. This effect can

Table 2.5: Sex ratio at last birth

	PDHS 1990-91			PDHS 2012-13		
	Total Sons	Total Daughters	Sex Ratio	Total Sons	Total Daughters	Sex Ratio
Overall	1399	1191	117.46	3628	2720	133.38
Education						
No Education	1085	906	119.76	2193	1685	130.15
Primary	128	108	118.52	565	405	139.51
Secondary	169	156	108.33	597	421	141.81
Higher	-	-	-	272	209	130.14
Spouse Education						
No Education	650	596	109.06	1293	962	134.41
Primary	228	163	139.88	568	427	133.02
Secondary	444	343	129.45	1173	916	128.06
Higher	69	81	85.19	586	414	141.55
Woman employed						
No	1176	994	118.31	2544	1944	130.86
Yes	223	196	113.78	1081	769	140.57
Family type						
Joint	238	191	124.61	723	481	150.31
Nuclear	1160	999	116.12	2904	2239	129.7
Place of Residence						
Rural	874	707	123.62	2341	1753	133.54
Urban	524	483	108.49	1287	967	133.09
Province/Region						
Punjab	893	749	119.23	2212	1581	139.91
Sindh	290	264	109.85	771	578	133.39
KPK	201	162	124.07	497	438	113.47
Balochistan	-	-	-	100	85	117.65
Economic status						
Poorest	194	195	99.49	609	455	133.85
Poorer	206	161	127.95	660	547	120.66
Middle	277	181	153.04	773	578	133.74
Richer	336	282	119.15	790	526	150.19
Richest	384	370	103.78	795	612	129.9

Source: Authors' calculations using PDHS 1990-91 and 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Subgroups with less than 100 observations are omitted.

be observed in skewed values of parity progress ratio (PPR) shown in Table 2.6. While women with or without a son both have similar PPR at parity 1, their ratios are substantially different at higher parities. For example, women at parity 2 with no son had a PPR of 0.97 in 2012-13 compared with a much lower value of 0.9 for women with one or two sons.

Table 2.6: Parity progression ratio

Number of children	Number of boys	PDHS 1990-91			PDHS 2012-13		
		Number of families with n children	Number of Families with n+1 Children	Parity Progression ratio (PPR)	Number of families with n children	Number of Families with n+1 Children	Parity Progression ratio (PPR)
1	0	1185	1156	0.98	2916	2869	0.98
	1	1405	1370	0.98	3432	3362	0.98
2	0	526	513	0.98	1283	1241	0.97
	1	1208	1130	0.94	3168	2862	0.9
	2	791	732	0.93	1779	1593	0.9
3	0	231	216	0.94	542	509	0.94
	1	823	747	0.91	2053	1799	0.88
	2	942	796	0.85	2320	1793	0.77
	3	377	334	0.89	777	649	0.84

Source: Authors' calculations using PDHS 1990-91 and 2012-13. Sample is restricted to women with complete fertility.

2.3.5 Desired Sex Ratio

The aforementioned indicators measured revealed dimension of son preference. Now we focus on the desire for sons stated by the women. Table 2.7 presents desire sex ratio (DSR) for women with complete fertility. We can again see strong preference for boys: overall desired sex ratio, which was 113 in 1990-91 is estimated to be 108 in 2012-13. The ratio diverges sharply by education and location of women, and shows divergent trends over time.

In 1990-91, the DSR was highest among women with no education (120) while in 2012-13, it was highest among women with higher education (121).

The ratio for women living in rural areas in 1990-91 was much higher compared with those living in urban areas (130 vs 106). The difference between the two groups of women had diminished by 2012-13 with ratios of 109 and 108 for women living in rural and urban areas respectively.

Previously strong province-wise variations too have decreased. In 1990-91, the values of DSR ranged from a high of 150 in the province of KPK (then called NWFP) to a low of 106 in Sindh. In contrast, the range had narrowed in 2012-13 with a maximum of 121 found in Balochistan and a minimum of 107 in Punjab. Wealth-wise difference in the desired sex ratio and those in terms of women's employment status have also narrowed over time.

2.3.6 Desired Preference

Table 2.8 shows aggregate and group-wise figures for the desired preference indicator divided into three categories of women: those with equal preference for boys and girls, those with preference for sons, and those with no son preference. Overall, majority of the women report having equal preference for boys and girls. Two thirds of the women (66%) report having equal preference followed by 31%

Table 2.7: Desired sex ratio

	PDHS 1990-91			PDHS 2012-13		
	Total Sons	Total Daughters	Sex Ratio	Total Sons	Total Daughters	Sex Ratio
Overall	6356	5614	113.22	43696	40307	108.41
Education						
No Education	3519	2944	119.53	32769	30327	108.05
Primary	1322	1257	105.17	5036	4621	108.98
Secondary	1316	1225	107.43	4839	4489	107.8
Higher	199	187	106.42	1051	869	120.94
Spouse Education						
No Education	1693	1363	124.21	15294	13724	111.44
Primary	1478	1375	107.49	8842	8311	106.39
Secondary	2631	2381	110.5	14480	13620	106.31
Higher	546	490	111.43	4871	4442	109.66
Woman employed						
No	5195	4546	114.28	30719	28291	108.58
Yes	1161	1068	108.71	12639	11678	108.23
Family type						
Joint	1283	1130	113.54	4990	4396	113.51
Nuclear	5073	4484	113.14	38706	35911	107.78
Place of Residence						
Rural	2113	1621	130.35	30949	28489	108.63
Urban	4243	3993	106.26	12747	11818	107.86
Province/Region						
Punjab	3602	3160	113.99	26663	24913	107.02
Sindh	2226	2100	106	6236	5556	112.24
KPK	501	333	150.45	9240	8560	107.94
Balochistan	26	21	123.81	1196	991	120.69
Economic status						
Poorest	1069	981	108.97	8164	7283	112.1
Poorer	378	263	143.73	8384	7688	109.05
Middle	883	718	122.98	10875	10210	106.51
Richer	1484	1311	113.2	9128	8494	107.46
Richest	2540	2339	108.59	7144	6631	107.74

Source: Authors' calculations using PDHS 1990-91 and 2012-13. Sample is restricted to women with complete fertility. Sample weights are used.

preferring sons.

Desired son preference is less prevalent among younger women (those between 15 and 24 years old) than older women. Stated son preference also decreases with increasing female education attainment and household wealth. Women with work show lower desired son preference (31%) than those not working (40%).

Table 2.9 presents desired gender preference by ideal family size. Majority of women who report wanting one or three children indicate preference for sons (60% for the former, 76% for the latter). In contrast, women who report two or four as their ideal number of children mostly report equal preference (92% among the former, 89% among the latter).

Table 2.8: Desired preference (PDHS 2012-13)

	Equal Preference	Son Preference	No Preference
	%	%	%
Overall	66.34	31.37	2.29
Education			
No Education	65.02	33.16	1.83
Primary	67.44	30.08	2.48
Secondary	67.66	28.87	3.47
Higher	71.98	24.91	3.11
Spouse Education			
No Education	62.02	36.28	1.7
Primary	67	31.81	1.19
Secondary	69.93	26.89	3.17
Higher	67.66	29.54	2.8
Woman employed			
No	56.68	40.18	3.13
Yes	66.77	31.46	1.77
Family type			
Joint	69.09	28.71	2.21
Nuclear	65.68	32.03	2.29
Place of Residence			
Urban	68.45	28.19	3.35
Rural	65.17	33.12	1.71
Region			
Punjab	67.1	30.17	2.73
Sindh	67.49	30.34	2.16
KPK	64.13	34.83	1.04
Balochistan	60.82	38.37	0.8
Economic Status			
Poorest	58.66	40.73	0.61
Poorer	68.85	30.42	0.72
Middle	66.36	30.82	2.82
Richer	66.73	30.78	2.49
Richest	69.55	26.23	4.22
Age			
15-24	73.36	24.9	1.73
25-34	65.58	32.35	2.07
35-49	66.23	31.33	2.45

Source: Authors' calculations using PDHS 2012-13. Sample is restricted to women with complete fertility. Sample weights are used.

2.4 Son Preference and Subsequent Childbearing

2.4.1 Actual Fertility

Now we focus our attention on the fertility consequences of son preference. Three indicators of son preference are used for this purpose, namely presence of at least one son at parity n, proportion of sons at parity n and the number of sons at parity n.

Tables 2.10 to 2.12 report results of estimations for first of these three indicators. Table 2.10 shows Probit estimates of the effect of having one or more son at a given parity on the probability of proceeding to subsequent birth while tables 2.11 and 2.12 show the ATE for the three corresponding sets of matching estimations.

Table 2.9: Desired preference by ideal family size

Ideal Number of children	1			2			3			4		
Gender Preference	Equal Preference	Son Preference	No Preference	Equal Preference	Son Preference	No Preference	Equal Preference	Son Preference	No Preference	Equal Preference	Son Preference	No Preference
	%	%	%	%	%	%	%	%	%	%	%	%
Overall	23.14	60.22	16.63	91.59	8.25	0.16	18.05	76.36	5.59	88.83	10.38	0.78
Education												
No Education	24.6	40.8	34.59	91.71	8.29	0	18.52	76.28	5.19	88.97	10.8	0.23
Primary	3.66	96.33	0	85.23	14.77	0	15.73	80.28	3.99	89.38	10	0.62
Secondary	12.55	73.24	14.21	95.11	4.89	0	14.31	79.41	6.27	88.79	7.98	3.24
Higher	57.43	42.56	0	91.69	7.51	0.8	28.59	62.58	8.83	86.25	13.7	0.05
Spouse Education												
No Education	16.86	65.33	17.81	92.9	7.1	0	14.45	78.24	7.31	86.91	12.98	0.12
Primary	2	97.99	0	85.8	14.2	0	13.44	84.32	2.25	90.7	8.45	0.85
Secondary	22.22	67.2	10.58	92.56	7.43	0.01	17.88	76.77	5.35	89.99	8.32	1.69
Higher	39.13	31	29.86	92.27	7.13	0.6	26.03	67.73	6.24	88.17	11.83	0
Place of Residence												
Urban	24.8	58.16	17.04	93.38	6.31	0.31	18.04	75.19	6.77	89.52	8.84	1.63
Rural	19.78	64	16.22	89.66	10.34	0	18.05	77.19	4.77	88.42	11.28	0.29
Region												
Punjab	20.78	56.27	22.94	89.67	10.33	0	15.72	78.04	6.24	90.62	8.34	1.04
Sindh	20.02	71.07	8.91	95.91	3.42	0.67	19.96	75.34	4.7	89.71	9.75	0.54
KPK	32.19	67.8	0	92.53	7.47	0	26.93	69.68	3.39	81.1	18.82	0.08
Balochistan	-	-	-	92.59	6.79	0.62	10.1	82.25	7.65	82.39	17.52	0.09
Economic Status												
Poorest	0	0	100	94.05	5.95	0	8.52	89.8	1.68	81.87	18.13	0
Poorer	7.83	92.16	0	86.89	13.11	0	19	78.99	2.01	91.95	8.05	0
Middle	27.28	24.82	47.9	90.11	9.89	0	19.2	72.6	8.19	89.81	10.18	0.01
Richer	8.74	91.26	0	92.42	7.58	0	16.2	81.03	2.77	89.42	9.35	1.23
Richest	38.23	46.75	15.02	92.99	6.57	0.44	21.31	69.33	9.37	88.96	8.83	2.21

Source: Authors' calculations using PDHS 2012-13. Sample is restricted to women with complete fertility.

We find no significant effect of the sex of the first child on the probability of the subsequent birth. This finding is in line with the parity progress ratio for women at first parity shown in Table 2.6 which does not vary regardless of the sex of the first-born.

We find negative and mostly significant impact of having one or more sons on the likelihood of proceeding to next parity. Marginal effects evaluated at means given at the bottom of Table 2.10 show that women at parities 2, 3 and 4 having at least one son were 5%, 9% and 10% less likely to continue childbearing compared with women with no son (2012-13 sample). Corresponding ATE for these three parities given in Tables 2.11 and 2.12 ranged from 5% to 13% (PSM), 5% to 12% (IPW) and 5% to 12% (AIPW).

Findings of the baseline Probit and the three matching estimates are highly similar in significance, direction and magnitude, and give strong evidence in favour of son preference's birth-stopping effect. Results for the 1990-91 dataset are analogous to those of the 2012-13 dataset with the exception that estimates for parity 3 are invariably found to be insignificant.

Overall, our findings corroborate the conclusion of Ben-Porath and Welch (1976) and Knodel and Prachuabmoh (1976) that son preferring couples with one or more sons at a given parity are more likely to have less additional children.

Estimates for son ratio, the second indicator of son preference are reported in Table 2.13. The results are similar to those of the first indicator and point to strengthening of son preference's fertility effect with increasing parity. While no significant effect of son ratio could be observed on the likelihood of proceeding to subsequent birth at parity 1, the effect is significant at higher parities and grows in birth order (2012-13 sample). A 1% increase in son ratio is associated with

Table 2.10: Presence of at least one son and subsequent birth – probit estimation

VARIABLES	PDHS 1990-91				PDHS 2012-13			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth
Parity 1 (ref: no son)								
At least one son	0.175(0.171)				-0.071(0.102)			
Parity 2 (ref: no son)								
At least one son		-0.456***(0.150)				-0.543***(0.109)		
Parity 3 (ref: no son)								
At least one son			-0.236(0.165)				-0.538***(0.124)	
Parity 4 (ref: no son)								
At least one son				-0.857***(0.307)				-0.450**(0.199)
Age	0.042***(0.014)	0.059***(0.010)	0.044***(0.008)	0.072***(0.008)	0.039***(0.009)	0.060***(0.006)	0.047***(0.005)	0.061***(0.005)
Age difference	-0.016*(0.009)	0.003(0.012)	0.017(0.011)	0.004(0.008)	-0.033***(0.008)	0.019***(0.007)	0.004(0.006)	0.010*(0.005)
Woman education (ref: none)								
Primary	0.631*(0.341)	0.083(0.211)	-0.012(0.162)	0.338*(0.186)	0.132(0.169)	-0.021(0.113)	-0.078(0.088)	-0.330***(0.086)
Secondary	-0.369*(0.203)	-0.209(0.170)	-0.167(0.144)	-0.512***(0.157)	-0.184(0.157)	-0.214*(0.112)	-0.324***(0.089)	-0.427***(0.097)
Higher	-0.897**(0.429)	-0.894**(0.360)	-0.740**(0.327)	-1.108***(0.429)	-0.07995	-0.666***(0.139)	-0.733***(0.118)	-0.913***(0.139)
Spouse education (ref: none)								
Primary	0.454(0.354)	-0.076(0.187)	0.153(0.156)	0.119(0.147)	0.136(0.170)	0.038(0.115)	-0.200**(0.098)	-0.059(0.092)
Secondary	-0.072(0.177)	0.034(0.139)	-0.155(0.130)	-0.094(0.125)	0.194(0.153)	0.178*(0.103)	-0.110(0.085)	-0.075(0.082)
Higher	0.261(0.322)	-0.061(0.257)	-0.592***(0.223)	-0.256(0.210)	0.289(0.189)	0.077(0.125)	-0.008(0.102)	-0.021(0.101)
Woman employed (ref: none)								
Yes	0.150(0.251)	0.040(0.162)	0.172(0.128)	0.141(0.138)	0.221(0.145)	-0.163*(0.088)	0.055(0.077)	0.091(0.073)
Media exposure (ref: none)								
Yes	-0.129(0.168)	0.067(0.137)	-0.168(0.119)	-0.105(0.111)	0.028(0.127)	0.053(0.091)	0.161**(0.080)	-0.221***(0.072)
Family structure (ref: joint)								
Nuclear family	1.382***(0.173)	0.876***(0.137)	0.924***(0.152)	1.237***(0.166)	1.009***(0.118)	0.822***(0.112)	0.778***(0.103)	0.711***(0.099)
Household size	0.174***(0.035)	0.087***(0.024)	0.142***(0.027)	0.166***(0.026)	0.110***(0.022)	0.125***(0.022)	0.114***(0.015)	0.105***(0.014)
Place of residence (ref: rural)								
Urban	0.284**(0.142)	-0.262*(0.138)	0.078(0.117)	-0.024(0.108)	-0.239*(0.141)	0.158*(0.096)	-0.017(0.077)	0.082(0.079)
Province/ Region (ref: Balochistan)								
Punjab	1.032**(0.417)	0.118(0.371)	-0.065(0.268)	0.343(0.282)	0.813***(0.162)	0.109(0.152)	0.218*(0.122)	-0.099(0.124)
Sindh	1.246***(0.426)	0.115(0.371)	0.014(0.273)	0.417(0.288)	0.491***(0.177)	-0.063(0.153)	0.229*(0.125)	-0.073(0.126)
KPK region	0.491(0.413)	-0.316(0.367)	-0.085(0.274)	0.420(0.289)	0.665***(0.169)	0.079(0.149)	0.298**(0.128)	-0.248*(0.128)
Islamabad					0.562***(0.215)	0.224(0.173)	0.033(0.142)	-0.246*(0.146)
Gilgit-Baltistan					0.477**(0.216)	0.022(0.183)	0.288**(0.145)	0.051(0.147)
Economic status (ref: poorest)								
Poorer	0.067(0.338)	-0.091(0.226)	0.088(0.208)	0.336*(0.176)	-0.442**(0.214)	-0.249*(0.137)	-0.276**(0.125)	0.022(0.102)
Middle	0.529(0.340)	-0.259(0.207)	0.265(0.191)	0.081(0.174)	-0.241(0.219)	-0.099(0.154)	-0.372***(0.122)	-0.065(0.112)
Rich	0.202(0.276)	-0.119(0.185)	-0.303*(0.164)	0.082(0.160)	-0.445*(0.257)	-0.612***(0.154)	-0.373***(0.136)	-0.274**(0.125)
Richest	0.145(0.286)	-0.154(0.180)	-0.057(0.167)	0.389**(0.154)	-0.192(0.289)	-0.785***(0.189)	-0.655***(0.153)	-0.424***(0.151)
Marginal effect	0.007(0.007)	-0.035***(0.009)	-0.034(0.021)	-0.115***(0.026)	-0.002(0.003)	-0.054***(0.008)	-0.092***(0.016)	-0.105**(0.039)
Constant	-2.813***(0.673)	-1.153**(0.550)	-1.891***(0.530)	-3.626***(0.592)	-0.932**(0.446)	-1.604***(0.405)	-1.562***(0.317)	-2.170***(0.359)
Observations	2,540	2,476	2,316	2,038	6,328	6,178	5,650	4,675

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Sample is restricted to women with complete fertility. Adequate weights are employed. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 2.11: Presence of at least one son and subsequent birth - Propensity score matching

	PDHS 1990-91				PDHS 2012-13			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Propensity score match	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth
ATE	0.102	-0.033***	-0.022	-0.102*	-0.003	-0.048***	-0.102***	-0.133**
	(-0.008)	(-0.012)	(-0.025)	(-0.032)	(-0.004)	(-0.008)	(-0.015)	(-0.028)
Observations	2,540	2,476	2,316	2,038	6,328	6,178	5,650	4,675

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Sample is restricted to women with complete fertility. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

a 6% lower probability of proceeding to next birth. This likelihood increases to 14% at the third and fourth parities.

Results of estimates of the 1990-91 (columns 1 – 4) are weak[6]. The son ratio – subsequent birth relationship is found to be significant only at parity 2 and 3, both with a marginal effect of 4%.

Next we test the hypothesis that the probability of having an additional child depends upon the number of boys in the first n children. Table 2.14 reports results for the impact of number of sons at a given parity on the probability of continuing childbearing for the first four parities. These results, while similar to those discussed so far, add another dimension to the son preference – fertility relationship. We find that women with more sons at a given parity are more likely to stop child-bearing compared with women with fewer sons. For example, while the likelihood of subsequent birth for women with one son at parity 4 does not significantly differ from that of women without a son, it does so significantly at the higher parities. Women with two or three sons are 12% less likely to proceed to fifth birth, those whose four children all are boys, are 14% less likely to do so.

[6] A possible reason for these weak results could be the smaller effective sample size of the 1990-91 dataset.

Table 2.12: Presence of at least one son and subsequent birth – IPW and AIPW estimates

	PDHS 1990-91								PDHS 2012-13							
Inverse-Probability weights	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
	Subsequent birth	POmean	Subsequent birth	POmean	Subsequent birth	POmean	Subsequent birth	POmean	Subsequent birth	POmean	Subsequent birth	POmean	Subsequent birth	POmean	Subsequent birth	POmean
ATE	0	0.974***	-0.038***	0.965***	-0.031	0.908***	-0.098***	0.927***	-0.004	0.978***	-0.049***	0.954***	-0.095***	0.914***	-0.123***	0.863***
	(-0.006)	(-0.004)	(-0.01)	(-0.008)	(-0.02)	(-0.019)	(-0.025)	(-0.024)	(-0.003)	(-0.002)	(-0.007)	(-0.006)	(-0.013)	(-0.012)	(-0.024)	(-0.024)
Observation	2,540	2,540	2,476	2,476	2,316	2,316	2,038	2,038	6,328	6,328	6,178	6,178	5,650	5,650	4,675	4,675
Augmented IPW																
ATE	0	0.974***	-0.038***	0.965***	-0.031	0.908***	-0.098***	0.927***	-0.004	0.978***	-0.049***	0.954***	-0.095***	0.914***	-0.123***	0.863***
	(-0.006)	(-0.004)	(-0.01)	(-0.008)	(-0.02)	(-0.019)	(-0.025)	(-0.024)	(-0.003)	(-0.002)	(-0.007)	(-0.006)	(-0.013)	(-0.012)	(-0.024)	(-0.024)
Observation	2,540	2,540	2,476	2,476	2,316	2,316	2,038	2,038	6,328	6,328	6,178	6,178	5,650	5,650	4,675	4,675

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Sample is restricted to women with complete fertility. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2.13: Son ratio and subsequent birth – probit estimation

	PDHS 1990-91				PDHS 2012-13			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
VARIABLES	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth
Parity 1								
Son ratio	0.175(0.171)				-0.071(0.102)			
Parity 2								
Son ratio		-0.462***(0.156)				-0.483***(0.099)		
Parity 3								
Son ratio			-0.278*(0.168)				-0.678***(0.103)	
Parity 4								
Son ratio				-0.180(0.185)				-0.547***(0.124)
Age	0.042***(0.014)	0.059***(0.010)	0.044***(0.008)	0.073***(0.008)	0.039***(0.009)	0.061***(0.006)	0.047***(0.005)	0.061***(0.005)
Age difference	-0.016*(0.009)	0.003(0.012)	0.017(0.011)	0.005(0.008)	-0.033***(0.008)	0.019***(0.007)	0.003(0.006)	0.009*(0.005)
Woman education								
(ref: none)								
Primary	0.631*(0.341)	0.072(0.206)	-0.018(0.161)	0.330*(0.184)	0.132(0.169)	-0.016(0.113)	-0.078(0.089)	-0.338***(0.087)
Secondary	-0.369*(0.203)	-0.228(0.168)	-0.167(0.143)	-0.518***(0.157)	-0.184(0.157)	-0.222**(0.112)	-0.338***(0.090)	-0.436***(0.097)
Higher	-0.897**(0.429)	-0.910**(0.357)	-0.741**(0.326)	-1.136***(0.428)	-0.07995	-0.679***(0.140)	-0.746***(0.118)	-0.929***(0.140)
Spouse education								
(ref: none)								
Primary	0.454(0.354)	-0.068(0.183)	0.145(0.157)	0.124(0.149)	0.136(0.170)	0.040(0.115)	-0.198**(0.098)	-0.064(0.092)
Secondary	-0.072(0.177)	0.034(0.139)	-0.167(0.129)	-0.094(0.124)	0.194(0.153)	0.181*(0.104)	-0.121(0.086)	-0.082(0.082)
Higher	0.261(0.322)	-0.068(0.249)	-0.598***(0.225)	-0.242(0.208)	0.289(0.189)	0.090(0.127)	-0.028(0.103)	-0.039(0.101)
Woman employed								
(ref: none)								
Yes	0.150(0.251)	0.018(0.160)	0.155(0.128)	0.132(0.137)	0.221(0.145)	-0.156*(0.089)	0.046(0.078)	0.083(0.073)
Media exposure								
(ref: none)								
Yes	-0.129(0.168)	0.073(0.136)	-0.167(0.119)	-0.106(0.111)	0.028(0.127)	0.055(0.091)	0.169**(0.081)	-0.216***(0.072)
Family structure								
(ref: joint)								
Nuclear family	1.382***(0.173)	0.876***(0.139)	0.906***(0.154)	1.226***(0.166)	1.009***(0.118)	0.823***(0.111)	0.782***(0.103)	0.713***(0.099)
Household size	0.174***(0.035)	0.086***(0.024)	0.143***(0.027)	0.166***(0.026)	0.110***(0.022)	0.125***(0.022)	0.115***(0.015)	0.105***(0.014)
Place of residence								
(ref: rural)								
Urban	0.284**(0.142)	-0.264*(0.139)	0.072(0.117)	-0.022(0.109)	-0.239*(0.141)	0.151(0.095)	-0.027(0.078)	0.072(0.080)
Province/ Region								
(ref: Balochistan)								
Punjab	1.032**(0.417)	0.132(0.379)	-0.072(0.268)	0.367(0.284)	0.813***(0.162)	0.093(0.152)	0.205*(0.124)	-0.108(0.124)
Sindh	1.246***(0.426)	0.106(0.380)	0.007(0.274)	0.453(0.289)	0.491***(0.177)	-0.082(0.152)	0.205(0.126)	-0.090(0.127)
KPK region	0.491(0.413)	-0.318(0.376)	-0.099(0.275)	0.437(0.291)	0.665***(0.169)	0.060(0.148)	0.281**(0.128)	-0.266**(0.128)
Islamabad					0.562***(0.215)	0.216(0.172)	0.024(0.143)	-0.038544
Gilgit-Baltistan					0.477**(0.216)	-0.007(0.183)	0.272*(0.145)	0.038(0.147)
Economic status								
(ref: poorest)								
Poorer	0.067(0.338)	-0.091(0.225)	0.086(0.206)	0.326*(0.176)	-0.442**(0.214)	-0.034776	-0.276**(0.126)	0.013(0.102)
Middle	0.529(0.340)	-0.270(0.205)	0.264(0.193)	0.096(0.173)	-0.241(0.219)	-0.118(0.155)	-0.380***(0.123)	-0.065(0.111)
Rich	0.202(0.276)	-0.146(0.183)	-0.300*(0.164)	0.081(0.160)	-0.241(0.219)	-0.624***(0.155)	-0.394***(0.138)	-0.286**(0.124)
Richest	0.145(0.286)	-0.169(0.178)	-0.053(0.166)	0.385**(0.153)	-0.192(0.289)	-0.790***(0.191)	-0.653***(0.154)	-0.428***(0.151)
Marginal effect	0.007(0.007)	-0.043***(0.015)	-0.044*(0.268)	-0.033(0.034)	-0.002(0.003)	-0.059***(0.012)	-0.139***(0.021)	-0.143***(0.032)
Constant	-2.813***(0.673)	-1.238**(0.553)	-1.924***(0.509)	-4.394***(0.546)	-0.932**(0.446)	-1.793***(0.394)	-1.670***(0.302)	-2.273***(0.290)
Observations	2,540	2,476	2,316	2,038	6,328	6,178	5,650	4,675

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Sample is restricted to women with complete fertility. Adequate weights are employed. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2.14: Number of sons and subsequent birth – probit estimation

VARIABLES	PDHS 1990-91				PDHS 2012-13			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth	Subsequent birth
Parity 1 (ref: 0)								
1	0.175(0.171)				-0.071(0.102)			
Parity 2 (ref: 0)								
1		-0.401**(0.157)				-0.510***(0.112)		
2		-0.541***(0.169)				-0.601***(0.120)		
Parity 3 (ref: 0)								
1			-0.123(0.182)				-0.272**(0.131)	
2			-0.329*(0.169)				-0.742***(0.129)	
3			-0.226(0.204)				-0.535***(0.146)	
Parity 4 (ref: 0)								
1				-0.859***(0.322)				-0.213(0.207)
2				-0.854***(0.311)				-0.500**(0.203)
3				-0.900***(0.318)				-0.525**(0.206)
4				-0.715**(0.348)				-0.592***(0.227)
Age	0.042***(0.014)	0.059***(0.010)	0.043***(0.008)	0.072***(0.008)	0.039***(0.009)	0.061***(0.006)	0.047***(0.005)	0.061***(0.005)
Age difference	-0.016*(0.009)	0.003(0.012)	0.017(0.011)	0.004(0.008)	-0.033***(0.008)	0.019***(0.007)	0.003(0.006)	0.008(0.005)
Woman education (ref: none)								
Primary	0.631*(0.341)	0.073(0.208)	-0.000(0.162)	0.345*(0.186)	0.132(0.169)	-0.019(0.113)	-0.066(0.090)	-0.340***(0.087)
Secondary	-0.369*(0.203)	-0.220(0.167)	-0.166(0.143)	-0.514***(0.158)	-0.184(0.157)	-0.217*(0.112)	-0.352***(0.090)	-0.448***(0.097)
Higher	-0.897**(0.429)	-0.907**(0.357)	-0.756**(0.326)	-1.095**(0.432)	-0.390*(0.205)	-0.671***(0.139)	-0.756***(0.119)	-0.939***(0.141)
Spouse education (ref: none)								
Primary	0.454(0.354)	-0.069(0.184)	0.138(0.156)	0.115(0.148)	0.136(0.170)	0.037(0.115)	-0.205**(0.098)	-0.061(0.092)
Secondary	-0.072(0.177)	0.034(0.139)	-0.167(0.129)	-0.099(0.125)	0.194(0.153)	0.180*(0.103)	-0.121(0.085)	-0.074(0.082)
Higher	0.261(0.322)	-0.064(0.253)	-0.589***(0.226)	-0.270(0.211)	0.289(0.189)	0.079(0.125)	-0.039(0.104)	-0.030(0.101)
Woman employed (ref: none)								
Yes	0.150(0.251)	0.023(0.160)	0.151(0.128)	0.138(0.138)	0.221(0.145)	-0.161*(0.088)	0.044(0.078)	0.087(0.073)
Media exposure (ref: none)								
Yes	-0.129(0.168)	0.070(0.137)	-0.162(0.119)	-0.099(0.112)	0.028(0.127)	0.054(0.091)	0.181**(0.081)	-0.216***(0.073)
Family structure (ref: joint)								
Nuclear family	1.382***(0.173)	0.873***(0.139)	0.911***(0.154)	1.244***(0.168)	1.009***(0.118)	0.821***(0.112)	0.776***(0.102)	0.714***(0.099)
Household size	0.174***(0.035)	0.086***(0.024)	0.142***(0.027)	0.166***(0.026)	0.110***(0.022)	0.125***(0.022)	0.115***(0.015)	0.105***(0.014)
Place of residence (ref: rural)								
Urban	0.284**(0.142)	-0.268*(0.138)	0.072(0.118)	-0.024(0.109)	-0.239*(0.141)	0.156(0.096)	-0.015(0.078)	0.075(0.080)
Province/ Region (ref: Balochistan)								
Punjab	1.032**(0.417)	0.124(0.376)	-0.083(0.264)	0.345(0.283)	0.813***(0.162)	0.100(0.151)	0.242**(0.123)	-0.101(0.124)
Sindh	1.246***(0.426)	0.105(0.377)	-0.000(0.270)	0.420(0.288)	0.491***(0.177)	-0.074(0.152)	0.232*(0.126)	-0.082(0.126)
KPK region	0.491(0.413)	-0.326(0.373)	-0.116(0.271)	0.416(0.290)	0.665***(0.169)	0.069(0.149)	0.306**(0.130)	-0.261**(0.128)
Islamabad					0.562***(0.215)	0.215(0.172)	0.045(0.143)	-0.266*(0.146)
Gilgit-Baltistan					0.477**(0.216)	0.010(0.183)	0.308**(0.144)	0.052(0.147)
Economic status (ref: poorest)								
Poorer	0.067(0.338)	-0.092(0.225)	0.087(0.207)	0.336*(0.176)	-0.442**(0.214)	-0.245*(0.138)	-0.275**(0.125)	0.025(0.102)
Middle	0.529(0.340)	-0.265(0.206)	0.267(0.192)	0.081(0.173)	-0.241(0.219)	-0.101(0.154)	-0.376***(0.122)	-0.059(0.112)
Rich	0.202(0.276)	-0.132(0.183)	-0.290*(0.164)	0.083(0.159)	-0.445*(0.257)	-0.615***(0.155)	-0.396***(0.137)	-0.275**(0.125)
Richest	0.145(0.286)	-0.164(0.178)	-0.050(0.166)	0.388**(0.153)	-0.192(0.289)	-0.783***(0.190)	-0.653***(0.154)	-0.427***(0.151)
Marginal effect: 1	0.007(0.007)	-0.029**(0.010)	-0.016(0.024)	-0.115***(0.032)	-0.002(0.003)	-0.050***(0.009)	-0.040**(0.017)	-0.045(0.041)
2		-0.044***(0.013)	-0.00	-0.114***(0.028)		-0.062***(0.011)	-0.138***(0.018)	-0.118**(0.041)
3			-0.032(0.029)	-0.123***(0.031)			-0.090***(0.023)	-0.125**(0.042)
4				-0.089**(0.038)				-0.144***(0.050)
Constant	-2.813***(0.673)	-1.124**(0.553)	-1.824***(0.524)	-3.622***(0.595)	-0.932**(0.446)	-1.600***(0.405)	-1.564***(0.319)	-2.140***(0.361)
Observations	2,540	2,476	2,316	2,038	6,328	6,178	5,650	4,675

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Sample is restricted to women with complete fertility. Adequate weights are employed. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

2.4.2 Stated Fertility Intentions

The estimations reported so far have determined the impact of son preference on actual fertility outcomes. Now we focus on the couple's stated fertility intentions. Table 2.15 shows results of Probit estimates for women's intention to discontinue fertility. We find a significant association between the presence of one or more son and intention to stop child-bearing. Women with at least one son are found to be 34% more likely to state no desire to have an additional child compared with women with no son (2012-13).

The corresponding figure for the 1990-91 sample is 29%. These results contrast with those pertaining to husband's stated intention to stop fertility (Table 2.16) which are not found statistically different from zero. Existance or otherwise of sons does not seem to affect husbands' decision on family size.

2.5 Discussion and Conclusion

In this study, we examined son preference and its fertility effects in Pakistan. We based our analysis on two rounds of Pakistan Demographic and Health Survey (PDHS). We began by presenting different aspects of revealed and stated preference for sons by using a number of indicators. Following this descriptive analysis, we studied the impact of son preference on actual and desired fertility outcomes. We used presence of at least one son at parity n, proportion of sons at parity n and the number of sons at parity n as indicators of son preference and considered first four birth parities. We carried out the estimations using Probit and three matching techniques namely PSM, IPW and AIPW. We obtained estimations for both sets of datasets in order to gauge the temporal dimension of the impact of son preference.

We find strong evidence for both the revealed and stated preference for male offspring. Son preference decreases in couple's level of education. It is more intense among middle-class and rural households. Besides, parity progression slows with number of sons born. We found that the age-old preference for boys still persists in Pakistan even though its strength has somewhat waned over time. At the same time, reliance over differential birth-stopping has increased.

We found that the likelihood of second birth does not appear to vary with the sex of the first-born. In contrast, women with one or more sons are found to be upto 14% less likely to pursue additional fertility compared with women with no son. This probability is greater at higher parities and among women with more sons. Our findings corroborate the evidence from Bangladesh and India supporting strong effect of the sex of the previous children on women's subsequent fertility (Chowdhury and Bairagi, 1990; Das, 1987). Our findings are also in line with those of Javed and Mughal (2019) who report strong evidence for differential birth-spacing behaviour occurring in Pakistan as a result of disproportionate preference for male children.

In addition to these actual differential birth-stopping effects, we also found support for stated desire for stopping child-bearing among women with one or more sons.

To sum up our findings, son preference continues in Pakistan, its strength has somewhat weakened over the past two decades, and it remains a strong predictor of women's fertility behaviour. Pakistan's continuing skewed sex ratio and the country's slow rate of demographic transition can be understood in light of these findings. Policy measures that promote equal treatment of boys and girls can therefore help curb the rapid rate of increase in the country's population.

Table 2.15: Presence of at least one son and stated completed fertility -probit estimation

VARIABLES	PDHS 1990-91	PDHS 2012-13
Sons (ref: none)		
At least one son	1.104***(0.078)	1.272***(0.060)
Age	0.073***(0.004)	0.089***(0.003)
Age difference	0.014***(0.004)	0.023***(0.004)
Woman education (ref: none)		
Primary	0.103(0.089)	0.033(0.059)
Secondary	0.143(0.087)	0.062(0.060)
Higher	0.099(0.216)	-0.086(0.083)
Spouse education (ref: none)		
Primary	-0.048(0.069)	-0.057(0.058)
Secondary	0.086(0.068)	-0.091(0.057)
Higher	-0.017(0.121)	-0.176**(0.068)
Woman employed (ref: none)		
Yes	0.022(0.068)	0.147***(0.048)
Media exposure (ref: none)		
Yes	0.130**(0.058)	0.025(0.047)
Family structure (ref: joint)		
Nuclear family	0.470***(0.076)	0.534***(0.051)
Household size	0.052***(0.007)	0.037***(0.005)
Place of residence (ref: rural)		
Urban	0.399***(0.055)	0.038(0.050)
Province/ Region (ref: Balochistan)		
Punjab	1.315***(0.112)	0.550***(0.068)
Sindh	0.955***(0.113)	0.306***(0.066)
KPK region	1.315***(0.116)	0.728***(0.070)
Islamabad		0.630***(0.088)
Gilgit-Baltistan		0.619***(0.082)
Economic status (ref: poorest)		
Poorer	-0.151(0.097)	0.166**(0.069)
Middle	-0.022(0.097)	0.333***(0.074)
Rich	-0.010(0.089)	0.291***(0.082)
Richest	0.008(0.084)	0.338***(0.098)
Marginal effect	0.288***(0.017)	0.338***(0.014)
Constant	-5.649***(0.198)	-5.295***(0.149)
Observations	6,106	12,445

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2.16: Presence of at least one son and completed fertility (husband's statement) - probit estimation

VARIABLES	PDHS 1990-91	PDHS 2012-13
Sons (ref: none)		
At least one son	-0.048(0.133)	0.087(0.096)
Husband Age	0.049***(0.005)	0.102***(0.005)
Age difference	-0.013(0.010)	0.004(0.007)
Husband education (ref: none)		
Primary	0.145(0.160)	0.051(0.111)
Secondary	0.018(0.145)	0.078(0.106)
Higher	0.030(0.203)	-0.045(0.182)
Woman education (ref: none)		
Primary	-0.022(0.151)	-0.146(0.113)
Secondary	-0.031(0.142)	-0.114(0.137)
Higher	-0.096(0.265)	0.077(0.162)
Woman employed (ref: none)		
Yes	-0.149(0.167)	-0.175*(0.090)
Family structure (ref: joint)		
Nuclear family	0.018(0.126)	-0.141(0.098)
Household size	-0.037**(0.017)	-0.009(0.010)
Place of residence (ref: rural)		
Urban	0.586***(0.141)	-0.061(0.094)
Economic status (ref: poorest)		
Poorer	0.162(0.464)	-0.217(0.145)
Middle	0.777**(0.381)	-0.339**(0.146)
Rich	0.710**(0.343)	-0.425***(0.153)
Richest	0.593*(0.340)	-0.385**(0.181)
Marginal effect	-0.015(0.042)	0.025(0.027)
Constant	-3.051***(0.448)	-3.455***(0.277)
Observations	1,268	2,910

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

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Chapter 3

Have a Son, Gain a Voice: Son Preference and Female Participation in Household Decision Making

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Abstract

Son preference is common in many Asian countries. Though a growing body of literature examines the drivers and socioeconomic impacts of phenomenon in case of China and India, work on other Asian countries is scarce. This study uses nationally representative survey of over 13 thousand households from Pakistan (PDHS 2012-13) to analyze the effects of observed preference for sons on women's participation in intra-household decision-making. Four key intra-household decisions are considered: decisions regarding healthcare, family visits, large household purchases and spending husband's income. These correspond to four categories of household decisions, namely healthcare, social, consumption and financial. Probit and Ordered Probit are employed as the main estimation techniques and other determinants of household decision-making are controlled for. Besides, a number of matching routines are employed to account for the possibility of potential selection bias.

We find that women with at least one son have more say in household decisions. Bearing at least one son is associated with 5%, 7% and 5% higher say in decisions involving healthcare, social and consumption matters respectively. Women's role in financial affairs, however, does not differ significantly from women with no sons. Female participation in decision-making grows significantly with the number of sons but only up to the third parity. These results are particularly visible among younger, wealthier and educated women, and those who got married earlier. The findings suggest a limited improvement in women's bargaining power at home resulting from the birth of one or more sons. This in part explains higher desire for sons expressed by women compared to men in household surveys.

Keywords: Son preference; Gender bias; Sex selection; Female decision-making; Intrahousehold bargaining; Pakistan.

JEL codes: D13; J13; C13; C70.

Résumé

La préférence pour les garçons est courante en asie. Alors que beaucoup d'études s'intéressent aux facteurs et aux impacts socioéconomiques de ce phénomène en Chine et en Inde, les travaux sur les autres pays asiatiques sont plus rares. A partir d'une enquête nationale réalisée sur plus de 13 000 ménages pakistanais (PDHS 2012-13), cette étude analyse les effets de la préférence pour les garçons sur la participation des femmes aux décisions prises dans le ménage. Quatre décisions importantes du ménage seront prises en compte : celles relatives aux soins de santé, aux visites de famille, sur les achats du ménage et sur l'affectation des dépenses des revenus du mari. Celles-ci représentent quatre catégories des décisions au sain du ménage : les décisions lié à la santé, aux liens sociaux, à la consommation et aux affaires financières. Les méthodes Probit et Probit Ordinal sont utilisées pour les estimations de base et d'autres déterminants liés aux décisions prises dans le ménage seront pris en compte. De plus, méthodes d'appariment sont utilisées pour tenir compte d'éventuels biais de sélection.
Les résultats indiquent que le fait d'avoir au moins un fils a une influence sur les décisions du ménage. Le fait d'avoir au moins un fils est associé à une hausse de 5%, 7% et 5% sur les décisions impliquant respectivement les soins de santé, les relations sociales et la consommation. L'implication des femmes dans les finances du ménage ne varie pourtant pas significativement avec celle des femmes sans fils. La participation des femmes dans les prises de décision augmente avec le nombre de fils mais seulement jusqu'à 3 garçons. Ce résultat entraine une amélioration relative sur le pouvoir de négociation des femmes au sein du ménage suite à la naissance d'un ou plusieurs garçons. Cela explique en partie le désir plus fort des femmes d'avoir des fils par rapport aux hommes, selon les enquêtes ménages.

Mots clés: Préférence pour les garçons ; Biais de genre ; Prise de décision de femmes ; Pakistan.

JEL codes: D13; J13; C13; C70.

3.1 Introduction

"Mother-in-law wanted a male child, woman poisons daughter, commits suicide after quarrel with in-law (The Express Tribune, November 28th, 2016)[1]*"*.

Such gruesome incidents are not rare in South Asia. Son preference is an age-old phenomenon widespread in the traditional societies of South and East Asia (D 'souza and Chen, 1980; Dinitz, Dynes, and Clarke, 1954; Gu and Roy, 1995; Guilmoto, 2009; Park, 1983). This preference manifests itself in such sex-selection methods as differential stopping behavior and sex-selective abortion. Approximately two million girls under the age of five are estimated to be missing every year around the world due to this disproportionate desire for male offspring (Altindag, 2016)[2]. Skewed preference for sons results in high population growth rates as women's childbearing is not considered complete until the desire number of sons is achieved. In patrilineal societies, sons are perceived to be the households' economic asset as they take up family businesses, carry the family name and insure the parents' old-age finances (Ben-Porath and Welch, 1976). Daughters, in contrast, are considered an economic burden for the household: parents must save for their dowry, and they leave home to join their husbands in a virilocal setup. As a result, women who bear sons often enjoy high prestige while those who fail to do so face social stigma and pressure at home leading to domestic violence, divorce or even tragedies such as the one mentioned above. What then is the role of son preference in determining women's participation

[1] https://tribune.com.pk/story/1246288/familial-pressure-woman-kills-daughter-commits-suicide/

[2] One of the first to point out this issue of 'missing women' in Asia was Amartya Sen who reported a large disparity in female to male ratio in Asia particularly South and West Asia and China compared to North America and Europe (Sen, 1990). He suggested the cause to be the prevalence of sex-selective abortions and high female mortality.

in intra-household decision-making? While literature on the social, economic and demographic drivers of son preference and sex selection has burgeoned in the past couple of decades, this question has so far attracted little attention. A handful of studies have examined the place of woman and the state of her welfare in relation to preference for boys. A couple of studies look at the nutrition and health outcomes of women bearing sons. Li and Wu (2011) show that a Chinese woman with a first-born son has a 3.9 percentage points' greater role in household decision-making than a woman with a first-born daughter. Having a first-born son improves the mother's nutrition intakes and reduces her likelihood of being underweight. Kishore and Spears (2014) find that women in urban India whose first child is a son have a greater body mass index (BMI) than women whose first child is a daughter. In another study on India, Zimmermann (2012) find little evidence of substantial non-monetary female benefits in India. Having a young son rather than a daughter of the same age leads to a short-term improvement in decision-making power. There is some improvement in the woman's say in decisions involving her health and family visits. However, there is no substantial improvement in her involvement in decisions of daily purchases and spending husband's income. Besides, there is no evidence that the woman enjoys greater freedom to perform more day-to-day activities without having to ask for the permission of other household members.

The aforementioned studies focus on China and India, two son prefering countries where fertility rates have substantially declined, social pressures to keep the family size small are strong and sex-selective abortion has been widespread. The question as to how preferential treatment of sons affects household decisionmaking in a Muslim-majority country where fertility rates are high and sex-selective abortion is not common yet remains unanswered.

This study analyzes the effects of observed preference for sons on women's participation in intra-household decision making in one such country, namely Pakistan[3]. The study contributes to the literature in the following ways:

First, the study attempts at understanding the role preference for male child plays in determining a woman's say in household decisions. Improved say in household decisions is a key aspect of female empowerment[4].

We find a significant association between the indicators of son preference and women's say in intra-household decisions, reflecting women's improved bargaining power at home. This to certain extent explains the high desirability for sons expressed by women in various demographic surveys. The positive consequence of female empowerment in part appears to arise out of disproportionate preference for the male child. The latter is widely reported to have undesirable affects on daughters' health and education outcomes. The improvement in women's agency seems to come at a cost often paid by the girl child.

Secondly, the study distinguishes between decisions considered in the literature as measures of female empowerment. According to Basu and Koolwal (2005), female participation in household decisions can be separated into two groups of female autonomy measures:

1. The self-indulgent or selfish measures of autonomy (e.g. permission to decide on the woman's healthcare, ability to visit friends and relatives without permission, ability to spend husband's income).

[3]"Pakistan's experience diverges most sharply in the absence of any sustained increases in the SRB—a change that would signal widespread use of sex-selective abortion. Is the Pakistani response indicative of the unacceptability of sex-selective abortion or of abortion in general? Given the relatively high rates of abortion, the answer is likely to be the former." Also see Brekke (2013) and Almond, Edlund, and Milligan (2013) who suggest Islam as the probable reason for lack of empirical evidence for sex selective abortion among Pakistani immigrants in Norway and Canada respectively.

[4]Empowerment is a process which can be defined as "The expansion in people's ability to make strategic choices in a context where this ability was previously denied to them" (Kabeer, 1999). Its main components are resources, perceptions, relationships and power (Marty, 1992).

2. Instrumental measures of autonomy as responsibility (e.g. decision to purchase major household items).

Basu and Koolwal (2005) consider decisions of the first category better measures of female empowerment as they allow the woman more freedom to do relatively unproductive things and have more control of their own bodies. Such classifications however ignore the balance of power and the underlying limits to bargaining within the household. A change in situation (e.g. birth of a child) modifies the power equation at home, leading to a new power balance. In our view, the extent to which the husband concedes space to the wife is subject to the nature of the decision. We argue that female empowerment could be understood by simply considering household decisions as either:

1. 'everyday' or 'mundane' which correspond to less important social, healthcare or economic matters not indicative of the existing power balance between the husband and the wife (e.g. visiting friends or relatives, seeing a doctor, buying a household item), or

2. 'strategic' (mainly involving money matters) which reflect real source of power at home (e.g. who decides how much to spend)[5].

The observation that women are excluded from key household decisions and limited to routine matters is also reported in other development studies. Jejeebhoy and Sathar (2001), for instance report in the context of Indian Subcontinent: "Women in general have limited economic decisionmaking authority: large numbers are excluded from even the most routine decisions, and few have the major say in any decision. There is a definite pattern to the kinds of decisions in which women participate: they are far more likely to be involved in decisions that are

[5] A related concept is that of 'Orchestrated power' (Woolley and Marshall, 1994).

perceived as routine in the family economy, such as those relating to food purchases, than in decisions that involve major purchases." (Page 699). Also see Zimmermann (2012) on India.

