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The Determinants of Female Labor Force Participation in Pakistan: An Instrumental Variable Approach

Mehak Ejaz

Centre for Research in Economics and Business
Lahore School of Economics

Centre for Research in Economics and Business (CREB)

Lahore School of Economics

Intersection Main Boulevard Phase VI, DHA and Burki Road
Lahore 53200, Pakistan
Tel: 042-36561230; 042-36560936
Email: creb@lahoreschool.edu.pk

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Lahore School of Economics
Intersection of Main Boulevard, Phase VI, DHA and Burki Road
Lahore 53200, Pakistan
Tel.: +92 42 3656 1230
creb@lahoreschool.edu.pk
www.creb.org.pk

Price: Rs100

Preface

The Centre for Research in Economics and Business (CREB) was established in 2007 to conduct policy-oriented research with a rigorous academic perspective on key development issues facing Pakistan. In addition, CREB (i) facilitates and coordinates research by faculty at the Lahore School of Economics, (ii) hosts visiting international scholars undertaking research on Pakistan, and (iii) administers the Lahore School's postgraduate program leading to the MPhil and PhD degrees.

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About the Author

Mehak Ejaz was a research associate at CREB and a postgraduate student at the Lahore School of Economics. She is currently pursuing a PhD at the University of Sheffield in the UK, where her primary research interests are labor economics and macro-modeling.

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Abbreviations

FLFP	female labor force participation
PSLM	Pakistan Social and Living Standards Measurement (Survey)
IV	instrumental variable
OLS	ordinary least squares (method)
2SLS	two-stage least-squares (method)

Abstract

This working paper analyzes the determinants of female labor force participation (FLFP) across rural and urban Pakistan. It provides evidence supporting various aspects of the female labor supply by utilizing cross-sectional data on females between the ages of 15 and 50 drawn from household data collected as part of the Pakistan Social and Living Standards Measurement Survey for 2006/07. Potential explanatory variables that determine FLFP include (i) females' own characteristics, (ii) household characteristics, and (iii) female empowerment indicators.

Endogenous explanatory variables, such as ownership of home appliances, fertility, and co-residence, can lead to biased and inconsistent results due to reverse causality. Therefore, the potential instruments we use here include (i) the average number of home appliances owned in the locality, (ii) the gender of the firstborn child, (iii) whether or not the first two children are of the same sex, (iv) proximity to a clinic, (v) contraceptive use, and (vi) housing type.

The probit model is used to estimate variables, while the instrumental variable (IV) approach is used to tackle the issue of endogeneity. In the first stage, the study's results give estimates of endogenous covariates separately, using the IV approach. In the second stage, the IV vector is used to show the impact of explanatory variables on the dependent variable FLFP. We find an inverse and significant relationship between FLFP and both fertility and the gender-wage gap; and a direct and significant relationship between FLFP and ownership of home appliances and co-residence.

JEL classifications: J01, J21, C26.

Keywords: Female labor force participation, endogenous covariates, instrumental variable technique.

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1. Introduction

Increased female participation in the labor market has been one of the major gains of economic development in developed economies, where, since 1900, the female labor force participation (FLFP) rate has increased from the low level of 4 percent to over 70 percent in 2000. Transition and Latin American economies have also experienced a steady rise in their FLFP rates over the last two decades. The spillovers of the increased role of females in the labor market have helped improve their public socioeconomic status. Technological advancements (Greenwood, Seshadri, & Yorukoglu, 2005), a narrowing gender inequality gap, declining fertility, and structural changes (Fernandez, Fogli, & Olivetti, 2002; Galor & Weil, 1996) are among the main channelizing factors that have increased female participation in economic activities. However, despite spells of high growth and structural transformation, Pakistan still has the lowest FLFP rate compared to developed and other South Asian economies.[1] Thus, there is an acute need to analyze in depth the role of females in Pakistan's labor market as well as in its economic development.

