

Three Essays on Intra-household Allocation

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F235 403

In memory of my beloved Hamida, who filled my life with love and care...

ABSTRACT

In a marriage market when individuals of different qualities meet, the partner with the better quality may accept the match if marriage payments exist or if the marriage surplus is divisible and the inferior quality partner can commit to a lower share. It is this second aspect that brings the two literatures of matching in the marriage market and intra-household allocation of resources together. This commitment of household shares at the time of marriage adds a novel dimension to the two literatures. We look specifically at the use of contraception and division of labour in the household.

Using data from rural Bangladesh in 1998-1999, the first paper finds that women in a relatively strong bargaining position at the time of marriage (gauged by the fraction of marriage payments composed of brideprice), continue to remain in a strong position post marriage as seen by their decision to use the contraceptive pill.

The second paper uses data from eighteen waves of the British Household Panel Survey (1991-2008) to investigate the division of labour in households. We argue that the partner who is relatively of better quality, or more specifically better educated, is given a larger share from the marital output by the lower quality partner to secure the match. Variations in the division of household labour in the data confirm this. In addition the empirical results indicate that the relative bargaining power of individuals at the time of matching persists during the marriage, through a sharing rule that varies over time but is agreed on by them at the time of marriage.

We then look at another aspect of intra-household allocation, the decision to send children in the household to work. Using data from the Pakistan Social and Living Standards Measurement Survey (PSLM) 2007- 2008 we find that variations in child labour are a consequence of variations in parental preferences rather than differences in household income.

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LIST OF ABBREVIATIONS

BHPS – British Household Panel Survey

BIDS – Bangladesh Institute of Development Economics

ILO – International Labour Organization

PGCHE – Post Graduate Certificate in Higher Education

PKR – Pakistani Rupee

PSLM – Pakistan Social and Living Standards Measurement Survey

GLOSSARY OF TERMS

Brideprice – payment of a significant amount made from the groom or his family to the bride’s family at the time of marriage.

Dowry – payment made at the time of marriage from the bride’s family to the bride.

Groomprice – portion of the dowry that consists of payments made to the groom and his parents at the time of marriage.

Maher (dower) – a compulsory payment made by the groom to the bride, without which under Islamic law a Muslim marriage is not valid.

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DECLARATION

A version of Chapter 2 was presented in the Summer Research Seminars of the Department of Economics 2011, University of Kent. In November 2011 it was also published as Discussion Paper No. 11/19 in the *Discussion Paper Series* of the School of Economics at the University of Kent.

An earlier version of chapter 3 of this thesis was presented at the '2013 Scottish Economic Society Annual Conference', held in Perth (Scotland) and the Summer Research Seminars of the Department of Economics 2012, University of Kent.

Chapter 1 : Introduction

The thesis comprises of three empirical essays on intra-household allocation. Two of these essays centre around the marriage market and the bargaining power of women; whereas the third essay is on child labour and its determinants. All three essays deal with critical issues within the realm of development economics.

Two different strands of literature dominate marriage market and bargaining power studies. The ones that look at the role of marriage payments in clearing the marriage market hold the intra-household allocation of resources exogenous; whereas the studies that explore the intra-household allocation of resources treat matching in the marriage market as pre-determined. The second and third chapter in this thesis brings these two different strands of literature together making the pizzaz at the time of marriage divisible.

Following an overview of the thesis in the first chapter, the second chapter examines the relationship between bargaining power and the use of contraceptives in the household. Using data¹ from rural Bangladesh in 1998-1999 it investigates whether women in a relatively strong bargaining position at the time of marriage continue to remain in a strong position post marriage as seen by their decision to use the contraceptive pill. Empirical results from multinomial logit provide evidence for this showing that as brideprice, taken as a fraction of total household marriage payments, increases from 0.1 to 0.3 the predicted probability of the mother using the contraceptive pill increases by 8 percentage points.

It might be thought that female bargaining power should rise as the amount of dowry received by the woman increases. However it is important to note that the dowry negotiated at the time of marriage may be a function of imbalances in the marriage market. Also the property rights a woman has over dowry in rural Bangladesh may be notional due to the high stigma attached to divorce and hence dowry may not have the expected positive effect on the bargaining power of women.

¹ Household Survey to Conduct Micro-Credit Impact Studies: Bangladesh collected by the World Bank and the Bangladesh Institute of Development Economics

The third chapter uses data from eighteen waves of the British Household Panel Survey (1991-2008) to investigate the division of labour in households. In this chapter we argue that the partner who is relatively of better quality, or more specifically better educated, will be given a larger share from the marital output by the lower quality partner to secure the match. Hence we expect relative bargaining power at the time of matching to persist during the marriage through a sharing rule decided on at the time of matching that is time-varying.

The second and third chapter also deals with the question of why the division of marriage surplus is not continually negotiated. We maintain that individuals commit to a time varying sharing rule up to a threshold, but if outside options exceed the cost of divorce, individuals will end those marriages in which they have a low marital share. Given that there are considerable costs to reversing marriage, this implies that matching in the marriage market can have a lasting impact on the bargaining power of individuals during their marriage. The results in chapter three show that households in which wives are more educated than their husbands, women engage in a lower proportion of total housework. If the sharing rule was decided at the time of marriage and not continually negotiated we would expect stronger between group effects as opposed to within group effects. Changes in outside options such as relative wages should also not have an effect on the sharing rule. In line with our argument we find that the between group estimator gives stronger results as compared to the within group estimator and the random effect estimator. The results also show that a rise in a woman's relative wage does not have a strong effect on the division of labour within the household, suggesting that the sharing rule is not renegotiated as outside options change. On the other hand, we find that the number of children has a significant effect on the wife's share of housework in the fixed effects model, which suggests that the sharing rule may be time-varying, with the wife doing more of the housework as the couple has more children.

Child labour can arise from two causes, either household heads do not care about the welfare of the child, or the household income is so low that children have to work in order to meet the basic subsistence needs of the family. In chapter four using data from the Pakistan Social and Living Standards Measurement Survey (PSLM) 2007- 2008 we examine this question, and explore whether child labour is a consequence of household poverty or lack of altruism on behalf of the household head. We first present a simple

theoretical model which links adult consumption with child consumption and child labour. Then through the use of budget shares of assignable consumption goods, such as tobacco related expenditure for adults and educational expenditure for children, variations in the consumption decision of the household are studied with the labour force participation of children. The empirical results show that probability of child labour in households where parents have a higher budget share of tobacco and a lower budget share of education is higher, indicating that it is the lower weight that they place on children's wellbeing in decision making rather than resource constraints that is important.

Finally, in chapter five we explore the relationship between the intra-household problem and economic development and in particular how the role of women and their bargaining power changes with the development of the economy. A ban on child labour might also impact economic development by promoting education, an important component of economic growth, helping lower fertility and encouraging better health. In addition economic development may also facilitate norms in societies to evolve and raise awareness on the dangers of child labour, discouraging parents from sending their children out to work.

Chapter 2 : Marriage Payments and Bargaining Power of Women in Rural Bangladesh

Introduction

In a marriage market when individuals of different qualities meet, the partner of a better quality may accept the match if the marriage surplus is divisible and the inferior quality partner can commit to a lower share. Using data² from rural Bangladesh (1998-1999) we investigate in this paper whether individuals commit to post-marriage household shares at the time of matching.

We argue that the relative size of marriage payments exchanged are indicative of the quality of the match and bargaining position of individuals at the time of matching. Marriage payments are particularly relevant in the case of Bangladesh where they are exorbitantly high and can be of a considerable financial burden to families.

We assume that women prefer to have fewer children and want to increase the consumption of contraceptives in general and the pill in particular. Hence the female bargaining power during the marriage, in this study, is captured via the use of the contraceptive pill. It is important to note that husbands and wives may differ in their preferences of desirable family size. Husbands often want larger and closer spaced families compared to women, given that women face an increasing cost of having children (Bankole and Singh, 1998; Francis, 2009; Naidu, 2006).

We examine whether as the female relative bargaining power of women at the time of matching increases, whether they bargain to have fewer children during their marriage and if so do they increase the use of contraceptives in general, and the pill in particular. Empirical results from multinomial logit provide evidence for this showing that as brideprice, taken as a fraction of total household marriage payment, increases from 0.1 to 0.3 the predicted probability of the mother using the contraceptive pill increases by 8 percentage points.

² Household Survey to Conduct Micro-Credit Impact Studies: Bangladesh

Literature Review and Rationale of the Study

This study investigates whether, women who are in a strong position at the time of matching as measured by the fraction of marriage payments composed of brideprice, continue to have a high bargaining power post marriage as seen by her ability to make decisions in the household. A woman's decision making power during the marriage is gauged via the use of the contraceptive pill.

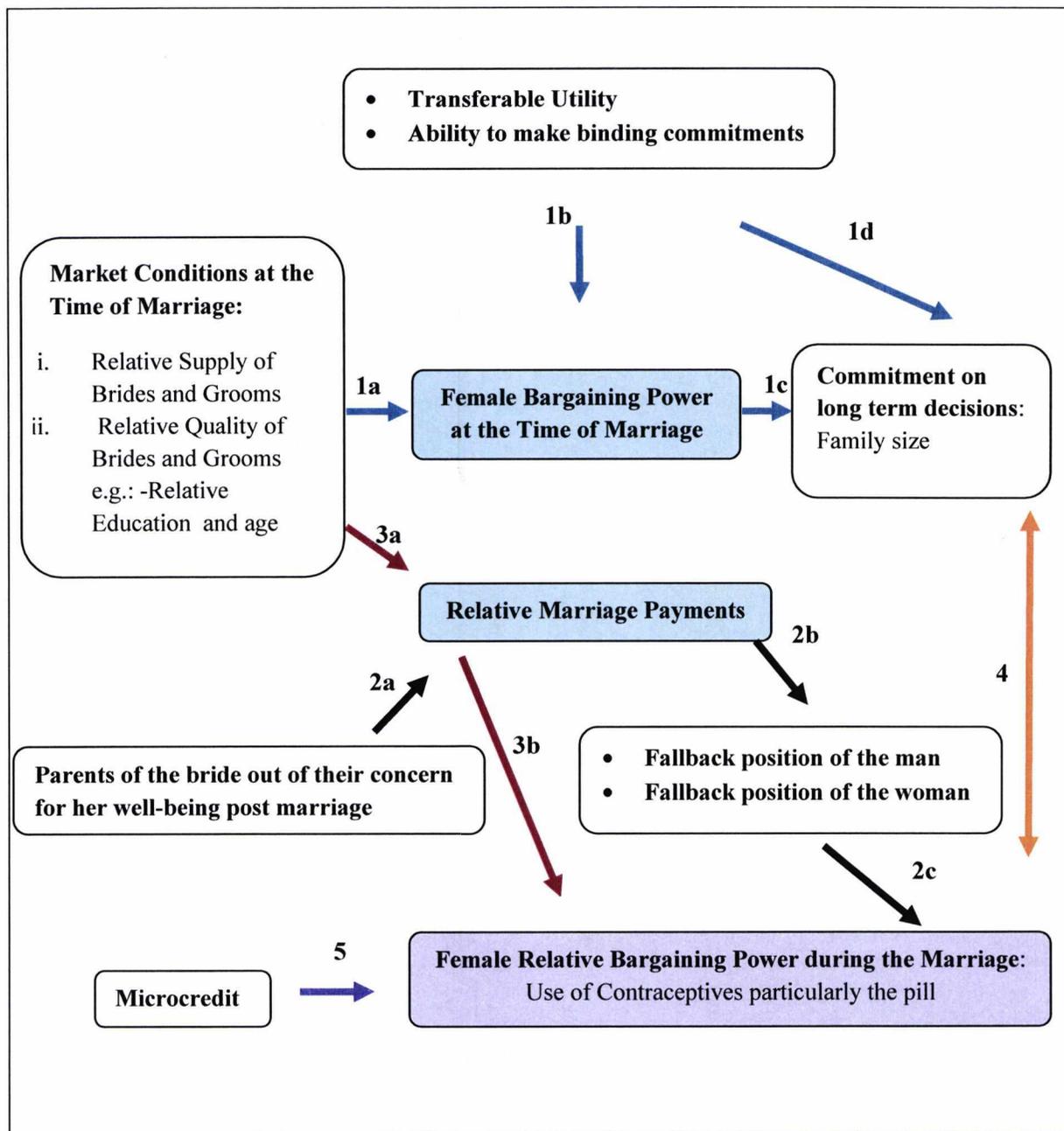
Figure 2-1 provides a diagrammatic illustration of the complex interplay of factors that impact the bargaining power of women at the time of marriage, the size of marriage payments, commitment on long term decisions, and the bargaining power of women during the marriage as measured by their decision to use the contraceptive pill.

Economics of marriage markets and intra-household bargaining provides models on sorting (Burdett and Coles, 1997; 1999; 2001); bargaining at the time of marriage (Becker 1981; 1991); and intra-household bargaining (Manser and Brown, 1980; McElroy and Horney, 1981; Lundberg and Pollak, 1993; Chiappori, 1992). There is a debate in the literature about whether outcomes post marriage are predetermined at the time of marriage or bargained over during the course of the marriage (*Link 4*, Figure 2-1). The extent, to which outcomes are predetermined, depends on the ability of the couple to make binding commitments at the time of marriage and transferable utility (*Link 1d* in Figure 2-1).

Becker's (1991) model has some key features that distinguish it from Burdett and Coles (1997, 1999 and 2001)³. Marriage markets are assumed by Becker to exist in a perfectly competitive world characterized by perfect knowledge, zero transaction costs and exogenous information where buyers and sellers pay a unique price for pizzazz. Under such features perfect assortative mating can be observed at equilibrium - where high quality men are matched with high quality women and vice versa (Becker, 1973). However, introduction of market frictions in the marriage market, separate out individuals of different qualities into classes where pizzazz levels may vary between men and women in the same class (Burdett and Coles, 1999).

³ Table 2-2 in the Appendix highlights the key differences in matching models

Figure 2-1: Relative Bargaining Power of Women and Determinants of Outcomes Post Marriage



Becker's (1991) theory of the marriage market allows for transferable utility where an individual with a large gain from marriage to a particular partner can ensure the match is made by compensating him/her via 'one-for-one' transfers of private goods such as marriage payments (as seen by *Link 1b* in Figure 2-1). He conjectures that the division of the marital output depends on the supply and demand of grooms and brides in the marriage market (Becker, 1991). One of the primary criticisms of Becker's work,

however, is that it cannot explain the coexistence of brideprice and dowry in some countries (Zhang Chan, 1999; Anderson, 2007). Within a framework of transferable utility, Burdett and Coles (1999) proposed a model where there were two types of partners in the marriage market, good (G) and bad (B). They assume that partners in the marriage are complementary inputs such that marriage output is only optimal when G types marry other G types. In the absence of marriage frictions in their model a perfect assortative mating equilibrium arises. However, when they introduce frictions in the marriage market not only a mixing equilibrium but also a negative assortative mating equilibrium arises, where B types do not marry others of their types as it results in low total household production. Instead G types are willing to marry B types if they can bargain a large share from the marriage product.

We argue that in the presence of market frictions and given that there is transferable utility, matches made in the marriage market will not always result in positive assortative mating. Instead we investigate whether a high quality individual can be convinced to form a match and marry a low quality individual given that he/she is promised a large enough share of the post marriage product (*Link 1c* in Figure 2-1).

The quality of individuals or their pizzazz is not directly observable in our data and neither is the marriage contract decided on by the couple. We hence use the size of marriage payments exchanged at the time of marriage to gauge the quality of the match, and the use of contraception to shed light on the division of marriage surplus post marriage.

We make two key assumptions in this paper. The first is that dowry serves the groomprice motive and is a means of correcting imbalances in the marriage market, matching individuals of different qualities. The other assumption that we make is that women prefer to have fewer children and hence will want to make use of contraception and of the pill in particular.

Assumption 1: Dowry serves the groomprice motive

Marriage payments have prevailed over all ancient societies and continue to even today remain widespread across many developing countries⁴. They can arise in the marriage

⁴ Prevalence of brideprice and dowry are given in Table 2-3 and Table 2-4 in the Appendix

market due to market conditions so as to either align the supply and demand of brides and grooms or to match individuals of different qualities and attributes to each other. They can also be from an altruistic parent out of concern for their child's welfare post marriage.

A popular hypothesis on the emergence of marriage payments follows Becker's work (1981, 1991), and attributes marriage payments as a mechanism via which the relative supply and demand of brides and grooms can be aligned in the marriage market as shown by *Link 3a* in Figure 2-1. The marriage squeeze hypothesis argues that in societies where older men marry younger women, if the ratio of marriageable men to women is low, then women have to pay higher dowries to attract scarce men (Amin, 2004; Maitra, 2007; Rao, 1993; Anderson, 2007; Gaspart, 2007; Esteve-Volart, 2004). Pre-mortem inheritance is another popular incentive identified in the literature for parents to provide dowries to their daughters at the time of marriage as seen by *Link 2a* in Figure 2-1. Pre-mortem inheritance usually exists in patrilocal societies where daughters join their in laws homes after marriage and sons carry on the family business and add to the family wealth (Anderson, 2007). Sons may not exert full effort if their sisters will benefit from the family wealth in the future and hence to mitigate the free rider problem parents' bequest inheritance to their daughters at the time of marriage (Esteve-Volart, 2004; Anderson, 2003; Siow, 2003). Dowry payments under pre-mortem inheritance have the effect of improving a woman's fallback position in the marriage as she has property rights over them (shown by *Link 2b*). As a consequence dowry payments should raise her welfare and bargaining power as seen via *Link 2c* in Figure 2-1 (Brown, 2003).

Another key motivation of providing dowry is groomprice, which has the effect of making brides more desirable in the marriage market, allowing them to match with men who would in the absence of the marriage payment not matched with them (as seen via *Link 3a* in Figure 2-1). Groomprice payments have been observed to vary with the quality of the groom which is determined by his level of education, whether he lives in an urban area and can provide a good living for the bride amongst many other things (Amin, 2004; Ambrus, 2010; Anderson, 2007; Tertilt, 2002). In India, Pakistan and Bangladesh the demand for brides depends on their appearance, particularly if they are light skinned or not, chastity, age and level of education (Amin, 2004; Anderson, 2000).

It has been argued that since dowry payments make brides more desirable, higher dowries should have the effect of increasing their price in the marriage market (Becker, 1991; Edlund, 2001). Consequently, in South Asia dark skinned, older women, getting married for the second time have to offer higher groomprice payments so as to attract partners and make a better match (Esteve-Volart, 2004; Becker, 1991; Edlund, 2001). Research shows that women in marriage markets may 'self-improve' such as invest in education so as to match with a better groom who is of high quality and educated as opposed to improving their own work prospects (Lahiri, 2004). Women are also able to marry men from a higher caste or social standing via groomprice. Therefore dowry under the groomprice mechanism can be used as a means of maintaining or improving status via marriage (Anderson, 2007). This practice known as hypergamy is a possible explanation of why dowry payments have persisted in India despite strides in development and modernization (Esteve-Volart, 2004). Groomprice component of dowry is paid directly to the groom and his family and they have property rights over them as opposed to the bride.

We argue that marriage payments play a role in sorting individuals of different characteristics and qualities (as can be seen by *Link 3a* in Figure 2-1) and explore whether matching in the marriage market affects outcomes post marriage. *Link 3b* in Figure 2-1 indicates this relationship between relative marriage payments and female relative bargaining power post marriage. Literature suggests that groomprice has a negative impact on a woman's bargaining position in the marriage as a dowry payment is indicative of a lower quality bride. Amin (2009) found that women who paid groomprice spent more time doing domestic chores as opposed to women who did not. In the same line of thought this paper argues that women can be attracted by men in the marriage market via high brideprice payments and that these payments will positively impact the bargaining position of these women post marriage as they signify that the bride is of high quality as compared to the groom, as seen by *Link 3b* in Figure 2-1.

This paper argues that the maintained hypothesis in the intra-household literature that dowry assets should make a woman better off may not necessarily hold. We assume that dowry payments in rural Bangladesh arise due to imbalances in the marriage market and mostly serve the groomprice motive rather than to protect the interests of the women once married. In the context of rural Bangladesh it is also reasonable to assume that

predetermined outcomes are of more importance with regards to the bargaining power of women. This is because there is symmetry at the time of marriage in the value of being single between men and women, where women are desired in the marriage market depending on their good looks, age, education, chastity and their fair complexion and men are desired given their level of education and prospects of earning a good living. However after marriage the value of being single for women (*Link 2(b)* in Figure 2-1) falls dramatically for cultural reasons. Even though divorce is permitted in Islam and by law, there is a social stigma attached to being single and single women are not given the same status in society as married women whether they have been divorced, are single parents, or have remained unmarried (Esteve-Volart, 2004). This is particularly more acute if the bride's parents are poor or have passed away (Esteve-Volart, 2004). Hence divorce by women represents unreasonable behaviour.

We argue that if the threat point does not correspond to divorce in rural Bangladesh as it represents unreasonable behaviour on the part of women and instead it is the non cooperative outcome of harsh words and burnt toast, then it should depend on the resources controlled by the woman during the marriage as opposed to outside marriage. However we argue that the control of resources under a woman is not affected by marriage payments - as bride price is received by the girl's parents, and dowry which serves the groom price motive is controlled by the husband. What we argue instead is that given that rural Bangladesh is a traditional society, commitments made to sort imbalances in the marriage market are binding - where a lot of importance is attached to people 'giving their word' and honouring it. The culture, informal institutions and norms put pressure on the dominant partner such as the husband from renegating his word.

Assumption 2: Women prefer to have fewer children and increased child spacing

This paper argues that as the female relative bargaining power increases women bargain for fewer children and increase the use of contraceptives in general and the pill in particular, as seen via *Link 3b* in Figure 2-1. The contraceptive pill is like an assignable good in intra-household literature on collective models, through which the individual consumption of a private good can be examined, in this case the consumption of the contraceptive pill by women (Browning et.al, 1994). The reason this paper measures female bargaining power via the use of the contraceptive pill and not through any other modern, temporary, non-clinical contraceptive such as the condom is because the use of

the contraceptive pill falls under the ambit of women. The contraceptive pill has few side effects, is easy to use and particularly readily accessible and of low cost in Bangladesh where fieldworkers deliver pills free of cost to homes.

In rural Bangladesh where infertility among women is a socially acceptable reason for husbands to desert their wives and marry again, women are likely to take their husbands into confidence when using the contraceptive pill as lack of fertility may suggest that a woman is infertile. It is important to acknowledge that husbands and wives have different preferences over family size. Bankole and Singh (1998) using data from 18 developing countries found that ideal family size differed substantially amongst husbands and wives where husbands wanted larger families and the next child sooner. It has also been argued that if women are in excess demand over men and hence brideprice exists, women have more bargaining power and so can bargain for fewer children, where having children has an increasing cost to women (Francis, 2009; Naidu, 2006). Research shows that welfare of women, and their decision making power within the household on important matters such as number of children to have and child spacing, increases with the availability of efficient birth control innovations such as the pill (Chiappori and Oreffice, 2008).

Context of the Study

The choice of using Bangladesh for the study was made keeping in mind that it gained its independence in 1971 and as a developing country with low socio-economic indicators faced many problems related to rapid population growth and low literacy. These problems were further compounded by the gender disparity in education and work force. Women in Bangladesh especially in rural areas faced many hardships including giving birth to and raising a large number of off-spring.

Various drives sponsored by the government of Bangladesh and international donors were undertaken between the mid-1970s and late 1990s to improve the living standards of its citizens. Prominent amongst these was the population control drive that included the Social Marketing Project, initiated in 1974 by USAID/Washington (Epstein and Altman, 1991) to distribute non-clinical contraceptives throughout Bangladesh; the Health and Population Sector Program in July 1998 that helped set up rural health and family planning clinics and outreach programs; as well as the Bangladesh Family

Planning program, and the Maternal and Child Health and Family Planning programs which delivered services through a community-based distribution approach; were launched by the government of Bangladesh (Khan and Rahman, 1996).

Bangladesh made great strides in population control as its fertility rates fell by 60 per cent and from 6.9 children per woman in 1970-1975 reduced to 2.4 in 2005-2010. A number of surveys and evaluation studies have been conducted by the government of Bangladesh and international agencies such as the World Bank to examine the effect of various factors such as outreach programs on population control. Results of these studies inform us that fertility in Bangladesh declined substantially falling from close to 7 in the early 1970s to 3.3 in 1994 and the number of women using contraception almost tripled (US Dept. of Commerce, 1993; Amin and Kamal, 1994). This census reveals that in 1991, nearly 8 out of every 10 married women using contraception were users of modern methods. The pill was the most popular method, where 1 out of every 3 married women using contraception had selected the pill.

A recent study (Kamal and Islam, 2010), investigating socioeconomic factors regarding use of contraceptives and choice of methods used in rural Bangladesh, indicates that the contraceptive prevalence rate among currently married women is 61% and use of modern methods is 49%; and preferred methods both modern and traditional were the oral pill and periodic abstinence. Findings suggest that discussion on family planning by husband and wife has the most significant effect on contraceptive use. Mannan (2002) attributed the popularity of the pill to its relatively few side effects and easy usage compared to other methods, and its accessibility and cost (fieldworkers delivered pills free of costs to homes). A larger percentage of urban women (48%) as compared to rural women (39%) used contraception (US Dept. of Commerce, 1993). The increased usage of contraceptives by married couples was identified as the main reason for the decline in fertility in Bangladesh. According to the Bangladesh Fertility Survey, however 'there was a significant gap between fertility preferences and use of contraception among married women' (U.S. Dept. of Commerce, 1993). During this period, it was seen that one third of all married women who were fertile were not using contraceptives and wished either to terminate childbearing or to space their next birth.

Data

The study uses survey data from 1998-1999 (Household Survey to Conduct Micro-Credit Impact Studies: Bangladesh) collected by the World Bank and the Bangladesh Institute of Development Economics (BIDS). The survey was conducted to collect information on the credit programs of Grameen Bank, Bangladesh Rural Advancement Committee and the Rural Development-12 program of the Bangladesh Rural Development Board in 1991-1992 and was followed by a later round of data collection in 1998-1999.

The 1991-1992 dataset included 1798 households from rural Bangladesh, randomly drawn from 87 villages of 29 thanas (sub-districts). These 29 thanas were randomly selected from 391 thanas in Bangladesh out of which 24 thanas had at least one of the above mentioned credit programs in operation; whereas, 5 thanas had none. From each of the thanas which had a credit program operational in it, 3 villages were randomly chosen from a list of villages provided by that program's local office, where the credit program had been running for at least three years. From the village census data provided by the Government of Bangladesh an additional three villages were randomly chosen in which no program was running. Same households from the villages chosen in the first round of the survey, along with new villages from the initial thanas, and three new thanas, were included in the follow up round in 1998-1999. The 1998-1999 survey collected data on 2599 households.

Survey data was collected in three rounds reflecting the major rice based seasons (Aus, Aman and Boro) in Bangladesh. Each round was conducted post-harvest namely in December/January, April/May, and July/August. The reason the data were collected in this manner was so as to capture the income flows, impact on agricultural employment and change in prices associated with each of these seasons.

This study uses the data collected in the second round by BIDS and the World Bank in 1998-1999. The sample selected for this study of 2077 couples, was of married men and women who were fathers and mothers identified by the mother and father identity numbers provided in the data. The reason for selecting a sample of mothers and fathers as opposed to just married couples is that we believe that all women want at least one

child, hence the real conflict in the household is about child spacing and the total number of children to have, and not whether to have any children at all.

Questions regarding contraceptive use are addressed to all women between the ages of 12-50 in the survey; women who respond in the affirmative to 'are you currently using any birth control methods,' are women who are married and of which 94% of them are mothers i.e. have one child or more at the time of the survey.

Table 2-5⁵ provides some insightful summary statistics regarding the sample. Fathers on average are older (by 8.5 years) and more educated than the mothers. On average 60% of household marriage payments comprise of brideprice and 50% of household savings under a microcredit program are by women.

The subsample averages in Table 2-6⁶ show that women who use the contraceptive pill are more educated than the average woman in the sample, and compared to women who use no form of contraception. Women who use contraception also receive a higher payment of brideprice at the time of marriage. Average amount of brideprice received by women who use the contraceptive pill is 1236 takas (62%) higher than women who use no contraception and 1186 takas (58%) more than women who use other forms of contraception. Children were restricted in the sample to those under the age of 18 and who were living currently in the household with their parents in 1998/99. On average, women who took the contraceptive pill had 5 children, 2 less than women who used other forms of contraception and 4 children fewer than women who used no form of contraception.

Amongst the sample of 2077 mothers and fathers, fifty eight per cent had one or more children under the age of 5.⁷ Of the 2077 women, 1182 were currently using contraception at the time of the survey in 1998-1999⁸. The most popular method of contraception was the pill (65.48%), followed by injections (16.92%), ligation (10.24%), rhythm (3.3%) condom (1.52%), other forms of contraception (1.18%), IUD (0.59%), vasectomy (0.51%) and withdrawal (0.25%)⁹.

⁵ See Table 2-5 in Appendix

⁶ See Table 2-6 in Appendix

⁷ See Table 2-7 in Appendix

⁸ See Figure 2-2 in Appendix

⁹ See Figure 2-3 in Appendix

To construct sex ratios of men and women of marriageable age, census data on the population of Bangladesh by age and sex from 1974, 1981, 1991 and 2001 was obtained from the United Nations Statistics Divisions Demographic Yearbook. Further, information on the 1991 census data was acquired by the Asia-Pacific Population Research Report (Kantner, Lerman and Yusuf, 1995). Three ratios were created - Proportion 1: number of boys' 15-19/number of girls 10-19; Proportion 2: number of boys 20-29/number of girls 10-19; and Proportion 3: number of boys 30+/number of girls 10-19 (see Table 2-8¹⁰).

As can be seen in Table 2-8¹¹, P1 does not vary much across the years. P2 however shows considerable changes, first decreasing from 0.73 in 1974 to 0.65 in 1981 before increasing again to 0.81 in 1991. In 2001 P2 was down to 0.74. P3 after falling slightly from 1.29 to 1.24 increased sharply to 1.59 in 1991 and 1.69 in 2001. Stata was used to interpolate and extrapolate sex ratios for the remaining years on which no census data was found. Figure 2-4¹² provides a graphical picture of how sex ratios are changing over time.

To search for a potential partner, girls were taken to enter the marriage market when they were 15 and boys at 20. Although girls in our paper are considered to enter the marriage market when they are 15, when calculating the sex ratios girls from age 10-19 are considered. This is because even though the legal age of marriage is 18 for women in Bangladesh, the literature shows that the largest proportion of women who get married are from the 10-19 age group and boys from the 20-29 age group (Rao, 1993; Esteve-Volart, 2004). Upon entering the marriage market at 15 girls faced competition by other 10-19 year olds and boys at 20 from other younger and older boys. Figure 2-5¹³ shows the relationship between the year mothers entered the marriage market and the year they got married. The figure indicates that the later women entered the marriage market, the later they got married.

¹⁰ See Table 2-8 in Appendix

¹¹ See Table 2-8 in Appendix

¹² See Figure 2-4 in Appendix

¹³ See Figure 2-5 in Appendix

Results and Discussion

Using data from rural Bangladesh (1998-1999), this study explores whether women in a relatively strong bargaining position at the time of matching continue to remain in a strong position post marriage, as seen by their decision making power within the household. The relative bargaining of women at the time of marriage is measured by taking brideprice as a fraction of total marriage payments, and decision making power post marriage is gauged via the use of the contraceptive pill by women. We first investigate the effect of relative marriage payments on the decision of women to use contraception via a probit, and then explore the effect on the decision to use the contraceptive pill, through the multinomial logit. Alternate measure of fertility such as total number of children born and birth spacing are also explored.

