DETERMINANTS OF FEMALE LABOR FORCE PARTICIPATION IN PAKISTAN: AN INSTRUMENTAL VARIABLE APPROACH.

By

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ABSTRACT

This thesis analyzes the determinants of female labor force participation (FLFP) across the rural and urban areas of Pakistan and its provinces. The thesis provides evidence on various aspects of women`s labor supply by utilizing the cross sectional data of women between the age 15-50 from the household data - Pakistan Social and Living Standard Measurement Survey (PSLM 2006-07). Women`s own characteristics, household characteristics and women`s empowerment indicators are the potential explanatory variables in the determination of female labor force participation. Own characteristics include age, educational endowments, marital status, and fertility whereas family size, working people within family, endowment of appliances, co-residence and per capita household income are categorized as household characteristics. As, women's empowerment is subject to measurement constraints, therefore, gender wage gap and current assets are utilized as proxy variables for women's empowerment. Further, attributes of location such as rural, urban, district are also used as determinants of FLFP.

Explanatory variables such as possessed home appliances, fertility and co-residence are seemed to be endogenous that may cause biased and inconsistent results due to reverse causality. Therefore, average ownership of home appliances in the locality, gender of the first child, same gender of the first two children, proximity to clinic,

contraceptive use, and housing information are considered as the potential instrumental variables.

The Probit and Instrumental Variable (IV) approach is adopted to tackle the endogeneity issue. The results discuss the estimates of endogenous covariates separately in the first stage using instrumental variable approach and then the vector of IV has been utilized to show the impact of explanatory variables on dependent variable, FLFP. This exercise is repeatedly done for overall Pakistan, Punjab, Sindh and NWFP. Baluchistan is not covered due to data constraints. An inverse and significant relationship of FLFP is found for both fertility and gender-wage gap, whereas, a direct and significant relationship is found for existence of home appliances in the house and co-residence.

Dedication

Dedicated to my Mentor Dr. Munir A. S. Chaudhary (Late), to whom I owe a lot in terms of knowledge, guidance and aspiration towards my academic and research career and goals.

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2SLS	Two Stage Least Square
E	Endogenous Covariates
ES	Economic Survey
FBS	Federal Bureau of Statistics
FLFP	Female Labor Force Participation
HH	Household
HHC	Household Characteristics
IV	Instrumental Variable
KLIPS	Korean Labor and Income Panel Study
LFP	Labor Force participation
LFS	Labor Force Survey
LPM	Linear Probability Model
NWFP	North West Frontier Province
P	Proxy Variables
PSLM	Pakistan Social and Living Standard Measurement Survey
WC	Women`s Characteristics

1. Introduction

1.1. Background

Increased female participation in the labor market is one of the major gains of economic development in the developed economies. Since 1900, the participation rate has increased from the low level of 4 percent to above 70 percent in 2000 in the developed countries. Transition and Latin American economies have also experienced a steady rise in female labor force participation during the last two decades. Spillovers of the increased role of women in the labor market have contributed in uplifting the socio-economic status of the masses. Technological advancements (Greenwood et al (2002, 2005)), narrowing gender inequality, declining fertility and structural changes (Galor and Weil (1996), Fernandez, Fogli and Olivetti (2002)) are the main channelizing factors that increased female participation in economic activities. Despite spells of high growth and structural transformation, Pakistan`s economy still has facing the lowest female participation rates compared to developed and other South Asian economies. [1] Therefore, there is acute need of in-depth analysis of the role of women in labor market as well as in economic development of Pakistan.

Since the seminal paper of Mincer in 1965, female labor force participation has attracted many researchers who explored female labor force participation with the

[1] Labor force participation rate (as percentage of population aged 15-64) in US is 70.1%, in Canada 73.2%, in Europe and central Asia 58.0%, in High income OECD 65.3%, in Korea 54.3%, in Japan 60.6%, in East Asian Pacific 71.2%, in Bangladesh 55%, in Sri Lanka 38.1%, in India 35.9%, in Nepal 52.8% and in Pakistan 34.3% (according to the World Development Gender Statistics 2007. http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTGENDER/EXTANATOOLS/EXTSTATINDDATA/EXTGENDERSTATS/0,,contentMDK:21438813~menuPK:4080948~pagePK:64168445~piPK:64168309~theSitePK:3237336,00.html

application of developments in theory of labor supply as well as econometric advancements during the last three decades. Along with the traditional labor supply theory, Becker (1965) discussed the household production model and female time allocation whereas Chiappori (1992) presented collective household model, which have provided the theoretical foundations for the analysis of female labor force participation. Empirical investigation by Gronau (1973) and Heckman (1979) focused on the appropriate estimation method. Afterwards, various studies addressed the endogeneity issue by introducing the instrumental variable technique. [2]

Most of the time series studies related to developed economies investigated the rising trend in the female labor force participation during the last three decades. Cross sectional studies utilized micro data in determining the probability of female labor force participation, whereas, panel data studies investigated the U shaped curvilinear relationship between economic development and female labor force participation. Technological advancement measured by the availability of labor saving home appliances, gender empowerment, and women's own and household characteristics are used as key explanatory variables in determining the probability of a woman entering into the labor market. Except few studies, the issue of female labor force participation in Pakistan could not get attention of the researchers despite its greater significance in developing economies. [3] Therefore, there is need to investigate the determinants of female labor force participation by considering a better theoretical

[2] Schultz (1978) in US, , Ettner (1995) in US, Rochelle Belkar et al (2000) in Australia, Sasaki (2002) in Japan, Chun and Oh (2002) in Korea, Francis (2005) in China, Lee, B. S. et al (2008) in Korea, Chun et al (2008) in Korea.

[3] Studies conducted in Pakistan such as Shah et al (1976), Shah (1986), Rashid et al (1989), Ibraz (1993), Naqvi and Shahnaz (2002) and Ejaz (2007).

model and appropriate estimation procedure along with the consideration of endogeneity of the factors impacting female participation.

According to Labor Force Surveys, female labor force participation (FLFP) rate in Pakistan that was below 7 percent in early 1970s increased to 10 percent and 10.5 percent at the end of the decade of 1970s and 1980s. Further, FLFP rate increased to 13.7 percent and 19 percent at the end of the decade of 1990s and year of 2007. This increase in FLFP rate when looked against the economic growth revealed that lower economic growth period of 70s and 90s experienced a rise in the FLFP, but the high economic growth period of 1980s observed a stagnant trend in FLFP that is mainly explained by persistence of gender discrimination and exacerbating factors such as conservative culture that are the main causes of lower FLFP in Pakistan (Ibraz, 1993).

From 1999 to 2008, the FLFP has witnessed a sharp increase; the possible reasons can be due to the increased use of household technologies, robust growth of services sector, and reducing gender inequality but so far there is no empirical evidence that has supported or examined such phenomenon in Pakistan. However, theoretical support for such phenomenon exists in international literature. [4] The current study intends to explain the causal relationship between the labor saving household technologies and female labor force participation in case of Pakistan. As there is lack of empirical evidences in case of Pakistan regarding the labor saving technology and labor force participation, therefore, this relationship is explored with the help of some

[4] "The rise in female labor force participation has several explanations as well. A major determinant is the stream of biotechnological advancements that have provided women greater control over and timing of childbearing decisions (see Bailey 2004). This greater flexibility, along with advancements in household technologies (such as the introduction of the dishwasher and the microwave oven), has afforded women greater freedom and time to increase their educational attainment, providing yet another reason to devote more time to the labor market (see Goldin 1995)."(Hotchkiss, 2005)

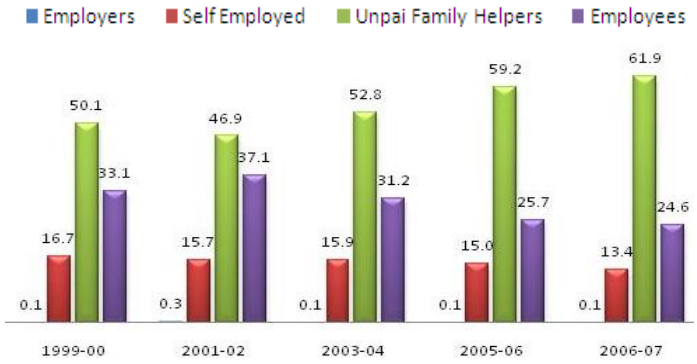
stylized facts that would provide simple guidelines but is unable to provide solid quantitative proof. According to Pakistan Economic Survey 2006-07, import of electrical goods has increased by annual average rate of 30 percent during 2002-08. Increase in overall imports to GDP ratio has resulted in a decline in gender inequality during 2002-05 (Naeem and Kalim, 2007). As the services sector has relatively more capacity to absorb females, the contribution of services sector in growth increased from 57 percent in the `90s to 65 percent during the last ten years. [5] Increased per capita income has also played a role in reducing gender inequality in Pakistan (Naeem and Kalim (2006)). The declining fertility rate is also an important characteristic that may have led to a higher participation of female towards labor market from 2000 to 2007. [6]

Although female labor force participation has increased significantly, it needs to be highlighted that two-thirds of this increase is attributed to the increase in unpaid family helpers, whereas wage earning employment has not increased at a significant pace. However, the increased participation in terms of wage employment has not received much attention as informal employment in unpaid family helper increased. Due to the fact that female labor force participation rate has increased with the increase in technology, declining gender inequality, and fertility rates, the major increase is coming from unpaid family helpers and there is no significant rise in the wage earning jobs.

[5] The data is taken from chapters 1, 8, & 12 of Pakistan Economic Survey, 2006-07
[6] Table 12.1 Pakistan Economic Survey, 2006-07)

In 1999-00, 5.2 million females were employed that increased to 9.5 million in 2007, causing an increase of 4.3 million females in the employed labor force. The employment status wise composition of the 4.3 million is presented in the Chart 1. It is quite visible that the major increase in employed female labor force is due to increase in the unpaid In 1999-00, 5.2 million females were employed that increased to 9.5 million in 2007, causing an increase of 4.3 million females in the employed labor force. The employment status wise composition of the 4.3 million is presented in the Chart 1. It is quite visible that the major increase in employed female labor force is due to increase in the unpaid family workers.

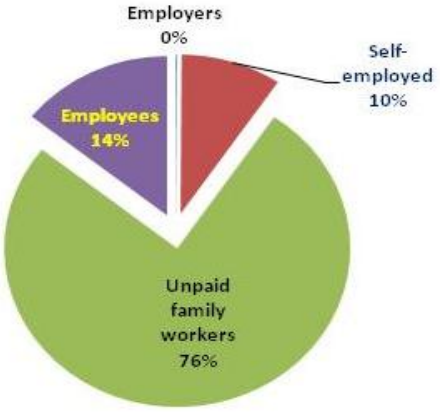
Chart 1
Composition of Female Employment Status



Source: Labor Force Surveys (various issues)

Chart 2 presents the percentage contribution of each category of employment status in the change of employed labor force. This confirms that 76 percent (3.3 million) increase in female employed labor force is only

Chart 2
Decomposition of Increase in Employed Females (2000 to 2007)



Source: Labor Force Surveys (various issues)

due to unpaid family workers and only 1 million female entered into wage earning jobs. And that is not a significant contribution of wage earning employment when the female population has increased by 10 million in the same period. Therefore, if the category of unpaid family helpers is excluded from the female labor force, then there is a decline in the female labor force participation rate as only 1 million or 10 percent females have entered into wage earning jobs from an increase of 10 million in total female population. On the basis of contribution of unpaid family helpers in the earnings of household income they are included in the labor force.

Despite the fact that Pakistan`s economy has experienced high economic growth and has gone through structural transformation, such as enhanced role of services sector, reducing fertility and declining gender inequality rates, female labor force participation in Pakistan has not increased at a reasonable pace as compared to developed as well as neighboring developing economies. In addition, empirical research pertaining to Pakistan in the literature is also not sufficient considering the severity of the issue. Furthermore, none of the studies addressing FLFP in Pakistan have adopted the instrumental variable technique for the treatment of endogenous covariates. Therefore, there is a need to analyze the determinants of female labor force participation rate in Pakistan. This thesis will provide cross sectional evidence on various aspects of FLFP in Pakistan. It will also provide econometric estimates of the determinants of FLFP across rural and urban areas of Pakistan for the year 2005-06 using PSLM micro data. Hypothesis will help to investigate the relationship between FLFP and women's own and household characteristics specifically estimating the effects of women's empowerment on FLFP.

1.2. Research Question

What factors contribute towards the participation of a female in the labor market?

The aforementioned discussion leads to the following set of determinants of FLFP. The women's own and the household's characteristics play an important role in determining female participation in the labor force. The women's characteristics such as educational endowments, marital status, and age along with the household characteristics indicated by family size, and locality of the family will be considered as potential determinants of female labor force participation. Gender empowerment (proxy by gender wage gap, and fixed assets endowments) and exposure to labor saving technology, measured by the existence of home appliances, and fertility measured by number of children per woman, will also be considered as explanatory variables.

Therefore, the research question leads towards the construction of following hypotheses.

Hypothesis-I

Women's own characteristics have no impact on the female to participate in the labor market.

Hypothesis-II

Household characteristics have no impact on the female participation in the labor market.

Hypothesis-III

Women`s empowerment does not affect female labor force participation in Pakistan.

The goal of the study is to explore the factors that determine female labor force participation. Own and household characteristics, and women`s empowerment indicators are the potential explanatory variables in the process of determination of female labor force participation. However, women's empowerment is subject to measurement constraints, therefore, gender wage gap, and current assets will be utilized as proxy variables for women's empowerment. Explanatory variables such as home appliances, fertility and co-residence seemed to be endogenous explanatory variables that may cause biased and inconsistent results due to reverse causality. Average women's ownership of home appliances in the region, gender of the first child, same gender of the first two children, proximity to clinic and contraceptive use, respectively will be considered as the potential instruments. Instruments have the power to explain the endogenous covariates but are not victim of reverse causality. Probit model with endogenous covariate will be estimated by using 2SLS technique. This technique will yield consistent, unbiased and robust results (Wooldridge 2002).

1.3. Objective

The objective of the study is to identify the significance of exacerbating factors in shrinking the role of women in labor market and is twofold. First, to identify the factors that discourages or encourages female to participate in the labor force across areas of Pakistan. Second, to analyze the role of women`s empowerment in the process of determination of female labor force participation.

After building up the background information, importance of topic, and construction of hypothesis in the introductory chapter, the second chapter reviews comprehensive literature by highlighting the main ideas, theory, findings and shortcomings of the relevant work conducted so far in the subject matter. Chapter three presents theoretical framework which incorporates collective household model with the unitary approach, based on which the methodology and empirical strategy has been developed. Chapter four includes detailed discussion of the Probit model and Instrumental variable technique. Chapter five explains the data source and the description of relevant variables. Empirical findings and results are reported in chapter six, whereas, conclusion and policy recommendations are discussed in the final chapter.

2. Literature Review

2.1. Seminal Contributions (Theoretical)

Issues concerning the role of female in the labor market were introduced by the seminal contributions of Mincer (1962), Becker (1965), and Cain (1976). These pioneering work raised interest among many researchers who further analyzed the female labor supply with different explanatory variables as well as with various econometric techniques applied to cross sectional, time series and panel data, resulting in a vast literature on the female labor supply theory. Mincer (1962) attempted to reinterpret the static analysis of labor supply to include lifetime variables. [7] He found out that family income has no effect on wife's demand for leisure. His results also indicated that the number of children have a significant effect on women`s lifetime labor supply curve. Moreover, he concluded that the probability of labor force participation is inversely related to lifetime wealth measures. Becker (1965) generalized the role of time in economic activities so that time became a central element in decisions affecting fertility, health, location, and the like. Becker's theory served as seminal paper on the allocation of time and laid foundation for the household production model. Since the work of Mincer (1965) and Becker (1965), several substantive methodological advancements have been made. The simple model of labor supply choice was extended in a number of dimensions which include issues related to family, abilities of husband and wife, decision regarding human capital accumulation, and consumption of market goods and leisure.

[7] Variables such as consumption, leisure, work at home, wages, budget constraints and time were translated into lifetime variables.

2.2. Seminal Contributions (Estimation)

Latter, Gronau (1974) and Heckman (1974) focused on the appropriate method of estimation and work on the selection bias and joint distribution of hours and wages within censored sample. Gronau (1974) estimated two behavioral relations that is market wage and shadow wage. He found that education plays an important role in determining market wage but the rate of return to education was under estimated due to negative correlation between education and true residuals in wage equation. Heckman (1974) presented seminal methodological contribution in the labor supply estimation. He introduced the simultaneous estimation of market wage and shadow wage (marginal value placed on women`s leisure) functions. Heckman`s approach allows one to estimate a common set of parameters which underlie the function determining the probability that a woman work, her hours of work, her observed wage rate, and shadow wage. Results indicate that the estimated effect of one child less than six years raises the asking wage by fifteen percent. Increases in net assets, husband's wage rate and woman's education has a positive effect on the asking wage. Schultz (1978) discussed the problem associated with the wage variable in particular and suggested to introduce an instrumental variable for wage rate using the sample of working women. He proposed that if hours and wages are jointly determined with other economic choices it may lead to measurement errors by producing bias in the results. Cogan (1981) introduced the idea of imputed wages by taking full sample of women but imputing a wage to non workers from a wage equation using the sample of workers.