Since Mincer's seminal study (1962), the subject has attracted many researchers who have applied to it developments in the theory of labor supply and econometric advancements of the last three decades. Along with the traditional labor supply theory, Becker (1965) has discussed the household production model and female time allocation; Chiappori (1992) has presented a collective household model, providing a theoretical foundation for the analysis of FLFP. Empirical investigations by Gronau (1973) and Heckman (1979) have focused on appropriate

[1] The labor force participation rate (as a percentage of the population aged 15–64) is 70.1 percent in the US, 73.2 percent in Canada, 58.0 percent in Europe and Central Asia, 65.3 percent in high-income countries that are members of the Organisation for Economic Co-operation and Development, 54.3 percent in Korea, 60.6 percent in Japan, 71.2 percent in East Asia and the Pacific, 55 percent in Bangladesh, 38.1 percent in Sri Lanka, 35.9 percent in India, 52.8 percent in Nepal, and 34.3 percent in Pakistan (World Bank, 2007).

estimation methods for FLFP. Subsequent studies have addressed the endogeneity issue by introducing the instrumental variable (IV) technique (Belker, Cockerell, & Edwards, 2000 for Australia; Chun, Kim, & Lee, 2008, Chun & Oh, 2002, and Lee, Jang, & Sarkar, 2008 for Korea; Ettner, 1995, and Schultz, 1978 for the US; Francis, 2005 for China; and Sasaki, 2002 for Japan).

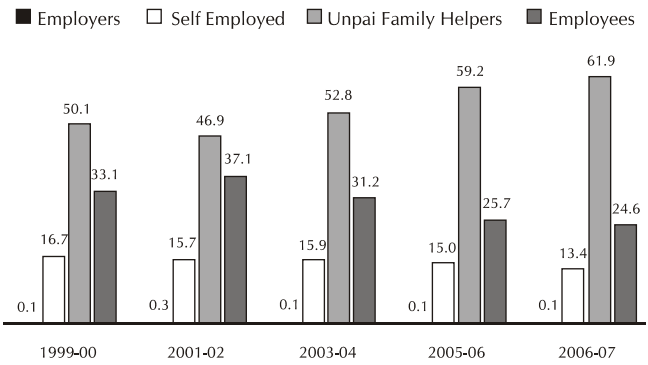
Barring a few studies, the issue of FLFP in Pakistan has not received much attention, despite its significance for developing economies (see, for example, Chishti, Lodhi, & Rashid, 1989; Ejaz, 2007; Ibraz, 1993; Naqvi & Shahnaz, 2002; Shah, 1986; Shah, Abbasi, & Alam, 1976). This study investigates the determinants of FLFP by taking into account an appropriate estimation procedure with special consideration for endogeneity between the factors that affect FLFP.

Between 1999 and 2008, overall FLFP increased sharply, possible reasons being the increased use of household technologies, the robust growth of the services sector, and reduced gender inequality. In Pakistan, however, there is no empirical evidence to support or examine this phenomenon, although it has received theoretical support in the international literature.[2] Given the lack of empirical evidence supporting the relationship between labor-saving technology and labor force participation in Pakistan, this study explores the causal relationship between these factors, using quantitative data.

Although FLFP has increased significantly, it is important to note that two thirds of this increase can be attributed to a rise in the number of unpaid household helpers, whereas waged employment has not increased at a significant rate (Figures 1 and 2).

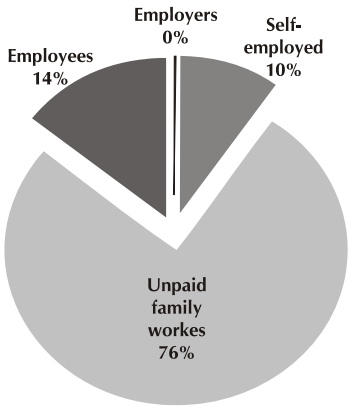
[2] According to Hotchkiss and Pitts (2005), "the rise in FLFP has several explanations. A major determinant is the stream of biotechnological advancements that have provided women greater control over and timing of childbearing decisions (see Bailey 2004). This greater flexibility, along with advancements 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 (Goldin, 1994)."

Figure 1: Composition of Female Employment



Source: Labour Force Survey of Pakistan (various issues).

Figure 2: Composition of Increase in Employed Females, 2006/07



Source: Labour Force Survey of Pakistan (2006/07).

Although Pakistan's economy has experienced high economic growth and structural transformation—such as the enhanced role of the services sector, reductions in fertility, and declining gender inequality rates—the country's FLFP rate has not increased at a reasonable pace compared to neighboring developing economies. Considering the severity of the issue, there is insufficient empirical research pertaining to Pakistan, and none of the studies addressing FLFP in Pakistan have used the IV technique to treat endogenous covariates.