Mader and Schneebaum (2013) report that across Europe, women are limited to decisions compatible with traditional "women's roles" as mothers and care-takers of family members and the household while husbands remain the primary decisionmakers in household financial matters.

We find that women's say in everyday decisions increases to certain extent as a result of bearing sons. This however does not necessarily reflect a greater bargaining power as her voice in financial matters does not improve. We elaborate this argument in the next section.

Thirdly, the study examines whether or not the role of son preference grows with the number of sons and birth parity. We find evidence of greater say among women having given birth to more than one sons. However, whatever improvement in women's participation in household decisions results from bearing sons dissipates beyond the third birth. This points to improvement in women's say to be context-dependent. Bearing sons beyond the optimal number does not increase the wife's bargaining position.

The rest of the study is organized as follows: The next section presents the conceptual framework. Section 3.3 briefly describes the female decision-making situation in Pakistan. Section 3.4 presents the data and methodology followed by findings and discussion in Section 3.5. Robustness measures are described in Section 3.6. The last section concludes and discusses possible implications of the findings.

3.2 Conceptual Framework

Husband: "I make the important decisions. She makes the rest." (Woolley and Marshall, 1994).

We consider a modified collective model of household bargaining broadly in line with the arguments of Mazzocco (2006) and Voena (2015) to develop the study's conceptual framework. Let us take a nuclear household in which the two agents (i.e. husband and wife) enter a limited commitment contract upon getting married. The role of each of the two is accordingly defined in the household and corresponding Pareto weights are assigned. This distribution of power can be renegotiated over time in response to shocks that affect the couple's individual and collective preferences.

Every unblocked decision the couple makes is based on consensus between the husband and the wife. The couple maximizes its utility with respect to household decision as follows:

$$Max\, U\ (x)$$

$$U(x_{1,.........}x_k) = \ \Theta_H U_H(x_{1,.........}x_k) + \Theta_w U_W(x_{1,.........}x_k) \quad and\ \Theta\epsilon[0,1] \tag{3.1}$$

$$Where\ \Theta_H = 1 - \Theta_W$$

U is the household utility while x is the particular decision relating to consumption, social, healthcare or financial matters. U_H and U_W are the husband's and the wife's utilities respectively, Θ_H and Θ_W are the Pareto weights that respectively capture the distribution of power between the husband and the wife. There are a number of factors (such as whether or not the woman bears sons, whether or not she earns money) that act as shocks which could influence her bargaining power in the household. Given the household's preference for boys, the woman enters an implicit agreement at the time of marriage to bear sons. This initial state can be given as:

$$U(x_{1,..........}x_k) = \Theta_{H1}U_H(x_{1,..........}x_k) + \Theta_{w1}U_W(x_{1,..........}x_k) \quad and\ \Theta\epsilon[0,1] \tag{3.2}$$

The wife fulfils her contract by giving birth to at least one son ($S > 0$). The contract is thereby renegotiated giving her an increased Pareto weightage. Her modified bargaining power Θ_{W2} is higher than the power Θ_{W1} that she would have exercised had she borne no son ($S = 0$).

$$U(x_{1,..........}x_k) = \Theta_{H2}U_H(x_{1,..........}x_k) + \Theta_{w2}U_W(x_{1,..........}x_k) \quad and\ \Theta\epsilon[0,1] \tag{3.3}$$

Thus $\Theta_{W2} > \Theta_{W1}$ if $0 < S \leq \Omega$ where, Ω is the optimum number of sons.
This favourable equation holds as long the desired number of sons Ω is not attained, beyond which the utility of bearing sons tapers off and the woman's role in household decision making does not increase any further.
In a patriarchal family setting, the woman's improved say at home does not necessarily exceed that of the husband even if the woman bears sons (i.e.$\Theta_{H2} > \Theta_{W2}$).
We assert that the improvement in female participation in the household decisions varies with the decisions' nature. The wife gains more weight in everyday

household decisions (those related to everyday running of the house) while crucial or strategic issues (those pertaining to investments or household finances) stay with the husband. The system can be separated thus:

$$U(x_{1,..........}x_k) = \sum_{K=1}^{K'} \alpha_K U_K(x_K) \quad and\ a_k > 0 \tag{3.4}$$

$$U_K(x_K) = \Theta_{H^K} U_{H^K}(x_k) + \Theta_{w^K} U_{W^K}(x_k) \tag{3.5}$$

For everyday decision, $\Theta_{W2} > \Theta_{W1}$.

In this scenario, female participation in decision making increases as the wife gains more weightage by bearing sons. However, when a strategic decision is being contemplated, then $\Theta_{W2} = \Theta_{W1}$ and $\Theta_{W2} < \Theta_{H1}$ and the balance of power stays as before.

In this framework, we assume that children do not have any role in household decision making. With the passage of time and with parents' aging, decision making is gradually transferred to the next generation.

We can extend the model and consider the case of extended household by introducing the role of household elders. Their inclusion further reduces wife's initial role in household decisions and makes her rise in prestige resulting from bearing a son all the more important.

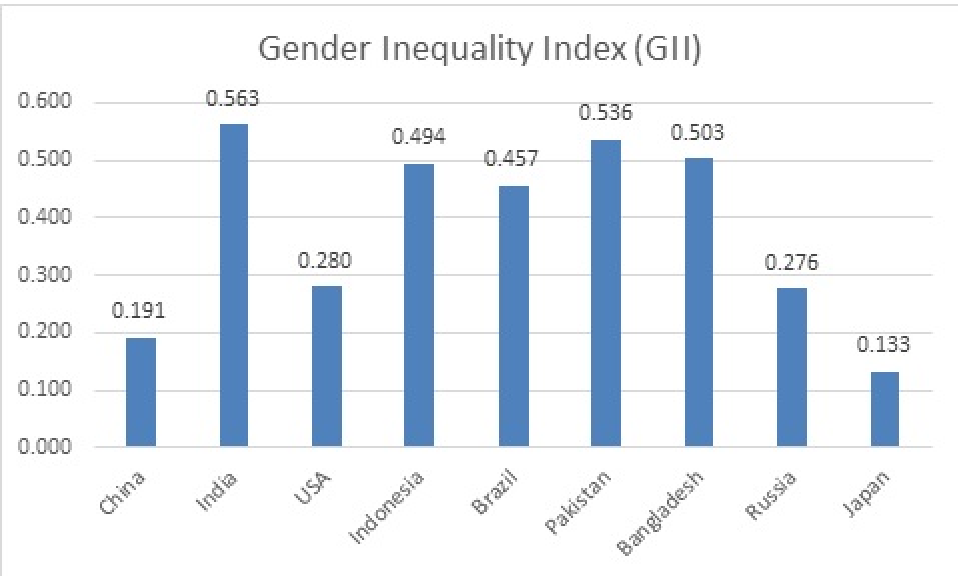
3.3 Female Decision Making in Pakistan

In Pakistan, the role of women in household decisions is generally weak. This is reflected in poor ratings on various indicators of women empowerment such as the Gender Inequality Index (GII), Gender Gap Index (GGI), and Social Institutions and Gender Index (SIGI). Among the top ten populous countries, Pakistan has the lowest ranking after India on the Gender Inequality Index (GII) (Figure 3.1). It is ranked a low 121st on the list. In South Asia, it ranks sixth with only Afghanistan (152nd) and India (130th) behind it.

The OECD Social Institutions and Gender Index (SIGI) which measures the extent of gender discrimination around the world classifies Pakistan as a high gender discrimination country with an index value of 0.301 (Social Institutions and Gender Index 2014). The situation is particularly grim according to the Gender Gap Index (GGI) which ranks Pakistan 143rd out of 144 countries classified (Gender Gap Index 2016). Worse still, the ranking has deteriorated in recent years from 112th place in 2006.

The Pakistan Demographic and Health Survey (PDHS) 2012-2013 provides

Figure 3.1: Top ten populous countries ranked according to Gender Inequality Index 2014



Source: Gender Inequality Index 2014

direct measures of women's voice in household decisions relating to healthcare, family visits, purchase of big items and spending of husband's income. According-ing to the survey, most intra-household decisions in Pakistan are made either by the husband acting alone or the husband and wife deciding jointly (Table 3.1). Women overall make only 6-9% of the household decisions in different aspects by themselves. Their say in household decisions increases with age: 3-4% of women aged 15 - 24 decide household matters alone while women aged 35 - 49 make 8-12% of decisions by themselves in different aspects. Likewise, their role in household decisionmaking improves with education: Women without formal education make 5-7% of household decisions alone. This proportion is 7-8, 8-13 and 9-17% for women with primary, secondary and higher education respectively for different aspects of decision making. Husband's education also plays some role. Pakistani women coming from urban areas have more say in household decisionmaking (9-14%) compared with those belonging to rural households (5-6%). Similarly, women coming from nuclear families (7-10%) participate more in household decisions compared to those belonging to joint families (3-5%). Working women too have better decisionmaking power than non-working women. This power steadily increases with household wealth with women in top quintile households making 8-14% of decisions alone. There is a large regional diversity in women's role in the Pakistani households. Women in the mostly rural, impoverished province of Balochistan could make only 1-2% of decisions by themselves while women in the capital Islamabad make 8-14% of household decisions.

Table 3.1: Household decision making

		Healthcare decisions				Social decisions				Consumption decisions				Financial decisions			
		Family elders	Husband	Jointly	Alone	Family elders	Husband	Jointly	Alone	Family elders	Husband	Jointly	Alone	Family elders	Husband	Jointly	Alone
	Overall	0.11	0.33	0.45	0.09	0.17	0.29	0.46	0.07	0.17	0.31	0.44	0.06	0.01	0.41	0.49	0.06
Age	15-24	0.30	0.32	0.34	0.03	0.40	0.25	0.30	0.03	0.42	0.27	0.28	0.02	0.02	0.44	0.48	0.04
	25-34	0.13	0.35	0.42	0.08	0.21	0.30	0.42	0.05	0.21	0.33	0.40	0.05	0.00	0.45	0.47	0.06
	35-49	0.03	0.32	0.51	0.12	0.05	0.28	0.55	0.09	0.05	0.32	0.52	0.09	0.01	0.38	0.51	0.08
Education	None	0.10	0.39	0.43	0.07	0.14	0.35	0.43	0.06	0.14	0.37	0.42	0.05	0.01	0.45	0.47	0.06
	Primary	0.15	0.29	0.45	0.08	0.20	0.23	0.48	0.07	0.22	0.27	0.42	0.07	0.00	0.38	0.54	0.07
	Secondary	0.13	0.24	0.48	0.13	0.21	0.22	0.48	0.08	0.22	0.23	0.46	0.08	0.01	0.35	0.54	0.08
	Higher	0.08	0.19	0.54	0.17	0.18	0.14	0.58	0.09	0.19	0.16	0.54	0.09	0.00	0.34	0.55	0.09
Spouse Education	None	0.09	0.38	0.44	0.08	0.13	0.35	0.43	0.07	0.13	0.37	0.41	0.08	0.01	0.44	0.47	0.07
	Primary	0.13	0.36	0.41	0.08	0.18	0.27	0.46	0.07	0.18	0.32	0.42	0.05	0.01	0.41	0.50	0.07
	Secondary	0.14	0.29	0.46	0.09	0.19	0.26	0.47	0.06	0.20	0.27	0.45	0.06	0.01	0.39	0.51	0.07
	Higher	0.10	0.28	0.49	0.11	0.18	0.23	0.51	0.07	0.17	0.26	0.49	0.06	0.01	0.40	0.51	0.06
Place of Residence	Rural	0.12	0.38	0.42	0.06	0.17	0.33	0.43	0.05	0.17	0.36	0.41	0.05	0.01	0.44	0.48	0.05
	Urban	0.10	0.25	0.50	0.14	0.16	0.21	0.52	0.09	0.17	0.24	0.49	0.09	0.00	0.36	0.52	0.10
Family Structure	Joint	0.34	0.28	0.32	0.05	0.48	0.2	0.26	0.04	0.49	0.21	0.25	0.03	0.02	0.48	0.44	0.05
	Nuclear	0.02	0.35	0.50	0.1	0.04	0.32	0.54	0.08	0.04	0.35	0.51	0.08	0.01	0.40	0.51	0.07
Women Employed	No	0.13	0.34	0.43	0.08	0.19	0.29	0.44	0.06	0.20	0.32	0.41	0.06	0.01	0.43	0.47	0.06
	Yes	0.06	0.32	0.49	0.11	0.10	0.27	0.52	0.08	0.09	0.31	0.51	0.07	0.00	0.36	0.54	0.07
Economic Status	Poorest	0.08	0.48	0.36	0.05	0.13	0.44	0.36	0.05	0.12	0.49	0.34	0.03	0.01	0.56	0.38	0.03
	Poorer	0.10	0.36	0.46	0.06	0.14	0.32	0.46	0.05	0.15	0.34	0.44	0.05	0.01	0.40	0.52	0.05
	Middle	0.13	0.32	0.45	0.09	0.17	0.28	0.46	0.07	0.18	0.29	0.44	0.07	0.01	0.37	0.53	0.08
	Rich	0.15	0.25	0.47	0.11	0.20	0.22	0.49	0.07	0.21	0.24	0.45	0.08	0.01	0.38	0.51	0.09
	Richest	0.10	0.24	0.50	0.14	0.18	0.18	0.53	0.09	0.19	0.21	0.5	0.08	0.01	0.35	0.54	0.08
Region	Islamabad	0.05	0.32	0.47	0.14	0.12	0.21	0.55	0.09	0.12	0.24	0.54	0.08	0.00	0.38	0.52	0.08
	Punjab	0.11	0.26	0.51	0.11	0.16	0.21	0.54	0.07	0.16	0.23	0.52	0.08	0.01	0.31	0.58	0.08
	Sindh	0.09	0.37	0.43	0.09	0.16	0.33	0.41	0.09	0.17	0.39	0.37	0.06	0.00	0.50	0.43	0.05
	KPK	0.18	0.45	0.30	0.05	0.23	0.4	0.31	0.04	0.25	0.40	0.30	0.04	0.02	0.55	0.37	0.04
	Gilgit	0.10	0.51	0.31	0.07	0.16	0.40	0.36	0.07	0.20	0.48	0.30	0.01	0.10	0.66	0.22	0.01
	Balochistan	0.08	0.66	0.23	0.01	0.12	0.63	0.21	0.02	0.12	0.66	0.20	0.01	0.00	0.74	0.23	0.01

Source: Authors' calculations using PDHS 2012-2013.

3.4 Data and Methodology

3.4.1 Model and Data Description

Our analysis is based on the Pakistan Demographic and Health Survey (PDHS) 2012-13. The 2012-13 PDHS is a representative survey based on interviews with 13,558 households selected using a two-stage stratified sample design. Women in the surveyed households were asked four questions about household decisions. These questions cover four aspects of intrahousehold decisionmaking, i.e. healthcare, social, consumption and financial decisions. The corresponding questions are as follows: who usually decides on female respondent's health care? Who usually decides on visits to family or relatives? Who usually decides on large household purchases? and who usually decides what to do with money the husband earns? The first three questions refer to everyday decisions while the fourth corresponds to strategic household decisions. There are five possible responses to each of these polytomous questions: "respondent alone", "jointly", "husband/partner alone", "others" and "family elders".

In addition to these four indicators, we also consider an aggregate indicator which takes the value of one if the woman has a say in at least one of the four decisions. The five household decision variables are alternately regressed on the son preference indicator while controlling for other individual, household and locational factors that influence women's role in decisionmaking. The presence of at least one son and the number of sons are alternately taken as proxies for son preference. The control factors considered include the respondent woman's age, age difference with the husband, woman's and husband's education level, woman's employment status, family structure[6], household size, household wealth status[7], region and area of residence, and exposure to electronic media. The base line model can be given as,

$$Y_{ij} = \beta_i + \gamma_i(SP_j) + \sum_J \mu_{ij} Z_J + \varepsilon_{ij} \tag{3.6}$$

Where Y_{ij} represents participation in household decision making i for household j, SP stands for son preference, Z_j represents the set of household characteristics that can affect decision making behaviour and ε_{ij} is the error term.

Table 3.2 describes the variables included in the study. 13% of the female respondents in the dataset report being without a son while 29% have one son, 26% have two sons, 16% have three sons and 14% respondents report having given birth to more than three sons. Over half of the female respondents (58%) possess no formal education compared to 34% of the husbands. Similarly, only 8% women report having acquired tertiary level education compared to 16% husbands. About two thirds of the households (64%) live in rural areas, while 71% are nuclear families.

3.4.2 Methodology

The empirical analysis proceeds as follows: In the first step, the overall association between son preference and female household decisionmaking is studied for the four Intrahousehold decisions as well as the aggregate decision indicator by

[6] A household whose head is neither the woman nor her husband is considered an extended household and nuclear otherwise.

[7] The household wealth variable is generated by constructing a principal component analysis index of household assets such as home ownership, floor type, water source, electricity availability, durable consumer goods etc. The quintiles of the generated variable indicate the economic status of the household.

Table 3.2: Data description

Variable	Description	Proportion/Mean
Healthcare	Person who usually decides on respondent's health care 0-Family elders or husband/partner alone 1- Respondent and husband/partner or respondent alone	 0.39 0.60
Family/relative visits	Person who usually decides on visits to family or relatives 0-Family elders or husband/partner alone 1- Respondent and husband/partner or respondent alone	 0.38 0.61
Large household purchasing	Person who usually decides on large household purchases 0-Family elders or husband/partner alone 1- Respondent and husband/partner or respondent alone	 0.41 0.58
Spending of husband income	Person who usually decides what to do with money husband earns 0-Family elders or husband/partner alone 1- Respondent and husband/partner or respondent alone	 0.42 0.57
Son	Dummy variable, takes the value of 1 if female have at least 1 son, 0 otherwise	0.86 0.13
Son	Categorical form, takes the value of 0 if female don't have son, 1 if female have 1 son, 2 if female have 2 sons, 3 if female have 3 sons, 4 otherwise	0.13 0.29 0.26 0.16 0.14
Age	Age of the female in completed years	34.48
Age difference	Age difference of husband with his wife in years	5.38
Education	Categorical form, female higher education level takes the value 0 if female with none education, 1 if female have primary, 2 if female have secondary education, 3 if female have higher education	0.58 0.15 0.16 0.08
Spouse education	Categorical form, husband education level takes the value 0 if respondent husband with none education, 1 if husband have primary, 2 if husband have secondary education, 3 if husband have higher education	0.34 0.16 0.31 0.16
Women employed	Dummy variable, takes the value of 1 if the female is employed, 0 otherwise	0.27 0.72
Media exposure	Categorical form, female frequency of watching television, takes the value 0 if female don't watch television, 1 if female watch television occasionally, 2 if female watch television weekly, 3 if female watch television daily	0.31 0.21 0.02 0.44
Family structure	Dummy variable, takes the value of 1 if the family is nuclear, 0 otherwise	0.71 0.28
Household size	Total number of family members in the household	8.58
Place of residence	Dummy variable, takes the value of 1 if the household resides in urban area, 0 otherwise	0.35 0.64
Region	Categorical form, takes the value 1 if household lives in Islamabad, 2 if household lives in Punjab, 3 if household lives in Sindh, 4 if household lives in KPK, 5 if household lives in Gilgit Baltistan, Baluchistan otherwise 6	0.005 0.56 0.25 0.12 0.007 0.048
Economic Status	Categorical form, takes the value 1 if household in poorest, 2 if household is poorer, 3 if household is middle, 4 if household is rich, richest otherwise 5	0.20 0.18 0.19 0.20 0.21

Source: Authors' calculations using PDHS 2012-2013.

employing the aforementioned indicators of son preference. In the second step, the analysis is performed with reference to birth parity by dividing the households into two groups: households with up to three children and households with more than three children. Close to half the households in the dataset (49%) have three or fewer children.

Estimations in both steps are carried out by employing a binary variable pertaining to the household decision under study. The variable takes the value of one if the decision is made alone by the female respondent or jointly with the husband, and zero otherwise. Alternatively, another definition of participation in decision making is considered by constructing a categorical indicator for the four types of decisions. The variable takes the values of 1, 2 or 3 in the ascending order of women's participation in the decisionmaking process.

The dataset is restricted to women who are currently married, reside with their husbands, and have at least one child. Appropriate weights are used to ensure the representativeness of the sample. Baseline estimations are carried out using Probit model while those of the alternative definition of dependent variables are done using Ordered Probit. Additionally, three matching techniques, namely Propensity Score Matching (PSM), Inverse Probability Weighting (IPW) and Augmented Inverse Probability Weighting (AIPW) are employed to account for the possibility that households with sons may differ from those without in ways that could be considered non random. Average Treatment Effects (ATE) and Average Treatment Effects on the Treated (ATT) are obtained. After the PSM estimations, balancing of the treatment groups and sensitivity are checked. Finally, a panoply of robustness measures are carried out by estimating alternative specifications and sub-samples.

Table 3.3: Son preference and female participation in decisionmaking – probit estimation

VARIABLES	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions
Sons (ref: none)					
At least one son	0.149***(0.051)	0.208***(0.055)	0.169***(0.058)	0.048(0.061)	0.223***(0.068)
Age	0.024***(0.003)	0.029***(0.003)	0.029***(0.003)	0.006**(0.003)	0.017***(0.003)
Age difference	0.008**(0.004)	0.011***(0.003)	0.009**(0.004)	-0.002(0.004)	0.002(0.005)
Women education (ref: none)					
Primary	0.059(0.051)	0.137**(0.058)	0.028(0.055)	0.054(0.069)	0.122*(0.070)
Secondary	0.239***(0.073)	0.131*(0.067)	0.119*(0.070)	0.089(0.088)	0.276***(0.097)
Higher	0.428***(0.096)	0.346***(0.099)	0.312***(0.095)	0.158(0.107)	0.592***(0.111)
Spouse education (ref: none)					
Primary	-0.140**(0.061)	-0.007(0.059)	-0.064(0.064)	-0.077(0.068)	-0.046(0.066)
Secondary	-0.029(0.054)	-0.022(0.057)	-0.027(0.055)	-0.084(0.057)	-0.049(0.058)
Higher	0.007(0.068)	0.027(0.072)	0.025(0.078)	-0.100(0.072)	-0.012(0.086)
Women employed (ref: none)					
Yes	0.199***(0.048)	0.221***(0.043)	0.260***(0.048)	0.184***(0.055)	0.261***(0.054)
Media exposure (ref: none)					
Occasionally	0.118*(0.061)	0.099(0.060)	0.116*(0.069)	0.089(0.063)	0.212***(0.066)
Weekly	-0.043(0.113)	-0.005(0.119)	0.123(0.106)	-0.069(0.141)	0.136(0.140)
Daily	0.141**(0.056)	0.121**(0.055)	0.160***(0.055)	0.100*(0.058)	0.179***(0.065)
Family structure (ref: joint)					
Nuclear family	0.291***(0.053)	0.444***(0.062)	0.393***(0.058)	0.082(0.064)	-0.069(0.075)
Household size	-0.030***(0.006)	-0.039***(0.007)	-0.047***(0.007)	-0.019***(0.006)	-0.035***(0.008)
Place of residence (ref: rural)					
Urban	0.216***(0.066)	0.160***(0.058)	0.172***(0.059)	0.118*(0.068)	0.139*(0.082)
Province/ Region (ref: Islamabad)					
Punjab	0.299***(0.079)	0.173***(0.062)	0.176**(0.075)	0.256***(0.086)	0.265***(0.092)
Sindh	0.042(0.089)	-0.01022	-0.279***(0.084)	-0.152(0.096)	-0.274***(0.095)
KPK region	-0.257***(0.092)	-0.384***(0.079)	-0.352***(0.091)	-0.282***(0.100)	-0.379***(0.102)
Gilgit-Baltistan	-0.151(0.160)	-0.114(0.163)	-0.421***(0.133)	-0.693***(0.137)	-0.475***(0.180)
Balochistan	-0.451***(0.128)	-0.545***(0.120)	-0.582***(0.130)	-0.618***(0.131)	-0.848***(0.135)
Economic status (ref: poorest)					
Poorer	0.210***(0.063)	0.215***(0.065)	0.223***(0.064)	0.313***(0.064)	0.169*(0.086)
Middle	0.119(0.081)	0.139*(0.072)	0.155**(0.071)	0.327***(0.083)	0.225***(0.082)
Rich	0.116(0.090)	0.140*(0.077)	0.148*(0.079)	0.237**(0.093)	0.191**(0.095)
Richest	0.066(0.109)	0.156(0.098)	0.122(0.097)	0.270**(0.120)	0.257**(0.114)
Marginal effect	0.052***(0.018)	0.070***(0.018)	0.057***(0.019)	0.017(0.022)	0.064***(0.020)
Constant	-1.282***(0.140)	-1.459***(0.137)	-1.395***(0.148)	-0.374**(0.155)	-0.212(0.154)
Observations	10,017	10,035	10,026	8,532	8,497

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 3.4: Number of sons and female participation in decision making – probit estimation

VARIABLES	Healthcare decision	Social decisions	Consumption decisions	Financial decisions	All decisions
Sons (ref: 0)					
1	0.139**(0.057)	0.165***(0.058)	0.131**(0.062)	0.051(0.065)	0.202***(0.071)
2	0.154***(0.059)	0.254***(0.065)	0.213***(0.068)	0.061(0.072)	0.263***(0.078)
3	0.179***(0.062)	0.235***(0.071)	0.208***(0.070)	0.028(0.079)	0.225***(0.083)
3+	0.144**(0.070)	0.270***(0.071)	0.180**(0.082)	0.015(0.082)	0.174*(0.091)
Age	0.023***(0.003)	0.027***(0.003)	0.028***(0.003)	0.006**(0.003)	0.018***(0.004)
Age difference	0.008**(0.004)	0.011***(0.003)	0.009**(0.004)	-0.002(0.004)	0.002(0.005)
Women education (ref: none)					
Primary	0.060(0.051)	0.138**(0.057)	0.028(0.055)	0.053(0.068)	0.121*(0.070)
Secondary	0.240***(0.073)	0.137**(0.067)	0.123*(0.071)	0.088(0.087)	0.279***(0.096)
Higher	0.431***(0.095)	0.357***(0.099)	0.320***(0.096)	0.156(0.107)	0.594***(0.112)
Spouse education (ref: none)					
Primary	-0.139**(0.061)	-0.007(0.059)	-0.063(0.064)	-0.078(0.068)	-0.047(0.066)
Secondary	-0.028(0.055)	-0.021(0.056)	-0.026(0.055)	-0.087(0.058)	-0.053(0.058)
Higher	0.009(0.067)	0.027(0.072)	0.025(0.078)	-0.103(0.073)	-0.015(0.086)
Women employed (ref: none)					
Yes	0.199***(0.048)	0.220***(0.043)	0.259***(0.047)	0.183***(0.055)	0.260***(0.054)
Media exposure (ref: none)					
Occasionally	0.118*(0.061)	0.096(0.061)	0.115*(0.069)	0.089(0.063)	0.213***(0.066)
Weekly	-0.045(0.113)	-0.007(0.119)	0.123(0.107)	-0.066(0.140)	0.137(0.140)
Daily	0.140**(0.056)	0.120**(0.055)	0.159***(0.055)	0.100*(0.058)	0.179***(0.066)
Family structure (ref: joint)					
Nuclear family	0.288***(0.055)	0.429***(0.064)	0.382***(0.060)	0.087(0.066)	-0.066(0.077)
Household size	-0.030***(0.007)	-0.041***(0.007)	-0.048***(0.007)	-0.018***(0.007)	-0.035***(0.008)
Place of residence (ref: rural)					
Urban	0.216***(0.066)	0.159***(0.058)	0.172***(0.059)	0.118*(0.068)	0.139*(0.082)
Province/ Region (ref: Islamabad)					
Punjab	0.299***(0.079)	0.171***(0.062)	0.175**(0.075)	0.257***(0.086)	0.265***(0.092)
Sindh	0.043(0.089)	-0.141*(0.074)	-0.278***(0.084)	-0.152(0.096)	-0.274***(0.095)
KPK	-0.259***(0.092)	-0.388***(0.079)	-0.355***(0.091)	-0.281***(0.100)	-0.381***(0.102)
Gilgit-Baltistan	-0.154(0.160)	-0.124(0.163)	-0.429***(0.133)	-0.693***(0.137)	-0.480***(0.180)
Balochistan	-0.452***(0.128)	-0.547***(0.120)	-0.584***(0.130)	-0.618***(0.131)	-0.850***(0.135)
Economic status (ref: poorest)					
Poorer	0.208***(0.063)	0.215***(0.064)	0.222***(0.064)	0.313***(0.063)	0.168*(0.085)
Middle	0.118(0.081)	0.140*(0.072)	0.154**(0.071)	0.327***(0.083)	0.223***(0.082)
Rich	0.115(0.090)	0.141*(0.077)	0.147*(0.079)	0.235**(0.093)	0.188**(0.096)
Richest	0.065(0.109)	0.161*(0.098)	0.123(0.097)	0.267**(0.121)	0.251**(0.114)
Marginal Effect: 1	0.048**(0.020)	0.056***(0.019)	0.044***(0.021)	0.018(0.023)	0.058***(0.021)
2	0.054***(0.020)	0.086***(0.022)	0.072***(0.023)	0.022(0.026)	0.075***(0.023)
3	0.062***(0.021)	0.080***(0.024)	0.070**(0.023)	0.010(0.028)	0.065*(0.024)
3+	0.050**(0.024)	0.092***(0.024)	0.060**(0.027)	0.005(0.030)	0.050*(0.026)
Constant	-1.271**(0.149)	-1.392***(0.145)	-1.354***(0.156)	-0.399**(0.163)	-0.226(0.162)
Observations	10,017	10,035	10,026	8,532	8,497

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

3.5 Results

Tables 3.3 and 3.4 report estimations for the two indicators of son preference, namely the presence of at least one son and number of sons. The association between female decisionmaking and son preference is found to be statistically significant for three out of four types of intrahousehold decisions. Women with at least one son have more say in everyday household decisions involving their healthcare, social and economic affairs (Table 3.3 Columns 1 - 3). The marginal effects for son preference indicators reported at the bottom of the table show that having given birth to at least one son is associated with 5.2%, 7.08% and 5.73% higher say in these decisions respectively. Women's role in financial matters, however, does not differ significantly from women with no sons (Column 4).
Overall, women with at least one male child have 6.4% more say in at least one out of four types of household decisions (Column 5).
This improvement is visible in households with one, two, three or more than three sons alike (Table 3.4). For instance, women with one, two, three or more than three sons have a 4.8%, 5.4%, 6.2% and 5% greater marginal probability to decide on their health matters by themselves or in conjunction with their husbands respectively. The corresponding probabilities for social matters are 5.6%, 8.6%, 8% and 9.2% respectively. As before, the say in financial matters remains insignificant implying that women's participation in decisions deemed strategic does not improve regardless of the number of sons borne. These findings help us see son preference's influence on female agency in a historic context as the impact on agency corresponds not only to the latest birth but also to the children previously born.

Having given birth to a son among the first three children is associated with

Table 3.5: Son preference and female participation in decisionmaking (parity wise) – probit estimation

VARIABLES	Healthcare decisions		Social decisions		Consumption decisions		Financial decisions		All decisions	
	(Parity<= 3)	(Parity> 3)	(Parity<= 3)	(Parity> 3)	(Parity<= 3)	(Parity> 3)	(Parity<= 3)	(Parity> 3)	(Parity<= 3)	(Parity> 3)
Sons (ref: none)										
At least one son	0.156***(0.059)	0.088(0.228)	0.224***(0.063)	0.057(0.240)	0.168***(0.064)	0.134(0.152)	0.020(0.068)	0.175(0.214)	0.226***(0.076)	0.205(0.238)
Age	0.026***(0.004)	0.018***(0.004)	0.030***(0.004)	0.024***(0.005)	0.031***(0.004)	0.024***(0.005)	0.007*(0.004)	0.003(0.005)	0.012***(0.005)	0.019***(0.006)
Age difference	0.016***(0.005)	0.002(0.005)	0.023***(0.005)	0.003(0.005)	0.016***(0.005)	0.003(0.005)	-0.004(0.005)	0.001(0.005)	0.003(0.006)	0.001(0.006)
Women education (ref: none)										
Primary	0.056(0.074)	0.083(0.068)	0.076(0.085)	0.247***(0.081)	0.036(0.086)	0.044(0.075)	-0.006(0.111)	0.120(0.089)	0.097(0.109)	0.161*(0.095)
Secondary	0.335***(0.087)	0.162(0.103)	0.239***(0.077)	0.030(0.103)	0.236***(0.086)	0.028(0.106)	0.170*(0.100)	0.002(0.114)	0.328***(0.110)	0.219*(0.122)
Higher	0.653***(0.104)	0.028(0.169)	0.413***(0.107)	0.312**(0.157)	0.449***(0.115)	0.140(0.158)	0.182(0.128)	0.181(0.158)	0.615***(0.129)	0.525***(0.175)
Spouse education (ref: none)										
Primary	-0.014(0.089)	-0.235***(0.075)	0.068(0.083)	-0.057(0.073)	0.048(0.091)	-0.149*(0.076)	0.027(0.092)	-0.154*(0.084)	0.031(0.102)	-0.100(0.081)
Secondary	0.017(0.073)	-0.079(0.077)	-0.042(0.077)	-0.015(0.076)	-0.040(0.075)	-0.018(0.074)	-0.107(0.077)	-0.068(0.071)	-0.072(0.084)	-0.034(0.085)
Higher	0.024(0.085)	-0.035(0.097)	0.077(0.094)	-0.063(0.113)	0.087(0.106)	-0.072(0.120)	-0.110(0.097)	-0.103(0.108)	0.024(0.104)	-0.062(0.129)
Women employed (ref: none)										
Yes	0.179**(0.080)	0.205***(0.058)	0.189**(0.080)	0.231***(0.068)	0.211***(0.077)	0.285***(0.058)	0.211***(0.080)	0.169**(0.077)	0.227**(0.089)	0.287***(0.077)
Media exposure (ref: none)										
Occasionally	0.219**(0.086)	0.044(0.082)	0.184**(0.083)	0.041(0.084)	0.191**(0.082)	0.063(0.102)	0.222**(0.102)	-0.007(0.081)	0.381***(0.101)	0.089(0.085)
Weekly	-0.026(0.162)	-0.044(0.177)	-0.173(0.164)	0.170(0.185)	0.056(0.161)	0.199(0.173)	-0.233(0.200)	0.070(0.171)	0.039(0.194)	0.223(0.219)
Daily	0.159**(0.080)	0.146**(0.073)	0.136*(0.076)	0.124(0.077)	0.161**(0.073)	0.184**(0.081)	0.138(0.086)	0.085(0.075)	0.194**(0.094)	0.182**(0.083)
Family structure (ref: joint)										
Nuclear family	0.358***(0.077)	0.129*(0.071)	0.485***(0.076)	0.319***(0.079)	0.450***(0.077)	0.233***(0.083)	0.101(0.084)	0.049(0.102)	0.022(0.096)	-0.202*(0.114)
Household size	-0.028***(0.010)	-0.035***(0.007)	-0.042***(0.010)	-0.039***(0.007)	-0.049***(0.010)	-0.047***(0.008)	-0.014(0.009)	-0.024***(0.008)	-0.031***(0.009)	-0.043***(0.010)
Place of residence (ref: rural)										
Urban	0.210**(0.082)	0.214**(0.083)	0.198***(0.073)	0.125(0.091)	0.220***(0.071)	0.129(0.087)	0.148(0.092)	0.094(0.083)	0.211*(0.107)	0.077(0.107)
Province/ Region (ref: Islamabad)										
Punjab	0.315***(0.092)	0.259**(0.110)	0.185**(0.084)	0.138(0.096)	0.207**(0.087)	0.099(0.123)	0.262**(0.104)	0.244**(0.121)	0.254**(0.100)	0.235(0.147)
Sindh	0.167(0.102)	-0.099(0.120)	-0.050(0.092)	-0.240**(0.105)	-0.147(0.100)	-0.444***(0.127)	-0.089(0.119)	-0.211*(0.126)	-0.182*(0.101)	-0.390***(0.149)
KPK region	-0.279**(0.112)	-0.271**(0.123)	-0.371***(0.106)	-0.416***(0.111)	-0.317***(0.110)	-0.426***(0.137)	-0.348***(0.127)	-254*(0.133)	-0.442***(0.114)	-0.383**(0.153)
Gilgit-Baltistan	0.064(0.180)	-0.320*(0.186)	0.184(0.176)	-0.319*(0.185)	-0.261*(0.133)	-0.564***(0.175)	-0.689***(0.155)	-0.716***(0.173)	-0.356*(0.199)	-0.584***(0.214)
Balochistan	-0.199(0.150)	-0.664***(0.146)	-0.198(0.147)	-0.836***(0.137)	-0.219(0.151)	-0.906***(0.164)	-0.479***(0.170)	-0.720***(0.150)	-0.657***(0.165)	-1.012***(0.173)
Economic status (ref: poorest)										
Poorer	0.206**(0.103)	0.208***(0.073)	0.238***(0.090)	0.193**(0.090)	0.225**(0.096)	0.224***(0.085)	0.335***(0.116)	0.298***(0.083)	0.206*(0.107)	0.146(0.106)
Middle	0.047(0.109)	0.185*(0.105)	0.072(0.107)	0.202**(0.094)	0.093(0.106)	0.214**(0.089)	0.274**(0.121)	0.378***(0.112)	0.187(0.120)	0.269**(0.104)
Rich	0.041(0.119)	0.186(0.123)	0.048(0.113)	0.223**(0.107)	0.029(0.113)	0.252**(0.106)	0.180(0.134)	0.281**(0.121)	0.156(0.141)	0.238*(0.127)
Richest	-0.027(0.149)	0.160(0.144)	0.070(0.128)	0.236*(0.133)	-0.030(0.130)	0.271**(0.134)	0.213(0.171)	0.335**(0.148)	0.244(0.158)	0.302*(0.154)
Marginal effect	0.053***(0.020)	0.031(0.081)	0.073***(0.020)	0.019(0.082)	0.054***(0.020)	0.046(0.053)	0.007(0.024)	0.063(0.078)	0.064***(0.022)	0.059(0.072)
Constant	-1.579***(0.201)	-0.696**(0.309)	-1.657***(0.194)	-0.907***(0.307)	-1.634***(0.208)	-0.856***(0.282)	-0.498**(0.228)	-0.283(0.323)	-0.291(0.209)	0.012(0.374)
Observations	4,906	5,111	4,909	5,126	4,908	5,118	3,789	4,743	3,778	4,719

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 3.6: Sex at first birth and female participation in decisionmaking – probit estimation

VARIABLES	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions
Sex at first birth (ref: female)					
Male	-0.067(0.048)	-0.037(0.048)	-0.023(0.048)	-0.023(0.050)	-0.067(0.055)
Age	0.020***(0.004)	0.023***(0.004)	0.022***(0.004)	0.004(0.004)	0.016***(0.004)
Age difference	0.006(0.005)	0.010**(0.005)	0.007*(0.004)	-0.001(0.004)	0.002(0.005)
Women education (ref: none)					
Primary	0.110(0.074)	0.216***(0.077)	0.080(0.073)	0.116(0.079)	0.225***(0.087)
Secondary	0.255***(0.085)	0.130(0.085)	0.117(0.085)	0.160*(0.089)	0.357***(0.111)
Higher	0.322***(0.117)	0.460***(0.114)	0.348***(0.110)	0.206*(0.110)	0.549***(0.128)
Spouse education (ref: none)					
Primary	-0.216***(0.073)	-0.076(0.073)	-0.173**(0.073)	-0.181**(0.076)	-0.110(0.085)
Secondary	-0.063(0.068)	-0.093(0.068)	-0.079(0.068)	-0.076(0.069)	-0.061(0.076)
Higher	-0.011(0.089)	-0.032(0.090)	-0.020(0.089)	-0.106(0.089)	-0.021(0.106)
Women employed (ref: none)					
Yes	0.171***(0.060)	0.268***(0.060)	0.277***(0.060)	0.109*(0.061)	0.244***(0.069)
Media exposure (ref: none)					
Occasionally	0.098(0.072)	0.088(0.072)	0.079(0.073)	0.004(0.074)	0.157*(0.080)
Weekly	-0.010(0.146)	0.204(0.144)	0.217(0.144)	0.062(0.157)	0.382**(0.167)
Daily	0.198***(0.067)	0.177***(0.068)	0.203***(0.067)	0.114(0.069)	0.258***(0.079)
Family structure (ref: joint)					
Nuclear family	0.412***(0.067)	0.578***(0.068)	0.559***(0.067)	0.215***(0.077)	0.122(0.084)
Place of residence (ref: rural)					
Urban	0.206***(0.065)	0.139**(0.064)	0.169***(0.063)	0.122*(0.065)	0.153**(0.076)
Province/ Region (ref: Islamabad)					
Punjab	0.301***(0.080)	0.205**(0.081)	0.186**(0.080)	0.286***(0.078)	0.220**(0.101)
Sindh	-0.004(0.080)	-0.167**(0.081)	-0.286***(0.080)	-0.110(0.079)	-0.367***(0.098)
KPK	-0.253***(0.088)	-0.398***(0.089)	-0.363***(0.088)	-0.239***(0.089)	-0.412***(0.106)
Gilgit-Baltistan	-0.172(0.107)	-0.093(0.109)	-0.394***(0.106)	-0.577***(0.107)	-0.446***(0.123)
Balochistan	-0.566***(0.101)	-0.674***(0.102)	-0.695***(0.102)	-0.542***(0.101)	-0.951***(0.115)
Economic status (ref: poorest)					
Poorer	0.211**(0.088)	0.274***(0.089)	0.281***(0.089)	0.354***(0.090)	0.158*(0.094)
Middle	0.096(0.095)	0.168*(0.095)	0.175*(0.096)	0.363***(0.096)	0.181*(0.101)
Rich	0.091(0.106)	0.168(0.106)	0.161(0.106)	0.256**(0.107)	0.130(0.116)
Richest	0.054(0.126)	0.225*(0.127)	0.156(0.125)	0.255**(0.128)	0.150(0.146)
Constant	-1.239***(0.178)	-1.468***(0.180)	-1.450***(0.177)	-0.504***(0.181)	-0.265(0.212)
Observations	5,977	5,991	5,983	5,490	5,463

Source: Authors' calculations using PDHS 2012-2013. Sample is restricted to women with complete fertility. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 3.7: Sex at last birth and female participation in decisionmaking – probit estimation

	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions
Sex at last birth (ref: female)					
Male	0.010 (0.036)	0.046(0.040)	0.035(0.037)	-0.014(0.041)	0.024(0.049)
Age	0.025***(0.003)	0.030***(0.003)	0.031***(0.003)	0.006**(0.003)	0.019***(0.003)
Age difference	0.008**(0.004)	0.011***(0.003)	0.009**(0.004)	-0.002(0.004)	0.002(0.005)
Women education (ref: none)					
Primary	0.061(0.051)	0.139**(0.058)	0.030(0.055)	0.054(0.069)	0.122*(0.070)
Secondary	0.237***(0.073)	0.129*(0.067)	0.117*(0.071)	0.089(0.088)	0.273***(0.098)
Higher	0.420***(0.095)	0.333***(0.100)	0.302***(0.095)	0.155(0.107)	0.578***(0.111)
Spouse education (ref: none)					
Primary	-0.140**(0.061)	-0.007(0.059)	-0.064(0.064)	-0.078(0.068)	-0.048(0.066)
Secondary	-0.031(0.055)	-0.022(0.057)	-0.027(0.055)	-0.086(0.058)	-0.051(0.058)
Higher	0.007(0.068)	0.028(0.071)	0.026(0.077)	-0.101(0.072)	-0.014(0.085)
Women employed (ref: none)					
Yes	0.201***(0.048)	0.222***(0.043)	0.261***(0.048)	0.184***(0.055)	0.262***(0.054)
Media exposure (ref: none)					
Occasionally	0.117*(0.061)	0.098(0.060)	0.115*(0.069)	0.089(0.063)	0.212***(0.066)
Weekly	-0.044(0.112)	-0.006(0.119)	0.122(0.107)	-0.068(0.141)	0.132(0.141)
Daily	0.143**(0.056)	0.124**(0.055)	0.162***(0.055)	0.101*(0.058)	0.183***(0.066)
Family structure (ref: joint)					
Nuclear family	0.302***(0.053)	0.460***(0.061)	0.407***(0.058)	0.084(0.063)	-0.050(0.072)
Household size	-0.029***(0.006)	-0.038***(0.007)	-0.045***(0.007)	-0.018***(0.006)	-0.033***(0.007)
Place of residence (ref: rural)					
Urban	0.213***(0.067)	0.156***(0.059)	0.170***(0.060)	0.117*(0.068)	0.136(0.083)
Province/ Region (ref: Islamabad)					
Punjab	0.300***(0.079)	0.174***(0.063)	0.177**(0.075)	0.257***(0.086)	0.263***(0.092)
Sindh	0.042(0.089)	-0.141*(0.074)	-0.280***(0.084)	-0.152(0.096)	-0.276***(0.094)
KPK	-0.252***(0.092)	-0.377***(0.079)	-0.347***(0.091)	-0.281***(0.100)	-0.374***(0.101)
Gilgit-Baltistan	-0.145(0.160)	-0.107(0.162)	-0.413***(0.133)	-0.691***(0.137)	-0.467***(0.179)
Balochistan	-0.446***(0.128)	-0.537***(0.119)	-0.575***(0.129)	-0.617***(0.131)	-0.842***(0.134)
Economic status (ref: poorest)					
Poorer	0.209***(0.064)	0.213***(0.065)	0.222***(0.064)	0.313***(0.064)	0.168**(0.085)
Middle	0.122(0.082)	0.141*(0.072)	0.158**(0.071)	0.329***(0.083)	0.228***(0.082)
Rich	0.116(0.091)	0.137*(0.077)	0.147*(0.079)	0.238**(0.094)	0.191**(0.095)
Richest	0.068(0.109)	0.155(0.098)	0.123(0.097)	0.271**(0.120)	0.260**(0.113)
Constant	-1.224***(0.138)	1.391***(0.139)	-1.341***(0.147)	-0.345**(0.153)	-0.123(0.155)
Observations	10,017	10,035	10,026	8,532	8,497

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

greater say in non-financial household decisions for the woman (Table 3.5). The overall effect is likewise positive with a 6.4% higher say in one of the four decision categories for the woman with one or more sons among the first three children borne.

Likewise, the sex of the first or the last child does not influence women's participation rates (Table 3.6, 3.7).

The parity-wise estimations reported in Table 3.5 depict another feature of the son preference – agency relationship. While having borne one or more sons is positively related to female participation in intrahousehold decisions upto the third parity, the relationship loses its significance in high-parity households. In other words, what matters is not merely the number of sons but crucially, their parity. Sons therefore represent a normal good whose utility loses its significance in large households.

The aforementioned findings reflect the fact that a society with high preference for boys allows son-bearing women better say in household decisions. This is particularly true for women who married young, i.e. those who married before the age of 18 (Table 3.8). Early marriages are not uncommon in Pakistan. 43% women in the sample got married before their 18th birthday. Women who marry later do not see a significant improvement in their participation in household decisions as a result of giving birth to sons.