2.3. Review of studies

Smith (1975) in his empirical work for U.S, used variables measuring non labor income or assets to estimate pure wealth effects. Using a life cycle framework, he examined the expected relationship between the observed assets level of families and their labor supply. Nakamura and Nakamura (1979) contradict some of these results while comparing the labor force participation behavior of married women in U.S and Canada using U.S Census data for the year 1970 and Canadian Census data for the year 1971. They found the female labor supply to be unresponsive to the changes in wage rates. Mroz (1987) essentially follows up on the Nakamura and Nakamura study relating to the responsiveness of female labor supply. He built a life-cycle model with human capital accumulation and home production in which the basic unit of analysis were married couples with children, and adjusted it using data from the 1970s and the 1990s for U.S. He noted the large diversity of reported estimates of female labor supply is a response to variations in wage rates and income. He concludes that the estimated uncompensated wage effect is positive but rather small. Moreover, he finds that the income effect is negative and fairly small. These results suggest that the modest sensitivity of married women's labor supply is not much different from the labor supply of prime aged married males. The backward bending labor supply, in essence, holds true for women as well as men. [8] Hence the results are consistent with the view that a woman's taste for work is an unobserved omitted variable that affects her current as well as previous labor market participation.

[8] Nakamura and Nakamura (1981)

Robinson and Tomes (1985) also supporedt the conclusions of Nakamura and Nakamura (1981), as they conducted their study on Canadian women. The estimates obtained in their study are larger than those of the Nakamura's, suggesting that the income elasticity of demand for leisure is larger relative to the substitution effect for women than for men. These results indicated that the contrasting patterns of female and male labor supply curves correspond to the differential responsiveness of male and female participation to opportunities, rather than the hours worked. Several researchers investigated the female labor force participation in developed countries: Ben-Porath and Gronau (1985) in Israel, Columbine (1985) in Italy, Franz (1985) in Germany, Iglesias and Riboud (1985) in Spain, Riboud (1985) in France, and Shimada and Higuchi (1985) in Japan.

Berndt (1991) identifies that the labor force participation rate of women varies by age and has considerably increased for all age groups during the past three decades. He extended the neoclassical labor supply framework to encompass the household, while addressing issues such as the discouraged worker hypothesis, which says that at times the employers discriminate against those wives with the suspicion that they will quit their jobs as their husbands find employment. and the male chauvinist model where wives takes her husband`s income as exogenous.. He pointed out that most of the first generation studies showed that female labor supply is more responsive to changes in wage rates and property income, compared to male labor supply. The second generation of studies pointed out that the elasticity of these estimates is greater.[9]

[9] Heckman, Killingsworth and Macurdy (1981).

Duleep and Sanders (1994) examined the current labor supply of 25-44 year old married women in the United States. Married women are further classified into native-born whites, Asian immigrants, Hispanic immigrants, and European immigrant's categories. Results showed that employment rates of women are inversely proportional to the number of children and age of the youngest child when no account of past work is taken. There are significant differences across the groups of women, whereby, native-born white women are less responsive to the number of children and age of the youngest child.

A major factor that reduces the female labor force participation rate relates to the fact that women essentially tend to concentrate more upon providing services to the household after they get married. This is a crucial issue and has been dealt with various researchers worldwide. Bradbury and Katz (2005) identify a recent decline in female labor force participation, specifically among the well educated women with children. He finds out that the unobserved and unpredictable factors like biotechnological advancements that have provided women a great control over the timings of childbearing decisions, the household technologies(like dish-washer etc)that allowed women to get more time for education attainment, and the changing attitudes towards role of women and appropriateness of women to work are large contributors towards ai increase in job opportunities of women and hence providing incentives to participate in economic activities.

2.4. Treatment of Endogeneity in Literature

The economists had used two stage approach in their studies while investigating married women`s participation in labor force.[10] Schultz (1978), for the first time explored how fertility responds to child mortality across economic classes within a society. Investigating labor supply decision of married women, he defined two income groups based not on observed income which might be endogenous, but on an instrumental variable prediction of income or expenditures derived from husband age, education, and origin. Ettner (1995), used the health status of parents or friends, age of parents and geographical proximity of parents and friends as instruments to address the endogeneity between elderly care responsibilities and labor force participation decision.Hyunbae Chun et al (2008) examined the effect of co-residence with one's parents or parent-in laws on the labor supply of married women. They recognized that co-residence should be treated as endogenous because the choice of family structure and labor supply of married women are jointly determined. Using the Korean Labor and Income Panel Study (KLIPS) 2004, the husband's birth order among siblings was constructed as an instrumental variable (IV) for co-residence with parents. Their IV estimation results cast doubt on the argument that co-residence with parents has a significant positive effect on the labor supply of married women and hence contradict the previous studies.

Sasaki (2002) estimated the effect of family structure on labor force participation. In this case, reverse causality exist between the two variables. Co-residence is

[10] Dubin and Mc Fadden (1984) also used the two- stage instrumental variable method for discrete variable choice models with endogenous variables. The residential electric appliances ownership is considered as an endogenous variable. Norton and Staiger (1994), addressed the effect of hospital ownership on access to care for uninsured patients. Instrumental variable estimates are used to predict the percentage of patients who are uninsured, controlling for hospital ownership and service.

endogenous therefore instrumental variable technique had been used. In that regard, sibling characteristics and housing information were used as instruments. After addressing the endogeneity issue, co residence with one's own parents has positive and significant effect on participation in labor force which suggest that co residence allows married women to share the burden of household work with parents and in laws, thus leading to increase in the probability of female labor force participation. Results also suggested that if her husband is the eldest son she is more likely to stay with parents in law.

The family structure or co-residence is actually a concept of joint family and nuclear family in case of Pakistan. Living with own parents or in-laws is not the women`s own decision in fact it's a collective decision. However, the reverse causality exists between labor force participation and co-residence. Birth order of husband`s and wife among the siblings has been used in the literature as an instrument for it which cannot be used in our analysis due to data constraint. However, Housing Information (whether house is owned or rented, detached or apartment, house size) is the only exogenous variable that can be used as an instrument for co-residence for the treatment of endogeneity.

Angrist and Evans (1998), used parental preferences for a mixed sibling gender composition to construct instrumental variables (IV) estimates of the effect of childbearing on labor supply in U.S. utilizing the PUMS data. The idea is based on widely observed phenomenon of parental preferences for a mixed sibling gender

composition. Twinning at the first birth has been used in a number of studies for instance, Stephen G. Bronars and Jeff Grogger (1994) and Jaisri Gangadharan and Joshua L. Rosenbloom (1996), both of which use large Census samples, and Rozenzweig and Wolpin (1980a, b), but, the primary interest of the study is to compare the results compare the results of twins estimates and the same-sex instruments. IV estimates for women are significant but smaller than ordinary least-squares estimates. A comparison of estimates using sibling-sex composition and twins instruments implies that the impact of a third child disappears when the child reaches age thirteen.

Chun and Oh (2002) estimated the effect of fertility on the labor force participation of married women in Korea. Since Korean households prefer sons to daughters, there is exogenous variation in the number of children among households depending on their first child's gender. Using this exogenous variation as an instrumental variable for fertility, they found that having children reduces the labor force participation of married Korean women by 27.5 percent.

Assad and Zouri (2003), in their paper, estimated a structural model to study the impact of fertility on the extent of women`s labor force participation in Urban Morocco. Both fertility and participation are potentially endogenous household decisions, requiring simultaneous estimation. Such estimation is further complicated by the need to find appropriate instruments for fertility. Proximity to clinics and contraceptive use, based on age-specific contraceptive use in province of residence

had been used as instruments for fertility which are the indicators of access to family planning methods and general awareness. Moreover, the timing of marriage (or the probability of being married at a certain age), which is an important determinant of both fertility and participation, may also be endogenous to those decisions. They found, in urban Morocco, marriage per se is not a constraint on labor force participation, but that it is a constraint on engaging in paid employment in the private sector. The presence of school-age children significantly reduces participation in all types of wage work. Moreover, a woman's own education, as well as that of her father; significantly increase the probability of her participation in the public sector.

The very recent study by Lee et al (2008) examined the relationship between marital status and female labor force participation in Korea. Low labor force participation among married women is explained by demand side factors while high labor force participation among middle aged women is explained by supply side factors. The study also addressed the potential endogeneity among her decisions of marriage and participation in labor market. Instrumental variables such as sex ratio (number of men aged 15 to 39 as percentage of women of same age cohort) and unemployment rate under 30 years of age had been used to overcome the problem.

Greenwood and Yorukoghe (2005), identified the impact of consumer durable goods revolution on women`s labor force participation. The technological revolution introduced labor-saving consumer durables, such as washing machines and vacuum cleaners and time-saving products such as frozen foods and ready-made clothes. The paper addressed the argument that technological progress in the household sector played a major role in liberating women from the home. This hypothesis has been

analyzed on the basis of Beckerian model of household production. The prices of household consumer or technological goods have been used as an instrument for home appliances in the analysis. The results confirmed that the adoption of these technologies frees up the amount of time devoted to housework. As the price of these durables falls over time, therefore, households make a decision about when to purchase new durables. Each period they also decide whether or not the woman in the family should work in the market sector. The model suggested that presence of labor-saving durable goods increases the elasticity of female labor supply elasticity. Moreover, it was also seen that the responsiveness of female labor-force participation to changes in wages appears to have increased over time.

Pirani *et al* (2008) estimated the causal effect of household appliance ownership on married women's labor force participation rates using micro-level data of 1960 and 1970 U.S Censuses. To control for endogeneity, a married woman's ownership of an appliance was instrumented by the average ownership rate for that appliance among single woman living in the same U.S state. The results from time series and cross sectional analysis revealed that single woman's labor force participation rates has not increased between 1960 and 1970, whereas, the diffusion of household appliances accounted for about one-third of the observed increase in married women's labor force participation rates during the 1960`s.

Average women`s ownership of home appliances in the Tehsil/district has been used as an instrument for home appliances in our study as used in Pirani`s paper. Whereas the instrument of prices of home appliances used by Greenwood cannot be incorporated in our study due to the fact that prices do change over time and our study

is based on cross-sectional data that includes number of appliances owned by a household but does not include their prices.

The summary of all the variables used in literature is discussed in table given below.

2.4.1 Endogeneity relevant for this study

Table 1: Instruments Relevant for Study		
Potential Endogenous Variable	**Instruments used in Literature**	**List of References**
Household Appliances Consumer goods or technological goods	**1) Prices of Household appliances**	Greenwood and Yorukoghe (2005)
	2) Average of single women ownership of home appliances in the region For married women`s ownership of appliances	Pirani et al. (2008),
	3) Adoption of modern refrigerator	Cardia (2007)
	4) Adoption of indoor plumbing facilities	
	5) Prices of home appliances	Bar and Leukhina (2005)
	6) Prices of Household Appliances	Greenwood Yorukoghe (2005)
	7) Average of Single women ownership of home appliances in the region For married women's ownership of appliances	Pirani et al. (2008)
	8) Adoption of modern refrigerator	Cardia (2007)
	9) Prices of home appliances	Bar and Leukhina (2005)
Family structure or Co-Residence With one`s own parents or parents in law	**1) Siblings Characteristics** 1) Birth order and number of siblings of wife and husband	Sasaki. (2002)
	2) Housing information 2) Whether house is owned or rented detached, or apartment or house size	
	3) Husband`s birth order among siblings	Chun et.al (2008)

Table 1: (Continued) Instruments used for Endogenous Covariates		
Potential Endogenous Variable	**Instruments used in Literature**	**List of References**
Fertility Theoretical reasons that fertility and labor supply are jointly determined given by Schultz(1981) and Goldin (1990)	**1) Sibling sex mix** A dummy whether gender of the second child matches the gender of first child or same gender of first two children	Angrist and Evans, (1998) Bronars and Grogger (1994) Gangadharan and Rosenbloom (1996) Rozenwing and Wolpin (1980)
	2) Twins in the first pregnancy Twin babies at first birth	
	3) Sex of the first child Gender of eldest child Number of children in a family is strongly related to the first child`s gender. (Gender of the first child is important because boy is preferred over a girl that is why if the first born is female there is more likelihood that parents will have another child try for a boy. This desire is independent of the labor force participation decision of a woman and hence treated as exogenous).	Chun and Oh (2002)
	4) Proximity to clinic and contraceptive use Based on age-specific contraceptive use in province of residence, which is an indicator of access to family planning methods and general awareness	Assaad and Zouari (2003)
	5) Distance from branch Distance from family planning centre can be used.	Asim (2008)

2.4.2 Endogeneity not relevant for this study

Marriage decision and Education are also the variables that has been treated as endogenous in the literature(e.g Sasaki(2002) and Francis(2005)), but in case of Pakistan, we cannot consider marriage to be an endogenous variable as labor force participation and marriage are not simultaneous decisions. In fact most of time girl`s parents decide about her marriage.

Table 2: Instruments not valid for the study		
Potential Endogenous Variable	**Instruments used in Literature**	**List of References**
Marriage	**1) Sex ratio in the region** Sex ratio is constructed as number of men aged 15-39 and women aged 15-39 years. Francis(2005)	Lee et al (2008), Francis (2005)
	2) Unemployment 30 Unemployment rates for people under 30 years of age in the city of woman`s current residence Lee and Kim(2007)	Lee and Kim (2007)
Education	**1) Parent`s Education** **2) Mother`s Education** **3) Father`s Education**	

Due to data constraints, earlier, education of the head of household was used as exogenous instrument for education (completed years of schooling), instead of parent`s, mother's or father`s education in the thesis. But the results did not show up significant results so it was used as separate exogenous variable rather than instrument for education.

2.4.3 Proxies for Women`s Empowerment

Table 3: Proxy Variables for Women`s Empowerment		
Potential Endogenous Variable	**Instruments used in Literature**	**List of References**
Empowerment	**1) Occupational sex segregation and gender wage differentials**	Tzannatos (1999) Winter (1994)
	2) Ratio of female professional and technical workers	UNDP Human Development Report 1995 and 1998 Worldwide
	3) Women`s share of earned income	
	4) Women`s assets at marriage and current assets Value of land owned, plot, animals, including poultry, sheep and goats, and cattle, durable goods and capital equipment owned by the household	Quisumbing and de la Briere (2000)
	5) Woman's assets at the time of marriage	Quisumbing and Maluccio(1999)
	6) Male and female non-labor income	Thomas 1997 and 1990 Thomas Contreras and Frankenberg (1997), Hotchkiss (2005)
	7) Modern contraceptive use	Gage(1995)

Due to unavailability of data, women's assets at the time of marriage cannot be incorporated. So, a current asset as explained in the literature has been used as a proxy for empowerment. In the analysis, variable of current assets includes fixed assets such as ownership of land either agricultural or non-agricultural like plots, etc.

Another proxy variable that can be incorporated in case of Pakistan is the non-labor income of men and women. The non-labor income includes the amount an HH receive or any member male or female receives in terms of rent if they have rented out their agricultural land or any residential or commercial building**.** But unfortunately the data is missing in the PSLM (2006-07).

Gender wage gap is also one of the important variables that have been treated as proxy for empowerment in the analysis. It has been discussed in the chapter 6.

2.5. Studies on Pakistan

A lot of studies have been conducted on the state of women in Pakistan analyzing factors affecting their participation rate in labor market. Shah (1986) analyzed the changing role of women in Pakistan between 1951 through 1981. He concluded that the labor force participation decision of women is inversely related to the socio-economic status of the family, such as ownership of durable goods, husband's education and observance of *purdah*. Shah et al (1976) examined some of the socio-economic and demographic factors that determine the labor force participation decision of women in Pakistan. They attempted to analyze results for all the four provinces of Pakistan. The results showed that labor force participation has a significant and inverse relationship with the nuclear family, as well as the child-woman ratio. However, a positive relationship has been found with marital status,

dependency ratio and literacy rates. The positive relationship with marital status is in contrast to most of the earlier studies. Rashid et al (1989) presented a case study of Karachi whereby they attempted to analyze the demographic and socio-economic factors affecting the labor supply of women. The results showed that LFP is positively related to an increase in expected earnings, wages and level of education. An interesting observation by these researchers is the presence of a male figure in the household reduces the likelihood of female participation in the labor force.[11] However, the presence of other females in the house increases the probability that a woman will work.

Ibraz (1993) focused on the rural areas of Pakistan, and observed that various cultural issues such as observation of *Purdah* in an Islamic society restrains a woman from active participation in the labor force.

Naqvi and Shahnaz (2002) have conducted a study similar to the other studies on this issue in case of Pakistan and have identified the household related factors that lead to women participation in economic activities. Empirical findings of their paper suggested that the economic participation of women is significantly influenced by factors such as age, education and marital status.