This study is an attempt to analyze the determinants of the FLFP rate in Pakistan. Using PSLM micro-data, it provides cross-sectional evidence on various aspects of FLFP and econometric estimates for rural and urban areas in Pakistan for 2005/06. The study's hypothesis investigates the relationship between FLFP and females' own and household characteristics, specifically estimating the effects of female empowerment on FLFP. The study's objective is to identify the significance of exacerbating factors in shrinking the role of women in the labor market, and is twofold: first, to identify the factors that discourage or encourage females to participate in the labor force across Pakistan; and second, to analyze the role of female empowerment in FLFP.

Section 2 reviews the literature on FLFP, highlighting the main ideas, theories, and findings of relevant work conducted so far. Section 3 explains the methodology used, and includes a detailed discussion of the probit model and IV technique. Section 4 describes the data sources and relevant variables used. Section 5 presents the results and empirical findings. Section 6 concludes the study and presents policy recommendations.

2. A Review of the Literature

This section provides an overview of the literature—both theoretical and Pakistan-specific—on FLFP.

2.1. Significant Theoretical Contributions

Issues concerning the role of females in the labor market were introduced in seminal contributions by Mincer (1962), Becker (1965), and Cain and Dooley (1976). These raised the interest of many researchers who further analyzed female labor supply using different explanatory variables and econometric techniques, which were applied to cross-sectional, time-series, and panel data, resulting in a vast body of literature on the subject. Mincer (1962) attempted to reinterpret the static analysis of labor supply to include lifetime variables,[3] and found that family income had no effect on a wife's demand for leisure. His results also indicated that the number of children has a significant effect on females' lifetime labor supply curve. He concluded that the

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

probability of labor force participation was 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, and location, etc. Becker's theory on the allocation of time laid a foundation for the household production model. Since then, there have been several substantive methodological advancements. The simple model of labor supply choice has been extended in a number of dimensions, which include issues related to family, the abilities of husband and wife, decisions regarding human capital accumulation, the consumption of market goods, and leisure.

2.2. Significant Contributions to Estimation Methods

Gronau (1973) and Heckman (1974) focused on the appropriate method of estimation, and worked on the selection bias and joint distribution. Gronau (1973) found that education played an important role in determining the market wage, but concluded that the rate of return on education was underestimated due to a negative correlation between education and true residuals in the wage equation. Heckman (1974) made an important methodological contribution to labor supply estimation by introducing a simultaneous estimation for market wage and shadow wage (the marginal value placed on a female's leisure) functions. Heckman's approach allows one to estimate a common set of parameters that underlie the function determining the probability of a female working, her hours of work, her observed wage rate, and shadow wage. Heckman's results indicated that the estimated effect of having one child aged below six was to raise the asking wage by 15 percent. Increases in net assets and a female's education had a positive effect on the asking wage. Schultz (1978) discussed the problem associated with the wage variable in particular, and suggested including an IV for the wage rate, using a sample of working females. He proposed that, if hours and wages were jointly determined with other economic choices, it could lead to measurement errors by producing bias in the results. Cogan (1981) introduced the idea of imputed wages by taking a full sample of females but imputing a wage to nonworkers from a wage equation using a sample of workers.

2.3. Additional Studies

In his empirical work on the US, Smith (1975) has used variables that measure nonlabor income or assets to estimate pure wealth effects.

Using a lifecycle framework, the author examines the expected relationship between the observed assets income level of families and their labor supply. Nakamura, Nakamura, and Cullen (1979) contradict some of these results while comparing the labor force participation behavior of married females in the US and Canada, using US census data for 1970 and Canadian census data for 1971. They find the female labor supply to be unresponsive to changes in wage rates. Mroz (1987) has followed up on the Nakamura et al. (1979) study by building a lifecycle model comprising human capital accumulation and home production—in which the basic units of analysis were married couples with children—and adjusting the model, using data from the 1970s and 1990s for the US. The study finds that the income effect is negative and fairly small, suggesting that the modest sensitivity of married females' labor supply was not much different from the labor supply of prime-age married males.

Berndt (1991) finds that the FLFP rate varies by age and has increased considerably for all age groups over the past three decades (1960s to 1980s). The author extends the neoclassical labor supply framework to encompass the household, while addressing issues such as the "discouraged worker" hypothesis, which states that employers sometimes discriminate against married females on the suspicion that they will quit their jobs once their husbands find employment. The study points out that most first-generation studies show that female labor supply is more responsive to changes in wage rates and property income than male labor supply. The second generation of studies points out that the elasticity of these estimates is greater (Heckman, Killingsworth, & MaCurdy, 1981).