Studies in the past have examined the relationship of various factors on the use of contraceptives by married women in Bangladesh such as education, door delivery of contraceptives and availability of micro-credit programs (Kamal and Islam, 2010; Khan, 1996; Mannan, 2002). Important factors seen affecting use of contraceptives in the literature were: women's age, number of living children, number of sons, women's education and age, her religion, and her membership of an NGO, as well as place of residence, and home delivery of contraceptives.

Results from the probit estimation on the choice of using contraception are presented in Table 2-9¹⁴, where the dependant variable equals 1 if the mother was currently using contraception and equalled zero if she was not. Results show that an increase of brideprice as a fraction of total marriage payments by one unit has a positive and significant effect on the likelihood of using contraception by 18 percentage points. The age at which women first marry has a negative effect on the use of the contraception, which may be indicating that women who marry later are keen to complete their families and hence less likely to use contraception. We also find that, as the number of living children increase mothers are more likely to practise contraception; as the number of children in the household under 5 increase, she is less likely to be currently using contraception; and as the age of the mother increases mothers are more likely to use contraception but at a decreasing rate. A probit on the use of the contraceptive pill as opposed to no contraception yields similar results where the likelihood of using the contraceptive pill increased with the fraction of brideprice taken, the education level of

¹⁴ See Table 2-9 in Appendix

the mother, the total number of living children in the household and as the age of the mother increased but at a decreasing rate. The likelihood of using the pill fell as the father's age and the number of children under the age of 5 increased by one unit.

Compared to the probit model, the multinomial logit model¹⁵ (Table 2-1) is less restrictive on the effects that explanatory variables can have on the different choices of contraceptive use, allowing coefficients of exogenous variables such as education of the mother to vary across using the contraceptive pill or other forms of contraception. The probit on the other hand restricts the coefficients to be the same for all currently using contraception (currently not using contraception) decisions. We use an unordered multinomial model such as multinomial logit, since there is no clear ordering of the outcome variable, as older women may prefer different forms of contraception as compared to younger women. The polychotomous dependent variable is the use of contraception and takes values of 0, 1, 2 depending on the three mutually exclusive alternative forms of contraception – respectively no contraception, contraceptive pill, other forms of contraception chosen by the individual.

Table 2-1 shows the impact of brideprice as a fraction of total household marriage payments on a woman's decision to use the contraceptive pill, where the total marriage payments received by the household are calculated by summing the amount of brideprice received by the woman and groomprice received by the man. The results of the multinomial logit show that as the fraction of total marriage payments composed of brideprice increases from 10% to 30% the predicted probability of using the contraceptive pill increases by 8 percentage points; and the predicted probability of choosing any other form of contraceptive increases by 6 percentage points.¹⁶

In line with findings of previous studies, individual characteristics of the mother's and father's play an important role in determining the use of the contraceptive pill, such as their level of education and ages (Kamal and Islam, 2010). As the years of education received by the mother increase by 3 years, from receiving 3 years of education to 6, the predicted probability of using the contraceptive pill increases by 5 percentage points.

¹⁵ We do the Hausman test for IIA assumption and we find the null hypothesis of independent alternative cannot be rejected and hence conclude that the model is not affected if we omit one of the existing alternatives.

¹⁶ We obtain these results by first estimating the predicted probability of using the contraceptive pill when brideprice as a fraction of total marriage payments is 10% and then 30%, after which we take the log of the two values and find the difference.

The predicted probability of women using other forms of contraception however shows a decline of 10 percentage points as mother's education increases by 3 years. Khan and Rahman, (1996) also find that the pill is used more by educated women, whereas injectables and permanent methods are used by uneducated women.

Table 2-1: Brideprice as a Fraction of Marriage Payments

	<u>Contraceptive</u> <u>Pill</u> 1	<u>Any other</u> <u>contraception</u> 2	x1	P1(P2)	x2	P1(P2)
Fathers age	-0.0148* (0.00717)	-0.0015 (0.00848)	35	0.385(0.193)	40	0.369(0.196)
Mothers age	0.236*** (0.0586)	0.277*** (0.0708)	25	0.25(0.09)	30	0.35(0.168)
Mothers age squared	-0.00459*** (0.000886)	-0.00457*** (0.00103)	25	0.625(0.3405)	30	0.6245(0.3404)
Mothers education	0.0189* (0.00918)	-0.0344* (0.0158)	3	0.37(0.19)	6	0.39(0.17)
Fathers education	0.00382 (0.0103)	-0.0104 (0.0149)	3	0.372(0.196)	6	0.372(0.196)
Brideprice fraction of marriage payments	0.791*** (0.204)	0.695** (0.256)	0.1	0.358(0.192)	0.3	0.387(0.204)
Mothers age at time of marriage	-0.0446 (0.0237)	-0.0331 (0.0276)	12	0.382(0.204)	15	0.374(0.197)
Number of children under the age of 5	-0.630*** (0.0941)	-0.831*** (0.117)	1	0.359(0.166)	2	0.252(0.094)
Number of children	0.152** (0.0547)	0.0841 (0.0607)	2	0.233(0.087)	4	0.318(0.109)
Constant	-1.585 (0.921)	-3.734** (1.191)				
N	2077					
pseudo R ²	0.06					
Standard errors in parentheses						
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$						

The results of the variable age and age squared suggest that as the age of the mother increases she is more likely to use the contraceptive pill as opposed to no contraception

but at a decreasing rate.¹⁷ However as the fathers age increases from 35 years to 40 years the predicted probability of using the contraceptive pill decreases by 4 percentage points. This may be explained by the fact that men may be able to exercise more control over household decisions as they become older.

Results show that as the number of children born in the household increase from 2 to 4, the predicted probability of choosing contraceptive pills rises by 31 percentage points.¹⁸ Previous studies investigating the effect of an increase in the total number of living children on the use of contraceptives confirm these findings (Khan, 1996; Kamal and Islam, 2010; Mannan, 2002). However as the number of children under the age of 5 increases from 1 to 2 the predicted probability of using the contraceptive pill falls by 35 percentage points. This result may suggest that in households where there are young children women are less likely to use contraception as they may still be completing their families or breast feeding one of their children, where lactation acts a natural form of contraception. The total number of living children is a key determinant of contraceptive use by women (Kamal and Islam, 2010; Khan, 1996). Mannan (2002) using the Bangladesh Demographic and Health Survey 1996-1997 found that women make less use of inefficient and permanent methods as the number of living children increases. Khan (1996) in his study using data from the 1990 Knowledge Attitude and Practice survey with a sample of about 8500 married women examined the relationship between fertility control, availability of contraceptives, and socio-demographic factors in rural Bangladesh. Factors that effected contraceptive use in his study were number of living children, followed by number of living sons, as well as the attitude of married women and their husbands towards fertility control.

We explore an absolute construct of marriage payment such as brideprice to see its effect on the decision to use the contraceptive pill. Table 2-10 in the appendix shows that as the value of brideprice increases from 1000 takas to 3000 takas the predicted probability of using the pill increases by 7 percentage points; whereas the decision to use any other form of contraception falls by 5 percentage points. This confirms our initial finding of the effect brideprice or bargaining power at the time of marriage has on the current

¹⁷ The turning point of this concave relationship is calculated at 26 years.

¹⁸ We include the presence of a male child to the basic specification in Table 3-1 however we find that its effect on the use of the contraceptive pill is not statistically significant.

decision making power of the woman, as seen by her usage of the contraceptive pill. We prefer the relative construct of marriage payment however, as marriage payments may be exchanged in both directions and it is only the relative value of one payment over the total that would give us an indication of the relative quality of the match and bargaining power.

Table 2-11 displays the result of the multinomial logit that estimates the effect of differences in educational attainment and age between the mother and father on the mother's decision to use the contraceptive pill. The difference in age variable is constructed by subtracting the mothers age from the fathers. Results show that as the difference in age variable increases from 7 years to 10 years the predicted probability of using the contraceptive pill falls by 2 percentage points. This confirms the hypothesis suggested before that as the age of the father increases relative to the mother he is likely to hold more decision making power in the household (Lundberg and Ward-Batts, 2000). The predicted probability of using the pill increases by 12 percentage points as the proportion of marriage payments composed of brideprice increase from 10% to 30%. Relative education of women as compared to men plays an important role in determining their bargaining power. Handa, (1996) argues that increased educational attainment of women increases opportunities for women to find income bearing jobs and via that channel improves their bargaining power in the household. Difference in husband and wife's age is another noteworthy measure of bargaining power where a woman, who is older, given her husband's age, is hypothesized to have more bargaining power in household decision making (Lundberg and Ward-Batts, 2000).

Results for the multinomial logit constrained such that coefficients of all variables equal each other in the two equations (of dependent variables use of contraceptive pill and other forms of contraception) except for education are shown in Table 2-13¹⁹. They show that as the education of mothers increase by three years (from 3 years of education to 6) the predicted probability of her using the contraceptive pill goes up by 6 percentage points whereas for other forms of contraception the predicted probability of using them falls by 12 percentage points. Khan and Rehman, (1996) similarly found that women who were educated were more likely to use the contraceptive pill; whereas,

¹⁹ See Table 2-13 in the Appendix

uneducated women often used injectables and other forms of contraception. A likelihood-ratio test was performed, to test the unrestricted model presented in Table 2-1 and the restricted model discussed above. Results show that the null hypothesis is strongly rejected and we conclude that the unrestricted model fits the data significantly better and is hence preferred.

Likelihood-ratio test	LR chi2(8) = 57.50
(Assumption: restrict nested in unrestricted)	Prob > chi2 = 0.0000

We argue that if predetermined outcomes persist during the course of the marriage then only those variables should affect outcomes post-marriage which were not predictable *ex ante*, such as availability of microcredit as shown by *Link 5* in Figure 2-1. Hence marriage payments such as brideprice may continue to matter despite participation of women in the microcredit program, if membership in the program was not anticipated by the couples at the time of marriage when marriage payments were exchanged. We find that being part of a microcredit program by itself did not have any significant effect on the predicted probability of women using the contraceptive pill (see Table 2-14 in Appendix). This may be so because even though women may be members of microcredit programs, literature suggests husbands or other male members may use the loans (Anandan, 2009). We therefore use an alternate measure and look at the effect of relative savings through participation in a microcredit program, on the use of contraception amongst women. Relative savings in this paper are defined as - the savings of the wife as a fraction of total household savings, under the microcredit program. Probit results on the use of contraception (where the dependant variable equals 1 if the mother was currently using contraception and equalled zero if she was not) are provided in Table 2-15²⁰, showing the positive significant effect on contraceptive use of a woman's relative savings as they increase under the microcredit program. The coefficient on brideprice taken as a fraction of household marriage payment remains significant and positive. Previous literature also suggests that increased savings of a woman under a microcredit program relative to her husband imply increased levels of cash income under the control of a woman, which should have the impact of strengthening her bargaining power and hence influence her reproductive behaviour (Pitt et.al, 1999).

²⁰ See Table 2-15 in Appendix

A specification with the dummy variable Islam was tried to see whether brideprice may in fact represent the Muslim marriage payment of maher. However, brideprice in our sample is received by individuals of all religions and not just Muslims. In addition, the results for the multinomial logit which included Islam and an interaction term with brideprice, are not included in this paper as they did not have a significant effect on the use of any form of contraception.

Dummy variables representing different districts in Bangladesh are included to see whether any regional differences may determine the use of the contraceptive pill as opposed to no contraception. Dhaka, Rangpur district, Sylhet, Khulna, Rajshahi and Barisal are the districts included.²¹ Multinomial estimates in Table 2-16²² show that belonging to district Dhaka, Khulna and Rajshahi have a positive significant impact on using the contraceptive pill, whereas belonging to Sylhet has a negative effect. It is interesting to note that even though the effect of brideprice as a fraction of total marriage payments weakens, it still remains significant and strong showing that the statistic is robust to changes in specification. We add four variables that might help explain why the district the individual belongs to matters: distance to nearest commercial bank from the household, distance of nearest paved road from the household, distance to nearest market place from the household, and distance to nearest business centre from the household. As the distance from the nearest paved road increases by 1 kilometre, the predicted probability of using other forms of contraception falls by 2 percentage points and as the distance from the nearest commercial bank increases by 2 kilometres, the predicted probability of a mother choosing other forms of contraception increases by 7 percentage points. After the inclusion of these variables, belonging to the district Sylhet has a significant and negative impact on the use of other forms of contraception; whereas, living in Rangpur district has a positive significant impact on the use of the contraceptive pill but no longer has significant impact on using other forms of contraception. Significance and signs of the rest of the districts remain roughly the same²³. Kabir et al. (2010) argue that contraceptive norms vary in Bangladesh from region to region and conclude that women

²¹ Chittagong is excluded so to avoid the dummy variable trap.

²² Results are reported in the Appendix, Table 2-16

²³ Results are reported in the Appendix, Table 2-17

empowerment has a positive significant effect on contraception norms in Dhaka, Khulna and Rajshahi district.

Results from Table 2-12 in the Appendix, show that as the difference in education between the mother and father²⁴ increases by 1 year, brideprice as a fraction of total marriage payments increases by 0.002. These results suggest that relative education of the mother compared to the fathers plays a significant role in explaining the size of marriage payments (Handa, 1996).

Alternate Measures of Fertility

To check the robustness of our results we measure female bargaining power during the marriage through two alternate constructs, total number of children and birth spacing. We argue that if women prefer to have fewer children due to increasing costs to them, then other than increased use of contraception and the pill in particular, it should also be reflected in birth spacing and total number of children born.

We do an ordered probit where the dependant variable is the number of children. To avoid letting our results being influenced by outliers, our dependant variable takes on the value of 1, 2, 3, 4, 5 and more than 5 – where the more than 5 category absorbs all the outliers. We also add additional controls to our original specification such as: whether a woman is breast feeding, if her first child was male, and if her second child is male. Table 2-18 in the appendix shows that relative marriage payments have a negative effect, significant at the 5 percent level, on the total number of children born.

As expected we find that women who are breastfeeding have fewer children, as breastfeeding acts as a natural contraceptive. Research shows that lactation inhibits 6.5 births on average per women (Weis, 1993). With regards to policy, postpartum family planning services decide between providing contraception immediately after birth to women, or once lactation-induced amenorrhea ends, so as to keep the ‘double protection interval’ at a minimum (Weis, 1993). The World Health Organization and United Nations Children’s Fund at the Bellagio Conference in 1988 suggest that contraception should start once menstruation starts or t months after childbirth, where t is

²⁴Where difference in education = mothers education – fathers education

recommended to be six months. Weis, (1993) using data from the Bangladesh Fertility Survey (1989) found that the breastfeeding period in Bangladesh is one of the longest in the world, where the appropriate t value can go up to 12 months.

Mother's age at marriage has a highly significant negative effect on the total number of children born. We argue that women who are older when they get married have more say in their marriages. The availability of the contraception pill also delays marriage as well as reduces the cost of marriage to women, as they no longer have to give up their careers when they get married by providing a reliable method of contraception (Goldin and Katz, 2002).

The gender of the first two children born, are also added as controls. We find that the effect of the first child being male on total fertility is not significant at the 5 percent level. However if the second child is male women are more likely to have more children. This result is puzzling as one would expect the demand for children to reduce once a family has a male offspring, particularly in the case of South Asia. The education of mothers has the expected negative effect and that of age to be increasing but at a decreasing rate as before.

As a robustness check we estimate the effect of relative marriage payments on family size, across different age cohorts for women. We divide our sample into three: 15-29, 30-44, 45-50. Results²⁵ show that our variable of interest, relative marriage payments, is significant for the 15-29 and 30-44 samples but not the 45-50 sample. This may be because most women have completed their families by the time they are 45, and as a result we are not able to rule out the age effect on contraception.

Instead we try and estimate the effect of relative marriage payments on another indicator of fertility - birth spacing. The dependant variable in the probit estimation is a dummy variable that takes on a value of 1 if the space between two successive births is one year or less. An interval of a year or less is chosen, as birth spacing of less than 14 months, increases the chances of infant mortality by 60 to 80 percent (Yeakey et al., 2009). Short birth intervals also have serious consequences on the health of the mother.

²⁵ Results are in Table 2-19 in the Appendix

In keeping with our hypothesis in Table 2-20 in the Appendix, we find that as the fraction of marriage payments composed of brideprice increases, the probability of the birth space between two live births being 12 months or less falls. The sign of the dummy variables denoting one if the first child born is a son, and second child is a son, are both positive and significant. These results as before are contrary to expectations as one would assume parents would be less keen to have a successive child quickly if they already have a son.

The characteristics of the parents play a significant role on birth spacing, where older men and women are more likely to have a birth space between two children of 12 months or less, but men who are more educated are less likely to. These results show that men and women who are older may be more inclined to complete fertility. However the more educated the father is, the more likely he is to understand the consequences of such short birth intervals, for the mother and the child and hence less likely for two births to occur so closely to each other. The age of the mother at the time of marriage, as before has a highly significant negative effect on a birth spacing of a year or less, and the presence of children under the age of 5 increases the probability of close birth spacing.

Sex ratios and Relative Marriage Payments

The possibility of sex ratios²⁶ affecting the bargaining power of women in the household post marriage was also investigated. The relationship between the two did not emerge to be as simple as imagined. Figure 2-7 in the Appendix shows that individuals entering the marriage market later end up with a higher brideprice as a fraction of total marriage payments. However, Figure 2-6 in the Appendix shows that as p1 (i.e. number of boys 15-19 relative to girls 10-19) increases the fraction of brideprice as a fraction of total marriage payments falls. These trends are puzzling as even though the bargaining power of women is increasing over time as gauged by the amount of brideprice received relative to groomprice given, sex ratios are working against women. The regression results²⁷ provide a similar picture where p1 has a negative significant effect on brideprice as a fraction of total marriage payments. This

²⁶ faced by individuals when they enter the marriage market

²⁷ Results are reported in the Appendix, Table 2-22

suggests that a factor other than sex ratios might be affecting the size of relative marriage payments in rural Bangladesh. It can be argued that the increasing trend of relative marriage payments over time is driven by the outside option of women which may have been growing in rural Bangladesh over time.

We include a conditional logit to control for district fixed effects in an effort to capture the effect of sex ratios at the district level and alleviate potential endogeneity in outcomes. We choose to control for fixed effects at the district level as opposed to village level, as research shows that ‘patrilocal residence and village exogamy’ are key features of a marriage in Bangladesh - where women marry men from outside their village and move into their husband’s homes in the new village post marriage (Khandker and Cartwright, 2006). The results included in Table 2-21 in the appendix confirm our initial findings: more educated father are less likely to have less birth spacing, as do mothers who are older at the time of marriage, whereas the older the parents are the higher the probability of closely spaced births. We find that as relative bargaining power at the time of marriage, as given by relative marriage payments, increases the likelihood of having births a year apart or less fall.

Conclusion and Policy Implications

To conclude this paper attempts to investigate whether the bargaining position of brides and bridegrooms at the time of marriage affects their decision making power within the household post marriage; where the relative bargaining position of women is measured by the fraction of marriage payments composed of brideprice and their decision making power post marriage by their use of the contraceptive pill. Results of this study show that as the fraction of total marriage payments composed of brideprice increases from 10% to 30% the predicted probability of using the contraceptive pill rises by 8 percentage points. Other factors such as the difference in age between the husband and wife, the number of living children in the household and the level of education of the mother are all seen to play a significant role in the use of contraceptive pills by women. Results show that an increase in the difference of ages between the father and the mother from 7 years to 10 years decreases the predicted probability of using the contraceptive pill by 2 percentage points and as the education of the mother increases by three years (where level of education attained increased from 3 to 6 years) the predicted

probability of using the contraceptive pill increases by 5 percentage points. Education however, has a negative effect on using other forms of contraception.

Marriage payments, as conjectured by Becker, arise to align the demand and supply of brides and grooms in the marriage market. However, there may be other characteristics of the bride and bridegroom that may be giving rise to these payments such as level of education, good looks or that they belong to dignified, high socio-economic status families. Hence marriage payments may be used to help match individuals of different characteristics and qualities to each other. This may particularly be so as marriage payments have the effect of making an individual more desirable in the marriage market. Our results show that as the difference in education between the mother and father increases by 1 year, brideprice as a fraction of total marriage payments increases by 0.002.

There is a close link between the bargaining of women in the household and desirable economic outcomes such as low levels of population growth and the health of women and children. Rapid population growth is a crucial problem for developing countries where 75% of the world's population resides. It lowers per capita income; hinders economic growth by lowering saving rates and reducing 'the stock of human capital'; puts additional pressure on government revenue to provide basic services; and high levels of fertility and closely spaced births also have an adverse effect on the health of the mother and increase child mortality (Todaro and Smith, 2009). The empowerment of women plays a crucial role in achieving lower levels of population growth as emphasized in the United Nations International Conference on Population and Development in 1994. Recommendations of the conference highlighted that high levels of fertility were a consequence of the low status of women at home and in their community. Findings of our paper support this hypothesis where an increase in the bargaining power of women at the time of marriage increases their predicted probability of using the contraceptive pill.

Further studies are required to investigate how distance from the natal home of women may affect binding commitments made at the time of marriage.

Bibliography

- Ambrus, A., Field, E. & Torero, M. (2010). Muslim Family Law, Prenuptial Agreements, and the Emergence of Dowry in Bangladesh. *The Quarterly Journal of Economics*, 125 (3), 1349-1397.
- Amin, S., Huq, L., Suran, L., & Chowdury, K. (2004). Does Dowry Improve Life for Brides? A Test of the Bequest Theory of Dowry in Rural Bangladesh. *The Population Council, Policy Research Division*, 195.
- Amin, S., & Lloyd, B. C. (1998). Women's Lives and Rapid Fertility Decline: Some Lessons from Bangladesh and Egypt. *Population Research and Policy Review*, 21, 275-317.
- Amin, S., & Suran, L. (2009). Terms of marriage and time-use patterns of young wives – Evidence from rural Bangladesh. *Electronic International Journal of Time Use Research*, 6(1), 92-108.
- Anderson, S. (2000). The Economics of Dowry Payments in Pakistan. Center of Economic Research Working Paper No. 2000-82.
- Anderson, S. (2003). Why Dowry Payments Declined with Modernization in Europe but Are Rising in India. *Journal of Political Economy*, 111(2), 269-310.
- Anderson, S. (2007). The Economics of Dowry and Brideprice. *Journal of Economic Perspectives*, 21(4), 151–174.
- Anderson, S. (2007). Why the Marriage Squeeze cannot cause Dowry Inflation. *Journal of Economic Theory*, 137, 140 – 152.
- Bankole, A., & Singh, Susheela. (1998). Couples' fertility and Contraceptive Decision-Making in Developing Countries: Hearing the Man's Voice. *International Family Planning Perspectives*, 24(1), 15-24.
- Becker, S. G. (1973). A Theory of Marriage: Part I. *The Journal of Political Economy*, 81(4), 813-846.
- Becker, G. (1991). *A treatise on the family*. Harvard University Press, Cambridge, MA.
- Bergstrom, C.T. (1996). Economics in a Family Way. *Journal of Economic Literature*, 34 (4), 1903-1934.
- Bergstorm, C.T. (1997). A Survey of Theories of the Family. *Handbook of Population and Family Economics*, 1(1), 21-79.

- Bhaskar, V. (2007). Parental Choice and Gender Balance. University College London.
- Boomgaard, P. (2003). Bridewealth and Birth Control: Low Fertility in the Indonesian Archipelago, 1500-1900. *Population and Development Review*, 29(2), 197-214.
- Brown, H. P. (2003). Dowry and Intra-household Bargaining: Evidence from China. *William Davidson Institute Working Paper*, 608.
- Browning, M., Bourguignon, F., Chiappori, P., & Lechene, V. (1994). 'Income and Outcomes: A Structural Model of Intra-household Allocation'. *The Journal of Political Economy*, 102 (6), 1067-1096.
- Browning, M., & Lechene, V. (2001). Caring and Sharing: Tests between Alternative Models of Intra-Household Allocation. Discussion Papers, Economics Department, University of Copenhagen.
- Burdett, K., & Coles, G. M. (1997). Marriage and Class. *The Quarterly Journal of Economics*, 112(1), 141-168.
- Burdett, K., & Coles, G. M. (1999). Long-Term Partnership Formation: Marriage and Employment. *The Economic Journal*, 109(456), F307-F334.
- Burdett, K., & Coles, G. M. (2001). Transplants and Implants: The Economics of Self-Improvement. *International Economic Review*, 42(3), 597-616.
- Chiappori, P. (1992). Collective Labour Supply and Welfare. *The Journal of Political Economy*, 100(3), 437-467.
- Chiappori, P., Alderman, H., Haddad, L., Hoddinott, J., & Kanbur, R. (1995). Unitary versus Collective Models of the Household: is it Time to Shift the Burden of Proof? *The World Bank Research Observer*, 10 (1), 1-19.
- Chiappori, P., & Oreffice, S. (2008). Birth Control and Female Empowerment: An Equilibrium Analysis. *The Journal of Political Economy*, 116(1), 113-140.
- Cowell, F. (2006) *Microeconomics: Principles and Analysis*. Oxford: Oxford University Press.
- Deb, S., Kabir, A., & Kawsar, L. A. (2010). Women's Empowerment and Regional Variation of Contraceptive Norms in Bangladesh. *International quarterly of community health education*, 31(4), 401-410.
- Edlund, L. (2001). Dear Son - Expensive Daughter: Why Do Scarce Women Pay to Marry? Columbia University, Department of Economics, Working Paper.

- Ermisch, J. (2003). *An Economic Analysis of the Family*. Princeton: Princeton University Press.
- Epstein, E., & Altman, D. (1991). Evaluation of the Bangladesh Social Marketing Project. Report no. 91-116-129, Office of Population Bureau for Science and Technology Agency for International Development, Washington, D.C.
- Esteve-Volart, B. (2004). Dowry in Rural Bangladesh: Participation as Insurance Against Divorce. http://dept.econ.yorku.ca/%7Eberta/dowry_web.pdf. (Unpublished Paper.)
- Falkingham, J., & Baschieri, A. (2009). Gender and Poverty: How misleading is the Unitary Model of Household Resources? An illustration from Tajikistan. *Global Social Policy*, 9(1), 43-62.
- Foster, A. (1996). Analysis of Household Behaviour when Households Choose Their Members: Marriage Market Selection and Human Capital Formation in Rural Bangladesh. University of Pennsylvania, Philadelphia, Pa. Processed.
- Francis, M. A. (2009). Sex ratios and the red dragon: using the Chinese Communist Revolution to explore the effect of the sex ratio on women and children in Taiwan. *Journal of Population Economics* (published online July 2009).
- Gaspart, F., & Platteau, J. (2007). The Perverse Effects of High Brideprices. *World Development*, 35(7), 1221–1236.
- Goldin, C., & Katz, F. L. (2002). The Power of the Pill: Oral Contraceptives and Women's Career and Marriage Decisions. *Journal of Political Economy*, 110, 4, 730-770.
- Handa, S. (1996). Maternal Education and Child Attainment in Jamaica: Testing the Bargaining Power Hypothesis. *Oxford Bulletin of Economics and Statistics*, 58(1), 119-137.
- Iyigun, M., & Walsh, R. (2007). Building the Family Nest: Pre-Marital Investments, Marriage Markets and Spousal Allocations. *Review of Economic Studies*, 74(2), 507-535.
- Kamal, S. M., & Islam, M.A. (2010). Contraceptive use: socioeconomic correlates and method choices in rural Bangladesh. *Asia-Pacific Journal of Public Health*, 22(4), 436-50.

- Kantner, A., Lerman, C., & Yusuf, M. (1995). What we can say about fertility trends in Bangladesh? An Evaluation of the 1991 Population Census. *Asia-Pacific Population Research Reports*, 5.
- Khan, M.M.A., & Rahman, M. (1996). Determinants of Contraceptive Method-Choice in Rural Bangladesh. International Centre for Diarrhoeal Disease Research Bangladesh, Working Paper No. 54.
- Khan, M.A. (1996). Factors affecting use of contraception in Matlab, Bangladesh. *Journal of Biosocial Science*, 28, 265-279.
- Lahiri, S., & Self, S. (2004). Gender Bias in Education: the Role of Inter-household Externality, Dowry and Other Social Institutions. Southern Illinois University Carbondale, Department of Economics, Discussion Papers.
- Lundberg, S., & Pollak, R. (1993). Separate Spheres Bargaining and the Marriage Market. *The Journal of Political Economy*, 101 (6), 988-1010.
- Lundberg, S., & Pollak, A. R. (1994). Noncooperative Bargaining Models of Marriage. *The American Economic Review*, 84 (2), 132-137.
- Lundberg, S., & Pollak, A. R. (2003). Efficiency in Marriage, Review of Economics of the Household. *Springer*, 1(3), 153-167.
- Lundberg, S., & Ward-Batts, J. (2000). Saving for Retirement: Household Bargaining and Household Net Worth. Unpublished.
- Maitra, S. (2007). Dowry and Bride Price. *International Encyclopaedia of the Social Sciences*, (2nd ed.).
- Mannan, H. R. (2002). Factors in Contraception Method Choice in Bangladesh. Goals Competence Evaluation and Access. *Contraception*, 65, 357- 364.
- Manser, M., & Brown, M. (1980). Marriage and Household Decision-Making: A Bargaining Analysis. *International Economic Review*, 21(1), 31-44.
- McElroy, M. B., & Horney, M. J. (1981). Nash-Bargained Household Decisions: Towards a Generalization of the Theory of Demand. *International Economic Review*, 22(2), 333-349
- Naidu, S. & Arunachalam, R. (2006). Do Men Pay for Fertility? Marriage Market Effects of a Family Planning Experiment in Bangladesh. University of California, Berkeley.
- Nelson, A. J. (1994). I, Thou, and Them: Capabilities, Altruism, and Norms in the Economics of Marriage. *The American Economic Review*, 84 (2), 126-131.

- Pencavel, J. (1998). Assortative Mating by Schooling and the Work Behaviour of Wives and Husbands. *The American Economic Review*, 88(2), 326-329.
- Pitt, M. M., Shahidur, R. K., Mckernan, S. & Latif, M.A. (1999). Credit Programs for the Poor and Reproductive Behaviour in Low-Income Countries: Are the Reported Causal Relationships the Result of Heterogeneity Bias? *Demography*, 36(1), 1-21.
- Pitt, M. M., Khandker, S. R., & Cartwright, J. (2006). Empowering women with micro finance: Evidence from Bangladesh. *Economic Development and Cultural Change*, 54(4), 791-831.
- Pollak, A. R. (2002). Gary Becker's Contributions to Family and Household Economics. Washington University in St. Louis.
- Pollak, A. R. (2005). Bargaining Power in Marriage: Earnings, Wage Rates and Household Production. Washington University St. Louis.
- Population Division of the United Nations Secretariat, World Urbanization Prospects: The 2003 Revision, Data Tables and Highlights.
- Population Trends Bangladesh. (1993). U.S. Department of Commerce, Bureau of the Census. Centre for International Research.
- Quisumbing, A. R., & Briere, B. (2000). Women's Assets and Intra-household Allocation in Rural Bangladesh: Testing Measures of Bargaining Power. *Food Consumption and Nutrition Division Discussion*, 86.
- Quisumbing, R. A., & Maluccio, A. J. (1999). Intrahousehold Allocation and Gender Relations: New Empirical Evidence from four developing countries. Working Paper 2. Washington, DC: World Bank.
- Quisumbing, R. A., & Maluccio, A. J. (2003). Resources at Marriage and Intra-household Allocation: Evidence from Bangladesh, Ethiopia, Indonesia, and South Africa. *Oxford Bulletin of Economics and Statistics*, 65 (3), 283-327.
- Rao, V. (1993). The Rising Price of Husbands: A Hedonic Analysis of Dowry Increases in Rural India. *The Journal of Political Economy*, 101(4), 666-677.
- Rao, V., & Bloch, F. (2002). Terror as a Bargaining Instrument: A Case Study of Dowry Violence in Rural India. *The American Economic Review*, 92(4).
- Sahib, P.R., & X. Gu. (2002). "Living in sin" and marriage: a matching model. *Journal of Population Economics*, 15, 261-282.