The control variables included in the estimations are often significantly associated with female intrahousehold decisionmaking with mostly expected signs. Women's say in household decisions increases with women's age as well as age difference with the husbands. In Pakistan, married women are at an average 5.3 years younger than their husbands. Moreover, educated women and working women seem to participate more in household decisions. Women living in nuclear

Table 3.8: Son Preference and female participation in decisionmaking (by Age at marriage)-Probit estimation

	Age <18	Age>=18	Age <18	Age>=18	Age <18	Age>=18	Age <18	Age>=18
VARIABLES	Health decisions	Health decisions	Social decisions	Social decisions	Consumption decisions	Consumption decisions	Financial decisions	Financial decisions
Sons (ref: none)								
At least one son	0.193***(0.074)	0.021(0.050)	0.188**(0.076)	0.060(0.051)	0.203***(0.077)	0.044(0.052)	0.144*(0.083)	-0.027(0.058)
Age	0.020***(0.003)	0.025***(0.003)	0.024***(0.003)	0.025***(0.003)	0.026***(0.003)	0.024***(0.003)	0.009***(0.003)	0.009***(0.003)
Age difference	0.005(0.004)	0.005(0.004)	0.002(0.004)	0.004(0.004)	-0.000(0.004)	0.003(0.004)	-0.004(0.004)	-0.007*(0.004)
Women education (ref: none)								
Primary	0.130**(0.063)	0.036(0.059)	0.194***(0.065)	0.119**(0.060)	0.089(0.065)	0.028(0.060)	0.058(0.068)	0.125*(0.065)
Secondary	0.353***(0.071)	0.239***(0.058)	0.262***(0.072)	0.167***(0.059)	0.257***(0.072)	0.218***(0.059)	0.243***(0.076)	0.196***(0.064)
Higher	0.572***(0.125)	0.486***(0.070)	0.706***(0.134)	0.365***(0.071)	0.611***(0.129)	0.342***(0.070)	0.512***(0.133)	0.180**(0.076)
Spouse education (ref: none)								
Primary	-0.072(0.061)	-0.157**(0.062)	0.002(0.061)	-0.010(0.063)	-0.012(0.062)	-0.077(0.063)	0.034(0.065)	-0.147**(0.067)
Secondary	0.021(0.055)	-0.023(0.052)	0.084(0.055)	-0.033(0.052)	0.026(0.056)	-0.049(0.053)	0.043(0.058)	-0.105*(0.056)
Higher	-0.050(0.071)	-0.005(0.061)	0.124*(0.072)	0.059(0.062)	0.042(0.073)	0.026(0.062)	-0.020(0.075)	-0.053(0.067)
Women employed (ref: none)								
Yes	0.083(0.053)	0.277***(0.047)	0.099*(0.053)	0.262***(0.048)	0.170***(0.054)	0.343***(0.048)	0.148***(0.055)	0.317***(0.050)
Media exposure (ref: none)								
occasionally	0.216***(0.057)	0.095*(0.056)	0.162***(0.058)	0.074(0.057)	0.134**(0.059)	0.051(0.058)	0.149**(0.061)	0.032(0.061)
Weekly	0.058(0.146)	-0.262**(0.124)	0.057(0.147)	-0.167(0.125)	0.052(0.147)	-0.134(0.126)	-0.021(0.148)	-0.205(0.136)
Daily	0.196***(0.054)	0.124**(0.053)	0.225***(0.055)	0.073(0.054)	0.244***(0.056)	0.133**(0.054)	0.134**(0.058)	0.077(0.058)
Family structure (ref: joint)								
Nuclear family	0.139**(0.060)	0.264***(0.049)	0.376***(0.061)	0.495***(0.050)	0.278***(0.063)	0.487***(0.050)	-0.043(0.068)	0.174***(0.057)
Household size	-0.031***(0.005)	-0.014***(0.004)	-0.036***(0.005)	-0.025***(0.004)	-0.042***(0.006)	-0.027***(0.005)	-0.021***(0.006)	-0.008(0.005)
Place of residence (ref: rural)								
Urban	0.092*(0.051)	0.154***(0.045)	0.079(0.052)	0.109**(0.045)	0.139***(0.052)	0.092**(0.046)	0.118**(0.054)	0.106**(0.049)
Province/ Region (ref: Islamabad)								
Punjab	0.379***(0.108)	0.261***(0.067)	0.379***(0.111)	0.066(0.069)	0.246**(0.112)	0.105(0.068)	0.309***(0.112)	0.247***(0.071)
Sindh	-0.075(0.107)	0.110(0.069)	-0.144(0.110)	-0.105(0.071)	-0.411***(0.111)	-0.212***(0.070)	-0.257**(0.111)	-0.101(0.073)
KPK	-0.347***(0.110)	-0.326***(0.075)	-0.345***(0.113)	-0.508***(0.077)	-0.459***(0.114)	-0.403***(0.076)	-0.393***(0.115)	-0.336***(0.080)
Gilgit-Baltistan	-0.217*(0.118)	0.178*(0.097)	-0.034(0.121)	0.187*(0.099)	-0.511***(0.122)	-0.127(0.099)	-0.695***(0.123)	-0.324***(0.103)
Balochistan	-0.278**(0.113)	-0.414***(0.081)	-0.240**(0.116)	-0.594***(0.083)	-0.492***(0.117)	-0.604***(0.083)	-0.450***(0.117)	-0.562***(0.087)
Economic status (ref: poorest)								
Poorer	0.262***(0.062)	0.214***(0.069)	0.169***(0.063)	0.275***(0.069)	0.261***(0.064)	0.259***(0.071)	0.304***(0.066)	0.412***(0.074)
Middle	0.319***(0.072)	0.191***(0.072)	0.208***(0.073)	0.268***(0.073)	0.210***(0.074)	0.283***(0.074)	0.331***(0.077)	0.432***(0.079)
Rich	0.358***(0.084)	0.260***(0.079)	0.164*(0.084)	0.319***(0.080)	0.260***(0.085)	0.354***(0.081)	0.282***(0.088)	0.455***(0.087)
Richest	0.266***(0.099)	0.147(0.091)	0.221**(0.100)	0.248***(0.092)	0.244**(0.101)	0.230**(0.094)	0.208**(0.104)	0.398***(0.100)
Constant	-1.145***(0.156)	-1.396***(0.128)	-1.358***(0.160)	-1.391***(0.130)	-1.241***(0.162)	-1.416***(0.132)	-0.459***(0.169)	-0.773***(0.140)
Observations	4,336	5,681	4,341	5,694	4,337	5,689	3,820	4,712

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

households and urban areas similarly have more say in household decisions. In rural areas, joint family settings are widespread. In such a setup, power often lies in the hands of the family elder who could either be the male or female head of the household. Exposure to media is another factor positively associated with female decisionmaking power. Women who watch the television more frequently are better aware of their rights and more informed about urban and global trends.

3.6 Sensitivity and Robustness Measures

3.6.1 Alternative Measures for Participation in Decision Making

The results described above could be an artifact of the particular construction of the indicators of female participation in decision making. To account for this possibility, we consider an alternative set of dependent variables. The binary indicator of participation in household decisions that stands for the wife making the decision by herself or in conjunction with her husband as opposed to she reporting to have no say in the decision is substituted by a categorical indicator reflecting a supposedly increasing order of woman's participation in the decision. Corresponding estimations using Ordered Probit shown in Tables 3.9 to 3.11 report findings largely similar to the baseline estimations shown above. These estimations provide a further insight into the intrahousehold bargaining that happens as a result of male childbearing. For instance, a woman with at least one son is found to have 2.2% higher likelihood of deciding about her health by herself and 3.3% higher likelihood of deciding jointly with her husband, while the likelihood that her husband or family elder would decide alone falls by 2.7% and 2.8% respectively. The increase in power to decide for herself is the highest for healthcare decisions. Financial decisions, as before, remain out of the woman's reach.

3.6.2 Role of Sex-Selective Abortion

The questions related to our dependent variable gauged women's participation in various household decisions at the time of the survey which (barring the possible exception of the last birth) follows the woman's existing reproductive history. This precludes a direct effect on the sex of children already born. If however the woman's agency could be treated as identical to the one present at the time of previous births, its influence over the sex of children could manifest itself through sex-selective abortions as a son preferring woman with greater decisionmaking power would be more likely to abort female foetus. An alternative would be to accept higher fertility in order to ensure the desired number of sons. In both the cases, the woman may be at greater risk of pregnancy losses. The latter could prove helpful in the absence of data on abortion in our dataset.

Table 3.12 shows estimations on a subsample of women with at least one pregnancy loss. The results corroborate the findings of the complete sample. The impact of bearing at least one son on the three non-financial decisions stays significant with strong coefficients while that on financial decisions remains insignificant.

Table 3.9: Son preference and female participation in decisionmaking – Ordered probit estimations

VARIABLES	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions
Sons (ref: none)				
At least one son	0.161***(0.046)	0.160***(0.050)	0.169***(0.051)	0.037(0.058)
Age	0.027***(0.002)	0.030***(0.003)	0.032***(0.002)	0.005**(0.003)
Age difference	0.012***(0.003)	0.015***(0.003)	0.012***(0.003)	-0.001(0.004)
Women education (ref: none)				
Primary	0.057(0.044)	0.112**(0.049)	0.058(0.047)	0.062(0.060)
Secondary	0.258***(0.057)	0.134***(0.049)	0.132**(0.058)	0.090(0.072)
Higher	0.434***(0.084)	0.255***(0.078)	0.258***(0.086)	0.172*(0.098)
Spouse education (ref: none)				
Primary	-0.101**(0.051)	-0.040(0.048)	-0.093*(0.050)	-0.081(0.059)
Secondary	-0.043(0.043)	-0.064(0.047)	-0.089*(0.046)	-0.103**(0.049)
Higher	-0.015(0.060)	-0.027(0.061)	-0.034(0.062)	-0.148**(0.064)
Women employed (ref: none)				
Yes	0.206***(0.036)	0.171***(0.031)	0.216***(0.039)	0.160***(0.043)
Media exposure (ref: none)				
Occasionally	0.056(0.049)	0.031(0.043)	0.043(0.051)	0.106*(0.056)
Weekly	-0.091(0.078)	-0.066(0.087)	0.005(0.081)	-0.099(0.121)
Daily	0.068(0.044)	0.062(0.042)	0.106**(0.044)	0.121**(0.047)
Family structure (ref: joint)				
Nuclear family	0.479***(0.048)	0.675***(0.054)	0.701***(0.053)	0.090(0.057)
Household size	-0.033***(0.005)	-0.035***(0.006)	-0.039***(0.006)	-0.016***(0.005)
Place of residence (ref: rural)				
Urban	0.238***(0.054)	0.181***(0.048)	0.185***(0.048)	0.171***(0.061)
Province/ Region (ref: Islamabad)				
Punjab	0.131**(0.063)	0.044(0.058)	0.069(0.060)	0.170**(0.071)
Sindh	-0.034(0.070)	-0.102(0.065)	-0.231***(0.067)	-0.146*(0.078)
KPK region	-0.275***(0.070)	-0.336***(0.064)	-0.321***(0.068)	-0.274***(0.084)
Gilgit-Baltistan	-0.093(0.116)	-0.080(0.122)	-0.375***(0.080)	-0.762***(0.109)
Balochistan	-0.230***(0.083)	-0.209**(0.082)	-0.238***(0.083)	-0.501***(0.098)
Economic status (ref: poorest)				
Poorer	0.111**(0.052)	0.120**(0.047)	0.107**(0.046)	0.266***(0.053)
Middle	0.046(0.070)	0.063(0.059)	0.045(0.056)	0.276***(0.073)
Rich	-0.003(0.080)	-0.009(0.066)	-0.011(0.064)	0.215**(0.084)
Richest	-0.016(0.091)	-0.015(0.078)	-0.063(0.076)	0.206**(0.104)
Constant cut1	0.063(0.111)	0.423***(0.107)	0.456***(0.118)	-1.838***(0.134)
Constant cut2	1.326***(0.111)	1.478***(0.109)	1.609***(0.118)	0.302**(0.129)
Constant cut3	2.929***(0.118)	3.206***(0.118)	3.326***(0.128)	2.045***(0.130)
Observations	10,017	10,035	10,026	8,532

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3.10: Number of sons and female participation in decision making – Ordered probit estimations

VARIABLES	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions
Sons (ref: 0)				
1	0.122**(0.052)	0.107*(0.055)	0.114**(0.056)	0.031(0.062)
2	0.194***(0.050)	0.205***(0.056)	0.216***(0.057)	0.051(0.066)
3	0.231***(0.052)	0.237***(0.064)	0.263***(0.059)	0.029(0.076)
3+	0.173***(0.059)	0.204***(0.062)	0.185***(0.067)	0.024(0.077)
Age	0.025***(0.002)	0.028***(0.003)	0.030***(0.002)	0.005*(0.003)
Age difference	0.012***(0.003)	0.015***(0.003)	0.012***(0.003)	-0.001(0.004)
Women education (ref: none)				
Primary	0.058(0.044)	0.113**(0.049)	0.059(0.047)	0.061(0.060)
Secondary	0.262***(0.057)	0.140***(0.049)	0.139**(0.059)	0.090(0.072)
Higher	0.444***(0.084)	0.270***(0.077)	0.272***(0.086)	0.173*(0.097)
Spouse education (ref: none)				
Primary	-0.099*(0.051)	-0.038(0.047)	-0.091*(0.051)	-0.081(0.059)
Secondary	-0.041(0.043)	-0.061(0.047)	-0.086*(0.046)	-0.104**(0.050)
Higher	-0.013(0.060)	-0.024(0.061)	-0.031(0.062)	-0.150**(0.064)
Women employed (ref: none)				
Yes	0.204***(0.036)	0.169***(0.031)	0.213***(0.038)	0.160***(0.043)
Media exposure (ref: none)				
Occasionally	0.055(0.049)	0.029(0.044)	0.041(0.051)	0.105*(0.056)
Weekly	-0.094(0.078)	-0.070(0.086)	0.001(0.080)	-0.098(0.120)
Daily	0.068(0.044)	0.061(0.042)	0.105**(0.045)	0.121**(0.047)
Family structure (ref: joint)				
Nuclear family	0.466***(0.049)	0.657***(0.056)	0.684***(0.055)	0.091(0.059)
Household size	-0.034***(0.006)	-0.037***(0.006)	-0.040***(0.006)	-0.016***(0.006)
Place of residence (ref: rural)				
Urban	0.237***(0.054)	0.181***(0.048)	0.185***(0.048)	0.170***(0.061)
Province/ Region (ref: Islamabad)				
Punjab	0.131**(0.063)	0.042(0.058)	0.067(0.061)	0.170**(0.071)
Sindh	-0.033(0.070)	-0.102(0.066)	-0.230***(0.067)	-0.146*(0.078)
KPK	-0.279***(0.070)	-0.342***(0.065)	-0.327***(0.068)	-0.274***(0.084)
Gilgit-Baltistan	-0.101(0.115)	-0.092(0.122)	-0.387***(0.081)	-0.762***(0.109)
Balochistan	-0.233***(0.083)	-0.213**(0.083)	-0.242***(0.083)	-0.501***(0.098)
Economic status (ref: poorest)				
Poorer	0.108**(0.052)	0.117**(0.047)	0.103**(0.045)	0.266***(0.053)
Middle	0.043(0.070)	0.061(0.059)	0.041(0.056)	0.276***(0.072)
Rich	-0.004(0.081)	-0.008(0.066)	-0.012(0.064)	0.214**(0.085)
Richest	-0.016(0.092)	-0.011(0.078)	-0.062(0.076)	0.205*(0.105)
Constant cut1	0.013(0.118)	0.346***(0.117)	0.387***(0.126)	-1.833***(0.142)
Constant cut2	1.277***(0.118)	1.402***(0.118)	1.541***(0.125)	0.308**(0.138)
Constant cut3	2.880***(0.124)	3.131***(0.127)	3.260***(0.134)	2.051***(0.141)
Observations	10,017	10,035	10,026	8,532

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 3.11: Son preference and female participation in decisionmaking (parity wise) – Ordered probit estimations

VARIABLES	Healthcare decisions		Social decisions		Consumption decisions		Financial decisions	
	(Parity<=3)	(Parity> 3)	(Parity<=3)	(Parity> 3)	(Parity<=3)	(Parity> 3)	(Parity<=3)	(Parity> 3)
Sons (ref: none)								
At least one son	0.155***(0.048)	0.020(0.183)	0.154***(0.053)	-0.014(0.181)	0.134***(0.051)	0.122(0.139)	0.010(0.064)	0.124(0.185)
Age	0.029***(0.003)	0.019***(0.003)	0.032***(0.003)	0.023***(0.004)	0.036***(0.003)	0.022***(0.004)	0.009**(0.004)	-0.000(0.004)
Age difference	0.022***(0.004)	0.003(0.004)	0.025***(0.004)	0.007*(0.004)	0.020***(0.004)	0.005(0.004)	-0.001(0.005)	-0.000(0.005)
Women education (ref: none)								
Primary	0.064(0.060)	0.083(0.060)	0.039(0.067)	0.232***(0.067)	0.036(0.067)	0.111(0.068)	0.002(0.104)	0.120*(0.072)
Secondary	0.332***(0.074)	0.212**(0.094)	0.215***(0.066)	0.051(0.082)	0.193***(0.069)	0.106(0.090)	0.147*(0.083)	0.022(0.099)
Higher	0.616***(0.087)	0.050(0.162)	0.327***(0.080)	0.169(0.146)	0.343***(0.091)	0.172(0.184)	0.176(0.115)	0.242(0.186)
Spouse education (ref: none)								
Primary	-0.038(0.072)	-0.142**(0.065)	-0.000(0.070)	-0.061(0.060)	-0.040(0.074)	-0.128**(0.060)	-0.052(0.082)	-0.104(0.071)
Secondary	-0.023(0.060)	-0.068(0.062)	-0.080(0.067)	-0.062(0.059)	-0.070(0.064)	-0.112*(0.061)	-0.160**(0.064)	-0.066(0.062)
Higher	0.003(0.076)	-0.063(0.087)	-0.011(0.080)	-0.087(0.096)	0.023(0.083)	-0.126(0.100)	-0.205**(0.084)	-0.117(0.093)
Women employed (ref: none)								
Yes	0.179***(0.058)	0.212***(0.043)	0.144***(0.054)	0.178***(0.051)	0.185***(0.058)	0.222***(0.048)	0.159**(0.067)	0.161***(0.057)
Media exposure (ref: none)								
Occasionally	0.105(0.068)	0.023(0.071)	0.104(0.065)	-0.021(0.068)	0.042(0.067)	0.049(0.085)	0.205**(0.092)	0.035(0.072)
Weekly	-0.133(0.132)	-0.043(0.120)	-0.243**(0.122)	0.121(0.125)	-0.137(0.125)	0.142(0.124)	-0.351*(0.191)	0.080(0.140)
Daily	0.047(0.061)	0.100(0.061)	0.063(0.064)	0.075(0.063)	0.063(0.061)	0.154**(0.066)	0.134*(0.074)	0.115*(0.064)
Family structure (ref: joint)								
Nuclear family	0.486***(0.065)	0.354***(0.073)	0.675***(0.069)	0.574***(0.081)	0.671***(0.060)	0.589***(0.084)	0.075(0.084)	0.094(0.098)
Household size	-0.032***(0.008)	-0.039***(0.007)	-0.035***(0.008)	-0.037***(0.006)	-0.043***(0.008)	-0.040***(0.007)	-0.014(0.008)	-0.019***(0.007)
Place of residence (ref: rural)								
Urban	0.190***(0.072)	0.281***(0.072)	0.183***(0.061)	0.181**(0.071)	0.200***(0.061)	0.171**(0.072)	0.180**(0.080)	0.158**(0.075)
Province/ Region (ref: Islamabad)								
Punjab	0.127(0.087)	0.119(0.084)	0.067(0.071)	-0.004(0.096)	0.099(0.071)	0.009(0.108)	0.211**(0.087)	0.121(0.112)
Sindh	0.039(0.091)	-0.124(0.095)	-0.017(0.078)	-0.209**(0.103)	-0.122(0.079)	-0.372***(0.112)	-0.087(0.095)	-0.204*(0.116)
KPK region	-0.259***(0.100)	-0.311***(0.096)	-0.274***(0.083)	-0.420***(0.106)	-0.243***(0.086)	-0.423***(0.118)	-0.338***(0.112)	-0.258**(0.122)
Gilgit-Baltistan	0.081(0.147)	-0.245*(0.144)	0.197(0.140)	-0.312*(0.161)	-0.210**(0.096)	-0.539***(0.134)	-0.825***(0.134)	-0.747***(0.149)
Balochistan	0.002(0.103)	-0.474***(0.108)	0.122(0.099)	-0.554***(0.114)	0.107(0.096)	-0.610***(0.125)	-0.379***(0.128)	-0.602***(0.128)
Economic status (ref: poorest)								
Poorer	0.076(0.075)	0.143**(0.069)	0.101(0.070)	0.134**(0.063)	0.040(0.073)	0.169***(0.061)	0.294***(0.090)	0.252***(0.074)
Middle	-0.026(0.088)	0.115(0.099)	0.043(0.083)	0.095(0.080)	-0.036(0.082)	0.125*(0.074)	0.237**(0.104)	0.323***(0.098)
Rich	-0.060(0.097)	0.056(0.123)	-0.084(0.093)	0.071(0.097)	-0.116(0.092)	0.095(0.093)	0.218*(0.119)	0.226**(0.112)
Richest	-0.062(0.121)	0.035(0.136)	-0.076(0.109)	0.054(0.111)	-0.201*(0.108)	0.089(0.108)	0.194(0.147)	0.248**(0.125)
Constant cut1	0.360**(0.164)	-0.868***(0.230)	0.718***(0.155)	-0.465**(0.220)	0.700***(0.157)	-0.461**(0.222)	-1.763***(0.204)	-1.979***(0.251)
Constant cut2	1.440***(0.167)	0.699***(0.233)	1.598***(0.161)	0.856***(0.228)	1.632***(0.162)	1.023***(0.223)	0.470**(0.200)	0.111(0.257)
Constant cut3	3.063***(0.175)	2.298***(0.235)	3.294***(0.173)	2.622***(0.234)	3.405***(0.172)	2.711***(0.234)	2.233***(0.205)	1.849***(0.256)
Observations	4,906	5,111	4,909	5,126	4,908	5,118	3,789	4,743

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3.12: Son preference and female participation in decisionmaking (by pregnancy loss) – probit estimation

VARIABLES	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions
Sons (ref: none)					
At least one son	0.207**(0.084)	0.383***(0.086)	0.333***(0.085)	0.106(0.098)	0.357***(0.113)
Age	0.027***(0.004)	0.025***(0.004)	0.024***(0.004)	0.004(0.004)	0.016***(0.005)
Age difference	0.002(0.006)	0.008(0.006)	0.002(0.006)	-0.000(0.006)	-0.005(0.006)
Education (ref: none)					
Primary	0.124(0.089)	0.223**(0.091)	0.076(0.088)	0.116(0.097)	0.195*(0.104)
Secondary	0.277***(0.098)	0.234**(0.099)	0.121(0.101)	0.083(0.110)	0.342***(0.132)
Higher	0.472***(0.135)	0.437***(0.136)	0.225*(0.136)	0.170(0.144)	0.542***(0.183)
Spouse education (ref: none)					
Primary	-0.026(0.085)	-0.012(0.085)	-0.075(0.086)	-0.076(0.091)	-0.014(0.094)
Secondary	0.040(0.082)	0.003(0.081)	-0.067(0.083)	-0.093(0.087)	-0.036(0.090)
Higher	0.119(0.108)	0.081(0.110)	0.037(0.112)	-0.002(0.111)	0.104(0.117)
Employed (ref: none)					
Yes	0.275***(0.070)	0.244***(0.068)	0.291***(0.068)	0.189**(0.074)	0.379***(0.077)
Media exposure (ref: none)					
occasionally	0.122(0.089)	0.083(0.086)	0.168*(0.091)	0.109(0.093)	0.348***(0.094)
Weekly	-0.156(0.183)	0.106(0.177)	0.143(0.181)	0.170(0.188)	0.211(0.200)
Daily	0.021(0.081)	0.009(0.081)	0.057(0.081)	0.058(0.086)	0.101(0.094)
Family structure (ref: joint)					
Nuclear family	0.289***(0.086)	0.459***(0.086)	0.473***(0.087)	0.150(0.100)	0.001(0.111)
Household size	-0.034***(0.008)	-0.043***(0.009)	-0.042***(0.009)	-0.012(0.009)	-0.041***(0.009)
Place of residence (ref: rural)					
Urban	0.101(0.078)	0.166**(0.078)	0.162**(0.078)	0.032(0.082)	0.087(0.092)
Province/ Region (ref: Islamabad)					
Punjab	0.391***(0.103)	0.262**(0.103)	0.227**(0.104)	0.373***(0.105)	0.297**(0.134)
Sindh	0.136(0.105)	-0.112(0.104)	-0.207**(0.106)	-0.001(0.106)	-0.322**(0.128)
KPK	-0.155(0.114)	-0.324***(0.113)	-0.346***(0.115)	-0.210*(0.118)	-0.376***(0.139)
Gilgit-Baltistan	-0.097(0.144)	-0.177(0.145)	-0.414***(0.143)	-0.593***(0.147)	-0.454***(0.163)
Balochistan	-0.457***(0.130)	-0.720***(0.131)	-0.686***(0.134)	-0.653***(0.132)	-1.024***(0.149)
Economic status (ref: poorest)					
Poorer	0.155(0.103)	0.075(0.101)	0.131(0.105)	0.267**(0.108)	0.102(0.106)
Middle	0.094(0.112)	-0.010(0.110)	0.061(0.115)	0.241**(0.119)	0.118(0.118)
Rich	0.205(0.128)	0.059(0.126)	0.182(0.130)	0.270**(0.136)	0.260*(0.146)
Richest	0.126(0.149)	-0.006(0.147)	0.204(0.150)	0.405**(0.159)	0.205(0.175)
Marginal effect	0.072**(0.029)	0.130***(0.029)	0.113***(0.028)	0.038 (0.035)	0.102***(0.034)
Constant	-1.519***(0.199)	-1.441***(0.200)	-1.455***(0.202)	-0.630***(0.218)	-0.288(0.236)
Observations	3,887	3,895	3,892	3,373	3,357

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

3.6.3 Selection by Wealth, Woman's Education and Age and Family Size

An important challenge to our empirical analysis comes from selection bias. We consider four possible scenario:

First, as mentioned by Rossi and Rouanet (2015), if mothers exhibiting specific gender preferences are more likely to die, surviving women would be selected which would underestimate the role of son preference. This bias could be handled by focusing on the subsample of younger women. A second way in which the effects of son preference could be biased is through education. Educated women can better understand their situation at home and identify possible options for improving their say. This may also involve sex discriminatory practices. We consider this bias by limiting the sample to women having attained some schooling. Less than half of the women surveyed (42%) possessed some schooling.

Another way in which son preferring women could be selected is through wealth. Women from wealthier households possess more financial means to ensure the desired number of sons whether through differential stopping or by undertaking sex-selective abortion. We account for this possibility by estimating the model on the subsample of households with above median wealth. Finally, the sex of children already borne could influence the decision to have more children. Thus son preferring women may be selected based on the number of children to which they have already given birth. We can check for this bias by focusing on women having given birth to one child as sex selective abortion should not be a worry for the first birth.

Table 3.13 shows results of estimations carried out on the subsample of young women (25 years and less) and those with some schooling while Table 3.14 shows results of estimations on wealthy women and those with a single child. The results are qualitatively similar to the main findings. As expected, the impact of son preference gets stronger when we focus on younger, educated and wealthier women. The effect of the sex of firstborn boy on decisionmaking is different in the sense that participation in even financial affairs is found to be significant.

3.6.4 Matching Estimations

To further ease concerns about potential endogeneity, we carry out estimations on our model using three matching routines: Propensity Score Matching (PSM), Inverse Probability Weighting (IPW) and Augmented Inverse Probability Weighting (AIPW). Matching estimators are based on the Rubin Causal Model with two key assumptions of unconfoundedness and overlap (P R Rosenbaum and Rubin, 1983).

PSM matches treated to non treated based on a propensity score for participation given the observable characteristics of the individual. The IPW improves on the PSM by according a higher weight to individuals receiving an unlikely treatment. This reweighting helps assign higher weights to individuals lying in the middle of the probability distribution and lower weights to those at the extremes (Wooldridge, 2007). The third technique AIPW combines both the properties of the regression based estimator and the IPW estimator, requiring either the propensity or outcome model (not both) to be correctly specified (Cao, Tsiatis, and Davidian, 2009).

Both the average treatment effect (ATE) and the average treatment effect on the treated (ATT) are obtained. ATE is the difference between the expected outcomes with and without treatment while ATT is the difference between expected outcome values with and without treatment for those who actually participated

Table 3.13: Selection Bias: Younger women (Aged 25 or less) and women with schooling – Probit estimates

VARIABLES	Younger Women (Age <=25) Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions	Have schooling Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions
Sons (ref: none)										
At least one son	0.249***(0.072)	0.332***(0.073)	0.294***(0.076)	0.075(0.089)	0.174*(0.091)	0.223***(0.063)	0.324***(0.065)	0.264***(0.064)	0.104(0.074)	0.258***(0.088)
Age						0.030***(0.004)	0.033***(0.004)	0.033***(0.004)	0.010**(0.004)	0.020***(0.006)
Age difference	0.011(0.007)	0.027***(0.007)	0.024***(0.007)	-0.001(0.008)	0.001(0.009)	0.007(0.006)	0.015**(0.006)	0.011*(0.006)	-0.013**(0.006)	-0.003(0.007)
Education (ref: none)										
Primary	-0.072(0.101)	0.049(0.105)	0.062(0.108)	-0.071(0.133)	-0.090(0.142)					
Secondary	0.113(0.108)	0.058(0.110)	-0.039(0.118)	-0.116(0.142)	0.015(0.154)					
Higher	0.313**(0.151)	0.262*(0.159)	0.327**(0.164)	0.305(0.221)	0.704***(0.219)					
Spouse education (ref: none)										
Primary	-0.147(0.110)	-0.103(0.105)	-0.138(0.110)	-0.096(0.134)	-0.222(0.137)	-0.135(0.106)	0.075(0.108)	-0.037(0.110)	-0.065(0.121)	-0.140(0.140)
Secondary	0.031(0.100)	-0.099(0.106)	-0.084(0.112)	-0.160(0.123)	-0.157(0.126)	0.014(0.095)	-0.003(0.097)	0.025(0.098)	-0.105(0.105)	-0.145(0.126)
Higher	0.091(0.126)	0.038(0.129)	0.128(0.134)	-0.311*(0.162)	-0.030(0.169)	0.118(0.100)	0.156(0.102)	0.180*(0.103)	-0.021(0.109)	0.039(0.135)
Employed (ref: none)										
Yes	0.128(0.102)	0.053(0.104)	0.036(0.110)	0.301**(0.127)	0.199(0.131)	0.255***(0.077)	0.384***(0.075)	0.370***(0.076)	0.214***(0.080)	0.406***(0.103)
Media exposure (ref: none)										
Occasionally	0.047(0.109)	0.039(0.111)	0.036(0.115)	0.128(0.133)	0.227(0.139)	0.091(0.100)	0.211**(0.102)	0.176*(0.103)	0.007(0.112)	0.167(0.132)
Weekly	-0.070(0.232)	-0.463*(0.244)	0.149(0.230)	0.085(0.308)	0.111(0.280)	0.133(0.175)	0.150(0.173)	0.390**(0.171)	-0.244(0.199)	0.066(0.209)
Daily	0.048(0.098)	0.065(0.100)	0.042(0.104)	0.069(0.124)	0.219*(0.130)	0.209**(0.088)	0.246***(0.090)	0.291***(0.090)	0.147(0.100)	0.336***(0.117)
Family structure (ref: joint)										
Nuclear family	0.428***(0.089)	0.610***(0.092)	0.496***(0.095)	0.018(0.114)	-0.009(0.120)	0.326***(0.072)	0.520***(0.073)	0.484***(0.072)	0.210**(0.086)	-0.027(0.103)
Household size	-0.009(0.008)	-0.025***(0.009)	-0.037***(0.010)	-0.002(0.010)	-0.011(0.011)	-0.032***(0.007)	-0.035***(0.008)	-0.042***(0.008)	-0.011(0.009)	-0.036***(0.010)
Place of residence (ref: rural)										
Urban	0.179*(0.092)	0.069(0.097)	0.251**(0.100)	0.153(0.124)	0.159(0.125)	0.191***(0.068)	0.131*(0.069)	0.130*(0.068)	0.008(0.077)	0.084(0.092)
Province/ Region (ref: Islamabad)										
Punjab	-0.055(0.141)	-0.049(0.144)	-0.073(0.147)	0.286(0.177)	0.225(0.191)	0.148**(0.071)	0.034(0.072)	0.001(0.072)	0.151**(0.074)	0.096(0.095)
Sindh	-0.032(0.147)	-0.177(0.149)	-0.365**(0.153)	-0.099(0.184)	-0.127(0.196)	0.215***(0.074)	-0.008(0.075)	-0.120(0.074)	-0.030(0.076)	-0.089(0.098)
KPK	-0.930***(0.157)	-0.747***(0.161)	-0.797***(0.164)	-0.550***(0.196)	-0.730***(0.204)	-0.429***(0.089)	-0.561***(0.091)	-0.480***(0.091)	-0.254**(0.098)	-0.571***(0.112)
Gilgit-Baltistan	-0.266(0.180)	0.021(0.185)	-0.612***(0.189)	-0.906***(0.227)	-0.575**(0.236)	0.224*(0.124)	0.308**(0.128)	-0.153(0.118)	-0.379***(0.128)	0.030(0.160)
Balochistan	-0.488***(0.168)	-0.223(0.171)	-0.321*(0.176)	-0.513**(0.201)	-0.807***(0.212)	-0.221*(0.125)	-0.204(0.131)	-0.341***(0.132)	-0.382***(0.128)	-0.770***(0.146)
Economic status (ref: poorest)										
Poorer	0.307**(0.125)	0.272**(0.126)	0.199(0.129)	0.506***(0.148)	0.378**(0.150)	0.164(0.184)	0.295(0.192)	0.120(0.192)	0.509**(0.214)	0.085(0.259)
Middle	0.368***(0.138)	0.347**(0.140)	0.213(0.146)	0.369**(0.170)	0.410**(0.176)	0.120(0.179)	0.149(0.187)	0.045(0.188)	0.510**(0.207)	0.263(0.254)
Rich	0.144(0.156)	0.240(0.164)	0.046(0.168)	0.380*(0.205)	0.228(0.217)	0.043(0.179)	0.132(0.189)	-0.037(0.189)	0.441**(0.208)	0.249(0.258)
Richest	-0.058(0.183)	0.180(0.189)	-0.009(0.197)	0.265(0.253)	0.190(0.267)	0.023(0.189)	0.194(0.197)	-0.026(0.197)	0.469**(0.217)	0.310(0.270)
Marginal Effect	0.084***(0.024)	0.101***(0.022)	0.085***(0.021)	0.027(0.032)	0.055*(0.029)	0.077***(0.022)	0.106***(0.021)	0.088***(0.021)	0.038(0.027)	0.062***(0.022)
Constant	-0.763***(0.199)	-0.956***(0.209)	-0.745***(0.214)	-0.350(0.247)	0.117(0.254)	-1.360***(0.226)	-1.758***(0.234)	-1.549***(0.235)	-0.690***(0.253)	-0.062(0.313)
Observations	2,769	2,768	2,767	1,683	1,679	4,967	4,971	4,974	3,877	3,863

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3.14: Selection bias: Household wealth and sex of firstborn – Probit estimates

VARIABLES	Sex of firstborn					Wealth (Above median)				
	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions
Sex of firstborn (ref: Female)										
Male	0.168**(0.074)	0.164**(0.077)	0.191**(0.079)	0.184**(0.091)	0.196**(0.095)					
Sons (ref: none)										
At least one son						0.296***(0.066)	0.280***(0.070)	0.219***(0.068)	0.066(0.079)	0.223**(0.093)
Age	0.030***(0.005)	0.032***(0.006)	0.033***(0.006)	0.006(0.006)	0.011*(0.006)	0.028***(0.004)	0.032***(0.004)	0.033***(0.004)	0.010**(0.004)	0.022***(0.005)
Age difference	0.004(0.006)	0.012*(0.007)	0.013*(0.007)	-0.016**(0.007)	-0.011(0.008)	0.009(0.006)	0.014**(0.006)	0.008(0.006)	-0.008(0.006)	0.004(0.008)
Education (ref: none)										
Primary	0.146(0.105)	0.309***(0.109)	0.245**(0.113)	0.223*(0.133)	0.133(0.137)	0.112(0.082)	0.153*(0.087)	0.068(0.087)	0.075(0.092)	0.169*(0.102)
Secondary	0.227**(0.109)	0.168(0.112)	0.005(0.118)	-0.209(0.140)	0.001(0.143)	0.267***(0.079)	0.260***(0.082)	0.123(0.081)	0.090(0.087)	0.396***(0.101)
Higher	0.614***(0.131)	0.494***(0.134)	0.487***(0.141)	0.206(0.166)	0.696***(0.171)	0.399***(0.093)	0.388***(0.095)	0.249***(0.094)	0.210**(0.101)	0.643***(0.119)
Spouse education (ref: none)										
Primary	-0.020(0.112)	-0.018(0.109)	-0.166(0.113)	0.063(0.134)	-0.040(0.139)	-0.214**(0.104)	0.009(0.104)	-0.065(0.106)	-0.077(0.115)	-0.087(0.134)
Secondary	-0.032(0.099)	-0.139(0.102)	-0.130(0.107)	-0.170(0.122)	-0.213*(0.124)	-0.105(0.088)	-0.054(0.091)	-0.081(0.092)	-0.035(0.096)	-0.122(0.116)
Higher	0.010(0.119)	-0.044(0.120)	-0.011(0.125)	0.012(0.144)	-0.025(0.155)	-0.122(0.095)	-0.040(0.100)	-0.038(0.100)	-0.079(0.104)	-0.131(0.125)
Employed (ref: none)										
Yes	0.208**(0.095)	0.033(0.094)	0.056(0.098)	0.213*(0.110)	0.183(0.115)	0.269***(0.081)	0.413***(0.081)	0.361***(0.082)	0.228***(0.083)	0.468***(0.107)
Media exposure (ref: none)										
Occasionally	0.071(0.110)	0.070(0.111)	0.099(0.115)	0.089(0.130)	0.244*(0.133)	0.211**(0.104)	0.264**(0.105)	0.269***(0.104)	0.109(0.114)	0.218*(0.131)
Weekly	-0.257(0.278)	-0.854**(0.351)	-0.081(0.332)	-0.050(0.349)	-0.226(0.333)	-0.007(0.182)	0.200(0.172)	0.217(0.178)	-0.278(0.202)	-0.014(0.208)
Daily	0.066(0.101)	-0.019(0.103)	0.017(0.109)	0.146(0.121)	0.212*(0.126)	0.243***(0.091)	0.262***(0.092)	0.342***(0.092)	0.189*(0.100)	0.336***(0.113)
Family structure (ref: joint)										
Nuclear family	0.445***(0.078)	0.756***(0.079)	0.738***(0.081)	0.157*(0.093)	0.177*(0.099)	0.362***(0.072)	0.600***(0.073)	0.531***(0.072)	0.154*(0.086)	-0.014(0.101)
Household size						-0.025***(0.006)	-0.026***(0.007)	-0.031***(0.007)	-0.009(0.008)	-0.023***(0.008)
Place of residence (ref: rural)										
Urban	0.196**(0.091)	0.192**(0.096)	0.271***(0.097)	0.012(0.118)	0.104(0.124)	0.147**(0.064)	0.057(0.065)	0.079(0.065)	-0.019(0.072)	-0.012(0.084)
Province/ Region (ref: Islamabad)										
Punjab	0.007(0.124)	-0.185(0.126)	-0.126(0.133)	0.184(0.148)	0.176(0.179)	0.067(0.069)	-0.023(0.070)	-0.044(0.069)	0.150**(0.071)	0.001(0.091)
Sindh	0.168(0.125)	-0.161(0.126)	-0.257*(0.133)	-0.107(0.150)	-0.056(0.179)	0.324***(0.072)	0.091(0.073)	-0.029(0.072)	0.052(0.073)	0.117(0.098)
KPK	-0.670***(0.144)	-0.879***(0.150)	-0.853***(0.158)	-0.645***(0.172)	-0.78***(0.195)	-0.341***(0.085)	-0.531***(0.087)	-0.461***(0.086)	-0.191**(0.092)	-0.574***(0.106)
Gilgit-Baltistan	-0.001(0.181)	-0.061(0.188)	-0.608***(0.196)	-0.776***(0.215)	-0.394*(0.237)	-0.028(0.147)	0.160(0.166)	-0.027(0.151)	-0.081(0.168)	-0.284(0.242)
Balochistan	-0.377**(0.155)	-0.375**(0.158)	-0.438***(0.167)	-0.676***(0.175)	-0.84***(0.199)	-0.104(0.114)	-0.220*(0.119)	-0.262**(0.118)	-0.376***(0.114)	-0.588***(0.131)
Economic status (ref: poorest)										
Poorer	0.024(0.124)	0.173(0.126)	0.062(0.131)	0.194(0.146)	0.202(0.145)					
Middle	0.070(0.135)	0.118(0.138)	0.090(0.145)	0.151(0.162)	0.218(0.164)					
Rich	-0.167(0.149)	0.030(0.156)	-0.003(0.160)	0.314*(0.185)	0.225(0.189)					
Richest	-0.205(0.170)	-0.031(0.178)	-0.066(0.184)	0.183(0.221)	0.244(0.229)					
Marginal Effect	0.057**(0.025)	0.050**(0.023)	0.055**(0.023)	0.066**(0.032)	0.058**(0.027)	0.102***(0.023)	0.092***(0.023)	0.073***(0.023)	0.024(0.029)	0.054**(0.023)
Constant	-1.527***(0.216)	-1.690***(0.213)	-1.789***(0.223)	-0.396(0.242)	-0.226(0.264)	-1.507***(0.199)	-1.781***(0.204)	-1.686***(0.203)	-0.388*(0.217)	-0.250(0.271)
Observations	2,831	2,833	2,832	1,781	1,773	5,022	5,032	5,028	4,005	3,982

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

in treatment.

Results for PSM estimations given in Tables 3.15 and 3.16 show a picture similar to our probit and ordered probit estimations[8]. In the case of women with one or more sons, The ATT for participation in healthcare, social and consumption-related decisions is significant at least at the 10% level. The ATT for women with at least one son compared to women without a son is 6.4%, 7.3% and 5.3% for decisions pertaining to respondent's healthcare, social and consumption decisions respectively. These average effects are in line with the effects found with Probit estimations, and are even somewhat stronger. The impact on financial decisions is insignificant as before. The result for the aggregate decision indicator is likewise significant with an average effect of 6.3% (Column 5).

Table 3.15: Son Preference and female participation in decisionmaking - PSM estimates

Propensity score match	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions
Unmatched	0.072***	0.105***	0.103***	0.02	0.034**
ATT	0.0641*	0.073**	0.053*	0.036	0.063**
Observations	10,025	10,043	10,034	8,540	8,509

Source: Authors' calculations using PDHS 2012-2013. *** p<0.01, ** p<0.05, * p<0.1

We also carry out parity-wise matching estimations: two sets of households are considered with groups of women upto three children (parity <= 31) and those having more than three children (parity > 3) alternatively taken as treatment groups. As found previously, son preference is found to have a significant effect on female participation in non-financial decisions for upto the third parity beyond which no significant effect could be traced (Table 18). If anything, the

[8]Estimations are carried out using Stata user command psmatch2 developed by Leuven and Sianesi (2003).

Table 3.16: Son Preference and female participation in decisionmaking (Parity wise) - PSM estimates

	Parity<=3					Parity> 3				
Propensity score match	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions
Unmatched	0.067***	0.086***	0.085***	0.037*	0.071***	-0.089*	-0.04	-0.026	-0.039	-0.094*
ATT	0.057**	0.048*	0.043*	0.047	0.061**	-0.062	-0.066	-0.044	-0.082	-0.11
Observations	4,908	4,911	4,910	3,792	3,785	4,968	4,983	4,975	4,607	4,724

Source: Authors' calculations using PDHS 2012-2013. *** p<0.01, ** p<0.05, * p<0.1

negative signs of ATT for parity above three points to a decreasing female participation in household decisions (Columns 6 – 10).

Table 3.17 shows IPW and AIPW estimates. Results of both the estimators are qualitatively similar to previous findings. For instance, the ATT for the aggregate decisions for both the techniques is found to be 6% as compared to 6.3% for PSM and 6.4% marginal effect for the baseline probit estimation. Having one or more sons leads to 6% higher participation in at least one out of four types of household decisions compared with women without a son.

The close similarity of our matching estimates with the baseline probit estimates makes us reasonably confident of the sign and significance of our estimation results.

We graphically assess common support for treatment and control groups used in PSM estimations (Figure B1). Graphs for the five decision estimations are similar and show satisfactory overlapping scores for households with no and at least one son. We explore the balancing properties of covariates across the treatment and control groups[9]. The results of propensity balance check presented in table 3.18 show that the standardised mean difference for the treated and untreated covariates is small. Standardised difference for most of the covariates are round or less than 10%, indicating adequate balancing.

Finally, we check the robustness of our matching estimates to selection on unobservables by performing the Rosenbaum bounds test (Paul R Rosenbaum, 2002)[10]. Table 3.19 and 3.20 reports the minimum and maximum values for the Mantel-Haenszel bounds along with their significance levels for participation in healthcare decisions. Results for this and other decision estimations are significant at 10% or less except for the financial affairs estimation. For healthcare

[9]We use Stata's pbalchk user command (Lunt, 2007) for this purpose.

[10]We use the Stata user command mhbounds Becker and Caliendo (2007) for this purpose.

Table 3.17: Son Preference and female participation in decisionmaking – IPW and AIPW estimates

Inverse-Probability weights	(1)		(2)		(3)		(4)		(5)	
	Healthcare decisions	POmean	Social decisions	POmean	Consumption decisions	POmean	Financial decisions	POmean	All decisions	POmean
ATE	0.045**	0.455***	0.041*	0.459***	0.041*	0.418***	0.041	.0452***	0.059**	0.620***
	(-0.022)	(-0.021)	(-0.022)	(-0.022)	(-0.021)	(-0.021)	(-0.026)	(-0.026)	(-0.027)	(-0.027)
ATET	0.047**	0.458***	0.042*	0.466***	0.042*	0.425***	0.043	0.450***	0.060**	0.617***
	(-0.024)	(-0.023)	(-0.024)	(-0.024)	(-0.023)	(-0.023)	(-0.029)	(-0.028)	(-0.03)	(-0.029)
Observation	10,017	10,017	10,035	10,035	10,026	10,026	8,532	8,532	8,497	8,497
Augmented IPW										
ATE	0.044*	0.456***	0.038*	0.462***	0.038*	0.421***	0.042	0.451***	0.061*	0.618***
	(-0.022)	(-0.022)	(-0.023)	(-0.022)	(-0.022)	(-0.022)	(-0.0280	(-0.027)	(-0.029)	(-0.029)
Observation	10,017	10,017	10,035	10,035	10,026	10,026	8,532	8,532	8,497	8,497

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3.18: Checking balance of confounders between treated and untreated-PSM

Variables	Mean in treated	Mean in Untreated	Standardised diff.
Age	34.54	28.03	0.858
Age difference	5.52	5.11	0.081
Education	0.79	1.15	-0.318
Employed	0.21	0.17	0.107
Media exposure	1.63	1.75	-0.096
Family structure	0.73	0.49	0.511
Household size	9.02	8.64	0.073
Place of residence	0.48	0.53	-0.102
Province/ Region	3.45	3.3	0.097
Economic status	3.1	3.26	-0.107

Source: Authors' calculations using PDHS 2012-2013.

decisions, the results lose their significance at 10% at and beyond a Γ value of 1.2. The corresponding value of Γ for social and consumption decisions is 1.35 while that for all decisions is 1.1. Γ for financial matters is initially insignificant but turns significant for Γ at and above 1.2. These low values of Γ, however, are not atypical in social sciences.

3.6.5 Role of Woman's Health

Another possibility is that a woman's health may determine the extent of her say at home with weak or unhealthy women being able to participate less in intra-household decisions. We take into account this possible influence of a woman's unhealthiness by estimating the model on a subsample of women with unhealthy body mass index (below 18.5 or above 25). The son preference – decisionmaking relationship given in table 3.21 is found to have similar levels of significance as before.