A major factor that reduces the FLFP rate is that females tend to concentrate more on providing services to the household after they get married. Bradbury and Katz (2005) identify a recent decline in FLFP, specifically among well-educated females with children. They find that unobserved, unpredictable factors such as (i) biotechnological advancements that have provided females greater control over childbearing decisions, (ii) household technologies (e.g., dishwashers) that have given females more time to devote to their education, and (iii) changing attitudes toward the role of females and appropriateness of their working, contribute largely to increases in job opportunities for females and give them incentive to participate in economic activities.

2.4. Treatment of Endogeneity

Economists have used a two-stage approach to investigating married females' participation in the labor force. Schultz (1978) first explored how fertility responded to child mortality across economic classes within a society. Investigating the labor supply decision of married females, he defined two income groups based not on observed income—which might be endogenous—but on an IV prediction of income or expenditures derived from the husband's age, education, and origin. Ettner (1995) has used parents' or friends' health status, parents' age, and parents' or friends' geographical proximity as instruments to address the endogeneity between elderly-care responsibilities and labor force participation decisions. Chun et al. (2008) examine the effect of co-residence with parents or parents-in-law on the labor supply of married females. They recognize that co-residence should be treated as endogenous because the choice of family structure and married female labor supply are jointly determined. Using the Korean Labor and Income Panel Study for 2004, the husband's birth order among his siblings is constructed as an IV for co-residence with parents. The study's IV estimation results cast doubt on the argument that co-residence with parents has a significant positive effect on the labor supply of married females, contradicting previous studies.

Sasaki (2002) estimates the effect of family structure on labor force participation. In this case, reverse causality exists between the two variables. Since co-residence is endogenous, the IV technique is used, and siblings' characteristics and housing type are used as instruments. After addressing the endogeneity issue, co-residence with parents is found to have a positive and significant effect on participation in the labor force, which suggests that co-residence allows married females to share the burden of household work with their parents and in-laws, thus leading to an increase in the probability of FLFP. The results also suggest that, if her husband is the eldest son, a female is more likely to live with her parents-in-law.

Drawing on data from the Public Use Microdata Sample dataset, Angrist and Evans (1998) use parental preferences for a mixed sibling gender composition to construct IV estimates of the effect of childbearing on labor supply in the US. The idea is based on the widely observed phenomenon of parental preference for a mixed sibling gender composition. Twinning at first birth has been used in a number of

studies (see, for instance, Gangadharan & Rosenbloom, 1996; Rozenzweig & Wolpin, 1980a, b), but Angrist and Evans's primary interest is to compare the results of twins' estimates and same-sex instruments. IV estimates for females are significant but smaller than ordinary least squares (OLS) estimates. A comparison of estimates using the instruments of sibling sex composition and twins implies that the impact of a third child disappears when he or she turns 13.

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

Assaad and Zouari (2003) construct a structural model to study the impact of fertility on the extent of FLFP in urban Morocco. Both fertility and participation are assumed to be potentially endogenous household decisions, requiring simultaneous estimation. Proximity to clinics and contraceptive use based on age-specific contraceptive use in the province of residence are used as instruments for fertility—indicators of access to family planning methods and general awareness. The authors find that marriage per se is not a constraint to labor force participation, but is a constraint to 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 female's own level of education, as well as that of her father, significantly increases the probability of her participation in the public sector.

Lee et al. (2008) examine the relationship between marital status and FLFP in Korea. Low labor force participation among married females is explained by demand-side factors, while high labor force participation among middle-aged women is accounted for by supply-side factors. The study also addresses the potential endogeneity between a female's decisions concerning marriage and participation in the labor market. IVs such as sex ratio (the number of males aged 15 to 39 as a percentage of females from the same age cohort) and unemployment rate among people under 30 years of age are used to overcome the problem.

Greenwood et al. (2005) examine the impact of the consumer durable goods revolution on FLFP. The technological revolution introduced labor-saving consumer durables, such as washing machines and vacuum cleaners, and time-saving products such as frozen foods and readymade clothes. The hypothesis that technological progress in the household sector has played a major role in liberating females from their homes is analyzed on the basis of the Beckerian model of household production. The prices of household consumer or technological goods are used as an instrument for home appliances. The results confirm that adopting these technologies frees up the amount of time that females devote to housework. Since the price of these durables falls over time, households decide when to purchase new durables, and whether or not females in the family should work in the market. The model suggests that the presence of labor-saving durable goods increases the elasticity of female labor supply.