- Schultz, T.P. (1990). Testing the Neoclassical Model of Family Labour Supply and Fertility. *The Journal of Human Resources*, 25(4), 599-634.
- Siow, A., & Botticini, M. (2003). Why Dowries? *The American Economic Review*, 93(4), 1385-1398.
- Suen, W., Chan, W. & Zhang, J. (2003). Marital transfer and intra-household allocation: a Nash-bargaining analysis. *Journal of Economic Behaviour & Organization*, 52, 133-146.
- Tertilt, M. (2002). The Economics of Brideprice and Dowry: A Marriage Market Analysis. University of Minnesota.
- Tiefenthaler, J. (1999). The sectoral labour supply of married couples in Brazil: Testing the unitary model of household behaviour. *Journal of Population Economics*, 12(4), 591-606.
- Tiefenthaler, J. & Klawon, E. (2001). Bargaining over family size: The determinants of fertility in Brazil. *Population Research and Policy Review*.20, 423-440.
- Thomas, D. (1990). Intra-Household Resource Allocation - An Inferential Approach. *The Journal of Human Resources*, 25(4), pp 635-664.
- Thomas, D. (1994). Like Father, Like Son, Like Mother, Like Daughter - Parental Resources and Child Height. *The Journal of Human Resources*, 29(4), 950-988.
- Todaro, M. & Smith, S. (2009). *Economic Development* (10th ed.). Harlow: Addison-Wesley.
- Vadakarasseril Anandan, J. (2009). Micro credit, empowerment and diversion of loan use.
- Weis, P. (1993). The contraceptive potential of breastfeeding in Bangladesh. *Studies in family planning*, 100-108.
- Yeakey, M. P., Muntifering, C. J., Ramachandran, D. V., Myint, Y., Creanga, A. A., & Tsui, A. O. (2009). How contraceptive use affects birth intervals: results of a literature review. *Studies in Family Planning*, 40(3), 205-214.
- Zhang, J. & Chan, W. (1999). Dowry and Wife's Welfare: A Theoretical and Empirical Analysis. *The Journal of Political Economy*, 107(4), 786-808.

Appendix

Table 2-2: Differences in Matching Models

Author (Year)	Market Frictions	Heterogeneous partners	Transferable Utility	Positive Assortative Mating
Ermisch (2003)	Yes	No	No	No
Burdett & Coles (1997)	Yes	Yes	No	If frictions are small
Burdett & Coles (1999)	Yes	Yes	Yes	No
Becker (1991)	No	Yes	Yes	Yes

Table 2-3: Prevalence of Brideprice in Contemporary Societies

Country	Years	Paid a brideprice	# Observations
Rural China	1950–2000	79%	451
Urban China	1933–1987	9%	586
Taiwan	1940–1975	53%	964
Rural Thailand	1950–1978	93%	248
Urban Thailand	1950–1978	79%	395
Cairo (Egypt)	1940–1976	93%	919
Damascus (Syria)	1940–1976	84%	1164
Kinshasa (Zaire)	1940–1976	96%	694
Tororo (Uganda)	1940–1976	95%	781
Urban Iran	1971–1991	99%	511
Uganda	1960–1996	73%	1657
Rural Uganda	1960–1980	98%	155
Rural Uganda	1980–1990	88%	364
Rural Uganda	1990–1996	65%	226
Urban Uganda	1960–1980	96%	93
Urban Uganda	1980–1990	79%	379
Urban Uganda	1990–1996	46%	440
Turkey	1944–1993	29%	6519
Rural Turkey	1960–1975	46%	127
Rural Turkey	1975–1985	37%	205
Rural Turkey	1985–1998	23%	286
Urban Turkey	1960–1975	34%	210
Urban Turkey	1975–1985	24%	367

Source: Anderson, S. (2007). The Economics of Dowry and Brideprice. *Journal of Economic Perspectives*, 21(4), pg. 153, table 1.

Table 2-4: Prevalence of Dowry in Contemporary Societies

Country	Years	Paid a dowry	# Observations
Rural India	1960–1995	93%	1217
Rural India	1970–1994	94%	1842
Rural Pakistan	1970–1993	97%	1030
Pakistan	1986–1991	87%	1300
Rural Bangladesh	1945–1960	3%	2303
Rural Bangladesh	1960–1975	11%	3367
Rural Bangladesh	1975–1990	44%	3745
Rural Bangladesh	1990–1996	61%	1065
Rural Bangladesh	2003	76%	1279

Source: Anderson, S. (2007). *The Economics of Dowry and Brideprice*. *Journal of Economic Perspectives*, 21(4), pg. 154, table 2.

Table 2-5: Descriptive Statistics

Variable	mean
Fathers age	40.13
Mothers age	31.58
Mothers education	2.84
Fathers education	3.20
Household savings under microcredit program	1401.36
Mothers savings under microcredit program	695.59
Age mother married	15.76
Brideprice taken by mother	2479.56
Household Marriage Payments	4153.40
Distance to Nearest Agricultural/Commercial Bank from the Household in km	3.40
Distance of nearest Paved Road from the Household in km	1.23
Distance to Nearest Haat from the Household in km	1.29
Distance to Nearest Business Centre from the household in km	3.65
Number of Observations	2077

Table 2-6: Sub-Sample Averages

Explanatory Variable	Sub sample Averages			All y Overall
	y=0 No Contraception	y=1 Contraceptive Pill	y=2 Other Forms of Contraception	
education of the mother (years)	2.655866	3.624031	1.77451	2.84352
brideprice (taka)	2008.849	3245.556	2059.007	2479.56
total children	9	4.9	6.8	7
Observations	895	774	408	2077

Table 2-7: Number of Children under the Age of 5

(sum) children under 5	Frequency	Percent
0	872	41.98
1	876	42.18
2	304	14.64
3	25	1.2

Figure 2-2: Use of Contraception

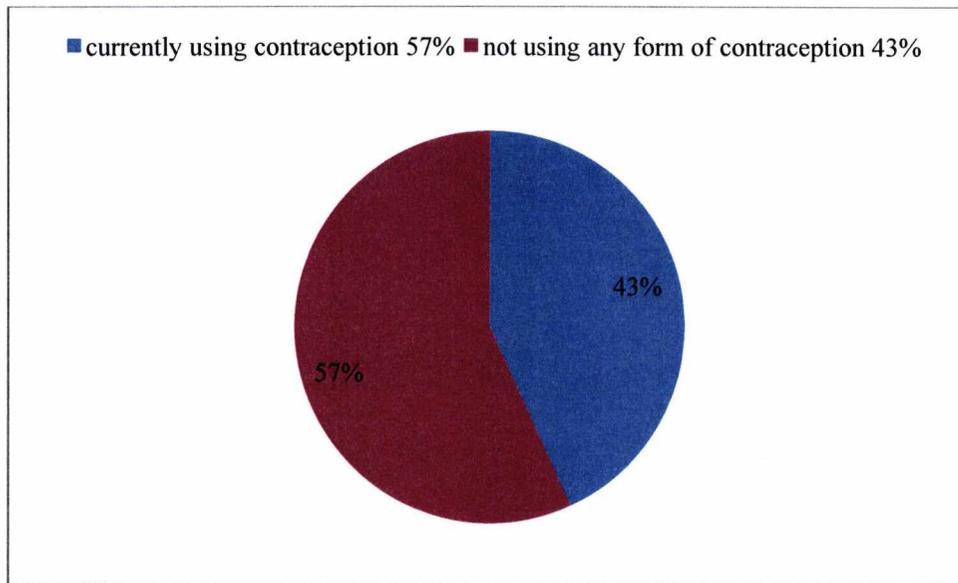


Figure 2-3: Type of Contraception Used

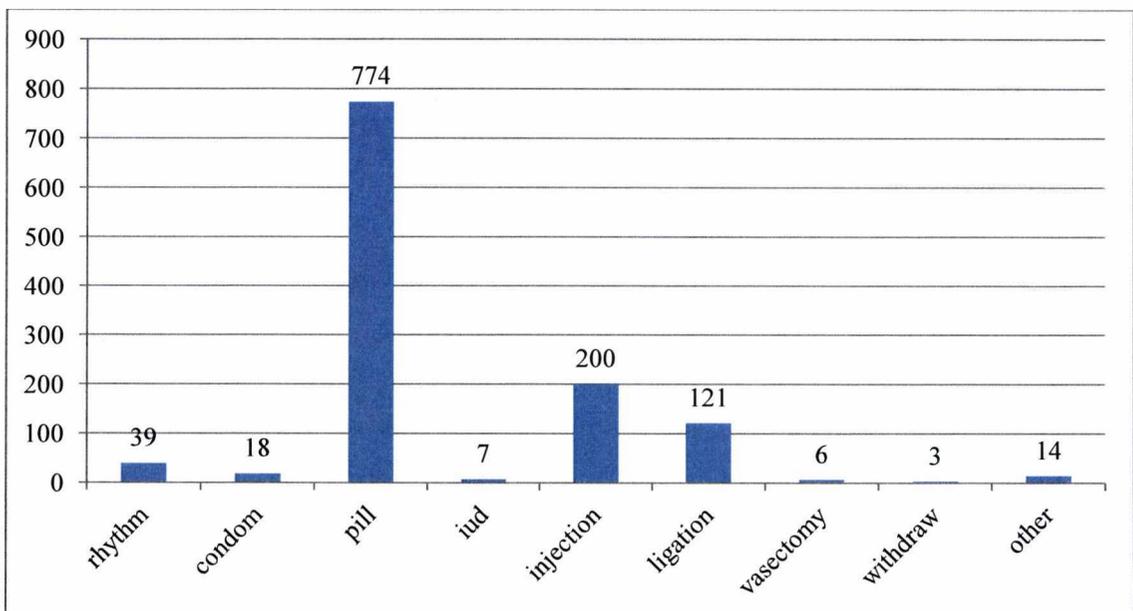


Table 2-8: Sex Ratio (number of boys/number of girls)

	1974	1981	1991	2001
P1 number of boys' 15-19/number of girls 10-19	0.47	0.46	0.44	0.47
P2 number of boys 20-29/number of girls 10-19	0.73	0.65	0.81	0.74
P3 number of boys 30+/number of girls 10-19	1.29	1.24	1.59	1.69

Table 2-9: Probit- Brideprice as a Fraction of Household Marriage Payments

	mother currently using contraception
Fathers age	-0.0024 (0.00152)
Mothers age	0.0552 ^{***} (0.0123)
Mothers age squared	-0.00101 ^{***} (0.000182)
Mothers education	0.00153 (0.00209)
Fathers education	-0.000118 (0.00232)
Brideprice fraction of marriage payments	0.183 ^{***} (0.0452)
Mothers age at time of marriage	-0.0102 [*] (0.00507)
Total number of children under the age of 5	-0.166 ^{***} (0.0204)
Number of children	0.0294 [*] (0.0115)
<i>N</i>	2077
pseudo <i>R</i> ²	0.061
Marginal effects; Standard errors in parentheses (d) for discrete change of dummy variable from 0 to 1 [*] <i>p</i> < 0.05, ^{**} <i>p</i> < 0.01, ^{***} <i>p</i> < 0.001	

Table 2-10: Absolute Marriage Payments

	<u>Contraceptive Pill</u> 1	<u>Any other contraception</u> 2	x1	P1(P2)	x2	P1(P2)
Fathers age	-0.0152* (-2.11)	-0.00185 (-0.22)	35	0.44(0.18)	40	0.41(0.2)
Mothers age	0.260*** (4.44)	0.293*** (4.13)	25	0.42(0.16)	30	0.44(0.21)
Mothers age squared	-0.00498*** (-5.62)	-0.00484*** (-4.71)	25		30	
Mothers education	0.0186* (2.05)	-0.0347* (-2.18)	3	0.39(0.19)	6	0.40(0.15)
Fathers education	0.000774 (0.08)	-0.0127 (-0.85)	3	0.37(0.21)	6	0.38(0.19)
Brideprice	0.0000261** (2.87)	0.0000171 (1.42)	1000	0.39(0.2)	3000	0.42(0.19)
Mothers age at time of marriage	-0.0495* (-2.08)	-0.0350 (-1.27)	12	0.36(0.2)	15	0.38(0.21)
Number of children under the age of 5	-0.635*** (-6.76)	-0.833*** (-7.11)	1	0.41(0.16)	2	0.33(0.11)
Number of children	0.148** (2.72)	0.0798 (1.32)	2	0.38(0.2)	4	0.36(0.21)
Constant	-1.732 (-1.87)	-3.782** (-3.17)				
<i>N</i>	2077	2077				
pseudo <i>R</i> ²	0.0579					
LR chi2(18)	252.60					
Prob > chi2	0.0000					
<i>t</i> statistics in parentheses						
* <i>p</i> < 0.05, ** <i>p</i> < 0.01, *** <i>p</i> < 0.001						

Table 2-11: Difference in Father's and Mother's Ages and Education

	<u>Contraceptive Pill</u>	<u>Any other contraception</u>				
	1	2	x1	P1(P2)	x2	P1(P2)
Brideprice fraction of marriage payments	1.127*** (0.195)	0.672** (0.238)	0.1	0.352(0.195)	0.3	0.395(0.2)
Difference in age	-0.0147* (0.00685)	-0.00829 (0.00833)	7	0.376(0.19)	10	0.368(0.19)
Difference in education	0.0115 (0.00803)	-0.0125 (0.0103)				
Constant	-0.231** (0.0846)	-0.839*** (0.103)				
<i>N</i>	2077					
pseudo <i>R</i> ²	0.01					

Table 2-12: Probit - Difference in Age and Education between Mother and Father

Brideprice as a fraction of total marriage payments	
Difference in age	0.00424 (0.0077)
Difference in education	0.00231* (0.000909)
Constant	0.187*** (0.00866)
<i>N</i>	2077
<i>R</i> ²	0.003
Standard errors in parentheses	
* <i>p</i> < 0.05, ** <i>p</i> < 0.01, *** <i>p</i> < 0.001	

Table 2-13: Multinomial Logit constrained

	<u>Contraceptive Pill</u>	<u>Any other contraception</u>	x1	P1(P2)	x2	P1(P2)
Mothers education	0.0199* (0.00905)	-0.0455** (0.0158)	3	0.375(0.19)	6	0.398(0.166)
Fathers age	-0.01 (0.00641)	-0.01 (0.00641)				
Mothers age	0.227*** (0.0509)	0.227*** (0.0509)				
Mothers age squared	-0.00418*** (0.000756)	-0.00418*** (0.000756)				
Fathers education	0.000515 (0.00971)	0.000515 (0.00971)				
Brideprice fraction of marriage payments	0.744*** (0.189)	0.744*** (0.189)				
Mothers age at time of marriage	-0.041 (0.021)	-0.041 (0.021)				
Number of children under the age of 5	-0.688*** (0.0856)	-0.688*** (0.0856)				
Number of children	0.122* (0.0479)	0.122* (0.0479)				
Constant	-1.785* (0.821)	-2.263** (0.822)				
<i>N</i>	2077					
pseudo <i>R</i> ²	0.046					
Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$						

Table 2-14: Ever joined any microcredit program

	<u>Contraceptive Pill 1</u>	<u>Any other contraception 2</u>
Fathers age	-0.0165* (-2.07)	-0.00699 (-0.76)
Mothers age	0.226*** (3.79)	0.282*** (3.96)
Mothers age squared	-0.00426*** (-4.75)	-0.00455*** (-4.38)
Mothers education	0.0206* (2.33)	-0.0315* (-2.13)
Fathers education	0.00325 (0.32)	-0.00740 (-0.51)
Brideprice fraction of marriage payments	0.871*** (4.18)	0.738** (2.90)
Ever joined any microcredit program	0.0457 (0.37)	-0.157 (-1.03)
Mothers age at time of marriage	-0.0382 (-1.56)	-0.0469 (-1.66)
Number of children under the age of 5	-0.628*** (-6.58)	-0.840*** (-7.18)
Number of children	0.204*** (3.63)	0.117 (1.89)
Constant	-1.769 (-1.83)	-3.302** (-2.69)
<i>N</i>	2044	2044
LR chi2(20)	247.00	
Prob > chi2	0.0000	
Pseudo R2	0.0569	

t statistics in parentheses

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

Table 2-15: Mothers Savings under Microcredit Program as a Fraction of Total Household Savings

	mother currently using contraception
Fathers age	-0.00226 (0.00152)
Mothers age	0.0510*** (0.0124)
Mothers age squared	-0.000962*** (0.000183)
Mothers education	0.00181 (0.00209)
Fathers education	0.000331 (0.00233)
Brideprice fraction of marriage payments	0.171*** (0.0455)
Mothers age at time of marriage	-0.00857 (0.00511)
Total number of children under the age of 5	-0.162*** (0.0205)
Number of children	0.0288* (0.0115)
Mothers savings as a fraction of total household savings	0.130** (0.0484)
<i>N</i>	2077
pseudo <i>R</i> ²	0.064

Marginal effects; Standard errors in parentheses

(d) for discrete change of dummy variable from 0 to 1

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

Table 2-16: Districts

	<u>Contraceptive Pill</u>	<u>Any other contraception</u>				
	1	2	x1	P1(P2)	x2	P1(P2)
Fathers age	-0.0115 (0.00735)	0.000958 (0.00852)	35	0.383(0.191)	40	0.37(0.196)
Mothers age	0.228*** (0.0591)	0.266*** (0.0718)	25	0.25(0.09)	30	0.36(0.16)
Mothers age squared	-0.00454*** (0.000893)	-0.00449*** (0.00104)	25	0.625(0.3375)	30	0.624(0.3374)
Mothers education	0.0196* (0.00937)	-0.0309 (0.0166)	3	0.374(0.19)	6	0.39(0.17)
Fathers education	0.00559 (0.0104)	-0.00697 (0.0153)	3	0.372(0.196)	6	0.377(0.191)
Brideprice fraction of marriage payments	0.489* (0.214)	0.581* (0.267)	0.1	0.36(0.192)	0.3	0.379(0.203)
Mothers age at time of marriage	-0.0172 (0.0248)	-0.0296 (0.0288)	12	0.378(0.208)	15	0.373(0.198)
Total number of children under the age of 5	-0.589*** (0.0955)	-0.832*** (0.119)	1	0.364(0.168)	2	0.28(0.1)
Number of children	0.212*** (0.0565)	0.118 (0.0623)	2	0.355(0.193)	4	0.428(0.197)
dhaka	0.560** (0.181)	0.376 (0.214)	0	0.346(0.19)	1	0.438(0.205)
rangpurdist	0.397 (0.204)	0.475* (0.235)	0	0.365(0.188)	1	0.413(0.231)
sylhet	-0.918** (0.288)	-0.552 (0.319)	0	0.381(0.198)	1	0.233(0.171)
khulna	0.553** (0.191)	-0.121 (0.243)	0	0.347(0.205)	1	0.477(0.149)
rajshahi	0.942*** (0.219)	0.395 (0.268)	0	0.352(0.197)	1	0.529(0.179)
barisal	-0.0687 (0.262)	0.446 (0.283)	0	0.375(0.191)	1	0.325(0.27)
Constant	-2.464** (0.945)	-3.912** (1.217)				
N	2077					
pseudo R ²	0.078					
Standard errors in parentheses						
* p < 0.05, ** p < 0.01, *** p < 0.001						

Table 2-17: Districts and Distance to Banks/Paved Road

	<u>Contraceptive Pill</u>	<u>Any other contraception</u>				
	1	2	x1	P1(P2)	x2	P1(P2)
Fathers age	-0.0128 (0.00739)	0.000352 (0.00856)	35	0.384(0.191)	40	0.37(0.196)
Mothers age	0.229*** (0.0593)	0.261*** (0.0718)	25	0.256(0.093)	30	0.362(0.159)
Mothers age squared	-0.00454*** (0.000896)	-0.00439*** (0.00104)	25	0.648(0.31)	30	0.647(0.341)
Mothers education	0.0196* (0.0094)	-0.0321* (0.0163)	3	0.374(0.192)	6	0.393(0.174)
Fathers education	0.00647 (0.0105)	-0.00629 (0.0152)	3	0.372(0.196)	6	0.377(0.192)
Brideprice fraction of marriage payments	0.526* (0.216)	0.573* (0.27)	0.1	0.365(0.193)	0.3	0.379(0.202)
Mothers age at time of marriage	-0.017 (0.0248)	-0.0273 (0.0291)	12	0.378(0.207)	15	0.374(0.198)
Number of children under age of 5	-0.594*** (0.0957)	-0.844*** (0.12)	1	0.364(0.168)	2	0.283(0.1)
Number of children	0.218*** (0.0569)	0.111 (0.0627)	2	0.355(0.19)	4	0.43(0.195)
dhaka	0.643*** (0.191)	0.275 (0.226)	0	0.339(0.196)	1	0.457(0.189)
rangpurdist	0.414* (0.21)	0.324 (0.242)	0	0.363(0.192)	1	0.427(0.21)
sylhet	-0.933** (0.296)	-0.775* (0.336)	0	0.38(0.2)	1	0.239(0.145)
khulna	0.579** (0.195)	-0.139 (0.246)	0	0.346(0.2)	1	0.483(0.146)
rajshahi	0.964*** (0.221)	0.373 (0.269)	0	0.351(0.198)	1	0.534(0.175)
barisal	0.00137 (0.267)	0.397 (0.289)	0	0.374(0.192)	1	0.343(0.25)
distance	-0.0713 (0.0441)	-0.106* (0.0516)	1	0.374(0.199)	2	0.366(0.188)
Distance to nearest haat	0.017 (0.0688)	0.059 (0.0792)	1	0.372(0.194)	2	0.372(0.2)
Distance to nearest business centre	0.024 (0.0277)	0.0016 (0.0324)	2	0.365(0.198)	4	0.37(0.197)
Distance to nearest bank	-0.019 (0.0267)	0.0772** (0.0299)	2	0.385(0.178)	4	0.376(0.19)
Constant	-2.444 (0.953)	-3.988** (1.225)				
N	2077					
pseudo R ²	0.081					
Standard errors in parentheses						
* p < 0.05, ** p < 0.01, *** p < 0.001						

Table 2-18: Number of children born (Ordered Probit)

	<u>Number of Children</u>
Fathers age	0.00601 (1.76)
Mothers age	0.596 ^{***} (22.42)
Mothers age squared	-0.00833 ^{***} (-21.07)
Mothers education	-0.0110 [*] (-2.46)
Fathers education	-0.00358 (-0.71)
Brideprice fraction of marriage payments	-0.217 [*] (-2.18)
Mothers age at time of marriage	-0.0561 ^{***} (-5.27)
Breastfeeding	-0.266 [*] (-2.51)
First child is a son	-0.0184 (-0.38)
Second child is a son	0.180 ^{***} (3.73)
<i>N</i>	2075
LR chi2(10)	817.23
Prob > chi2	0.0000
Pseudo R2	0.129

t statistics in parentheses

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

Table 2-19: Number of children born (Ordered Probit) - Age Cohort

	(Age of mother: 15-29) Number of Children	(Age of mother: 30-44) Number of Children	(Age of mother: 45-50) Number of Children
Fathers age	0.0814** (2.69)	0.0264 (1.93)	0.0577 (1.91)
Fathers age squared	-0.00105** (-2.65)	-0.000260 (-1.53)	-0.000490 (-1.42)
Mothers age	0.789*** (3.57)	0.429** (2.79)	-9.521** (-2.85)
Mothers age squared	-0.0106* (-2.28)	-0.00612** (-2.86)	0.101** (2.85)
Mothers education	-0.0127 (-1.78)	-0.00614 (-0.96)	-0.00600 (-0.40)
Fathers education	0.00247 (0.33)	-0.00980 (-1.32)	-0.0180 (-0.92)
Brideprice fraction of marriage payments	-0.298* (-1.99)	-0.282* (-1.99)	-0.588 (-0.93)
Mothers age at time of marriage	-0.236*** (-11.64)	-0.00344 (-0.24)	0.0474 (1.63)
<i>N</i>	871	1022	184
LR chi2(8)	542.34	21.43	19.26
Prob > chi2	0.0000	0.0061	0.0135
Pseudo R2	0.2521	0.0068	0.03

Table 2-20: Birth Spacing- Less than 1 year difference between children

	<u>Birth Spacing:</u> <u>Less than 1 year</u>
Fathers age	0.0030** (3.20)
Mothers age	0.0153* (2.37)
Mothers age squared	-0.00015 (-1.58)
Mothers education	0.00015 (0.12)
Fathers education	-0.0033* (-2.11)
Brideprice fraction of marriage payments	-0.0554* (-1.98)
Mothers age at time of marriage	-0.0108*** (-3.74)
Breastfeeding	-0.0516 (-1.64)
First child is a son	0.034* (2.54)
Second child is a son	0.0288* (2.16)
Number of children under the age of 5	0.065*** (6.83)
<i>N</i>	2075
LR chi2(11)	142.33
Prob > chi2	0.0000
Pseudo R2	0.0925

Marginal effects; *t* statistics in parentheses

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

Table 2-21: Conditional Logit - Birth Spacing (District Fixed effects)

	<u>Birth Spacing:</u> <u>Less than 1 year</u>
Fathers age	0.0230* (2.22)
Mothers age	0.184* (2.52)
Mothers age squared	-0.00183 (-1.73)
Mothers education	0.00415 (0.28)
Fathers education	-0.0395* (-2.11)
Brideprice fraction of marriage payments	-0.776* (-2.39)
Mothers age at time of marriage	-0.104** (-3.21)
Breastfeeding	-0.377 (-1.11)
First child is a son	0.380** (2.64)
Second child is a son	0.300* (2.11)
Number of children under the age of 5	0.656*** (6.43)
<i>N</i>	2059
LR chi2(11)	127.74
Prob > chi2	0.0000
Pseudo R2	0.0872

t statistics in parentheses

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

Table 2-22: Regression- Sex Ratios

Brideprice as a fraction of total marriage payments	
p1: number of boys' 15-19/number of girls 10-19	-3.691 ^{***} (0.877)
p2: number of boys 20-29/number of girls 10-19	-0.534 (0.279)
p3: number of boys 30+/number of girls 10-19	0.184 (0.152)
Constant	2.023 ^{***} (0.463)
<i>N</i>	1873
pseudo <i>R</i> ²	
Standard errors in parentheses	
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$	

Figure 2-4: Sex Ratios over time

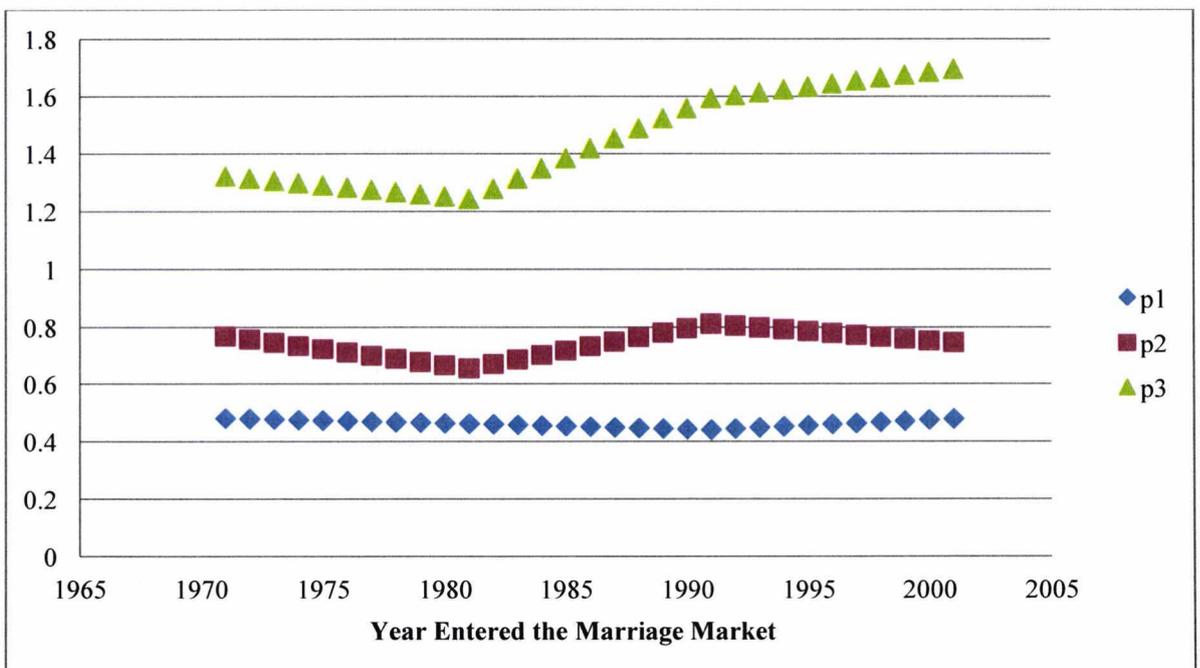


Figure 2-5: Relationship between Year of Entry into the Marriage Market and Year Married