Table 3.19: Sensitivity analysis-Son preference and female participation in household decision making

(a) Health decisions

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	3.979	3.979	0	0
1.05	3.217	4.743	0	0
1.1	2.492	5.473	0.006	0
1.15	1.8	6.172	0.035	0
1.2	1.138	6.843	0.127	0
1.25	0.504	7.49	0.307	0
1.3	0.041	8.113	0.483	0
1.35	0.627	8.714	0.265	0
1.4	1.192	9.296	0.116	0
1.45	1.738	9.859	0.041	0
1.5	2.266	10.405	0.011	0

(b) Social decisions

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	5.471	5.471	0	0
1.05	4.709	6.235	0	0
1.1	3.985	6.965	0	0
1.15	3.295	7.666	0	0
1.2	2.635	8.339	0.004	0
1.25	2.002	8.987	0.023	0
1.3	1.395	9.613	0.081	0
1.35	0.812	10.217	0.208	0
1.4	0.249	10.801	0.402	0
1.45	0.228	11.368	0.41	0
1.5	0.752	11.918	0.226	0

(c) Consumption decisions

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	5.38	5.38	0	0
1.05	4.631	6.131	0	0
1.1	3.918	6.85	0	0
1.15	3.239	7.539	0.001	0
1.2	2.59	8.202	0.005	0
1.25	1.968	8.839	0.025	0
1.3	1.371	9.455	0.085	0
1.35	0.796	10.049	0.213	0
1.4	0.243	10.624	0.404	0
1.45	0.224	11.181	0.411	0
1.5	0.74	11.722	0.23	0

(d) Financial decisions

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	0.727	0.727	0.234	0.234
1.05	0.06	1.394	0.476	0.082
1.1	0.502	2.031	0.308	0.021
1.15	1.11	2.64	0.134	0.004
1.2	1.692	3.224	0.045	0.001
1.25	2.251	3.786	0.012	0
1.3	2.789	4.326	0.003	0
1.35	3.307	4.847	0	0
1.4	3.807	5.35	0	0
1.45	4.29	5.837	0	0
1.5	4.758	6.309	0	0

(e) All decisions

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	2.282	2.282	0.011	0.011
1.05	1.64	2.925	0.051	0.002
1.1	1.028	3.54	0.152	0
1.15	0.444	4.129	0.329	0
1.2	0.039	4.694	0.484	0
1.25	0.576	5.238	0.282	0
1.3	1.092	5.762	0.137	0
1.35	1.589	6.268	0.056	0
1.4	2.068	6.757	0.019	0
1.45	2.53	7.23	0.006	0
1.5	2.978	7.69	0.001	0

Table 3.20: Sensitivity analysis-Son preference and female participation in household decision making-Parity Wise

(a) Health decisions (Parity≤ 3)

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	3.22	3.22	0.001	0.001
1.05	2.551	3.891	0.005	0
1.1	1.913	4.532	0.028	0
1.15	1.304	5.145	0.096	0
1.2	0.721	5.734	0.235	0
1.25	0.162	6.299	0.436	0
1.3	0.302	6.844	0.381	0
1.35	0.818	7.369	0.207	0
1.4	1.316	7.877	0.094	0
1.45	1.797	8.368	0.036	0
1.5	2.261	8.843	0.012	0

(b) Health decisions (Parity>3)

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	1.741	1.741	0.041	0.041
1.05	1.993	1.491	0.023	0.068
1.1	2.233	1.253	0.013	0.105
1.15	2.465	1.026	0.007	0.152
1.2	2.687	0.809	0.004	0.209
1.25	2.901	0.602	0.002	0.274
1.3	3.108	0.402	0.001	0.344
1.35	3.308	0.211	0	0.417
1.4	3.502	0.026	0	0.49
1.45	3.691	-0.046	0	0.518
1.5	3.873	0.125	0	0.45

(c) Social decisions (Parity≤ 3)

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	4.28	4.28	0	0
1.05	3.61	4.952	0	0
1.1	2.971	5.594	0.001	0
1.15	2.362	6.209	0.009	0
1.2	1.779	6.799	0.038	0
1.25	1.22	7.367	0.111	0
1.3	0.684	7.914	0.247	0
1.35	0.168	8.441	0.433	0
1.4	0.256	8.951	0.399	0
1.45	0.736	9.445	0.231	0
1.5	1.199	9.923	0.115	0

(d) Social decisions (Parity>3)

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	0.726	0.726	0.234	0.234
1.05	0.978	0.475	0.164	0.317
1.1	1.218	0.236	0.112	0.407
1.15	1.448	0.008	0.074	0.497
1.2	1.669	0.016	0.048	0.494
1.25	1.882	0.225	0.03	0.411
1.3	2.087	0.426	0.018	0.335
1.35	2.285	0.62	0.011	0.268
1.4	2.477	0.807	0.007	0.21
1.45	2.662	0.987	0.004	0.162
1.5	2.842	1.162	0.002	0.123

(e) Consumption decisions (Parity≤ 3)

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	3.976	3.976	0	0
1.05	3.318	4.636	0	0
1.1	2.691	5.266	0.004	0
1.15	2.093	5.869	0.018	0
1.2	1.521	6.449	0.064	0
1.25	0.973	7.005	0.165	0
1.3	0.446	7.542	0.328	0
1.35	-0.014	8.059	0.506	0
1.4	0.474	8.56	0.318	0
1.45	0.945	9.043	0.172	0
1.5	1.4	9.512	0.081	0

(f) Consumption decisions (Parity>3)

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	0.449	0.449	0.327	0.327
1.05	0.702	0.196	0.241	0.422
1.1	0.944	-0.045	0.172	0.518
1.15	1.176	0.082	0.12	0.467
1.2	1.398	0.303	0.081	0.381
1.25	1.612	0.515	0.054	0.303
1.3	1.818	0.718	0.035	0.236
1.35	2.016	0.914	0.022	0.18
1.4	2.209	1.103	0.014	0.135
1.45	2.395	1.286	0.008	0.099
1.5	2.575	1.463	0.005	0.072

(g) Financial decisions (Parity≤ 3)

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	0.874	0.874	0.191	0.191
1.05	0.288	1.46	0.387	0.072
1.1	0.187	2.02	0.426	0.022
1.15	0.721	2.555	0.235	0.005
1.2	1.232	3.068	0.109	0.001
1.25	1.723	3.56	0.042	0
1.3	2.195	4.034	0.014	0
1.35	2.649	4.491	0.004	0
1.4	3.087	4.932	0.001	0
1.45	3.511	5.359	0	0
1.5	3.92	5.772	0	0

(h) Financial decisions (Parity>3)

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	0.671	0.671	0.251	0.251
1.05	0.911	0.431	0.181	0.333
1.1	1.141	0.202	0.127	0.42
1.15	1.362	-0.017	0.087	0.507
1.2	1.573	0.023	0.058	0.491
1.25	1.777	0.223	0.038	0.412
1.3	1.973	0.416	0.024	0.339
1.35	2.162	0.602	0.015	0.274
1.4	2.345	0.781	0.01	0.218
1.45	2.523	0.954	0.006	0.17
1.5	2.695	1.121	0.004	0.131

(i) All decisions (Parity≤ 3)

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	4.244	4.244	0	0
1.05	3.68	4.811	0	0
1.1	3.143	5.353	0.001	0
1.15	2.631	5.871	0.004	0
1.2	2.141	6.37	0.016	0
1.25	1.672	6.85	0.047	0
1.3	1.221	7.313	0.111	0
1.35	0.788	7.76	0.215	0
1.4	0.37	8.192	0.356	0
1.45	-0.032	8.611	0.513	0
1.5	0.334	9.018	0.369	0

(j) All decisions (Parity>3)

Gamma (Γ)	Mantel-Haenszel bounds		Significance level	
	Maximum	Minimum	Maximum	Minimum
1	1.858	1.858	0.032	0.032
1.05	2.071	1.646	0.019	0.05
1.1	2.275	1.445	0.011	0.074
1.15	2.471	1.254	0.007	0.105
1.2	2.66	1.071	0.004	0.142
1.25	2.842	0.896	0.002	0.185
1.3	3.018	0.729	0.001	0.233
1.35	3.188	0.568	0.001	0.285
1.4	3.354	0.413	0	0.34
1.45	3.514	0.263	0	0.396
1.5	3.67	0.119	0	0.453

Table 3.21: Son Preference and female participation in decisionmaking (women with 'unhealthy' BMI) - probit estimation

VARIABLES	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions
Sons (ref: none)					
At least one son	0.230**(0.110)	0.274**(0.114)	0.192*(0.112)	0.172(0.125)	0.222*(0.131)
Age	0.031***(0.006)	0.032***(0.006)	0.031***(0.006)	0.005(0.006)	0.018***(0.006)
Age difference	0.002(0.008)	0.006(0.008)	0.006(0.008)	-0.002(0.008)	0.004(0.010)
Education (ref: none)					
Primary	0.052(0.128)	0.089(0.134)	-0.148(0.134)	0.043(0.146)	0.199(0.162)
Secondary	0.114(0.139)	0.128(0.142)	-0.046(0.143)	0.093(0.155)	0.293*(0.168)
Higher	0.254(0.181)	0.311*(0.173)	0.017(0.172)	0.462**(0.191)	0.856***(0.220)
Spouse education (ref: none)					
Primary	-0.041(0.125)	0.078(0.127)	0.035(0.129)	0.084(0.137)	0.109(0.147)
Secondary	-0.036(0.117)	-0.039(0.120)	0.060(0.119)	-0.158(0.128)	-0.058(0.137)
Higher	0.163(0.143)	0.032(0.143)	0.181(0.143)	-0.123(0.150)	-0.002(0.168)
Employed (ref: none)					
Yes	0.199**(0.101)	0.285***(0.101)	0.360***(0.100)	0.154(0.107)	0.251**(0.113)
Media exposure (ref: none)					
occasionally	0.136(0.126)	0.031(0.130)	0.200(0.132)	-0.074(0.137)	0.004(0.156)
Weekly	-0.264(0.243)	-0.230(0.242)	-0.327(0.259)	-0.080(0.251)	-0.151(0.259)
Daily	0.166(0.116)	0.034(0.122)	0.068(0.120)	-0.035(0.128)	0.140(0.141)
Family structure (ref: joint)					
Nuclear family	0.187(0.115)	0.515***(0.120)	0.425***(0.121)	0.342**(0.136)	0.123(0.147)
Household size	-0.033***(0.011)	-0.044***(0.013)	-0.046***(0.013)	-0.008(0.012)	-0.021(0.013)
Place of residence (ref: rural)					
Urban	0.202*(0.110)	0.065(0.109)	0.031(0.110)	0.131(0.115)	-0.017(0.126)
Province/ Region (ref: Islamabad)					
Punjab	0.474***(0.135)	0.115(0.135)	0.149(0.136)	0.633***(0.137)	0.453***(0.161)
Sindh	0.273*(0.142)	-0.038(0.145)	-0.277*(0.144)	0.087(0.143)	-0.053(0.168)
KPK	-0.155(0.153)	-0.471***(0.153)	-0.520***(0.154)	-0.046(0.160)	-0.237(0.176)
Gilgit-Baltistan	0.059(0.225)	0.207(0.236)	-0.251(0.212)	-0.305(0.225)	0.159(0.250)
Balochistan	-0.496***(0.181)	-0.751***(0.188)	-0.791***(0.189)	-0.595***(0.187)	-0.900***(0.198)
Economic status (ref: poorest)					
Poorer	0.163(0.158)	0.087(0.164)	0.076(0.165)	0.083(0.166)	0.163(0.173)
Middle	-0.028(0.169)	0.171(0.176)	0.035(0.178)	0.134(0.181)	0.090(0.197)
Rich	0.012(0.184)	0.208(0.189)	0.151(0.192)	-0.022(0.200)	0.193(0.221)
Richest	-0.042(0.212)	0.211(0.214)	0.302(0.217)	0.155(0.226)	0.269(0.247)
Marginal Effect	0.080**(0.038)	0.091**(0.038)	0.063*(0.037)	0.061(0.045)	0.062*(0.038)
Constant	-1.588***(0.269)	-1.547***(0.277)	-1.374***(0.278)	-0.786***(0.297)	-0.663**(0.322)
Observations	1,937	1,938	1,938	1,633	1,630

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

3.6.6 Alternative Controls

A woman's status at home may vary depending upon the number of children she bears. We control for this possibility by including the number of children in the model. Similarly, the indicator of wealth in the DHS dataset is an asset-based composite index which may not accurately capture a household's wealth. We substitute this index by a strong indicator of household wealth, namely ownership of a car.

Results of these two estimations shown in tables 3.22 and 3.23 do not vary significantly from those of the baseline model. A woman's participation in household decisions increases in the number of children she bears and does not vary by wealth.

We also check whether the non linearity of age affects the son preference – decisionmaking relationship by introducing a quadratic term in the model. The squared age variable is mostly found to be insignificant and does not alter the relationship in question (Results given in Table B1 in the appendix).

3.6.7 Other Measures of Female Agency

Finally, we estimate the association between preference for male child and objective measures of women's empowerment. Table 3.24 shows estimations with woman's Body Mass Index (BMI) and her employment status as dependent variables.

Son preference has a positive relationship with a woman's employment status. The effect on her BMI is interesting: while the likelihood of a woman being underweight (BMI less than 18.5) or of normal weight (BMI between 18.5 and 24.9) is lower among women with at least one son, opposite is true for the likelihood

Table 3.22: Son Preference and female participation in decisionmaking (number of children as control) – probit estimation

VARIABLES	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions
Sons (ref: none)					
At least one son	0.150***(0.054)	0.199***(0.059)	0.159***(0.061)	0.069(0.065)	0.239***(0.071)
Age	0.025***(0.003)	0.029***(0.004)	0.030***(0.003)	0.009***(0.003)	0.020***(0.004)
Age difference	0.007**(0.004)	0.011***(0.003)	0.008**(0.004)	-0.002(0.004)	0.001(0.005)
Education (ref: none)					
Primary	0.067(0.051)	0.149***(0.056)	0.042(0.054)	0.058(0.068)	0.134*(0.069)
Secondary	0.261***(0.073)	0.163**(0.065)	0.154**(0.070)	0.095(0.086)	0.299***(0.095)
Higher	0.468***(0.097)	0.407***(0.095)	0.379***(0.095)	0.165(0.105)	0.626***(0.111)
Spouse education (ref: none)					
Primary	-0.140**(0.061)	-0.010(0.059)	-0.067(0.064)	-0.078(0.068)	-0.044(0.066)
Secondary	-0.030(0.054)	-0.026(0.057)	-0.031(0.056)	-0.088(0.057)	-0.052(0.059)
Higher	0.009(0.067)	0.026(0.071)	0.027(0.077)	-0.104(0.071)	-0.018(0.085)
Employed (ref: none)					
Yes	0.196***(0.049)	0.215***(0.043)	0.252***(0.049)	0.183***(0.055)	0.255***(0.053)
Media exposure (ref: none)					
Occasionally	0.123**(0.060)	0.107*(0.058)	0.125*(0.065)	0.092(0.063)	0.218***(0.065)
Weekly	-0.037(0.112)	0.003(0.118)	0.132(0.105)	-0.067(0.140)	0.140(0.139)
Daily	0.151***(0.056)	0.135**(0.054)	0.175***(0.053)	0.103*(0.058)	0.188***(0.065)
Family structure (ref: joint)					
Nuclear family	0.465***(0.045)	0.663***(0.049)	0.651***(0.046)	0.189***(0.055)	0.137**(0.064)
Total Children	-0.025**(0.011)	-0.023**(0.011)	-0.030***(0.011)	-0.030***(0.011)	-0.041***(0.012)
Place of residence (ref: rural)					
Urban	0.230***(0.066)	0.178***(0.059)	0.192***(0.059)	0.129*(0.068)	0.161*(0.083)
Province/ Region (ref: Islamabad)					
Punjab	0.288***(0.079)	0.158**(0.062)	0.161**(0.074)	0.255***(0.086)	0.249***(0.092)
Sindh	0.021(0.088)	-0.167**(0.073)	-0.305***(0.083)	-0.158*(0.096)	-0.300***(0.095)
KPK	-0.277***(0.091)	-0.410***(0.079)	-0.381***(0.090)	-0.287***(0.100)	-0.403***(0.102)
Gilgit-Baltistan	-0.175(0.161)	-0.149(0.165)	-0.458***(0.134)	-0.700***(0.137)	-0.504***(0.180)
Balochistan	-0.534***(0.122)	-0.652***(0.113)	-0.699***(0.124)	-0.659***(0.127)	-0.942***(0.128)
Economic status (ref: poorest)					
Poorer	0.194***(0.063)	0.196***(0.065)	0.202***(0.064)	0.304***(0.063)	0.149*(0.087)
Middle	0.099(0.081)	0.117(0.071)	0.131*(0.071)	0.316***(0.082)	0.198**(0.083)
Rich	0.075(0.088)	0.089(0.075)	0.091(0.078)	0.213**(0.092)	0.146(0.094)
Richest	0.002(0.105)	0.080(0.096)	0.038(0.095)	0.229*(0.117)	0.171(0.113)
Marginal effect	0.052***(0.019)	0.068***(0.020)	0.054***(0.020)	0.025(0.023)	0.069***(0.021)
Constant	-1.585***(0.141)	-1.831***(0.128)	-1.842***(0.137)	-0.585***(0.142)	-0.577***(0.148)
Observations	10,017	10,035	10,026	8,532	8,497

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 3.23: Son Preference and female participation in decisionmaking (Alternative wealth indicator) – probit estimation

VARIABLES	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions	All decisions
Sons (ref: none)					
At least one son	0.127**(0.051)	0.216***(0.054)	0.187***(0.060)	0.045(0.062)	0.227***(0.066)
Age	0.024***(0.003)	0.029***(0.003)	0.030***(0.003)	0.008***(0.003)	0.019***(0.003)
Age difference	0.007**(0.004)	0.010***(0.003)	0.008**(0.004)	-0.001(0.004)	0.003(0.005)
Education (ref: none)					
Primary	0.067(0.050)	0.142**(0.056)	0.031(0.054)	0.076(0.063)	0.150**(0.069)
Secondary	0.213***(0.071)	0.159**(0.064)	0.128*(0.071)	0.107(0.081)	0.319***(0.086)
Higher	0.429***(0.099)	0.353***(0.100)	0.314***(0.098)	0.214**(0.098)	0.648***(0.113)
Spouse education (ref: none)					
Primary	-0.120*(0.061)	0.015(0.061)	-0.037(0.064)	-0.043(0.069)	-0.015(0.067)
Secondary	-0.013(0.053)	-0.004(0.054)	-0.004(0.053)	-0.037(0.057)	-0.017(0.057)
Higher	0.011(0.063)	0.030(0.066)	0.031(0.075)	-0.066(0.071)	0.026(0.084)
Employed (ref: none)					
Yes	0.176***(0.053)	0.194***(0.045)	0.235***(0.052)	0.146***(0.056)	0.219***(0.055)
Media exposure (ref: none)					
Occasionally	0.148**(0.059)	0.138**(0.059)	0.143**(0.065)	0.140**(0.063)	0.253***(0.063)
Weekly	0.000(0.114)	0.048(0.113)	0.176*(0.106)	0.003(0.144)	0.213(0.131)
Daily	0.182***(0.056)	0.163***(0.054)	0.204***(0.054)	0.167***(0.059)	0.232***(0.063)
Family structure (ref: joint)					
Nuclear family	0.305***(0.054)	0.483***(0.063)	0.433***(0.059)	0.089(0.066)	-0.092(0.073)
Household size	-0.035***(0.007)	-0.044***(0.007)	-0.052***(0.008)	-0.022***(0.007)	-0.039***(0.008)
Place of residence (ref: rural)					
Urban	0.209***(0.062)	0.160***(0.054)	0.165***(0.051)	0.135**(0.066)	0.188**(0.073)
Province/ Region (ref: Islamabad)					
Punjab	0.282***(0.082)	0.173***(0.066)	0.154*(0.080)	0.253***(0.089)	0.253***(0.097)
Sindh	0.006(0.089)	-0.159**(0.077)	-0.324***(0.087)	-0.206**(0.096)	-0.338***(0.100)
KPK	-0.251***(0.092)	-0.362***(0.081)	-0.353***(0.093)	-0.272***(0.100)	-0.399***(0.105)
Gilgit-Baltistan	-0.168(0.157)	-0.119(0.163)	-0.443***(0.134)	-0.744***(0.135)	-0.567***(0.180)
Balochistan	-0.464***(0.130)	-0.554***(0.125)	-0.610***(0.136)	-0.655***(0.135)	-0.900***(0.139)
Have a car (ref: no)					
Yes	-0.091(0.085)	0.029(0.073)	-0.050(0.081)	-0.050(0.074)	-0.005(0.101)
Marginal effect	0.044**(0.017)	0.073***(0.018)	0.062***(0.020)	0.016(0.022)	0.065***(0.020)
Constant	-1.145***(0.141)	-1.398***(0.139)	-1.304***(0.150)	-0.040392	-0.130(0.162)
Observations	9,790	9,806	9,797	8,350	8,317

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

of being overweight (BMI between 25 and 29.9) and obese (BMI above 30). In Pakistan, women's weight is often a reflection of her socioeconomic status[11]. These findings provide tentative support to the argument that women with sons enjoy improvements in her domestic life.

Table 3.24: Son preference and other measures of female empowerment (woman's BMI and labour force participation)

VARIABLES	Body mass index (BMI)	Ordered probit marginal effects for given bmi				Women employed	Probit marginal effect for women employed
		Underweight<18.5	Normal 18.5-24.9	Overweight 25-29.9	Obese 30 or greater		
Sons (ref: none)							
At least one son	0.227***	-0.050***	-0.035***	0.037***	0.048***	0.168***	0.053***
	(-0.058)	(-0.013)	(-0.008)	(-0.01)	(-0.011)	(-0.044)	(-0.013)
Constant cut1	-0.974***						
	(-0.058)						
Constant cut2	0.449***						
	(-0.053)						
Constant cut3	1.237***						
	(-0.057)						
Constant						-0.753*** (0.039)	
Observations	3,920	3,920	3,920	3,920	3,920	11,487	11,487

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

3.6.8 Placebo Tests

Given the non-experimental cross-sectional nature of our survey data and the fact that the outcomes and covariates of interest are demographic indicators, devising suitable placebo tests is challenging. We alternately replace the decisionmaking outcome variables by a couple of variables which should plausibly not be related to our covariate of interest:

First, consanguineous marriages are widespread throughout the country. The fact the couple is related should not depend on whether it later on has one or more sons. Table 3.25 shows the estimation using the incidence of consanguineous

[11] For instance, women with above median wealth in PDHS have a BMI of 29.1 compared with 24.3 for women with below median wealth.

marriage as outcome. The association with the son preference variable expectedly appears to be highly insignificant (P-value = 0.85). Subsequent columns respectively show sets of estimations on the subsample of related couples and those who do not declare themselves to be related. The two sets of results are highly similar and corroborate the baseline findings.

Second, we can reasonably argue that whether or not the husband works does not depend on whether or not he has a son. Third, we employ a seemingly absurd outcome variable: whether the survey team visited the house once or more. Both these variables should in principle be independent of whether or not the woman has a son.

As expected, the results of these estimations given in table 3.26 are invariably insignificant.

3.6.9 Testing Multiple Hypotheses

We carry out Multivariate analysis of variance and covariance (MANOVA) tests using our five decision variables and the binary son preference variable. Results of the four statistics (Wilks' lambda, Pillai's trace, Lawley–Hotelling trace, and Roy's largest roo) given in table 3.27 all show that the null hypothesis of equality of means is rejected at the 1% level of significance.

We also employ Bonferroni correction for testing the statistical significance of the regression coefficients of our covariates of interest. The method corrects for the P values when multiple tests are simultaneously performed on the same data. Table 3.28 Shows Bonferroni corrections for ten pair-wise comparisons taking the health decision estimation as the first. We find that eight out of ten pairs are significantly different at the 5% level or better according to the P values shown

Table 3.25: Son Preference and consanguineous marriages – probit estimations

VARIABLES	Consanguineous marriage (cm)	Healthcare decisions-cm		Social decisions-cm		Consumption decisions-cm		Financial decisions-cm		All decisions-cm	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Sons (ref: none)											
At least one son	0.010(0.055)	0.124*(0.068)	0.191**(0.082)	0.222***(0.070)	0.197**(0.089)	0.193**(0.077)	0.134*(0.084)	0.074(0.083)	-0.002(0.090)	0.195**(0.097)	0.285**(0.112)
Age	-0.000(0.003)	0.024***(0.003)	0.025***(0.004)	0.030***(0.004)	0.028***(0.005)	0.030***(0.004)	0.030***(0.005)	0.005(0.004)	0.008*(0.005)	0.019***(0.004)	0.015***(0.005)
Age difference	-0.014***(0.003)	0.009*(0.005)	0.002(0.007)	0.011**(0.005)	0.009(0.006)	0.011**(0.005)	0.004(0.006)	0.000(0.005)	-0.006(0.006)	0.001(0.006)	0.001(0.007)
Women education (ref: none)											
Primary	-0.045(0.060)	0.083(0.069)	0.014(0.098)	0.185**(0.073)	0.027(0.099)	0.051(0.067)	-0.030(0.098)	0.121(0.085)	-0.070(0.098)	0.168*(0.091)	0.045(0.115)
Secondary	-0.225***(0.060)	0.245**(0.100)	0.189*(0.099)	0.150*(0.089)	0.064(0.086)	0.155*(0.089)	0.048(0.100)	0.124(0.119)	0.016(0.104)	0.262*(0.143)	0.255**(0.105)
Higher	-0.566***(0.078)	0.513***(0.130)	0.281**(0.130)	0.360***(0.126)	0.284**(0.122)	0.382***(0.124)	0.227*(0.128)	0.200(0.139)	0.114(0.128)	0.673***(0.145)	0.431***(0.154)
Spouse education (ref: none)											
Primary	0.130**(0.056)	-0.212***(0.075)	0.021(0.095)	-0.014(0.075)	0.011(0.089)	-0.078(0.080)	-0.025(0.100)	-0.011985	0.054(0.096)	-0.065(0.085)	-0.019(0.092)
Secondary	0.217***(0.053)	-0.061(0.061)	0.042(0.087)	0.003(0.066)	-0.037(0.085)	-0.007(0.063)	-0.043(0.087)	-0.115*(0.066)	-0.043(0.091)	-0.053(0.067)	-0.043(0.096)
Higher	0.337***(0.067)	0.005(0.080)	0.045(0.118)	0.050(0.093)	0.023(0.114)	0.047(0.096)	0.009(0.117)	-0.071(0.092)	-0.131(0.111)	-0.015(0.107)	0.027(0.133)
Women employed (ref: none)											
Yes	0.114**(0.055)	0.220***(0.057)	0.154*(0.085)	0.191***(0.051)	0.317***(0.085)	0.240***(0.056)	0.321***(0.085)	0.240***(0.061)	0.087(0.092)	0.263***(0.059)	0.258**(0.102)
Media exposure (ref: none)											
Occasionally	-0.051(0.053)	0.043(0.070)	0.287***(0.094)	0.004(0.074)	0.309***(0.097)	0.010(0.086)	0.352***(0.095)	0.033(0.078)	0.216**(0.092)	0.140*(0.078)	0.377***(0.109)
Weekly	0.118(0.128)	-0.053(0.142)	-0.004(0.217)	-0.118(0.138)	0.330*(0.200)	0.088(0.127)	0.247(0.207)	-0.039(0.166)	-0.144(0.245)	0.101(0.158)	0.236(0.238)
Daily	0.005(0.053)	0.094(0.066)	0.255***(0.090)	0.101(0.065)	0.198**(0.089)	0.131**(0.065)	0.257***(0.092)	0.080(0.073)	0.152*(0.088)	0.143*(0.082)	0.265**(0.109)
Family structure (ref: joint)											
Nuclear family	-0.095*(0.049)	0.265***(0.066)	0.331***(0.092)	0.422***(0.075)	0.464***(0.099)	0.369***(0.072)	0.418***(0.096)	0.027(0.082)	0.170*(0.101)	-0.107(0.089)	-0.004(0.117)
Household size	0.019***(0.005)	-0.029***(0.008)	-0.032***(0.010)	-0.043***(0.008)	-0.029***(0.010)	-0.050***(0.008)	-0.039***(0.011)	-0.023***(0.008)	-0.011(0.010)	-0.034***(0.008)	-0.038***(0.012)
Place of residence (ref: rural)											
Urban	-0.202***(0.061)	0.225***(0.081)	0.159*(0.090)	0.186***(0.066)	0.082(0.093)	0.167**(0.070)	0.153*(0.084)	0.166**(0.084)	0.026(0.087)	0.162(0.099)	0.058(0.115)
Province/ Region (ref: Islamabad)											
Punjab	0.016(0.085)	0.291***(0.105)	0.288**(0.112)	0.159*(0.085)	0.178*(0.101)	0.210**(0.092)	0.104(0.112)	0.270**(0.110)	0.217*(0.112)	0.285**(0.125)	0.211*(0.122)
Sindh	0.049(0.092)	-0.013(0.116)	0.152(0.110)	-0.204**(0.097)	-0.005(0.105)	-0.318***(0.101)	-0.175(0.114)	-0.270*(0.110)	-0.049(0.116)	-0.327***(0.126)	-0.152(0.123)
KPK region	-0.302***(0.094)	-0.279**(0.115)	-0.230*(0.121)	-0.357***(0.104)	-0.444***(0.121)	-0.321***(0.113)	-0.408***(0.123)	-0.332***(0.122)	-0.236*(0.129)	-0.337***(0.133)	-0.436***(0.131)
Gilgit-Baltistan	-0.685***(0.153)	-0.347(0.216)	0.026(0.167)	-0.302(0.216)	0.024(0.166)	-0.515***(0.190)	-0.363**(0.150)	-0.801***(0.187)	-0.638***(0.151)	-0.682***(0.240)	-0.248(0.171)
Balochistan	-0.159(0.113)	-0.503***(0.145)	-0.374**(0.168)	-0.567***(0.143)	-0.562***(0.149)	-0.552***(0.147)	-0.656***(0.168)	-0.642***(0.155)	-0.593***(0.158)	-0.907***(0.160)	-0.737***(0.168)
Economic status (ref: poorest)											
Poorer	-0.145(0.091)	0.182**(0.073)	0.306**(0.118)	0.239***(0.080)	0.109(0.119)	0.217***(0.076)	0.225*(0.115)	0.324***(0.070)	0.276**(0.124)	0.138(0.104)	0.254**(0.128)
Middle	-0.355***(0.099)	0.126(0.100)	0.136(0.136)	0.075(0.081)	0.191(0.135)	0.104(0.084)	0.219*(0.127)	0.378***(0.097)	0.225(0.144)	0.201**(0.094)	0.303*(0.161)
Rich	-0.531***(0.110)	0.011(0.107)	0.293**(0.147)	0.046(0.091)	0.187(0.142)	0.063(0.096)	0.229*(0.134)	0.209*(0.115)	0.261*(0.152)	0.042(0.111)	0.453***(0.167)
Richest	-0.434***(0.119)	0.004(0.133)	0.204(0.179)	0.138(0.123)	0.117(0.164)	0.152(0.117)	0.061(0.155)	0.258(0.161)	0.278(0.170)	0.194(0.153)	0.411**(0.201)
Marginal effect	0.003(0.019)	0.043*(0.024)	0.065**(0.028)	0.075***(0.023)	0.065**(0.029)	0.064**(0.025)	0.045*(0.028)	0.026(0.030)	-0.000(0.033)	0.058**(0.029)	0.076**(0.032)
Constant	0.723***(0.148)	-1.190***(0.175)	-1.485***(0.225)	-1.436***(0.161)	-1.508***(0.221)	-1.381***(0.171)	-1.476***(0.235)	-0.309(0.190)	-0.482**(0.231)	-0.179(0.191)	-0.319(0.246)
Observations	10,049	6,170	3,844	6,174	3,858	6,169	3,854	5,181	3,348	5,165	3,329

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 3.26: Son Preference, spouse's employment status and number of visits by the survey team – probit estimations

VARIABLES	Husband works	survey team visited once or more
Sons (ref: none)		
At least one son	0.128(0.102)	0.098(0.112)
Age	-0.029***(0.005)	0.004(0.007)
Age difference	-0.024***(0.007)	-0.002(0.007)
Women education (ref: none)		
Primary	0.088(0.116)	-0.199(0.124)
Secondary	-0.064(0.111)	-0.120(0.125)
Higher	0.189(0.167)	0.022(0.157)
Spouse education (ref: none)		
Primary	0.059(0.135)	0.054(0.119)
Secondary	-0.077(0.093)	0.057(0.108)
Higher	-0.106(0.122)	-0.051(0.132)
Women employed (ref: none)		
Yes	-0.096(0.096)	0.457***(0.082)
Media exposure (ref: none)		
Occasionally	0.315***(0.101)	0.031(0.135)
Weekly	0.145(0.214)	-0.336(0.228)
Daily	0.108(0.089)	-0.028(0.134)
Family structure (ref: joint)		
Nuclear family	0.161(0.099)	0.090(0.142)
Household size	0.016*(0.009)	0.020*(0.011)
Place of residence (ref: rural)		
Urban	0.171*(0.102)	0.106(0.110)
Province/ Region (ref: Islamabad)		
Punjab	-0.224(0.164)	-0.568***(0.120)
Sindh	0.034(0.171)	-0.666***(0.130)
KPK region	-0.650***(0.174)	-0.438***(0.141)
Gilgit-Baltistan	-0.970***(0.187)	-0.434**(0.216)
Balochistan	-0.672***(0.181)	-1.017***(0.205)
Economic status (ref: poorest)		
Poorer	0.011(0.090)	0.295(0.239)
Middle	-0.066(0.108)	0.359*(0.214)
Rich	-0.028(0.136)	0.208(0.238)
Richest	0.003(0.172)	0.487*(0.261)
Marginal effect	0.008(0.007)	0.005(0.005)
Constant	2.924***(0.258)	-2.298***(0.211)
Observations	10,052	10,052

Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

and nine out of ten pairs according to the t statistics.

3.7 Concluding Remarks

Duvendack and Palmer-Jones (2016) write:

"The association of women's agency with human development is a shibboleth of recent development studies and for many the nearest thing there is currently to

Table 3.27: Multivariate analysis of variance and covariance

Source	Statistic		df	F(df1, df2)		F	Prob>F
At least one son	W	0.998	1	5	8549	3.11	0.0083 e
	P	0.001		5	8549	3.11	0.0083 e
	L	0.001		5	8549	3.11	0.0083 e
	R	0.001		5	8549	3.11	0.0083 e
Residual	8553						
Total	8554						

Source: Authors' calculations using PDHS 2012-2013. W = Wilks' lambda, L = Lawley-Hotelling trace, P = Pillai's trace R = Roy's largest root e = exact, a = approximate, u = upper bound on F

Table 3.28: Bonferroni correction

Equations	Contrast	Std.Err.	Bonferroni	
			t	P>|t|
2 vs 1	0.007	0.007	1.12	1
3 vs 1	-0.031	0.006	-4.58	0
4 vs 1	-0.046	0.007	-6.3	0
5 vs 1	0.13	0.005	22.78	0
3 vs 2	-0.039	0.006	-6.31	0
4 vs 2	-0.053	0.007	-7.1	0
5 vs 2	0.123	0.005	22.51	0
4 vs 3	-0.014	0.007	-2.05	0.406
5 vs 3	0.162	0.006	26.13	0
5 vs 4	0.176	0.006	26.68	0

Authors' calculations using PDHS 2012-2013. 10 number of comparisons.

a magic bullet for human development".

Our analysis shows that a cause of improvement in female decisionmaking may well be the disproportionate preference for male child which in itself symbolizes perpetuation of discriminatory social status for women. This sheds a less glorious light on female participation in household decision making as seen from the perspective of women's empowerment. This, to a certain extent, explains the reason why women in the Indian Subcontinent show stronger preference for boys than do their husbands[12].

The finding also puts into question the adequacy of the commonly used variables

[12]For instance, the desired son to daughter ratio among Pakistani women is 108 compared to 106 among men (PDHS 2012-13).

of women's participation in household decision making as indicators of female empowerment.

We show that even the reported improvement in female participation in household decisions resulting from bearing sons is context-specific and depends on the nature of decisions being taken, parity and age at marriage. Compared to women with no sons, women having given birth to at least one son exercise more power in everyday decisions (those pertaining to healthcare, family visits and major household purchase items). For instance, let us consider two sets of households with similar characteristics, one with no son and the other with one son. In the first type of household, women have a 45% probability of making a decision on major household purchases either by themselves or in conjunction with their husbands. In contrast, the corresponding probability for households with one son is 50%.

The beneficial effect can be seen in households with one, two or three sons. The effect loses its potency beyond the third parity. From this reference point, sons are a normal good whose production improves the producer's bargaining power but with diminishing utility.

Besides, the balance of power does not change in decisions deemed strategic as bearing one or more sons does not lead to better participation in financial matters. Women's say in how to spend husband's income does not vary with the number of sons. This implies that husbands concede space to son-bearing wives only in non financial matters perceived to be of lesser importance. The gain in women's voice resulting from change in situation at home thus remains limited and context-specific.

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Chapter 4

Son Preference, Parity Transition and Birth Spacing in Pakistan

A version of this paper is under review in a peer-reviewed journal.

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Abstract

Son preference prevails widely in South and East Asia and is demonstrated by sex-selection methods such as differential stopping and sex-selective abortion. Differential birth-spacing is one example of how this disproportionate desire for sons could manifest itself. The time span before moving on to the next pregnancy may be short as long as sons have not been born. Shorter birth spacing leads to higher demand on the mother's body, leading to higher health risk to both mother and child. In addition there is greater competition among siblings for parental care and resources.

We study this phenomenon by using three demographic and health surveys of Pakistani households covering the period from 1990-91 to 2012-13. We investigate if and how preference for sons affects birth-spacing, if this relationship has evolved over time, if it depends on the order, number or overall proportion of sons born, and whether it increases the probability of risky births (those less than 24 or 18 months from the previous birth). We gauge the type of households in which this phenomenon appears to be more prevalent.

Using parametric, semi- and non-parametric estimation methods, we find strong evidence for differential behaviour at early parities throughout the period. Women whose two first children are both sons wait 13 to 17 percent longer before their third birth than women with no sons. Birth-spacing differs substantially by parity and number of children. Sex of the firstborn also plays a significant role. There is a higher probability of risky births. The phenomenon is prevalent more among households that are wealthier or nuclear and among older, more educated women with a greater say in intra-household decisions. These findings have important implications for maternal and child health outcomes in Pakistan.

Key words: Birth spacing; Gender bias; Pakistan; Risky birth; Son preference; Survival analysis.

JEL codes: D13; J13; O15; C13; Z13.

Résumé

L'espacement différencié entre les naissances est un exemple démontrant comment le phénomène de préférence pour les garçons peut se manifester. La période précédant la prochaine grossesse peut être courte tant que le nombre désiré des garçons n'est pas né. Une période limitée entre les naissances entraine plus de pression sur le corps des femmes, plus de risques en matière de santé pour la mère et son enfant. De plus, il existe une plus grande rivalité entre les enfants concernant les soins et les ressources des parents.
Nous étudions ce phénomène à partir de trois enquêtes démographiques et de santé réalisées auprès de différents ménages pakistanais de 1990-91 à 2012-2013. Nous voulons savoir si et comment la préférence pour les garçons affecte l'écart entre deux naissances, si cette relation évolue sur la période, si elle dépend de l'ordre de naissance, du nombre ou de la part de garçons nés, et si cela accroit la probabilité de naissances risquées.
Nous étudions également le profil de ménage où ce phénomène est plus récurrent. En utilisant des méthodes d'estimation paramétriques semi et non paramétriques, nous trouvons des indices forts en faveur d'espacement différencié pour les premières naissances tout au long de la période. Les femmes qui ont d'abord eu deux garçons attendent entre 13 et 17% plus de temps avant une troisième naissance que celles qui n'ont pas eu de garçons. L'espacement varie de façon significative par ordre des naissances et le nombre d'enfants. Le sexe du premier enfant également joue un rôle important. En outre il existe une probabilité plus forte de naissances risquées. Ce comportement est plus répandu dans les familles plus riches ou nucléaires, avec des femmes plus âgées, plus éduquées ou qui ont un poids plus important dans les prises de décision au sein du ménage. Ces résultats ont des répercussions importantes pour la santé maternelle et infantile au Pakistan.

Mots clés: Préférence pour les garçons ; Biais de genre ; Espacement des naissances; Ordre des naissances ; Pakistan.

JEL codes: D13; J13; O15; C13; Z13.

4.1 Introduction

"The harvest is so ripe, yet why are daughters still born?" (A proverb from the Indian subcontinent)

The phenomenon of son preference has increasingly gained attention in the recent past as age-old customs, in conjunction with greater demand for small families and availability of modern medical technology find expression in terms of sex-selective abortion, female infanticide and daughter neglect. Sen (1990) famously pointed out that there were more than a hundred million missing girls in Asia due to parents' son-preferring attitudes.

Where the sex-selection methods are unavailable or less accessible or are not considered socially acceptable, parent fertility remains incomplete until and unless the desired number of sons is achieved. One potential demographic consequence of this disproportionate desire for sons is the household's altered birth parity and birth spacing.

Couples with no sons at earlier parities may choose to shorten the interval to the next birth in search of male offspring (Milazzo, 2012). This shortening of birth spacing can have adverse effects on the mother's and children's health outcomes. There is a higher risk of maternal depletion, pregnancy-related complications and maternal mortality. Children with shorter preceding intervals face increased odds of both neonatal and under-five mortality, even though the impact may only appear in high parity births (Kozuki and Walker, 2013). Rutstein and Winter (2014) report 26 percent excess under–five mortality due to birth–to–conception intervals of less than 36 months. Greater stress on parental resources resulting from shorter intervals also affects the nutrition and health of existing children and worsens their chances of survival (sibling competition effect).

In this study, we investigate how preference for sons affects birth-to-birth intervals among Pakistani women. Pakistan is an interesting case study. It is the world's sixth most populous country with substantially biased sex ratios and high fertility rates. Under five and infant mortality rates at 78 and 64 per thousand births are also among the highest in Asia (PDHS, 2013). It is a Muslim-majority country where, unlike in China or India, sex-selective abortion remains limited[1](Javed and Mughal, 2018; Zaidi and Morgan, 2016).

Son preference therefore manifests itself through larger family size. The impact on spacing thus becomes an important issue, with possible repercussions on maternal and child health outcomes.

This study makes a number of contributions to the son preference literature:

First, we carry out a comprehensive examination of changes in birth spacing with respect to various aspects of son preference using a set of parametric, semi- and non-parametric estimations. We analyze parity-wise effects of observed preference for sons on subsequent birth spacing. We look at the differential impact of the number of sons born to a woman at a given parity. In addition, we gauge the effect of the sex of the eldest child and the overall son-to-child ratio on the waiting time to the subsequent birth.

We also check whether having one or more sons influences the length of the waiting period before the final birth and the use of contraceptives.

We obtain strong evidence for son preference at parity 1. This significant impact seems to dissipate beyond the second parity. Women whose two first children are both sons are found to wait 13 to 17 % longer before their third birth than women with no sons. Women with one or more sons who have not completed their fer-

[1]This largely owes to strong Islamic injunctions against female infanticide and foeticide. For instance, the Quran states: "and when the girl-child that was buried alive is made to ask (9) for what crime she had been slain" (Surah At-Takwir (Shrouding In Darkness) 81:8).

tility are also more likely to be using contraceptives compared with women with no sons.

Secondly, we study the son preference – spacing relationship using three demographic and health surveys of Pakistani households covering the period from 1990 to 2012. This allows us to understand the variation in the relationship over time. During this period, fertility rates in Pakistan have fallen[2] and contraceptive prevalence has picked up[3]. We find that the son preference – spacing association has survived over the years.

Thirdly, we investigate whether disproportionate preference for male offspring increases the probability of risky births (those less than 24 or 18 months from the previous birth). We find evidence for significantly higher incidence of risky births among women with no sons.

Fourthly, we explore the characteristics of women who show sex-selective interval shortening behaviour. We find that this behaviour is more common among women with greater say in intra-household decisions and decisions related to their health. The effect is also higher among wealthier, nuclear and urban households as well as among consanguineous couples.

The remaining content of the paper is organized as follows:

Section 4.2 briefly overviews extant relevant literature. Section 4.3 presents the spacing situation in Pakistan. Section 4.4 describes the datasets used and discusses the empirical methodology and the models employed. Findings are presented in Section 4.5 followed by robustness measures in Section 4.6. Section 4.7 concludes and discusses possible implications of the findings.

[2]The country's Total Fertility Rate (TFR) fell from 5.4 children per woman in 1990 (PDHS 1990-91) to 3.8 children per woman in 2012 (PDHS 2012-13).

[3]Pakistan's Contraceptive Prevalence Rate (CPR) grew from 12 percent in 1990 (PDHS 1990-91) to 35 percent in 2012 (PDHS 2012-13).

4.2 Overview of Related Literature

There is a large and burgeoning literature on fertility choices of couples in the presence of son preference in the developing countries. In one of the first studies in this area, Repetto (1972) reported that son preference and number of living sons were not among the factors that influence actual current fertility levels in Bangladesh, India and Morocco. Rahman and Vanzo (1993) found that for Bangladeshi woman with at least one daughter, the risk of a subsequent birth was negatively related to the number of sons already born.

Effects of son preference on fertility were also discussed in other studies on Asian countries (for example see Jiang, Li, and Sánchez-Barricarte (2016) on China, Arnold, Choe, and Roy (1998) and Pörtner (2015) on India, Pong (1994) on Malaysia, Tsay and Chu (2005) on Taiwan and J. Haughton and D. Haughton (1995) on Vietnam).

Studies such as Arnold (1985) and Ben-Porath and Welch (1976) argued that gender preferences in least developed countries manifested themselves through association between birth interval and child sex ratios. Tu (1991) showed that while most women in Shaanxi Province, China tried to have their first birth as soon as possible after their first marriage, the length of the second and third birth intervals and the likelihood of going on to have a second or third birth was strongly influenced by the sex composition of the children already born. Larsen, Chung, and Gupta (1998) showed that South Korean women who had a son were less likely to have another child, and those with a son who progressed to have another child took longer to conceive the child. This pattern prevailed for women of parity one, two, and three, and became more pronounced with higher parity.

Although a few studies have examined the role of son preference on fertility among Pakistani households, the interaction between preference for male child and birth spacing in the country yet remains unexplored.

In a pioneer study, Khan and Sirageldin (1977) reported that the negative inducement of the number of living sons in Pakistani households on the desire for additional children was three times that due to the number of living daughters, and was equally as true for wives' responses as for their spouses'. Besides this, the positive inducement of the deficit of surviving sons from the ideal number was two to three times that due to the deficit of surviving daughters from the ideal number. Similarly, Rukanuddin (1982) found that the tendency to compensate for child death was stronger among Pakistani couples having suffered the loss of a male child than those having suffered the loss of a female child. In contrast, De Tray (1984) found no clear evidence supporting an impact of son preference on fertility among Pakistani households.

Ali (1989) employed the Pakistan National Survey 1979-80 dataset and reported that the desire to have at least one son influenced the demand for additional children.

Finally, Hussain, Fikree, and Berendes (2000) conducted two rounds of household surveys (1990-91 and 1995) in Karachi, Pakistan's most populous city, and reported that the sex of surviving children was strongly correlated with the couple's subsequent fertility and contraceptive behaviour.

Channon (2017) likewise showed that the association of son preference with parity progression and modern contraceptive use had become stronger in Pakistan over time.

4.3 Overview of Birth Spacing Among Pakistani Couples

Average waiting time until the next birth among Pakistani couples is above World Health Organization's minimum endorsed benchmark of 24 months. Table 4.1 gives average succeeding birth intervals at parity 1, 2 and 3. In 2012-13, the average succeeding birth space at parity 1, 2 and 3 was reported to be 27.3, 29.2 and 29.5 months respectively. Average birth spacing has increased over time. In 2012, it was 1.1, 2.1 and 1.3 months above the 1990 levels for the first three parities respectively.

Birth space shows increase with birth order. Spacing is higher at parity 1 among poor households (28 months in 2012-13) compared with that of non poor households (26.9 months in 2012-13). This changes at subsequent parities with 28.2 months vs 29.8 months average waiting time between the second and the third child and 28.8 months vs 30 months between the third and the fourth child birth for poor and non-poor households respectively (2012-13).

Spacing patterns in rural and urban areas have evolved over time:

In 1990-91, rural women had longer waiting periods to subsequent births at all the three parities. This reversed for birth spacing at the second and the third parity during the 2000s with urban women showing significantly higher waiting periods than do rural women. This trend is also seen with respect to women employment status. The difference in average succeeding birth space is also evident relative to woman and spouse education. Spacing does not show much variation with the joint or nuclear nature of family structure.

Just under half of the total birth spaces between the first and the second child

Table 4.1: Overview of Average Birth Spacing

	1990-91			2006-07			2012-13		
	1-2	2-3	3-4	1-2	2-3	3-4	1-2	2-3	3-4
Overall	26.21	27.13	28.21	27.51	29.11	29.15	27.33	29.2	29.5
Education									
None	26.91	26.98	27.99	27.81	28.6	28.41	27.2	28.4	28.39
some schooling	23.85	27.67	29.1	26.85	30.33	31.23	27.53	30.61	31.88
Spouse Education									
None	26.4	27.28	27.79	28.18	29	28.51	26.87	28.14	28.64
some schooling	25.96	26.94	28.7	27.12	29.16	29.58	27.58	29.82	30.07
Women Employed									
No	26.01	27.12	28	27.61	29.08	29.39	27.47	29.53	30.08
Yes	27.24	27.22	29.27	27.26	29.2	28.57	27.01	28.42	28.13
Family Structure									
Joint	24.94	28.58	28.98	27.04	28.52	30.86	27.39	29.32	30.5
Nuclear	26.44	26.9	28.11	27.63	29.24	28.82	27.31	29.17	29.33
Place of Residence									
Rural	26.77	27.23	28.81	28.06	28.83	28.89	27.53	28.74	28.89
Urban	25.34	26.97	27.21	26.55	29.59	29.65	26.95	30.08	30.81
Economic Status									
Poor	25.85	27.72	29.74	28.35	28.44	28.15	28.05	28.22	28.81
Non-poor	26.34	26.89	27.59	27.04	29.49	29.77	26.92	29.77	29.96

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used.

are under 24 months, while 27 percent do not exceed 18 months (Table 4.2). The proportion of risky births decreases with parity.

Table 4.3 presents parity-wise statistics of subsequent birth spacing for women with at least one son. 50 percent of women with a first-born girl have a short subsequent birth spacing (less than 24 months) while 47 percent of women with a first-born son have a short birth interval. Similarly, 43 and 46 percent of women at parities 2 and 3, who have no sons, have a birth interval of under 24 months compared with 40 percent of women with at least one son. The proportion of women with short subsequent birth intervals decreases with the number of existing sons.