Pirani, León, and Lugauer (2008) estimate the causal effect of household appliance ownership on married females' labor force participation rates, using micro-level data from the 1960 and 1970 US censuses. To control for endogeneity, a married female's ownership of an appliance is instrumented by the average ownership rate for that appliance among single females living in the same US state. The results of time-series and cross-sectional analyses reveals that labor force participation rates for single females did not increase between 1960 and 1970, but that the diffusion of household appliances accounted for about one third of the observed increase in married females' labor force participation rates during the 1960s.

2.4.1. Potential Endogenous Variables

The present study uses the average of females' ownership of home appliances in a particular district as an instrument for home appliances (see Pirani et al., 2008). Table 1 summarizes the variables used in the literature.

Table 1: Instruments Relevant to Study

Potential Endogenous Variables	Instruments Used in the Literature	Citations
Home appliances (consumer or technological goods)	Prices of home appliances	Greenwood et al. (2005)
	Average of single females' ownership of home appliances in the region (for married females' ownership of appliances)	Pirani et al. (2008)
	Use of modern refrigerator	Cardia (2007)
	Use of indoor plumbing facilities	
	Prices of home appliances	Bar and Leukhina (2005)
	Prices of home appliances	Greenwood Yorukoghe (2005)
	Average of single females' ownership of home appliances in the region (for married females' ownership of appliances)	Pirani et al. (2008)
	Use of modern refrigerator	Cardia (2007)
	Prices of home appliances	Bar and Leukhina (2005)
Family structure or co-residence (with parents or parents-in-law)	Siblings' characteristics (birth order and number of siblings of wife and husband)	Sasaki (2002)
	Housing type (owned or rented, detached or apartment, or house size)	
	Husband's birth order among siblings	Chun et al. (2008)
Fertility (theoretical reasons for why fertility and labor supply are jointly determined are given by Schultz, 1981, and Goldin, 1990)	Sibling sex mix (dummy indicating whether sex of second child matches that of first child, or whether first two children are of the same sex)	Angrist and Evans (1998) Gangadharan and Rosenbloom (1996) Rosenzweig and Wolpin (1980a, b)
	Twins in first pregnancy (twins at first birth)	
	Sex of first child (number of children in a family is strongly related to the first child's sex)	Chun and Oh (2002)
	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)
	Distance from branch (or family planning center)	Asim (2008)

2.4.2. Endogenous Variables not Instrumented For

As Table 2 shows, variables such as marriage-related decisions and education have been treated as endogenous in the literature. In Pakistan's case, however, we cannot consider marriage an endogenous variable because labor force participation and marriage are not simultaneous decisions. In fact, most of the time a girl's parents decide on her marriage.

Table 2: Invalid Instruments for Study

Potential Endogenous Variables	Instruments Used in the Literature	Citations
Marriage	Sex ratio in region (ratio of number of males aged 15–39 to number of females aged 15–39)	Lee et al. (2008) Francis (2005)
	Unemployment under 30 (unemployment rate for people under 30 years of age in the locality where female currently lives)	Kim and Lee (2007)
Education	Parents' level of education: mother's level of education, father's level of education	

Due to data constraints that arose earlier in writing this paper, we use the household head's level of education as an exogenous instrument for education (number of completed years of schooling) instead of the parents', mother's, or father's level of education. However, the results did not prove significant, and so the instrument is used as a separate exogenous variable rather than an instrument for education.

2.4.3. Proxies for Female Empowerment

Based on the literature, Table 3 lists a number of proxy variables for female empowerment.

Table 3: Proxy Variables for Female Empowerment

Potential Endogenous Variables	Instruments Used in the Literature	Citations
Female empowerment	Occupational sex segregation and gender wage differentials	Tzannatos (1999) Winter (1994)
	Ratio of professional to technical workers	UNDP (1995, 1998)
	Share of earned income	
	Assets at time of marriage and current assets (value of land owned, plot size; number of livestock, including poultry, sheep, goats, and cattle; and durable goods and capital equipment owned by household)	Quisumbing and de la Briere (2000)
	Assets at time of marriage	Quisumbing and Maluccio (1999)
	Modern contraceptive use	Gage (1995)

Due to the unavailability of data, we are unable to incorporate females' assets at the time of marriage as a variable. Instead, we use current assets as explained in the literature as a proxy for empowerment. Variables of current assets include fixed assets, such as ownership of either agricultural or nonagricultural land.