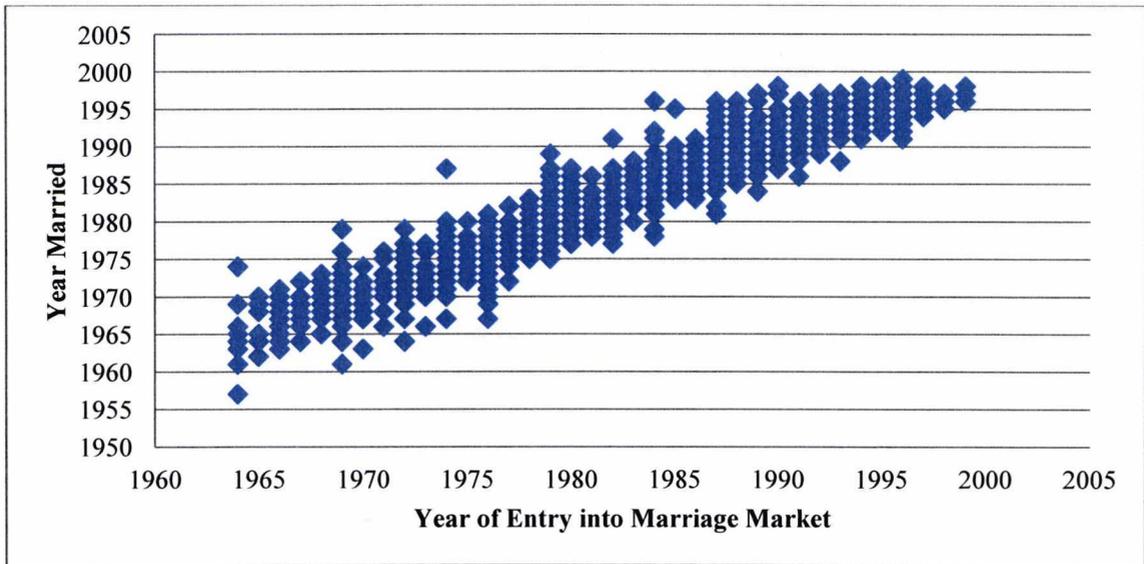


Figure 2-6: Relationship between Relative Marriage Payments and P1

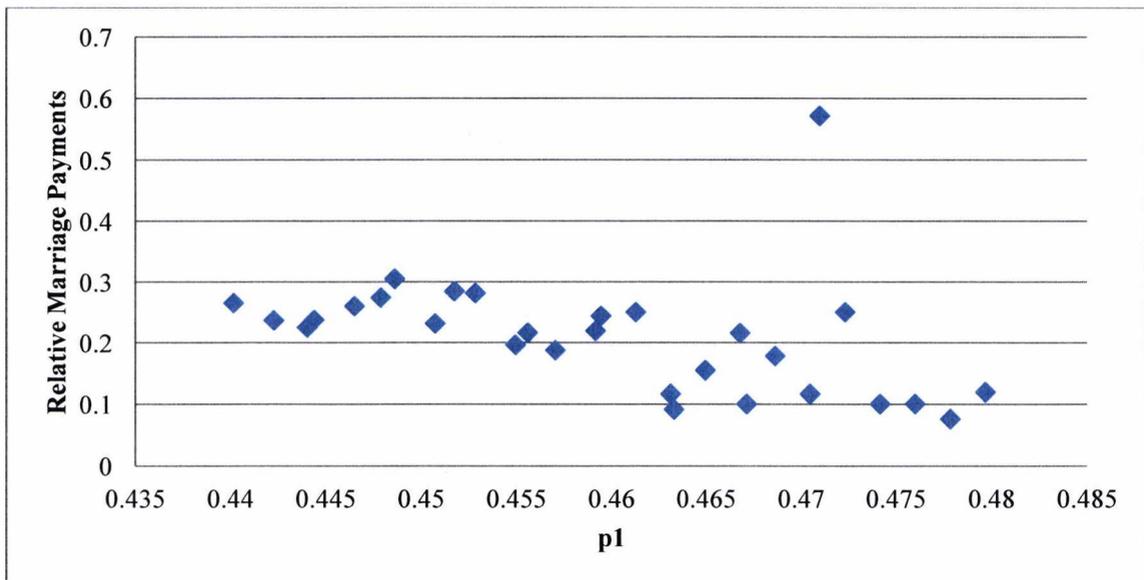
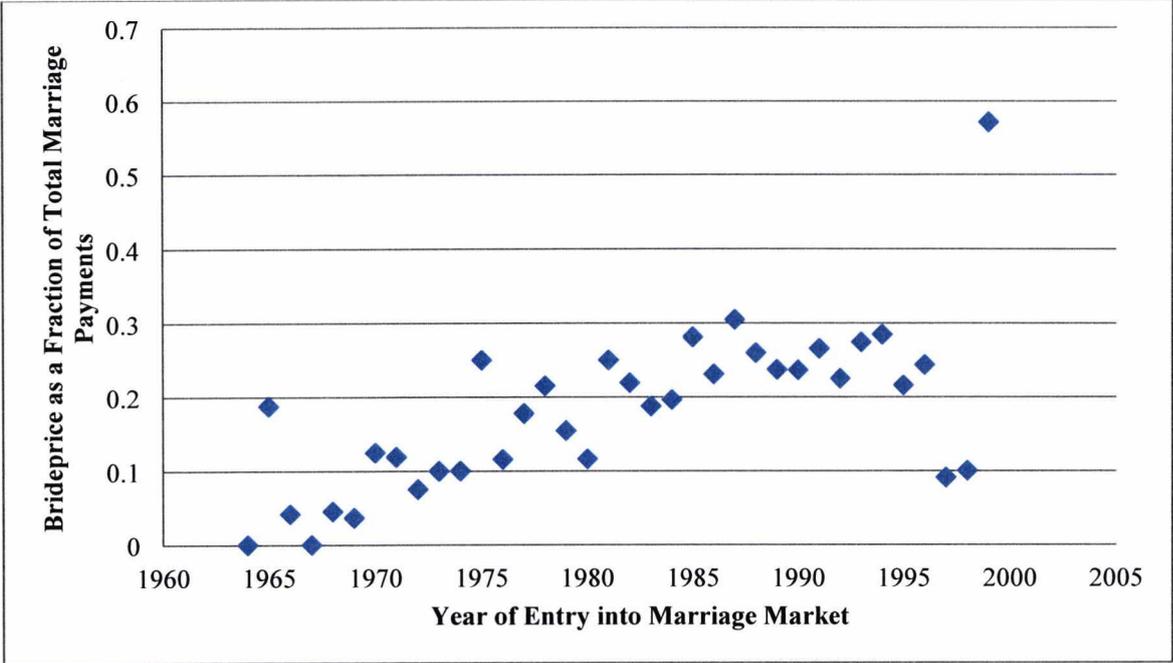


Figure 2-7: Relationship between Brideprice taken as a fraction of Total Marriage Payments and Year of Entry into the Marriage Market



Chapter 3 : Division of Household Labour and the Marriage Market in Britain- Who Does the Mopping?

Introduction

This paper uses data from eighteen waves of the British Household Panel Survey (1991-2008) to investigate whether the division of household labour during the marriage, is determined at the time of matching. We explore whether the partner who is relatively of better quality, or more specifically better educated, is given a larger share from the marital surplus by the lower quality partner to secure the match. In essence testing the hypothesis of whether the relative bargaining power of individuals at the time of matching persists during the marriage through a time varying sharing rule.

We argue that through binding commitments about behaviour post marriage (for instance sharing of housework and time spent on leisure amongst many other things) spouses can decide on their allocation of output during the marriage (Lundberg and Pollak, 2008). The allocation of output between the couple, termed by Chiappori as the sharing rule, is determined by the partners' relative bargaining power at the time of marriage, specifies their individual utilities during the marriage. Even though the sharing rule is determined at the time of marriage, we argue that it can be time varying, where couples decide at the time of marriage how the marital output will be allocated as circumstances of their marriage change over time. This sharing rule that varies over time hence adapts as say the number of children in the household increase, but since it is determined at the time of marriage and depends on the relative bargaining power of the partner at that time, it is impervious to changes in outside options as the marriage progresses.

Key theoretical models by Becker (1991); Burdett and Coles (1997, 1999, 2001); Manser and Brown (1980); McElroy and Horney (1981); and Lundberg and Pollak (1993) shed light on how matches are formed and decisions are made post marriage. Becker's (1991) model has some key features that distinguish it from Burdett and Coles (1997, 1999 and 2001). Marriage markets are assumed by Becker to exist in a perfectly competitive world characterized by perfect knowledge, zero transaction costs and exogenous information where buyers and sellers pay a unique price for pizzazz. Under such features perfect assortative mating can be observed at equilibrium - where high

quality men are matched with high quality women and vice versa (Becker, 1973). However, introduction of market frictions in the marriage market, such as imperfect information and transaction costs, separate out individuals of different qualities into classes where pizzazz levels may vary between men and women in the same class (Burdett and Coles, 1999). Within a framework of transferable utility, Burdett and Coles (1999) proposed a model where in the presence of frictions in the marriage market not only a mixing equilibrium but also a negative assortative mating equilibrium may arise, where better quality individuals are willing to lower quality individuals if they can bargain a large share from the marriage product.

In this paper we conjecture that in a marriage market when individuals of different qualities meet, the partner with the better quality may accept the match if the marriage surplus is divisible and the inferior quality partner can commit to a lower share, bringing the two literatures of matching in the marriage market and intra-household allocation of resources together. This commitment of household shares at the time of marriage adds a novel dimension to the two literatures.

In the marriage market individuals can attract spouses by offering high marriage payments and pre-marital investments such as education (Hadfield, 1999; Peters, 2006). Unlike other attributes that affect desirability in the marriage market such as beauty, education can be acquired (Chiappori et al., 2010). Level of schooling cannot only determine who individuals match with but also the sharing rule, where the share for each partner in the marriage surplus depends on the ‘opportunity cost in alternative matches’ or the options outside marriage (Chiappori et al., 2010; Becker, 1973; Iyigun and Walsh, 2005; Baker and Jacobsen, 2007).

Why is the division of marriage surplus not continually negotiated? We argue that individuals commit to a time varying sharing rule up to a threshold, but if outside options exceed the cost of divorce, individuals will end those marriages in which they have a low marital share. Given that there are considerable costs to reversing marriage, this implies that matching in the marriage market can have a lasting impact on the bargaining power of individuals during their marriage (Chiappori et al., 2010)²⁸.

²⁸ Refer to Table 3-6 in the Appendix to see the number of divorces per thousand married population in England and Wales. <http://www.guardian.co.uk/news/datablog/2010/jan/28/divorce-rates-marriage-ons>

In the UK²⁹ the cost of divorce includes paper work, legal fees, negotiation with respective spouses and in some cases court hearings. Paper work ranges from filing for a divorce petition³⁰ to the court identifying reasons why the marriage will not work, followed by applying for a ‘decree nisi’³¹, given that their spouse is in agreement that the marriage should end, and finally six weeks later an application for a ‘decree absolute’³², after which the divorce is finalised. For couples who cannot decide on the reason for divorce, how they will look after their children and divide other possessions, property and money, court hearings are required. If the couple has children then separate paperwork regarding their childcare, maintenance and custody is also needed. Legal paperwork and proceeding besides ending a relationship involves a strong emotional upheaval whether the couple is cohabiting or married. Couples who are living together and not married i.e. they are cohabiting can formalise their status by settling on a legal agreement such as a cohabitation contract. In the absence of a cohabitation contract there is an additional cost associated with reversing cohabitation as there is no set way to split resources unlike marriage.

In this paper we assume that housework is an undesirable task and hence both husband and wife will try to spend as little time on it as possible³³. Empirical research shows that housework is predominately performed by women, even in developed countries where women are part of the ‘paid labour force’ (Ramos, 2005; Hadfield, 1999). Combining both paid labour and unpaid housework, women’s total work time has increased over the years, with many women working a ‘second shift’ at home (Gershuny, 2000; Kan, 2008; Greenstein, 2000). Couprie (2007) using the BHPS showed that men spend an average of five hours a week on housework as compared to women who spend fifteen. Greenstein (2000) differentiates amongst household chores by gender, where tasks such as laundry and cleaning are expected to be performed by women while others such as car maintenance and yard work by men. Intra-household division of time and the total time women spend working at home are important because

²⁹ Information regarding divorce procedures is from <https://www.gov.uk/divorce/overview>

³⁰ Dissolution petition in the case of a civil partnership

³¹ Condition order in the case of civil partnership

³² Final order in the case of civil partnership

³³ Kan (2008) and Greenstein (2000) make similar assumptions in their papers.

they – impact women’s labour market participation decision and highlight the intra-household roles of men and women (Ramos, 2005).

Premarital investments determine relative potential wages of spouses in the household via which they affect the bargaining power of women and the intra-household allocation of resources (Kan, 2008; Bond and Sales, 2001; Iyigun and Walsh, 2005). Education increases the wages an individual earns, facilitates marriage to an educated person and union of two educated individuals translates into high marital output. Higher relative education also increases the outside option of the individual and hence their bargaining power. It is hypothesized that the higher is the woman’s bargaining power as opposed to her husbands, the greater is the probability of her working in paid labour outside the home and her husband sharing the housework (Bond and Sale, 2001; Chiappori et al., 2010). Ramos (2005) demonstrates that husbands’ participation in housework is higher in those marriages where either partner has a high level of education.

In recent years investment in education by women has been on the rise (Chiappori et al., 2010). This phenomenon may be explained by the fact that education has a larger effect on female earnings. Dougherty’s (2005) study lends support to these findings by showing that women have higher returns to schooling in the U.S. These findings are puzzling however given that holding characteristics constant, women earn much less than men in the labour market. Dougherty (2005) uses a Mincerian semi logarithmic wage equation and finds that the wage differential due to gender differences attributable to ‘discrimination, tastes and circumstance’ is lower in women who are highly educated. They argue that this may also be so as educated women are better equipped to defend themselves against discrimination.

Trends in industrialized countries show that fertility has been declining, gender norms are becoming less prevalent and women’s wages have been increasing over the years (Chiappori et al., 2010; Baker and Jacobsen, 2007). All these factors contribute to women having to spend less time doing unpaid housework and more participating in paid labour outside the home. Chiappori et al. (2009) in their paper “Investment in Schooling and the Marriage Market” discuss two regimes, differentiated by the amount of time women spend on housework. In the ‘new regime’ due to falling fertility and improved ‘household technology’ women spend less time on housework; especially educated women with uneducated husbands, are able to dedicate more time to paid

labour. In both regimes women are discriminated against in the labour market because employers believe that women will ‘invest less on the job’. They argue however that this discrimination is lower amongst educated women as employers expect them to stay in the labour market for longer.

Research³⁴ shows that individuals invest more than the social optimum in tasks they do not do once married and invest sub-optimally in jobs that they do. This may be because they want to make themselves less dependent on marriage and hence have higher outside options. However, sometimes socially sanctioned gender roles may disallow individuals to follow this strategy. In such situations, the gender that is unrestricted, will invest in marketable skills and would discourage changes that might lead the restricted gender to acquire marketable skills. Baker and Jacobsen (2007) highlight that the restricted gender has lower bargaining power in the marriage and hence a lower share in the intra-household allocation of resources.

Marriage markets are more frequently characterized by assortative mating in the absence of transferable utility, so that lower quality men (women) cannot attract higher quality women (men) by committing to them a higher share of the marital output (Chiappori et al., 2010). Ermisch (2006) show that in their sample of British couples only 30% were married to individuals with the same educational level as their own.

Identification of the sharing rule can also be done through inferring changes in individual welfare through assignable goods (‘private good whose consumption can be individually observed’ and which provide utility exclusively to the husband or the wife) as relative incomes vary, while holding total household income constant (Couprie, 2007). The amount of leisure enjoyed by an individual qualifies as an assignable good as it can only be consumed by one spouse at a time (Ermisch and Pronzato, 2008). Sorting in the marriage market affects the allocation of time spent in leisure (Becker, 1973). Couprie (2007) define leisure as the time left over once time spent in the paid labour force and housework has been accounted for. Empirical research³⁵ shows that leisure time of an individual rises with increases in their relative wage.

³⁴ Baker and Jacobsen, 2007

³⁵ Ermisch and Pronzato, 2008

Data

To investigate whether matching in the marriage market has a lasting impact on the division of labour in the household, the British Household Panel Survey (BHPS) from 1991-2008 is used. The BHPS has interviewed annually from autumn 1991 around 10,000 adults (16+) from a nationally representative sample of 5,500 households. Currently 18 years of data is available and each year the same individuals are re-interviewed, where if individuals are no longer part of the original household, members of the new household that they are a part of are interviewed as well. The data amongst many other things provides information on educational qualifications, number of hours spent in paid work and labour earnings, along with information on frequency of leisure activities, number of hours spent on housework and retrospective marital histories.

Our sample includes only those households which report: highest academic qualifications obtained by the couple; frequency of leisurely activities; hours of housework; whom amongst the couple did the cleaning, ironing and cooking; number of hours worked per week; and take home pay of the couple. The sample was also restricted to those couples where they both did paid work last week. The reason we select only those households where both partners are working is so that we can separate the decision to work from the decision on how many hours to spend doing household chores. We hence assume that labour supply is exogenous. This leaves us with 19121 person-years observations, reflecting 4182 persons, each observed for an average of 4.6 years. We also do not convert our unbalanced panel into a balanced one, as by including in our sample only those individuals that have data available for all 18 years may lead to a loss in efficiency through a loss of observations, and if the data is not randomly missing lead to an unrepresentative sample as well.

Table 3-1: Descriptive Statistics

Variable	Mean	Standard Deviations	Minimum	Maximum
Age	39	10.07	16	73
Highest Educational Qualification	2	0.96	1	4
Husband more qualified than wife	0.31	0.46	0	1
Husband less qualified than wife	0.25	0.44	0	1
Marital Length	15	11.83	0	57
Wife: Log of relative predicted wage	0.45	0.04	-0.13	1.59

The descriptive statistics in Table 3-1 above show that the mean age of our sample is 39 years, where women spend approximately 15 hours on average doing housework as opposed to men who spend only 5 hours a week. The average academic qualification of our sample is 2 which is equivalent to having completed your A levels, HND, HNC or Teaching. For 31% of our sample the husband is more qualified than the wife and for 25% of the sample the husband is less qualified than his wife. The marital length on average for the sample is 15 years. For households observed only once in the sample (410 observations) the marital length on average is 4 years but for those observed for all 18 years (1409 observations) the average marital length is 25 years. The log of the wife's predicted wage relative to the total predicted wage of the couple is on average 45%. Household in which the wife has children of her own 46% of them have 1 child, 43% have 2, 10% have 3 and the rest of the 1% have 4 children or more.

We calculate the change in wage from last period to the next and we find that for 41% of the sample there is a change in wage. Transition probabilities from one period to the next show that 85% of individuals whose wages didn't change in the last period continue to remain unchanged in the next period as well, however 15% of the individuals whose wages were unchanged from the last period do change. Figure 3-4 in the appendix shows the average change in wage by year and qualification for the 4 different academic qualification groups.

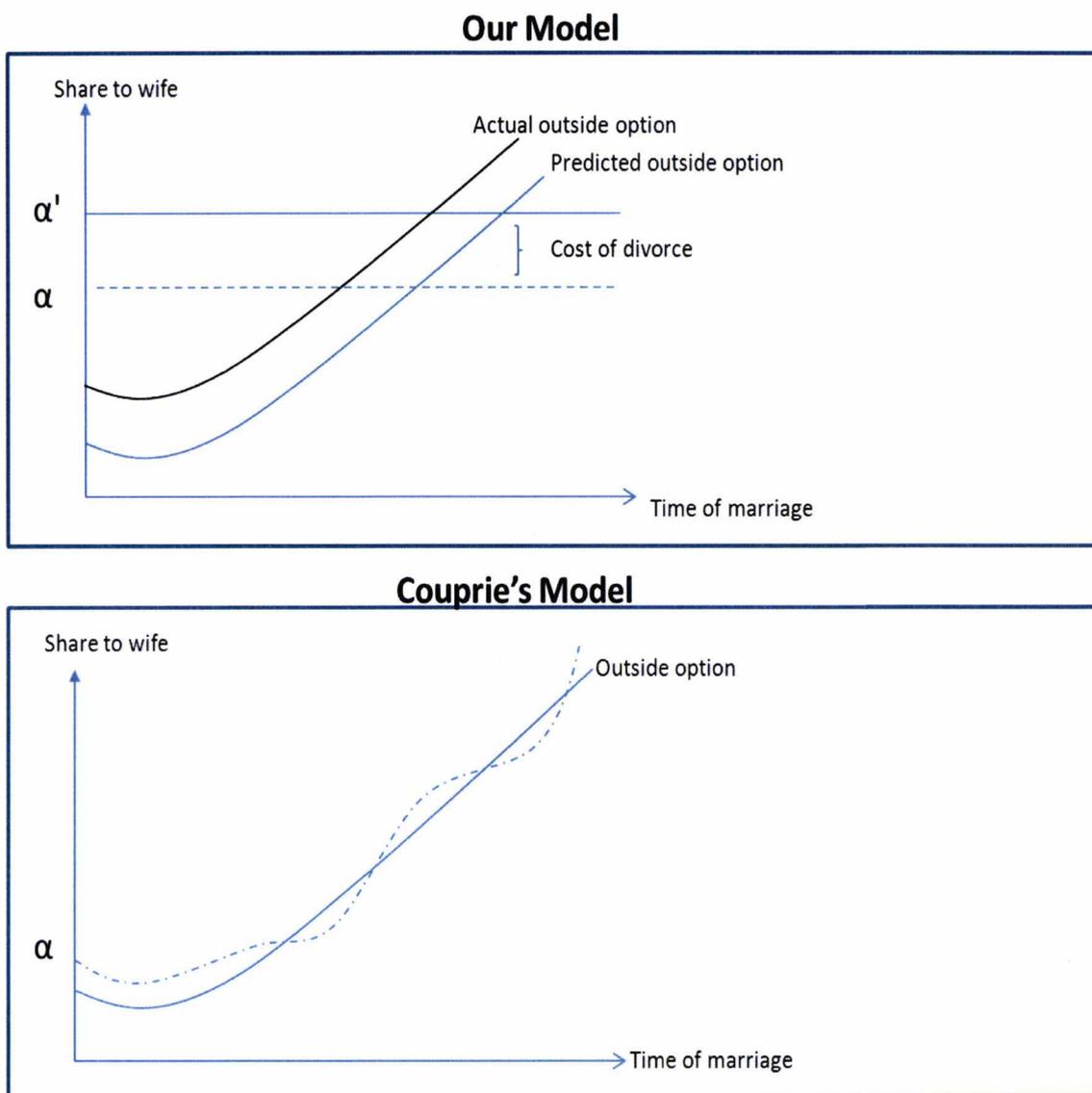
Methodology

Using data from eighteen waves of the British Household Panel Survey (1991-2008) this study explores whether matching in the marriage market has a lasting impact on the bargaining power of individuals during their marriage. We hypothesize that individuals of a better quality at the time of matching, remain in a stronger position post marriage even as outside options change, as observed by their share in the division of housework and frequency of engaging in leisurely activities.

The figure below shows the share of a woman in the household as outside options change. The illustration demonstrates how the share of the woman in the marriage (α) remains constant during the marriage. If increase in outside options was completely foreseeable, divorce costs infinite, then it would be easier to make binding commitments

and increasing outside options would not affect existing marriages. In our model we argue that women can make commitments up to a threshold. If actual outside options are more than predicted at the time of marriage and exceed a low but significant cost of divorce, women will renegotiate the sharing rule (α') in line with their outside options. Similarly Ligon (2002), in their paper explain that the sharing rule is 'invariant' up to a point, past which if the utility from being single exceeds that from being in the marriage, individuals will renegotiate the sharing rule such that they are indifferent between staying in the marriage or being single.

Figure 3-1: Share of Woman in the Marriage over time



The fixed effect estimator shows how α changes over time as outside options increase, we expect this effect to be very weak. The between effect estimator shows how α differ from woman to woman and the random effect estimator is an average of both. If the share of marriage was continually negotiable we would expect the fixed effect and between effect estimator to be the same. Figure 3-1 above also shows an alternate to our model – Couprie’s model. In Couprie’s model the sharing rule is continually negotiated as outside options are not foreseeable, cost of divorce is very low and hence binding commitments are difficult to make; we would then expect the share of the woman in the marriage to be tracked by her outside option, and the fixed effect estimator to give strong results.

If our hypothesis is correct, then we expect the between group estimator³⁶ to give stronger results and hence have larger coefficients as compared to the within group estimator and the random effect estimator. The between group estimator only used the cross section variations in the data while the within group looks at the variations over time. On the other hand the random effect estimator uses both the within and between group variations and is a weighted average of the two models. By studying the within and between effect separately we are able to decompose the random effect estimator and see where the majority of the variation is coming from. The reason we expect the between group estimator to give stronger results is because we conjecture that the sharing rule is not continually negotiated during the marriage. Hence while individual behaviour may vary substantially across individuals we do not expect it to vary very much between observations of the same individual over time.

Results and Discussion

Table 3-2 shows the results from fixed effect, random effect and between effect regressions, on the weekly hours of housework done by the wife as a fraction of total time spent on housework by the couple. In the BHPS individuals were asked “About how many hours do you spend on housework in an average week, such as time spent cooking, cleaning and doing the laundry?” From the response to this question, the variable proportion of house work was constructed by dividing the average weekly

³⁶ The Between Effect model is efficient only if the regressors are uncorrelated to the composite error term.

hours spent by the wife on housework, by the sum of the total time spent weekly by the husband and wife. All the regressions, except for between effect, use panel robust standard errors so as to avoid the correlation over time in errors for a given individual, and hence underestimated standard errors and inflated t statistics. For the between effect estimator we use the bootstrap method, an alternate to obtain panel-robust standard errors, with 400 re-samples over i.

Table 3-2: Hours of Housework Done by the Wife as a Fraction of Total Time Spent by the Couple

	Random Effect Proportion of housework done by the wife	Fixed Effect Proportion of housework done by the wife	Between Effect Proportion of housework done by the wife
Number of children the wife has	0.0255*** (0.00211)	0.0230*** (0.00270)	0.0305*** (0.00293)
Husband <i>more</i> qualified than wife	0.0160* (0.00714)	-0.00800 (0.0178)	0.0194** (0.00744)
Husband <i>less</i> qualified than wife	-0.0222** (0.00727)	-0.00581 (0.0162)	-0.0248** (0.00813)
Husband's level of academic qualification	0.0271*** (0.00361)	0.00539 (0.0110)	0.0297*** (0.00453)
Relative wage of the wife	-0.221** (0.0676)	-0.186* (0.0899)	-0.267* (0.126)
Wife's age	0.00382*** (0.000241)	0.00700 (0.00417)	0.00403*** (0.000269)
Year	-0.00198*** (0.000491)	-0.00583 (0.00424)	-0.000346 (0.000929)
Constant	4.535*** (0.963)	12.17 (8.316)	1.273 (1.819)
N	19121	19121	19121
r2		0.010	0.131
r2_o	0.087	0.068	0.089
r2_b	0.129	0.103	0.131
r2_w	0.009	0.010	0.008
sigma_e	0.127	0.127	
sigma_u	0.145	0.173	
rho	0.567	0.649	

Standard errors in parentheses

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

Controlling for households where both the husband and wife report doing 'paid work last week', the results for the between effect estimator as expected are stronger, as they have larger coefficients, than the random effect model³⁷. The overall fit, given by the overall R^2 is the best for the between-effect model. As hypothesized, households where husbands are more educated than their wives by an additional level of qualification,

³⁷ 95% of the couples in the sample did paid work last week

relative hours per week spent by women on housework, increases by 0.0194. Similarly there is a negative relationship with the hours of housework done by the wife when husbands are less academically qualified than their wives, as in marriages where wives are more educated than their husbands, women engage in a lower proportion of total housework. This result is confirmed by the literature where Chiappori et al. (2009) find that educated women with uneducated husbands are able to spend less time in housework and more in paid labour. Previous studies also show that acquired attributes such as education play a role in increasing the desirability of individuals at the time of matching; and via its effect on an individual's potential income has an impact on the allocation rule (Chiappori et al, 2010; Iyigun and Walsh, 2005).

Next we restrict the sample to those women who are 35 years or older to study the effect on women who are past childbearing age. The results³⁸ are in accordance to our findings in Table 3-2, where the between effect results are stronger than fixed and random effects; and the variables 'husband is more qualified than the wife' and 'husband is less qualified than wife' have the same sign and are highly significant at the one per cent level. We run a regression for the sample of women who have no children of their own, as they may have different outside options to women with children³⁹. The results are very similar to the ones in Table 3-2, the 'husband is less qualified than wife' variable has a negative relationship with the total proportion of housework done by the wife, in line with our hypothesis that in households where husbands have comparatively lower educational qualifications than their wives women engage in relatively fewer hours of housework. Results for regressions where both the husband and wife are employed full time show that while the 'husband is more qualified than wife' and 'husband is less qualified than wife' variables exhibit the same signs as the results in Table 3-2 but they are no longer significant⁴⁰. This sample is likely to represent those households where both husband and wife are highly educated and working full time, hence the variables measuring relative education are not significant at the 5 per cent level.

³⁸ Table 3-7 in the Appendix reports the results

³⁹ Table 3-8 in the Appendix reports the results

⁴⁰ Table 3-9 in the Appendix reports the results

The variable 'husband's level of academic qualification' is coded such that 1 is the highest qualification and 4 the lowest⁴¹. Results in Table 3-2 show that as husband's education decreases the proportion of housework done by the wife increases. Ramos (2005) demonstrates that husbands' participation is higher in those marriages where either partner has a high level of education. Their results show that 'new men', defined by them as men who spend relatively more time on housework, are educated themselves, have wives who are highly educated and comparatively earn less than their wives. They show however that the probability of being a 'new man' decreases with the number of children in the household, in accordance with the results from our estimation where on average every additional child in the family increases women's relative weekly hours of housework by .0305.

We argue that at the time of marriage couples commit to a time varying sharing rule. Couples decide on the allocation of output at the time of matching for different circumstances during the marriage. Hence we hypothesize that even though this time varying sharing rule does not change as outside options change, it adapts to different situations in the marriage. The results in Table 3-2 show that the number of children has a significant effect on the wife's share of housework in the fixed effects model, which suggests that the sharing rule may be time-varying, with the wife doing more of the housework as the couple have more children.

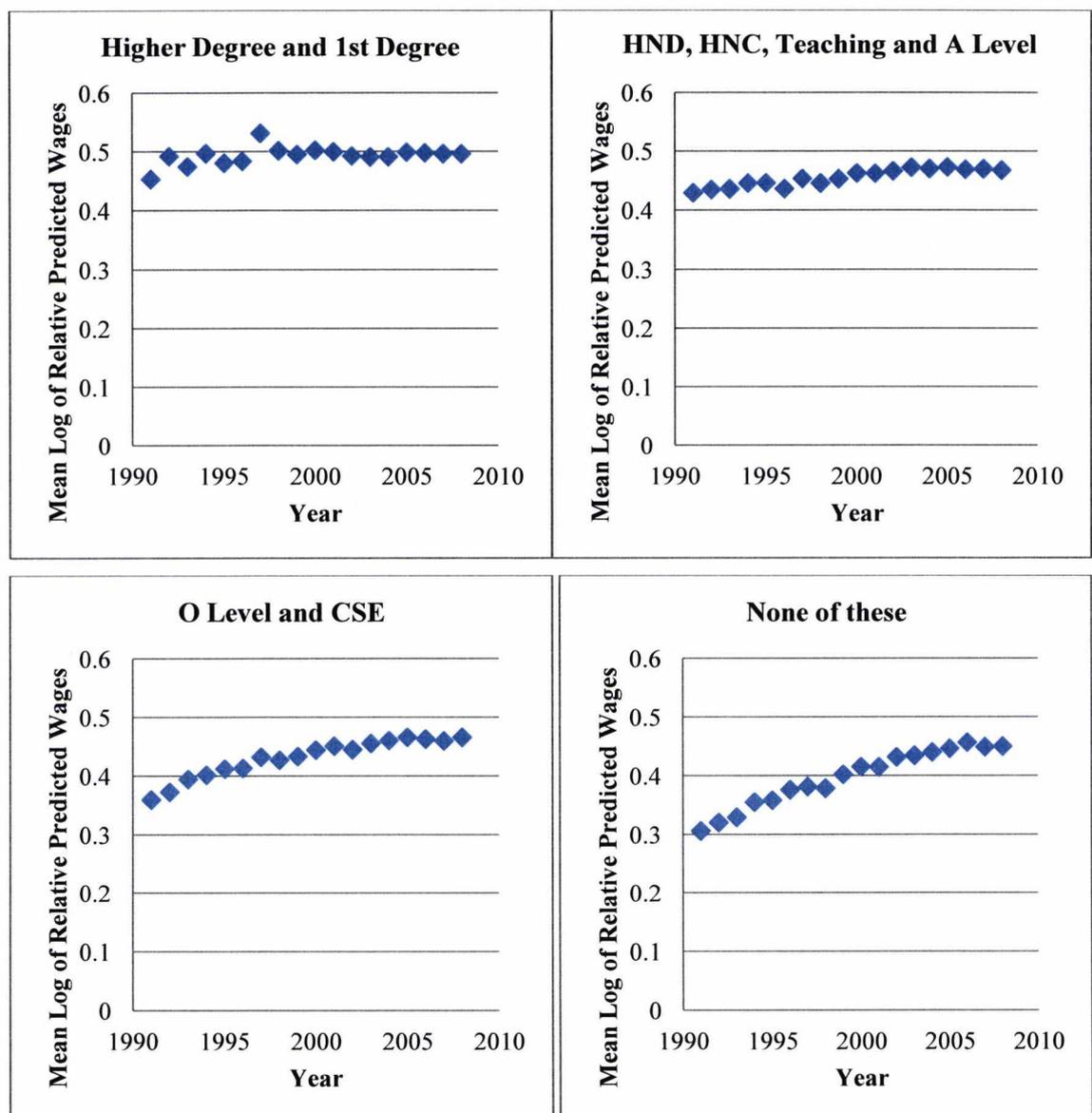
The results for regressions which control for different ethnicities are not included in this paper as they did not have a significant effect on the relative hours of housework done by the wife. The sample includes six couples from Pakistani, Indian and Bangladeshi origin; six black Caribbean, black African and black's from other origins and two couples from Chinese origin.