Ejaz (2007) investigated the factors determining female labor force participation in Pakistan by applying Probit and Logit models using micro data on sample of female aged 15-49. The results suggested that age, education attainment, and marital status have significant and positive effects on FLFP. The greater the probability of a woman

[11] Although, according to the PSLM 2005-06 data, the frequency distribution of the total number of male members shows that no household exists without male member in the family (for detail see frequency table in appendix). Therefore, this observation is not relevant to our study.

belonging to nuclear family and having access to a vehicle, the more likely she is to participate in economic activities whereas a large number of children and availability of home appliances reduces the probability of FLFP. For the effect of nuclear family, the sign is in contrast to those of Shah (1976). The result implies that reducing the burden of women regarding child care and facilitating attainment of education would lead to higher labor force participation rate for women in Pakistan.

It can be inferred from the literature that various economic as well as sociological factors have a profound effect on the labor force participation decision of women. However, it is felt that some important factors have been neglected in these studies, especially those relating to household issues such as empowerment, fertility, and family structure. This study, therefore attempts to identify and present a comprehensive analysis of all such factors. Although, the innovative aspect of the Naqvi and Shahnaz (2002) study was to relate women's decision to participate in economic activities with their empowerment, but its econometric foundations were very weak due to the fact that it failed to address the endogeneity problem in the empowerment and participation of women. In fact, endogeneity issues have not been dealt with, generally, in the studies carried out on Pakistan. Therefore, it is important to use an instrumental variable technique. It is expected that this thesis will contribute to the economic literature in a significant way by improving upon the previous studies and addressing the issue of endogeneity which has not been considered so far in determining FLFP in Pakistan and also measuring women`s empowerment quantitatively for the first time using gender-wage gap as a proxy in identifying the factors affecting FLFP in Pakistan. [12]

[12] Apart from LFP related studies, the latest study of Asim (2008) considered the control for endogeneity in his thesis while evaluating the impact of microcredit on indicators of women's empowerment in the urban slums of the Lahore district of Pakistan. He also addressed the concerns for

3. Conceptual Framework

A woman's decision to participate in the labor market has theoretical underpinning in the labor supply curve. The woman performs a sort of cost benefit analysis of sacrificing leisure to work in the labor market. If the earnings by participating in the labor market are higher than the perceived value of enjoying leisure at home, then the female will decide to participate. Along with this unitary approach, there are arguments (Thomas, 2001, Duflo, 2004) that support the conjecture that household behavior is invariant to the source of income. Therefore, the purpose of the study is to determine the women`s decision to participate in the labor market by keeping in view both unitary decision making and collective model of household behavior.

3.1. Unitary Approach

In the unitary approach of labor supply, the labor-leisure choice model assumes that a person chooses a combination of hours of leisure and income (or an aggregate consumption bundle) in order to maximize utility. There is a trade-off between leisure and income in that consumption of more leisure (less work) results in less income. This utility maximization problem has a corner solution in which the person chooses to consume maximum number of leisure hour possible (i.e. work zero hours). The decision to work (or participate in the labor market) boils down to the evaluation of what the market is willing to pay a person for his or her time relative to the value that person's time generates (in terms of additional utility) when consumed as leisure.

This labor force participation decision can be expressed mathematically as

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endogeneity in his estimation by using proxies for initial levels of empowerment, matching the controls and treated units on observable characteristics and finally instrumenting for the treatment.

$$W_i - MRS_{i,H=0} \begin{cases} > 0 \ then \ LFP = 1 \\ \leq 0 \ \text{then} \quad LFP = 0 \end{cases}$$

where W_i is the market wage that person i can earn in the market, $MRS_{i,H=0}$ is person i's reservation wage (the utility gained at zero hours of work), and LFP is a binary choice variable that is equal to 1 if the person is a labor force participant and equal to 0 if the person is not in the labor force. This theoretical construction translates into an operational estimation framework by assuming that the difference between a person's market wage and reservation wage can be represented by a linear function of observable characteristics about that person and an unobservable random component:

$$I_i^* = W_i - MRS_{i,H=0} = \beta_0 + \beta_1' X_{W,i} + \beta_2' X_{R,i} + \varepsilon_i = \begin{cases} > 0 \Rightarrow LFP = 1 \\ \leq 0 \Rightarrow LFP = 0 \end{cases}.$$

$X_{W,i}$ is a vector of observable characteristics that determine what wage a person could expect to earn in the market. One of the most important human capital characteristics determining labor market earnings is the woman's education level. Labor market experience is also important and will be proxied by age. Age squared is also included as a regressor to capture the concavity of the experience/age-labor force participation profile.

General theoretical framework under unitary approach is as follows: A woman's decision to participate in the labor market is based on her reservation wage and information on offered wage in the labor market. Offered market wage W is determined by

$$W = Z_1 \beta + \varepsilon_1$$

Where, Z_1 is a vector of variables that affect market wage.

Offered wage is assumed to be determined by, among other things, the human capital of an individual, measured in years of schooling or work experience. If married women face employers' discrimination or if marriage affects productivity, marital status would also be an important factor influencing the offered market wage. Reservation wage among women, W_r, is assumed to be determined by marital status and various other factors, such as accumulated human capital, family composition, and income of husband (for married women) and other members of the family:

$$W_r = Z_2\delta + \varepsilon_2$$

Where, Z_2 is a vector of those variables. A woman will participate in the labor market if the offered market wage exceeds her reservation wage, or if

$$Z_1\beta - Z_2\delta > \varepsilon_2 - \varepsilon_1$$

Under the assumption that the error terms ε_1 and ε_2 are normally distributed with zero mean (i.e. $E(\varepsilon_1) = E(\varepsilon_2) = 0$) and constant variance, define $y_1 = \varepsilon_2 - \varepsilon_1$, which is also normally distributed with zero mean and constant variance. The probability that a woman participates in the labor market is determined by Z_1 and Z_2. A limited dependent variable method is appropriate for this type of estimation. The dependent variable is 1 if a woman is in the labor force in the sample period, and 0 otherwise. All the variables in Z_1 and Z_2 are included as independent variables.

$$y_1 = I\ (Qv > 0)$$

Where, $Q = [Z_1, Z_2]$, $v = \begin{bmatrix} \beta \\ -\delta \end{bmatrix}(\beta, \delta)$, such that

$$Qv = [Z_1, Z_2] \begin{bmatrix} \beta \\ -\delta \end{bmatrix}$$

$$= Z_1\beta - Z_2\delta$$

and I (.) is an indicator function that takes the value of 1 if the term in the bracket is true, and 0 otherwise.

In unitary models, the household is considered as a unit with own utility function and assumes that all household members in a multi-person household have identical preferences. The optimal time allocation scheme of individuals depends solely on comparative advantages and not on who generates income or who benefits from a change in time spending. Browning, et al.(1994), Lundberg, Pollak & Wales (1997), Ward-Batts (2002), Thomas (1990), Browning & Chiappori (1998) and others criticize the unitary approach on the grounds that a household cannot be viewed as a single unit. However, the decision to participate in the labor market is not purely based on economic considerations. The collective household behavior has also a role to play. Further, in societies like Pakistan, traditional and cultural factors also play a vital role in the decision making of the woman. Moreover, the opportunity cost of leisure is greater than work for a woman who belongs to a poor household in which she is bound to work to meet her day to day expenses like food and living. Therefore, the labor-leisure choice does not always gives a corner solution for low or zero wages except for some cases it can be true, for instance in some backward and conservative regions of Pakistan women are not allowed to make any decision on her own. But, our analysis is not focusing the married women only. However, husband`s decisions do not entirely based on their own preferences in fact the family decisions and pressures do play a major role in the final decision. Therefore, the collective household model should help to explain the labor supply decision more precisely

especially in case of developing countries like Pakistan where the provision of services from government is not there compared to the welfare states in the world.

3.2. Collective HH Model Approach

Chiappori (1988) introduced the collective household model. In this approach, men and women have their own utility functions and behave to optimize the collective utility function. The household equilibrium is Pareto efficient.

$$U_{h,n} = \pi_n * U_{Male,n} + (1 - \pi_n) * U_{Female,n}$$

Where π_n may be interpreted as the power of the male and consequently $(1 - \pi_n)$ as the power of the female in the household *n* (see Chiappori 1988, 1997; Apps & Rees 1997; and Browning and Chiappori 1998).

Chiappori (1992), Bourguignon and Chiappori (1992), and Woolley (1996) examined models using the caring preference structure and derived conditions which generate testable restrictions. Particularly, the authors have shown the household resource allocation, which is generally assumed to generate Pareto-efficient outcomes, modeled in two stages: at the first stage, total household resources are allocated to each individual according to an agreed upon "sharing rule." At the second stage each agent allocates his or her share of resources to the purchase of goods that provide utility to the individual.

3.3. Intra-Household Decision and Women's Empowerment

For simplicity, it is assumed that the household has only two members (male and female). Further, by considering the structure of the family with minimum women's empowerment, the man first makes his decision. Therefore, the woman considers the

income of the male and his working hours as exogenous and makes a decision in regards to participating in the labor market. A woman maximizes her utility of leisure time and consumption subject to the constraint that male disutility due to her decision should be minimum. This type of model is considered as caring model. The disutility of the male member due to her decision should not overshadow the utility to the male of her income. [13] Further, if the assumption of the caring model is relaxed and the sharing model is introduced, which says that relative power of a woman is an important factor and thus considers the bargaining power of woman as well as her empowerment. Then, the woman's decision depends on her relative position in the household.

The thesis intends to evaluate the role of women's empowerment in the household in determining the decision to participate in the labor market. Women's empowerment has two main dimensions, namely empowerment within the household, and empowerment in the society. Intra household indicators include the women`s assets (ownership of land, etc), which is one of the variables of interest in the analysis. The prevailing gender inequality in society is the dimension that is independent of household empowerment and only exists due to socio-economic and cultural constraints in the society. This type of gender inequality has been measured by the gender wage gap.

[13] Disutility of male in result of time allocation of female to work cannot be measured, therefore, the household income (pooled income) along with the role of reservation wages is considered for determination of female labor supply.

4. Methodology

Economists frequently encounter a research problem where a dependent variable of the structural model is not directly observed. Actual value observed may be dependent on the values of other variables or alternatively may observe a variable that takes on values related to underlying unobserved dependent variables. For these models, ordinary least squares or standard economic estimators are not appropriate because of limited or qualitative nature of the observed dependent variable. The collective household behavior provides the following specification for the determination of labor supply decision of the women.

$$FLFP = f(WC, HHC, P, E)$$

Where FLFP = Female Labor force participation, WC = Women's characteristics, HHC = Household Characteristics, P = Proxy variables for Women's Empowerment, and

E = Endogenous covariates (in our analysis they are fertility, home-appliances and Coresidence)

Here, FLFP is the outcome variable, WC and HHC are the control variables, whereas P and E are the variables of interest.

The effect of fertility, home appliances, co-residence, and marriage on labor force participation has been evaluated by Instrumental Variable (IV) approach in order to overcome the problem of endogeneity. The reverse causation could lead to incorrect conclusion due to correlation between endogenous covariates and participation. Causality may run in opposite direction only, that is, increase in labor force

participation leads towards change in fertility or home appliances, or vice versa. Fertility rate and ownership of appliances are potentially endogenous variables. Causation may operate in the reverse direction, from dependent to independent. Specifically, if the woman's participation in the labor market leads to an increase in ownership of home appliances or a decline in fertility rate, then the standard Probit estimates will be biased.

The fertility, measured by the number of children per female, was instrumented by the proximity to clinic and contraceptive use and gender of the first child or same gender of the first two children. Household appliances were instrumented by the average women`s ownership of home appliances in the district. Women's empowerment was proxied by gender wage gap and current assets, such as the level of fixed assets (ownership of land either agricultural or non-agricultural, plot etc.) of the household. Women`s age, marital status, education level, and imputed wages were considered as her own characteristics which are all exogenous variables. The Household Characteristics include the per capita income of HH, family size, family type (whether the family is joint or nuclear), location(rural/urban dummy), agricultural/ non-agricultural HH, woman headed HH and head`s education.

The thesis examined the cross sectional household data from Pakistan and employs limited dependent variable models to determine the effect of various socioeconomic and demographic variables on the labor force participation of women. Specifically, the connection between empowerment and labor force participation has been analysed. For Pakistan, Naqvi and Shahnaz (2002) and Ejaz, (2006) discussed the decision making empowerment issue but did not consider the issue of endogeneity. It

is thus proposed to use the IV estimation in order to address the concerns of endogeneity between the variables in the model.

4.1. Empirical Strategy

The relationship between female labor force participation and gender empowerment is estimated with Probit model. Because of the potential endogeneity of women's empowerment, the probit model has been estimated with instrumental variables (IV). Though relatively easy to interpret, the linear probability model has drawbacks. One disadvantage is that fitted probabilities can be negative or greater than one. Another disadvantage is that the partial effect of any explanatory variable is constant. Therefore, to bypass these limitations, more sophisticated binary choice models, such as Probit, are sometimes preferred For two reasons; one, that the predicted probabilities are bound between 0 and 1 and the other, the estimated co-efficient is effect change in Z for a unit change in X.

4.1.1. Two-Stage Least Square (2SLS)

The error term ε_i is correlated with the coefficients of interest i.e. β and δ in the Ordinary Least Square (OLS) equation of labor supply. The OLS estimates of β and δ would be biased .as the OLS estimates are upward and downward biased depending on whether the ε_i is positively or negatively correlated to endogenous covariates P and E. To avoid the correlation between error term and the endogenous variables like co-residence, fertility and home appliances two stage least square method(2SLS) is used.

To address the endogeneity problem of fertility, co-residence and home appliances, we use an instrumental variable approach. An ideal instrument should be correlated with endogenous variable but uncorrelated with all other factors that determine labor force participation of women. With such instruments, a two stage least squares (2SLS) approach has been applied.

The first stage co residence, fertility and home appliances equations uses ordinary least squares to predict their respective probabilities. Using the predicted probability of each endogenous covariate, we estimate the labor supply equation in the second stage.

4.1.2. Probit and IV

The Probit estimation is based on an underlying latent variable model of FLFP

$$FLFP = \alpha + P_i\beta + E_i\delta * + X_i\gamma + \varepsilon_i \qquad (1)$$

In the Probit model, the dependent variable, FLFP is a binary choice variable that can take only two values: 1 if the woman is either currently working in labor market or looking for work and 0 if she does not. Non-linear maximum likelihood function for the normal probability (Probit) model has been estimated where FLFP is a function of several explanatory variables, P_i is the vector of proxy variables for women's empowerment indicators, E_i is the vector of endogenous covariates, and X_i is a vector of exogenous variables pertaining to women's specific and household-level characteristics leading to the woman's decision to be involved in formal economic activity. The Probit model was estimated by 2SLS process and instrumental variable techniques.

For notational purposes, consider the following:

$$\text{FLFP} = \text{b0} * (\hat{Y}) + \varepsilon_i \qquad Y = (1, P, E, X))$$

The model allows for the possibility that elements of Y_i may be correlated with the error term ε_i. Here, we consider E as potentially correlated with ε_i, if $E\{E_i, \varepsilon_i\} \neq 0$.

If endogeneity is present, then results can be biased and inconsistent. To mitigate potential endogeneity issues, let Z_i represent the vector of instrument such as , , gender of the first child, proximity to clinic and contraceptive use, average ownership of home appliances in the district, and housing information and where each instrument is a continuous variable.

Lack of availability of data ,the subjectivity inherent in assessing processes, and the shifts in relevance of indicators over time has posed the major methodological challenges in measuring the process of women's empowerment, including the use of direct measures as opposed to proxy indicators. However, some authors who have made efforts at empirically measuring empowerment have argued that as a process, it cannot be measured directly, but only through proxies (Ackerly 1995).

Women's empowerment cannot be measured, therefore, it will be proxied by the ownership of current assets and gender wage gap. Empowerment will be more fully explored in the later chapter.

More rigorous treatment of Probit models with endogenous explanatory variables are given in Wooldridge (2002, pg 472-477).

5. Data Source and Variable Description

5.1. Data Source

The study is based on cross-sectional micro-data set of Pakistan Social and Living Standards Measurement (PSLM) Survey 2006-07 conducted by the Federal Bureau of Statistics(FBS), Pakistan. The survey is based on the income and consumption data at household level. The PSLM 2004-05 was conducted as part of first round of Survey covering 77,000 households at district level and in round two almost the same number households were interviewed in PSLM 2006-07.

5.2. Variable Description

Dependent Variable
FLFP (female labor force participation) = 1 if woman work or looking for work
= 0 otherwise
Sets of Explanatory Variables

1. Women's Own Characteristics (WC)
2. Household Characteristics(HHC)
3. Women`s Empowerment(P)
4. Endogenous covariates(E)

Table 4: Set of Explanatory Variables		
Women's Characteristics (WC)		
Age Age^2	Age of the female respondent 15-50 years	
Marital Status	Dummy variable =1 when unmarried; = 0 when married (Unmarried includes single, divorced and widowed women)	
Education $(Education)^2$	Years of schooling of the female	
Wages	Imputed wages from the sample of working to non working	
Household Characteristics (HHC)		
HH-Income	Household income per capita	
Family size	Size of family (No. of family members including respondent)	
Location	Dummy variable = 1 if residing in urban areas, =0 otherwise Dummy variables for each of the province (Punjab, Sindh, NWFP) along with rural and urban dummies and district dummies	
Agricultural Household	Dummy variable = 1 if household owns agriculture land and/or main occupation is agriculture related, =0 otherwise	
Woman Headed HH	Dummy variable = 1 If female is head of Household; [14] =0 otherwise	
Residential status	Dummy variable = 1 if Permanent house, =0 otherwise	
Proxy Variables for Women's Empowerment (P)		
Gender Wage Gap	difference between female and male imputed wages	
Current assets	Level of current assets which include ownership of land (agricultural or non- agricultural) and plot.	
Endogenous Variables (E) and their respective Instruments		
Endogenous variables	**Instruments**	**Explanation**
Fertility rate (endogenous) Number of children per female	Distance (Exogenous instrument)	Distance from nearest family planning centre
	Contraceptive use (exogenous Instrument	Proximity to clinic and contraceptive use
	Gender of first child (exogenous Instrument)	Gender of the first child (boy or girl)
	Sibling sex mix (Exogenous instrument)	Same gender of the first two children

[14] According to the PSLM 2005-06, 3 percent (3576 out of 119182) women aged between 15-50 years are the household head. However, in the full sample without age restriction, 6.6 percent households are headed by women.