Another proxy variable that could have been incorporated in Pakistan's case is nonlabor income—the amount a household (or any male or female household member) receives in terms of rent if they have rented out their agricultural land or residential or commercial property. Unfortunately, the PSLM survey for 2006/07 does not provide this data.

The gender wage gap is also an important variable that has been treated as a proxy for female empowerment in our analysis (see Section 6).

2.5. Studies on Pakistan

Only a few studies analyze the factors affecting FLFP in Pakistan. Shah (1986) examines the changing role of women in Pakistan between 1951 and 1981, and concludes that a female's labor force participation decision is inversely related to her family's socioeconomic status, as indicated by ownership of durable goods, her husband's level of education, and

observance of *purdah* (segregation). Shah et al. (1976) examine some of the socioeconomic and demographic factors that determine FLFP decisions for all four provinces in Pakistan. Their results show that labor force participation has a significant and inverse relationship with the nuclear family and the child-woman ratio. However, some literature has found a positive relationship between FLFP and marital status, the dependency ratio, and literacy rate. The first instance contradicts earlier studies. Chishti et al. (1989) present a case study of Karachi whereby they analyze the demographic and socioeconomic factors that affect FLFP. Their results show that labor force participation is positively related to an increase in expected earnings, wages, and level of education. Another interesting observation is that the presence of a male figure in the household reduces the likelihood of FLFP (Government of Pakistan, 2006).[4] However, the presence of other females in the household increases the probability that a female might work.

Ibraz (1993) focuses on rural Pakistan, and observes that various cultural practices, such as *purdah*, constrain females from active participation in the labor force. Naqvi and Shahnaz (2002) have conducted a similar study and identified household-related factors that lead to female participation in economic activities. Empirical findings suggest that females' economic participation is significantly influenced by factors such as age, level of education, and marital status.

Ejaz (2007) investigates factors that determine FLFP in Pakistan by applying probit and logit models to micro-data on a sample of females aged 15–49. The results suggest that age, educational attainment, and marital status have significant and positive effects on FLFP. The greater the probability of a female belonging to a 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 the availability of home appliances reduces the probability of FLFP. In terms of the effect of a nuclear family, Ejaz's (2007) results contradict those of Shah et al. (1976). Reducing the burden of childcare on females and facilitating their education is likely to lead to higher FLFP in Pakistan.

The available literature shows that various economic and sociological factors have a significant effect on FLFP. However, some important factors

[4] According to the PSLM survey data for 2005/06, the frequency distribution of the total number of male members shows that no household lacks male member (for details, see the frequency table in the appendix). Therefore, this observation is not relevant to our study.

have been neglected, especially those relating to household issues such as empowerment, fertility, and family structure. The present study, therefore, attempts to identify and present a comprehensive analysis of all such factors. Although Naqvi and Shahnaz (2002) were innovative in relating a female's decision to participate in economic activities to her empowerment, the study's econometric foundations were weak because it failed to address the endogeneity problem in empowerment and female participation. The literature on Pakistan does not, in general, deal with endogeneity issues. This working paper aims to contribute to the economic literature by building on previous studies, while addressing the issue of endogeneity and measuring female empowerment quantitatively for the first time, using the gender wage gap as a proxy for factors affecting FLFP in Pakistan.

3. Methodology

A frequently encountered problem arises when a dependent variable of the structural model has not been directly observed. OLS or standard economic estimators are not appropriate for such models because of the limited or qualitative nature of the observed dependent variable. Therefore, collective household behavior (Chiappori, 1988) provides the following specification for determining females' labor supply decisions:

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

Here, FLFP = female labor force participation, WC = women's characteristics, HHC = household characteristics, P = proxy variables for female empowerment, and E = endogenous covariates (fertility, ownership of home appliances, and co-residence). FLFP is the outcome variable, WC and HHC are control variables, and P and E are variables of interest.

Fertility, ownership of home appliances, and co-residence are potentially endogenous variables. In order to overcome the problem of endogeneity, we evaluate their effect on FLFP using the IV approach. Causality can only run in opposite directions—an increase in labor force participation will lead to a change in fertility or ownership of home appliances, or vice versa. Specifically, if a female's participation in the labor market leads to an increase in ownership of home appliances or a decline in the fertility rate, then the probit estimates may be biased and inconsistent.