The wage of the wife as a fraction of combined husband and wife earnings is included in the regression, to test the effect on the sharing rule of a variable that does change over time and affects outside options. We hypothesize that changes in relative hourly earnings should not matter very much.

⁴¹ The qual variable is coded from 1 to 4 where 1 is for higher degree and 1st degree; 2 for HND,HNC, Teaching and A level; 3 for O level and CSE; and 4 if you none of these.

In the BHPS the usual pay that is reported is based on the most recent pay period and the 'normal' hours worked are self-reported by individuals. Stewart and Swaffield (2002) and Connolly and Gregory (2003) show that hourly wages calculated from the self-reported hours and hourly wages reported by the individual themselves are significantly different from each other. In order to deal with this measurement error and endogeneity we use predicted hourly wages. Hourly wages are predicted by age, age squared, sex, educational qualification and year.

Figure 3-2 : Mean Log of Relative Predicted Wages for Women over time by Qualification



The bottom right hand quadrant in Figure 3-2 above shows that relative wages have increased most dramatically for women who are not educated. The average share of women's income from the most lowly educated has gone up from 30% to 40% over time. For highly educated women in the top left hand quadrant, wages are ten percentage points above the mean and the average share about 45%. The returns to education is not very high for women as predicted wages have increased the most for women with low levels of education. If there is more assortative mating then it is less likely for uneducated women to be matched with high quality men, and since women with no academic qualifications wages are rising the fastest over time, we would expect women's share in total couple's wages to increase. However despite this increase in relative wages, the fixed effect and random effect results are significant but weak, implying that the effect of relative wages is coming from before-hand. Previous studies show that relative wages at the time of marriage significantly affect the sharing rule (Chiappori et al.; Becker, 1973; Iyigun and Walsh, 2005; Baker and Jacobsen, 2007). Ramos (2005) and Hadfield (1999) show that the partner with the relatively lower wage often specialises in housework and is less likely to engage in paid labour work.

Figure 3-3: Effect of a Change in Relative Wage on the Probability of a Woman doing all the Cleaning given that Cleaning/Hoovering =1 in the previous period

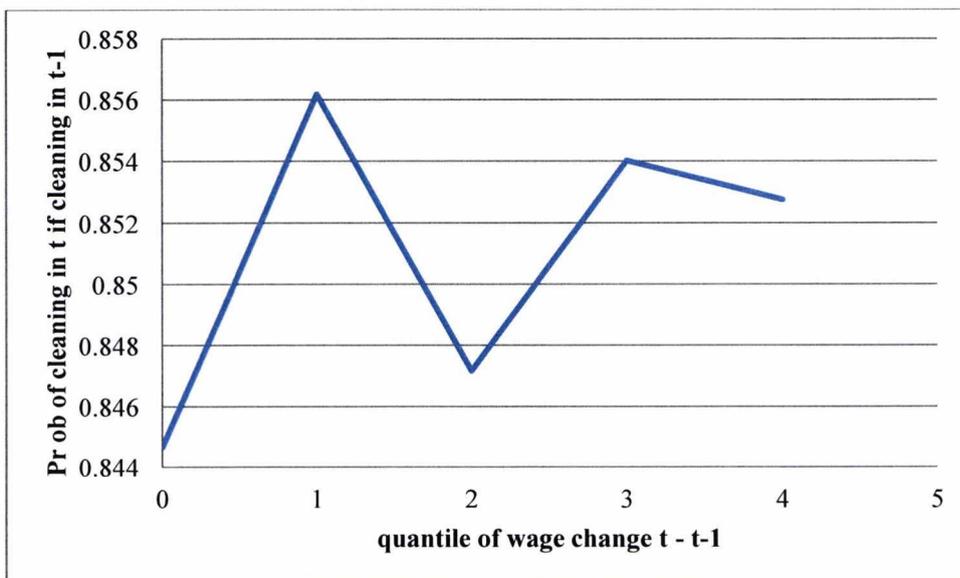


Figure 3-3 shows the probability of a woman continuing to do all the household cleaning this period given that that she was doing it last period, as her wage changes from last period to this period. If division of household chores is constantly negotiated in the marriage as conditions such as relative wages (outside options) change then the

figure above should exhibit a negative relationship. Instead we find, in line with our hypothesis, that there is a weak effect of a 1 percentage point increase on the probability of women doing all the housework, as the range of wage goes from the lowest negative relative change to the highest relative positive change. We can thus conclude that a change in relative wage does not predict changes in help with housework. Further evidence can be found by looking at figures on the effect of a change in wage on the probability of women doing all the household cleaning this period given that they were not in the last period; and similar diagrams for household washing/ironing can be seen in the Appendix⁴². All the figures are in line with our proposed hypothesis.

As an additional control we include the non-labour income of the wife as a fraction of the total non-labour income of the couple, The results⁴³ in accordance with our initial findings in Table 3-2 show that the between effect is stronger than random and fixed effect, and if the wife is comparatively more academically qualified than her husband she spends relatively less time on housework. The variable ‘relative non-labour income of wife’ commonly used as a measure of bargaining power in labour economics literature, is positive and significant. In line with our hypothesis the current bargaining power of women during their marriage does not have the expected effect on housework, where women should spend less time doing it as their relative bargaining power increases. We argue that perhaps this result is reflecting the income effect of non-labour income which should lower the amount of paid work individuals take on instead spending more time at home, perhaps taking on additional household chores (Bloemen and Stanca, 2008).

The sharing rule can be identified through consumption of assignable goods such as leisure. Table 3-3 reports the results from regressions on the frequency of leisure activities reported by the wife as a fraction of total leisure enjoyed by the household. The ratio helps control for the fact that more outgoing individuals may be married to each other. In this paper leisure accounts for how often individuals: walk/swim/play sport, watch live sport, go to the cinema, go to theatre/concert, eat out, go out for drink, attend evening classes, attend local groups and do voluntary work. The results from the estimation show that women enjoy leisure activities more frequently the higher their

⁴² See Appendix: Figure 3-5, 3-6 and 3-7

⁴³ Results are reported in Table 3-10 in the Appendix

relative wages are, where the coefficient from the between effects regression is twice that of random effect. Findings of Ermisch and Pronzato (2008) also find that leisure time increases with an individual's relative wage. As expected the between effect regression provides the strongest results, in line with our hypothesis that the sharing rule is determined primarily at the time of marriage, where sorting in the marriage market affects the allocation of time spent in leisure (Becker, 1973).

Table 3-3: Frequency of Leisure Activities Enjoyed by the Wife as a Fraction of the Total Leisure Enjoyed by the Couple

	Random Effect Relative leisure enjoyed by wife	Fixed Effect Relative leisure enjoyed by wife	Between Effect Relative leisure enjoyed by wife
Husband <i>more</i> qualified than wife	-0.00179 (0.00207)	0.00423 (0.00605)	-0.000283 (0.00256)
Husband <i>less</i> qualified than wife	0.00419 (0.00220)	-0.00479 (0.00620)	0.00302 (0.00282)
Husband's level of academic qualification	0.000894 (0.00121)	0.00360 (0.00509)	0.00237 (0.00166)
Relative wage of the wife	0.0961** (0.0336)	0.0407 (0.0431)	0.171** (0.0579)
Wife's age	0.0000576 (0.0000772)	0.000889 (0.00197)	0.0000783 (0.0000823)
Year	-0.00114*** (0.000189)	-0.00189 (0.00200)	-0.00115*** (0.000337)
Constant	2.735*** (0.368)	4.214 (3.934)	2.713*** (0.659)
N	9214	9214	9214
r2		0.0054	0.0123
r2_o	0.0086	0.0005	0.00850
r2_b	0.0113	0.0003	0.0123
r2_w	0.0042	0.0054	0.00235
sigma_e	0.0412	0.0412	
sigma_u	0.0355	0.0486	
rho	0.4269	0.5826	

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3-4 and 3-5 provide results from random effects probit estimators. The dependant variables are dichotomous, taking on a value of 1 if the woman mostly does all the cleaning/hovering and 1 if she does all the washing/ironing - the results are shown in Table 3-4 and 3-5 respectively. Robust standard errors are used to account for heteroskedasticity and correlation over time in errors for a given individual.

The results are strongly significant and have the expected signs. Women are more likely to do all the cleaning as the number of children increases and husbands are comparatively more qualified than them; and less likely to, if they are more qualified than their spouse and as their husband's absolute education increases. These results suggest a time-varying sharing rule determined by the relative quality of the couple at the time of marriage, where the better quality partner spends less time on housework, but women spend more time cleaning as the circumstances of the marriage change (such as the number of children in the household increase).

Table 3-4: Wife does the Cleaning/Hoovering

	Random Effect Cleaning/hoovering
Number of children the wife has	0.215*** (0.0208)
Husband <i>more</i> qualified than wife	0.432*** (0.0704)
Husband <i>less</i> qualified than wife	-0.318*** (0.0722)
Husband's level of academic qualification	0.192*** (0.0392)
Relative wage of the wife	-1.451* (0.729)
Wife's age	0.0151*** (0.00275)
Year	-0.00291 (0.00516)
Constant	5.835 (10.09)
N	18464
Log likelihood	-9079.3
Wald chi2 (7)	262.22
Prob>chi2	0.0000
Sigma_u	1.5253
Rho	0.6994

Standard errors in parentheses

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

Household tasks such as cleaning and laundry are often thought of as women's chores whereas car maintenance and yard work are considered a man's work around the house

(Greenstein, 2000). The results in Table 3-4 and 3-5 are interesting as they show that in families where women are more academically qualified they are less likely to adhere to these gender based roles and other family members are more likely to step into a domain that is considered to be women's.

Table 3-5: Wife does the Washing/Ironing

	Random Effect washing/ironing
Number of children the wife has	0.193 ^{***} (0.0227)
Husband <i>more</i> qualified than wife	0.352 ^{***} (0.0753)
Husband <i>less</i> qualified than wife	-0.377 ^{***} (0.0782)
Husband's level of academic qualification	0.401 ^{***} (0.0429)
Relative wage of the wife	-1.869 [*] (0.791)
Wife's age	0.0328 ^{***} (0.00300)
Year	-0.0189 ^{***} (0.00558)
Constant	37.52 ^{***} (10.91)
N	18464
Log likelihood	-7779.1
Wald chi2 (7)	404.42
Prob>chi2	0.0000
Sigma_u	1.5769
rho	0.7132

Standard errors in parentheses

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

Conclusion

In conclusion, the empirical results shows that individuals of a better quality at the time of matching, remain in a stronger position post marriage, as observed by their share in the division of housework and frequency of engaging in leisurely activities. We find that as the education of the husband increases or the relative education of the wife increases, the hours spent on housework by the wife as a fraction of total time spent by the couple falls. Also the between effect results are stronger, suggesting that the sharing rule is determined at the time of matching and not continuously negotiated during the marriage, even as outside options such as relative wages change. Even though the sharing rule is not affected by a change in outside option, the results show that it varies

with time as circumstances of the marriage such as the number of children increase. We argue that couples decide on a time variant sharing rule at the time of matching where they decide on different allocations of output for diverse situations that might arise as the marriage progresses.

Bibliography

- Baker, M., & Joyce, P. J. (2007). Marriage, Specialization, and the Gender Division of Labour. *Journal of Labour Economics*, 25(4), 763-93.
- Becker, G. (1991). *A treatise on the family*. Harvard University Press, Cambridge, MA.
- Bloeman, H., & Stancanelli, E. (2008). How Do Parents Allocate Time? The Effects of Wages and Income. IZA Discussion Paper No. 3679.
- Bond, S., & Sales, J. (2001). Household Work in the UK: An Analysis of the British Household Panel Survey 1994. *Work Employment and Society*, 15(2), 233-50.
- Burdett, K., & Coles, G. M. (1997). Marriage and Class. *The Quarterly Journal of Economics*, 112(1), 141-168.
- Burdett, K., & Coles, G. M. (1999). Long-Term Partnership Formation: Marriage and Employment. *The Economic Journal*, 109(456), F307-F334.
- Burdett, K., & Coles, G. M. (2001). Transplants and Implants: The Economics of Self-Improvement. *International Economic Review*, 42(3), 597-616.
- Chiappori, P., Iyigun, M., & Weiss, Y. (2009). Investment in Schooling and the Marriage Market. *The American Economic Review*, 99(5), 1689-1713.
- Connolly, S., & Gregory, M. (2002). The National Minimum Wage and Hours of Work: Implications for Low Paid Women. *Oxford Bulletin of Economics and Statistics*, 64, 607-31.
- Couprie, H. (2007). Time Allocation within the Family: Welfare Implications of Life in a Couple. *Economic Journal*, 117(516), 287-305.
- Dougherty, C. (2005). Why Are the Returns to Schooling Higher for Women Than for Men? *Journal of Human Resources*, 40(4), 969-88.
- Ermisch, J., Francesconi M., & Siedler, T. (2006). Intergenerational Mobility and Marital Sorting. *Economic Journal*, 116(513), 659-79.
- Ermisch, J., & Pronzato C., (2008). Intra-Household Allocation of Resources: Inferences from Non-Resident Fathers' Child Support Payments. *Economic Journal*, 118(527), 347-62.
- Gershuny, J., Bittman, M., & Brice, J. (2005). Exit, Voice, and Suffering: Do Couples Adapt to Changing Employment Patterns? *Journal of Marriage and the Family*, 67(3), 656-65.

- Greenstein, N. T. (2000). Economic Dependence, Gender, and the Division of Labour in the Home: A Replication and Extension. *Journal of Marriage and Family*, 62(2), 322-335.
- Hadfield, G. K. (1999). A Coordination Model of the Sexual Division of Labour. *Journal of Economic Behaviour & Organization*, 40(2), 125-53.
- Iyigun, M., & Walsh, R. (2007). Building the Family Nest: Premarital Investments, Marriage Markets, and Spousal Allocations. *The Review of Economic Studies*, 74(2), 507-35.
- Kan, M. Y. (2008). Does Gender Trump Money? Housework Hours of Husbands and Wives in Britain. *Work Employment and Society*, 22(1), 45-66.
- Kan, Y. M., & Heath, A. (2006). The Political Values and Choices of Husbands and Wives. *Journal of Marriage and the Family*, 68(1), 70-86.
- Ligon, E. (2002). Dynamic Bargaining in Households (with an Application to Bangladesh). Available at SSRN: <http://ssrn.com/abstract=1776810>.
- Lundberg, S., & Pollak, R. (1993). Separate Spheres Bargaining and the Marriage Market. *The Journal of Political Economy*, 101 (6), 988-1010.
- Manser, M., & Brown, M. (1980). Marriage and Household Decision-Making: A Bargaining Analysis. *International Economic Review*, 21(1), 31-44.
- Marriage, Civil Partnership and Divorce information from GUK (gov.uk). Retrieved from: <https://www.gov.uk/divorce/overview>
- McElroy, M. B., & Horney, M. J. (1981). Nash-Bargained Household Decisions: Towards a Generalization of the Theory of Demand. *International Economic Review*, 22(2), 333-349.
- Peters, M. (2007). The Pre-Marital Investment Game. *Journal of Economic Theory*, 137(1), 186-213.
- Ramos, X. (2005). Domestic Work Time and Gender Differentials in Great Britain 1992-1998 - What Do "New" Men Look Like? *International Journal of Manpower*, 26(3), 265-95.
- Siow, A., & Peters, M. Competing Premarital Investments. *SSRN eLibrary*.
- Stewart, M. B., & Swaffield, K. J. (2002). Using the Bhps Wave 9 Additional Questions to Evaluate the Impact of the National Minimum Wage. *Oxford Bulletin of Economics and Statistics*, 64, 633-52.

- Warren, T. (2003). Class- and Gender-Based Working Time? Time Poverty and the Division of Domestic Labour. *Sociology-the Journal of the British Sociological Association*, 37(4), 733-52.

Appendix

Table 3-6: England and Wales - Divorces per thousand of the Married Population

Year	Divorces per thousand of the married population
1991	13.5
1992	13.9
1993	13.8
1994	14.2
1995	13.7
1996	13.6
1997	13
1998	12.9
1999	12.9
2000	12.7
2001	12.9
2002	13.3
2003	13.9
2004	14
2005	12.9
2006	12.1
2007	11.8
2008	11.2

Source: Office for National Statistics

Figure 3-4: Change in Wages by Year and Qualification

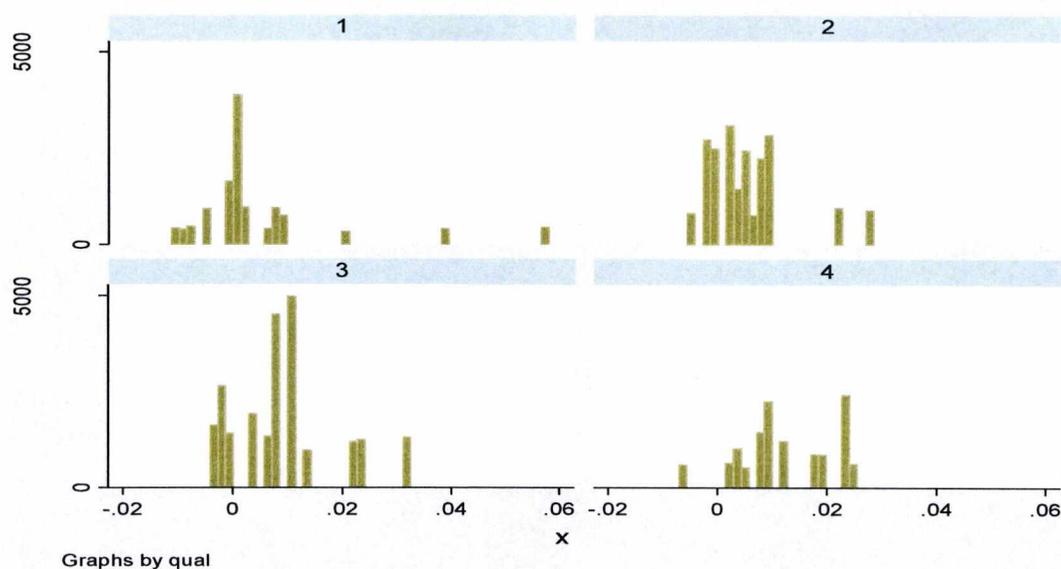


Table 3-7: Hours of Housework Done by the Wife as a Fraction of Total Time Spent on Housework - Wife is Past Childbearing Age

	Fixed Effect Proportion of housework done by the wife	Random Effect Proportion of housework done by the wife	Between Effect Proportion of housework done by the wife
Number of Children the wife has	0.00938* (0.00374)	0.0106*** (0.00255)	0.0151*** (0.00380)
Husband <i>more</i> qualified than wife	-0.00574 (0.0215)	0.0264** (0.00871)	0.0355*** (0.00934)
Husband <i>less</i> qualified than wife	-0.00424 (0.0181)	-0.0280** (0.00911)	-0.0375*** (0.00966)
Husband's level of academic qualification	0.00838 (0.0139)	0.0319*** (0.00446)	0.0378*** (0.00544)
Relative wage of the wife	-0.178 (0.128)	-0.163 (0.0897)	-0.0871 (0.133)
Year	-0.00137 (0.000875)	-0.00127* (0.000635)	-0.00214* (0.000995)
Constant	3.532* (1.717)	3.258** (1.247)	4.954* (1.958)
N	11804	11804	11804
r2	0.00828		0.0523
r2_o	0.0234	0.0371	0.0373
r2_b	0.0374	0.0515	0.0523
r2_w	0.00828	0.00764	0.00755
sigma_e	0.117	0.117	
sigma_u	0.170	0.149	
rho	0.677	0.619	

Standard errors in parentheses

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

Table 3-8: Hours of Housework Done by the Wife as a Fraction of Total Time Spent on Housework - Wife has No Children of her Own

	Fixed Effect Proportion of housework done by the wife	Random Effect Proportion of housework done by the wife	Between Effect Proportion of housework done by the wife
Husband <i>more</i> qualified than wife	-0.0260 (0.0250)	0.0136 (0.00848)	0.0131 (0.00998)
Husband <i>less</i> qualified than wife	0.0107 (0.0246)	-0.0181* (0.00889)	-0.0201* (0.00969)
Husband's level of academic qualification	0.00443 (0.0157)	0.0305*** (0.00448)	0.0291*** (0.00573)
Relative wage of the wife	-0.0672 (0.121)	-0.191* (0.0791)	-0.325* (0.160)
Wife's age	0.00773 (0.00609)	0.00405*** (0.000278)	0.00433*** (0.000296)
Year	-0.00907 (0.00620)	-0.00329*** (0.000681)	-0.000124 (0.000989)
Constant	18.56 (12.16)	7.119*** (1.341)	0.842 (1.921)
N	10496	10496	10496
r2	0.00254		0.149
r2_o	0.0891	0.113	0.114
r2_b	0.114	0.144	0.149
r2_w	0.00254	0.000532	0.000442
sigma_e	0.126	0.126	
sigma_u	0.181	0.147	
rho	0.672	0.578	

Standard errors in parentheses

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

Table 3-9: Hours of Housework Done by the Wife as a Fraction of Total Time Spent on Housework - Both Husband and Wife Work Full Time

	Fixed Effect Proportion of housework done by the wife	Random Effect Proportion of housework done by the wife	Between Effect Proportion of housework done by the wife
Number of Children the wife has	0.0159*** (0.00358)	0.0164*** (0.00273)	0.0174*** (0.00418)
Husband <i>more</i> qualified than wife	-0.0335 (0.0205)	0.0133 (0.00810)	0.0135 (0.00854)
Husband <i>less</i> qualified than wife	-0.00800 (0.0180)	-0.0203* (0.00809)	-0.0104 (0.00978)
Husband's level of academic qualification	-0.00129 (0.0126)	0.0289*** (0.00421)	0.0252*** (0.00539)
Relative wage of the wife	0.0238 (0.101)	-0.121 (0.0838)	-0.450*** (0.132)
Wife's age	0.0128* (0.00508)	0.00318*** (0.000282)	0.00339*** (0.000325)
Year	-0.0131* (0.00517)	-0.00220*** (0.000601)	0.000460 (0.000973)
Constant	26.36** (10.15)	4.933*** (1.180)	-0.237 (1.910)
N	13524	13524	13524
r2	0.00449		0.0932
r2_o	0.0400	0.0638	0.0645
r2_b	0.0565	0.0902	0.0932
r2_w	0.00449	0.00262	0.00111
sigma_e	0.132	0.132	
sigma_u	0.2054	0.148	
rho	0.709	0.559	

Standard errors in parentheses

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

Table 3-10: Hours of Housework Done by the Wife as a Fraction of Total Time Spent on Housework - Wife's non labour income as a fraction of total non labour income of the couple

	Random Effect Proportion of housework done by the wife	Fixed Effect Proportion of housework done by the wife	Between Effect Proportion of housework done by the wife
Number of children the wife has	0.0232* (10.36)	0.0213* (7.60)	0.0261* (7.26)
Husband <i>more</i> qualified than wife	0.0118 (1.54)	-0.0174 (-0.86)	0.0157* (1.96)
Husband <i>less</i> qualified than wife	-0.0235* (-3.05)	-0.00807 (-0.46)	-0.0259* (-2.92)
Husband's level of academic qualification	0.0268* (7.02)	0.00954 (0.77)	0.0284* (5.71)
Relative wage of the wife	-0.219* (-3.14)	-0.179+ (-1.93)	-0.274* (-2.08)
Wife's age	0.00382* (14.62)	0.00554 (1.19)	0.00421* (13.32)
Year	-0.00206* (-4.04)	-0.00450 (-0.95)	-0.000149 (-0.17)
Relative non-labour income of wife	0.0199* (4.09)	0.0171* (3.14)	0.0315* (3.09)
Constant	4.689* (4.69)	9.538 (1.03)	0.863 (0.50)
N	16189	16189	16189
r2_o	0.0798	0.0631	0.0804
r2_b	0.1260	0.1058	0.1285
r2_w	0.0123	0.0130	0.0102
sigma_e	0.1250	0.1250	
sigma_u	0.1449	0.1701	
rho	0.5730	0.6492	

t statistics in parentheses

+ $p < 0.10$, * $p < 0.05$

Figure 3-5: Effect of a Change in Relative Wage on the Probability of a Woman doing all the Cleaning given that Cleaning/Hoovering=0 in the previous period

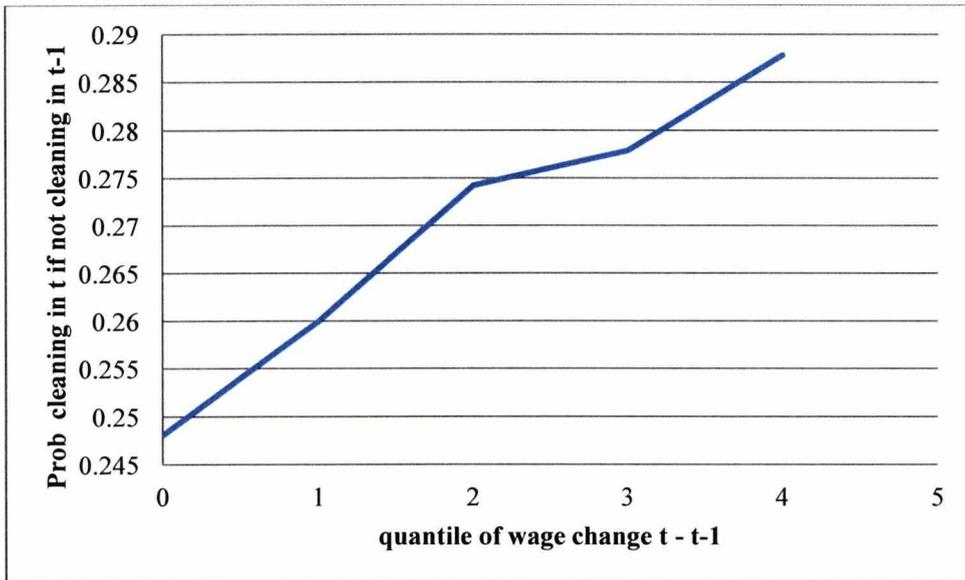


Figure 3-6: Effect of a Change in Relative Wage on the Probability of a Woman doing all the Washing/Ironing given that Washing/Ironing=1 in the previous period

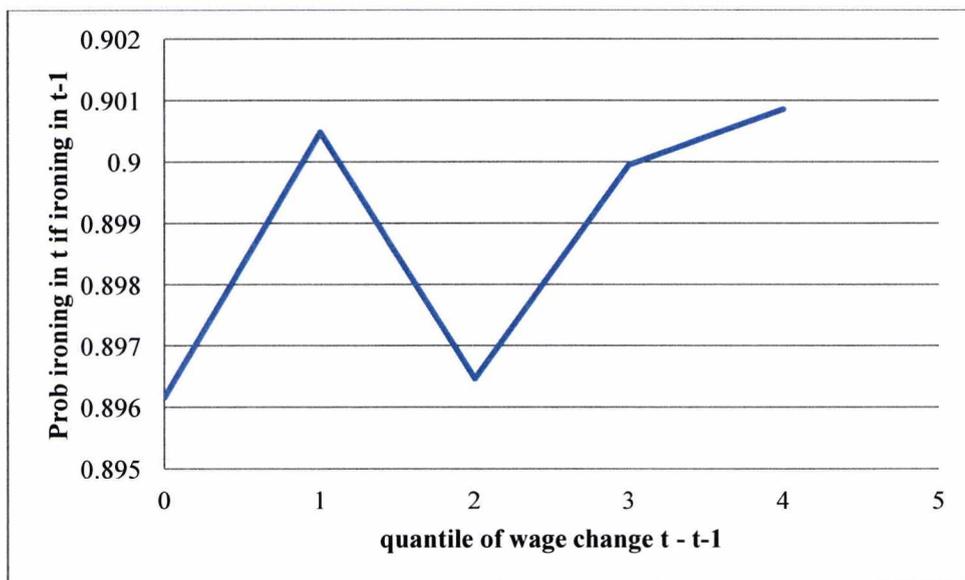
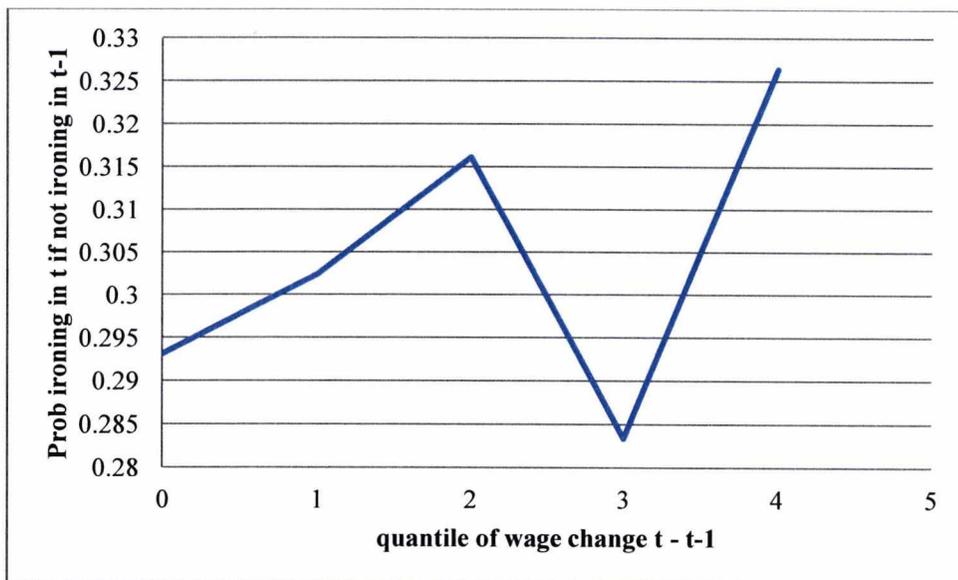


Figure 3-7: Effect of a Change in Relative Wage on the Probability of a Woman doing all the Washing/Ironing given that Washing/Ironing=0 in the previous period



Chapter 4 : Child Labour in Pakistan – Parental Attitudes or Poverty?

This paper using data from the Pakistan Social and Living Standards Measurement Survey (PSLM) 2007- 2008 explores whether child labour is a consequence of household resource constraints or due to the lower weight placed on children's wellbeing in household decision making, A simple theoretical model is also presented in this paper which links adult consumption, child consumption and child labour, specifically providing us with predictions to test our hypothesis empirically.