Table 4.2: Proportion of risky birth spacing (below 24 and 18 months)

	1990-91		2006-07		2012-13	
	<24 Months	>=24 Months	<24 Months	>=24 Months	<24 Months	>=24 Months
Parity 1	0.491	0.509	0.480	0.520	0.486	0.514
Parity 2	0.481	0.519	0.441	0.559	0.422	0.578
Parity 3	0.453	0.547	0.440	0.560	0.424	0.576
	<18 Months	>=18 Months	<18 Months	>=18 Months	<18 Months	>=18 Months
Parity 1	0.274	0.726	0.266	0.734	0.272	0.728
Parity 2	0.276	0.724	0.241	0.759	0.218	0.782
Parity 3	0.244	0.756	0.244	0.756	0.220	0.780

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used.

4.4 Empirical Strategy

4.4.1 Data Description

We employ data from three rounds of the Pakistan Demographic and Health Survey (PDHS). The PDHS is a nation-wide representative survey of ever-married women aged 15-49 which contains wide range information about women's health and reproductive history.

We restrict our sample to women having completed their fertility i.e. those who either gave the answer "want no more children" in response to the question "Do you desire more children?", those who or whose spouse had undergone sterilization, and those who report to be infecund. Nulliparous women and those with multiple births were excluded from the dataset.

The dataset contains information about birth history, birth order and spacing in descending birth order (from youngest to oldest child). We analyse the data in ascending order by inversing the birth information.

Our outcome variable is duration (in months) between parity n and $n+1$.

A number of indicators are taken to represent son preference. These correspond to the presence of at least one son at a given parity, total number of sons born,

Table 4.3: Parity-wise spacing of succeeding births

Parity		Mean and Proportion birth spacing (months)											
		1990-91				2006-07				2012-13			
		Mean	Std. Dev.	<24(%)	>=24(%)	Mean	Std. Dev.	<24(%)	>=24(%)	Mean	Std. Dev.	<24(%)	>=24(%)
Parity 1	No Son	25.20	13.87	50.75	49.25	26.67	15.90	50	50	26.31	16.13	50.18	49.82
	At least one son	27.05	16.24	47.75	52.25	28.22	16.96	46.33	53.67	28.19	17.93	47.21	52.79
Parity 2	No Son	26.52	14.77	48.71	51.29	27.17	16.63	48.26	51.74	28.05	16.20	43.75	56.25
	At least one son	27.29	16.70	47.98	52.02	29.65	17.81	42.99	57.01	29.51	17.36	41.73	58.27
Parity 3	No Son	27.61	18.96	48.12	51.88	27.76	13.57	46.38	53.62	29.42	19.65	43.87	56.13
	At least one son	28.28	15.88	44.93	55.07	29.32	17.70	43.74	56.26	29.50	17.11	42.27	57.73

Source: Author's calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used.

sex of the firstborn, presence of male children before the last birth, and the proportion of sons in total number of children. We control for individual factors (woman's age at marriage, age difference with the husband, current age, education, employment status, exposure to media), spouse factors (education) and household's demographic, economic and spatial information (family structure, household size, place of residence and household wealth).

Table 4.4 gives the definitions of the variables included in the study while Table 4.5 provides summary statistics of the variables.

54 percent of the women at parity 1 have a son in all the three subsets. The proportion of women with at least one son increases to 79 percent and 90 percent at the second and third parities respectively. Mean female age at marriage is low (17.9 in 1990-91 and 18.3 in 2012-13). Majority of women have no schooling (76 percent in 1990-91, 61 percent in 2012-13). A small proportion of women reports to be employed (16 percent in 1990-91, 28 percent in 2012-13).

An average household in the dataset is composed of eight members. Majority of the households are located in rural areas.

4.4.2 Methodology

Our analysis proceeds as follows:

In the first step, we explore the relationship between different son preference indicators and waiting time until the next birth. We limit the analysis to third parity, thereby focusing on the spacing effects of the second, third and fourth births. Respondents who did not experience subsequent birth were therefore censored. In addition to comparing birth intervals of women with and without a son at each parity, we look for the size effect of son preference by studying

Table 4.4: Definition and measurement of variables

Variable	Description
Birth space	Succeeding birth space in months at given parity n
At least one son	Dummy variable, takes the value of 1 if the female have at least a son at given parity n in total number of children, 0 otherwise
Number of sons	Number of sons at given parity n in total number of children born to a woman
All sons	Dummy variable, takes the value of 1 if the woman only had sons till the penultimate birth, 0 otherwise
Son ratio	Proportion of boys in the total number of children
Age at marriage	Woman's age at marriage
Age difference	Age difference of husband with his wife in years
Age	Woman's age in completed years
Education	Dummy variable, takes the value of 1 if the woman at least has primary education, 0 otherwise
Spouse education	Dummy variable, takes the value of 1 if the husband at least has primary education, 0 otherwise
Women employed	Dummy variable, takes the value of 1 if the female is employed, 0 otherwise
Media exposure	Dummy variable (PDHS 1990-1991), takes the value of 1 if the woman listens radio or watches television every week, 0 otherwise. Dummy variable (PDHS 2006-2007 and 2012-2013), takes the value of 1 if the woman watches television occasionally or weekly or daily, 0 otherwise
Family structure	Dummy variable, takes the value of 1 if the family is nuclear, 0 otherwise
Household size	Total number of family members in the household
Place of residence	Dummy variable, takes the value of 1 if the household resides in urban area, 0 otherwise
Economic Status	Dummy variable, takes the value 1 if the household belongs to top three wealth quintiles, 0 otherwise

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used.

how the number of sons influences the spacing patterns of a woman's succeeding births up to the third parity. We also analyse average spacing effects of having a firstborn male child and the overall ratio of sons to total numbers of children born to a woman (son ratio). We calculate the ratio for women who have given birth to at least two living children. We also check the impact of having borne sons on the interval to the last birth. Finally, we estimate the impact of having one or more sons on the woman's reported contraceptive use.

We carry out the aforementioned set of estimations on the three PDHS datasets and gauge the change in the relationship occurring over time.

In the second step, we study to what extent does preference for male offspring contributes to short-spaced or risky births with spacing below 24 or 18 months. Next, we determine the characteristics of women and their households that have

Table 4.5: Descriptive Statistics

Variable	1990-91		2006-07		2012-13	
	Proportion/Mean	Std. Dev.	Proportion/Mean	Std. Dev.	Proportion/Mean	Std. Dev.
At least one son at n parity in total number of children						
Parity 01						
No Son	0.45	0.49	0.45	0.49	0.45	0.49
At least one son	0.54		0.54		0.54	
Parity 02						
No Son	0.20	0.40	0.20	0.40	0.20	0.40
At least one son	0.79		0.79		0.79	
Parity 03						
No Son	0.09	0.29	0.10	0.30	0.10	0.29
At least one son	0.90		0.89		0.90	
Number of sons at n parity in total number of children						
Parity 01						
0 son	0.45	0.49	0.45	0.49	0.45	0.49
1 son	0.54		0.54		0.54	
Parity 02						
0 son	0.20	0.71	0.20	0.69	0.20	0.69
1 son	0.47		0.51		0.50	
2 sons	0.31		0.27		0.28	
Parity 03						
0 son	0.09	0.86	0.10	0.85	0.09	0.84
1 son	0.34		0.34		0.36	
2 sons	0.39		0.41		0.40	
3 sons	0.15		0.13		0.13	
All sons till penultimate birth						
No	0.86	0.33	0.86	0.34	0.84	0.36
Yes	0.13		0.13		0.15	
Son ratio	0.54	0.22	0.54	0.22	0.55	0.22
Age at Marriage	17.86	4.01	17.91	3.70	18.29	3.4
Age difference	7.07	6.16	6.09	5.73	5.71	5.64
Age	35.88	7.50	36.71	7.39	36.77	7.29
Education						
No	0.76	0.42	0.68	0.46	0.61	0.48
Yes	0.23		0.31		0.38	
Spouse education						
No	0.48	0.49	0.38	0.48	0.35	0.47
Yes	0.51		0.61		0.64	
Women employed						
No	0.83	0.36	0.72	0.44	0.71	0.45
Yes	0.16		0.27		0.28	
Media exposure						
No	0.54	0.49	0.29	0.45	0.31	0.46
Yes	0.45		0.70		0.68	
Family structure						
Joint	0.16	0.37	0.22	0.41	0.19	0.39
Nuclear	0.83		0.77		0.80	
Household size	8.41	3.5	8.77	4.51	8.33	4.24
Place of residence						
Rural	0.61	0.48	0.63	0.48	0.64	0.47
Urban	0.38		0.36		0.35	

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used.

shown significant spacing effects related to son preference. Characteristics examined include (I) household wealth, (II) family structure (nuclear or joint), (III) Consanguineous marriage, (IV) woman's age at marriage (V) woman's say in household decisions and (VI) location of residence (urban / rural).

We compare poor households with non-poor ones (those lying in the two bottom quintiles vs those in the upper three quintiles of the asset distribution) and wealthy households (those in the top quintile) with poor and middle-income ones (those in the second to fifth quintiles).

We examine the role of woman's age at marriage by dividing the sample into roughly equal groups of women who married early (before 18 years of age) and those who got married later.

Woman's say at home is measured using two binary indicators. The first measures whether the responding woman makes one of the following decisions by herself or conjointly with her husband: (I) healthcare, (II) family visits, (III) everyday consumption, and (IV) spending husband's income[4]. The second indicator reports whether a woman can decide about her healthcare independently or in conjunction with her husband.

Finally, we carry out a number of robustness and sensitivity checks to test the quality of our estimations.

4.4.3 Econometric Techniques

We employ a panoply of parametric, semi- and non-parametric duration model estimation techniques to examine the son preference – birth spacing relationship[5].

Duration analysis (also known as lifetime data analysis, reliability analysis, time

[4]The indicator is taken from Javed and Mughal (2018).

[5]Estimations relating to short birth intervals however are carried out using Probit models.

to event analysis or event history analysis) is used to examine data in which the outcome variable corresponds to time (t) to occurrence of the event of interest. In this study, the event of interest is the waiting period between a given parity and succeeding birth. A key advantage of duration models is that they enable us to censor individuals who do not experience the event of interest.

First, we estimated Cox proportional-hazard (PH) regression model (Cox, 1972) using appropriate sample weights. This semi-parametric model helps focus on the ordering of the event of interest and can be given by:

$$h(t \mid X) = h_o(t)\ exp(X^t \beta) \tag{4.1}$$

or in a precise form:

$$h(t \mid X) = h_o(t)\ exp(\beta_1 X_1 + \beta_2 X_2.......\beta_k X_k) \tag{4.2}$$

where $h(t)$ is the hazard rate, $h_o(t)$ is the baseline hazard function, X is the vector of individual characteristics which influence the occurrence of the event, andβ is the regression coefficient. The hazard rate measures the effect of given co-variates on the occurrence of the event of interest. Taking a binary variable with $X = 0$ as the reference group (here women without a son) and $X = 1$ as the non-reference group (women with a son), the hazard rate between the two groups can be given as follows:

$$HR = \frac{h(t \mid X = 1)}{h(t \mid X = 0)} = exp(\beta) \tag{4.3}$$

If the value of $HR = 1$, then both groups have an equal chance of experiencing the event. In contrast, if the value of $HR > 1$, then individuals in the non-reference group have a greater probability of experiencing the event, whereas a value < 1 implies a higher probability for individuals of the reference group to experience the event.

Following Cox model estimations, survival curves are obtained using the Kaplan-Meier (KM) estimator. The KM cumulative survival curve is a non-parametric approach based on the survival function $S(t)$ which, for a randomly-selected individual from the population under study, specifies the probability of occurrence of an event after time t. In our case, the curve shows progression to the next birth and shows how quickly it happens.

Let $N(t)$ represent the occurrence of an event (e.g. subsequent birth) within the time span $[0, t]$. The time span could be divided into a number of short periods $0 = t_o < t_1 < .... < t_k = t$. Using the multiplication rule to denote the conditional probability

$$S(t) = \prod_{k=1}^{k} S(t_k \mid t_{k-1}) \tag{4.4}$$

and $S(v \mid u) = \frac{S(v)}{S(u)}$

Here $> u$, the conditional probability that the subsequent birth will occur later than v, given that it has not occurred by time u. We assume that the time of occurrence of the event is not tied. If no subsequent birth takes place within the time $(t_{k-1}, t_k]$ then estimates $S(t_k \mid t_{k-1})$.

If subsequent birth happens by the time $T_j \epsilon (t_{k-1}, t_k]$, then the natural estimate of $S(t_k \mid t_{k-1})$ is $1 - \frac{1}{Y(t_{k-1})} = 1 - \frac{1}{Y(T_j)}$.

Putting the above estimates into equation 4, we obtain the Kaplan–Meier estimator as follows:

$$\hat{S}(t) = \prod_{T_j \leq t} \{1 - \frac{1}{Y(T_j)}\} \tag{4.5}$$

We also employ Survival-time Regression Adjustment (RA). The RA estimator fits separate models for different treatment levels and uses the averages of predicted outcomes to obtain Average Treatment Effects (ATE) (StataCorp, 2017). Unlike the hazard rate obtained by Cox estimation which provides relative conditional probabilities cumbersome to interpret, RA's ATE is simply the population average of the difference between outcomes when everyone is subjected to the treatment (has a son in this case) and when no one is subjected to the treatment (does not have a son). The RA is estimated using the Weibull outcome model.

The logic of RA can be described as follows:

First, we estimate the parameters β_τ of a parametric model for the survival-time outcome t for each treatment level $\tau \epsilon \{0, 1\}$.

Here, $F(t|x, \tau, \beta_\tau)$ is the distribution of t conditional on covariates x and the treatment level τ. The estimate of β_τ can be denoted by $\hat{\beta}_{r\alpha,\tau}$.

Now we estimate the mean survival time conditional on x and treatment level τ for each observation of the sample. We get

$$\hat{E}(t_i \mid x_i, \tau, \hat{\beta}_{r\alpha,\tau}) \tag{4.6}$$

For the potential survival-time outcome t_τ corresponding to the treatment level,

$$E(t \mid x, \tau, \beta_\tau) = E(t_\tau \mid x, \beta_\tau) \tag{4.7}$$

Sample averages of $\hat{E}(t_i \mid x_i, \tau, \widehat{\beta_{ra,\tau}})$ consistently estimate the POM for treatment level τ. The mean can be written as POM_t.

4.5 Findings

4.5.1 Son Preference and Spacing

We begin by examining birth spacing with respect to a number of dimensions of differential gender preference. Table 4.6 reports results of Cox estimations of parity-wise spacing effects for the three rounds of PDHS. Results for each round are shown in three columns corresponding to intervals between first and second birth, second and third birth, and third and fourth birth as outcome variables respectively. We see that the hazard ratios are invariably below 1 reflecting a lower failure probability among women with male children compared with those without a son.

At parity 1, there is little evidence of variation in the relationship occurring over time as the hazard ratios are significantly different from one at the 1% level of significance for all the three rounds. The ratio is 10 - 13 % lower for women with a firstborn male child compared with women with no son.

In contrast, there is some evidence for change over time at parity 2. While the hazard ratio for subsequent birth spacing was not significantly different from one in 1990-91 regardless of the sex of the children, the ratio is found to be significant in later years. Women for whom one or both of the first two children are sons are significantly more likely to delay the following birth compared with women with no sons (15 % in 2006-07, 10 % in 2012-13). Results for parity 3 are insignificant for all the three rounds.

These findings suggest a significant probability of reduction of waiting time to subsequent birth for women with no son among the first two surviving children. This can also be seen in Kaplan-Meier curves for the three rounds shown in Figures 4.1 – 4.3. For all three datasets the lower (blue) survival curve for women with no sons is shorter and steeper than the upper (red) curve for women with one or more sons implying that women with no sons move on to the next birth earlier than do women with sons.

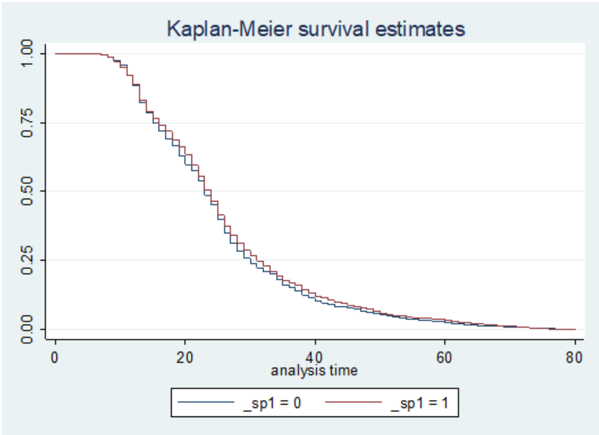
Table 4.6: Presence of at least one son at parity n and subsequent birth spacing (Cox estimation)

	PDHS 1990-91			PDHS 2006-07			PDHS 2012-13		
Hazard ratio	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4
Parity 1									
One son (ref: no son)	0.875***			0.900***			0.889***		
	(0.042)			(0.029)			(0.030)		
Parity 2									
At least one son (ref: no son)		0.932			0.850***			0.903**	
		(0.059)			(0.037)			(0.040)	
Parity 3									
At least one son (ref: no son)			0.929			0.935			0.979
			(0.108)			(0.049)			(0.088)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2476	2316	2038	4586	4246	3672	6057	5535	4569

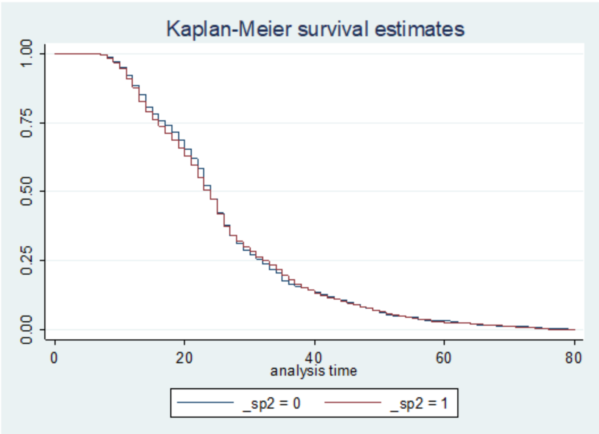
Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Figure 4.1: Presence of at least one son at parity n and subsequent birth spacing (Kaplan-Meier cumulative survival graph: PDHS 1990-91)

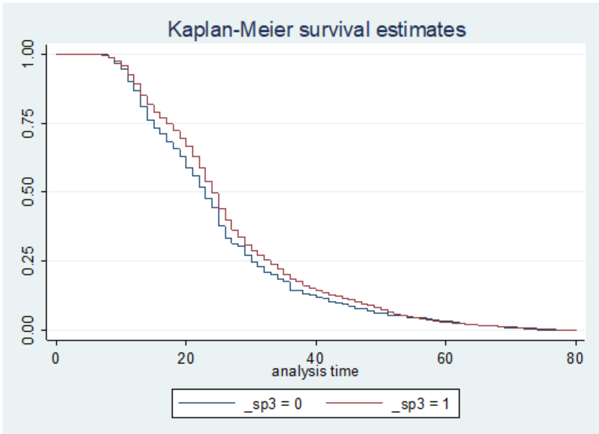
(a) Parity 01



(b) Parity 02



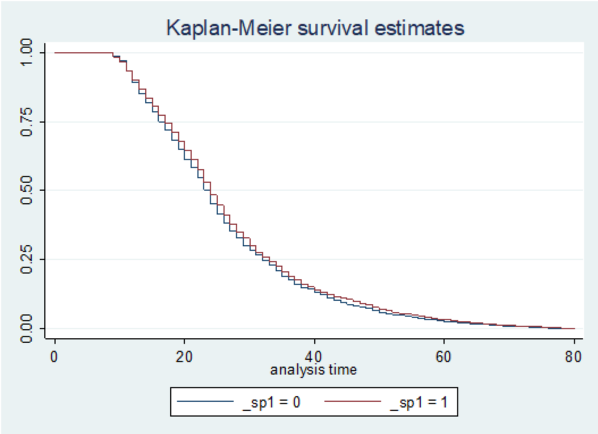
(c) Parity 03



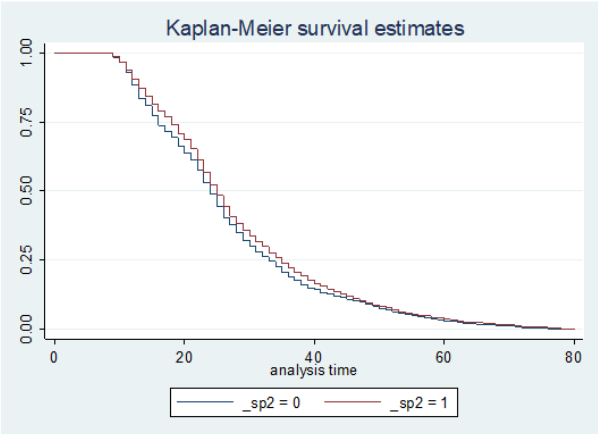
Source: Authors' calculations using PDHS 1990-91. Note: The 0 implies women with no son at parity n and 1 implies women with at least one son parity n. Sample is restricted to women with complete fertility.

Figure 4.2: Presence of at least one son at parity n and subsequent birth spacing (Kaplan-Meier cumulative survival graph: PDHS 2006-07)

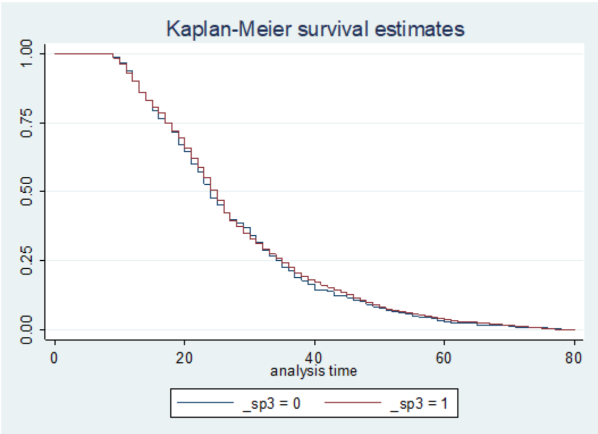
(a) Parity 01



(b) Parity 02



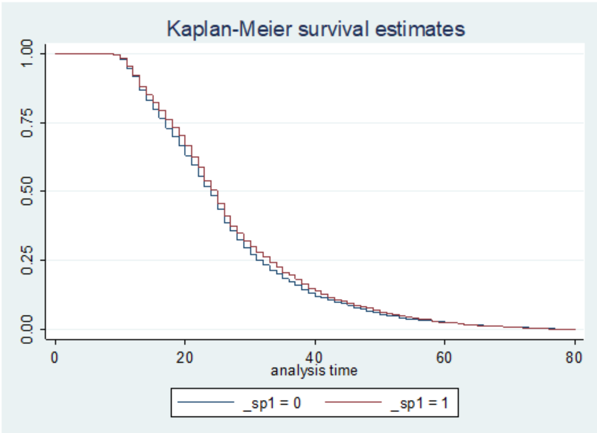
(c) Parity 03



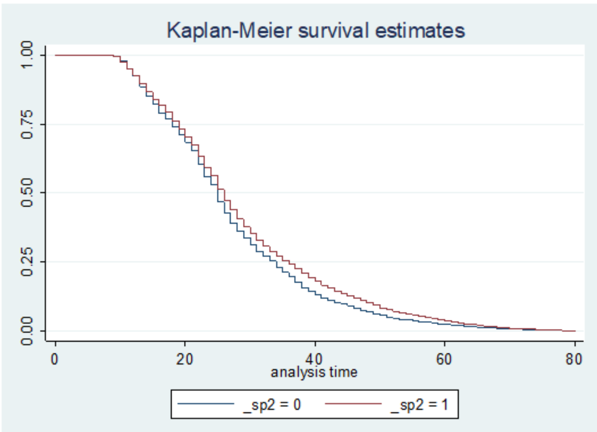
Source: Authors' calculations using PDHS 2006-07. Note: The 0 implies women with no son at parity n and 1 implies women with at least one son parity n. Sample is restricted to women with complete fertility.

Figure 4.3: Presence of at least one son at parity n and subsequent birth spacing (Kaplan-Meier cumulative survival graph: PDHS 2012-13)

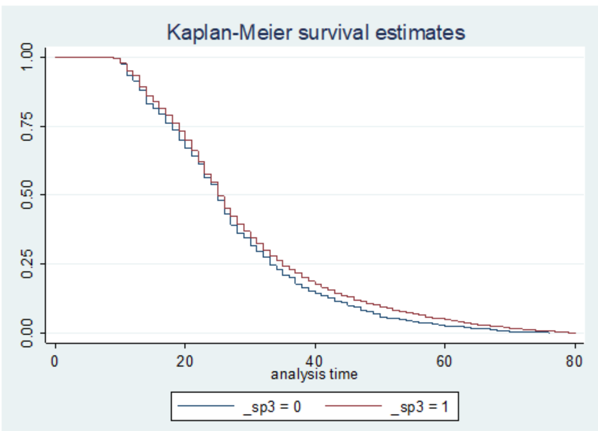
(a) Parity 01



(b) Parity 02



(c) Parity 03



Source: Authors' calculations using PDHS 2012-13. Note: The 0 implies women with no son at parity n and 1 implies women with at least one son parity n. Sample is restricted to women with complete fertility.

Table 4.7 shows Cox estimations for birth spacing effects for women with one, two and three children. As before, women with one or two sons at parities 1 and 2 show a significantly lower hazard ratio of proceeding to the next birth. While the hazard ratio for women with one son at parity 2 is not significantly different from one in the 1990-91 dataset, the ratio is significantly below one for women with two sons. A woman whose two children are both sons has a 13 – 17% lower hazard ratio during the period under study compared with mothers with only girls.

The trend of birth interval between the penultimate and the last child also varies according to the sex of existing children (Table 4.8). The hazard ratio for women with only male children is less than one for all three subsets and significant at the 1% level. All-son women in the three datasets are 14 – 18% more likely to delay their last birth compared with corresponding women having one or more daughters. In other words, women who only have boys till the penultimate birth are more likely to wait longer before the final birth than women with one or more girls.

Results obtained using Survival-time regression adjustment (shown in Table 4.9) add to the evidence in favour of a sizeable role of son preference in determining the length of overall birth intervals. At parity 1, women with just one female child proceed to the next birth 1.63 to 1.66 months or about seven weeks earlier than those who have a boy. The average subsequent birth interval for women with a son at parity 1, for example, is found to be 26.83 months in the 2012-13 dataset.

The difference between all-boy and all-girl mothers remains strong in the second and third parities. Women whose two existing children are both girls transit to a third birth 1.28 to 2.74 months (or between 5.5 and 11.9 weeks) earlier than their two-boy counterparts. The corresponding range of difference in waiting span for parity 3 is 1.59 to 2.79 months (6.9 to 12.1 weeks) respectively.

Table 4.7: Number of sons at parity n and subsequent birth spacing (Cox estimation)

Hazard ratio	PDHS 1990-91 Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	PDHS 2006-07 Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	PDHS 2012-13 Duration 1 to 2	Duration 2 to 3	Duration 3 to 4
Parity 1 (ref: 0)									
1	0.875***			0.900***			0.889***		
	(0.042)			(0.029)			(0.030)		
Parity 2 (ref: 0)									
1		0.968			0.856***			0.917**	
		(0.064)			(0.040)			(0.043)	
2		0.878*			0.839***			0.879***	
		(0.065)			(0.042)			(0.046)	
Parity 3 (ref: 0)									
1			0.898			0.986			1.023
			(0.112)			(0.058)			(0.0940
2			0.936			0.899*			0.950
			(0.114)			(0.051)			(0.089)
3			0.993			0.918			0.948
			(0.125)			(0.065)			(0.097)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2476	2316	2038	4586	4286	3672	6057	5535	4569

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4.8: Son Preference and Last birth spacing (Cox estimation)

Hazard ratio	Last space PDHS 1990-91	PDHS 2006-07	PDHS 2012-13
All sons till penultimate birth	0.825***	0.856***	0.819***
(ref: at least one daughter)	(0.061)	(0.043)	(0.038)
Controls	Yes	Yes	Yes
Observations	2476	4586	6057

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Next, we examine how overall birth spacing differs by the proportion of boys in the total number of children over a woman's reproductive history. Table 4.10 shows results of Cox regression for birth spacing by son ratio. The hazard ratios for women with a higher proportion of boys is substantially below one and significant at 1% (HR = 0.62 in 1990-91, 0.68 in 2006-07 and 0.74 in 2012-13).

Table 4.9: Presence of at least one son at parity n and subsequent birth spacing (Survival-time regression adjustment)

Survival-time regression adjustment	PDHS 1990-91 Duration 1-2	Duration 2-3	Duration 3-4	PDHS 2006-07 Duration 1-2	Duration 2-3	Duration 3-4	PDHS 2012-13 Duration 1-2	Duration 2-3	Duration 3-4
ATE									
At least one son(At least one son vs No son)	1.669**	1.281*	2.791**	1.667***	2.416***	1.598**	1.637***	2.741***	2.725***
	(0.685)	(0.799)	(1.122)	(0.509)	(0.681)	(0.791)	(0.450)	(0.520)	(0.792)
POmean									
At least one Son									
No son	25.319***	26.350***	25.522***	27.034***	27.388***	27.771***	26.838***	27.871***	28.388***
	(0.486)	(0.674)	(1.050)	(0.350)	(0.603)	(0.727)	(0.314)	(0.438)	(0.734)
Observations	2,476	2,316	2,038	4,586	4,246	3,672	6,057	5,535	4,569

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

This again shows that women with fewer boys are significantly more likely to shorten birth intervals than those with no son.

These results give a clearer picture of the evolution of the son preference – spacing relationship. The difference in birth spacing by sex of children seems to show a weakening trend over time.

Table 4.11 gives evidence for differential spacing effects of another aspect of son preference. Women whose first child was a son have hazard ratios <1 throughout the period studied, suggesting that such women are more likely to postpone future pregnancies compared with women whose firstborn was a daughter.

Finally, we gauge women's birth spacing conditional on the sex of the preceding children by looking at their use of contraceptive measures. We expect contraceptive prevalence to be higher among women with one or more sons than those without a son. Table 4.12 reports Probit estimates for the likelihood of current contraceptive use among married women who have yet not completed their fertility. For all the three datasets, having one or more male child has a

Table 4.10: Son to total children ratio and overall birth spacing (Cox estimation)

	PDHS 1990-91	PDHS 2006-07	PDHS 2012-13
	Overall birth space	Overall birth space	Overall birth space
Son ratio			
	0.625***	0.679***	0.742***
	(0.077)	(0.056)	(0.063)
Controls	Yes	Yes	Yes
Observations	2476	4586	6057

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4.11: Sex of first child and overall birth spacing (Cox estimation)

	PDHS 1990-91	PDHS 2006-07	PDHS 2012-13
	Overall birth space	Overall birth space	Overall birth space
Parity 01			
Sex (ref: female)			
Male	0.890**	0.915***	0.863***
	(0.044)	(0.032)	(0.031)
Controls	Yes	Yes	Yes
Observations	2476	4586	6057

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

positive effect on the probability that the woman is currently using a contraceptive measure, significant at the 1% level. Marginal effects evaluated at the means show that the probability of higher contraceptive use ranged from 4% in 1990-91 to 8% in 2012-13. These results again point to significant gender-specific effects on women's fertility outcomes which shows signs of strengthening over time.

4.5.2 Son Preference and Short Birth Intervals

Now we examine the possibility that preference for sons influences the risk of short birth spacing (shorter than 24 or 18 months between two births).
Table 4.13 reports results of parity-wise Probit estimations on the likelihood that

Table 4.12: Presence of at least one son and current contraceptive use - probit estimation

	PDHS 1990-91	PDHS 2006-07	PDHS 2012-13
	Use of Contraceptive	Use of Contraceptive	Use of Contraceptive
At least one son (ref: no son)			
	0.719***	0.225***	0.298***
	(0.131)	(0.081)	(0.066)
Marginal effect	0.038***	0.052***	0.084***
	(0.007)	(0.017)	(0.018)
Controls	Yes	Yes	Yes
Constant	-2.827*** (0.341)	-1.661***(0.228)	-1.482***(0.206)
Observations	3525	3107	4564

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with incomplete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

the subsequent birth will occur before 24 or 18 months. Having a son at parity 1 is significantly associated with the likelihood of longer spacing with a positive sign for the coefficient. Women with a male firstborn child are between 2.9 and 5.7 % more likely to have their next birth later than 18 or 24 months compared with women with a firstborn girl.

This likelihood for risky births is somewhat higher for births below 18 months (marginal effect at means = 0.057 in 1990-91, 0.029 in 2006-07 and 0.042 in 2012-13) than for those under 24 months from the previous birth (marginal effect = 0.037 in 1990-91, 0.031 in 2006-07 and 0.032 in 2012-13). The impact of son preference on short birth spacing is mostly insignificant at higher parities.

We find little change in the impact over time.

These results suggest an important role of son preference in the incidence of risky births. Given that half of the child births in Pakistan occur less than 24 months after the previous birth, this shortening of birth intervals among women having previously given birth to girls points to the possibility of a non-negligible increase in risk of child mortality resulting from disproportionate preference for male offspring.

Table 4.13: Preference of at least one son and short birth spacing (Probit estimations)

Variable	18 months			24 months		
At least one son (ref: no son)	PDHS 1990-91	PDHS 2006-07	PDHS 2012-13	PDHS 1990-91	PDHS 2006-07	PDHS 2012-13
Duration 1 to 2	0.179***(0.070)	0.091**(0.046)	0.128***(0.047)	0.095(0.066)	0.080*(0.043)	0.085*(0.044)
Duration 2 to 3	-0.000(0.092)	0.185***(0.058)	0.054(0.061)	0.058(0.083)	0.127**(0.055)	0.060(0.057)
Duration 3 to 4	0.132(0.117)	-0.098(0.084)	0.070(0.095)	0.094(0.115)	0.026(0.077)	0.039(0.086)
Marginal effect						
Duration 1 to 2	0.057	0.029	0.042	0.037	0.031	0.032
Duration 2 to 3	-0.000	0.059	0.016	0.022	0.050	0.023
Duration 3 to 4	0.042	-0.029	0.021	0.037	0.010	0.015
Controls	Yes	Yes	Yes	Yes	Yes	Yes

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.5.3 Characteristics of Son-Preferring Households with Differential Spacing

Next we focus on household and individual characteristics observed in son preferring women with differential spacing behaviour. Below, we present results from Cox estimations on subsamples grouped by wealth status, family structure, geographical setting, type of marriage, marriage cohorts, and say in intra-household decisions[6]. Kaplan-Meier survival curves for these subsamples are given in the appendix.

Household wealth

Tables 4.14 and 4.15 show parity-wise estimations by wealth status of Pakistani

[6]Results for only the 2012-13 dataset are shown.

households. The former set of estimations compares poor households (those lying in the fourth and fifth quintiles of wealth distribution) with non-poor households while the latter compares wealthy households (those in the first and second quintiles of wealth distribution) with the poor and middle-income households. Both sets of results depict a similar picture: Sex-specific modification in waiting time span is mainly observed among wealthier households, while little or no significant effect is observed among poorer households. The hazard ratio for non-poor households with a son is significantly below one for both parities (HR = 0.85). Corresponding HR values for wealthy households with a son are 0.84 for the first and 0.81 for the second parity. These results can be understood in light of the fact that contraceptive prevalence in Pakistan varies substantially by wealth from a low of 21% among the bottom-quintile households to 46% among the top-quintile households.

Family structure

The son preference – birth spacing relationship also varies by type of households. In Pakistan, joint household settings are common (especially in rural areas) whereas nuclear families are mostly seen in urban areas. Unlike joint households, nuclear families with one or more sons at parity 1 and 2 have a higher probability of delaying subsequent birth than their no-son counterparts (Table 4.16). Interestingly, women living in joint families are found to show a strong likelihood of sex-related changes in spacing between the third and the fourth birth (HR = 0.71 significant at the 5% level), a feature not found elsewhere. To the extent this could be relied on the result leads to an interesting finding: the desire for a son drives women in nuclear families to begin shortening birth intervals from the birth of the first child, whereas women living in joint-

Table 4.14: Presence of at least one son at parity n and subsequent birth spacing – poor vs non-poor households (Cox estimation)

Hazard ratio	Poor			Non-poor		
	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4
Parity 1						
At least one son (ref: no son)	0.970			0.847***		
	(0.054)			(0.035)		
Parity 2						
At least one son (ref: no son)		0.978			0.851***	
		(0.075)			(0.045)	
Parity 3						
At least one son (ref: no son)			0.926			1.014
			(0.135)			(0.114)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2061	1956	1755	3996	3579	2814

Source: Authors' calculations using PDHS 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

family settings do not reduce the time span to subsequent births until parity3.

Consanguineous marriages

Marriages among cousins and relatives are not unusual in Pakistan. Table 4.17 reports results for subsamples of consanguineous and non-consanguineous marriages. While the hazard ratios for both groups of households are significant and similar at the first parity (HR = 0.88 significant at 5% vs 0.89 significant at 1%), the effect survives at parity 2 only among consanguineous couples), neither group of households shows a significant change in sex-related spacing behaviour at the third parity.

Place of residence

Table 4.18 reports another feature of households showing differential birth intervals related to sex of existing children. Households based in both rural and urban

Table 4.15: Presence of at least one son at parity n and subsequent birth spacing - wealthy vs non-wealthy households (Cox estimation)

Hazard ratio	Non wealthy			Wealthy		
	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4
Parity 1						
At least one son (ref: no son)	0.905***			0.853**		
	(0.034)			(0.058)		
Parity 2						
At least one son (ref: no son)		0.924			0.814**	
		(0.047)			(0.067)	
Parity 3						
At least one son (ref: no son)			0.913			1.244
			(0.084)			(0.248)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4461	4168	3604	1596	1367	965

Source: Authors' calculations using PDHS 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

areas exhibit son preferring birth spacing behaviour at parity 1 (HR = 0.90 for rural households, 0.86 for urban households, both significantly different from one at the 1% level of significance). However, we find evidence for significant effects at parity 2 only among urban households.

Woman's age at marriage

The likelihood of shortening birth intervals at first and second parities among women who married young (before their 18th birthday) depends on whether one or both of the children born were boys (Table 4.19). The hazard ratio for women who married later is not significantly different from one.

Say in household affairs

One final factor found to influence the association between son preference and birth spacing is women's participation in household decisions. Evidence for the

Table 4.16: Presence of at least one son at parity n and subsequent birth spacing by family type (Cox estimation)

Hazard ratio	Joint			Nuclear		
	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4
Parity 1						
At least one son (ref: no son)	0.935			0.880***		
	(0.069)			(0.033)		
Parity 2						
At least one son (ref: no son)		0.995			0.887**	
		(0.090)			(0.045)	
Parity 3						
At least one son (ref: no son)			0.707**			1.020
			(0.119)			(0.096)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1195	999	708	4862	4536	3861

Source: Authors' calculations using PDHS 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

relationship is found among women who participate in one of the four types of household decisions namely healthcare, social, consumption, and financial. Women with a say at home having one son at parity 1 are 14% more likely to delay transition to parity 2 compared with those without a son, while those with one or two sons are 10% more likely to delay the third birth (Table 4.20). No such significant effects are observed for women who do not have a say in intra-household decisions.

Likewise, as shown in Table 4.21, women who make decisions about their own health or jointly with their husbands are more likely to delay second and third births at parity 1 and 2 respectively, contingent on having a male child (HR = 0.856 significant at 1% at parity 1, 0.882 significant at 5% at parity 2). The corresponding hazard ratios for women without a say in healthcare decisions do not significantly differ from one.

Table 4.17: Presence of at least one son at parity n and subsequent birth spacing by consanguineous marriages (Cox estimation)

Hazard ratio	No- consanguineous marriage			Yes- consanguineous marriage		
	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4
Parity 1						
At least one son (ref: no son)	0.879**			0.887***		
	(0.048)			(0.036)		
Parity 2						
At least one son (ref: no son)		0.917			0.895**	
		(0.069)			(0.051)	
Parity 3						
At least one son (ref: no son)			1.098			0.901
			(0.152)			(0.099)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2387	2137	1728	3668	3396	2839

Source: Authors' calculations using PDHS 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

The son preference – birth spacing relationship does not significantly differ by women's participation in household decisions beyond the third parity.

4.6 Robustness Measures

4.6.1 Alternative Parametric Estimations

Alternative parametric survival models are estimated to check the robustness of our findings. For this purpose, we employ the Exponential survival model. The density function and hazard rate for this parametric model with constant hazard can be given as follows:

Table 4.18: Presence of at least one son at parity n and subsequent birth space by place of residence (Cox estimation)

Hazard ratio	Rural			Urban		
	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4
Parity 1						
At least one son	0.901***			0.862***		
(ref: no son)						
	(0.039)			(0.045)		
Parity 2						
At least one son		0.936			0.837***	
(ref: no son)						
		(0.054)			(0.052)	
Parity 3						
At least one son			0.926			1.085
(ref: no son)						
			(0.097)			(0.181)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3075	2868	2482	2982	2667	2087

Source: Authors' calculations using PDHS 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

$$f(t; v) = v\, exp\{-vt\} \quad and \quad \alpha(t; v) = v \quad for\, t > 0 \tag{4.8}$$

Estimates using exponential survival regression are shown in Table 4.22. The results are analogous to those estimated using semi-parametric models previously presented, both in terms of significance as well as in magnitudes of the coefficients.

At parity 1, the hazard ratios for all three rounds are found to be significantly different from one Women with a firstborn boy have a $6 - 8$ % lower probability of proceeding to subsequent birth at a given time compared to women with a firstborn girl. As before, the corresponding likelihood of moving to next birth is only observed among the women in the two recent samples while no significant

Table 4.19: Presence of at least one son at parity n and subsequent birth spacing by woman's age at marriage (Cox estimation)

Hazard ratio	Early (<=18) Duration 1 to 2	Early (<=18) Duration 2 to 3	Early (<=18) Duration 3 to 4	Late (>18) Duration 1 to 2	Late (>18) Duration 2 to 3	Late (>18) Duration 3 to 4
Parity 1						
At least one son	0.846***			0.967		
(ref: no son)						
	(0.037)			(0.050)		
Parity 2						
At least one son		0.910*			0.903	
(ref: no son)						
		(0.052)			(0.066)	
Parity 3						
At least one son			0.991			0.960
(ref: no son)						
			(0.122)			(0.093)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3652	3482	3057	2526	2168	1618

Source: Authors' calculations using PDHS 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

effect is seen for transition from third to the fourth birth in any dataset.

4.6.2 Self Selection by Child Mortality

The decision and waiting time to subsequent birth may be influenced by the incidence of mortality among children who were born earlier. Women having suffered a child loss may proceed to next birth earlier than otherwise intended, particularly if the child who died was a boy. Women having faced male child mortality may therefore self-select.

We account for this possibility by estimating Cox model on the subsample of women, none of whose previous children had died. As seen before, results for parity 1 remain significant (Table 4.23). The results are also significant at par-

Table 4.20: Presence of at least one son at parity n and subsequent birth spacing by participation in household decisionmaking (Cox estimation)

	No say			Have a say		
Hazard ratio	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4
Parity 1						
At least one son (ref: no son)	0.978			0.858***		
	(0.073)			(0.034)		
Parity 2						
At least one son (ref: no son)		0.844			0.897**	
		(0.094)			(0.047)	
Parity 3						
At least one son (ref: no son)			0.918			1.015
			(0.104)			(0.104)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1382	1297	1134	4074	3718	3042

Source: Authors' calculations using PDHS 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

ity 2 for the 2006-07 and 2012-13 samples. The hazard ratios for the 2012-13 subsample of women with one or two sons at parity 1 and 2 are 0.89 and 0.92 respectively, both significantly different from one. Results for parity 3 are found to be insignificant just as with the full sample.

4.6.3 Matching Estimates

Another means of controlling for potential selection bias is by using a matching routine. We use Propensity Score Matching (PSM) to account for the possibility that households with sons at a given parity may differ from those without, in ways that could be considered non-random. Treated (with son) and non treated (without son) groups are matched by comparing the conditional probabilities of participating in the treatment group (having a son in this case) based on a set

Table 4.21: Presence of at least one son at parity n and subsequent birth spacing by participation in healthcare decisions (Cox estimation)

Hazard ratio	No- say in self health decisions			Yes- say in self health decisions		
	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4
Parity 1						
At least one son (ref: no son)	0.940			0.856***		
	(0.051)			(0.036)		
Parity 2						
At least one son (ref: no son)		0.940			0.882**	
		(0.068)			(0.050)	
Parity 3						
At least one son (ref: no son)			0.938			0.982
			(0.077)			(0.111)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2517	2313	1929	3515	3197	2618

Source: Authors' calculations using PDHS 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

of observable characteristics. These probabilities are obtained by regressing the treatment variable on the vector of co-variates using Probit estimations and are used to construct a propensity score. After the PSM estimations, we checked the balancing of the treatment groups.

Table 4.24 reports Average Treatment Effects (ATE) for the three parities obtained using Propensity Score Matching (PSM). The ATE for all the parities is positive, suggesting a delaying effect of having one or more sons. As found with semi-parametric and parametric methods, the impact is found to be invariably significant at parity 1 and significant for the 2006-07 and 2012-13 samples at parity 2.

After carrying out the PSM estimations, the balancing of the treatment groups was checked by using Kernel density plots. Plots for the first set of estimations are given in the appendix. The covariates of the groups are found to be well

Table 4.22: Presence of at least one son at parity n and subsequent birth spacing (Parametric survival model)

Hazard ratio	PDHS 1990-91 Duration 1 to 2	PDHS 1990-91 Duration 2 to 3	PDHS 1990-91 Duration 3 to 4	PDHS 2006-07 Duration 1 to 2	PDHS 2006-07 Duration 2 to 3	PDHS 2006-07 Duration 3 to 4	PDHS 2012-13 Duration 1 to 2	PDHS 2012-13 Duration 2 to 3	PDHS 2012-13 Duration 3 to 4
Parity 1									
At least one son (ref: no son)	0.925***			0.942***			0.931***		
	(0.024)			(0.018)			(0.030)		
Parity 2									
At least one son (ref: no son)		0.959			0.911***			0.947**	
		(0.034)			(0.023)			(0.024)	
Parity 3									
At least one son (ref: no son)			0.966			0.960			0.990
			(0.066)			(0.029)			(0.054)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2476	2316	2038	4586	4246	3672	6057	5535	4569

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4.23: Presence of at least one son at parity n and subsequent birth spacing – Subsample with no child loss (Cox estimation)

Hazard ratio	PDHS 1990-91 Duration 1 to 2	PDHS 1990-91 Duration 2 to 3	PDHS 1990-91 Duration 3 to 4	PDHS 2006-07 Duration 1 to 2	PDHS 2006-07 Duration 2 to 3	PDHS 2006-07 Duration 3 to 4	PDHS 2012-13 Duration 1 to 2	PDHS 2012-13 Duration 2 to 3	PDHS 2012-13 Duration 3 to 4
Parity 1									
At least one son (ref: no son)	0.899**			0.844***			0.892***		
	(0.049)			(0.032)			(0.033)		
Parity 2									
At least one son (ref: no son)		0.920			0.806***			0.922*	
		(0.062)			(0.039)			(0.046)	
Parity 3									
At least one son (ref: no son)			0.910			0.932			0.964
			(0.100)			(0.057)			(0.100)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1850	1695	1437	3707	3369	2828	4945	4428	3498

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

balanced.

4.6.4 Placebo Test

Given the non-experimental and cross-sectional nature of our dataset and the fact that our outcome and covariates of interest are mainly demographic indicators makes devising a placebo test a challenging task. We attempt to substitute the birth interval outcome variable with the month the respondent woman was interviewed, a variable which is plausibly independent of existing children's sex at any given parity. As expected, this variable appears to be independent of the sex of the existing children at any parity (Table 4.25).

Table 4.24: Presence of at least one son at parity n and subsequent birth spacing (Propensity score matching)

Propensity score match	PDHS 1990-91			PDHS 2006-07			PDHS 2012-13		
	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4
Parity 01									
ATE	1.729**			1.425*			1.522***		
	(0.678)			(0.572)			(0.480)		
Parity 02									
ATE		1.182			2.565***			2.404***	
		(0.900)			(0.778)			(0.578)	
Parity 03									
ATE			2.030			0.754			1.437
			(1.284)			(0.967)			(0.997)
Observations	2483	2323	2044	4486	4246	3732	6057	5535	4569

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4.25: Placebo test – Month of interview as outcome (Cox estimation)

Hazard ratio	PDHS 1990-91			PDHS 2006-07			PDHS 2012-13		
	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4	Duration 1 to 2	Duration 2 to 3	Duration 3 to 4
Parity 1									
One son (ref: no son)	0.999			1.039			1.039		
	(0.035)			(0.027)			(0.024)		
Parity 2									
At least one son (ref: no son)		0.937			0.944			1.009	
		(0.039)			(0.032)			(0.028)	
Parity 3									
At least one son (ref: no son)			0.903			0.936			0.996
			(0.055)			(0.044)			(0.040)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2540	2476	2316	4666	4586	4246	6205	6057	5535

Source: Authors' calculations using PDHS 1990-91, 2006-07 & 2012-13. Sample is restricted to women with complete fertility. Sample weights are used. Linearized standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.7 Conclusion

In this study, we attempted to understand whether and to what extent the wont of preferring boys over girls influences birth spacing patterns among Pakistani women. Our analysis of data from three representative demographic and health surveys showed evidence for significant effects of son preference at the first two parities. Women with a firstborn girl for instance proceed to the second birth seven weeks earlier than women with a firstborn boy. These differential spacing effects dissipate beyond the second parity.