Home Appliances (endogenous) Number of home appliances available to female	Average HA (Exogenous instrument)	Average women`s ownership of household appliances in the district
Co- Residence or Family Structure(endogenous) Live with own parents or in laws	Housing information (Exogenous instrument)	House is owned or rent , detached or apartment or house size

5.3 Descriptive Statistics

Total number of observations in the data is 500,868 which include 242,423 females and 258,271 males. This survey has gathered information on almost 254 variables pertaining to education, health, housing, family planning, employment and earnings. In the sample, 119,255 female are between age of 15 to 50 years and is studied for labor force participation.

The agricultural Households and Non agricultural Households

The households that are:

- Residing in urban area having own agricultural land constitute 12% of the sample (21104).
- Residing in rural area and own agricultural land constitute 49.7% of the sample (161613).
- Residing in urban area and own non-agric land/plot are 4.5% of the sample (7835).
- Residing in rural area and own non-agric land/plot are 4.5% of the sample (14781).

The agricultural HH whose main occupation is agriculture are 43,092, of which 5,298 (12.3%) are residing in urban areas and 37,794 (87.7%) in rural areas. Within the agricultural households, 5,730 (13.3%) female (age15-50) participate in labor force. Out of 5730, 437 are from urban areas, whereas 5,293 from rural areas which constitute 7.6% and 92.4 %, respectively.

The composition of employment status is as follows: [15]

Table 5:
Composition of Employment in Urban and Rural Setup

Urban	Rural	Total
Paid employment (63.4%)	Paid employment (24.5%)	Paid employment (27.5%)
Unpaid Family helper,[16] (19.5%)	Unpaid Family helper (58.3%)	Unpaid Family helper (55.4%)
Livestock (2.7%)	Livestock (6.3%)	Livestock (6%)
Others 14.4%	Others 10.9%	Others 11.1%

[15] Employment status category includes paid employee, self employed (non-agricutural), unpaid family helper, livestock (only), own cultivator, share cropper as defined by PSLM report. However, we reported only those entities which are relevant to our analysis and rest is included in other category.

[16] Unpaid family helper is a member of the family who works for the family enterprise without being paid. Although they are not paid, their efforts result in an increase in the household income, therefore, are considered employed persons.(PSLM 2004-05)

6. Measurement of Woman`s Empowerment

One of the main problem in the history of Pakistan`s economic development is the gender inequality with respect to the socioeconomic indicators. Pakistan ranks 99 out of 109 countries according to Human Development Report, 2009.

6.1. Gender Wage Gap

This variable is computed by adopting the methodology of Shannon and Kidd (2003), Blau and Kahn (1992), and Anderson and Shapiro (1996). The wage determination equation for men and women will be constructed separately by considering the education and age (proxy for experience) as explanatory variables. Further, regional as well as occupational dummy variables will also be considered to tackle the job and region specific gender wage discriminations.

The regression for women will be estimated by the following equation.

$$ln(w_i) = x_i^f \beta + \mu_i \qquad \text{(Women`s equation)}$$

w_i is the market wages received by female and $x^f i$ is the vector of explanatory variables, which includes education, age and its square (proxy for experience) regional and occupational dummy variables. This regression will be estimated for each individual woman working and earning wages who is between the ages of 15 to 50 years.

The regression for the male will be estimated by the following equation.

$$ln(w_i) = x_i^m \theta + \epsilon_i \qquad \text{(Male`s equation)}$$

w_i is the market wages received by male and x_i^m is the vector of explanatory variables, which includes education, age and its square (proxy for experience), regional and occupational dummy variables. This regression will be estimated for each individual male working and earning wages who is between the ages of 15 to 50 years.

After estimating the women's and male`s equations separately, the following steps are used to construct gender wage gap

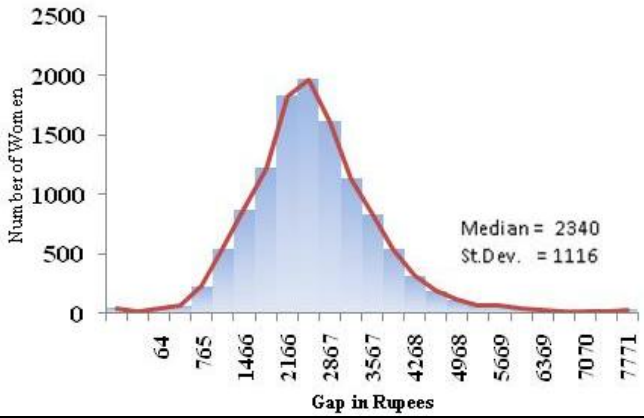
1. First of all I estimate β by using the data of each individual working woman who is earning wages by using the equation $ln(w_i) = x_i^f \beta + \mu_i$. where β is the coefficient of characteristics (education, age, occupation and regional dummies).
2. After estimating the women`s equation in Step 1, we find $\hat{w} = x_i^f \beta$ The wages of working woman is predicted on the basis of women's equation. It is like imputing the wages.
3. In the third step, we find $x_i^f \theta$. Wages for each woman is computed by taking the coefficients of male equation with the explanatory variables of women such as education, age and regional and occupation dummies. By using the coefficient θ of men's equation the wages are computed for women, thus the wages are imputed for working women. So we arrived at $\hat{w} = x_i^f \theta$.
4. Hence, the difference of both the imputed wages from women's equation $(\hat{w} = x_i^f \beta)$ and from men`s equation $(\hat{w} = x_i^f \theta)$ is the exogenous level of gender discrimination that a woman is facing in the society.

$$Gender\ wage\ gap = (x_i^f \theta) - (x_i^f \beta) \qquad \text{(Gap equation)}$$

6.1.1. Regression Results for Women`s Empowerment using a proxy variable: Gender-Wage Gap

The standard Mincerian model is applied to estimate the earning function for male and female separately. To avoid the earning heterogeneity, the dependent variable is the wages earned in logarithmic form. The explanatory variables include personal, human capital, employment, and spatial characteristics. Further, interactive variables are also utilized to determine the earnings of both genders. After confirming the diagnostics, both wage equations are finalized. The details of estimated equations along with the diagnostics are reported in appendix.

Chart 3
Frequency Distribution of Gender Wage Gap

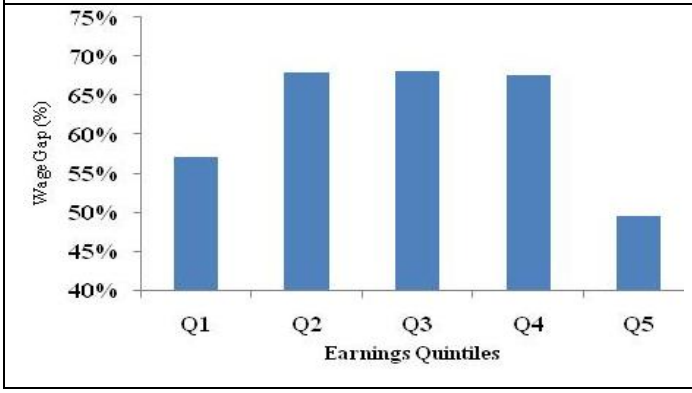


The first imputed wages are calculated on the basis of female's characteristics (explanatory variables) and responsiveness of female's characteristics to earnings. Second imputed wages are calculated on the basis of female's characteristics (explanatory variables) and responsiveness of male's characteristics to earnings. In other words, pure female's imputed wages are computed from coefficients of female equation by using the explanatory variables of the female only, and mix imputed wages are computed from the coefficients of male equation by using the explanatory variables of the female. Gender wage gap is calculated by taking the difference of mix imputed wages and pure imputed wages.

Chart 3 presents the frequency distribution of the gender wage gap. On average, female wages are 2340 rupees less than male wages. The gender wage gap follows a normal distribution, which shows that discriminatory attitudes towards female deviates from a fix mind set. The possible reason for high standard deviation is regional and demand characteristics.

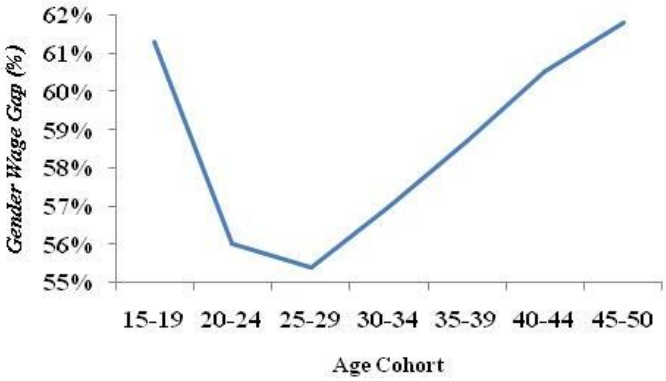
In relative terms, a female is discriminated by 60 percent on average. The gender wage gap is plotted against the quintiles of earnings in Chart 4 (Q1 represents the lowest wages and Q5 represents the highest wages), which present that the low and high income earning women are relatively less discriminated than the middle income earning women. The reason might be minimum wage legislations and demand for highly skilled females in upper groups.

Chart 4
Gender Wage Gap by Earning Quintiles



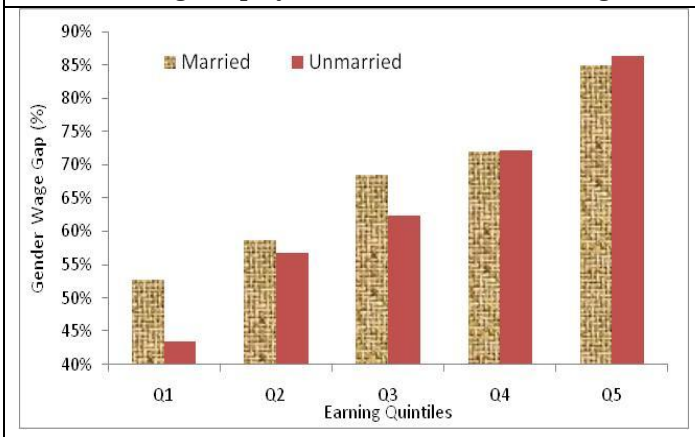
The discrimination against female in the labor market is less for the middle aged women. The new entrants of age 15-19 years and experienced women of age

Chart 5
Gender Wage Gap by Age Cohort



35-50 years are relatively more discriminated. The reason for such U-shape curve might be higher productivity at a young age. The wage gap changes overtime with age of women. Gaps in older women may reflect older attitudes (they start with very low wages, so the gap persisted). Whereas the gaps in age groups 20-30 may be lower due to modern attitudes of women toward employment. The Data shows that out of 118261 sample of women between the age of 15-50 years, 2061 cases are the between the age 15-19 years, which is almost 17% of total women sample.

Chart 6
Gender Wage Gap by Marital Status and Earning level



As this is the school going age, one can predict that the reason of more discrimination is due to the fact that they are working instead of attaining education. Due to the lack of experience and skills they might be getting lower wages which leads to higher discrimination. In case of marital status, Chart 6 presents that married women are subject to higher discrimination relative to unmarried women. It means that employer considers the household obligations and discriminate the married accordingly.

Chart 7 and 8 confirms that discrimination decreases with the level of education, as illiterates are highly discriminated and highly educated are least discriminated. The possible reason for this is the demand in the labor market. With less human capital endowments, women have to face more competition in the markets so the firm can discriminate against female laborers. The gender wage gap is highest for the illiterates. On average, illiterate, primary, secondary, matriculate, intermediate, graduate, and highly educated female worker is discriminated by 70 percent, 65 percent 49 percent, 48 percent, 47 percent percent, and 29 percent respectively. Further, the quintiles show that the discrimination is increasing with the level of earnings. The gender wage gap is higher in the commodity producing sectors and lowest in the services sectors.

Chart 7a

Gender Wage Gap by Education and Earning Level

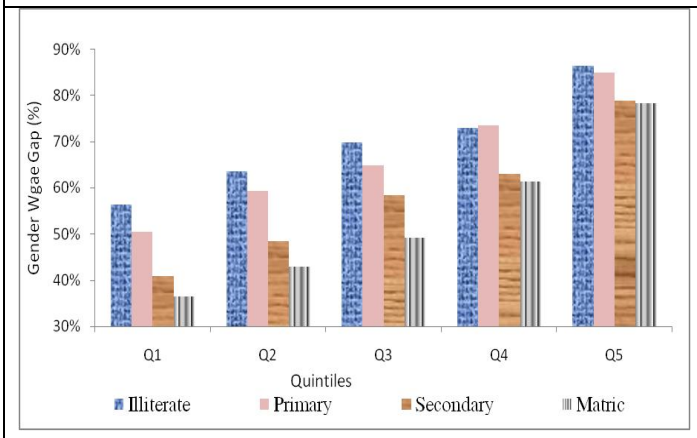
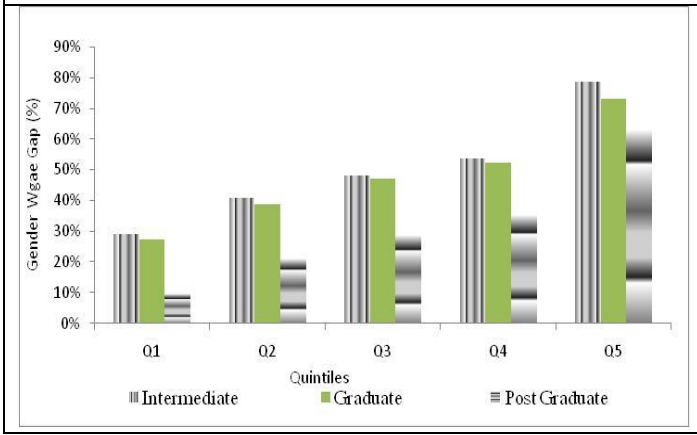


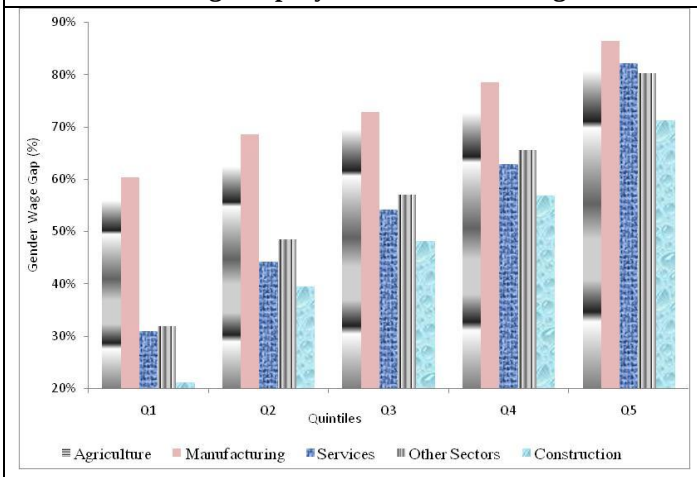
Chart 7b

Gender Wage Gap by Education and Earning Level



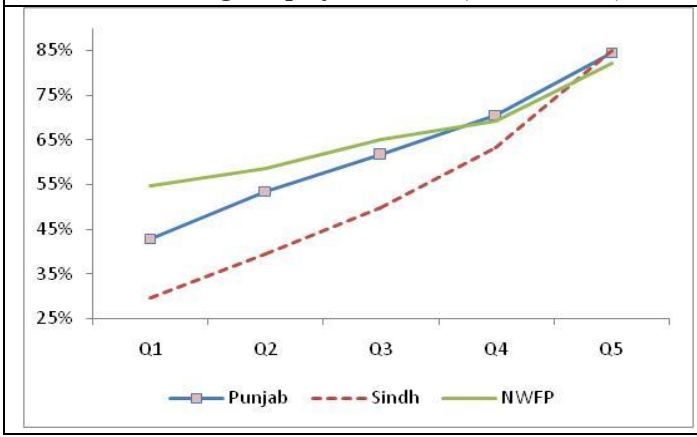
The highest discrimination is observed in the manufacturing sector. The reason is obviously derived from education as commodity producing sector absorbs less educated and services sector absorbs more educated workers. (see Chart 8). The gender wage gap is investigated in the rural areas of each province. In the urban areas of provinces, discrimination is highest in the NWFP province, whereas, it is lowest in the urban areas of Punjab.