Using standard expenditure regressions we look at the correlation between unobservable factors affecting the participation of children in the labour market and on the budget shares of assignable child and adult goods. We argue that once we control for total household expenditure, region, province, age and sex of household members, age and education of the household head, and the size of the household in the budget share regressions - the rest of the unobserved variation contained in the residuals are likely to be parental preferences. We use these residuals to see if preferences play any part in determining child labour and whether they indicate selfishness or altruism on behalf of the parents. Results show that variations in child labour can be explained by differences in parental preferences across households.

Introduction

Child labour is not a new phenomenon. Children have played a role in the economy during the industrial revolution in Europe and mid-nineteenth century America (Basu, 1999). In recent times child labour is found primarily in developing countries, with Asia having the most number of labourers in the world and Africa having the largest proportion of child workers. The first report on child labour in 1979 by the United Nations found that 98% of child workers belong to the developing world (Ray, 2000). The International Labour Organization in 1995 estimated that there were 120 million full time paid child workers from the ages of five to fourteen years around the world (Basu, 1999). Even though the labour force participation of 10 to 14 years old children has fallen over the years, the absolute number of children working is large enough to warrant concern (Ray, 2000).

The ILO survey of 1996 showed that 10% of all children between the ages of 5-14 years were engaged in labour. 67% of these children worked in the agricultural sector; 11% worked as unskilled labour in manufacturing; 9% in wholesale and retail trade; and 8% in social and personal services.⁴⁴ Most parents cited assistance in household enterprise in rural areas (74%) and supplementing household income in urban areas (61%), as the primary reason of sending their children to work.⁴⁵ In this paper we explore whether those parents who state that their children work to augment the family income are driven by need or want.

The definition of child labour in studies may be driven by data or ethics. In this paper due to data constraints we define a child as age 17 or under, and exclude unpaid work performed by children at home. Statistics on the prevalence of child labour are wide ranging due to the conflict over the definition of child labour. While almost all define a child as age 14 or younger, some include household duties as child labour whereas others such as the International Labour Organization do not, arguing that household chores are carried out by children in all societies to a varying degrees. Ray (2000) stresses that International Labour Organization estimates may be underreporting child labour especially amongst girls who usually take on a larger burden of housework.

The concept that parental preferences, or more specifically how altruistic they are towards their children, affects how decisions are made in the household regarding child labour and education is not a new one in the literature. Basu and Van (1999) stress how parents of child workers are often equated with selfishness where they are imagined to be enjoying leisure while their children work. In fact in keeping with this view state intervention is recommended by policy makers to prevent parents from 'extracting services from their children' (Brown and Stern, 2002). Goldin and Parsons (1989) study highlights non-altruistic behaviour amongst parents from 6800 industrial families in the United States from 1889-1890. They observe how parents with positive household assets and hence no borrowing constraints sent their children to work even though they had the resources to school them. Parents were also not compensating their children later in the form of higher bequests, instead using higher family income for higher current consumption. They argue that most households relocated to areas with abundant

⁴⁴ Child Care Foundation Pakistan http://www.ccfp.org.pk/do_you_know.html

⁴⁵ Child Care Foundation Pakistan http://www.ccfp.org.pk/do_you_know.html

child labour opportunities which consequently led to low adult wages. They estimate that the resulting lower adult wages due to the relocation competed away 90% child income, hence the increase in family income was 'illusory'. In addition they observe that children were sent to work even when their wages were very low, suggesting non-altruism as the driving force behind child labour as opposed to low returns to education. Goldin and Parsons (1989) argue that the eventual demise of child labour was due to increased technological advancement that reduced the demand for tasks performed by children and not because of parental altruism.

One of the other main determinants of child labour supply that makes it widely prevalent in developing countries is household poverty (Baland and Robinson, 2000; Bhalotra, 2007; Basu and Van, 1998; Moehling 2004). Basu and Van (1999) provide a multiple equilibria theoretical model to study the effect of poverty on child labour. In their model they argue that there exists a critical wage below which households will be compelled to send their children to work, but above which they assume that no household would send their child to work. They refer to this as the luxury axiom as it treats child leisure as a luxury good that can only be consumed when income of the household is high enough. Another important feature of the model is the substitution axiom which assumes that adult and child labour are perfectly substitutable and the ratio of productivity though may not be one, always remains the same. In their paper they show that a coordinated decision by parents to withdraw their children from child labour would move the economy to the preferred higher wage equilibrium with no children working. Critics have argued however that the luxury hypothesis assumes parental altruism which may not always be the case, and parental preferences also may depend on if the child is male or female (Basu, 1999). The substitution hypothesis can be subjected to criticism as well. It can be argued that adult female labourers working outside the home may remove their daughters from school to do the housework, suggesting a complementary relationship between the two. However as the mother's wage becomes high enough she may be able to hire outside help for housework and the daughter may be able to resume school (Basu, 1999). This indicates a more complicated relationship between female adult labour and child labour, where child labour first may rise and then fall as the mother takes up work outside the home (Basu, 1999). Good schools and availability of child care are instrumental to breaking this link between

adult female labour and child labour (Ray, 2000). While this paper deals with the effect of poverty on child labour, it does not explore the child care dimension.

Various studies have tested the luxury hypothesis. Ray (2000) uses the poverty status of the household, measured through a dummy variable, to see its effect on child labour in Peru and Pakistan. The results of his study confirm the luxury hypothesis in Peru but not in Pakistan. Basu (1999) criticizes this approach of testing for the luxury hypothesis, arguing that Ray solely identifies the critical wage in the Basu and Van model through the poverty line, whereas there is no suggestion in the model that this should be the case. Dumas (2007) also highlights two drawbacks, one that this method requires the relevant subsistence poverty level to be randomly defined; and secondly that because child and adult labour are determined simultaneously, adult labour supply may be endogenous to child labour.

Bhalotra (2007) stresses that the negative effect of household income on child labour does not provide support for the poverty hypothesis as it merely suggests that child leisure is a normal good. She argues that negative own wage elasticity of the child however does suggest that child labour is a consequence of poverty. This is so because as a child's wage increases he/she will have to work fewer hours to help the family reach the subsistence level. Bhalotra (2007) using data from rural Pakistan finds negative wage elasticity for boys and concludes that poverty forces boys to take up work, and hence cash transfers to such households would reduce child labour amongst them. She however finds no evidence for girls, and argues that girls are compelled to work due to low returns to education and not necessarily poverty. Dumas (2007) criticises these results as they are based on a very small sample of child labourers and because he argues the sample is not representative of child labour, as most children do unpaid work for their parents.

Dumas (2007), argues that the luxury hypothesis depends on the strength of parents preferences. If the parents are strongly altruistic then they will send their children to work until the family can meet its subsistence needs. However if they are not as altruistic then they will weigh the trade off between additional household consumption and child leisure when deciding whether to send children to work, even when the household is above the subsistence level. The results of their study show that child

leisure in Burkina Faso is a normal good and that child labour is not a means to bring the household to the subsistence level.

It may be argued that children engaged in work miss out on education, perpetuating poverty. Returns to education include higher future wages, yet children from poor household often do not attend school and engage in labour intensive work instead (Ravallion, 2000). An uneducated parent is likely to have lower earnings and hence have to send his/her child to work, who in turn as an adult will follow the same cycle. It has been estimated that in developing countries an educated adult earns 11 per cent per year of education more annually than an uneducated adult. It is important to explore whether child labour comes at the expense of schooling. Education is an important component of economic growth and has positive externalities associated with it, such as lower fertility and better health amongst many other things (Basu, 1999; Anker, 2000). Ray (2000) argues that child labour and poverty impede school enrolment, where the probability of a Pakistani child attending school increases significantly as the household crosses the poverty line.

In developing economies children are often an asset to parents, assisting families to meet their basic needs. Children may also help smooth the household income in the face of shocks, given market imperfections such as poorly developed credit markets. Ravallion (2000) argues that whether child labour leads to this poverty trap depends on if child leisure and schooling are substitutes or complements. If they are substitutes then working children may not have to forgo schooling. Some policy recommendations suggest 'double shifts' in primary schools for those children who combine schooling and child labour (Ravallion, 2000). Ravallion (2000) argues that working children who study may forgo informal after school help and work in unsafe environments, but need not necessarily give up formal schooling. In fact in economies where specific knowledge may be important, children may be able to enhance their returns from education with skills learnt at the workplace; suggesting complementarities between the two (Basu, 1999; Dumas, 2007; Ravallion, 2000; Brown and Stern, 2002). In some instances child income may enhance the probability of a child attending school (Basu, 1999; Brown and Stern, 2002). Research on child labour from rural India suggests that child labour is often 'light' with many children working less than three hours a day so that children can combine work with education (Basu, 1999). It is argued however that

the same may not be the case for children who have rigid work hours in factories (Basu, 1999). It is also important to note that children who work may not be able to concentrate in school after a long day's work (Brown and Stern, 2002). Ray (2000) in a comparative study on child labour between Peru and Pakistan found that children in Peru were not as badly impacted by poverty; this was due to their ability to combine school and work.

Ravallion (2000) studies the impact on child labour and schooling, of the Food for Education Programme in rural Bangladesh. The aim of the programme was to incentivise schooling amongst rural households, by providing monthly food rations to them if they sent their children to primary school. They point out that the programme stipend has the effect of reducing the price of schooling for parents, and was equal to 13% of the average monthly earnings of boys and 20% of that for girls. In the study, Ravallion (2000) compares participating and non-participating households to study the child labour and education decision by parents. They find that amongst participating households, a stipend for less than the average child earning, was enough to lead to full school attendance. Child labour was reduced, but only by a small proportion. They conclude that children were substituting leisure with schooling and were hence combining child labour with education.

Distribution of resources in the household may vary with the labour market status of children. Moehling (2004) contends that to solve the principal agent problem, in particular to minimize children shirking at the workplace, parents may give working children a larger share of household resources. Using American data from the Bureau of Labour Statistics Cost of Living Survey 1917-1919, the study find that clothing expenditure on working children was higher, and increased with their contribution to income in the household.

The determinants of child labour depend on the context and vary from one region to the other making it difficult to identify the general truth about it. The literature on child labour however does raise some important questions about some of the determinants of child labour and their implications in terms of policy. In particular if child labour is a consequence of household poverty or a result of parental selfishness.

Model

We present a simple theoretical model which links adult consumption, child consumption and child labour. Specifically it provides us with predictions that enable us to explore whether the variation in the allocation of resources in the household with the labour market outcomes of children (as observed in the data⁴⁶), are due to resource constraint or a consequence of lower weight placed on children's wellbeing in household decision making.

We attempt to model the simultaneous determination of the consumption decision of the household and labour force participation of children. There are however some potentially complicated issues such as adult leisure and bargaining parameters that are not modelled in this paper. One of the main simplifying assumptions that we make is that households do not make decisions about adult leisure. This is because as adult wages are relatively much higher than child wages we do not expect a situation (corner solution) where adults do not work and enjoy leisure. Secondly variations in bargaining parameters are not modelled as we infer those from the empirical results. Another simplification that we make is that the utility of household members is not substitutable for each other. This is so to avoid the situation where if one party excels at market labour, works longer hours and enjoys less leisure; then they are penalised by possibly having less utility.

The initial maximization problem of the household becomes such that one party's (child) utility is maximized subject to giving the other party (adult) a reference utility.

$$U_c = \left[(wh + Y - \Omega)^\delta + (1-h)^\delta \right]^{\frac{1}{\delta}} \quad (1)$$

$$wh + Y = C + \Omega \quad (2)$$

The model assumes that adults only receive utility from consumption of adult goods (Ω) whereas children from the consumption of leisure and child goods (U_c). Equation 1 shows how the household head maximizes utility which is a function of adult consumption goods (Ω), child leisure ($1-h$), and child consumption (C). The price of consumption is normalized to unity and all adults and children are treated identically. We use the constant elasticity of substitution (CES) function as it is less restrictive and

⁴⁶ Pakistan Social and Living Standards Measurement Survey 2007-2008

allows the elasticity of substitution to take a larger range, and permits the weight on child leisure to vary from child consumption.

We assume that $-\infty < \delta < 1$. As δ approaches $-\infty$ and the elasticity of substitution (denoted by s) approaches zero, then child consumption and child leisure are perfect complements, where $\delta = \frac{s-1}{s}$.

Equation 2 states the budget constraint for the household where w is the wage of the child, h hours worked by the child, Y income from all other sources, C child consumption and Ω adult consumption. The household budget constraint pools income from the child with that from all other sources – where the inclusion of income from child labour should have the effect of moving out the budget constraint for the household. The slope of the budget constraint is given by the wage of the child. The equation shows that child consumption is equal to the total household income once adult consumption has been accounted for.

We expect the correlation between household budget share on assignable goods and labour force participation of children to differ depending on whether the source of variation is parental preferences or external factors such as wages and household income.

To find the first order condition below, we maximize the utility of the child (equation 1) given the budget constraint (equation 2), with respect to h .

$$h = \frac{1 + w^{\frac{1}{\delta-1}}(\Omega - Y)}{(w^{\frac{\delta}{\delta-1}} + 1)} \quad (3)$$

Equation 3 shows that the hours worked by the child increases (h) as adult consumption increases (Ω), and falls as income from all other sources rises (Y). If the wage of the child (w) is small enough, and income from all other sources other than the child (Y) large enough, then child hours can be negative. This suggests a corner solution where child labour supply beyond a certain income threshold is zero.

To find child consumption we use equation 2 where the hours worked by the child (h) as obtained in equation 3 is multiplied with child wage (w), added to household income from all other sources (Y) and adult consumption (Ω) is deducted.

$$C = \frac{w - \Omega + Y}{\frac{\delta}{(w^{\delta-1} + 1)}} \quad (4)$$

The equation above shows that child consumption increases with income from all other sources (Y) and falls as adult consumption (Ω) increases. Child utility is given by equation 5, and it is a sum of child consumption (C) and child leisure ($1-h$).

$$U_C = \left[\left(\frac{w - \Omega + Y}{\frac{\delta}{(w^{\delta-1} + 1)}} \right)^\delta + \left(\frac{w^{\frac{\delta}{\delta-1}} - w^{\frac{1}{\delta-1}}\Omega + w^{\frac{1}{\delta-1}}Y}{\frac{\delta}{(w^{\delta-1} + 1)}} \right)^\delta \right]^{\frac{1}{\delta}} \quad (5)$$

Since the main empirical question in this paper is whether children are sent to work because of external factors or parental preferences, below we compute a set of predictions for both situations. In the first situation below we hold the relative shares constant and vary external factors, whereas in the second situation relative shares are varied.

Situation 1: Relative shares are fixed

In situation 1 below we hold relative shares fixed, such that utility of the child and of the adult are equal ($U_C = \Omega$) and assume Leontief utility function so that the indifference curve of adults and children are complements. One of the reasons for fixing shares is to ensure that if children are putting more effort into working, then intuitively they should not be penalized by getting lower utility in the household.

To hold adult consumption (Ω) fixed so that children and adults get an equal share of resources in the household we set the utility of the child (equation 5) equal to adult consumption (Ω), as shown in equation 6. It is important to note that the findings from this situation only depend on omega (the share of utility received by the adult) being fixed and not that omega is equal to child utility.

$$\left[\frac{(w - \Omega + Y)^{\frac{\delta}{\delta}}}{(w^{\delta-1} + 1)} + \frac{(w^{\frac{\delta}{\delta-1}} - w^{\frac{1}{\delta-1}}\Omega + w^{\frac{1}{\delta-1}}Y)^{\frac{\delta}{\delta}}}{(w^{\delta-1} + 1)} \right]^{\frac{1}{\delta}} = \Omega \quad (6)$$

Equation 7 shows the consumption of adults given that children and adults have equal shares in the household.

$$\frac{(w + Y)(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} = \Omega \quad (7)$$

We can use equation 3 and 7 to find hours worked by the child (h) in this particular situation.

$$h = \left[1 + w^{\frac{1}{\delta-1}} \frac{w(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}} - Y}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)} \quad (8)$$

To solve for child consumption (C), we use equation 4 and 7.

$$C = \left[\frac{w + Y}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)} \quad (9)$$

We then compute comparative statics to see the effect in each household of a change in endowments - essentially looking at how a change in household income effects (Y) child consumption (C), adult consumption (Ω) and hours worked by the child (h).

$$\frac{\partial \Omega}{\partial Y} = \frac{1}{[1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}]} \quad (10)$$

$$\frac{\partial C}{\partial Y} = \left[\frac{1}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)} \quad (11)$$

Equation 10 and 11 respectively show that as income from sources other than child labour (Y) increases, adult consumption (Ω) increases, and child consumption (C) increases, but the larger the wage of the child (w) is the lower the effect of a change in Y on Ω and C.

$$\frac{\partial h}{\partial Y} = -\frac{w^{\frac{1}{\delta-1}}}{\frac{\delta}{(w^{\delta-1} + 1)}} \left(\frac{1}{1 + (1 + w^{\frac{1}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right) \quad (12)$$

As expected, we find in equation 12 above that as income from sources other than child labour (Y) increases hours worked by the child (h) falls. Hence we can assume that child leisure is a normal good which is why its consumption increases, as income from all other sources (Y) other than child income rises.

Situation 2: Relative shares vary

The relative size of Ω can be seen as the preference over children in the household as the higher adult consumption or utility is, the fewer the resources are left over for child consumption. We consider the effect on child consumption and hours worked by the child, of a variation in adult consumption across households.

$$C = \frac{w - \Omega + Y}{\frac{\delta}{(w^{\delta-1} + 1)}}$$

$$\frac{\partial C}{\partial \Omega} = -\frac{1}{\frac{\delta}{(w^{\delta-1} + 1)}} \quad (13)$$

Using equation 4 we differentiate child consumption (C) with respect to adult consumption (Ω) to see the effect. We find that as adult consumption increases child consumption falls.

$$h = \frac{1 + w^{\frac{1}{\delta-1}}(\Omega - Y)}{\frac{\delta}{(w^{\delta-1} + 1)}}$$

$$\frac{\partial h}{\partial \Omega} = \frac{w^{\frac{1}{\delta-1}}}{\frac{\delta}{(w^{\delta-1} + 1)}} \quad (14)$$

Similarly we see the effect on child leisure of an increase in adult consumption. Equation 14 shows that as adult consumption rises hours worked by the child increase.

The model provides us with two sets of predictions given which factors we hold constant. Situation 1 of the model dictates (where relative shares were held constant) that as the household income from sources other than child increase; adult consumption, child consumption and child leisure rise. However when parents are less altruistic such that they increase their share of household resources, then as their share increases child consumption falls and child leisure decreases. This implies a negative relationship between hours worked and child consumption.

As observed in equation 3 of the model, child labour can also be a result of external factors such as poverty, where if the household income from sources other than children was large enough children would not participate in child labour. This suggests an income threshold beyond which parents are not compelled to send their children to work.

Context of the Study

To study child labour we used data from Pakistan. What makes Pakistan an interesting case study is that not only is it the sixth most densely populated country in the world but also because the population is mainly comprised of the youth. Amongst the approximately 180 million⁴⁷ people living in Pakistan 42⁴⁸% of the population is under the age of 18 and 23% are between the ages of 10 to 19⁴⁹.

Child labour statistics show that in 2008-2009⁵⁰ 5.54% of the total labour force in Pakistan consisted of children between the ages of 10-14 and 13.31% from the age group 15-19. In developing countries such as Pakistan it has been argued that work done by the child at the expense of schooling, or that is dangerous to the child's mental or physical well-being should be characterised as child labour. However, children who do apprenticeships with their families and supplement their family income by working a few hours a day 'in benign conditions' so as to assist the family's survival should not be included in the definition⁵¹.

⁴⁷ http://www.unicef.org/infobycountry/pakistan_pakistan_statistics.html#104

⁴⁸ Figures are from 2011, United Nations Population Division.

⁴⁹ Figures are from 2011, United Nations Population Division.

⁵⁰ Labour Force Statistics, 2008-2009. Pakistan Bureau of Statistics, Government of Pakistan

⁵¹ http://www.ccfp.org.pk/do_you_know.html

World Bank data from 2006-2011 highlights that ⁵²21% of the population in Pakistan lives below the international poverty line which is less than ‘\$1.08 a day at 1993 international prices (equivalent to a \$1 a day in 1985 prices, adjusted for purchasing power parity)’. Poverty can be a determining factor in a household deciding whether or not to engage in child labour. As a household drops below the poverty line, Brown and Stern (2002) find that in Pakistan the number of hours worked by each of their children increases by 500 hours per year. Schooling of children in such Pakistani households is negatively impacted where the effect on girls is much more pronounced than boys.

Pakistan also has the ‘second largest out of school population’ in the world⁵³ where 7 million children do not attend school because of poverty (UNICEF, 2011). Recently in 2010 via the 18th Amendment, article 25A was added to the 1973 constitution which states that ‘the State shall provide free and compulsory education to all children of the age of five to sixteen years in such manner as may be determined by law.’⁵⁴ However if this article is to have any meaningful effect on literacy, its implementation and understanding the determinants of child labour are key.

Currently there is no law that bans labour of children under the age of 14 in Pakistan. One of the only laws related to labour force participation of children is the Employment of Children Act, 1991. This act applies to all children under the age of 14 and specifies working conditions, maximum hours a child is allowed to work, and lists hazardous industries where child labour is prohibited. It also instructs all organizations which employ children to maintain a register detailing their ages and hours worked. According to this law anyone in breach to it is punishable with imprisonment which can extend to up to a year and a fine of up to PKR 20,000 or both.

Data

The data used in this paper is from the Pakistan Social and Living Standards Measurement Survey (PSLM) carried out from July 2007 to June 2008. The PSLM is a collaborative effort between the World Bank and Government of Pakistan. It is a large household survey comprising of all the urban and rural areas of the four provinces of Pakistan and its capital Islamabad, with the exception of the military restricted areas.

⁵² Statistics are from the most recent year data available at the world bank from 2006-2011

⁵³ http://www.aserpakistan.org/document/report_cards/2012/summary_report_cards/National.pdf

⁵⁴ http://www.aserpakistan.org/document/report_cards/2012/summary_report_cards/National.pdf

The survey uses a two stage stratified sample design. In the first stage villages and enumeration blocks in urban and rural areas were chosen via the probability proportional to size sampling technique. Then through systematic sampling with a random start, in the second stage a fixed number of households (16 from rural areas and 12 from urban areas) were selected.

Our sample includes only those household which report child earnings, and have one child or more. Out of a total of 15,512 there are 1951 households with no children and 1051 household this reduces our sample to 12,131 households.

To find total household expenditure on education, we aggregate expenses on fees, books, hostel and stationary; and for total tobacco expenditure we sum together total expenditure on cigarettes, tobacco, pan and betel nut. These aggregate expenditures include payments made by the household in cash, in kind, through own production, receipt from assistance, or from dowry. Educational expenditures are reported per year as opposed to tobacco expenditure which is monthly. Similarly to compute budget shares, total expenditure of the household is composed of some items that represent fortnightly expenditure, others monthly or yearly. Hence for comparison purposes all expenditures are converted to a monthly basis.

Households on average in a month spend PKR 550 on education which is 3% of their total household budget; and PKR 149 on tobacco and related goods, with a budget share of 1.3%. Figure 4-6⁵⁵ shows that the majority of household expenditure on tobacco related products is in the form of cigarettes (80%), followed by tobacco (14%), betel nut (3%) and pan (3%). On the other hand tuition fees (56%) and educational books (39%) constitute the bulk of expenditure on education⁵⁶. Households spend 4% of total household education expenditure on hostels and 1% on stationary.

We generate the yearly wage of individuals by multiplying the amount earned in the last month by the number of months worked during the last year, for individual's primary job, secondary occupation, selling income in-kind or from pension. To find the household income from all sources, we sum the yearly wage of all household members;

⁵⁵ Figure 4-6 in Appendix

⁵⁶ Figure 4-7 in Appendix

income from any second occupation; wages from any other work; wages in kind; pension; income from durable goods sold; total income from zakat, usher and remittances; income from property sold; income from property rented; profit from savings; withdrawal from savings; jewellery sold; securities sold; dividends from securities; money from provident fund; loan borrowed; amount of loan received back plus profit; money received from group insurance; rent from rural land; money from rural land sold; money from livestock sold; rent from agricultural equipment; sold agricultural equipment; non-agricultural establishment property sold; non-agricultural equipment sold; non-agricultural establishment property rented; and non-agricultural equipment rented. On average monthly household adult income is PKR 8603, child income PKR 191, and income from all other sources is PKR 3365.

The total number of children in the household range from 1 to 37, the average is 4, and 81% of the households have 5 children or less;⁵⁷ whereas the household is typically composed of 7 members.

The International Labour Organization Convention No.138 defines child as age 14 or under. However our data provides us information on child earnings of children under 14 for only 291 households. Hence due to data constraints we define child labour as any person of age 17 or under who has reported positive earnings⁵⁸ in the previous year. This increases our sample to 987 households that have one or more child working.

In the PSLM survey, employment questions are addressed to persons age 10 and above, hence our data for child labour is restricted to 10-17 year olds. Although a significant number of children under the age of 10 work it may be argued that the majority of child workers are 10 years or older (Basu and Van, 1998). In our sample 8% of the households engage in child labour. In those households the average monthly wage of adult members is PKR 6965 and child members is PKR 2453. The data does not provide us with the number of hours worked by the child.

⁵⁷ Figure 4-5 in Appendix shows total number of children in the household.

⁵⁸ Basu and Van, 1998; Basu, 1999; Edmonds, 2004; Ray, 2000; Moehling, 2004

Kernel-weighted local polynomial smoothing: Budget Share of Education and Log of Household income

Figure 4-1:
Sample of Households where children don't work

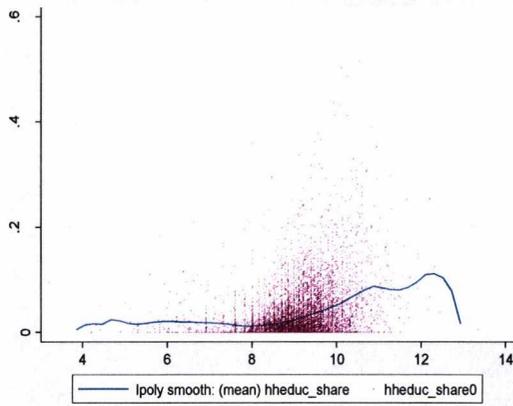
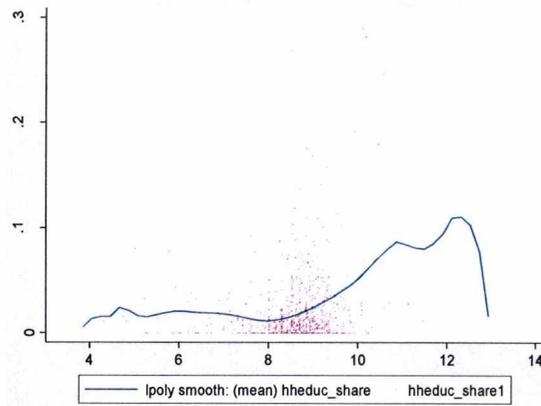


Figure 4-2:
Sample of Households where children work



Kernel-weighted local polynomial smoothing: Budget Share of Tobacco and Log of Household income

Figure 4-3:
Sample of Households where children don't work

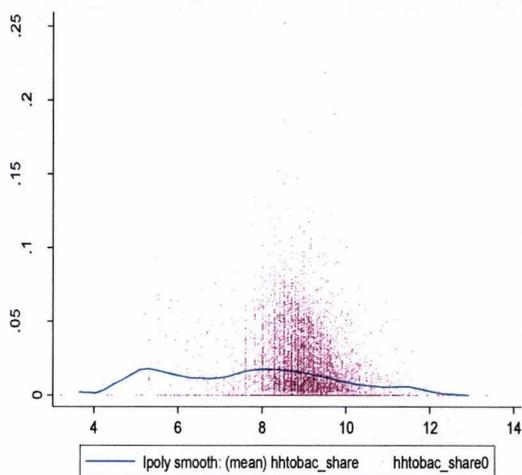
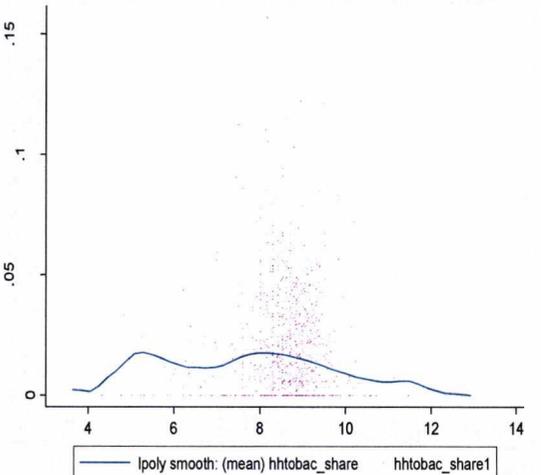


Figure 4-4:
Sample of Households where children work



To explore the relationship between education expenditure shares and income, in figure 4-1 we plot the smoothed values of a kernel-weighted local polynomial regression of the log of household income on the log of education expenditure. Using the sample of households where children do not participate in the labour force for the scatter plot, its

location on the graph suggests that education is a luxury good where the budget share of education in the household rises sharply as income rises. Tobacco on the other hand as can be seen in Figure 4-3 is a necessity where the budget share gradually decreases as income rises⁵⁹ Figure 4-2 and 4-4 include a scatter plot for the sample of those households where at least one child engages in child labour. The figures show that education is a luxury good and tobacco a necessity, for those households as well where children work.

Results and Discussion

For the purpose of this study we use cross sectional household data from Pakistan (PSLM) from 2007-2008 to explore whether the relationship between allocation of resources within the household and child labour is driven by parental preferences or external factors such as household poverty.

The model presented earlier in this chapter provides us with predictions regarding the effect on consumption of adult and child goods of a change in hours worked by the child and income, given the preference of the parent; and the effect on child consumption and hours worked by the child as the preferences of the parents vary.

Budget shares of private consumption goods that can be assigned to children or adults are commonly used in the literature to provide an important insight into the welfare of specific groups in the household. To gauge the intra-household allocation of resources, we assign budget shares on education associated expenditures to measure consumption on goods exclusively consumed by children; and the share of tobacco, pan and related goods for adults. Ray (2000) argues that consumption expenditure is a better measure of 'economic well-being than income.' Since household level data does not provide information on individual consumption, Deaton (1989) argues that assignable goods such as alcohol and tobacco can be used to gauge expenditure on adult goods and indirectly allow us to get an insight into child welfare as well.

Deaton (1989) studied the intra-household of resources, in particular if there was gender discrimination between children using household level expenditure data. He conjectured that holding income constant households with children should make fewer purchases on

⁵⁹ Scatter plot in figure 4-3 is for the sample of household where children do not participate in the labour force.

adult goods, and in particular if boys were favoured over girls then households with more boys should spend even less on adult related goods. Adult goods in his study were depicted by tobacco, alcohol and adult clothing. Tobacco, alcohol and adult clothing are popular choices in the literature for adult goods as they are exclusively consumed by them (Deaton and Muellbauer, 1986). Since our data is from Pakistan which is a Muslim country where the consumption of alcohol is forbidden we cannot gauge expenditure on it. Our data also does not provide us with any other exclusive adult good such as clothing. We however do have data on tobacco, pan, betel nut and cigarettes; and we use expenditure on them to capture consumption of goods exclusively consumed by adults.