The spacing delaying behaviour resulting from son preference is more common among women who are married at an early age or living in wealthier, nuclear households. The association seems to have undergone little significant change over the past two decades. Rapid urbanization in Pakistan over the past two decades does not seem to have substantially modified differential fertility outcomes.

We found that women with a higher proportion of sons among their children are more likely to delay succeeding births. Women with one or more sons are also more likely to employ contraceptive methods than women without a son. Besides, women with no sons are significantly more likely to have a subsequent birth interval below 24 or 18 months.

To sum up, there is conclusive evidence suggesting that Pakistani couples stay away from contraceptive methods and shorten time span between births in order to obtain the desired number of sons. This manifestation of son preference has important consequences at the national level. Connubial bliss may indeed require a son or two but the disproportionate preference for sons that it entails affects the country's demographic transition by hampering efforts to control rapid population growth, reduce high incidence of child and maternal mortality, and improve health outcomes. Pakistan has one of the highest child and maternal mortality rates in Asia. Female child mortality is especially high, and may in part result from the risky fertility behavior associated with excessive preference for boys. The country seeks to achieve the Sustainable Development Goal of bringing the incidence of maternal mortality to below 70 deaths per 100,000 live births and under-5 mortality to below 25 per 1,000 live births by the year 2030.

Measures and awareness campaigns that promote gender equality in the country can help lessen the occurrence of risky births, thereby not only lowering the risk to both mother and child's life but also improving their health outcomes. Tackling pervasive desire for sons can therefore be an important ingredient of any successful policy action targeting maternal and child health.

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Chapter 5

Female Age at Marriage, Gender Preference and Differential Parental Investment

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Abstract

Early female marriage is a practice still prevalent in many parts of the world. In this study, we examined how age at marriage interacts with women's perspectives on gender balance pertaining to their reproductive and maternal preferences. Our aim is to establish the presence or otherwise of an association between age at marriage and preference for boys in terms of fertility choices of married women. We also study the interaction between women's age at marriage and gender bias found in parental allocation of nutrition and healthcare resources. Using the 1990-91 and 2012-13 rounds of Pakistan Demographic and Health Survey and employing Probit and various matching routines, we analyse the reproductive and child-related outcomes of Pakistani women.
We find that marriage at 18 or later positively influences women's preference for family's sex composition. Not only the women who married later report weaker preference for boys than do women who married before 18, but also show less likelihood of bearing one or more sons. These differential impacts show little change over time. This reduction in son preferring behaviour is more common among women coming from poor, rural households with no education, employment or regular exposure to media. However, whether or not a woman married early or late does little to modify the male gender bias prevalent in parental investment. Preferential treatment of sons, be it in the form of pre- or post-natal care, access to nutritious food or healthcare the male child receives does not differ by the mother's age at the time of marriage.

Key words: Age at marriage; gender bias; son preference; Nutrition; Child health; Pakistan

JEL codes: D13; J13; O15; C13; Z13.

Résumé

La pratique du mariage précoce des femmes est encore présente dans de nombreux pays du monde. Dans cette étude, nous avons cherché à voir si l'âge auquel une femme se marie joue un rôle sur son point de vue sur l'équilibre entre les sexes au niveau de sa reproduction et des soins maternels à apporter à ses enfants. Notre objectif est d'établir la présence ou non d'une association entre l'âge au mariage et la préférence pour les garçons en termes de choix de fécondité des femmes mariées. Nous étudions également l'interaction entre l'âge au marriage des femmes et la discrimination entre les sexes constatée dans l'allocation parentale des ressources en matière de nutrition et de soins de santé. A partir des enquêtes démographiques et de santé du Pakistan de 1990-91 et de 2012-13 et en utilisant des méthodes économétriques telles que la Probit et des techniques d'appariement, nous analysons des indicateurs pré et post-nataux du développement de l'enfant. Les résultats indiquent que le fait de se marier à 18 ans ou plus tard a un impact positif sur la préférence des femmes au niveau de la composition de leurs familles. Non seulement les femmes qui se marient plus tardivement sont moins concernées par la préférence pour les garçons mais aussi elles ont moins la probabilité de donner naissance à un ou plusieurs garçons. Ces différents résultats évoluent très peu avec le temps. Cette baisse au niveau de la préférence pour les garçons est plus présente chez les femmes venant d'un ménage pauvre, vivant en milieu rural, sans éducation, sans emploi ou étant peu exposé aux médias. Pourtant, peu importe qu'une femme se marie avant ou après 18 ans, cela ne modifie pas le biais en faveur des garçons dans leur investissement parental. Nous trouvons que l'âge auquel une femme se marie n'influence pas la discrimination pour les garçons qui peut exister au départ au niveau des soins pré et post-nataux, de l'accès à la nourriture et aux soins en matière de santé.

Mots clés: Age au mariage; Discrimination entre les sexes; Préférence pour les garçons; Nutrition; santé de l'enfant; Pakistan

JEL codes: D13; J13; O15; C13; Z13.

5.1 Introduction

The practice of early marriage of women (also called Child marriage) remains common in many parts of the developing world. Around 700 million currently alive women worldwide were married by age of 18 (Suarez, 2018). The phenomenon is particularly frequent in Sub-Saharan Africa and South Asia with a prevalence rate of marriage below 18 years of 38% and 30% respectively (Figure 5.1).

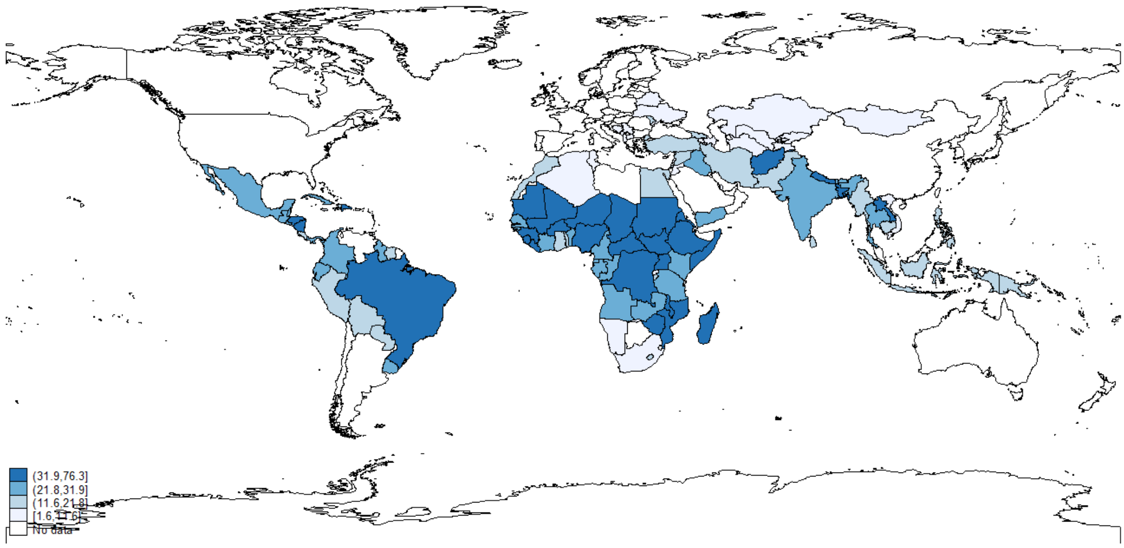
Younger women are believed to be more fertile, sexually inexperienced and easy to 'control'. They can perform more household chores. They require lower dowry in order to be married than do older women. In dowry system societies such as those found in South Asia, this smaller dowry requirement constitutes a significant economic incentive for poor households (Allendorf et al., 2017).

The practice has important consequences for the health and well-being of the woman and the child. Women who marry early produce more children than who marry later (Maitra, 2004; Nasrullah et al., 2013; Raj, Saggurti, Balaiah, et al., 2009). They are younger at the time of first birth and give subsequent births at shorter intervals (Jensen and Thornton, 2003; Koski, Clark, and Nandi, 2017; Raj, 2010). Early marriage is associated with greater risk of sexually transmitted diseases, cervical cancer, malaria, death during childbirth, and obstetric fistulas (Nour, 2006) as well as still-birth and miscarriages (Kamal and Hassan, 2015).

Early marriage can limit women's economic empowerment and education outcomes of their children (Sekhri and Debnath, 2014; Yount, Crandall, and Cheong, 2018). There is increasing evidence for adverse health outcomes among children born to women having married early, including higher risk of premature birth and neo-natal, infant, or child mortality (Adhikari et al., 2003; Garcia-Hombrados, 2017; Raj, Saggurti, Winter, et al., 2010). Early female marriage is also associated with adverse effects on child weight, height and general health (Chari et al., 2017; Palloni, 2017; Wachs, 2008).

Few studies have hitherto analyzed the inter-generational gender dimensions of

Figure 5.1: Incidence of early marriage in the developing world



Source: Authors' calculations using UNICEF global database 2018.

early marriage. Delprato, Akyeampong, and Dunne (2017) evaluate the impact of maternal age at marriage on their children's education in Sub-Saharan Africa. They find that early marriage is still an obstacle to children's access to and completion of schooling, and contributes to a widening of gender gap in education. Preferential treatment of boys at early stage of life is particularly an issue in the son-preferring societies of the Indian Subcontinent. Mothers in India are reported to visit ante-natal clinics and receive tetanus shots more frequently when pregnant with a boy (Bharadwaj and Lakdawala, 2013). They breastfeed boys significantly longer than girls (Hafeez and Quintana-Domeque, 2018; Jayachandran and Kuziemko, 2011), and provide them more childcare time and vitamin supplementation (Barcellos, Carvalho, and Lleras-Muney, 2014).

In this study, we analyze gender preferences and differential parental investment in relation to female age at marriage among Pakistani households. We purport to establish the presence or otherwise of an association between age at marriage and reported as well as actual preference for boys in terms of fertility choices of married women, and observe any changes in the associations that have occurred over time. We examine the relationship between age at marriage and differential pre- and post-natal childcare as well as longer-term development outcomes. At issue is whether or not early marriage has a role to play in the gender discrimination that 'begins in the womb", and whether boys and girls are treated differently when parents allocate nutrition and healthcare resources among their children.

Like elsewhere in the region, the incidence of early marriage and son preference are both high in Pakistan. About 21% of Pakistani girls get married before the age of 18 (UNICEF, 2017). Sex ratio at birth of the country is skewed with 107 boys born per 100 girls, while 31% of the married women interviewed during the 2012-13 round of Pakistan Demographic and Health Survey (PDHS) reported greater desire for having boys.

In light of the positive effects of later female marriage on child health and development presented above, we can expect later marriage to be associated with reduced desire for having more boys than girls and lesser discrimination between living boys and girls in terms of pre- and post-natal resource allocations. Findings of this study can provide insight into the interplay between female age at marriage on the one hand and son preference and gender bias in parental investments on the other.

5.2 Data

We employ two rounds (1990-91 and 2012-13) of the Pakistan Demographic and Health Survey (PDHS, 2013, 1991). The PDHS are household surveys representative at the national level containing information about fertility, family planning, maternal and child health. These surveys were conducted by the National Institute of Population Studies, Islamabad with technical and financial assistance from USAID.

The two rounds of the survey are summarized in Table A1 in the appendix. According to the survey, the proportion of women who married below the age of 18 dropped from 50% in 1990-91 to 42% in 2012-13 (Table 5.1). Only 15% of early-married women surveyed in 1990 had received some schooling compared to 25% women who married later. This gap grew in 2012 with corresponding figures for early and later married women increasing to 29% and 51% respectively. A greater proportion of women who married early is gainfully employed and lives in rural areas compared with their later-married counterparts.

Table 5.1: Individual and household characteristics by age at marriage

	PDHS 1990-91		PDHS 2012-13	
	Married < 18	Married >=18	Married < 18	Married >=18
Overall	0.50	0.49	0.42	0.57
Education	0.15	0.25	0.29	0.51
Spouse Education	0.48	0.54	0.58	0.72
Women Employed	0.20	0.13	0.30	0.23
Family Structure				
Joint	0.30	0.36	0.29	0.36
Place of Residence				
Rural	0.73	0.65	0.73	0.60
Economic Status				
Poor	0.66	0.69	0.49	0.30

Source: Authors' calculations using PDHS 1990-91 & PDHS 2012-13. Note: Adequate sampling weights are used.

5.3 Empirical Framework

5.3.1 Model

We begin by studying age at marriage's association with stated and actual preference for boys. Stated preference to an extent reflects the woman's perception of gender equality and should plausibly decrease with growing maturity and autonomy that accompany later marriage. We consider a married woman to have stated preference for boys if her reported ideal number of sons exceeds the ideal number of daughters.

The model for stated preference can be given as:

$$SSP_{ij} = \alpha_o + \alpha_1 ATM_{ij} + \alpha_2 X_{ij} + \alpha_3 Y_j + \mu_{ij} \tag{5.1}$$

Where SSP_{ij} is the stated son preference of the woman i belonging to the household j, ATM_{ij} is the age at marriage for woman i belonging to the household j, X_{ij} represents characteristics of the woman i belonging to the household j. Y_j is the characteristics of household j, and μ_{ij} is the error term. $SSP_{ij} = 1$ if ideal number of sons $>$ ideal number of daughters, 0 otherwise, and ATM_{ij} is $= 1$ if age at marriage $>= 18$, 0 otherwise.

This model is estimated on an unrestricted sample.

The use of a direct measure of son preference such as woman's stated preference is debated in the literature on the grounds that a woman's perception of ideal number of sons and daughters may be driven by the number of sons she has already borne (Dasgupta, 2016; Pritchett, 1994). Keeping in view the possibility of this "Rationalization bias", we estimate the association between woman's age at marriage and her actual or revealed preference in terms of sons actually borne.

The model for revealed preference can be given as:

$$RSP_{ij} = \beta_o + \beta_1 ATM_{ij} + \beta_2 X_{ij} + \beta_3 Y_j + \mu_{ij} \tag{5.2}$$

Where RSP_{ij} indicates the revealed son preference for woman i belonging to household j having completed her fertility.

The indicator takes the value of 1 if the woman has given birth to at least one son, 0 otherwise. This measure, also used in (Javed and Mughal, 2018), refers to the differential stopping behaviour observed among son preferring-couples. Equation 5.2 is estimated for a subsample of women with complete child-bearing, i.e. those who report desiring no more children, those who are infecund, or those whose husbands report having undergone sterilization procedure.

Both models include a set of individual and household indicators as explanatory variables. The controls include the respondent woman's age, education level, employment status, exposure to electronic or print media, age difference with the husband, husband's education level, household size, family structure, household wealth, area of residence, availability of sanitation facilities, and access to improved water supply.

The indicator for family structure takes the value of 1 (corresponding to nuclear family) if either the woman or her husband is reported to be the household head, 0 otherwise. The household wealth variable is constructed using Principal Component Analysis by generating an index of household assets such as home ownership, floor type, water source, electricity availability and durable consumer goods. The quintiles of the generated variable indicate the economic status of the household ranging from the poorest to the richest quintile).

We also estimate the above two models on individual subsets of women

(I) with and without schooling, (II) with and without exposure to media, (III) with and without work, (IV) living in rural and urban areas, and those (V) belonging to poor or non-poor households. These estimations help us in understanding the profile of women among whom the son preference – age at marriage relationship is stronger.

Our third model pertains to the relationship between mother's age at marriage and outcomes related to her under-5 children.

The model can be given by the following equation:

$$CDO_{imj} = \delta_o + \delta_1 ATM_{ij} + \delta_2 Sex_{imj} + \delta_3 (ATM_{ij} \times Sex_{imj}) + \delta_4 X_{imj} + \delta_5 Y_{ij} + \delta_6 Z_j + \mu_{ij} \tag{5.3}$$

Where CDO_{imj} denotes the birth, nutrition or development outcome for the child i born to the mother m belonging to the household j, ATM_{ij} corresponds to mother's age at marriage, Sex_{imj} corresponds to the gender of the child i born to the mother m, X, Y and Z denote the child, mother and household characteristics respectively, and $\mu_{ij}$the error term.

In this model, what interests us is not the effect of the child's gender Sex_{imj} on the child-level outcome per se, but rather the interaction of gender and mother's age at marriage. A statistically significant coefficient of interest δ_3 with either positive or negative sign would suggest evidence in favour of differential effects of woman's age at marriage on the child-level indicator. We estimate the model on three groups of indicators:

(I) Birth and post-natal care indicators including child's weight at birth, post-natal check-up, and complete immunization. Estimations for the first two indicators are carried out on the subgroup of children for whom mothers had an ultrasound during pregnancy.

The weight at birth variable takes the value of 1 if the birth weight is considered normal (i.e. between 2.5 and 4.5 kg), 0 otherwise.

The dummy variable for full immunization takes the value of 1 if a child of between 1 and 5 years of age completed the WHO-recommended vaccination course, 0 otherwise. The course includes one dose of vaccine against tuberculosis (BCG), three doses of vaccine against diphtheria, pertussis, and tetanus (DPT), three doses of polio vaccine (excluding the polio vaccine given at birth) and one dose of measles vaccine given to the child during the first year.

(II) Nutrition-related indicators including duration of breast-feeding, consumption of meat and fish by the child, and consumption of fruits by the child.

(III) Long-term development outcomes including stunting, weight for age, infant and child mortality.

A child whose height-for-age Z-score is below minus two standard deviations (-2 SD) from the median of the WHO reference population is considered stunted.

A child whose weight-for-age is below minus two standard deviations (-2 SD) from the reference population median is considered under-weight.

In addition to woman and household indicators, the child-level models also include controls for child's individual characteristics. These include child's age, sex, and birth order. Mother's Body Mass Index (BMI) is also included as a determinant of the child's health outcomes.

Tables 5.2 and 5.3 give the description and proportions or means of outcomes and control variables included in the three models for the 1990-91 and 2012-13 datasets. While stated preference for boys fell from 40% to 31% during the period, actual preference remained constant at 95% (Table 5.2).

Although most child health outcomes showed improvement during the period, development indicators are still far from being satisfactory. In 2012-13, about 48% and 30% of the children were reported to be stunted and under-weight respectively, while infant- and child-mortality were still high at 90 and 100 deaths per 1000 births respectively.

5.3.2 Estimation Techniques

All model specifications with binary dependent variables are estimated using the Probit estimator and corresponding marginal effects for age at marriage are obtained. Appropriate weights are employed to ensure the representative nature of the sample design. Estimations are carried out for both the 1990-91 and 2012-13 datasets.

We also obtain Regression Adjustment (RA) estimates for the stated and revealed preference models. This provides us with the Average Treatment Effect (ATE) corresponding to the population average of the difference between son preference outcomes in the hypothetic case when all women married at 18 or later and when all women married before 18. The RA estimates are obtained using the Weibull outcome model.

We carry out the whole set of Probit estimations using age at first cohabitation as alternative measure of female age at marriage to test the robustness of our findings. Though highly correlated with woman's age at marriage, this indicator can be important when studying early marriage.

We also estimate our son preference models using a categorical variable for age at marriage. This variable takes the value of 1 for women who married between the ages of 18 and 23 and 2 for women who married after the age of 24 with

Table 5.2: Data description (Outcomes)

Variables	Description	Proportion/Mean PDHS 1990-91	Proportion/Mean PDHS 2012-13
Son Preference			
Stated	Dummy variable, takes the value of 1 if ideal number of boys is reported to be greater than ideal number of girls, 0 otherwise	0.40	0.31
		0.59	0.68
Revealed	Dummy variable, takes the value of 1 if the mother has at least 1 son, 0 otherwise	0.96	0.95
		0.03	0.04
Child outcomes			
Birth and Post-natal outcomes			
Home delivery	Dummy variable, takes the value of 1 if child born at home, 0 otherwise	0.13	0.51
		0.86	0.48
Weight at birth	Dummy variable, takes the value of 1 if child weight at birth is normal, 0 otherwise	0.79	0.74
		0.20	0.25
Post-natal checkup	Dummy variable, takes the value of 1 if child had post-natal checkup within 2 months of birth, 0 otherwise	-	0.53
			0.46
Child fully immunized	Dummy variable, takes the value of 1 if child completed the vaccination course, 0 otherwise	0.45	0.57
		0.54	0.42
Nutrition outcomes			
Breastfeeding	Number of months the child was breast-fed	15.93	14.52
Meat or fish	Dummy variable, takes the value of 1 if child under age 2 had meat or fish during the day preceding the interview, 0 otherwise	-	0.10
			0.89
Fruits	Dummy variable, takes the value of 1 if child under age 2 had a fruit during the day preceding the interview, 0 otherwise	-	0.25
			0.74
Development outcomes			
Stunting	Dummy variable, takes the value of 1 if child is stunted, 0 otherwise	0.56	0.48
		0.43	0.51
Underweight	Dummy variable, takes the value of 1 if child is underweight, 0 otherwise	0.44	0.30
		0.55	0.69
Infant mortality	Dummy variable, takes the value of 1 if child died before the first birthday, 0 otherwise	0.10	0.09
		0.89	0.90
Child mortality	Dummy variable, takes the value of 1 if child died before the fifth birthday, 0 otherwise	0.12	0.10
		0.87	0.89

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Notes:The stated son preference variables are summarized at the mother level using the full sample. The revealed son preference variables are summarized at the mother level for women with completed fertility. The following variables are summarized at the child level: home delivery, normal weight at birth, postnatal check, child fully immunized, breastfeeding, meat and fish, fruits, child is stunted, child is underweight, infant mortality and child mortality. Proportions and means are reported in columns 3 and 4. Adequate sampling weights are used.

Table 5.3: Data description (Controls)

Variables	Description	Proportion/Mean PDHS 1990-91	Proportion/Mean PDHS 2012-13
Variables of interest			
Age at Marriage 1	Dummy variable, takes the value of 1 if woman married after reaching the age of 18 years, 0 otherwise	0.49	0.57
		0.50	0.42
Age at Marriage 2	Categorical variable, takes the value of 0 if woman married before the age of 18, 1 if woman married between 18 and 23 years of age, 2 if woman married at the age of 24 or above.	0.50	0.42
		0.40	0.46
		0.09	0.10
Age at Cohabitation	Dummy variable, takes the value of 1 if woman began cohabiting at 18 years of age or above, 0 otherwise	-	0.59
			0.40
Individual			
Age	Woman's age in completed years	31.02	32.24
Age difference	Age difference between husband and wife in years	6.53	5.22
Education	Categorical variable, takes the value of 0 if the woman has no education, 1 if the woman possesses primary education, 2 if the woman possesses secondary education, 3 if the woman possesses higher education	0.79	0.57
		0.09	0.15
		0.10	0.17
		0.01	0.09
Spouse education	Categorical variable, takes the value of 0 if the husband possesses no education, 1 if the husband possesses primary education, 2 if the husband possesses secondary education, 3 if the husband possesses higher education	0.48	0.32
		0.17	0.16
		0.29	0.33
		0.04	0.16
Employed	Dummy variable, takes the value of 1 if the woman is employed, 0 otherwise	0.16	0.26
		0.83	0.73
Media exposure	Dummy variable. takes the value of 1 if woman reads newspaper, listens radio or watches television once a week, 0 otherwise	0.41	0.48
		0.58	0.51
Household-related			
Family structure	Dummy variable, takes the value of 1 if the family is nuclear, 0 otherwise	0.66	0.62
		0.33	0.37
Household size	Total number of family members in the household	8.06	8.39
Place of residence	Dummy variable, takes the value of 1 if the household resides in an urban area, 0 otherwise	0.30	0.33
		0.69	0.66
Wealth Status	Categorical variable, takes the values of 1 to 5 for households belonging to the poorest, poorer, middle, rich and richest household wealth groups.	0.15	0.19
		0.16	0.19
		0.18	0.19
		0.23	0.20
		0.26	0.20
Sanitation	Dummy variable, takes the value of 1 if the household have Improved sanitation facility, 0 otherwise	0.36	0.65
		0.63	0.34
Water source	Dummy variable, takes the value of 1 if the household has access to improved water facility, 0 otherwise	0.79	0.90
		0.20	0.09
Child-level			
Age	Child's age in months	28.33	30.13
Sex	Dummy variable, takes the value of 1 if the child sex is male, 0 otherwise	0.51	0.51
		0.48	0.48
Birth order	Child birth order	4.09	3.48
BMI	Mothe's Body mass index (BMI)	-	23.42

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Notes: Individual and household control variables are summarized at the mother level. Child controls are summarized at the child level for children up to 5 year of age. The proportions and means are reported in columns 3 and 4. Adequate sampling weights are used.

women marrying before 18 as the reference group. According to PDHS, while the proportion of women marrying below 18 fell from 50% in 1990-91 to 42%, the proportion of women marrying between the ages of 18 and 23 increased from 40% to 46% during the same period with minor change in the over 24 year category. As a further robustness measure, we estimate the son preference models using three matching routines, namely Propensity Score Matching (PSM), Inverse Probability Weighting (IPW) and Augmented Inverse Probability Weighting (AIPW). The use of these techniques helps account for the possibility that women marrying early may differ from those marrying later in ways that could be considered non-random. These matching estimators are based on the Rubin Causal Model with assumptions of unconfoundedness and overlapping (Rosenbaum and Rubin, 1983). The PSM matches the treated group individuals (those who married later) to the non-treated counterparts (women who married early) based on a propensity score for participation given observable characteristics of the individual. The IPW improves on PSM by according a higher weight to individuals receiving an unlikely treatment. This reweighting helps assign higher weights to individuals lying in the middle of the probability distribution and lower weights to those at the extremes (Wooldridge, 2007). The AIPW combines both the properties of the regression based estimator and the IPW estimator, requiring either the propensity or outcome model (but not necessarily both) to be correctly specified (Cao, Tsiatis, and Davidian, 2009).

The average treatment effect (ATE) calculated for each matching estimation provides difference between the expected outcomes with and without treatment. After the PSM estimation, the balancing of the treatment groups is checked using Kernel density plots. Plots for the baseline set of estimations are given in the appendix. The covariates of the two groups are found to be well balanced.

5.4 Findings

5.4.1 Differential Gender Preference

We begin by presenting bivariate tabulations for stated and revealed son preference grouped by women who married before and after their 18th birthday (Table 5.4). Subgroup means for the two types of preferences are invariably higher among early-marriage women in both the 1990-91 and 2012-13 datasets implying greater preference for boys among them compared to late-marriage women. The difference is significant in three out of four pairs of statistics, the exception being the stated preference in 1990-91.

A similar picture emerges when we regress the two measures of preference on the age at marriage indicator. Table 5.5 shows the results of Probit estimations with and without the full set of controls for the two measures for each of the two datasets. The coefficients of age at marriage variable for the stated preference model are insignificant for the 1990-91 sample with or without controls (Columns 1 - 2). In contrast, coefficients for the 2012-13 stated preference model (Columns 3 - 4) and both of the revealed preference models (Columns 5 - 8) are significant with a negative sign. Corresponding marginal effects for the 2012-13 stated preference models are 4.9% without controls and a lower 2.4% with the set of controls. Marginal effects for the revealed preference are stronger than the stated ones (3.2 - 4.3% with controls compared with 2.4% with controls respectively), and are higher in 2012-13 (4.3%) than in 1990-91 (3.2% with controls).

These findings show a clear difference in fertility behaviour between women who married early and those who married later. Late-marrying women report lower preference for boys. They are also 3 to 4% less likely to have given birth to one of more sons, a finding that corroborates this claim.

Results of RA estimations reinforce this inference (results not shown). The ATE for the stated preference estimation for the 2012-13 sample is 4.2%. This means that stated preference for boys would be lower by 4.2% if all women married at 18 at later compared to the situation in which all women married before 18. The impact is even stronger for revealed preference, with the difference between the two extremes ranging from 6% (2012-13) to 10% (1990-91).

Table 5.4: Female age at marriage and preference for boys

	PDHS 1990-91			PDHS 2012-13		
	Married < 18	Married >=18	t-stat	Married < 18	Married >=18	t-stat
	(1)	(2)	(3)	(4)	(5)	(6)
Stated Preference	0.41	0.39	-0.63	0.33	0.29	-3.60
Revealed Preference	0.97	0.94	-3.70	0.98	0.96	-3.72

Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13. Notes: Adequate sampling weights are used to account for sample design. The unit of analysis is women. The means are reported in columns 1, 2, 4, and 5. Columns 3 and 6 report the t-statistic for the female early marriage- later marriage mean comparison test.

Table 5.5: Female age at Marriage and son preference – Probit estimations

	Stated Preference				Revealed Preference			
VARIABLES	PDHS 1990-91		PDHS 2012-13		PDHS 1990-91		PDHS 2012-13	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age at marriage (ref: below 18)								
18 and above	-0.041	0.009	-0.137***	-0.070*	-0.414***	-0.460***	-0.339***	-0.307***
	(0.065)	(0.072)	(0.034)	(0.037)	(0.114)	(0.140)	(0.094)	(0.109)
Marginal effect	-0.015	0.003	-0.049***	-0.024*	-0.032***	-0.032***	-0.046***	-0.043***
	(0.025)	(0.026)	(0.012)	(0.013)	(0.008)	(0.009)	(0.006)	(0.006)
Constant	-0.215***	0.265	-0.367***	-0.329***	2.015***	-0.320	2.128***	0.231
	(0.048)	(0.201)	(0.026)	(0.097)	(0.092)	(0.403)	(0.077)	(0.381)
Observations	2,542	2,454	11,274	10,777	2,732	2,697	6,587	6,539
Controls	NO	YES	NO	YES	NO	YES	NO	YES

Source: Authors' calculations using PDHS 1990-91 & PDHS 2012-13. Notes: Each coefficient provided in the table corresponds to a separate regression. Adequate sampling weights are used to account for sampling design. Full set of controls is included in less parsimonious estimations. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Is the difference in fertility behaviour between women who married early and those who married later valid across the socioeconomic spectrum? We examine five pairs of subgroups of women to answer this question. These include:

(I) Women with no schooling compared with women who have received some schooling

(II) Women who are employed compared with women who do not work

(III) Women with exposure to media compared with women with no regular media exposure

(IV) Women living in rural areas compared to women living in urban centres, and

(V) Women belonging to poor households (i.e. bottom quintile of the assets distribution) compared to women belonging to non-poor households.

Table 5.6 presents results of these subsample estimations for the 2012-13 dataset. The coefficients of age at marriage for the stated preference models are significant among all the first sub-groups of the five pairs of estimations (Column 1) and insignificant among the second sub-group (Column 2). Marginal effects of the former five are all in the 3 to 4% range. This suggests that the decrease in reported preference for boys seen so far appears to be present mainly among women belonging to less affluent sections of the society, i.e. those with no schooling, exposure to media or formal work as well as those who belong to poor households and live in rural areas.

Results for the revealed preference model are similar for sub-groups of women corresponding to three characteristics: media exposure, place of residence and wealth (Panels C – E, Columns 3 – 4).

Results for the other two characteristics (i.e. schooling and work) are different, however (Panels A – B, Columns 3 – 4). The decrease in revealed son preference is significant regardless of whether the women is educated or employed. The marginal effects for educated and working women are in fact slightly higher than their uneducated and not working counterparts. This final finding seems puzzling if seen in light of the mainly less-affluent profile of women stating lower preference for boys seen above. The reason for this divergent finding possibly lies in the state of large unmet need for contraceptive methods. While poor or uneducated women may have a greater motivation for reducing discriminatory fertility choices, they may lack the means to realize the desired balance. According to the 2012-13 PDHS, unmet need for family planning services among currently-married women ranged from 25% among women belonging to the bottom quintile of wealth distribution to 15% among the top quintile, and from 22% among women with no schooling to 15% among women with higher education.

5.4.2 Differential Parental Investment

If gender-specific reproductive preferences differ by age at which a woman marries, do parental investments on child health and nutrition too do so? Compared with their early-marriage counterparts, women who marry later may have better understanding and more say in how and what to do to optimize resources allocated to children.

Once the child is conceived and the sex of the child known, the gender bias of the parents can reflect in the care the foetus, the neo-nate and the infant receives. Over 88% of Pakistani women had an ultrasound done during their most recent pregnancy. This ubiquitous knowledge of the sex of the child can lead to differential birth outcomes: Mother of the future male offspring may get better nourishment and healthcare. She may be taken to the hospital rather than delivering the child at home. Male new-born and infant may also get greater medical attention and access to more nutritious food which may later lead to better health and development outcomes compared to girls.

Table 5.6: Female age at marriage and son preferences - individual and household characteristics

	Stated Preference		Revealed Preference	
	(1)	(2)	(3)	(4)
VARIABLES	No- schooling	Schooling	No- schooling	Schooling
Age at marriage (ref: below 18)				
18 and above	-0.087*	-0.065	-0.336**	-0.348**
	(0.045)	(0.062)	(0.143)	(0.142)
Marginal effect	-0.032*	-0.021	-0.016**	-0.021***
	(0.016)	(0.020)	(0.007)	(0.007)
Constant	-0.382***	-0.653***	-0.561	1.207**
	(0.116)	(0.249)	(0.533)	(0.564)
Observations	6,044	4,733	3,854	2,685
Controls	YES	YES	YES	YES
	Not working	Employed	Not working	Employed
Age at marriage (ref: below 18)				
18 and above	-0.100**	-0.015	-0.201*	-0.644***
	(0.043)	(0.070)	(0.119)	(0.217)
Marginal effect	-0.035**	-0.005	-0.011*	-0.028***
	(0.015)	(0.024)	(0.006)	(0.010)
Constant	-0.346***	-0.405**	0.385	-0.098
	(0.112)	(0.196)	(0.389)	(0.844)
Observations	8,309	2,483	4,921	1,629
Controls	YES	YES	YES	YES
	No-media exposure	Media Exposure	No-media exposure	Media Exposure
Age at marriage (ref: below 18)				
18 and above	-0.104**	-0.021	-0.360**	-0.242
	(0.049)	(0.055)	(0.150)	(0.151)
Marginal effect	-0.037**	-0.007	-0.018**	-0.014
	(0.017)	(0.019)	(0.008)	(0.008)
Constant	-0.350***	-0.374**	-0.179	0.599
	(0.125)	(0.172)	(0.534)	(0.518)
Observations	5,297	5,480	3,187	3,352
Controls	YES	YES	YES	YES
	Rural	Urban	Rural	Urban
Age at marriage (ref: below 18)				
18 and above	-0.105**	0.025	-0.352**	-0.255
	(0.044)	(0.066)	(0.142)	(0.158)
Marginal effect	-0.038**	-0.008	-0.016**	-0.017
	(0.016)	(0.021)	(0.007)	(0.009)
Constant	-0.250**	-0.771***	0.026	0.062
	(0.114)	(0.238)	(0.511)	(0.575)
Observations	5,703	5,074	3,314	3,225
Controls	YES	YES	YES	YES
	Poor	Non-poor	Poor	Non-poor
Age at marriage (ref: below 18)				
18 and above	-0.109*	-0.045	-0.580***	-0.171
	(0.055)	(0.049)	(0.184)	(0.124)
Marginal effect	-0.041*	-0.015	-0.026***	-0.010
	(0.020)	(0.016)	(0.010)	(0.007)
Constant	-0.469***	-0.500***	-0.579	0.572
	(0.143)	(0.136)	(0.719)	(0.411)
Observations	4,053	6,724	2,137	4,314
Controls	YES	YES	YES	YES

Source: Authors' calculations using PDHS 2012-13. Notes: Each coefficient provided in the table corresponds to a separate regression. Adequate sampling weights are used to account for sampling design. Full set of controls is included. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5.7 shows various birth and child development outcomes for sub-groups of early- and late-marriage women. As seen in t-statistics for mean comparison test (Columns 3 and 6), the two sub-groups of women differ in all the measures with the exception of child birth weight. Compared to children of women who married before the age of 18, a greater proportion of those born to women who married later have normal birth weight and complete the full vaccination course by their first birthday (Panel A). Likewise, a smaller proportion of children born to late-marriage women is stunted or underweight, or dies before the first or the fifth birthday. The statistical difference in outcomes between the two groups of women is reflected in both boys and girls (Panels B and C).

We are interested in observing the interaction between woman's age at marriage

Table 5.7: Female age at marriage and child outcomes

	PDHS 1990-91			PDHS 2012-13		
	Married < 18	Married >=18	t-stat	Married < 18	Married >=18	t-stat
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Full Sample						
Normal weight at birth	0.77	0.77	0.10	0.61	0.71	2.37
Child fully immunized	0.37	0.46	4.42	0.47	0.63	10.78
Stunting	0.55	0.44	-5.41	0.53	0.38	-6.07
Underweight	0.44	0.35	-4.33	0.36	0.24	-5.20
Infant mortality	0.11	0.09	-5.24	0.09	0.08	-4.52
Child mortality	0.14	0.10	-6.37	0.11	0.09	-5.85
Panel B: Male child subsample						
Normal weight at birth	0.77	0.76	-0.04	0.67	0.73	1.00
Child fully immunized	0.40	0.47	2.46	0.46	0.65	9.25
Stunting	0.54	0.46	-3.03	0.56	0.40	-4.68
Underweight	0.42	0.38	-1.62	0.38	0.27	-3.11
Infant mortality	0.12	0.09	-4.11	0.10	0.09	-1.97
Child mortality	0.14	0.10	-5.19	0.11	0.09	-3.31
Panel C: Female child subsample						
Normal weight at birth	0.77	0.78	0.21	0.55	0.70	2.44
Child fully immunized	0.34	0.44	3.63	0.48	0.60	6.02
Stunting	0.55	0.41	-4.71	0.49	0.35	-3.89
Underweight	0.46	0.33	-4.63	0.34	0.21	-4.25
Infant mortality	0.11	0.09	-3.31	0.09	0.07	-4.58
Child mortality	0.13	0.10	-3.84	0.11	0.08	-5.08

Source: Authors' calculations using PDHS 1990-91 & PDHS 2012-13. Notes: Adequate sampling weights are used to account for sample design. The unit of analysis is child. The means are reported in Columns 1, 2, 4, and 5. Columns 3 and 6 report the t-statistic for the child marriage- non child marriage mean comparison test.

and the sex of the child in order to understand the differential role mother's age at marriage plays in determining indicators of parental investment.

Tables 5.8 to 5.10 present partial results of three sets of estimations pertaining to pre- and post-natal care, nutrition, and long-term health and survival. All estimations include a set of mother, child and household characteristics as control variables.

Table 5.8 Columns 1 and 2 give results for home delivery and birth weight of children during whose pregnancy mothers had an ultrasound, while Columns 3 to 5 give results for post-natal medical visit and immunization. The interaction term in none of the five estimations is found to be statistically different from zero, implying that the impact of mother's pre- and post-natal healthcare investment on the child is independent of the child's sex.

The interaction term in three out of four child nutrition estimations (Table 5.9) is likewise insignificant. The only exception is the 2012-13 breastfeeding estimation (Column 2). Not only is the interaction between mother's age at marriage and child sex significant but also the coefficient of child's sex suggesting higher duration of breastfeeding by the mother if the child is a boy. Evidence of gender-biased breastfeeding has previously been reported in the case of India (Jayachandran and Kuziemko, 2011) and Pakistan (Hafeez and Quintana-Domeque, 2018). The negative sign of the interaction term may be indicative of a less discriminatory feeding pattern prevalent among later-marriage women.

The evidence of a general lack of statistical significance found in the results persists in Table 5.10 which reports results of estimations for long-term development outcomes. The effects of maternal age at marriage on the developmental outcomes of the child are not found to be gender-specific. The impact of maternal age at marriage on the likelihood that the child is stunted or under-weight (Columns 1 – 4), or the probability of the child not surviving beyond the first or the first five years of existence (Columns 5 – 8) is again independent of the child's sex. An exception is the result for child's weight for age in 1990-91 (Column 3) in which the interaction is found to be statistically significant and has a positive sign. This points to the possibility that the beneficial impact of woman's late marriage on the child's weight is reinforced when the child is a boy. This gender-specific effect is no longer present in 2012-13 (Column 4).

All in all, there is little evidence to support the Contention that women's age at marriage is associated with early child investments on health and nutrition. This lack of association is valid across specifications and does not show sign of change over time.

Table 5.8: Female age at marriage and birth and post-natal healthcare

VARIABLES	Home delivery	Weight at birth	Postnatal Checkup	Full Immunization	
	PDHS 2012-13	PDHS 2012-13	PDHS 2012-13	PDHS 1990-91	PDHS 2012-13
Age at marriage (ref: below 18)					
18 and above	-0.153	-0.289	0.138**	0.156*	0.107*
	(0.138)	(0.310)	(0.067)	(0.080)	(0.059)
Sex (ref: female)					
Male	-0.098	0.210	0.046	0.166**	-0.020
	(0.147)	(0.400)	(0.071)	(0.078)	(0.062)
Age at marriage × Sex	0.123	0.038	-0.059	-0.103	0.127
	(0.187)	(0.453)	(0.090)	(0.1080)	(0.080)
Constant	0.404	-0.268	-0.636***	-0.598***	-0.884***
	(0.294)	(0.762)	(0.099)	(0.132)	(0.100)
Observations	1,633	447	6,636	4,054	8,473
Mother-level controls	YES	YES	YES	YES	YES
Household-level controls	YES	YES	YES	YES	YES
Child-level controls	YES	YES	YES	YES	YES

Source: Authors' calculations using PDHS 1990-91 & PDHS 2012-13. Notes: Each coefficient provided in the table corresponds to a separate regression. Information on ultrasound (required for estimations including home delivery and weight at birth) and post-natal checkup is only available in the 2012-13 dataset. Adequate sampling weights are used to account for sampling design. Full set of mother, household and child-level controls is included in the estimations. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5.9: Female age at marriage and child nutrition

	Breastfeeding		Meat and fish	Fruits
VARIABLES	PDHS 1990-91	PDHS 2012-13	PDHS 2012-13	PDHS 2012-13
Age at marriage (ref: below 18)				
18 and above	-0.254	0.172	-0.178*	-0.331***
	(0.407)	(1.018)	(0.101)	(0.086)
Sex (ref: female)				
Male	0.426	2.674***	0.060	-0.052
	(0.427)	(1.033)	(0.093)	(0.083)
Age at marriage × Sex	-0.565	-2.747**	0.064	0.145
	(0.579)	(1.368)	(0.133)	(0.113)
Constant	11.595***	12.078***	-1.587***	-0.611***
	(0.600)	(2.228)	(0.229)	(0.203)
Observations	4,923	971	4,465	4,461
Mother-level controls	YES	YES	YES	YES
Household-level controls	YES	YES	YES	YES
Child-level controls	YES	YES	YES	YES

Source: Authors' calculations using PDHS 1990-91 & PDHS 2012-13. Each coefficient provided in the table corresponds to a separate regression. Information on meat and fish and fruits is only available in the 2012-13 dataset. Adequate sampling weights are used to account for sampling design. Full set of mother, household and child-level controls is included in the estimations. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5.10: Female age at marriage and child development outcomes

VARIABLES	Stunting		Underweight		Infant Mortality		Child Mortality	
	PDHS 1990-91	PDHS 2012-13	PDHS 1990-91	PDHS 2012-13	PDHS 1990-91	PDHS 2012-13	PDHS 1990-91	PDHS 2012-13
Age at marriage (ref: below 18)								
18 and above	-0.215***	-0.178*	-0.233***	-0.255**	-0.093**	0.028	-0.099**	0.044
	(0.079)	(0.097)	(0.078)	(0.101)	(0.045)	(0.057)	(0.042)	(0.055)
Sex (ref: female)								
Male	0.028	0.170	-0.074	0.090	0.027	0.038	0.007	0.070
	(0.077)	(0.103)	(0.075)	(0.105)	(0.038)	(0.054)	(0.036)	(0.052)
Age at marriage × Sex	0.103	-0.026	0.223**	0.150	-0.026	0.091	-0.036	0.040
	(0.110)	(0.131)	(0.108)	(0.136)	(0.060)	(0.077)	(0.057)	(0.074)
Constant	-0.252**	0.517**	-0.206*	0.818***	-1.299***	-1.223***	-1.274***	-1.201***
	(0.113)	(0.206)	(0.112)	(0.227)	(0.060)	(0.124)	(0.057)	(0.118)
Observations	3,967	3,007	3,967	3,007	26,113	16,609	26,113	16,609
Mother-level controls	YES	YES	YES	YES	YES	YES	YES	YES
Household-level controls	YES	YES	YES	YES	YES	YES	YES	YES
Child-level controls	YES	YES	YES	YES	YES	YES	YES	YES

Source: Authors' calculations using PDHS 1990-91 & PDHS 2012-13. Notes: Each coefficient provided in the table corresponds to a separate regression. Adequate sampling weights are used to account for sampling design. Full set of mother, household and child-level controls is included in the estimations. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

5.5 Robustness Measures

We examine the robustness of our findings by estimating our models using alternative indicators for our variable of interest and other econometric procedures. First, we employ women's age at cohabitation in place of age at marriage. According to PDHS 2012-13, women begin cohabiting with their husbands 18 weeks after marriage at an average, mean age at cohabitation being 18.95 years. As a result of this delay, 40% of the married women in the sample report having started cohabiting with their husbands before the age of 18 compared with 42% of women who were married.

Nonetheless, the results of the whole set of estimations carried out with a binary variable for age at cohabitation (Tables 5.11 – 5.14) are analogous to the results with the variable for age at marriage presented in the previous section. The coefficients of the variable of interest of the son preference models remain significant as before with negative sign, while the interaction term in the parental investment models stay mostly insignificant.

Second, we use a categorical variable for age at marriage in the two son preference models instead of the default binary variable. This allows us to gauge if the differences in son preference that late-marriage women exhibit in contrast to early-marriage women are equally present in the 18 to 23 year and over 24 year sub-groups of women.

The results of estimations for revealed preference for boys (shown in Table 5.15 Columns 3 and 4) are negative and statistically significant as before. Women marrying at 24 or later show somewhat greater decrease in preference than those marrying between 18 and 23 years of age. Results of stated preference are however divergent. In addition to insignificant results found in the 1990-91 sample,

Table 5.11: Female age at cohabitation and preference for boys

VARIABLES	Stated Preference		Revealed Preference	
	(1)	(2)	(3)	(4)
Age at cohabitation (ref: below 18)				
18 and above	-0.158***	-0.077**	-0.301***	-0.298***
	(0.032)	(0.035)	(0.075)	(0.094)
Marginal effect	-0.056***	-0.027**	-0.025***	-0.023***
	(0.011)	(0.012)	(0.006)	(0.006)
Constant	-0.377***	-0.381***	1.905***	-0.375
	(0.024)	(0.086)	(0.060)	(0.293)
Observations	13,000	12,414	6,849	6,797
Controls	NO	YES	NO	YES

Source: Authors' calculations using PDHS 1990-91 & PDHS 2012-13. Notes: Each coefficient provided in the table corresponds to a separate regression. Adequate sampling weights are used to account for sampling design. Full set of controls is included in less parsimonious estimations. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

no statistically significant difference is seen in the 2012-13 among women who marry at 24 or later either (Table 5.15 Columns 1 and 2). Difference in this case mainly exists between women who married before the age of 18 and those who married between the ages of 18 and 23.

Third, we account for the possibility of selection bias by estimating the son preference models using matching routines. We employ three matching techniques, namely Propensity Score Matching (PSM), Inverse Probability Weighting (IPW) and Augmented Inverse Probability Weighting (AIPW).

Results of the estimations are given in Tables 5.16 and 5.17.

The Average Treatment Effect (ATE) of both the stated and revealed preference models have significance and signs similar to those of the coefficients of the baseline Probit models. The magnitude of the ATE ranges from under 2% to over 5% for the estimations using the three techniques.