Fertility, measured by the number of children per female, is instrumented by proximity to a clinic, contraceptive use, and the sex of

the first child or whether the first two children are the same sex. Ownership of home appliances is instrumented by the average female's ownership of home appliances in the district. The WC variable comprises age, marital status, education level, and imputed wages, all of which are exogenous variables. The HHC variable includes a household's per capita income, family size, family type (whether joint or nuclear), location (rural/urban dummy), whether the household is agricultural or nonagricultural, whether it is female-headed, and the head's level of education.

Lack of data and shifts in the relevance of indicators over time have posed major methodological challenges to measuring female empowerment. However, some authors who have tried to empirically measure empowerment argue that it cannot be measured directly, but only through proxies (Ackerly, 1995). The present study proxies female empowerment through ownership of current assets and the gender wage gap.

We examine cross-sectional household data on Pakistan and use a probit model to determine the effect of various socioeconomic and demographic variables on FLFP.

3.1. Estimation Strategy

The relationship between FLFP, female fertility, empowerment, and availability of home appliances is estimated using the probit model. Because of the potential endogeneity of these variables with regard to FLFP, we estimate the probit model using IVs. Although relatively easy to interpret, the linear probability model has two main drawbacks. One disadvantage is that fitted probabilities can be negative or greater than 1. A second is that the partial effect of any explanatory variable is constant. Given these limitations, more sophisticated binary-choice models, such as the probit, are preferred because (i) the predicted probabilities are bound between 0 and 1, and (ii) the estimated coefficient is an effect change in Z for a unit change in X.

3.1.1. Two-Stage Least-Squares Method

The error term ε_i is correlated with the coefficients of interest, i.e., β and δ in the OLS equation for labor supply. The OLS estimates of β and δ are likely to be biased as they are upward- and downward-biased depending on whether ε_i is positively or negatively correlated with the endogenous

covariates P and E. To avoid the correlation between the error term and endogenous variables, we use the two-stage least-squares (2SLS) method.

To address the endogeneity problem of fertility, co-residence, and home appliances, we use an IV approach. An ideal instrument should be correlated with an endogenous variable but uncorrelated with all other factors that determine FLFP. With such instruments, we use the 2SLS approach.

In the first stage, we apply the OLS method to the co-residence, fertility, and home appliances equations to predict their respective probabilities. The predicted probability of each endogenous covariate is then used to estimate the FLFP equation in the second stage.

3.1.2. Probit Estimation and IV Technique

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

$$\mathrm{FLFP_i} = \mathrm{a} + \delta * \mathrm{WE_i} + \gamma * \mathrm{X_i} + \varepsilon_\mathrm{i}\ \mathrm{FLFP} = \alpha + \mathrm{P_i}\beta + \mathrm{E_i}\delta * + \mathrm{X_i}\gamma + \varepsilon_\mathrm{i} \quad (1)$$

In the probit model, the dependent variable, FLFP, is a binary-choice variable that can assume only two values: 1 if the female is either currently working in the labor market or looking for work and 0 if she is not. We then estimate a nonlinear maximum likelihood function for the normal probability (probit) model in which FLFP is a function of several explanatory variables, P_i is the vector of proxy variables for female empowerment indicators, E_i is the vector of endogenous covariates, and X_i is the vector of exogenous variables pertaining to female-specific and household-level characteristics leading to a woman's decision to engage in formal economic activity. The probit model is estimated using the 2SLS process and IV techniques.

For notational purposes, we consider the following:

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

The model allows for the possibility that elements of Yi may be correlated with the error term ε_i. Here, we consider E to be potentially correlated with ε_i, if $\mathrm{E}\{\mathrm{E_i}, \varepsilon_\mathrm{i}\} \neq 0$.

If there is endogeneity, the results may be biased and inconsistent. To mitigate the effects of potential endogeneity, we let Z_i represent the vector

of instruments such as the sex of the first child, proximity to a clinic, contraceptive use, average ownership of home appliances in the district, and housing type, and where each instrument is a continuous variable.

4. Data Source and Variables

This study is based on a PSLM cross-sectional micro-dataset for 2006/07, the survey having been conducted by the Federal Bureau of Statistics. The data includes the incomes and consumption levels of 77,000 households at provincial and district level. Table 4 lists the variables used in the study.