The Working-Leser form also known as the PIG-LOG model is a popular fit for cross sectional data in the literature where budget share is a linear function of the logarithm of total expenditure (Deaton and Muellbauer, 1986; Deaton, 1989). These preferences also form the basis of the Almost Ideal Demand System model proposed by Deaton and Muellbauer (Strom 1998). We use standard⁶⁰ empirical engel curves as seen in equation 15 below to determine budget shares of tobacco and education in the household where budget share w_k (composed of expenditure on good k , $p_k q_k$ divided by total household expenditure, x) is related linearly to the logarithm of total expenditure.⁶¹ The demographic profile of the household is captured by the logarithm of total household size, n and the number of people in $j-1$ categories of sex and age⁶², vector z includes dummy variables for other household characteristics such as region, province, logarithm of educational level and age of the household head, and u denotes the error term that embodies unobservable household preferences (Deaton and Muellbauer, 1986; Deaton, 1989).⁶³

$$w_k = \frac{p_k q_k}{x} = \alpha_k + \beta_k \ln x + \delta_k \ln n + \sum_1^{j-1} \tau_{kj} n_j + \mu_k \bullet z + u_k \quad (15)$$

Following Deaton's (1989) approach all households are included in our regressions whether they consume tobacco and educational goods or not. We argue that a

⁶⁰ Deaton (1997)

⁶¹ In following with Deaton (1989) we do not consider price variation since the data used in this study was collected over single year.

⁶² One category is eliminated to avoid the dummy variable trap.

⁶³ Adapted from Deaton (1989)

household's decision to send their child to work will not only affect how much they consume of a good (the consumption decision), but also whether to consume that good or not (the participation decision). By including households that do not report positive educational and tobacco expenditure both types of decisions are captured (Deaton, 1989).

Table 4-4 in the appendix shows that there is a negative relationship between log of total household expenditure and log of tobacco share, indicating that tobacco, pan and related goods are necessities. The budget share of education on the other hand increases as total household expenditures rise suggesting that education is a luxury good. These results are in keeping with the relationship between income and expenditure we explored in the previous section. Both goods however are normal goods as expenditure on them increases as total household expenditure increases.

It can be argued however that total household expenditure is endogenous to budget shares as expenditure on say education and total household expenditure may be chosen simultaneously. This can be because, a household that spends a large amount on education might also have an unusually large total expenditure; and budget share is a component of total expenditure as total expenditure appears on both the left and right side of the equation (Haque, 2005; Lluch et. al, 1977; Strom, 1998; Liviatan, 1961). To avoid inconsistent estimates we use two stage least squares instrumental variable regression and instrument log of total household expenditure with log of total monthly household income.⁶⁴ The log of disposable non-asset income has been used extensively in the literature to instrument total expenditure (Haque, 2005; Lluch et. al, 1977; Strom, 1998; Liviatan, 1961). Liviatan (1961) argued that non asset monthly income while being strongly correlated to total expenditure is not correlated to budget shares making it an efficient instrument. He asserted that according to the permanent income hypothesis consumption decisions are not made on income that has 'temporary' components and since income variables found in cross sectional data measure income over a short period of time, typically a month and do not include other sources of income such as from assets, it is by no means a representative of the 'true' economic concept of income. Table 4-1 also shows that tobacco and related products are necessities whereas education is a luxury. The regression controls for household

⁶⁴ Excluding child income and income from assets

composition such as age and sex of members⁶⁵, and the household size. Specifically male and female household members are separated into eight demographic groups of age groups 0-4 years, 5-14 years, 15-55 years, and over 55⁶⁶.

Table 4-1: Budget Shares -Instrumenting Expenditure by Income

	(1) Tobacco Share	(2) Education Share
Log of total household expenditure	-0.000648 (-0.69)	0.0356*** (15.42)
Log of household size	-0.00389** (-3.05)	-0.00424 (-1.75)
Male Age 0_2	0.000802* (1.97)	-0.0106*** (-14.87)
Male Age 3_4	0.000133 (0.30)	-0.00577*** (-7.52)
Male Age 5_14	0.000120 (0.55)	0.00272*** (6.07)
Male Age 15_54	0.00132*** (5.73)	-0.00220*** (-4.40)
Male Age 55 and above	0.00204*** (3.54)	-0.00738*** (-7.06)
Female Age 0_2	0.000814 (1.89)	-0.00762*** (-10.40)
Female Age 3_4	-0.0000164 (-0.04)	-0.00647*** (-8.46)
Female Age 5_14	0.0000368 (0.16)	0.00148*** (3.43)
Female Age 15_54	-0.000300 (-1.39)	0.000140 (0.27)
Urban	-0.00335*** (-7.30)	0.00829*** (9.21)
Punjab	0.00558*** (10.05)	0.0106*** (11.17)
Sindh	0.00810*** (13.58)	0.000668 (0.73)
Khyber Pakhtunkhwa	-0.00289*** (-5.93)	0.0115*** (8.65)
Log age of household head	0.00171 (1.31)	-0.00805*** (-3.92)
Household head years of education	-0.000966*** (-14.22)	0.000755*** (5.66)
Constant	0.0232** (2.96)	-0.278*** (-15.48)
<i>N</i>	9849	9849
Wald chi2(17)	1155.79	2151.78
Prob > chi2	0.0000	0.0000
R-squared	0.1064	0.2505

t statistics in parentheses

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

⁶⁵ The category females aged 55 and above are left out from the regression to avoid the dummy variable trap.

⁶⁶ Similar to Deaton's specification (1989)

The results show that as the number of males between the age of 0-2, 15-54 and above 55 in the household increase the budget share of tobacco in the household increases. As the log of household size increases however the expenditure share of tobacco falls, as does belonging to an urban neighborhood or living in the province of Khyber-Pakhtunkhwa. The more educated the household head is the lower the expenditure share of tobacco.

Education as can be seen in Table 4-1 is a luxury good. As the number of individuals in the male and female demographic group between the ages 5-14 years increase the budget share on education rises. It can perhaps be inferred that the presence of boys and girls of school going age (5-14) increases the budget share of education. However, as the number of males in any other age group increases the expenditure share of education in the household falls. Belonging to an urban neighborhood and the level of education of the household head have a positive effect on the budget share of education.

The error term, among other things, contains the effect of variables not included as independent variable in the regression but which influence the dependant variable. We argue that parental preferences play a vital role in determining the share of resources adults and children receive in the household. Hence once the standard constraints in the tobacco and education share regressions such as total household expenditure, region, province, age and sex of household members, age and education of the household head, and the size of the household in the budget share regressions are controlled for, we argue that a large component of the residual should be composed of preferences. Using the residuals from the tobacco and education regressions in the probit on child labour, we see if these parental preferences play any role in determining the decision to send children to work.

In a typical family the household head essentially has two decisions to make, whether to send the child to work and if so then for how many hours. Our sample of 12131 households from the PSLM data 2007/2008 comprises of only 987 households that send their children out to work. This shows that the majority of households do not engage in child labour and suggest that the key margin to explore is child participation in the labour force as opposed to the number of hours worked by the child. Table 4-2 shows the determinants of child labour along with the residuals from the budget share regressions.



Table 4-2: Probit – Determinants of Child Labour

	(1) Child under the age of 17 working	(2) Child under the age of 17 working
Log of total household expenditure	-0.477 ^{***} (-9.25)	-0.574 ^{***} (-10.69)
Log of household size	0.915 ^{***} (6.99)	0.927 ^{***} (7.07)
Male Age 0_2	-0.257 ^{***} (-6.00)	-0.237 ^{***} (-5.50)
Male Age 3_4	-0.248 ^{***} (-5.37)	-0.235 ^{***} (-5.06)
Male Age 5_14	0.0646 ^{**} (2.90)	0.0630 ^{**} (2.82)
Male Age 15_54	0.157 ^{***} (7.41)	0.162 ^{***} (7.59)
Male Age 55 and above	-0.0460 (-0.92)	-0.0379 (-0.76)
Female Age 0_2	-0.235 ^{***} (-5.48)	-0.219 ^{***} (-5.09)
Female Age 3_4	-0.301 ^{***} (-6.21)	-0.289 ^{***} (-5.96)
Female Age 5_14	-0.0185 (-0.82)	-0.0200 (-0.88)
Female Age 15_54	-0.0293 (-1.35)	-0.0305 (-1.40)
Urban	0.214 ^{***} (5.52)	0.223 ^{***} (5.73)
Punjab	0.439 ^{***} (7.69)	0.443 ^{***} (7.74)
Sindh	0.415 ^{***} (6.84)	0.418 ^{***} (6.87)
Khyber Pakhtunkhwa	0.163 [*] (2.44)	0.153 [*] (2.28)
Log age of household head	0.0685 (0.62)	0.0862 (0.78)
Household head years of education	-0.0518 ^{***} (-9.77)	-0.0484 ^{***} (-9.08)
Tobacco Residual	2.367 ^{**} (2.76)	
Education Residual		-5.208 ^{***} (-7.60)
Constant	0.799 (1.48)	1.563 ^{**} (2.82)
<i>N</i>	12131	12131
LR chi2(18)	817.47	877.94
Prob > chi2	0.0000	0.0000
Pseudo R2	0.1222	0.1313

t statistics in parentheses

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

The results show that as the log of total household expenditure increases the probability of a child working under the age of 17 falls. There is a positive relationship between household size and child labour. With regards to the gender and age categories we find that as the number of males in the household between the ages of 5 -14 and 15-54

increases the probability of child labour rises. However as the number of females and males from 0-2 years and 3-4 years rises the probability of a child 17 and under engaging in work falls. As the education level of the household head increase the probability of child labour decreases but belonging to an urban neighbourhood increases the chances of a child being sent out to work.

To test whether variations in child labour can be explained by variations in preferences we observe the sign and significance of the residual variables. We find that there is a positive significant relationship between the tobacco residual and child labour; and a negative significant one between the education residual and a child working. These results indicate selfish preferences where parents who consume more tobacco related goods systematically send more children to work. Similarly households who have lower budget shares of education related goods are more likely to engage in child labour.

The error term could also be capturing the effect of other omitted variables that determine expenditure on tobacco and education, and affect the child labour decision; or could simply just be capturing noise in the model. For instance we would get a positive relationship between education expenditure and residuals if in a household an adult decides to cut back on smoking due to health concerns, and channels that share of the budget towards education expenditure instead. The sign of the residual in this scenario would no longer be a signal of altruistic preferences. However we argue, that preferences which determine the weight of child welfare as given in the utility maximisation decision of the household should play a key large role in determining expenditure on adult and children goods, and hence constitute the bulk of the error term.

We also find the predicted probability of a child working at the mean of variables in Figure 4-8 allowing the residual to vary. At the lowest value of the residual for tobacco there is a 4 percentage point probability of a child working and the highest value the probability of a child engaging in child labour is 14 percentage points.⁶⁷ For the education residual we find that the change is larger at 18 percentage points⁶⁸.

As a robustness check we run a probit on child labour without the sex and age variables. The results in Table 4-3 below are similar to the results in Table 4-2 we find that the

⁶⁷ See figure 4-8 in Appendix

⁶⁸ See figure 4-9 in Appendix

probability of engaging in child labour rises, as household size increases and if they belong to an urban region, but falls as total household expenditure rises and the educational level of the household head increases. In addition the tobacco residual is positive and significant and the education residual negative and strongly significant, suggesting selfish preferences.

Table 4-3: Preferences and Child Labour

	(1) Child under the age of 17 working	(2) Child under the age of 17 working
Log total household expenditure	-0.396*** (-8.22)	-0.520*** (-10.22)
Log household size	0.856*** (15.64)	0.915*** (16.44)
Urban	0.246*** (6.53)	0.251*** (6.64)
Punjab	0.349*** (6.35)	0.351*** (6.36)
Sindh	0.354*** (6.02)	0.358*** (6.07)
Khyber Pakhtunkhwa	0.0572 (0.89)	0.0406 (0.63)
Log age household head	0.484*** (7.25)	0.499*** (7.44)
Education household head	-0.0490*** (-9.70)	-0.0458*** (-9.01)
Tobacco residual	2.436** (2.92)	
Education residual		-6.238*** (-8.78)
Constant	-0.990* (-2.43)	-0.0461 (-0.11)
<i>N</i>	12131	12131
LR chi2(9)	516.65	599.78
Prob > chi2	0.0000	0.0000
Pseudo R2	0.0773	0.0897

t statistics in parentheses

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

As an additional robustness check we use a sub sample of households where extended families reside, identified by the relationship to household head specifically if grandchildren are present. The results⁶⁹ in accordance with the ones in Table 4-1 show that education is a luxury good, and the relationship between the budget share of tobacco products and the log of household size is negative. As before, we also find that the share of education expenditure in the household rises and tobacco expenditure falls, as the education level of the household head increases. We then use the residuals from

⁶⁹ Table 4-5 in the Appendix

the budget share regressions of extended families to see if they help determine child labour, and similar to our earlier results we find a positive significant relationship between the tobacco residual and child working; and a negative significant one between the education residual and child labour, indicating selfish preferences.⁷⁰

Whether child labourers have to forgo schooling if they work depends on if schooling and leisure are substitutes or complements. If they are substitutes then children may not give up schooling, and though may not have time for additional help after school are still able to attend it (Ravallion, 2000). Moreover if primary schools offer ‘double shifts’ children may be able to combine schooling and child labour (Ravallion, 2000). In fact economies where specific knowledge is important, children may be able to enhance their returns from education with skills learnt at the workplace; suggesting complementarities between the two (Basu, 1999; Dumas, 2007; Ravallion, 2000; Brown and Stern, 2002). In some instances child income may enhance the probability of a child attending school (Basu, 1999; Brown and Stern, 2002). Research on child labour from rural India suggests that child labour is often ‘light’ with many children working less than three hours a day so that children can combine work with education (Basu, 1999).

We restrict the sample to households where children both earn a positive wage and are currently enrolled in school to see whether our results are robust to this specification. The results remain similar to our initial findings and the education residual remain negative and highly significant whereas the tobacco residual positive and significant. This confirms our initial findings of selfish preferences.⁷¹

Conclusion, Policy Implications and Limitations

This paper attempts to investigate whether the variation between allocation of resources in the household and child labour can be explained by parental preferences (how altruistic they are) or external constraints such household poverty. We run standard expenditure regressions on assignable consumption goods such as budget share of education related goods for children and budget share of tobacco expenditure for adults, the residuals from these regressions of which preferences are a large component are extracted to investigate their impact on the determination of child labour. The

⁷⁰ Results are reported in Table 4-6 in the Appendix

⁷¹ Results are reported in Table 4-7 and 4-8 in the Appendix

probability of child labour in households where parents have a higher budget share of tobacco and a lower budget share of education is higher, indicating selfish preferences.

Policy recommendations in the literature are divided between legal bans and ‘collaborative interventions’ which implement an economic environment that would enable parents to willingly remove their children from work (Basu, 1999). Examples of such interventions are free meals in school, easy access to good quality schools, and efforts to increase adult wages (Basu, 1999). Bhalotra (2007) argues that if child labour is caused by poverty, then economic policy tailored to compensate households for loss of earnings, such as Food for Education Programme in Bangladesh would be successful. An enrolment subsidy, provision of good quality schools, increased awareness of hazardous forms of child labour and economic incentives for poor families are some popular policy initiatives taken to reduce child labour (Ravallion, 2000; Anker, 2000).

State intervention is however recommended by policy makers to prevent parents who are selfish from ‘extracting services from their children’ (Brown and Stern, 2002). Given our results showing that variation in child labour may be explained by variations in preferences as opposed to being driven by need such as household poverty, we argue that perhaps child labour should be banned as it lowers the welfare of children in the household. Child labour reduces a child’s leisure time and may also come at the cost of schooling. Children who combine child labour and education may also be too tired to concentrate in class or find it difficult to do homework, making it difficult for them to keep up.

International initiatives to curb child labour include enforcement of ‘international labour standards’ which set a guideline for minimum conditions that need to be met, failure of which can lead to trade sanctions (Basu, 1999). It is also argued that globalization increases the demand for cheap labour, which raises the wage of child labour, which in turn reduces the returns to education. Bhalotra (2007) argues that unless policies are accompanied by an increase in the returns to education they will not be successful in reducing child labour. However if parents are sending their children to work to increase their own consumption and welfare in the household, then increases in returns to education may do little to discourage it. In such contexts trade sanctions on countries engaging in child labour may prove to be an important means of lowering child labour.

There are strong arguments for legally banning child labour in its worst forms such as under bonded labour and hazardous work conditions (Basu, 1999). Child labour in the past has been associated with corporal punishment, sexual exploitation and may also have negative psychological effect on children (Basu and Van, 1998). For these reasons and many others, it is imperative to evaluate policy instruments used in the past to reduce child labour.

Important lessons can be drawn from the decline in child labour in developed countries. Basu (1999) points out how no country presently has child labour participation rates as high as Britain in the middle of the last century. Increased prosperity linked to economic growth, higher adult wages, along with technological progress that rendered menial jobs done by children useless, played a vital role in reducing the incidence of child labour in the developed world (Brown and Stern, 2002). Laws that initially reduced and eventually banned child labour and replaced it with compulsory education, combined with economic prosperity led to the eventual demise of child labour (Basu, 1999).

If children are performing tasks that can easily be replaced via technological advancement, then banning dangerous tasks may prove to be a catalyst to encouraging innovation (Brown and Stern, 2002). However Ray (2000) stresses that if child labour is banned then children who continue to work in spite of that may become invisible and vulnerable to working in hazardous conditions. Basu (1999) argues that while a child ban is difficult to implement, compulsory schooling is easier to monitor. For those children who continue to combine work with school, compulsory schooling may hinder full time work. Given that working and education are not necessarily mutually exclusive activities, this might prove to be a more desirable alternative.

In our paper we assume a strict complementarity between child and adult utility. However if child utility is a luxury good then we should expect the share of children in the household to increase with income.

Another limitation of this study is that statistics on child labour may not be accurate as they are likely to be under reported, especially in countries where they are prohibited. In most developed countries child labour is illegal whereas other countries such as Pakistan, Bangladesh and India have banned child labour in hazardous conditions and

for very young children (Basu, 1999). Children working on family enterprises also may not be performing paid work and hence their work could go unreported.

Bibliography

- Anker, R. (2000). The economics of child labour: A framework for measurement. *International Labour Review*, 139(3), 257-280.
- Annual Status of Education Report (ASER) Pakistan. 2012. Retrieved from http://www.aserPakistan.org/document/report_cards/2012/summary_report_cards/National.pdf
- Baland, J., & Robinson, A. J. (2000). Is Child Labour Inefficient? *Journal of Political Economy*, 108 (4), 663-679.
- Basu, K. (1999). Child Labour: Cause, Consequence, and Cure, with Remarks on International Labour Standards. *Journal of Economic Literature*, 37(3), 1083-1119.
- Basu, K., & Ray, R. (2002). The Collective Model of the Household and an Unexpected Implication for Child Labour: Hypothesis and an Empirical Test. *World Bank Policy Research Working Paper*, 2813.
- Basu, K., & Tzanntos, Z. (2003). The Global Child Labour Problem: What Do We Know and What Can We Do? *The World Bank Economic Review*, 17(2), 147-173.
- Basu, K., & Van, H. P. (1998). The Economics of Child Labour. *The American Economic Review*, 88(3), 412-427.
- Behrman, R. J., Pollak, A. R., & Taubman, P. (1982). Parental Preferences and Provision for Progeny. *Journal of Political Economy*, 90(1), 52-73.
- Brown, D.K., Deardorff, A.V., & Stern, R.M. (2002). The Determinant of Child Labour: Theory and evidence". *RSIE Discussion Paper*, 486.
- Bhalotra, R. S., & Attfield, C. (1998). Intrahousehold Resource Allocation in Rural Pakistan: A Semiparametric Analysis. *Journal of Applied Econometrics*, 13, 463-480.
- Child Care Foundation Pakistan. Do You Know? 2010. Retrieved from http://www.ccfp.org.pk/do_you_know.html
- Chowa, G., Ansong, D., & Masa, R. (2010). Assets and child well-being in developing countries: A research review. *Children and Youth Services Review*, 32, 1508-1519.

- Cockburn, J. (2001). Child Labour versus Education: Poverty Constraints or Income Opportunities? Paper presented at a Conference on Opportunities in Africa: Micro-evidence on firms and households, April.
- Deaton, A., & Muellbauer, J. (1980). An Almost Ideal Demand System. *The American Economic Review*, 70(3), 312-326.
- Deaton, A., & Muellbauer, J. (1986). On Measuring Child Costs: With Applications to Poor Countries. *Journal of Political Economy*, 94(4), 720-744.
- Deaton, A. (1989). Looking for Boy-Girl Discrimination in Household Expenditure Data. *The World Bank Economic Review*, 3(1), 1-15.
- Deaton, A. (1997). *The Analysis of Household Surveys*. Baltimore, Maryland: John Hopkins University Press for the World Bank.
- Dessy, E.S. (2000). A Defense of Compulsive Measures against Child Labour. *Journal of Development Economics*, 62, 261-275.
- Edmonds, V. E. (2005). Does Child Labour Decline with Improving Economic Status? *The Journal of Human Resources*, 40(1), 77-99.
- Edmonds, V. E. (2006). Child Labour and Schooling Responses to Anticipated Income in South Africa. *Journal of Development Economics*, 81, 386-414.
- Fafchamps, M., & Wahba, J. (2006). Child Labour, urban proximity, and household composition. *Journal of Development Economics*, 79, 374-397.
- Galli, R. (2001). The economic impact of child labour. *IILS Decent Work Research Programme Working Paper*, 128.
- Grosh, E. M., & Glewwe, P. (1998). Data Watch: The World Bank's Living Standards Measurement Study Household Surveys. *The Journal of Economic Perspectives*, 12(1), 187-196.
- Haque, M. O. (2006). *Income elasticity and economic development: Methods and Applications* (Vol. 42). Springer
- Hazarika, G., & Bedi, S. A. (2003). Schooling Costs and Child Work in Rural Pakistan. *The Journal of Development Studies*, 39(5), 29-64.
- Heady, C. (2003). The Effect of Child Labour on Learning Achievement. *World Development*, 31(2), 385-398.
- Hou, X. (2011). Women's Decision Making Power and Human Development: Evidence from Pakistan. *World Bank Policy Research Working Paper*, 5830.

- Kanbur, R., & Haddad, L. (1994). Are better of households more unequal or less unequal? *Oxford Economic Papers*, 46, 445-458.
- Labour Force Statistics, 2008-2009. Pakistan Bureau of Statistics, Government of Pakistan. Retrieved from: http://www.pbs.gov.pk/sites/default/files/Labour%20Force/publications/lfs2008_09/t08.pdf
- Liviatan, N. (1961). Errors in Variables and Engel Curve Analysis. *Econometrica*, 29(3), 336-362.
- Lloyd, B. C., Mete, C., & Grant, J. M. (2009). The implications of changing educational and family circumstances for children's grade progression in rural Pakistan: 1997–2004. *Economics of Education Review*, 28, 152-160.
- Lloyd, B. C., & Sathar, A. Z. (2005). The Effect of Gender Differences in Primary School Access, Type, and Quality on the Decision to Enrol in Rural Pakistan. *Economic Development and Cultural Change*, 53(3), 685-710.
- Lluch, C., Powell, A.A., Williams, A. R. (1977) *Patterns in Household Demand and Saving*. (pp. 27-34). A World Bank Research Publication. Oxford University Press.
- Lodhi, S. A., Tsegai, D., & Gerber, N. (2011). Determinants of participation in child's education and alternative activities in Pakistan. *ZEF-Discussion Papers on Development Policy*, 159.
- Lundberg, J. S., Pollack, A. R., & Wales, J. T. (1997). Do Husbands and Wives Pool Their Resources? Evidence from the United Kingdom Child Benefit. *The Journal of Human Resources*, 32(3), 463-480.
- Moehling, M. C. (2005). 'She has suddenly become powerful': Youth Employment and Household Decision-Making in the Early Twentieth Century. *Journal of Economic History*, 65, 414-438.
- Mansuri, G. (2006). Migration, School Attainment and Child Labour: Evidence from Rural Pakistan. *World Bank Policy Research Working Paper*, 3945.
- Parsons, O. D., & Goldin, C. (1989). Parental Altruism and Self-Interest: Child Labour among Late Nineteenth-Century American Families. *Economic Inquiry*, 27(4), 637-659.
- Ravallion, M., & Wodon, Q. (2000). Does Child Labour Displace Schooling? Evidence on Behavioural Responses to an Enrolment Subsidy. *The Economic Journal*, 110, C158-C175.

- Ray, R. (2000). Analysis of Child Labour in Peru and Pakistan: A Comparative Study. *Journal of Political Economy*, 13, 3-19.
- Ray, R. (2002). Simultaneous Analysis of Child Labour and Child Schooling: Comparative Evidence from Nepal and Pakistan. *Economic and Political Weekly*, 37(52), 5215-5224.
- Ray, R. (2003). The Determinants of Child Labour and Child Schooling in Ghana. *Journal of African Economies*, 11(4), 561-590.
- Rosati, C. F., & Rossi, M. (2003). Children's Working Hours and School Enrolment: Evidence from Pakistan and Nicaragua. *The World Bank Economic Review*, 17(2), 283-295.
- Strom, S. (1998). *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*. Cambridge University Press.
- Swinnerton, A.K., & Rogers, A. C. (1999). The Economics of Child Labour: Comment. *The American Economic Review*, 89(5), 1382-1385.
- UNICEF Pakistan Statistics. Retrieved from:
http://www.unicef.org/infobycountry/pakistan_pakistan_statistics.html#104

Appendix A

Table 4-4: Budget Shares of Tobacco and Educational Expenditure

	(1) Tobacco Share	(2) Education Share
Log of total household expenditure	-0.00505*** (-11.91)	0.0265*** (30.41)
Log of household size	-0.00139 (-1.40)	-0.00434* (-2.12)
Male Age 0_2	0.00126*** (3.34)	-0.0104*** (-13.45)
Male Age 3_4	0.000203 (0.49)	-0.00602*** (-7.11)
Male Age 5_14	0.000219 (1.08)	0.00286*** (6.82)
Male Age 15_54	0.00181*** (9.11)	-0.00122** (-2.99)
Male Age 55 and above	0.00148** (3.04)	-0.00627*** (-6.28)
Female Age 0_2	0.00126*** (3.37)	-0.00767*** (-10.00)
Female Age 3_4	0.000320 (0.76)	-0.00625*** (-7.20)
Female Age 5_14	0.0000362 (0.18)	0.00168*** (3.98)
Female Age 15_54	-0.000356 (-1.77)	0.000400 (0.97)
Urban	-0.00231*** (-6.07)	0.0117*** (14.94)
Punjab	0.00600*** (11.37)	0.0127*** (11.72)
Sindh	0.00856*** (14.95)	0.00161 (1.37)
Khyber Pakhtunkhwa	-0.00291*** (-4.89)	0.0148*** (12.10)
Log age of household head	0.00452*** (4.71)	-0.00710*** (-3.60)
Household head years of education	-0.000633*** (-13.75)	0.00111*** (11.76)
Constant	0.0462*** (10.41)	-0.204*** (-22.29)
<i>N</i>	12131	12131
F(17, 12113)	89.07	239.32
Prob > F	0.0000	0.0000
R-squared	0.1111	0.2514
Adj R-squared	0.1099	0.2504

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4-5: Budget Shares of Tobacco and Educational Expenditure (Sample - Living with Extended Family)

	(1) Education Share	(2) Tobacco Share
Log of total household expenditure	0.0273*** (5.89)	0.000831 (0.40)
Log of household size	-0.0000719 (-0.02)	-0.0102*** (-3.75)
Male Age 0_2	-0.00785*** (-6.02)	0.000984 (1.34)
Male Age 3_4	-0.00169 (-1.20)	0.00161* (2.15)
Male Age 5_14	0.00219** (2.68)	0.000268 (0.75)
Male Age 15_54	-0.00115 (-1.38)	0.00135** (3.29)
Male Age 55 and above	-0.00546** (-2.71)	0.00233 (1.69)
Female Age 0_2	-0.00477*** (-3.55)	0.000348 (0.50)
Female Age 3_4	-0.00297* (-2.09)	0.000786 (1.03)
Female Age 5_14	0.00114 (1.58)	0.000399 (1.03)
Female Age 15_54	-0.0000805 (-0.10)	0.0000288 (0.07)
Urban	0.00496** (2.89)	-0.00328*** (-3.36)
Punjab	0.00796*** (3.87)	0.00282* (2.30)
Sindh	0.00375 (1.88)	0.00832*** (5.68)
Khyber Pakhtunkhwa	0.00979*** (4.13)	-0.00473*** (-4.53)
Log age of household head	-0.00425 (-0.68)	0.00103 (0.25)
Household head years of education	0.000919*** (3.39)	-0.00104*** (-6.26)
Constant	-0.230*** (-6.14)	0.0249 (1.37)
<i>N</i>	1798	1798
Wald chi2(17)	307.08	243.56
Prob > chi2	0.0000	0.0000
R-squared	0.1929	0.1215

t statistics in parentheses

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

Table 4-6: Determinants of Child Labour (Sample - Living with Extended Family)

	(1) Child under the age of 17 working	(2) Child under the age of 17 working
Log of total household expenditure	-0.531*** (-10.12)	-0.473*** (-9.16)
Log of household size	0.905*** (6.90)	0.900*** (6.87)
Male Age 0_2	-0.252*** (-5.85)	-0.257*** (-5.99)
Male Age 3_4	-0.256*** (-5.52)	-0.245*** (-5.29)
Male Age 5_14	0.0657** (2.94)	0.0650** (2.91)
Male Age 15_54	0.156*** (7.34)	0.157*** (7.41)
Male Age 55 and above	-0.0479 (-0.96)	-0.0454 (-0.91)
Female Age 0_2	-0.234*** (-5.44)	-0.236*** (-5.51)
Female Age 3_4	-0.307*** (-6.34)	-0.299*** (-6.17)
Female Age 5_14	-0.0182 (-0.80)	-0.0177 (-0.78)
Female Age 15_54	-0.0294 (-1.34)	-0.0285 (-1.31)
Urban	0.240*** (6.16)	0.215*** (5.52)
Punjab	0.458*** (7.98)	0.433*** (7.56)
Sindh	0.402*** (6.60)	0.415*** (6.85)
Khyber Pakhtunkhwa	0.162* (2.41)	0.158* (2.37)
Log age of household head	0.0664 (0.60)	0.0668 (0.61)
Household head years of education	-0.0492*** (-9.25)	-0.0519*** (-9.79)
Education Residual	-5.208*** (-7.60)	
Tobacco Residual		2.367** (2.76)
Constant	1.313* (2.39)	0.803 (1.48)
N	12131	12131
LR chi2(18)	877.94	817.47
Prob > chi2	0.0000	0.0000
Pseudo R2	0.1313	0.1222

t statistics in parentheses

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

Table 4-7: Budget Shares of Tobacco and Educational Expenditure (Sample - Attend School and Work)