Table 5.12: Female age at cohabitation and birth and post-natal child healthcare

VARIABLES	Home delivery PDHS 2012-13	Weight at birth PDHS 2012-13	Postnatal checkup PDHS 2012-13	Full immunization PDHS 2012-13
Age at cohabitation (ref: below 18)				
18 and above	-0.174	-0.109	0.134**	0.139**
	(0.138)	(0.317)	(0.067)	(0.059)
Sex (ref: female)				
Male	-0.140	0.328	0.051	-0.004
	(0.148)	(0.410)	(0.071)	(0.062)
Age at cohabitation × Sex	0.194	-0.115	-0.072	0.099
	(0.187)	(0.466)	(0.090)	(0.079)
Constant	0.470*	-0.173	-0.445***	-0.790***
	(0.268)	(0.699)	(0.092)	(0.093)
Observations	1,633	447	6,636	8,473
Mother-level controls	YES	YES	YES	YES
Household-level controls	YES	YES	YES	YES
Child-level controls	YES	YES	YES	YES

Source: Authors' calculations using PDHS 2012-13. Notes: Each coefficient provided in the table corresponds to a separate regression. Adequate sampling weights are used to account for sampling design. Full set of mother, household and child-level controls is included in the estimations. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5.13: Female age at cohabitation and child nutrition

VARIABLES	Breastfeeding PDHS 2012-13	Meat and fish PDHS 2012-13	Fruits PDHS 2012-13
Age at cohabitation (ref: below 18)			
18 and above	-0.162	-0.118	-0.356***
	(1.023)	(0.101)	(0.086)
Sex (ref: female)			
Male	2.403**	0.068	-0.041
	(0.999)	(0.092)	(0.082)
Age at cohabitation × Sex	-2.351*	0.050	0.128
	(1.358)	(0.132)	(0.113)
Constant	11.698***	-1.765***	-0.565***
	(2.128)	(0.199)	(0.190)
Observations	971	4,465	4,461
Mother-level controls	YES	YES	YES
Household-level controls	YES	YES	YES
Child-level controls	YES	YES	YES

Source: Authors' calculations using PDHS 2012-13. Notes: Each coefficient provided in the table corresponds to a separate regression. Adequate sampling weights are used to account for sampling design. Full set of mother, household and child-level controls is included in the estimations. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

5.6 Conclusion

The fifth Sustainable Development Goal (SDG) of the United Nations which deals with gender inequality calls for entailing women and girls equal rights to economic resources and ensuring their full participation at all levels in economic decisions (UN, 2015). A prerequisite to achieving the goal of women's economic empowerment is by eliminating harmful practices such as child marriage before age 18.

In this study, we examined how age at marriage interacts with women's perspectives on gender balance pertaining to their reproductive and maternal prefer-

Table 5.14: Female age at cohabitation and child development outcomes

VARIABLES	Stunting PDHS 2012-13	Underweight PDHS 2012-13	Infant Mortality PDHS 2012-13	Child Mortality PDHS 2012-13
Age at cohabitation (ref: below 18)				
18 and above	-0.179*	-0.268***	0.028	0.031
	(0.098)	(0.102)	(0.058)	(0.055)
Sex (ref: female)				
Male	0.159	0.112	0.036	0.062
	(0.103)	(0.104)	(0.054)	(0.052)
Age at cohabitation × Sex	-0.014	0.107	0.096	0.056
	(0.131)	(0.135)	(0.077)	(0.074)
Constant	0.479**	0.809***	-1.163***	-1.135***
	(0.195)	(0.217)	(0.117)	(0.112)
Observations	3,007	3,007	16,609	16,609
Mother-level controls	YES	YES	YES	YES
Household-level controls	YES	YES	YES	YES
Child-level controls	YES	YES	YES	YES

Source: Authors' calculations using PDHS 2012-13. Notes: Each coefficient provided in the table corresponds to a separate regression. Adequate sampling weights are used to account for sampling design. Full set of mother, household and child-level controls is included in the estimations. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5.15: Female age at marriage subgroups and preference for boys

VARIABLES	Stated Preference				Revealed Preference			
	PDHS 1990-91		PDHS 2012-13		PDHS 1990-91		PDHS 2012-13	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age at marriage (ref: below 18)								
18-23	-0.025	0.010	-0.145***	-0.088**	-0.273**	-0.310**	-0.320***	-0.300***
	(0.069)	(0.075)	(0.036)	(0.038)	(0.119)	(0.148)	(0.098)	(0.110)
24 and above	-0.099	0.003	-0.103*	0.052	-0.813***	-1.014***	-0.433***	-0.372**
	(0.106)	(0.120)	(0.058)	(0.065)	(0.164)	(0.208)	(0.148)	(0.175)
Marginal effect								
1	-0.009	0.003	-0.052***	-0.030**	-0.018**	-0.018**	-0.018***	-0.016***
	(0.026)	(0.027)	(0.012)	(0.013)	(0.008)	(0.008)	(0.005)	(0.005)
2	-0.038	0.000	-0.037***	0.018	-0.092***	-0.107***	-0.028***	-0.021***
	(0.040)	(0.044)	(0.020)	(0.023)	(0.026)	(0.029)	(0.012)	(0.012)
Constant	-0.215***	0.264	-0.367***	-0.322***	2.015***	-0.524	2.128***	0.224
	(0.048)	(0.202)	(0.026)	(0.097)	(0.092)	(0.389)	(0.077)	(0.379)
Observations	2,542	2,454	11,274	10,777	2,732	2,697	6,587	6,539
Controls	NO	YES	NO	YES	NO	YES	NO	YES

Source: Authors' calculations using PDHS 1990-91 & PDHS 2012-13. Notes: Each coefficient provided in the table corresponds to a separate regression. Adequate sampling weights are used to account for sampling design. Full set of controls is included in less parsimonious estimations. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

ences.

We came up with a beneficial role of late marriage in addressing inter-generational gender bias existing in Pakistan. Delay in women's marriage beyond the 18th birthday positively influences women's preference for family's sex composition. Not only the women who married later report weaker preference for boys than do women who married before 18, but also show less likelihood of bearing one or more sons. These differential impacts show little change over time.

We found that this reduction in son preferring behaviour was more common among less affluent women: those coming from poor, rural households with no

Table 5.16: Female age at marriage and preference for boys - Propensity Score Matching

	Stated Preference		Revealed Preference	
Propensity score match	PDHS 1990-91	PDHS 2012-13	PDHS 1990-91	PDHS 2012-13
ATE	0.000	-0.049***	-0.058***	-0.015***
	(0.024)	(0.011)	(0.012)	(0.005)
Observations	2,454	10,777	2,697	6,539

Source: Authors' calculations using PDHS 1990-91 & PDHS 2012-13. Notes: Sample used for stated preference estimations (shown in columns 1 & 2) includes all women. Sample used for revealed preference estimations (shown in columns 3 & 4) consists of women with complete fertility. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

education, employment or regular exposure to media. This finding has considerable implications on the aggregate level. Rising female age at marriage is playing a non-negligible role in societal changes that are currently taking place in Pakistan. Keeping in perspective that son preference is predominantly seen among women with less wealthy, rural background (Javed and Mughal, 2019), a stronger decrease in son preference among women of this socioeconomic profile is reflective of converging demographic trends.

We also found limits to marital age's inter-generational effects. Whether or not a woman married early or late does little to modify the male gender bias prevalent in parental investment.

Preferential treatment of sons, be it in the form of pre- or post-natal care, access to nutritious food or healthcare the male child receives does not differ by the mother's age at the time of marriage. This finding underscores the strength of prevailing norms and customs, and emphasizes the need for awareness campaigns and active policy intervention in order to promote more equal distribution of parental care and resources.

Table 5.17: Female age at marriage and preference for boys – IPW and AIPW estimates

Inverse-Probability weights	PDHS 1990-91		PDHS 2012-13		PDHS 1990-91		PDHS 2012-13	
	Stated Preference	POmean	Stated Preference	POmean	Revealed Preference	POmean	Revealed Preference	POmean
ATE	0.000	0.392***	-0.044***	0.386***	-0.054***	0.974***	-0.017***	0.978***
	(0.021)	(0.015)	(0.010)	(0.007)	(0.010)	(0.004)	(0.004)	(0.002)
Observation	2,454		10,777		2,697		6,539	
Augmented IPW								
ATE	8.14	0.392***	-0.044***	0.387***	-0.054***	0.974***	-0.017***	0.978***
	(0.021)	(0.015)	(0.010)	(0.007)	(0.010)	(0.004)	(0.004)	(0.002)
Observation	2,454		10,777		2,697		6,539	

Source: Authors' calculations using PDHS 1990-91 & PDHS 2012-13. Notes: Sample used for stated preference estimations includes all women. Sample used for revealed preference estimations consists of women with complete fertility. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

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Chapter 6

Conclusion

This chapter is divided in to three sections. Section 6.1 is a discussion of the general summary and findings, section 6.2 is about the policy implication of the study and last section is about limitations and future research perspectives.

6.1 What Have We Learnt So Far

This thesis began by asking questions about son preference in Pakistan such as its prevalence and strength, effects on women's childbearing, its role in determining women's participation in intra-household decisionmaking, effect on birth spacing, probability of risky births and role of maternal age at marriage in modifying gender-specific reproduction and development outcomes. We carried out empirical studies to find answers for these questions.

After a brief presentation of data sources and definitions in Chapter 1, we examined son preference and its fertility effects in Pakistan in chapter 2. We considered different aspects of revealed and stated preference for sons by using a number of indicators. We found strong evidence for both the revealed and stated preference for male offspring. Moreover, son preference decreases in couple's level of education, and it is more intense among middle-class and rural households. Parity progression slows with number of sons born. We found that the probability of continuing childbearing decreases with the number of sons born. We concluded that son preference continues in Pakistan, its strength has somewhat weakened over the past two decades, and it remains a strong predictor of women's fertility behaviour.

In chapter 3, we studied the role of son preference in determining women's participation in intra-household decision-making. We found a significant association between son preference and women's say in intra-household decisions in Pakistani households. Women with at least one son have higher say in decisions involving healthcare, social and consumption matters respectively. Besides, women's role in financial affairs does not differ significantly from women with no sons. Moreover, we found that female participation in decision-making grows significantly with the number of sons but only up to the third parity. These findings are particularly visible among younger, wealthier and educated women, and those who got married earlier. We concluded that there is role of son preference in determining women's participation in intra-household decision-making. The improvement in female participation remains limited and decision- or context-specific.

In chapter 4, we investigate the effects of son preference on birth-to-birth intervals among Pakistani women. We analyze parity-wise effects of observed preference for sons on subsequent birth spacing. We check the effects of number of sons born to a woman at a given parity on subsequent birth spacing. In addition, we look the effect of the sex of the eldest child and the overall son-to-child ratio on the waiting time to the subsequent birth. We investigated whether disproportionate preference for male offspring increases the probability of risky births (those less than 24 or 18 months from the previous birth).

We obtained strong evidence for son preference at parity 1. This significant impact seems to dissipate beyond the second parity. We found that women with a higher proportion of sons among their children are more likely to delay succeeding births. Women with one or more sons are also more likely to employ contraceptive methods than women without a son. We found that the son preference – spacing association has survived over the years. Moreover, there is evidence for significantly higher incidence of risky births among women with no sons. We observed that this phenomenon is prevalent more among households that are wealthier or nuclear and among older, more educated women with a greater say in intra-household decisions. We concluded that Pakistani couples stay away from contraceptive methods and shorten time span between births in order to obtain the desired number of sons.

Finally, Chapter 5 focused on how age at marriage interacts with women's perspectives on gender balance pertaining to their reproductive and maternal preferences. We analyzed the interaction between women's age at marriage and gender bias found in parental allocation of nutrition and healthcare resources. We found that marriage at 18 or later positively influences women's preference for family's sex composition. Not only the women who married later report weaker preference for boys than do women who married before 18, but also show less likelihood of bearing one or more sons. These differential impacts show little change over time. Moreover, this reduction in son preferring behaviour is more common among women coming from poor, rural households with no education, employment or regular exposure to media. However, whether or not a woman married early or late does little to modify the male gender bias prevalent in parental investment. Preferential treatment of sons, be it in the form of pre- or post-natal care, access to nutritious food or healthcare the male child receives does not differ by the mother's age at the time of marriage.

6.2 Policy Implications

Growth and development becomes a challenge when half of the population can not utilize its capabilities to full potential.

We studied some aspects of the pervasive gender inequality and its manifestation in disproportionate preference for boys prevalent in the Pakistani society. Our analysis points to a number of policy implications. Just as it has in South Korea and other formerly-son preferring societies in East Asia, son preference can weaken when the roots of this practice are tackled. Policies that increase the opportunity cost of discrimination, whether at home or in the labour market, can be helpful.

One such step could be to ensure the implementation of inheritance laws, especially in the rural areas. Another step could be to enforce existing labour laws that protect the rights of women in the labour market. The aim should be to make work environment more conducive for all.

Besides, considering the extent of differential birth stopping seen in Chapter 2, there is strong need for providing better access to family planning services so that the couples could meet their contraceptive needs.

Given the significant role of rising age at marriage in falling preference for boys shown in the previous chapter, measures need to be taken to incentivise later marriage.

A key such measure would be to provide more education facilities to girls, especially at the secondary school and higher education level. Families in less developed areas should be given financial incentives for educating girls beyond primary or middle school.

Awareness campaigns can also be useful tools for promoting more rights for girls and women. Community leaders, particularly religious scholars, need to be involved. Pakistan is a muslim-majority country and Islam is the country's state religion.

Prophet Muhammad (peace be upon him) is reported to have said "Lucky is the woman whose first child is a daughter", and "When a boy is born, then he brings one Noor (light) and when a girl is born, then she brings two Noors".

A particular area in which the role of community leaders can be significant is in discouraging excessive demands of dowry imposed on daughter's parents. The practice of dowry is often deemed 'unislamic' by scholars. The economic burden poor parents face due to dowry requirements contributes to sons' excessive desirability.

One final recommendation pertains to sex-selective abortions.

There is no evidence of widespread sex-selection in Pakistan practised in Pakistan, as reported by Zaidi and Morgan (2016). However, relevant data are scarce and leave room for malpractice and abuse. Better mechanism needs to be devised to monitor the use of sex-detrmination technology and its use in sex-selective abortion.

6.3 Limitations and Future Research Perspectives

In this thesis, we examined some questions about son preference in Pakistan. Our empirical analysis limited itself to seeking answers to these questions. Other topics of investigation not examined in this document can be considered in future works.

Firstly, this study mostly considered women perception and reproductive behaviour and not much considered men perception about son preference. Research needs to be done on husband's perception of son preference and compare it with female outcomes examined in this thesis.

Second, there was no information about parent-in-law and their siblings, this information can also be beneficial in analyzing the data. For example, socioeconomic status of parent in law may influence the marital and reproductive live of couples.

Son preference is an outcome of patriarchal institutional structures. Cousin marriage is another dimension of patrilineage in a patriarchal society. In future, we can examine how and to what extent is marriage among relatives associated with son preference. Further, we can see the role consanguineous marriages play in determining child development in the presence of disproportionate son preference. Moreover, Government of Pakistan recently initiated health insurance program in different parts of the country. In this regard, a primary study can be helpful in capturing the role of gender bias at the micro level. For example, it can be possible to see whether or not gender bias eliminate in the presence of free health insurance market.

Bibliography

Zaidi, Batool and S. Philip Morgan (2016). "In the Pursuit of Sons: Additional Births or Sex-Selective Abortion in Pakistan?" In: *Population and Development Review* 42.4, pp. 693–710. ISSN: 17284457. DOI: 10.1111/padr.12002.

Appendix: Chapter 2

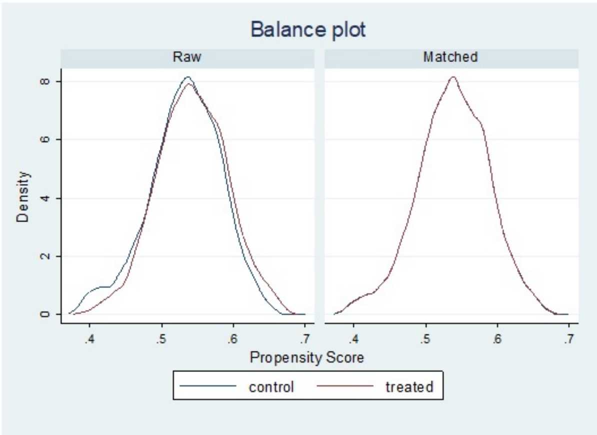
Table A1: Summary of the two datasets

	1990-91	2012-13
Household sample size	7,193	12,943
Number of women (ever married, age 15 to 49)	6,611	13,558
Women with complete fertility	2,732	6,849
Number of men	1,354	3,134
Number of births	27,369	50,238
Total fertility rate	5.4	3.8
Sex ratio at birth	105.6	108.13

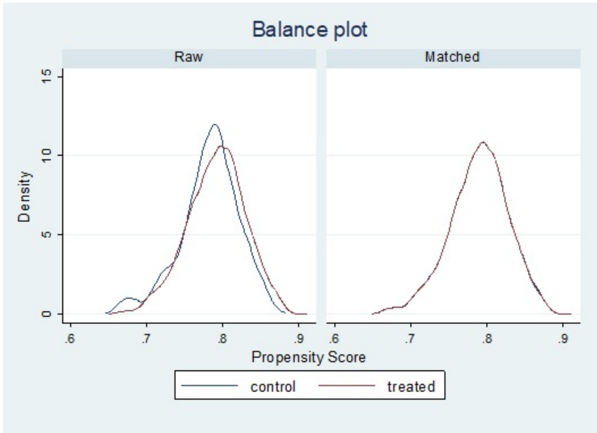
Source: Authors' calculations using PDHS 1990-91 and PDHS 2012-13.

Figure A1: Kernel density plots after Propensity score matching (PDHS 1990-91)

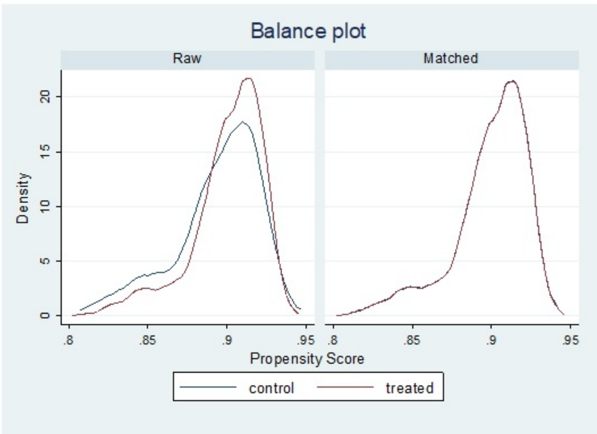
(a) Model 1



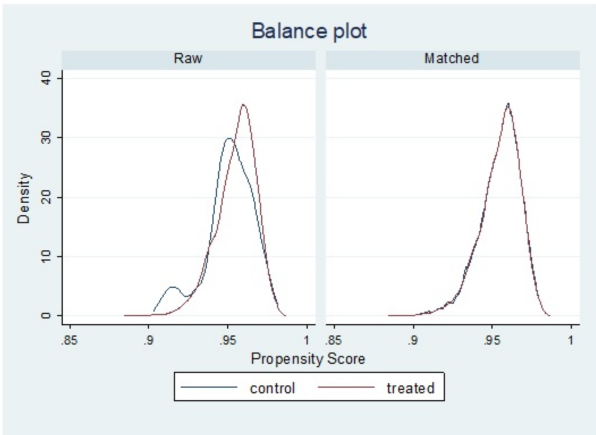
(b) Model 2



(c) Model 3



(d) Model 4



Source: Authors' calculations using PDHS 1990-91.

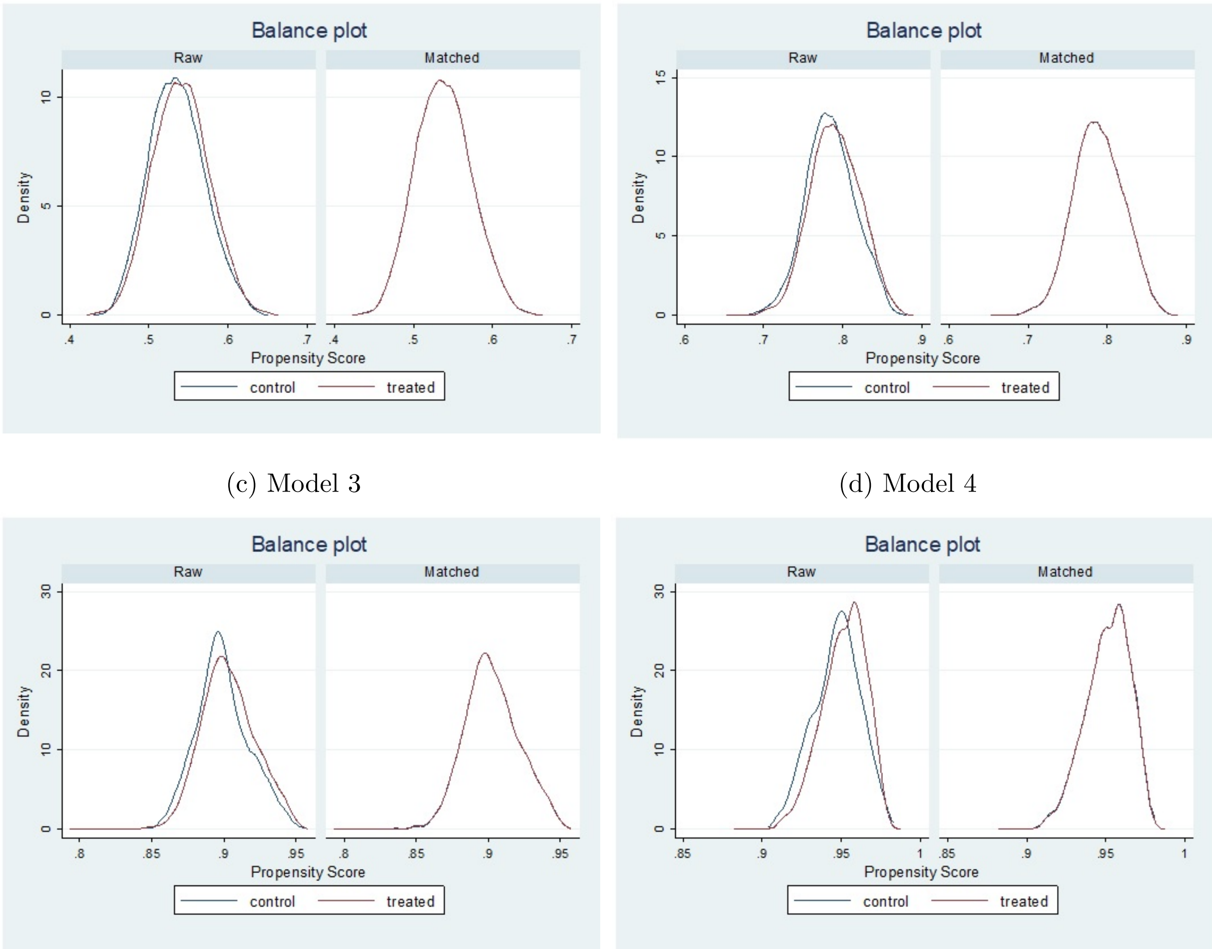
Figure A2: Kernel density plots after Propensity score matching (PDHS 2012-13)

(a) Model 1

(b) Model 2

(c) Model 3

(d) Model 4



Source: Authors' calculations using PDHS 2012-13.

Appendix: Chapter 3

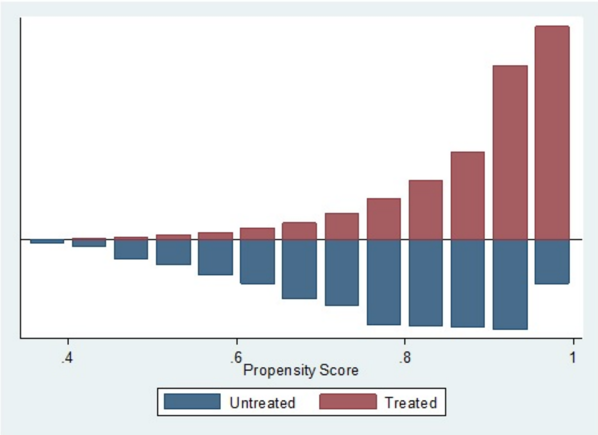
Table B1: Son preference and female participation in decisionmaking (with age square interaction effect) – probit estimation

	Healthcare decisions	Social decisions	Consumption decisions	Financial decisions
Sons (ref: none)				
At least one son	0.142***(0.0521)	0.201***(0.0555)	0.156***(0.0595)	0.0500 (0.0620)
Age	0.0435**(0.0193)	0.0477**(0.0200)	0.0665***(0.0210)	0.000957(0.0222)
Age Square	-0.000288(0.000280)	-0.000277(0.000292)	-1.6686E-07	7.06e-05(0.000317)
Age difference	0.00777**(0.00360)	0.0113***(0.00326)	0.00908**(0.00366)	-0.00167(0.00375)
Women education (ref: none)				
Primary	0.0598(0.0507)	0.138**(0.0573)	0.0294(0.0548)	0.0536(0.0686)
Secondary	0.238***(0.0733)	0.130*(0.0669)	0.117*(0.0705)	0.0894(0.0876)
Higher	0.424***(0.0957)	0.342***(0.0987)	0.303***(0.0942)	0.159(0.107)
Spouse education (ref: none)				
Primary	-0.139**(0.0608)	-0.00617(0.0594)	-0.0618(0.0638)	-0.0773(0.0681)
Secondary	-0.0299(0.0545)	-0.0232(0.0568)	-0.0284(0.0553)	-0.0841(0.0573)
Higher	0.00516(0.0682)	0.0247(0.0724)	0.0209(0.0783)	-0.0999(0.0719)
Women employed (ref: none)				
Yes	0.196***(0.0477)	0.218***(0.0425)	0.254***(0.0472)	0.185***(0.0549)
Media exposure (ref: none)				
Occasionally	0.118*(0.0606)	0.0991*(0.0601)	0.117*(0.0691)	0.0888(0.0627)
Weekly	-0.0429(0.113)	-0.00509(0.119)	0.124(0.107)	-0.0696(0.141)
Daily	0.140**(0.0560)	0.120**(0.0547)	0.159***(0.0552)	0.0998*(0.0577)
Family structure (ref: joint)				
Nuclear family	0.285***(0.0539)	0.439***(0.0620)	0.382***(0.0575)	0.0831(0.0650)
Household size	-0.0305***(0.00629)	-0.0395***(0.00684)	-0.0474***(0.00664)	-0.0184***(0.00623)
Place of residence (ref: rural)				
Urban	0.214***(0.0664)	0.158***(0.0579)	0.169***(0.0593)	0.118*(0.0678)
Province/ Region (ref: Islamabad)				
Punjab	0.299***(0.0793)	0.173***(0.0618)	0.175**(0.0750)	0.257***(0.0862)
Sindh	0.0439(0.0884)	-0.138*(0.0731)	-0.274***(0.0838)	-0.152(0.0960)
KPK	-0.257***(0.0917)	-0.383***(0.0788)	-0.350***(0.0908)	-0.283***(0.0996)
Gilgit-Baltistan	-0.150(0.160)	-0.113(0.163)	-0.418***(0.132)	-0.694***(0.138)
Balochistan	-0.451***(0.128)	-0.545***(0.120)	-0.581***(0.130)	-0.618***(0.131)
Economic status (ref: poorest)				
Poorer	0.211***(0.0631)	0.216***(0.0654)	0.225***(0.0641)	0.313***(0.0637)
Middle	0.121(0.0813)	0.141*(0.0717)	0.158**(0.0709)	0.327***(0.0830)
Rich	0.117(0.0901)	0.141*(0.0765)	0.151*(0.0788)	0.237**(0.0934)
Richest	0.0683(0.109)	0.158(0.0975)	0.126(0.0963)	0.269**(0.120)
Constant	-1.591***(0.326)	-1.758***(0.343)	-1.980***(0.364)	-0.296(0.380)
Observations	10,017	10,035	10,026	8,532

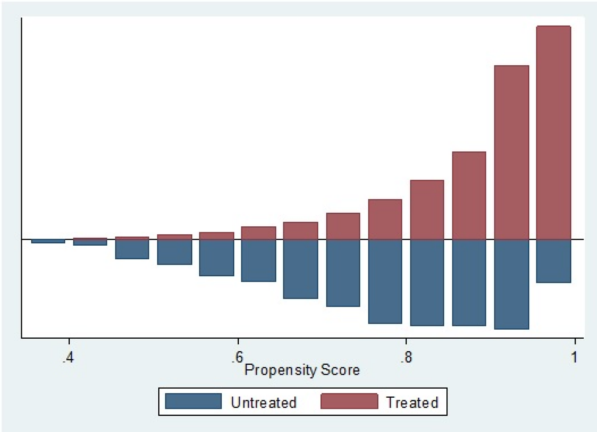
Source: Authors' calculations using PDHS 2012-2013. Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Figure B1: Density distribution for the estimated propensity scores for having no son and having at least one son households

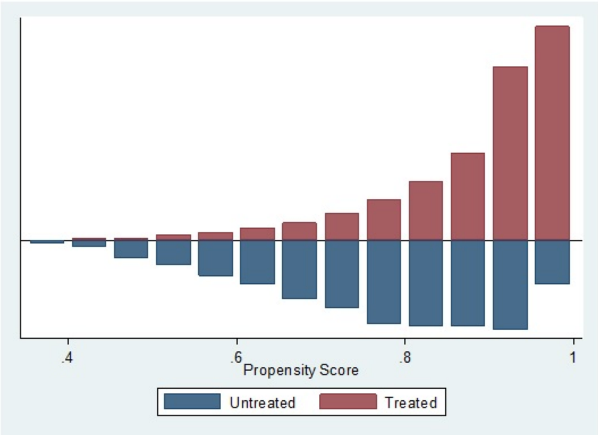
(a) Outcome-Health decisions



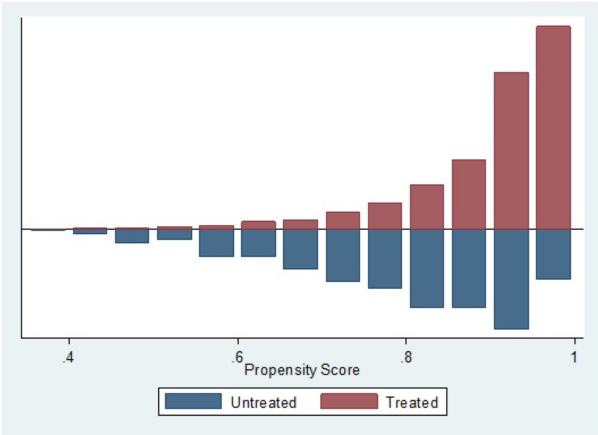
(b) Outcome-Social decisions



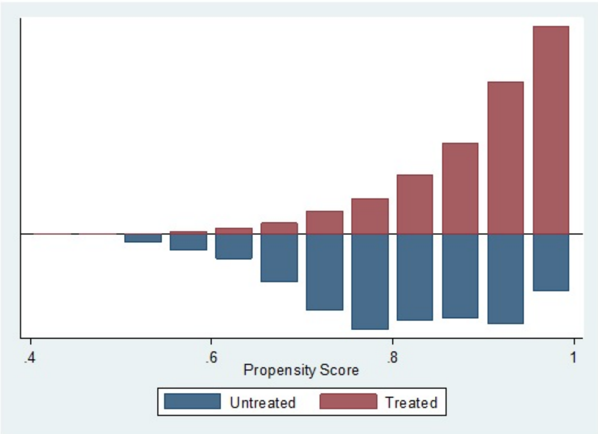
(c) Outcome-Consumption decisions



(d) Outcome-Financial decisions



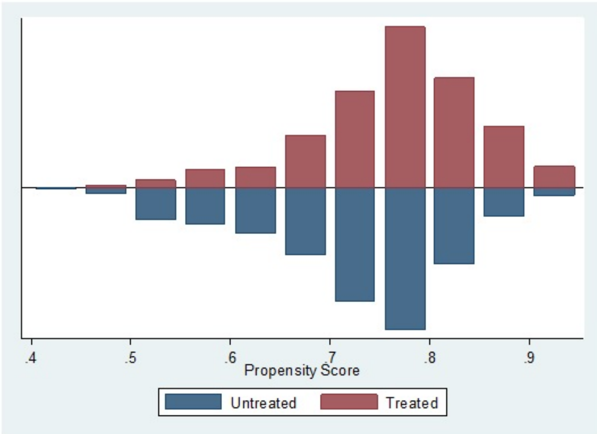
(e) Outcome-All decisions



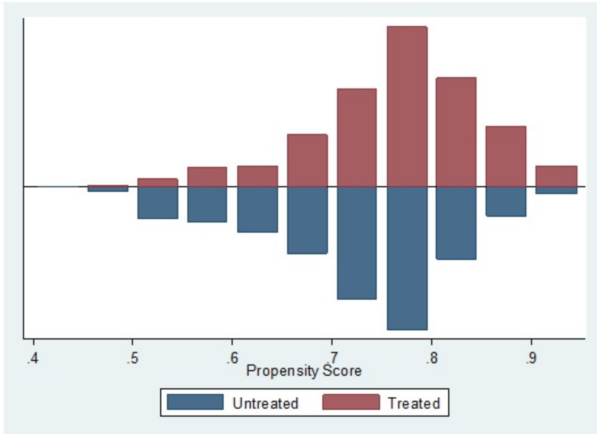
Source: Authors' calculations using PDHS 2012-13.

Figure B2: Density distribution for the estimated propensity scores for having no son and having at least one son (Parity≤ 3)

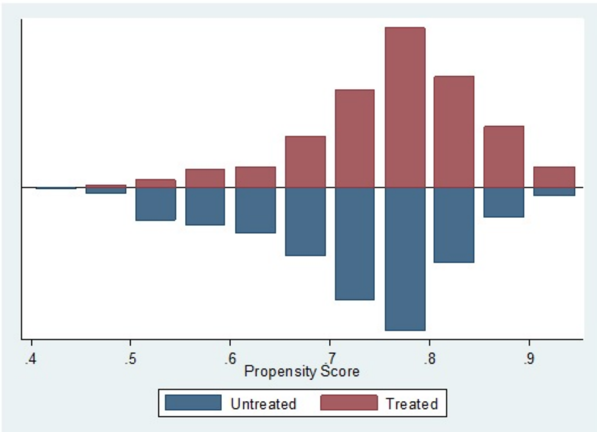
(a) Outcome-Health decisions



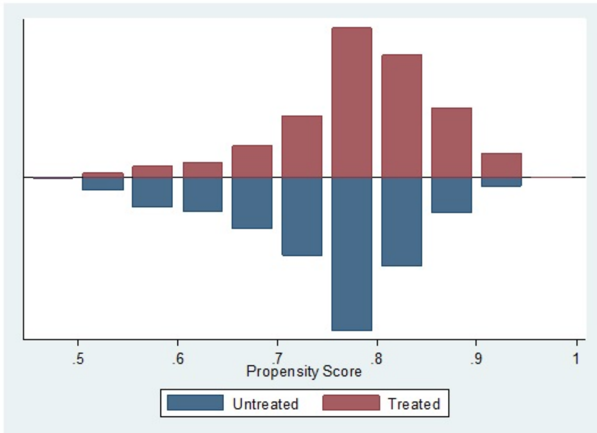
(b) Outcome-Social decisions



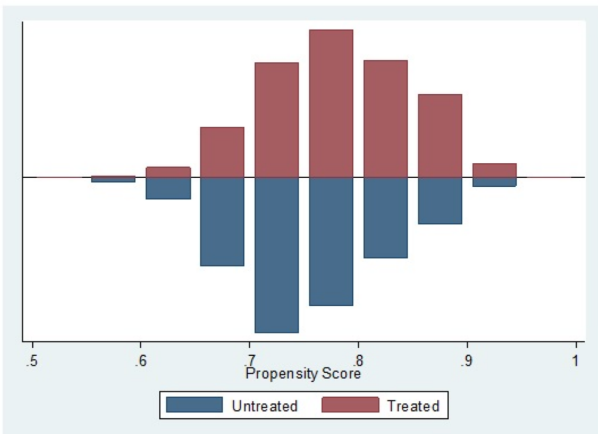
(c) Outcome-Consumption decisions



(d) Outcome-Financial decisions



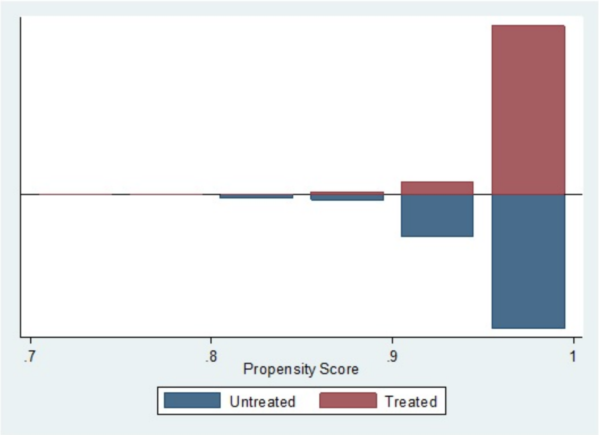
(e) Outcome-All decisions



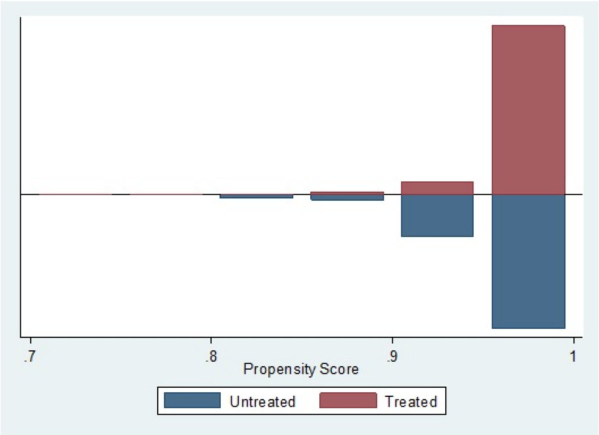
Source: Authors' calculations using PDHS 2012-13.

Figure B3: Density distribution for the estimated propensity scores for having no son and having at least one son (Parity>3)

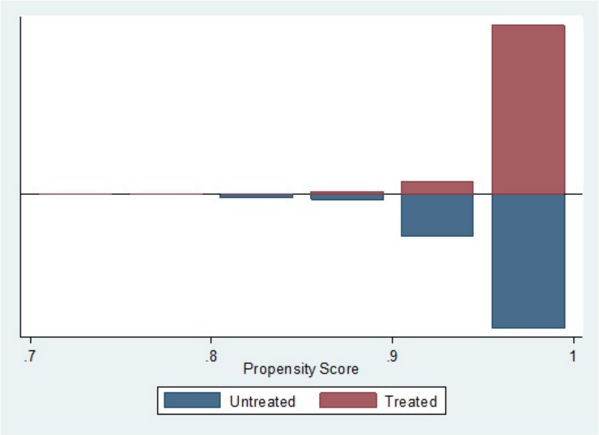
(a) Outcome-Health decisions



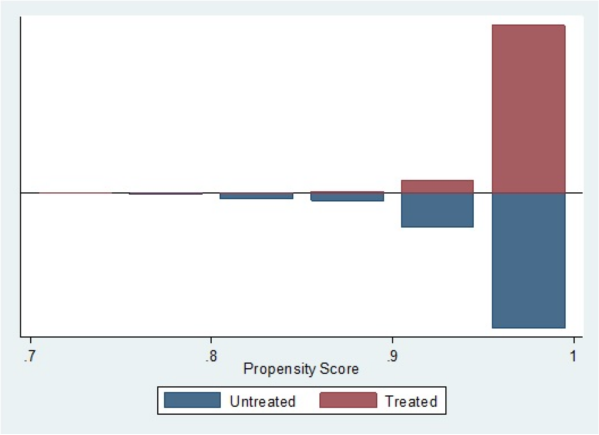
(b) Outcome-Social decisions



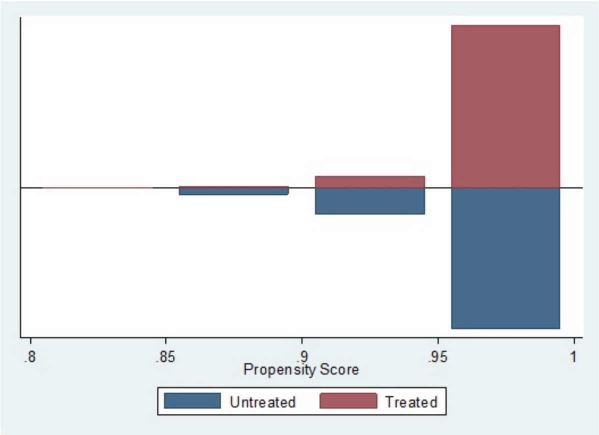
(c) Outcome-Consumption decisions



(d) Outcome-Financial decisions



(e) Outcome-All decisions

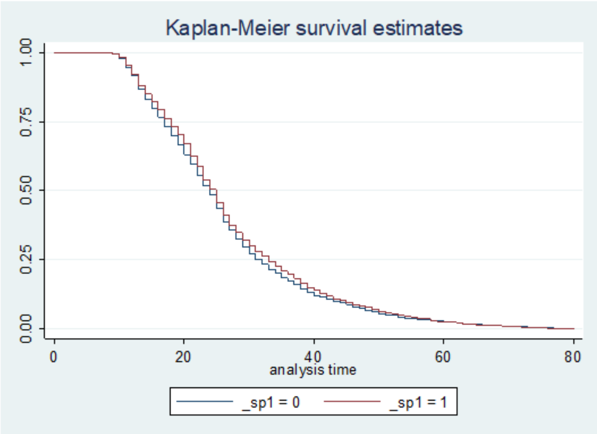


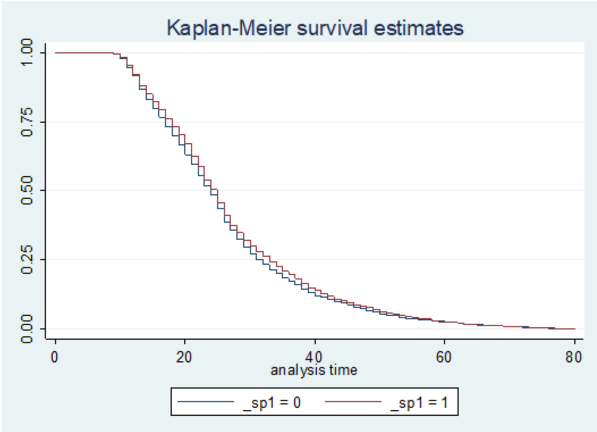
Source: Authors' calculations using PDHS 2012-13.

Appendix: Chapter 4

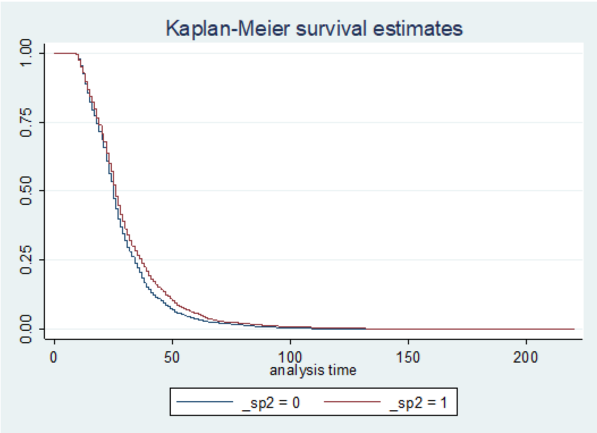
Figure C1: Presence of at least one son at parity n and subsequent birth spacing – poor vs non-poor households (Kaplan-Meier cumulative survival graph)

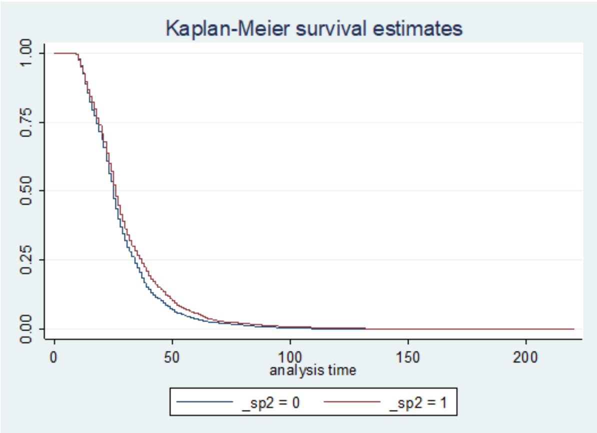
(a) Parity 01



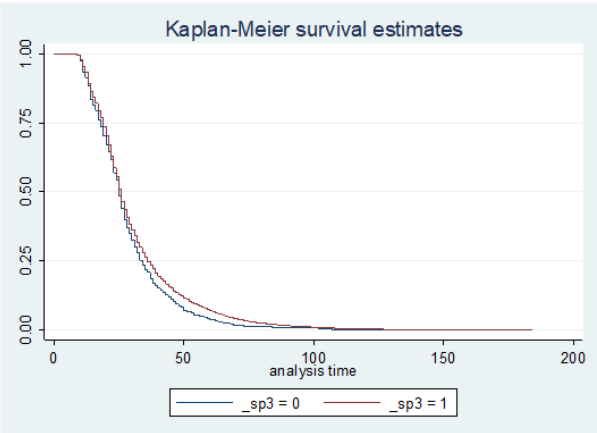


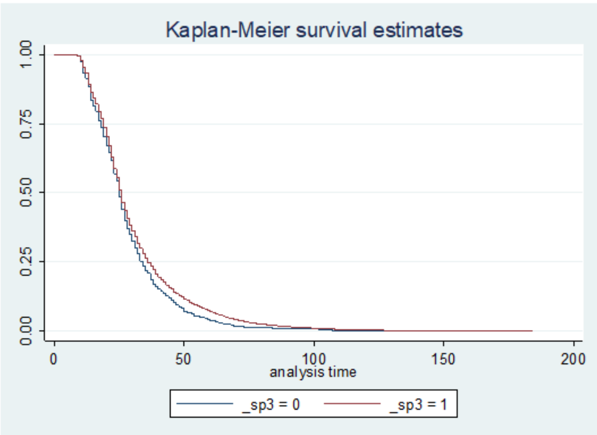
(b) Parity 02





(c) Parity 3

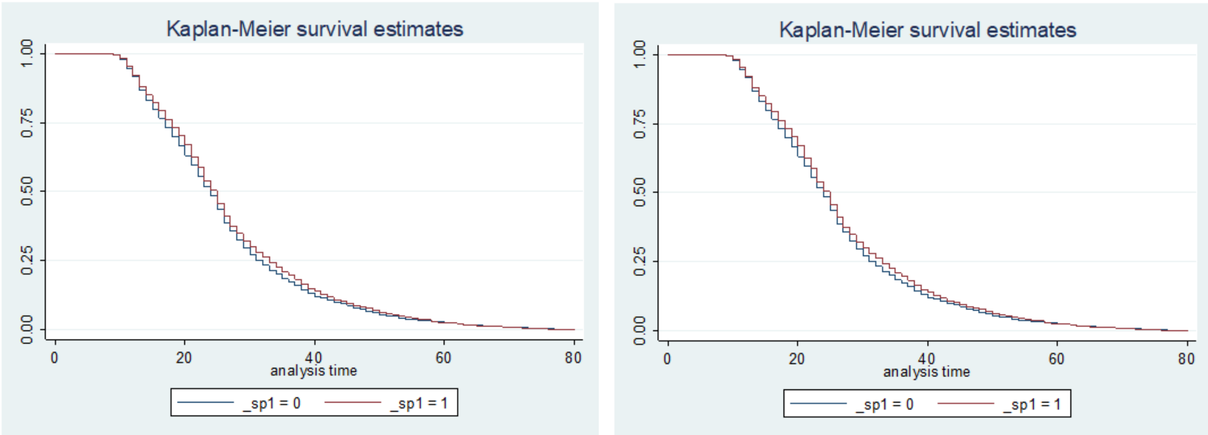




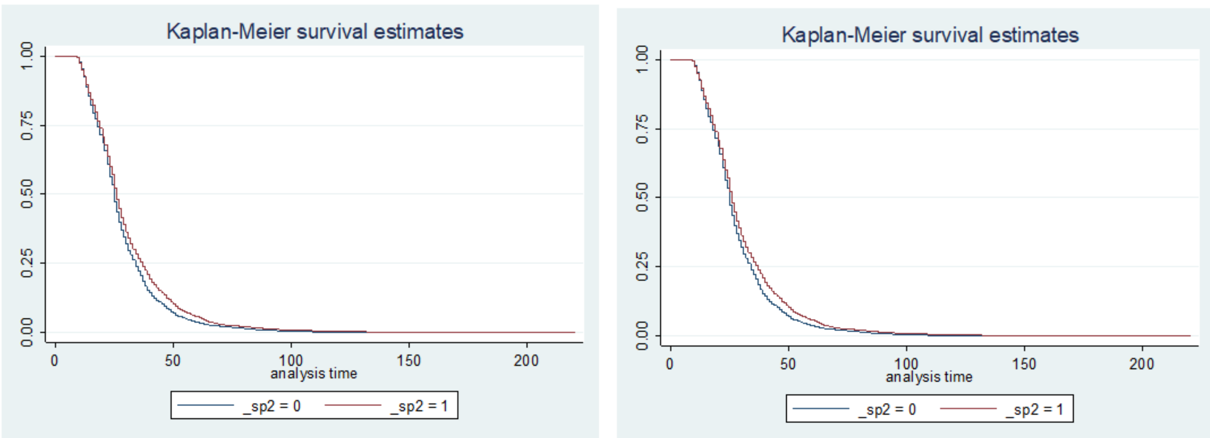
Source: Authors' calculations using PDHS 2012-13. Note: The 0 implies women with no son at parity n and 1 implies women with at least one son parity n. Sample is restricted to women with complete fertility.