Chart 8
Gender Wage Gap By Sectors and Earning Level



The reason for this is the cultural development and emergence of awareness in the big cities of Pakistan especially, Lahore, Rawalpindi and Karachi. In case of rural areas, the situation is converse. Discrimination is highest in rural Punjab and rural Sindh but least in the rural NWFP. One of the possible reason could be that if everyone is poor (both men and women) it is harder to have large wage gaps. A precise analysis of district dummy shows that female residing in the Islamabad, Jhelum, Rawalpindi, Bhakkar, Mianwali, Chakwal, Khushab, Lahore,

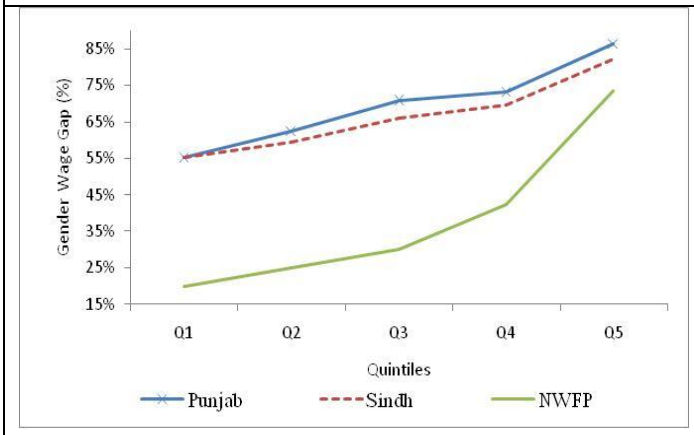
Chart 9
Gender Wage Gap by Provinces (Urban Areas)



Faislabad and Sialkot are less discriminated compared to female of Multan, Khanewal, Sargodha, T.T.Singh, Okara, Jhang, Muzaffargarh, Rajanpur, Lodhran, Pakpattan, and Layyah. The rest of districts are in the middle. The discrimination is higher in Peshawar and Charsada. The province of Sindh is relatively better in case of gender discrimination. The econometric results of gender wage-gap for both men and women equation are reported in the appendix table (A-3).

Chart 10

Gender Wage Gap by Provinces (Rural Areas)



Earning functions of man and women are separately estimated for the computation of gender wage gap. These earning functions are the Mincerian equations in which the log of wages is explained by the own characteristics of the person, location and occupation dummies. In order to improve the specifications, the interactive variables are also introduced in the equations. The higher Adjusted R^2 and significance of the parameters reflects the quality of estimated earning function. As theoretically specified, the age that is proxy for experience and education has positive significant impact on the earnings. The impact of experience is even further strong in case of paid employed and workers living in Sindh province, which can be seen from the interactive variable of wage with paid employed and age with dummy for Sindh province. In case of province of NWFP, the experience has low return than Sindh and

Punjab. The results also indicate that education and earnings are positively correlated, therefore, the both the earning functions have the theoretically justified results.

However, when we compare both the earning functions, the coefficients of male equation are stronger in the magnitude and significance. The coefficient of age in male equation is higher than female equation showing that male earnings increase higher than female after the attainment of experience. But in case of education, the coefficients of female equation are stronger than male equation. It means that with the improvement in education, the female receives more income than their male counterpart. The possible reason for higher marginal return of female is the low level of literacy in the female so there is less competitive environment for educated females.

In order to tackle the heterogeneity in earnings across various locations, the dummy variables for province and district are incorporated which have significance role in determining the earnings in both the equations.

7. Results and Empirical Findings

The objective of the current research is to investigate the determinants of female labor force participation (FLFP) across rural and urban areas of Pakistan at provincial as well as at district level by utilizing the cross-sectional data of PSLM (2006-07). The dependent variable FLFP is of binary nature, i.e. woman is working or not working. The explanatory variables are categorized into four sets of characteristics, namely woman's own characteristics, household characteristics, women`s empowerment and endogenous covariates. Endogenous variables are properly instrumented in order to address the reverse causality between the endogenous variables and labor force participation. Whereas, the effect of women`s empowerment has been captured by using gender wage gap and fixed current assets as proxy variables.

This chapter presents the results of two step Probit estimation of female labor force participation. In the first step, the endogenous covariates are regressed on the instrumental variables and in the second step, the predicted endogenous covariates along with the control variables (such as own and household characteristics and proxy variables for empowerment of the women) are utilized as explanatory variables to determine the female labor force participation. This two step procedure is adopted to perform estimation by considering the unpaid family helpers as working women as per the definition of labor force defined in labor Force Surveys, and then by considering the unpaid family helpers as non working women or in other words considering only those women who are paid employees. Further, the estimation is performed on the overall Pakistan data, and on the three provinces of Punjab, Sindh,

and NWFP. Balochistan province is excluded due to data constraint. The results of both stages are discussed below.

7.1. First Stage Results of Endogenous Covariates

In the first stage, simple OLS regression equations have been regressed for each of the endogenous covariates by using instrumental variables along with the control variables. It leads to Probit estimation procedure in the second stage in which the predicted values from first stage along with the other control and proxy variables are used to determine the FLFP.

As per the literature, endogenous covariates are those variables that are supposed to have a causal relationship with FLFP. Woman's fertility, co-residence with parents or in-laws, and ownership of home appliances are identified as the endogenous covariates, which need to be corrected by using the instrumental variables technique. These instruments are selected in the manner that they have direct impact on the endogenous covariates, but do not have any direct link with FLFP. Proximity to family planning centre, contraceptive use, and sibling sex mix are considered as the instruments in case of fertility. Average ownership of appliances in the locality are as an instrument for home appliances and housing information is used as instrument for co-residence.

Studying the impact of fertility on the extent of female labor force participation is complicated by the fact that both are potentially endogenous household decisions, requiring simultaneous estimation. The most complicated part of such estimation is to find the appropriate instruments for fertility. The instrumental variables used in the

first stage regression are proximity to clinics and contraceptive use, which are indicators of access to family planning methods and general awareness. Moreover, the gender composition of first two children in the family is used to estimate the effect of demand for an additional child on mother`s fertility. The results of OLS equation of women's fertility rate are presented in Table 3. The instrumental variables perform better and are with justified sign and magnitudes. The coefficients of proximity to clinics show a positive impact on the fertility rate, indicating a point when the distance is greater, the number of children born to a woman will be higher. Contraceptive use has an inverse relationship with fertility; more or frequent use will reduce the probability to have more children. The preference for son may be strong enough in the traditional society of Pakistan, which may result in substantial increase in family size. Therefore, parents of same gender siblings are more likely to go on having an additional child. It has been observed that the coefficient of first two boys (-0.019) shows negative impact compared to the coefficients of first two girls (0.032) which shows a positive effect. It can be inferred that the mothers of first two girls are more likely to have a third child compared to the mother having first two boys. This instrument exploits the widely observed phenomenon of parental preference for a mixed siblings-sex composition. The other control variables include women`s age, age square, level of education, family size, and location dummies (such as provincial, district, rural and urban dummies). These findings are very much consistent with previous studies mentioned in literature review.

Table6: First Stage Regression Results of Fertility (Endogenous Covariate)					
Variables	**Coefficients**	**Standard Error**	**Variables**	**Coefficients**	**Standard Error**
Instrumental Variables					
Proximity to Clinic	0.0170*	(0.005)	First two boys	-0.0190	(0.013)
Contraceptive use	-0.0250***	(0.014)	First two Girls	0.0320*	(0.012)
Control Variables					
Age	0.3100*	(0.005)	Sialkot	-0.2930*	(0.046)
Age^2	-0.0030*	(0.000)	Hafiza Abad	-0.1670*	(0.053)
Education	-0.0310*	(0.004)	M. Bahauddin	-0.3010*	(0.052)
$Education^2$	-0.0010	(0.000)	Kasur	0.1480*	(0.042)
Family Size	0.9900*	(0.004)	Sahiwal	-0.1310	(0.047)
Family Size ^{2}	-0.0260*	(0.000)	Pakpattan	-0.0750*	(0.053)
Working People	-0.1910*	(0.004)	D.G.Khan	-0.1470*	(0.044)
NWFP	-0.4130*	(0.023)	Rajanpur	0.1800***	(0.047)
Women Head HH	0.5490*	(0.034)	Leiah	-0.0970*	(0.052)
Nuclear*Urban	-0.1710*	(0.015)	Muzaffargarh	0.2070*	(0.043)
Nuclear	2.6120*	(0.015)	Nawab Shah	0.1930**	(0.049)
Home Appliances	-0.0370*	(0.004)	Ghotki	0.0920*	(0.044)
Attock	-0.3260*	(0.053)	Shikarpur	-0.1880*	(0.045)
Rawalpindi	-0.1080*	(0.036)	Sanghar	0.2070*	(0.040)
Chakwal	-0.2630*	(0.054)	Mirpur Khas	0.1500*	(0.040)
Sargodha	-0.1670*	(0.040)	Karachi	0.1800*	(0.022)
Khushab	-0.1620***	(0.057)	Upper Dir	0.3290*	(0.053)
Mianwali	-0.1070*	(0.059)	Chitral	0.1450*	(0.057)
Faisalabad	-0.1970*	(0.028)	Peshawar	0.3840*	(0.041)
T. T. Singh	-0.1520*	(0.046)	Charsada	0.7410*	(0.027)
Gujrat	-0.3290*	(0.047)	Constant	-9.8520*	(0.078)
Number of observations	77046		R^2	0.6972	
F(45, 77000)	3940.04		Adjusted R^2	0.697	

*, **, *** indicate significance at 1%, 5%,and 10% level respectively. Standard errors are in parenthesis

Co-residence (living with own parents or in-laws in a joint family-or nuclear) due to its reverse causality with FLFP is also treated as an endogenous variable. Therefore, housing information (owned or rented) has been used as an instrument for the dummy variable of co-residence; joint or nuclear family. The variable takes nuclear family = 1 and joint family = 0).In the first stage, the results of instrumental variable shows an inverse relation between housing information and co-residence. It means that the decision of living in joint family or nuclear family depends on the living place or house. If the house is rented then there is more likelihood of women to live in nuclear family. On the other hand, if the house is owned or if it is ancestral house, then according to the culture of Pakistan single women live with her parents and married ones live with the in-laws.The control variables include age, age squared, education, marital status family size, dummy for women-headed household, rural/urban dummy and household income per capita. The results are reported in Table 4.

Table 7:
First Stage Regression Results of Co-Residence (Endogenous Covariate)

Variables	Coefficients	Standard Error	Variables	Coefficients	Standard Error
Instrumental Variable					
Housing Information	-0.40087*	(0.0013)	Constant	1.648835	(0.00296)
Control Variables					
Age	0.00375	(0.0001)	Family Size	-0.08405*	(0.001)
Age^2	-0.00005	(0.000)	Women-Headed HH	-0.58509*	(0.005)
Education	-0.01246*	(0.0001)	Location	-0.09557*	(0.052)
Marital status	0.12818	(0.0016)	Household Income	-0.02142*	(0.042)
Number of observations	496060		R^2	0.4188	
F(9,496050)	39717.66		Adjusted R^2	0.4188	

*, **, *** indicate significance at 1%, 5%,and 10% level respectively. Standard errors are in parenthesis

The ownership of home appliances is also subject to reverse causality when considered as an explanatory variable for FLFP. The average ownership of home appliances by women in the sampling unit has been used as an instrument for ownership of home appliances due to exogenous nature of average ownership in the locality. In order to discover the standard of living at household level, the home appliances have been further divided into two categories; first is the number of labor saving appliances available to a woman and second is number of time consuming or luxurious home appliances available to her. Labor saving category include iron, sewing machine, fan, refrigerator, cooler, cycle, motorcycle, car, truck and tractor, whereas, the time consuming durables include VCR, VCP, television(TV) and air-conditioner (AC). The results shows a positive relationship between average women`s ownership of labor saving appliances in the district and labor saving home appliances of the household to which a woman belongs to. It means as the trend of increase in the number of labor saving appliances in the district increases on average, consequently, the number of labor saving appliances of each household will increase. There are certain possible reasons to it; one possible reason could be the increase in income per capita of the households in the district reflecting betterment in their standard of living. Demonstration effect might also be one of the explanations to it. Same is the case with the luxurious appliances. As the standard of living of the households in the locality gets better, the number of luxurious home appliances on average increases and therefore the number of luxurious home appliances of the household of which women is a part, increases. The other control variables include

age, age squared, marital status, education, women headed household, rural/urban dummy and household income per capita. The results are reported in the table 5.

Table 8:
First Stage Regression Results of Home Appliances; Labor Saving (Endogenous Covariate)

Instrumental Variables	Coefficients	Standard Error	Variables	Coefficients	Standard Error
Average Women's Ownership of Labor Saving Appliances in District	0.821904*	(0.002)	Constant	0.8050*	(0.012)
Control variables					
Age	-0.0079*	(0.000)	Women-headed HH	0.6323*	(0.022)
Marital Status	-0.10673*	(0.006)	HH income	-0.0429*	(0.000)
Education	0.1286*	(0.000)	Location	0.2266*	(0.000)
Number of observations	496060		R^2	0.4294	
F(7,496052)	5333.64		Adjusted R^2	0.4294	
First Stage Regression Results of Home Appliances; Time Consuming Luxurious (Endogenous Covariate)					
Instrumental Variables	**Coefficients**	**Standard Error**	**Variables**	**Coefficients**	**Standard Error**
Average Women's Ownership of Luxurious Appliances in District	0.7786*	(0.003)	Constant	0.2694*	(0.006)
Age	-0.0034	(0.0003)	Women-headed HH	0.3455	(0.011)
Age^2	0.0044	(0.000)	Location	-0.0273	(0.004)
Marital status	-0.257	(0.003)	HH-income	0.006	(0.0004)
Education	0.0444	0.003)			
Number of observations	496060		R^2	0.3515	
F(8,496051)	12753.3		Adjusted R^2	0.3515	

*, **, *** indicate significance at 1%, 5%,and 10% level respectively. Standard errors are in parenthesis

7.2. Second Stage Results

The predicted or fitted values from each of the first stage regression is used as exogenous variable along with other explanatory variables classified in women`s own and household characteristics catagories and proxy variables of women`s empowerment. The two stage least square regression (2SLS) has been estimated using

binary variable, FLFP (a dummy variable; including working women = 1, and non-working = 0). Estimated parameters and probability derivatives or marginal effects of Probit model for overall Pakistan are reported in Table 6

Table 9:
All Pakistan Probit Results of Female Labor Force Participation

Dependent Variable Female Labor Force Participation						
Explanatory Variables	**With Unpaid Family Helper**			**Without Unpaid Family Helper**		
	Coefficients	**Marginal effects**	**Standard Error**	**Coefficients**	**Marginal effects**	**Standard Error**
Age	0.1043	0.0038	(0.000)*	0.1067	0.0003	(0.000)*
Age^2	-0.0012	0.0000	(0.000)*	-0.0013	0.0000	(0.000)*
Education	-0.0904	-0.0033	(0.000)*	-0.1077	-0.0003	(0.000)*
$Education^2$	0.0037	0.0001	(0.000)*	0.0031	0.0000	(0.000)*
Marital Status	-0.3038	-0.0127	(0.002)*	-0.2910	-0.0009	(0.000)*
Family size	0.0979	0.0036	(0.000)*	0.0345	0.0001	(0.000)*
$Family\ size^2$	-0.0031	-0.0001	(0.000)*	-0.0019	0.0000	(0.000)*
Household Income	0.6710	0.0247	(0.003)*	0.9490	0.0023	(0.001)*
Agricultural Household	1.3482	0.1094	(0.011)*	3.0951	0.1742	(0.020)*
Women Headed HH	-0.0189	-0.0007	(0.002)*	0.8617	0.0086	(0.002)*
Residential status	0.3403	0.0087	(0.002)*	0.5002	0.0006	(0.000)*
Location	-0.3472	-0.0134	(0.005)*	-0.1375	-0.0003	(0.000)*
Punjab	2.4011	0.1891	(0.033)*	3.2644	0.0779	(0.028)*
Sindh	3.0231	0.5372	(0.075)*	2.4238	0.0862	(0.053)*
Assets	-0.0716	-0.0026	(0.000)*	-0.1730	-0.0004	(0.000)*
Labor saving appliances hat	-0.3333	-0.0122	(0.002)*	0.0590	0.0001	(0.000)*
Labor saving appliances hat^2	0.0224	0.0008	(0.000)*	-0.0113	0.0000	(0.000)*
Luxurious appliances hat	-0.0974	-0.0036	(0.001)*	-0.1317	-0.0003	(0.000)*
Luxurious appliances hat^2	0.2507	0.0092	(0.002)*	0.2612	0.0006	(0.000)*
Co-Residence hat	4.3161	0.1586	(0.024)*	0.4846	0.0012	(0.003)*
Fertility hat	-0.1242	-0.0046	(0.001)*	-0.0106	0.0000	(0.000)*
Wage-Gap	-0.9345	-0.0343	(0.008)*	-1.1190	-0.0027	(0.001)*
Wage gap*Punjab	0.5964	0.0219	(0.008)*	-0.6944	-0.0017	(0.001)*
Wage Gap*Sindh	-0.6870	-0.0252	(0.009)*	-1.3953	-0.0034	(0.001)*
Punjab*urban	-0.0449	-0.0016	(0.004)*	0.3647	0.0013	(0.001)*
Sindh*urban	-0.1528	-0.0049	(0.003)	0.9006	0.0079	(0.005)*
Constant	-7.6637	-	-	-6.9461	-	-
Islamabad/FATA	-0.5999	-0.0119	(0.002)	-0.4371	-0.0006	(0.000)*
Attock	-0.7749	-0.0131	(0.002)*	-0.1432	-0.0003	(0.000)*
Rawalpindi	-0.0157	-0.0006	(0.003)*	-0.0417	-0.0001	(0.000)*
Jhelum	-0.3996	-0.0097	(0.002)*	-0.4985	-0.0006	(0.000)*
Chakwal	-0.5576	-0.0116	(0.002)	-0.0704	-0.0002	(0.000)*
Sargodha	-0.2563	-0.0072	(0.002)*	0.0556	0.0001	(0.001)*
Bhakkar	-0.9320	-0.0138	(0.002)	-2.5620	-0.0008	(0.000)*