	(1) Tobacco share	(2) Education share
Log of total household expenditure	-0.00137 (-1.40)	0.0383*** (13.74)
Log of household size	-0.000697 (-0.46)	-0.00904** (-2.81)
Male Age 0_2	-0.00000177 (-0.00)	-0.00903*** (-9.85)
Male Age 3_4	-0.0000233 (-0.05)	-0.00598*** (-6.24)
Male Age 5_14	0.000510* (2.16)	0.00142** (2.61)
Male Age 15_54	0.00100*** (4.06)	-0.00199** (-3.28)
Male Age 55 and above	0.00126* (2.12)	-0.00774*** (-5.82)
Female Age 0_2	0.000398 (0.91)	-0.00627*** (-6.68)
Female Age 3_4	-0.000122 (-0.25)	-0.00717*** (-7.41)
Female Age 5_14	0.000294 (1.20)	0.000643 (1.24)
Female Age 15_54	-0.000495* (-2.15)	0.000373 (0.60)
Urban	-0.00250*** (-5.26)	0.00960*** (8.76)
Punjab	0.00471*** (7.74)	0.0107*** (8.64)
Sindh	0.00657*** (10.01)	0.00102 (0.83)
Khyber Pakhtunkhwa	-0.00328*** (-6.19)	0.0144*** (8.74)
Log age of household head	0.00180 (1.29)	-0.00603* (-2.18)
Household head years of education	-0.000807*** (-11.04)	0.000721*** (4.25)
Constant	0.0225** (2.69)	-0.295*** (-13.34)
<i>N</i>	7405	7405
Wald chi2(17)	765.38	1307.33
Prob > chi2	0.0000	0.0000
R-squared	0.0937	0.2208

t statistics in parentheses

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

Table 4-8: Determinants of Child Labour (Sample - Attend School and Work)

	(1) Child under the age of 17 working	(2) Child under the age of 17 working
Log of total household expenditure	-0.478*** (-9.29)	-0.588*** (-10.84)
Log of household size	0.922*** (7.05)	0.952*** (7.25)
Male Age 0_2	-0.259*** (-6.04)	-0.246*** (-5.71)
Male Age 3_4	-0.249*** (-5.38)	-0.234*** (-5.03)
Male Age 5_14	0.0655** (2.94)	0.0697** (3.12)
Male Age 15_54	0.156*** (7.37)	0.161*** (7.54)
Male Age 55 and above	-0.0479 (-0.96)	-0.0360 (-0.72)
Female Age 0_2	-0.236*** (-5.51)	-0.226*** (-5.26)
Female Age 3_4	-0.301*** (-6.21)	-0.286*** (-5.88)
Female Age 5_14	-0.0179 (-0.79)	-0.0156 (-0.69)
Female Age 15_54	-0.0297 (-1.37)	-0.0318 (-1.45)
Urban	0.216*** (5.57)	0.216*** (5.55)
Punjab	0.437*** (7.65)	0.443*** (7.74)
Sindh	0.411*** (6.77)	0.416*** (6.84)
Khyber Pakhtunkhwa	0.162* (2.42)	0.138* (2.05)
Log age of household head	0.0687 (0.63)	0.0757 (0.69)
Household head years of education	-0.0514*** (-9.70)	-0.0482*** (-9.04)
Tobacco Residual	2.367** (2.76)	
Education Residual		-5.208*** (-7.60)
Constant	0.797 (1.47)	1.656** (2.97)
N	12131	12131
LR chi2(18)	817.47	877.94
Prob > chi2	0.0000	0.0000
Pseudo R2	0.1222	0.1313

t statistics in parentheses

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

Figure 4-5: Number of Children

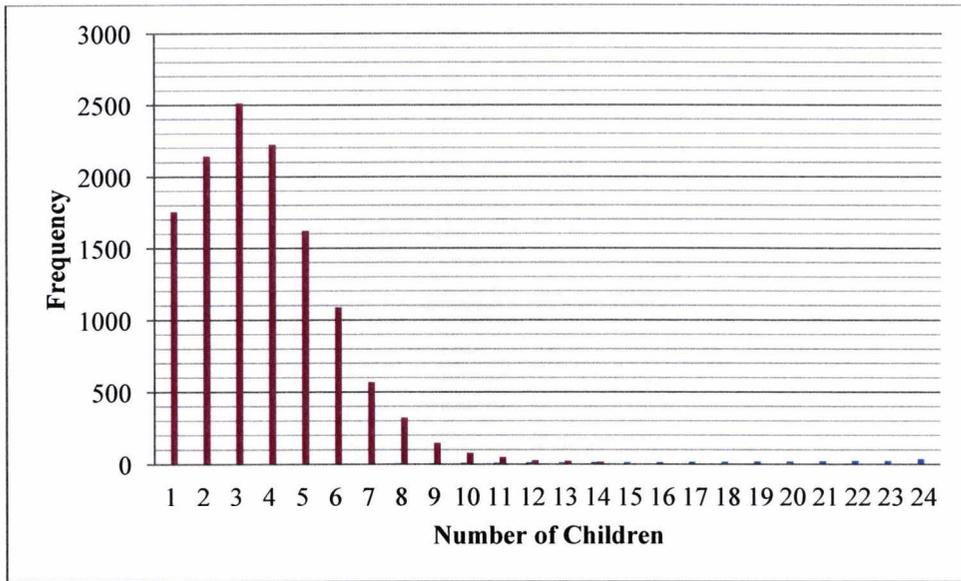


Figure 4-6: Composition of Household Expenditure on Tobacco and related goods

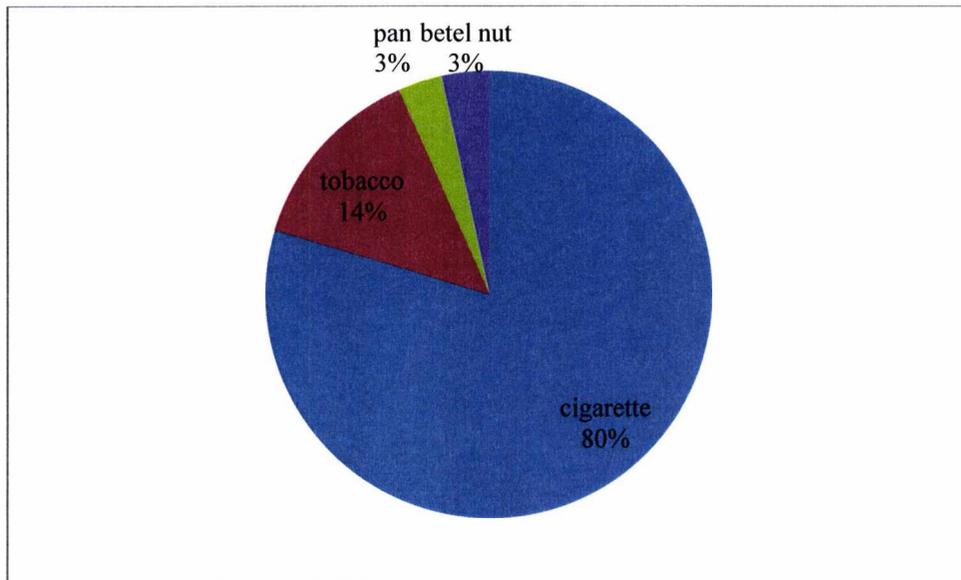


Figure 4-7: Composition of Household Expenditure on Education and related goods

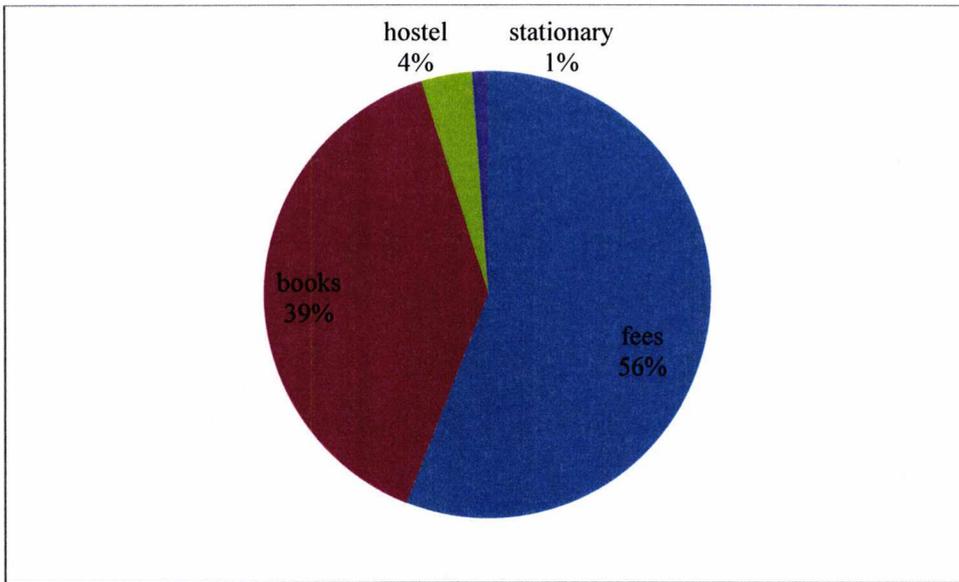


Figure 4-8: Predicted Probability of Childworking=1 and Tobacco Residuals

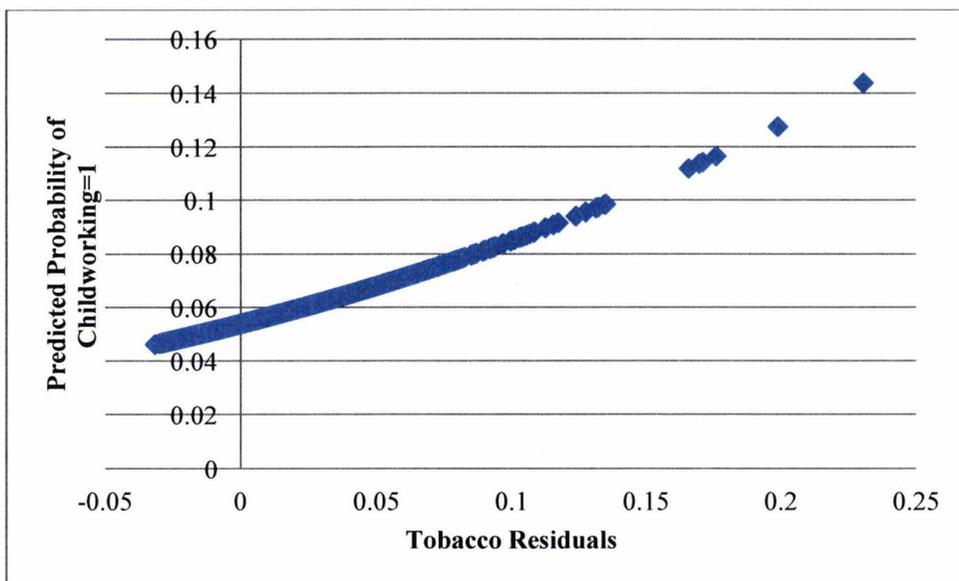
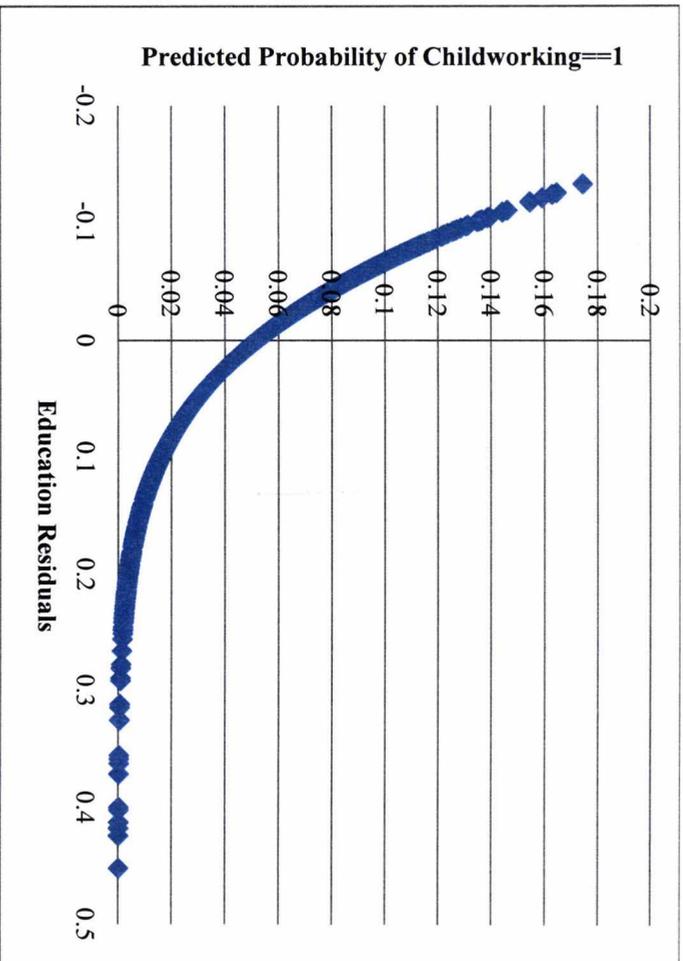


Figure 4-9: Predicted Probability of Childworking=1 and Education Residuals



Appendix B

$$U_c = [(wh + Y - \Omega)^\delta + (1-h)^\delta]^\frac{1}{\delta}$$

$$\frac{\partial U_c}{\partial h} = \frac{1}{\delta} [(wh + Y - \Omega)^\delta + (1-h)^\delta]^\frac{1-\delta}{\delta} [\delta(wh + Y - \Omega)^{\delta-1}(w) + \delta(1-h)^{\delta-1}(-1)] = 0$$

$$\frac{\partial U_c}{\partial h} = \frac{1}{\delta} [(wh + Y - \Omega)^\delta + (1-h)^\delta]^\frac{1-\delta}{\delta} [\delta w(wh + Y - \Omega)^{\delta-1} - \delta(1-h)^{\delta-1}] = 0$$

$$\frac{\partial U_c}{\partial h} = [(wh + Y - \Omega)^\delta + (1-h)^\delta]^\frac{1-\delta}{\delta} [w(wh + Y - \Omega)^{\delta-1} - (1-h)^{\delta-1}] = 0$$

$$[(wh + Y - \Omega)^\delta + (1-h)^\delta]^\frac{1-\delta}{\delta} w(wh + Y - \Omega)^{\delta-1} - [(wh + Y - \Omega)^\delta + (1-h)^\delta]^\frac{1-\delta}{\delta} (1-h)^{\delta-1} = 0$$

$$[(wh + Y - \Omega)^\delta + (1-h)^\delta]^\frac{1-\delta}{\delta} w(wh + Y - \Omega)^{\delta-1} = [(wh + Y - \Omega)^\delta + (1-h)^\delta]^\frac{1-\delta}{\delta} (1-h)^{\delta-1}$$

$$w = \frac{(1-h)^{\delta-1}}{(wh + Y - \Omega)^{\delta-1}}$$

$$w^\frac{1}{\delta-1} = \frac{(1-h)}{(wh + Y - \Omega)}$$

$$w^\frac{1}{\delta-1} (wh + Y - \Omega) = 1 - h$$

$$w^\frac{\delta}{\delta-1} h + h = -w^\frac{1}{\delta-1} Y + w^\frac{1}{\delta-1} \Omega + 1$$

$$h(w^\frac{\delta}{\delta-1} + 1) = 1 + w^\frac{1}{\delta-1} (\Omega - Y)$$

$$h = \frac{1 + w^\frac{1}{\delta-1} (\Omega - Y)}{(w^\frac{\delta}{\delta-1} + 1)}$$

$$C = w \left[\frac{1 + w^\frac{1}{\delta-1} (\Omega - Y)}{w^\frac{\delta}{\delta-1} + 1} \right] + Y - \Omega$$

$$C = \left[\frac{w + w^\frac{\delta}{\delta-1} (\Omega - Y)}{w^\frac{\delta}{\delta-1} + 1} \right] + Y - \Omega$$

$$C = \left[\frac{w + w^\frac{\delta}{\delta-1} \Omega - w^\frac{\delta}{\delta-1} Y}{w^\frac{\delta}{\delta-1} + 1} \right] + Y - \Omega$$

$$C = \frac{w}{w^\frac{\delta}{\delta-1} + 1} + \frac{w^\frac{\delta}{\delta-1} \Omega}{w^\frac{\delta}{\delta-1} + 1} - \Omega - \frac{w^\frac{\delta}{\delta-1} Y}{w^\frac{\delta}{\delta-1} + 1} + Y$$

$$C = \frac{w - \Omega + Y}{w^\frac{\delta}{\delta-1} + 1}$$

Plug in C and h into U_c

$$U_c = \Omega$$

$$\left[\left(\frac{w - \Omega + Y}{w^{\frac{\delta}{\delta-1}} + 1} \right)^\delta + \left(\frac{w^{\frac{\delta}{\delta-1}} - w^{\frac{1}{\delta-1}}\Omega + w^{\frac{1}{\delta-1}}Y}{w^{\frac{\delta}{\delta-1}} + 1} \right)^\delta \right]^{\frac{1}{\delta}} = \Omega$$

$$\left[\left(\frac{w - \Omega + Y}{w^{\frac{\delta}{\delta-1}} + 1} \right)^\delta + \left(\frac{w^{\frac{1}{\delta-1}}(w - \Omega + Y)}{w^{\frac{\delta}{\delta-1}} + 1} \right)^\delta \right]^{\frac{1}{\delta}} = \Omega$$

$$\left(\frac{w - \Omega + Y}{w^{\frac{\delta}{\delta-1}} + 1} \right)^\delta + \left(\frac{w^{\frac{1}{\delta-1}}(w - \Omega + Y)}{w^{\frac{\delta}{\delta-1}} + 1} \right)^\delta = \Omega^\delta$$

$$\frac{(w - \Omega + Y)^\delta}{(w^{\frac{\delta}{\delta-1}} + 1)^\delta} + \frac{[w^{\frac{1}{\delta-1}}(w - \Omega + Y)]^\delta}{(w^{\frac{\delta}{\delta-1}} + 1)^\delta} = \Omega^\delta$$

$$\frac{(w - \Omega + Y)^\delta + [w^{\frac{1}{\delta-1}}(w - \Omega + Y)]^\delta}{(w^{\frac{\delta}{\delta-1}} + 1)^\delta} = \Omega^\delta$$

$$\frac{(w - \Omega + Y)^\delta + w^{\frac{\delta}{\delta-1}}(w - \Omega + Y)^\delta}{(w^{\frac{\delta}{\delta-1}} + 1)^\delta} = \Omega^\delta$$

$$\frac{(w - \Omega + Y)^\delta}{(w^{\frac{\delta}{\delta-1}} + 1)^\delta} (1 + w^{\frac{\delta}{\delta-1}}) = \Omega^\delta$$

$$(w - \Omega + Y)^\delta (1 + w^{\frac{\delta}{\delta-1}})^{1-\delta} = \Omega^\delta$$

$$(w - \Omega + Y)(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}} = \Omega$$

$$(w + Y)(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}} = \Omega + \Omega(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}$$

$$(w + Y)(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}} = \Omega(1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}})$$

$$\frac{(w + Y)(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} = \Omega$$

Plug Ω into h

$$h = \frac{1 + w^{\frac{1}{\delta-1}}(\Omega - Y)}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

$$\frac{(w + Y)(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} = \Omega$$

$$h = \frac{1 + w^{\frac{1}{\delta-1}} \left(\frac{(w + Y)(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} - Y \right)}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

$$h = \frac{1 + w^{\frac{1}{\delta-1}} \left(\frac{(w + Y)(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} - \frac{Y(1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}})}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right)}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

$$h = \left[1 + w^{\frac{1}{\delta-1}} \left(\frac{(w + Y)(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} - \frac{Y(1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}})}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right) \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

$$h = \left[1 + w^{\frac{1}{\delta-1}} \left(\frac{w(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}} + Y(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}} - Y - Y(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right) \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

$$h = \left[1 + w^{\frac{1}{\delta-1}} \frac{w(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}} - Y}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

Plugging Ω into C

$$C = \frac{w - \Omega + Y}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

$$\frac{(w + Y)(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} = \Omega$$

$$C = \frac{w - \left(\frac{(w+Y)(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}}{1+(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}} \right) + Y}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

$$C = \left[w - \left(\frac{(w+Y)(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}}{1+(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}} \right) + Y \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

$$C = \left[\frac{w \left\{ 1 + (1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}} \right\}}{1+(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}} - \left(\frac{(w+Y)(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}}{1+(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}} \right) + \frac{\left\{ 1 + (1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}} \right\} Y}{1+(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}} \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

$$C = \left[\frac{w + w(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}} - (w+Y)(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}} + Y + Y(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}}{1+(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}} \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

$$C = \left[\frac{w+Y + w(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}} - (w+Y)(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}} + Y(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}}{1+(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}} \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

$$C = \left[\frac{w+Y}{1+(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}} \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

Comparative Statics

$$\frac{(w+Y)(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}}{1+(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}} = \Omega$$

$$\frac{(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}}{1+(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}} = \frac{\partial \Omega}{\partial Y}$$

$$\frac{(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}}{(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}} \left[\frac{1}{(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}} + 1 \right]} = \frac{\partial \Omega}{\partial Y}$$

$$\frac{1}{\left[\frac{1}{(1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}}} + 1 \right]} = \frac{\partial \Omega}{\partial Y}$$

$$\frac{1}{\left[1 + (1+w^{\frac{\delta}{\delta-1}})^{\frac{\delta}{\delta-1}} \right]} = \frac{\partial \Omega}{\partial Y}$$

As Y increase Ω increases, but as w increases the effect of Y on Ω decreases

$$C = \left[\frac{w + Y}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

$$C = \left[\frac{w + Y}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right] (w^{\frac{\delta}{\delta-1}} + 1)^{-1}$$

$$C = \frac{(w + Y)(w^{\frac{\delta}{\delta-1}} + 1)^{-1}}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}}$$

$$\frac{\partial C}{\partial Y} = \frac{(w + Y)(0) + (1)(w^{\frac{\delta}{\delta-1}} + 1)^{-1}}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}}$$

$$\frac{\partial C}{\partial Y} = \frac{(w^{\frac{\delta}{\delta-1}} + 1)^{-1}}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}}$$

$$\frac{\partial C}{\partial Y} = \left[\frac{1}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

As Y increase C increases, but as w increases the effect of Y on C decreases

$$h = \left[1 + w^{\frac{1}{\delta-1}} \frac{w(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}} - Y}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right] \frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)}$$

$$h = \left[\frac{1}{(w^{\frac{\delta}{\delta-1}} + 1)} + \frac{w^{\frac{1}{\delta-1}}}{(w^{\frac{\delta}{\delta-1}} + 1)} \frac{w(1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}} - Y}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right]$$

$$\frac{\partial h}{\partial Y} = \frac{w^{\frac{1}{\delta-1}}}{(w^{\frac{\delta}{\delta-1}} + 1)} \frac{-1}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}}$$

$$\frac{\partial h}{\partial Y} = - \frac{w^{\frac{1}{\delta-1}}}{(w^{\frac{\delta}{\delta-1}} + 1)} \left(\frac{1}{1 + (1 + w^{\frac{\delta}{\delta-1}})^{\frac{1-\delta}{\delta}}} \right)$$

As Y increase h falls

$$C = \frac{w - \Omega + Y}{\frac{\delta}{(w^{\delta-1} + 1)}}$$

$$\frac{\partial C}{\partial \Omega} = -\frac{1}{\frac{\delta}{(w^{\delta-1} + 1)}}$$

As adult consumption rises, child consumption falls.

$$h = \frac{1 + w^{\frac{1}{\delta-1}}(\Omega - Y)}{\frac{\delta}{(w^{\delta-1} + 1)}}$$

$$\frac{\partial h}{\partial \Omega} = \frac{w^{\frac{1}{\delta-1}}}{\frac{\delta}{(w^{\delta-1} + 1)}}$$

As adult consumption rises hours worked by the child rise

Chapter 5 : Conclusion

The welfare of households may be exaggerated if we use measures that assume that everyone within the family, whether they belong to different age groups or gender are treated the same. This study explores the intra-household allocation of resources in three varied instances. In developed countries the welfare of women can often be measured by the labour force participation of women, wage differentials etc. In developing countries where women are primarily engaged in unpaid labour these issues may not be relevant. The well-being of women may instead be measured by how resources are allocated to them within the household (Mammen and Paxson, 2000). The welfare of children must also be measured separately from that of adults, as the allocation of resources within the household is controlled by parents. This problem is even more acute as children do not choose households they are born into and hence it cannot be taken for granted that their wellbeing is being looked after (Deaton, 1997).

The first empirical study in the thesis looks at the relative bargaining power of women in rural Bangladesh and its effect on their decision making power within the household with regards to fertility. The second study investigates how relative education amongst spouses in Britain leads to variations in the division of household labour and leisure. Women with comparatively more educational qualifications than their husband spent less time engaged in household labour and more in leisure. Both these studies, even though refer to two very different contexts where the fall back position of women vary dramatically, nevertheless show that the quality of a woman at the time of marriage (whether measured by the fraction of marriage payments composed of brideprice or her educational qualifications) strengthens her role within the household.

Finally in the last piece of empirical work, we study whether variations in child labour are a consequence of variations in parental preferences rather than differences in household income. We find that it is the lower weight that parents place on children's wellbeing in decision making rather than resource constraints that is important. The argument to ban child labour hence gains force as we realise that children may be working in households not to meet basic subsistence needs. State interventions in such contexts may prove to be an important mean to prevent parents from 'extracting services from their children' (Brown and Stern, 2002). There are also strong arguments

for a ban on child labour in situations where children work in hazardous conditions that may impact their psychological and physical well-being, as well as accumulate lower levels of human capital (Basu and Van, 1998).

The demise of child labour in developed countries shows that economic growth leading to higher adult wages and technological progress may lower the demand for menial jobs performed by children (Brown and Stern, 2002). Policies such as compulsory education along with economic prosperity eventually eradicated child labour from developed countries (Basu, 1999). A common theme that hence emerges in this study is how the role of women and children in the economy changes as it develops.

The vital role of women in achieving desirable economic outcomes such as lower fertility and improved health of children has been confirmed in the development economic literature time and again. High fertility hampers development efforts by lowering per capita income, and reduced child spacing increases mortality amongst women and infants (Todaro and Smith, 2009). Availability of 'near perfect contraception' may be seen as a means to increase the status of women, through which they can have complete control over the timing of childbearing (Birdsall and Chester, 1987). Women can delay having children, space out consequent children according to their own needs, and hence confidently participate in the labour market (Birdsall and Chester, 1987). This certainty may also allow women to accumulate human capital and pursue careers traditionally considered to be male-dominated (Birdsall and Chester, 1987).

Research shows that women in rural Bangladesh are often discriminated against, where infant mortality is high and life expectancy of women is much lower than that of men (Balk, 1994). Bangladesh has also suffered from some of the highest fertility rates in all of Asia (Balk, 1994). However, despite strides in economic development and urbanization fertility rates did not fall to the expected level due to the low status of women (Balk, 1994). The United Nations International Conference on Population and Development in 1994 concluded that high levels of population growth were a result of the low status of women in households.

We can hence infer that while availability of contraception and economic development

facilitates lower fertility, if women do not have enough say in the household to use them, their effects would be considerably dampened. Our research on rural Bangladesh confirms this, where women who were in a relatively strong position in their marriage, were more likely to use contraception that they could exercise control over, such as the contraceptive pill and have fewer children.

Low economic development is also often associated with high fertility because households may substitute adult labour domestically, in agriculture, and livestock, with child labour. Boserup (1989) argues that children in some instances may even contribute more to the household than they consume, especially if the family does not send them to school. High infant mortality is another reason why over fear of few surviving heirs, fertility is high. Boserup (1989) highlights that social norms in such regions have evolved over the years to encourage high fertility - where fertile, married women in society are given a higher status than single, infertile women. She argues that improvements in health, sanitation and modern contraceptives that come with economic development have significantly bolstered the position of women in these societies.

Research shows that child labour may transmit across generations through its negative impact on human capital accumulation (Edmonds, 2005). Emerson and Souza (2003) argue that children who work earn lower salaries in the future, showing that gains in work experience are outweighed by low levels of education. Children of educated parents were also less likely to engage in child labour and had a higher probability of participating in the labour force if their parents were child labourers as well (Emerson and Souza, 2003). These factors point towards an inter-generational trap of child labour and emphasize the need to ban child labour, complemented by compulsory schooling that may be easier to monitor.

Technological progress that comes with economic development, such as the mechanization of agriculture in Egypt; the green revolution in India; electricity in Philippines; introduction of wheelbarrows in Bogota; all have the effect of reducing the demand for child labour (Grootaert and Kanbur, 1995). Lower demand for child labour may translate into lower job opportunities for children hence lowering its incidence. It may also contribute to lower fertility where parents focus on the quality of children as opposed to quantity; leading to smaller, better educated families and a lower occurrence

of child labour.

Rapid economic development improves the status of women as it corrects for market failures, which often hampers gender equality in access to education. In addition economies where there is low investment in the education of women, may suffer from lower economic growth and per capita income (Dollar and Gatti, 1999). Hence high status of women not only acts as a catalyst to economic development, but is also a consequence of it. Research by Mammen and Paxson (2000) shows that women's education levels rises both absolutely and relatively as compared to men as an economy develops. They argue that the absolute and relative education of women is a key determinant to their labour force participation. It is also an important means to increasing the status of women. In extended family systems a mother-in-law has lower authority over an educated daughter-in-law as opposed to an uneducated one (Boserup, 1989). Women who are educated also command higher bride price, can contribute towards their dowry, hence increasing the age at which they marry and their choice of marriage partner.

Our empirical work on the division of household labour in British household substantiates this, where women relatively more educated than their husbands spent a lower proportion of their time engaged in housework. Education hence directly impacts a woman's status in the household, improving her welfare in the form of more leisure and less time performing housework.

We can thus conclude that economic development plays a vital role in enhancing the status of women in the economy, strengthening their bargaining power and hence increasing their access to resources within the household. From the results of the research in this thesis we can infer that bargaining power matters and can affect a range of outcomes - whether it is the ability for women in rural Bangladesh to use contraception and have fewer children, or women in developed countries such as Britain who can spend less time doing household chores, or children in Pakistan who do not have to engage in labour. We also know that empowered women contribute to economic development by reducing fertility and improving the health of their children, amongst many other beneficial effects. Technological development associated with economic development may also reduce the demand for work performed by children hence helping reduce the prevalence of child labour.

Bibliography

- Balk, D. (1994). Individual and Community Aspects of Women's Status and Fertility in Rural Bangladesh. *Population Studies*, 48(1), 21-45.
- Basu, K., & Van, H. P. (1998). The Economics of Child Labour. *The American Economic Review*, 88(3), 412-427.
- Birdsall, N., & and Chester, A.L. (1987). Contraception and the Status of Women: What is the Link? *Family Planning Perspectives*, 19(1), 14-18.
- Boserup, E. (1990). Population, the Status of Women, and Rural Development. In Geoffery McNicoll and Mead Cain, eds., *Rural Development and Population: Institutions and Policy*, 45-60. New York: Population Council.
- Brown, D.K., Deardorff, A.V., & Stern, R.M. (2002). The Determinant of Child Labour: Theory and evidence". *RSIE Discussion Paper*, 486.
- Deaton, A. (1997). *The Analysis of Household Surveys*. Baltimore, Maryland: John Hopkins University Press for the World Bank.
- Dollar, D., & Gatti, R. (1999). Gender Inequality, Income, and Growth: Are Good Times Good for Women? Policy Research Report, Engendering Development, Working Paper No.1. Washington, D.C.
- Edmonds, V.E. (2005). Does Child Labour Decline with Improving Economic Status? *The Journal of Human Resources*, XL (1), 77-99.
- Emerson, M. P., & Souza, A.P. (2003). Is There a Child Labour Trap? Intergenerational Persistence of Child Labour in Brazil. *Economic Development and Cultural Change*, 51(2),375-398
- Grootaert, C., & Kanbur, R. (1995). Child Labour: An economic perspective. *International Labour Review*, 134(2), 187-203.
- Hazan, M., & Berdugo, B. (2002). Child Labour, Fertility, and Economic Growth. *The Economic Journal*, 112, 810-828.
- Mammen, K., & Paxson, C. (2000). Women's Work and Economic Development. *The Journal of Economic Perspectives*, 14(4), 141-164.