Figure C2: Presence of at least one son at parity n and subsequent birth spacing - wealthy vs non-wealthy households (Kaplan-Meier cumulative survival graph)

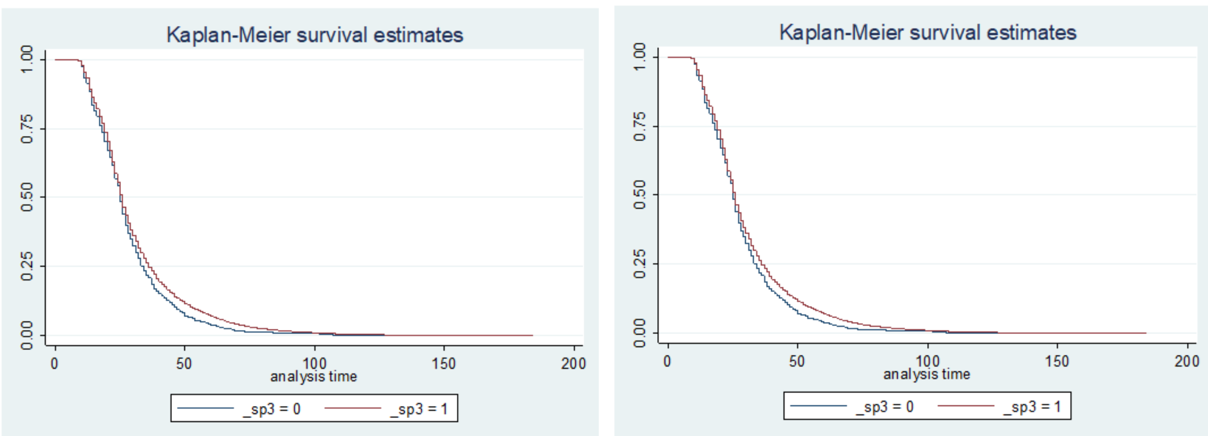
(a) Parity 01



(b) Parity 02



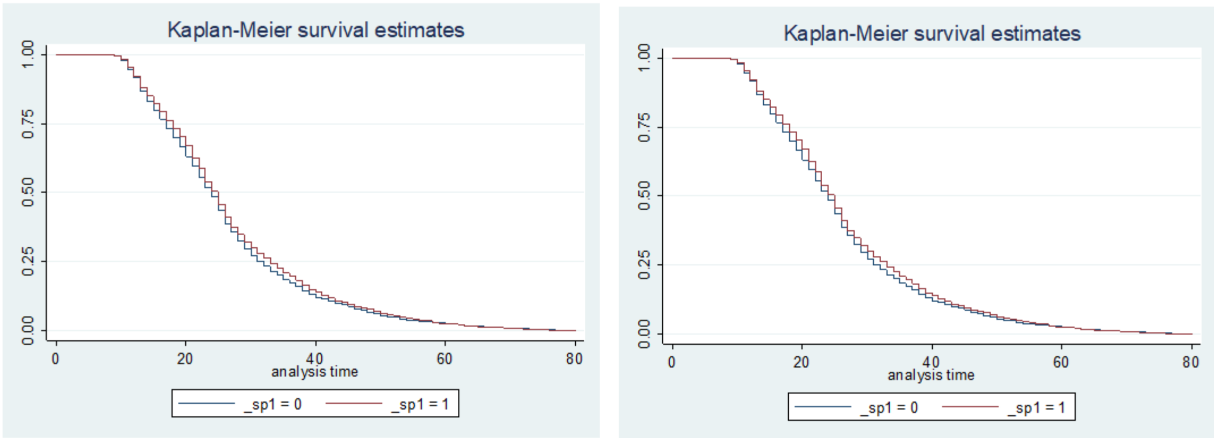
(c) Parity 3



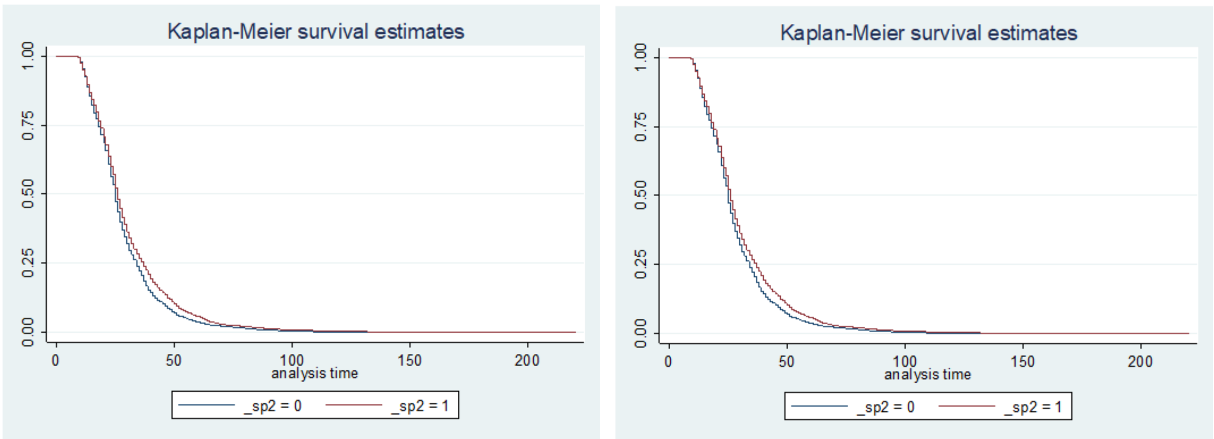
Source: Authors' calculations using PDHS 2012-13. Note: The 0 implies women with no son at parity n and 1 implies women with at least one son parity n. Sample is restricted to women with complete fertility.

Figure C3: Presence of at least one son at parity n and subsequent birth spacing by family type (Kaplan-Meier cumulative survival graph)

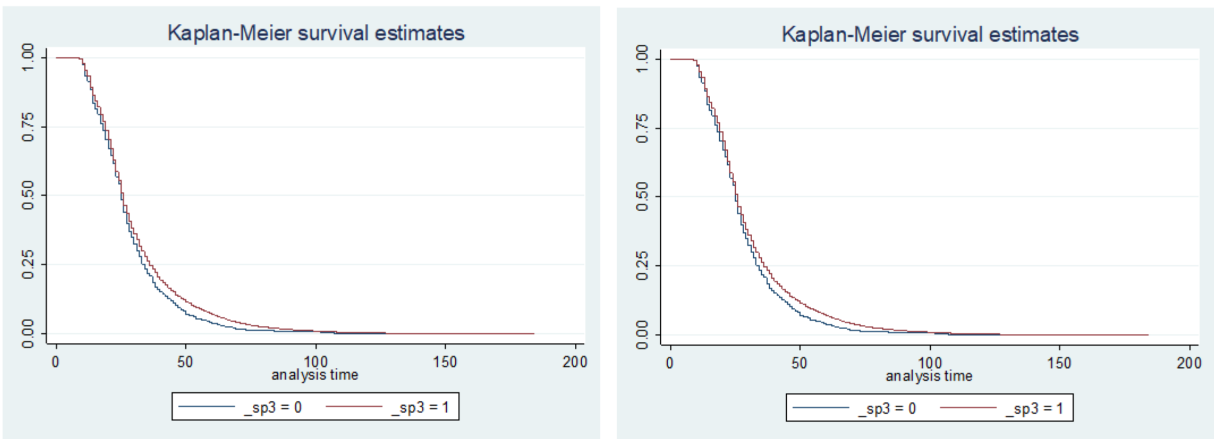
(a) Parity 01



(b) Parity 02



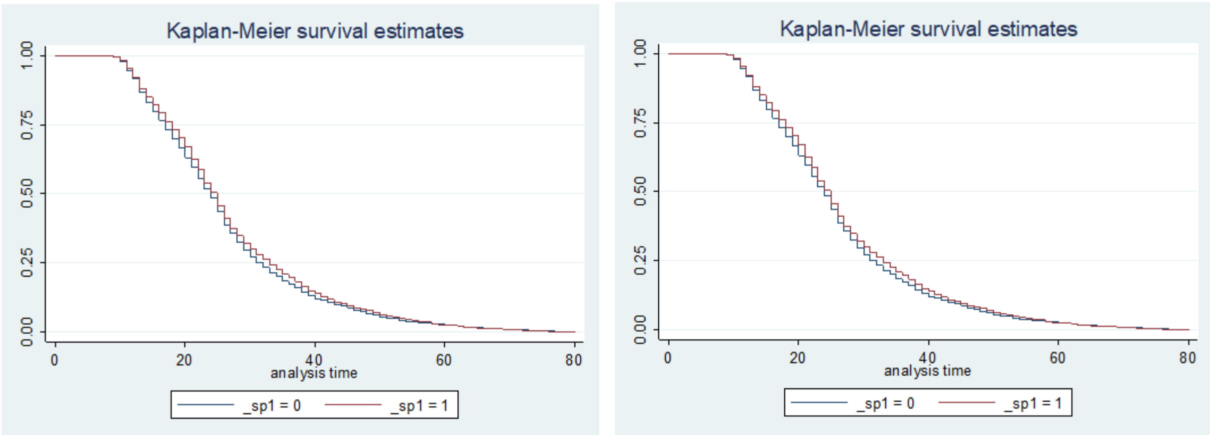
(c) Parity 3



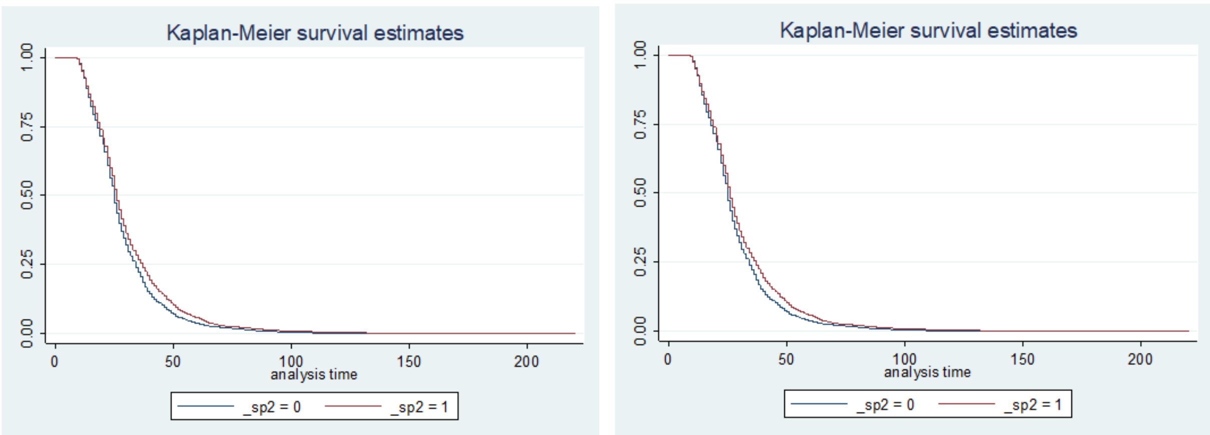
Source: Authors' calculations using PDHS 2012-13. Note: The 0 implies women with no son at parity n and 1 implies women with at least one son parity n. Sample is restricted to women with complete fertility.

Figure C4: Presence of at least one son at parity n and subsequent birth spacing by consanguineous marriages (Kaplan-Meier cumulative survival graph)

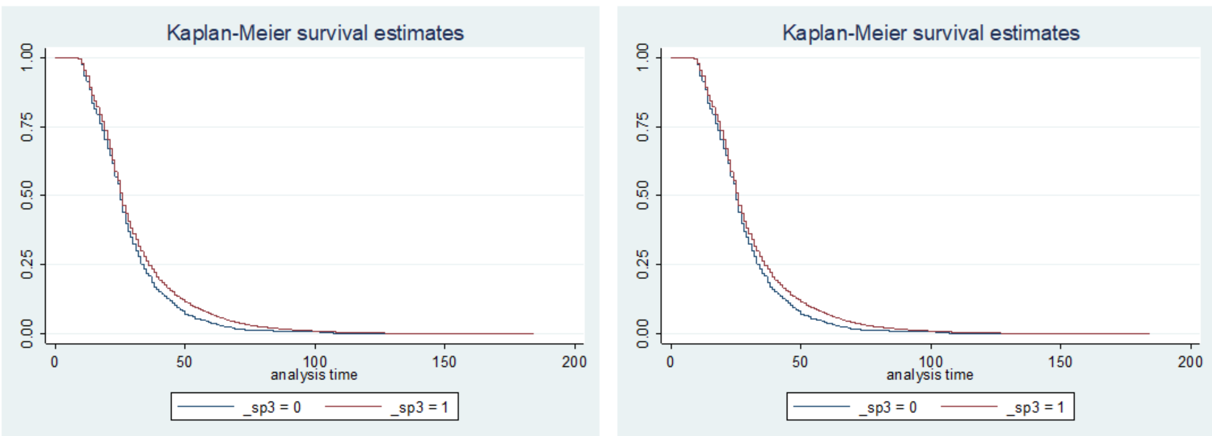
(a) Parity 01



(b) Parity 02



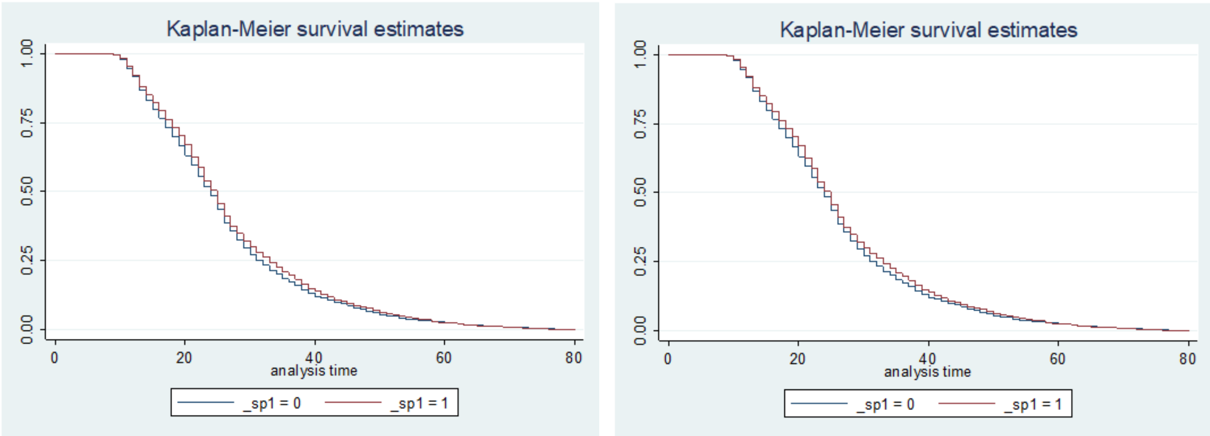
(c) Parity 3



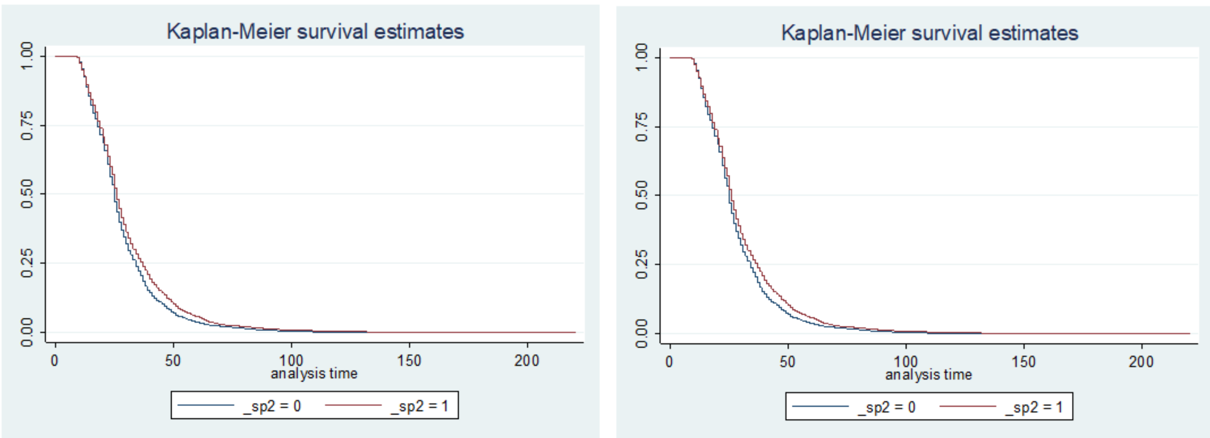
Source: Authors' calculations using PDHS 2012-13. Note: The 0 implies women with no son at parity n and 1 implies women with at least one son parity n. Sample is restricted to women with complete fertility.

Figure C5: Presence of at least one son at parity n and subsequent birth space by place of residence (Kaplan-Meier cumulative survival graph)

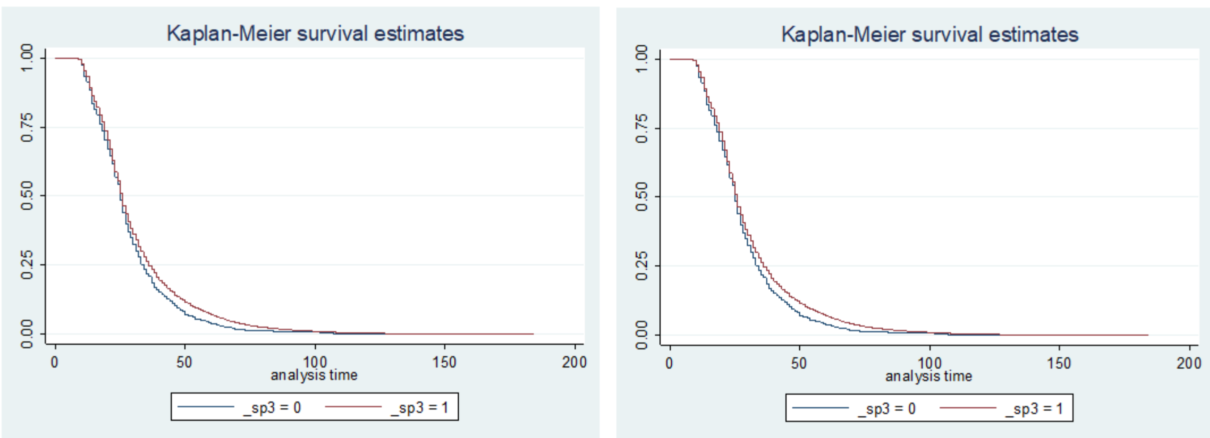
(a) Parity 01



(b) Parity 02



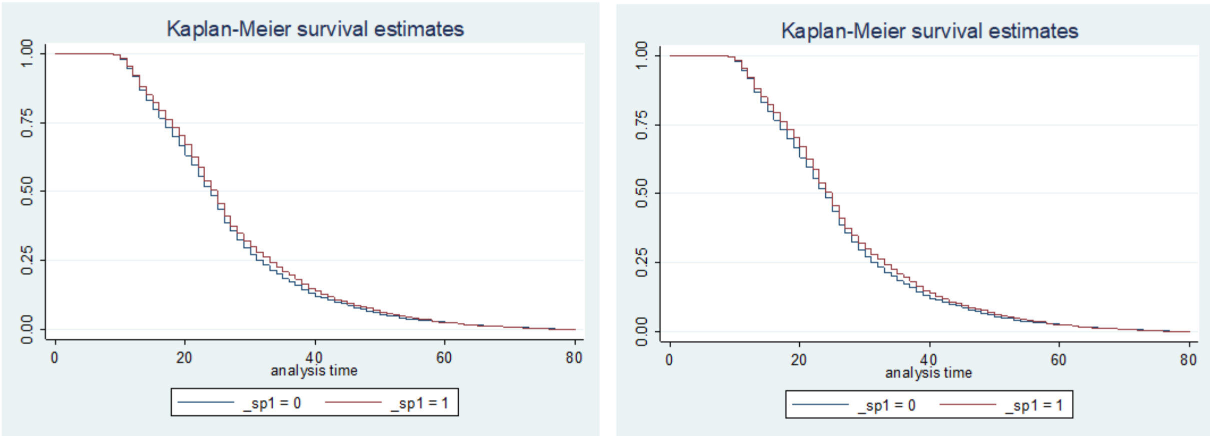
(c) Parity 3



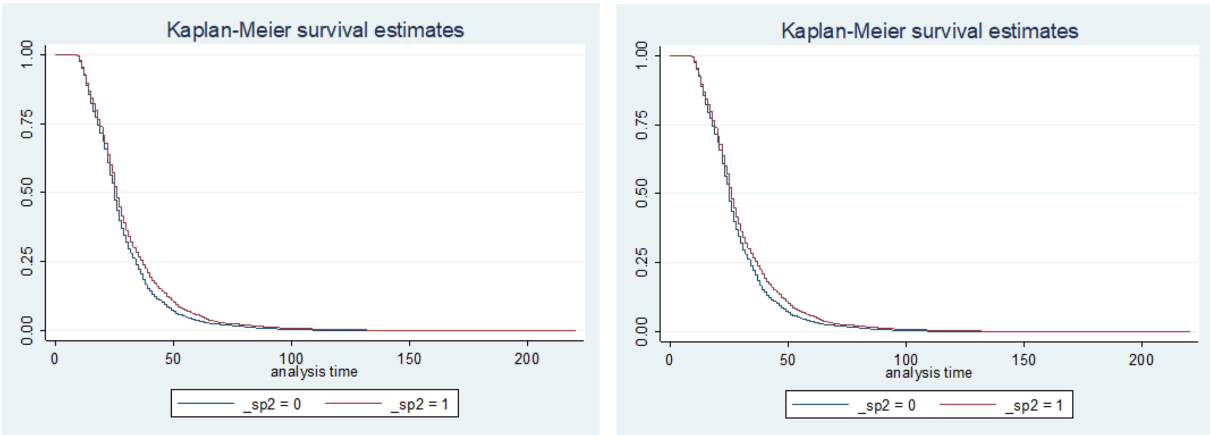
Source: Authors' calculations using PDHS 2012-13. Note: The 0 implies women with no son at parity n and 1 implies women with at least one son parity n. Sample is restricted to women with complete fertility.

Figure C6: Presence of at least one son at parity n and subsequent birth spacing by age at marriage (Kaplan-Meier cumulative survival graph)

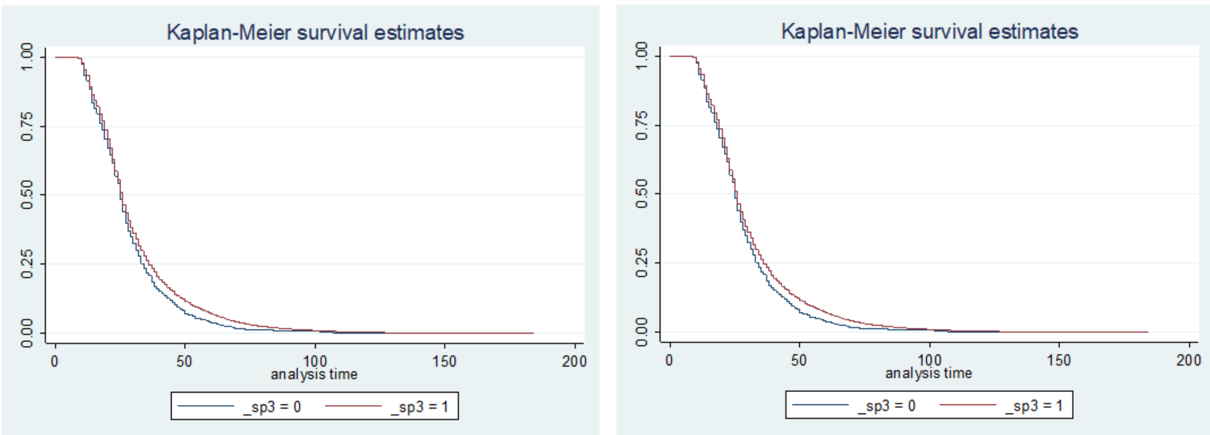
(a) Parity 01



(b) Parity 02



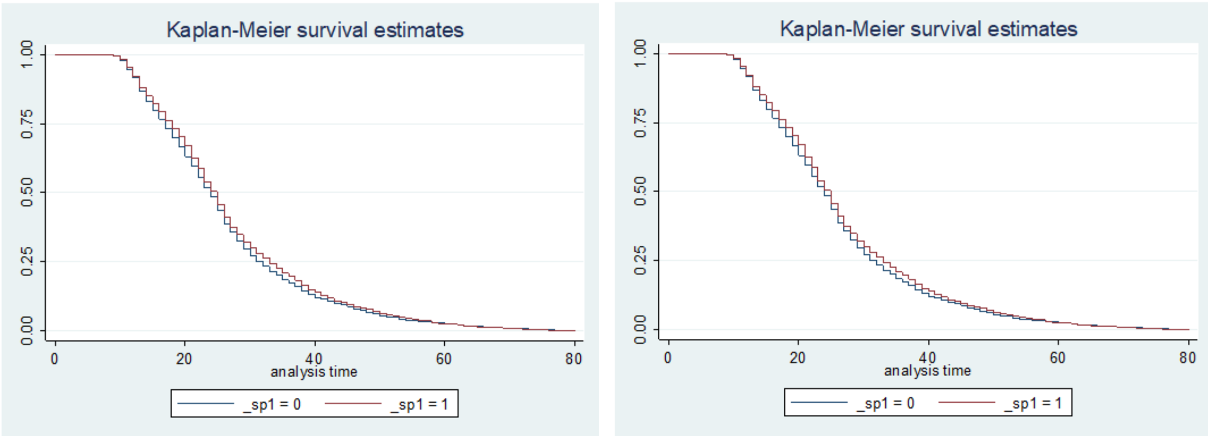
(c) Parity 3



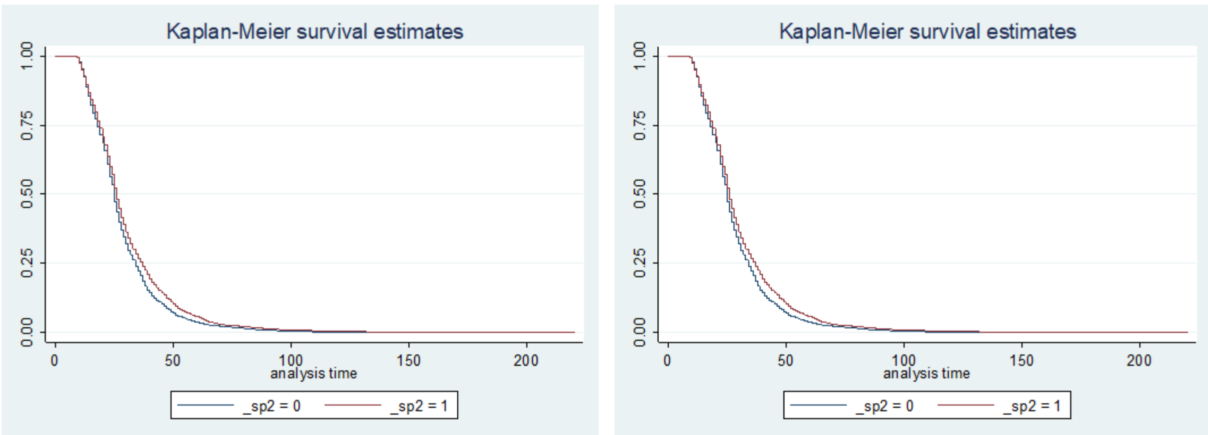
Source: Authors' calculations using PDHS 2012-13. Note: The 0 implies women with no son at parity n and 1 implies women with at least one son parity n. Sample is restricted to women with complete fertility.

Figure C7: Presence of at least one son at parity n and subsequent birth spacing by participation in decisionmaking (Kaplan-Meier cumulative survival graph)

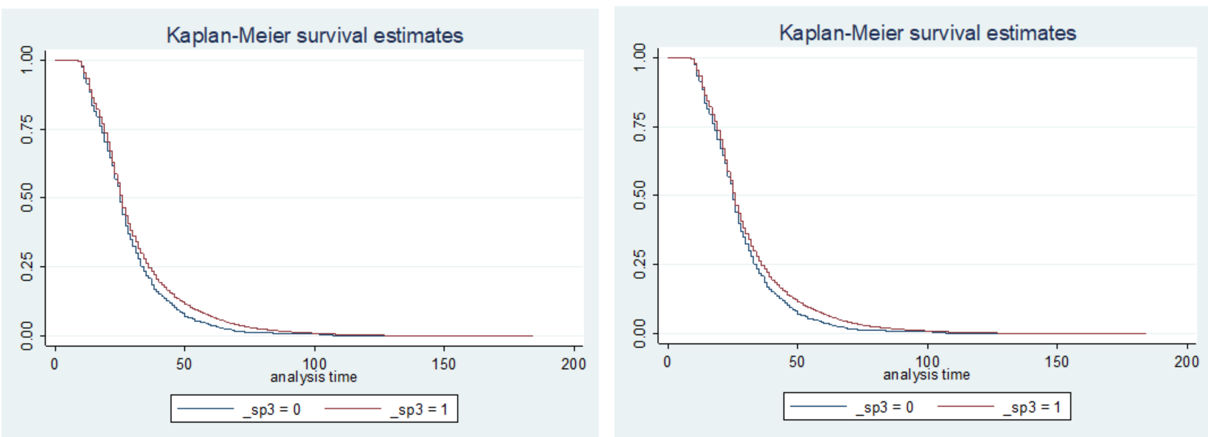
(a) Parity 01



(b) Parity 02



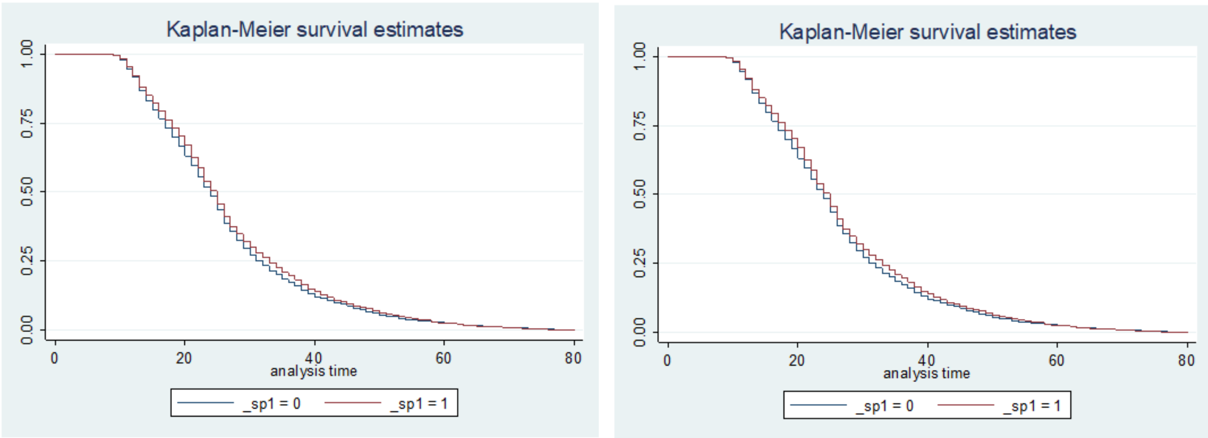
(c) Parity 3



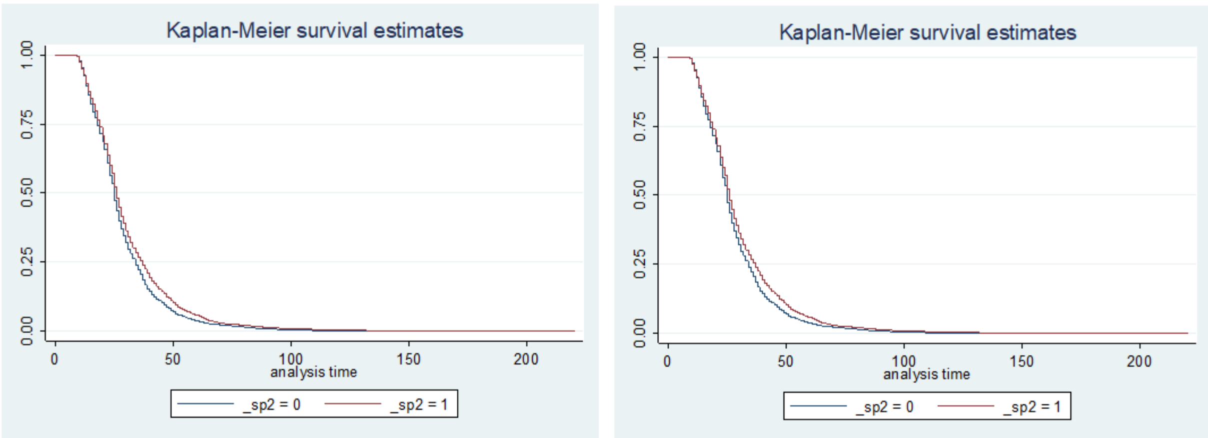
Source: Authors' calculations using PDHS 2012-13. Note: The 0 implies women with no son at parity n and 1 implies women with at least one son parity n. Sample is restricted to women with complete fertility.

Figure C8: Presence of at least one son at parity n and subsequent birth spacing by participation in healthcare decisions (Kaplan-Meier cumulative survival graph)

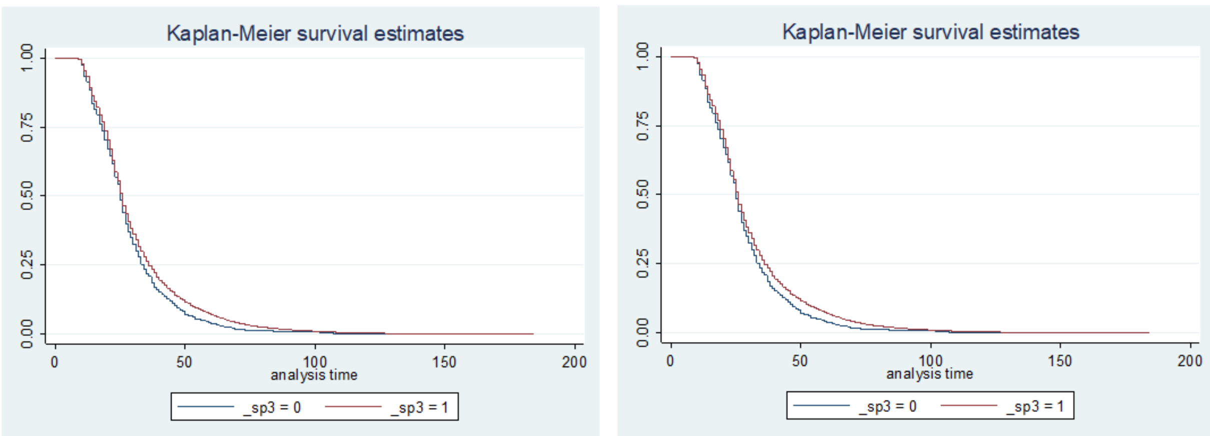
(a) Parity 01



(b) Parity 02



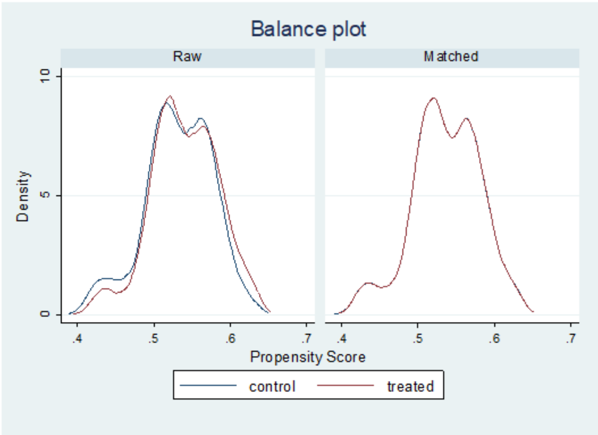
(c) Parity 3



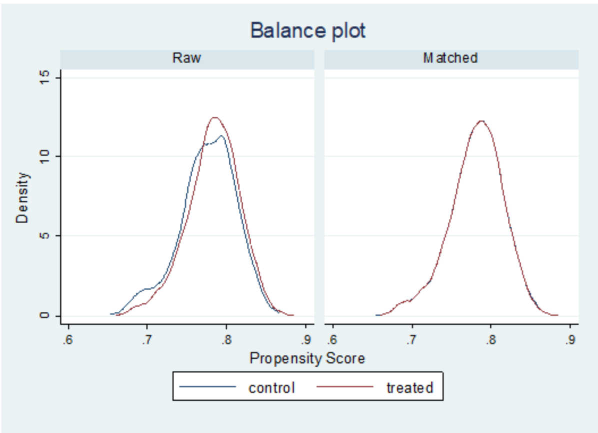
Source: Authors' calculations using PDHS 2012-13. Note: The 0 implies women with no son at parity n and 1 implies women with at least one son parity n. Sample is restricted to women with complete fertility.

Figure C9: Kernel density plots after Propensity score matching (PDHS 1990-91)

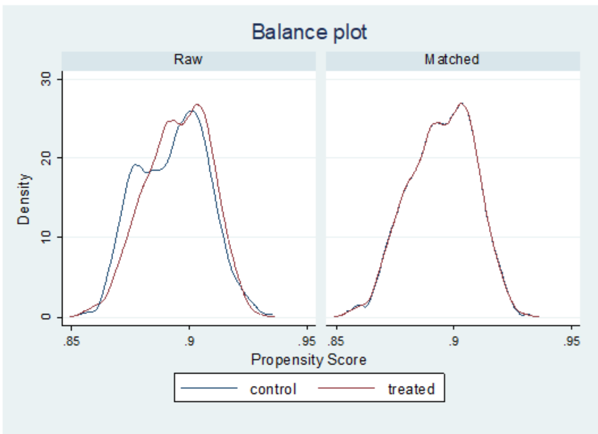
(a) Parity 01



(b) Parity 02



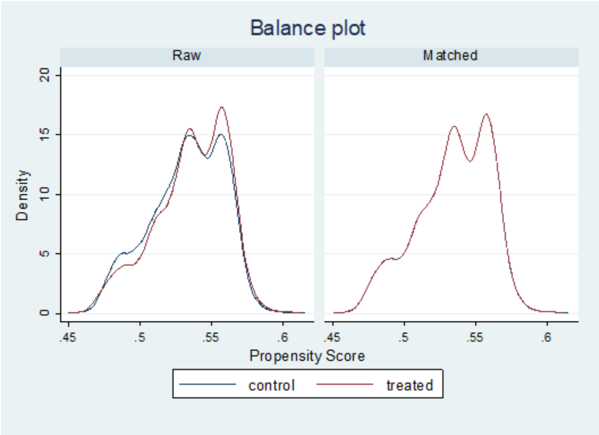
(c) Parity 03



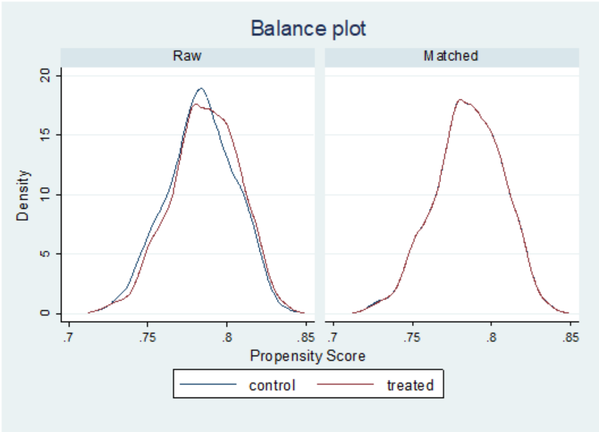
Source: Authors' calculations using PDHS 1990-91. Sample is restricted to women with complete fertility.

Figure C10: Kernel density plots after Propensity score matching (PDHS 2006-07)

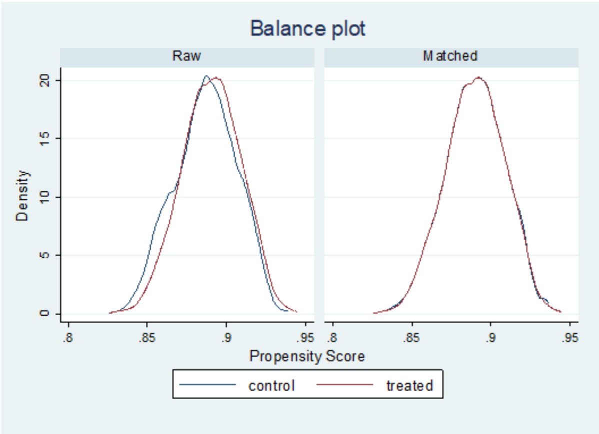
(a) Parity 01



(b) Parity 02



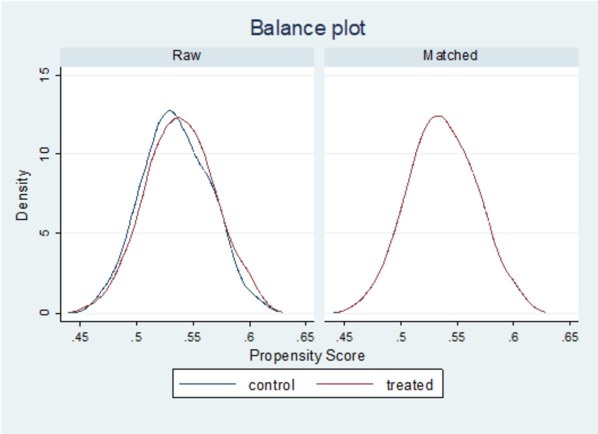
(c) Parity 03



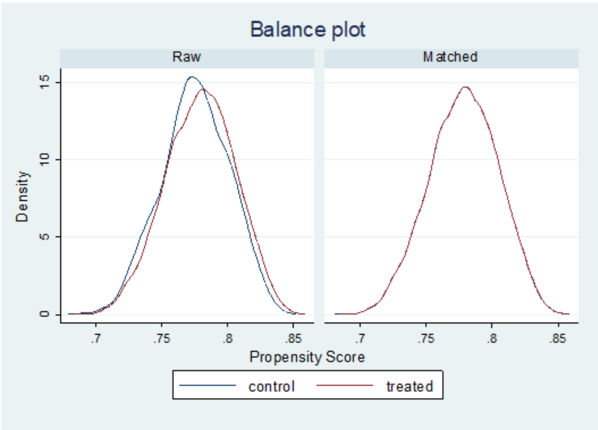
Source: Authors' calculations using PDHS 2006-07. Sample is restricted to women with complete fertility.

Figure C11: Kernel density plots after Propensity score matching (PDHS 2012-13)

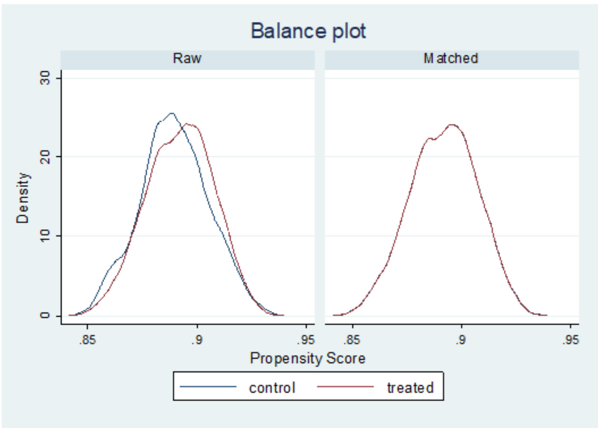
(a) Parity 01



(b) Parity 02



(c) Parity 03



Source: Authors' calculations using PDHS 2012-13. Sample is restricted to women with complete fertility.

Appendix: Chapter 5

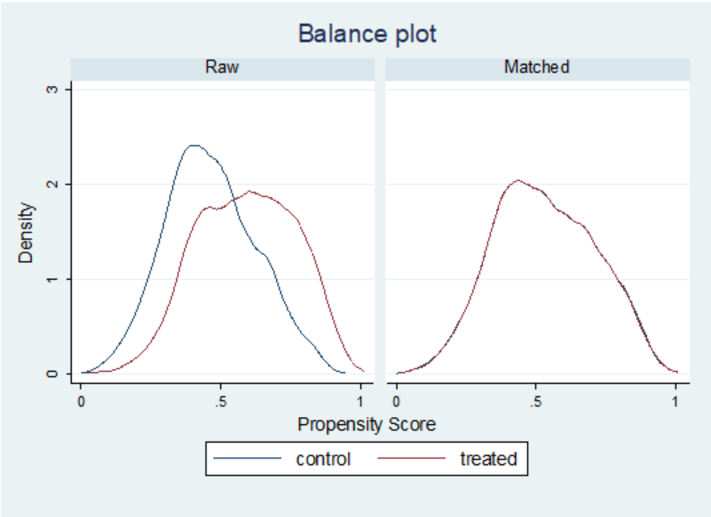
Table D1: Summary of datasets

	1990-91	2012-13
Household sample size	7,193	12,943
Number of women (ever married, age 15 to 49)	6,611	13,558
Women with complete fertility	2,732	6,849
Number of men	1,354	3,134
Number of births	27,369	50,238
Total fertility rate	5.4	3.8
Sex ratio at birth	105.6	108.13

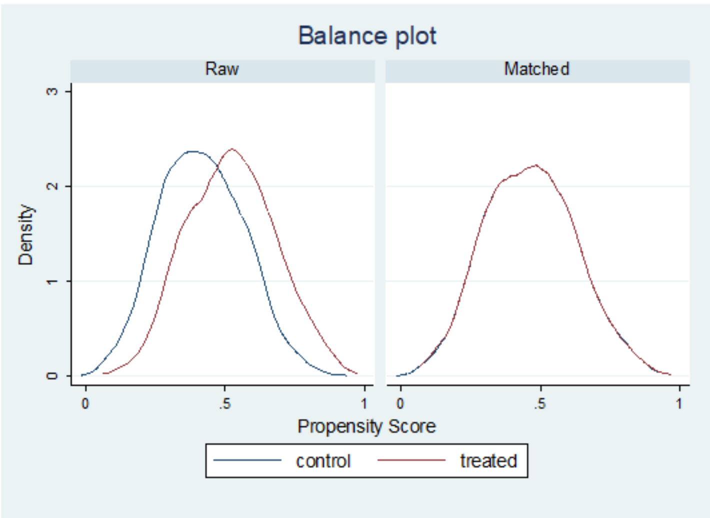
Source: Authors' calculations using PDHS 1990-91 & 2012-13.

Figure D1: Kernel density plots after Propensity score matching (PDHS 1990-91)

(a) Stated Preference



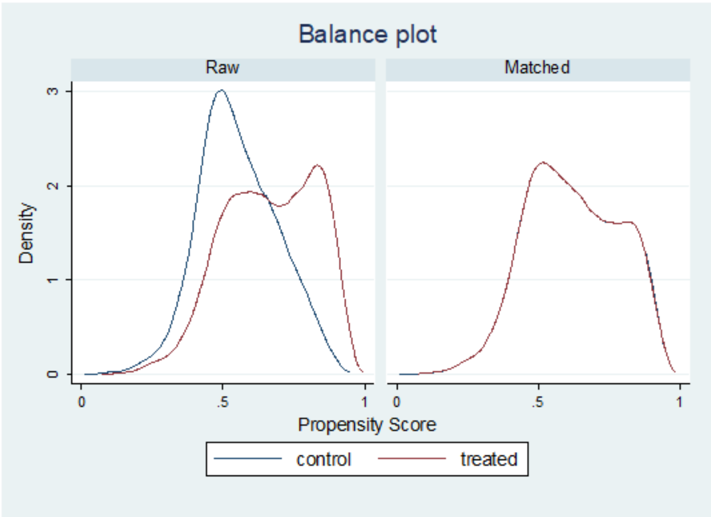
(b) Revealed Preference



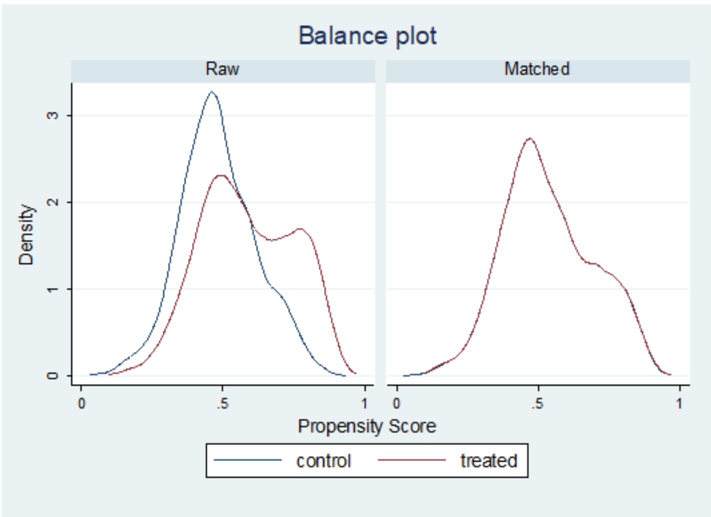
Source: Authors' calculations using PDHS 1990-91.

Figure D2: Kernel density plots after Propensity score matching (PDHS 2012-13)

(a) Stated Preference



(b) Revealed Preference



Source: Authors' calculations using PDHS 2012-13.

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