Table 9: All Pakistan Probit Results of Female Labor Force Participation						
Dependent Variable Female Labor Force Participation						
Explanatory Variables	**With Unpaid Family Helper**			**Without Unpaid Family Helper**		
	Coefficients	**Marginal effects**	**Standard Error**	**Coefficients**	**Marginal effects**	**Standard Error**
Khushab	-0.0997	-0.0033	(0.002)*	-0.7135	-0.0007	(0.000)*
Mianwali	-0.5713	-0.0117	(0.002)*	-0.6310	-0.0006	(0.000)*
Faisalabad	0.2253	0.0104	(0.003)*	0.5312	0.0030	(0.002)*
Jhang	0.3314	0.0173	(0.004)*	0.4406	0.0022	(0.001)*
T.T. Singh	0.1786	0.0079	(0.004)*	0.2593	0.0010	(0.001)*
Gujranwala	-0.2538	-0.0072	(0.002)*	0.1989	0.0007	(0.001)*
Gujrat	-0.2140	-0.0063	(0.002)*	0.5695	0.0036	(0.002)*
Sialkot	0.1115	0.0046	(0.004)*	0.3012	0.0012	(0.001)*
Hafiza Abad	-0.4780	-0.0107	(0.002)*	-0.0801	-0.0002	(0.000)*
M. Bahauddin	-0.2457	-0.0070	(0.002)*	-0.0145	0.0000	(0.000)*
Narowal	0.2760	0.0136	(0.005)*	0.5028	0.0028	(0.002)*
Lahore	-0.0247	-0.0009	(0.002)*	0.1531	0.0005	(0.001)*
Kasur	0.2884	0.0144	(0.004)*	0.6536	0.0047	(0.002)*
Okara	0.5823	0.0396	(0.007)*	0.2260	0.0008	(0.001)*
Sheikhupura	0.2190	0.0101	(0.004)*	0.7594	0.0065	(0.003)*
Vehari	0.0807	0.0032	(0.003)*	0.7284	0.0060	(0.003)*
Sahiwal	0.5996	0.0416	(0.008)*	0.4137	0.0020	(0.001)*
Multan	0.1324	0.0056	(0.003)*	0.3433	0.0015	(0.001)*
Khanewal	0.1323	0.0056	(0.003)*	-0.1352	-0.0003	(0.000)*
Pakpattan	0.4508	0.0269	(0.007)*	0.1725	0.0006	(0.001)*
Lodhran	-0.4079	-0.0098	(0.002)*	-0.1875	-0.0003	(0.000)*
D.G.Khan	-0.3466	-0.0089	(0.002)*	-0.4374	-0.0006	(0.000)*
Rajanpur	0.9141	0.0864	(0.013)*	0.2706	0.0010	(0.001)*
Leiah	-0.1167	-0.0038	(0.002)*	0.5235	0.0031	(0.002)*
Muzaffargarh	0.6534	0.0479	(0.008)*	0.2366	0.0008	(0.001)*
Bahawalpur	-0.4858	-0.0109	(0.001)*	-1.2840	-0.0008	(0.000)*
Bahawalnagar	0.6874	0.0519	(0.009)*	-0.2070	-0.0004	(0.000)*
Khairpur	-0.0410	-0.0014	(0.004)*	0.9081	0.0102	(0.009)*
Sukkur	0.3630	0.0197	(0.008)*	1.4356	0.0375	(0.022)*
Nawab	1.1578	0.1360	(0.023)*	1.4988	0.0433	(0.027)*
Neshero	-0.9651	-0.0140	(0.002)*	-0.6478	-0.0007	(0.000)*
Ghotki	-0.2231	-0.0065	(0.003)*	0.6659	0.0050	(0.006)*
Jacobabad	1.5906	0.2553	(0.027)*	0.1764	0.0006	(0.001)*
Shikarpur	0.4296	0.0250	(0.009)*	1.4181	0.0362	(0.022)*
Larkana	0.6455	0.0465	(0.010)*	0.8440	0.0084	(0.008)*
Dadu	0.1953	0.0088	(0.005)*	0.9769	0.0122	(0.010)*
Hyderabad	0.8677	0.0771	(0.015)*	1.5775	0.0488	(0.026)*
Badin	0.8151	0.0699	(0.014)*	1.1974	0.0216	(0.015)*
Thatta	-1.1694	-0.0145	(0.002)*	0.1907	0.0006	(0.002)*
Sanghar	0.7878	0.0658	(0.012)*	0.1359	0.0004	(0.002)*

Table 9: All Pakistan Probit Results of Female Labor Force Participation						
Dependent Variable Female Labor Force Participation						
Explanatory Variables	**With Unpaid Family Helper**			**Without Unpaid Family Helper**		
	Coefficients	**Marginal effects**	**Standard Error**	**Coefficients**	**Marginal effects**	**Standard Error**
Mirpur	1.2735	0.1633	(0.022)*	0.8264	0.0081	(0.007)*
Tharparkar	0.7008	0.0540	(0.012)*	1.2005	0.0219	(0.015)*
Swat	1.2776	0.1649	(0.060)*	1.5284	0.0458	(0.031)*
Upper Dir	2.2053	0.4877	(0.084)*	2.0493	0.1223	(0.062)*
Lower Dir	0.7702	0.0634	(0.037)*	1.1539	0.0195	(0.017)*
Chitral	2.5225	0.6114	(0.080)*	2.2910	0.1781	(0.079)*
Shangla	0.9820	0.0991	(0.046)*	1.1100	0.0176	(0.016)*
Malakand	1.1198	0.1273	(0.054)*	1.3617	0.0319	(0.025)*
Bonair	0.8344	0.0731	(0.040)*	1.1495	0.0193	(0.017)*
Peshawar	1.5747	0.2484	(0.066)*	1.6789	0.0606	(0.035)*

*, **, *** indicate significance at 1%, 5%,and 10% level respectively. Standard errors are in parenthesis

Number of observations	113026	Wald χ^2 (82)	4396932 (0.000)	Wald χ^2 (82)	42946.43 (0.000)
		Pseudo R^2	0.5566	Pseudo R^2	0.87

The probability derivatives indicate the change in probability on account of a one-unit change in the given independent variable after holding the entire remaining variable constant at their mean.

As mentioned earlier, the explanatory variables are classified into four categories: women`s own characteristics, household characteristics, the proxy variables for women`s empowerment and the endogenous covariates. At first stage, the instrumental variable (IV) technique has been applied. The endogenous variables such as fertility, co-residence and home-appliances are utilized in second stage by taking their predicted values. In second stage, all the variables were incorporated in the final equation. Women`s own and household characteristics are the control

variables in the equation whereas, the proxy and endogenous covariates were treated as variables of interest.

On the basis of the conceptual framework developed in chapter 3 and empirical findings, we identify whether Unitary or Collective household model explains the socio-economic conditions of Pakistani women better. Own characteristics include age and age-squared. As age increases, after a certain optimal level, its relationship with LFP starts becoming negative. Age and education are both conventional variables so previous studies have also used these as control variables in the econometric analysis. Age of the woman is positively related to labor force participation. The coefficients of age and age-squared shows that as the age increases, the likelihood of women to participate increases until the age of 42 years, after that increase in age reduces the likelihood to participate in the labor market. [17] The coefficient of marital status shows that married women are less likely to participate in the labor market compared to the unmarried women because a married woman is less likely to work outside due to household responsibilities. The variable of education measured by years of schooling completed is taken in level as well as squared form. The coefficients of level and squared of education implies that an increase in

[17] **In the equations of the type** $Y = \alpha + \beta_1 X + \beta_2 X^2$

$$\frac{\partial y}{\partial x} = \beta_1 + 2\beta_2 X$$

$$\beta_1 + 2\beta_2 X = 0 \text{ (Optimization)}$$

$$2\beta_2 X = -\beta_1$$

$$X = -\frac{\beta_1}{2\beta_2}$$

Applying this on the variables with the squared term we come up with x = 42yrs for age, 11 for the level of education, 15 for the household members and 7 for the number of home appliances in a household. Hence, they are used as turning point in the analysis.

education after twelve year of schooling (intermediate) increase the probability of women to participate in the labor market whereas the less educated (matriculation or below) are discouraged to enter the labor market.

Household characteristics include household income per capita, family size, agricultural household, and dummy for rural or urban areas. Household income per capita has a positive and significant relationship with FLFP which shows higher the level of income, higher will be the probability to work. The women living in agricultural household have higher probability to participate compared to non-agricultural household. [18] The coefficient of family size indicate greater number of family member in the household increases the probability of the female members to participate in the labor market but as the family size increase above fifteen members, the probability of women to participate in the labor market becomes negative. It is reasonable to infer that owing to lower income and large family, up to a certain level women are more likely to work as more income is needed, But a larger number of people in the household would cause a higher workload for female members, as they will be involved in preparing food, doing laundry and looking after the family members, so the turning point is fifteen and after that the association become negative.

In the first stage, the results of instrumental variable technique had shown an inverse relation between housing information and co-residence (the predicted variable co-

[18] Within 5,730 agricultural Households, (13.3%) female (age15-50) participate in labor force. Out of 5730, 437 are from urban areas, whereas 5,293 from rural areas which constitute 7.6% and 92.4 % respectively.

residencehat has a positive and significant relationship with female labor force participation. [19] It suggests that living in joint family allows her to share a burden of work at home with parents or in-laws. On the other hand, if she is residing in the nuclear family she is unable to manage both household and office work together. Moreover, it is very interesting to say that in case of Pakistan, this traditional factor encourages a woman to take part in economic activities.

The coefficient of level of predicted variable from labor saving appliances, is negative with respect to labor force participation but the square is positive indicating that the likelihood to participate increases when the number of labor saving appliances increase from seven. The category belongs to lower and middle class households where the appliances consist of basic necessities and durable goods. It is reasonable to infer that owing to lower household income, a woman would move towards labor market to meet the household needs. In similar manner, the coefficient of level of time consuming or luxurious appliances shows a negative relationship and square of it is showing a positive relationship with women`s labor force participation. This variable is a representative of upper class households where the women spend more time utilizing the facilities at home to get access to more opportunities like education , health etc. Therefore, being more competitive she is more likely to an active participant of labor market activities. In case of both, overall Pakistan and Punjab regression results, a negative relationship exists between labor saving appliances and FLFP including unpaid family helper whereas a positive relation

[19] "Labor force participation is significantly and positively associated with co-residence. (Hill 1984; Yamada, Yamada, and Chaloupka 1987; Morgan and Hiroshima 1983; Ogawa and Ermisch 1996; Nagase 1997)", (see Sasaki 2002).

exists excluding the unpaid family helpers. The turning points for overall Pakistan with unpaid family helpers is seven labor saving appliances and without unpaid is three. Whereas, the turning point for Punjab with unpaid family helpers is 13 and without is five.

The coefficient of women headed household variable is negative for unpaid family helpers and turns positive for only paid workers. As women is the head of house and she try to prefer paid jobs and reluctant to offer unpaid family helpers without any monetary benefits. In the urban areas, the monetized pay is preferred whereas in rural agricultural area women do support the family as unpaid helper. So the coefficients of urban areas of Punjab and Sindh province are negative for unpaid family helpers and positive for paid employees.

The interacted term of wage gap and Punjab has been constructed to get the diversified impact of gender wage gap in Punjab on women`s labor force participation. The coefficient of overall Pakistan gender wage gap is -0.9345 but interacted term of Gap with Punjab shows the coefficient of 0.5964. The positive sign indicates that the relationship is direct in case of Punjab, however, the computational exercise shows that it is implicitly negative.[20] The overall impact of wage discrimination is negative as indicated by the derived coefficient from the interactive term. As overall wage gap is negative with higher magnitude and Punjab is characterized with relatively lower discrimination. The interacted term confirms that

[20] -0.9345*(Wage-gap) + 0.5964 (wage gap*Punjab)
If Punjab =1, then -0.9345*(Wage-gap) + 0.5964 (wage gap*1)
By taking wage gap common, Wage-gap (-0.9345+0.5964) = -0.3381*(Wage-Gap)

this negative relationship holds but it is less sensitive relative to overall impact when we include unpaid family helpers.

Two dimensions of women`s empowerment; both within the household and within the society have been discussed in the thesis. Gender wage gap is used as a proxy for women's empowerment in the society, whereas, women's fixed assets are used for her intra household empowerment. [21] Gender wage gap is computed after estimating the Mincerian wage equation and Blinder-Oaxaca wage decomposition methodology. The wage-gap has a negative impact on labor force participation indicating that higher the discrimination against women and hence, lower will be the participation.

On the basis of empirical findings, it can be inferred that the variables used as women`s own characteristics and household characteristics in our study supports unitary model. As offered wage is being determined by her own characteristics and reservation wages are determined by household`s characteristics. However, the proxy variables explain the collective household model for Pakistan. Along with the women's own characteristics, the household characteristics such as household income per capita, co-residence, family size, and residential status fertility are also playing an important role in determining the decision of women's participation in the labor market. Apart with economic considerations, keeping traditional and cultural factors into account, the study supports collective household model for Pakistan.

Provincial results of Punjab, Sindh and NWFP with and without unpaid family helps are reported in the Tables A-4, A-5 and A-6 respectively. The similar two stage least square process is replicated by using the province wise data. According to 2SLS

[21] The results of gender-wage gap have been discussed separately in Chapter 6

estimation with instrumental variable approach for Punjab, the fertility is negatively related to FLFP in both cases including and not including unpaid helpers. Fertility rate is negatively related to FLFP in all the three provincial regressions of with paid family helper. However, the magnitude of the coefficient varies across provinces. In case of NWFP, the FLFP is least sensitive to the changes in fertility as compared to Sindh and Punjab. Co-residence is positively related to FLFP. Whereas, the labor saving appliances shows negative relationship but the square of it becomes positive. The turning point for the labor saving appliances in the equation with unpaid family helpers is five and with paid is thirteen.

In the estimation of overall Pakistan, the interacted term of wage gap and Punjab has been constructed in order to get the impact specifically for the province of Punjab. The cross term of wage gap with Punjab gives the significant and positive indicating that there is less response to gender discrimination in Punjab relative to other parts of the country. In the Punjab province specific estimation, these results are confirmed as the gender wage gap has a coefficient of -0.56, which is lower than the coefficient of (-0.94) in overall Pakistan. In case of NWFP and Sindh province, the FLFP is highly sensitive with the changes in gender discrimination.

Higher the amount of women`s fixed current assets there is less likelihood for her to work for pay. This relationship is quite similar in the provincial regressions with the slight difference in magnitudes. Women's assets, used as a proxy for women`s empowerment has positive impact on participation. If she has handsome amount of fixed assets such as agricultural or non-agricultural land then she is considered powerful enough to make her own decisions. Even if she is unmarried, the amount of current assets she owns can explain the power she has in decision making.

In case of traditional control variable of age, the results of provinces of Punjab and Sindh are quite consistent with the overall results. The results indicate that FLFP is positively associated with age but when age exceeds 40-43 years, this relationship reversed. However, the FLFP become negatively correlated with age when the age exceeds 67 years. This seems possible as in the traditional conservative society of NWFP province, where the household encourage older women to participate in the labor market as well. In all the regression, the impact of marital status and family size is quite similar with slight variations in the magnitudes of coefficients. In the similar manner, the role of rural urban difference in explaining the FLFP is also consistent across regressions.

7. Conclusion and Policy Recommendations

The study aims to identify the determinants of woman's labor force participation for overall Pakistan as well as its provinces. Given that FLFP is lower among women than men in Pakistan, the thesis discusses the underlying demand and supply factors that cause such lower participation of women. In the wake of dichotomous dependent variable, the Probit model is used. Further, in order to tackle the problem of reverse causality due to fertility, ownership of home appliances, and co-residence, the IV technique with two stage least square is applied. In the first stage, instruments are regressed by OLS method to attain the predicted values of endogenous covariates. Whereas, in the second stage the other explanatory exogenous variables along with these fitted values are regressed for female labor force participation (FLFP) using probit estimation procedure. Hence,ensuring the exogeniety of regressors.

Four sets of explanatory variables are used in the analysis, which are women`s own characteristics (WC), household characteristics (HHC), women`s empowerment (P) and endogenous covariates (E). Women`s own and household characteristics as explained in detail in the previous chapters includes explanatory variables like age marital status education level, household income, residential status etc. These two sets are considered as the control variables in our analysis. Their results are quite consistent with the economic literature. From these results, we can assert that demand is a more decisive factor in determining women's participation while the supply is a more important determinant of older and married women's participation. The set of proxy variables of women`s empowerment (gender wage-gap and current assets) and

endogenous covariates (co-residence, fertility and home appliances) are the variables of interest. The empirical findings says that schooling after intermediate increases the probability of women to participate in the labor market whereas the less educated are discouraged to enter the labor market. The household factors like higher income per capita increases the probability of women to work. Living in a joint family, increase the possibility of women to participate in economic activities. Higher number of family members in the household increases the probability of a woman to participate in the labor market but as the number increases above fifteen, the situation gets reversed. Being involved in childcare activities and having facilities of home appliances, a woman is less likely to participate in the economic activities. Local labor market conditions also exhibit different effects on women's participation probability. One of the interesting results of this analysis is that married women are subject to higher discrimination relative to unmarried women. These results point toward the fact that women of different marital status are not treated equally in the labor market. The findings confirm the wage discrimination of women against men in all the sectors but highest in manufacturing. The women's empowerment indicators reveals that lower the empowerment lesser will be the likelihood of women to take part in economic activities.

The low participation rate among women may reflect penalty for possible disruption in human capital formation for women resulting from the discontinuity of market activity due to marriage, childcare and discriminatory practices by employers or co-workers. These factors may not only lead to lower wage offers by employers, but also pushes them down in the occupational ladder. Therefore, demand deficiency and low

market wage, combined with high reservation wage may be responsible for the low women`s participation in labor market. Several important policy implications emerge from our empirical findings.

1. It appears that LFP among women can be raised mainly by facilitating or sharing their child care activities through provision of public childcare and work training facilities. Moreover, encouraging schooling particularly Kindergarten programs can also free up parents from childcare duties at least part time. If the woman is residing in joint family then to some extent the problem is solved. Otherwise the private day care nearby might also work.
2. Enforcement of legal rights and protection of women in against discriminatory practices in the private as well as public sector would encourage women to participate in the labor market. Training the legal profession in these laws might be a useful program in this regard.
3. The negative effect of below matriculation schooling on women's LFP may reflect employers' reluctance to employ women with lower education. Skill oriented training programs for less educated or illiterate woman might help in generating employment opportunities.
4. Public special training programs could be effective in raising the productivity of women who are forced to enter the labor market because of family's financial needs. If a training program could increase the trainee's productivity, it will increase the market wage for these women especially the married, as they face larger pay gaps.

Appendices

Quotation

"It is open to men to debate whether economic progress is good for men or not, but for women to debate the desirability of economic growth is to debate whether women should have the chance to cease to be beasts of burden, and to join the human race" W. Arthur Lewis, The Theory of Economic Growth (1955).

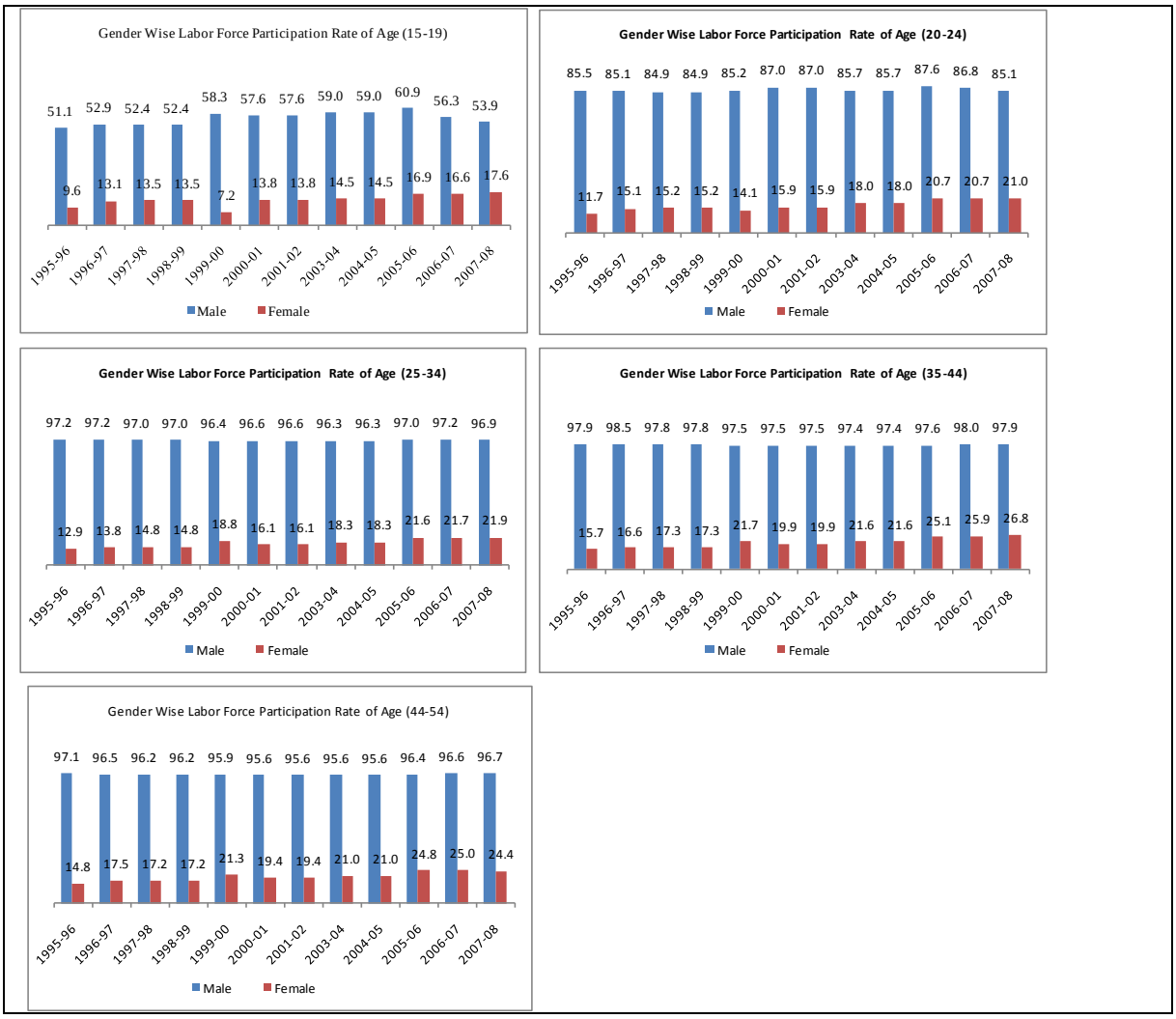
Trends in the labor force participation rates in Pakistan

According to Labor Force Survey 2006-07, the estimated population of Pakistan is 158.17 million; the labor force of the country is 50.33 million which has been increasing over the years. Along with the increase in the participation in labor market, the employed labor force has also exhibit rising trend. Over the last decade, a significant improvement in labor force participation has been observed.

Table A-1
Labor Force Employed, Unemployed in Pakistan
(In Millions)

	2001-02	**2003-04**	**2005-06**	**2006-07**
Labor Force	41.83	45.5	50.05	50.33
Employed	38.37	42	46.95	47.65
Unemployed	3.46	3.5	3.1	2.68

Source: Economic Survey 2007-08



Source: Economic survey (2007-08)

In the light of above cited background of figures regarding labor force participation it can be inferred that female participation is far below the male participation.

Rural –Urban differences

CRUDE ACTIVITY (PARTICIPATION) RATES - PAKISTAN AND PROVINCES

(%)

Province/Area	2005-06					2006-07				
	Total	Male	Female	*Augmented		Total	Male	Female	*Augmented	
				Total	Female				Total	Female
Pakistan	32.2	50.3	13.3	40	28.8	31.8	49.1	13.5	39.2	28.5
Rural	33.2	49.9	16	43.9	37.3	32.9	48.3	16.7	43.2	37.5
Urban	30.2	51	7.9	32.1	11.7	29.7	50.8	7.1	31.2	10.2
Baluchistan	29.5	48.2	8	40.3	30.9	28.6	46.4	8.3	38.2	28.6
Rural	30.9	49.5	9.4	43.9	37	30.1	48	9.8	41.9	34.8
Urban	25.1	43.9	3.1	28.8	10.9	23.7	41.5	3.3	26.2	8.6
NWFP	26.4	44.4	8.8	41.3	37.7	24.7	42.4	6.7	38.3	33.8
Rural	26.3	44.1	9.2	43.1	41.6	24.3	41.6	7	39.8	37.5
Urban	26.7	46.4	6.4	31.2	15.4	26.5	46.3	5.4	30.2	13
Punjab	34.9	51.6	17.9	40	28	34.7	50.6	18.4	39.6	28
Rural	36.4	51.3	21.2	43.2	34.5	36.3	49.9	22.4	42.9	35.4
Urban	31.9	52.1	10.5	33.4	13.7	31.3	52.1	9.5	32.6	11.9
Sindh	30	51.1	6.4	38.9	24.9	30	50.3	7.3	39	26.2
Rural	31.2	51.2	8.1	47.1	41.7	31.5	49.9	10.3	47.8	45
Urban	28.9	50.9	4.6	30.6	8.1	28.5	50.6	4.3	29.8	7.1

Note:- *Conventionally, persons 10+ aged reporting housekeeping and other related activities are considered out of labor force. However, from the perspective of time use, they are identified as employed if they have spent time on a specific set of marginal economic activities. Males augmented activity rates fare insignificantly higher than the standard crude rates are therefore not shown in this table.

Table A-2
Population, Labor Force, and Participation rate across rural urban areas in Pakistan

	Population			Labor Force			Employed Labor Force			Unemployed Labor Force			Unemployment Rate (%)			Labor Force Participation Labor Force Participation Rates (%)		
Years	Over all	Rural	Urban	Over all	Rural	Urban	Over all	Rural	Urban	Over all	Rural	Urban	Over all	Rural	Urban	Over all	Rural	Urban
1997	130.6	88.4	42.1	37.5	26.0	11.8	35.2	24.5	10.7	2.3	1.5	0.8	6.1	5.7	7.2	28.7	29.4	27.2
1998	133.6	90.2	43.4	39.3	27.5	11.3	36.9	26.2	10.8	2.3	1.4	1.0	5.9	5.0	8.0	29.4	30.6	27.0
1999	136.6	91.9	44.8	40.2	28.0	12.2	37.8	26.6	11.2	2.4	1.4	1.0	5.9	5.0	8.0	29.4	30.6	27.0
2000	139.8	93.6	46.1	40.5	28.5	12.0	37.3	26.5	10.8	3.2	2.0	1.2	7.8	6.9	9.9	29.0	29.8	27.1
2001	142.9	95.4	47.5	41.4	29.1	12.3	38.1	27.1	11.0	3.2	2.0	1.2	7.8	6.9	9.9	29.0	29.8	27.1
2002	146.0	97.1	48.9	43.2	29.4	13.8	39.6	27.2	12.5	3.6	2.2	1.4	8.3	7.6	9.8	29.6	29.9	29.1
2003	149.0	99.1	49.9	44.1	30.0	14.1	40.5	27.7	12.7	6.7	2.3	1.4	8.3	7.6	9.8	29.6	29.9	29.1
2004	151.1	100.3	50.8	46.0	31.2	14.8	42.4	29.1	13.3	3.5	2.1	1.4	7.7	6.7	9.7	30.4	31.0	29.2
2005	154.0	101.6	52.4	46.8	31.8	15.0	43.2	29.7	13.6	3.6	2.1	1.5	7.7	6.7	9.7	30.4	31.0	29.2
2006	156.8	102.8	54.0	50.5	34.6	15.9	47.4	32.8	14.6	3.1	1.9	1.3	6.2	5.4	8.0	32.2	33.2	30.2
2007	159.6	103.9	55.7	50.8	35.1	15.7	48.1	33.4	14.7	2.7	1.7	1.1	5.2	4.7	6.7	31.8	32.9	29.7

Source: Pakistan Economic Survey 2007-08

Frequency Distribution of Male Members within Household				
# of males in the HH	# of HH	Percent	Valid Percent	Cumulative Percent
1	493	0.671388	0.671443	0.671443
2	420	0.571973	0.57202	1.243463
3	2954	4.022879	4.023208	5.26667
4	2772	3.775024	3.775332	9.042003
5	4355	5.930818	5.931303	14.97331
6	5263	7.16737	7.167956	22.14126
7	6497	8.847882	8.848605	30.98987
8	6894	9.388533	9.389301	40.37917
9	7168	9.761678	9.762475	50.14164
10	6708	9.135231	9.135977	59.27762
11	6082	8.282718	8.283395	67.56102
12	5126	6.980798	6.981368	74.54238
13	4161	5.666621	5.667084	80.20947
14	3380	4.603023	4.603399	84.81287
15	2639	3.593899	3.594193	88.40706
16	2028	2.761814	2.76204	91.1691
17	1581	2.153071	2.153247	93.32235
18	1207	1.643742	1.643877	94.96622
19	861	1.172545	1.172641	96.13886
20	582	0.792592	0.792656	96.93152
21	417	0.567888	0.567934	97.49946
22	351	0.478006	0.478045	97.9775
23	269	0.366335	0.366365	98.34387
24	221	0.300967	0.300992	98.64486
25	177	0.241046	0.241066	98.88592
above 25	818	1.113986	1.114077	100

Table A-3
Gender Wage-gap in Pakistan

Explanatory Variables	Coefficients Of Male Equation	Coefficients Of Female Equation	Explanatory Variables	Coefficients Of Male Equation	Coefficients Of Female Equation
Constant	7.551* (0.020)	6.392 (0.084)	Graduated	0.6106* (0.0256)	1.006 (0.125)
Age	0.0156* (0.0005)	0.0121 (0.0024)	Higher Educated	1.1424* (0.0170)	1.6782 (0.0500)
Marital Status	0.0828* (0.0077)	0.2044 (0.0270)	Paid Employee	-0.3794* (0.0185)	0.0060 (0.0807)
Family Size	0.0048* (0.0010)	0.0031 (0.0043)	Transport Sector Employee	0.1716* (0.0087)	0.7595 (0.1285)
Primary Educated	0.0145 (0.0134)	0.3917 (0.0528)	Manufacturing Sector Employee	0.0972* (0.0077)	(0.1987) (0.0321)
Secondary Educated	0.4758* (0.0168)	0.5447 (0.1410)	Electricity & Gas Sector	0.070** (0.024)	0.0677 (0.2575)
Professional Educated	-0.1060*** (0.0598)	-0.6738 (0.3067)	Real Estate Sector	0.379* (0.028)	0.5208 (0.1585)
Dummy For NWFP*Age	-0.0135* (0.0012)	0.0337 (0.0109)	PUNJAB Urban	0.156* (0.012)	0.0647 (0.0546)
Dummy For NWFP*Age^2	0.0002* (0.0000)	(0.0004) (0.0002)	SINDH Urban	0.117* (0.014)	(0.0356) (0.0783)
Dummy For SINDH*Age	0.0030* (0.0004)	0.0033 (0.0017)	NWFP*Urban* Educated	0.007* (0.002)	(0.0125) (0.0113)
Paid Employee*Age	0.0033* (0.0005)	0.0036 (0.0025)	Agriculture Household*PUNJAB*Urban	0.176* (0.018)	0.2188 (0.0622)
Marital Status*Agriculture Household	-0.1643* (0.0140)	-0.1438 (0.0369)	Agriculture Household*NWFP*Urban	0.166* (0.044)	0.2980 (0.1828)
Marital Status*Primary Educated	0.1221* (0.0136)	(0.4206) (0.0643)	Agriculture Household*SINDH*Urban	0.157* (0.031)	0.0777 (0.1283)
Marital Status*Construction Sector Employee	-0.2104* (0.0091)	0.3501 (0.1299)	Paid Employee*NWFP	0.452* (0.011)	-0.0521 (0.1423)
Family size*Dummy For Urban	-0.0115* (0.0012)	-0.0052 (0.0065)	Employee*NWFP	0.201* (0.054)	(dropped) 0.0000
Primary Educated*Dummy For NWFP	0.5845* (0.0200)	0.1614 (0.2613)	Professional Educated*Dummy For Urban	0.2251* (0.0623)	0.9078 (0.3117)
Primary Educated*Dummy For Urban	0.0403* (0.0131)	(0.0128) (0.0648)	Professional Educated*Construction Sector Employee	0.4293* (0.1043)	0.4122 (0.5701)
SINDH*Secondary Educated	-0.2421* (0.0196)	0.0707 (0.1529)	Professional Educated*Wholesale & Trade Employee	-0.4828* (0.0889)	-0.4049 (0.5486)
PUNJAB* Secondary Educated	-0.2076* (0.0181)	0.0295 (0.1436)	Dummy For PUNJAB* Graduated	0.1100* (0.0276)	-0.0609 (0.1289)
Professional Educated*Manufacturing Sector Employee	0.1809** (0.0709)	(dropped)	Dummy For SINDH* Graduated	0.0562* (0.0279)	0.0394 (0.1348)

Explanatory Variables	Coefficients Of Male Equation	Coefficients Of Female Equation	Explanatory Variables	Coefficients Of Male Equation	Coefficients Of Female Equation
Islamabad/ FATA	0.5694* (0.0254)	0.8297* (0.0888)	Agriculture Household*Illiterate	0.1208* (0.0142)	0.0495 (0.0380)
Attock	0.3033* (0.0253)	0.1789 (0.1190)	Hafiza Abad	0.1772* (0.0275)	0.1944*** (0.1072)
Rawalpindi	0.4232* (0.0182)	0.6967* (0.0734)	Mandi Bahauddin	0.3236* (0.0280)	0.2666** (0.1272)
Jhelum	0.2650* (0.0277)	0.7130* (0.1627)	Lahore	0.4002* (0.0134)	0.4230* (0.0514)
Chakwal	0.5170* (0.0253)	0.6517* (0.1285)	Kasur	0.2292* (0.0203)	0.2066** (0.0826)
Sargodha	0.1766* (0.0207)	0.1125 (0.0932)	Okara	0.0989* (0.0228)	0.0327 (0.0727)
Bhakkar	0.2008* (0.0286)	0.6913* (0.1738)	Sheikhupura	0.3316* (0.0189)	0.1313** (0.0613)
Khushab	0.1748* (0.0293)	0.5345* (0.1402)	Multan	0.2308* (0.0174)	0.1282* (0.0455)
Mianwali	0.2437* (0.0281)	0.6790* (0.1596)	Khanewal	0.0872* (0.0234)	0.1242** (0.0584)
Faisalabad	0.3399* (0.0146)	0.2783* (0.0558)	Pakpattan	-0.1040* (0.0276)	-0.1022 (0.0666)
Jhang	0.1062* (0.0211)	0.0169 (0.0656)	Lodhran	0.1649* (0.0277)	-0.0861 (0.0691)
T.T.Singh	0.0997* (0.0247)	0.0679 (0.0886)	D.G.Khan	0.1926* (0.0250)	0.1349 (0.1135)
Gujranwala	0.3209* (0.0183)	0.2582* (0.0757)	Rajanpur	0.0960* (0.0292)	-0.0255 (0.1068)
Gujrat	0.3543* (0.0257)	0.2321** (0.0956)	Leiah	0.1263* (0.0287)	-0.1736 (0.1112)
Sialkot	0.3010* (0.0219)	0.2740* (0.0892)	Muzaffargarh	0.1361* (0.0230)	-0.0037 (0.0634)
Neshero Feroz	0.0531** (0.0226)	0.3206** (0.1629)	Thatta	0.0500** (0.021)	0.2752 (0.2251)
Ghotki	0.0999* (0.0268)	0.1684 (0.1621)	Sanghar	0.023 (0.023)	0.2740** (0.1512)
Jacobabad	0.2953* (0.025)	0.646** (0.259)	Mirpur Khas	0.083* (0.025)	0.188 (0.146)
Hyderabad	0.084* (0.016)	-0.039 (0.074)	District Of Karachi	0.477* (0.013)	0.694* (0.060)
Peshawar	0.177* (0.020)	-0.032 (0.138)	Charsada	0.311* (0.016)	0.127 (0.375)

*, **, *** indicate significance at 1%, 5%,and 10% level respectively. Standard errors are presented in parenthesis

	Number of obs	F-Ratio	P-Value	R-Squared	Adj R-squared	Root MSE
Female Equation	5851	70.00	0.0000	0.4829	0.4760	0 .76709
Male Equation	71118	591.18	0.0000	0.3967	0.3960	0.56973

Table A-4 Punjab Probit Results of Female Labor Force Participation						
Dependent Variable Female Labor Force Participation						
Explanatory Variables	With Unpaid Family Helper			Without Unpaid Family Helper		
	Coefficients	Marginal effects	Standard Error	Coefficients	Marginal effects	Standard Error
Age	0.0946	0.0141	(0.001)	0.1026	0.0022	(0.000)
Age^2	-0.0011	-0.0002	(0.000)	-0.0012	0.0000	(0.000)
Education	-0.1023	-0.0153	(0.001)	-0.1161	-0.0025	(0.000)
Education^2	0.0030	0.0004	(0.000)	0.0025	0.0001	(0.000)
Married	-0.3400	-0.0541	(0.005)	-0.2599	-0.0062	(0.001)
Family size	0.1036	0.0154	(0.001)	0.0650	0.0014	(0.001)
Family size^2	-0.0031	-0.0005	(0.000)	-0.0032	-0.0001	(0.000)
Agricultural Household	1.5159	0.3172	(0.014)	3.1084	0.3606	(0.017)
Residential Status	0.3831	0.0436	(0.008)	0.6196	0.0068	(0.001)
Women headed HH	-0.0400	-0.0058	(0.008)	0.7804	0.0412	(0.007)
Assets	-0.0797	-0.0119	(0.001)	-0.1749	-0.0038	(0.000)
Household Income	0.6214	0.0927	(0.002)	0.9049	0.0196	(0.001)
Labor saving appliances	-0.1546	-0.0231	(0.006)	0.4170	0.0090	(0.002)
Labor saving appliances^2	0.0057	0.0009	(0.001)	-0.0458	-0.0010	(0.000)
Luxurious appliances	-0.0002	0.0000	(0.012)	-0.0433	-0.0009	(0.004)
Luxurious appliances^2	-0.0532	-0.0079	(0.005)	-0.0480	-0.0010	(0.001)
Co-Residence hat	2.0287	0.3026	(0.088)	0.4076	0.0088	(0.027)
Fertility hat	-0.1284	-0.0191	(0.001)	-0.0282	-0.0006	(0.000)
Wage-gap	-0.5609	-0.0837	(0.011)	-2.0563	-0.0445	(0.004)
location	-0.3204	-0.0465	(0.004)	0.2539	0.0058	(0.001)
Islamabad/FATA	-0.5529	-0.0560	(0.009)	-0.5047	-0.0063	(0.002)
Attock	-0.7197	-0.0649	(0.006)	-0.1308	-0.0024	(0.004)
Rawalpindi	-0.0686	-0.0098	(0.010)	-0.1569	-0.0029	(0.002)
Jhelum	-0.4590	-0.0496	(0.008)	-0.6396	-0.0070	(0.001)
Chakwal	-0.5996	-0.0588	(0.007)	-0.1733	-0.0031	(0.003)
Sargodha	-0.2286	-0.0293	(0.008)	0.0194	0.0004	(0.004)
Bhakkar	-1.1141	-0.0768	(0.003)	-2.6719	-0.0089	(0.001)
Khushab	-0.2217	-0.0284	(0.009)	-0.8695	-0.0077	(0.001)
Mianwali	-0.7103	-0.0642	(0.005)	-0.8260	-0.0075	(0.001)
Faisalabad	0.2020	0.0339	(0.011)	0.4501	0.0157	(0.007)
Jhang	0.3076	0.0556	(0.012)	0.3983	0.0136	(0.007)

Table A-4 (Contd.) Punjab Probit Results of Female Labor Force Participation						
Dependent Variable Female Labor Force Participation						
Explanatory Variables	**With Unpaid Family Helper**			**Without Unpaid Family Helper**		
	Coefficients	**Marginal effects**	**Standard Error**	**Coefficients**	**Marginal effects**	**Standard Error**
T.T. Singh	0.1026	0.0164	(0.012)	0.1431	0.0037	(0.005)
Gujranwala	-0.2319	-0.0297	(0.009)	0.1444	0.0037	(0.005)
Gujrat	-0.1791	-0.0237	(0.010)	0.5396	0.0219	(0.010)
Sialkot	0.1495	0.0246	(0.014)	0.2489	0.0072	(0.006)
Hafiza abad Abad	-0.4897	-0.0519	(0.007)	-0.1708	-0.0030	(0.003)
Mandi Bahauddin	-0.2597	-0.0324	(0.010)	-0.0884	-0.0017	(0.004)
Narowal	0.2557	0.0450	(0.014)	0.4240	0.0151	(0.007)
Lahore	-0.0033	-0.0005	(0.009)	0.1090	0.0026	(0.004)
Kasur	0.2516	0.0441	(0.013)	0.5457	0.0222	(0.009)
Okara	0.5870	0.1248	(0.017)	0.2045	0.0056	(0.005)
Sheikhupura	0.2624	0.0461	(0.013)	0.7394	0.0370	(0.013)
Vehari	0.0628	0.0098	(0.011)	0.6396	0.0290	(0.010)
Sahiwal	0.5641	0.1187	(0.017)	0.3365	0.0108	(0.007)
Multan	0.1503	0.0247	(0.011)	0.3614	0.0118	(0.007)
Khanewal	0.0690	0.0108	(0.011)	-0.1744	-0.0031	(0.002)
Pakpattan	0.4460	0.0882	(0.018)	0.1314	0.0033	(0.005)
Lodhran	-0.2894	-0.0353	(0.009)	-0.0379	-0.0008	(0.003)
D.G.Khan	-0.3326	-0.0395	(0.007)	-0.4489	-0.0059	(0.002)
Rajanpur	0.9029	0.2247	(0.021)	0.3172	0.0100	(0.007)
Leiah	-0.0726	-0.0103	(0.011)	0.5800	0.0249	(0.013)
Muzaffargarh	0.6869	0.1541	(0.018)	0.2808	0.0084	(0.006)
Bahawalpur	-0.4200	-0.0472	(0.005)	-1.1607	-0.0086	(0.001)
Bahawalnagar	0.6246	0.1353	(0.017)	-0.2366	-0.0039	(0.002)
Constant	-3.6522	-	-	-4.1213	-	-

*, **, *** indicate significance at 1%, 5%,and 10% level respectively. Standard errors are in parenthesis.

Number of observations	51615	Wald χ^2 (53)	23531.7 (0.000)	Wald χ^2 (53)	2753.88 (0.000)
		Pseudo R^2	0.5116	Pseudo R^2	0.8436

Table A-5 Sindh Probit Results of Female Labor Force Participation						
Dependent Variable Female Labor Force Participation						
Explanatory Variables	**With Unpaid Family Helper**			**Without Unpaid Family Helper**		
	Coefficients	**Marginal effects**	**Standard Error**	**Coefficients**	**Marginal effects**	**Standard Error**
age1	0.1210	0.008011	(0.001)	0.1880	0.00002670	(0.000)
age2	-0.0015	-0.000101	(0.000)	-0.0030	-0.00000043	(0.000)
education	-0.1444	-0.007360	(0.002)	-0.1271	-0.00001430	(0.000)
education2	0.0070	0.000435	(0.000)	0.0072	0.00000093	(0.000)
married	-0.2374	-0.014120	(0.005)	-0.6869	-0.00020850	(0.000)
fmsize	0.1266	0.007415	(0.001)	-0.0020	-0.00000259	(0.000)
fmsize2	-0.0042	-0.000253	(0.000)	-0.0009	-0.00000002	(0.000)
agrihh	0.8112	0.089930	(0.021)	3.2633	0.07535010	(0.027)
residential	0.1709	0.006924	(0.014)	0.8051	0.00003310	(0.000)
womenhhh	-0.3358	-0.020185	(0.010)	1.2555	0.00213090	(0.005)
lc_assets	-0.0499	-0.003311	(0.001)	-0.1778	-0.00002530	(0.000)
lhhincome	0.9493	0.066938	(0.004)	1.2824	0.00018090	(0.000)
hapl_lhat	-0.4037	-0.020625	(0.004)	-0.1639	-0.00003820	(0.000)
hapl_lsq	0.0136	0.018469	(0.001)	-0.0295	0.00004400	(0.000)
hapl_that	0.4248	0.710325	(0.008)	0.4172	0.00063240	(0.000)
hapl_tsq	-0.0827	-0.009139	(0.003)	-0.0208	0.00000813	(0.000)
nuclearhat	11.0571	-0.079546	(0.073)	5.1796	-0.00028470	(0.001)
frtltyhat	-0.1519	-0.003675	(0.001)	0.0446	-0.00000627	(0.000)
wagegap	-1.2820	-0.041711	(0.015)	-2.0961	0.00024550	(0.000)
location	-0.6285	-0.003213	(0.005)	0.9695	0.01296110	(0.000)
Khairpur	-0.0517	0.019315	(0.008)	1.6360	0.05582570	(0.012)
Sukkur	0.2115	0.192414	(0.013)	2.3176	0.09715740	(0.037)
Nawab	1.1418	-0.030083	(0.030)	2.5568	-0.00000666	(0.057)
Neshero	-0.9628	-0.014060	(0.003)	-0.2258	0.00431400	(0.000)
Ghotki	-0.2371	0.381698	(0.007)	1.2372	0.01331300	(0.006)
Jacobabad	1.6599	0.030497	(0.030)	1.5916	0.04514940	(0.008)
Shikarpur	0.3316	0.072667	(0.013)	2.1856	0.01560310	(0.030)
Larkana	0.6587	0.012110	(0.017)	1.7253	0.00712230	(0.012)
Dadu	0.1623	0.093012	(0.010)	1.4494	0.04334640	(0.007)
Hyderabad	0.7618	0.099544	(0.021)	2.2949	0.01877590	(0.029)
Badin	0.7366	-0.032690	(0.019)	1.7850	0.00263070	(0.014)
Thatta	-1.2128	0.104676	(0.002)	1.0998	0.00055750	(0.003)
Sanghar	0.7337	0.176504	(0.017)	0.5962	0.00659470	(0.001)
Mirpur Khas	1.0388	0.091892	(0.023)	1.4249	0.02267380	(0.007)
Tharparkar	0.6798	0.008011	(0.020)	1.9276	0.00002670	(0.020)
Constant	-9.7969	-	-	-9.8087	-	-
Number of observations	27724	Wald χ^2 (35)	888.07 (0.000)	Wald χ^2 (35)	11011.29 (0.000)	
		Pseudo R^2	0.5253	Pseudo R^2	0.9649	

*, **, *** indicate significance at 1%, 5%,and 10% level respectively. Standard errors are in parenthesis.

Table A-6
NWFP Probit Results of Female Labor Force Participation

Dependent Variable Female Labor Force Participation

Explanatory Variables	With Unpaid Family Helper			Without Unpaid Family Helper		
	Coefficients	Marginal effects	Standard Error	Coefficients	Marginal effects	Standard Error
age1	0.0135	0.0000	(0.000)	0.0921	0.0000	(0.000)
age2	-0.0001	0.0000	(0.000)	-0.0013	0.0000	(0.000)
education	-0.0047	0.0000	(0.000)	0.0768	0.0000	(0.000)
education2	-0.0063	0.0000	(0.000)	-0.0106	0.0000	(0.000)
married	-0.6586	-0.0001	(0.000)	-0.3417	0.0000	(0.000)
fmsize	0.1019	0.0000	(0.000)	-0.0788	0.0000	(0.000)
fmsize2	-0.0040	0.0000	(0.000)	0.0016	0.0000	(0.000)
agrihh	1.4822	0.0010	(0.001)	2.5871	0.0026	(0.005)
residential	-0.3209	0.0000	(0.000)	-0.4625	0.0000	(0.000)
womenhhh	0.6948	0.0001	(0.000)	1.0533	0.0001	(0.000)
lc_assets	-0.0546	0.0000	(0.000)	-0.0994	0.0000	(0.000)
lhhincome	1.2263	0.0001	(0.000)	1.4535	0.0000	(0.000)
hapl_lhat	-1.0825	0.0000	(0.000)	-0.8724	0.0000	(0.000)
hapl_lsq	0.1213	0.0000	(0.000)	0.1152	0.0000	(0.000)
hapl_that	0.7085	0.0000	(0.000)	1.3746	0.0000	(0.000)
hapl_tsq	-0.1944	0.0000	(0.000)	-0.4884	0.0000	(0.000)
nuclearhat	4.4651	0.0002	(0.000)	1.3671	0.0000	(0.000)
frtltyhat	-0.0879	0.0000	(0.000)	0.0619	0.0000	(0.000)
wagegap	-2.7563	-0.0001	(0.000)	-1.8683	0.0000	(0.000)
location	-0.9556	-0.0002	(0.000)	-0.7948	0.0000	(0.000)
Swat	0.9899	0.0004	(0.000)	1.0865	0.0001	(0.000)
Upper Dir	1.9138	0.0078	(0.006)	1.7053	0.0007	(0.001)
Lower Dir	0.1793	0.0000	(0.000)	0.4575	0.0000	(0.000)
Chitral	2.1221	0.0135	(0.010)	1.7890	0.0009	(0.001)
Shangla	0.4384	0.0000	(0.000)	0.3134	0.0000	(0.000)
Malakand	0.8482	0.0003	(0.000)	1.1268	0.0001	(0.000)
Bonair	0.5985	0.0001	(0.000)	0.6963	0.0000	(0.000)
Peshawar	1.4158	0.0016	(0.001)	0.7130	0.0000	(0.000)
Constant	-3.9102	-	-	-4.7941	-	-

*, **, *** indicate significance at 1%, 5%,and 10% level respectively. Standard errors are in parenthesis.

Number of observations	33687	Wald χ^2 (28)	33687 (0.000)	Wald χ^2 (28)	3429.47 (0.000)
		Pseudo R^2	0.7155	Pseudo R^2	0.8147

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