Table 4: Variables Used in Study

Dependent variable	
Female labor force participation = FLFP	= 1 if a female is working or looking for work = 0 otherwise
Explanatory variables	
Women's characteristics (WC)	
Age and age^2	Respondent is 15–50 years old
Marital status	Dummy variable = 1 if female is unmarried and = 0 if married (Unmarried includes single, divorced, and widowed women)
Education and (education)^2	Years of schooling
Wages	Imputed wages from the sample of working to nonworking
Household characteristics (HHC)	
Household income	Household income per capita
Family size	No. of family members, including respondent
Location	Dummy variable = 1 if female resides in an urban area and = 0 otherwise Dummy variables for each province (Punjab, Sindh, and Khyber-Pakhtunkhwa) along with rural and urban dummies and district dummies
Agricultural household	Dummy variable = 1 if household owns agricultural land and/or its main occupation is agriculture-related, and = 0 otherwise
Female-headed	Dummy variable = 1 if household head is female and = 0 otherwise
Residential status	Dummy variable = 1 if house is permanent and = 0 otherwise

Continued...

Table 4: Variables Used in Study (Continued)

Proxy variables for female empowerment (P)

Gender wage gap	Difference between female and male imputed wages
Current assets	Level of current assets, including ownership of land (agricultural or nonagricultural) and plot

Endogenous variables (E) and their respective instruments

Endogenous Variable	Instrument	Explanation
Fertility rate Number of children per female	Distance	Distance from family planning center
	Contraceptive use	Proximity to clinic and contraceptive use
	Gender of first child	Male or female
	Sibling sex mix	Whether or not the first two children are same-sex
No. of home appliances available to female	Average no. of appliances	Average women's ownership of household appliances in the district
Co- residence Lives with parents/in-laws	Housing type (Exogenous instrument)	House is owned or rent, detached or apartment or house size

4.1. Gender Wage Gap as a Proxy for Female Empowerment

This variable is computed by adopting the methodology used by Anderson and Shapiro (1996), Blau and Kahn (1992), and Shannon and Kidd (2003). The wage determination equation for males and females (aged 15–50, working, and earning wages) has been constructed separately for each individual by considering his/her level of education and age (proxy for experience) as explanatory variables. Further, both regional and occupational dummy variables are used to tackle job- and region-specific gender wage discrimination.

The regression for females is estimated by the following equation:

$$ln(w_i) = x_i^f \beta + \mu_i \qquad \text{(Females' equation)}$$

Here, w_i is the market wage received by a female and x_i^f is the vector of explanatory variables.

The regression for males is estimated by the following equation:

$$ln(w_i) = x_i^m \theta + \epsilon_i \qquad \text{(Males' equation)}$$

Here, w_i is the market wage received by a male and x_i^m is the vector of explanatory variables.

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

We apply the standard Mincerian model to estimate the earning function for males and females separately. To avoid any earning heterogeneity, the dependent variable is the logarithmic form of wages earned. The explanatory variables include personal, human capital, employment, and spatial characteristics. We also use interactive variables to determine the earnings of both genders (see Table 5).

Table 5: Gender Wage Gap for Pakistan

Equation	No. of Observations	F-Ratio	P-Value	R^2	Adj. R^2	Root MSE
Female	5,851	70.00	0.0000	0.4829	0.4760	0.76709
Male	71,118	591.18	0.0000	0.3967	0.3960	0.56973

Source: Author's calculations.

5. Results and Empirical Findings

The study's objective is to investigate the determinants of FLFP across rural and urban Pakistan, using cross-sectional data from the PSLM survey for 2006/07. The dependent variable FLFP is binary, i.e., a female is either working or not working. The explanatory variables are categorized into four sets of characteristics: (i) a woman's own characteristics, (ii) household characteristics, (iii) female empowerment, and (iv) endogenous covariates. Endogenous variables are properly instrumented in order to address the reverse causality between the endogenous variables and labor force participation. The effect of female empowerment is captured by the gender wage gap and fixed current assets as proxy variables.

This section presents the results of a two-step probit estimation of FLFP. First, we regress the endogenous covariates on the IVs; second, we use the predicted endogenous covariates along with control variables (such as women's own and household characteristics and proxy variables for

female empowerment) as explanatory variables to determine FLFP. This two-step procedure is used to estimate FLFP both when unpaid family helpers are defined as working females (as per the definition of the labor force in the official Labour Force Surveys), and when considering the former as nonworking females, i.e., when considering only those females who are paid employees.

5.1. First-Stage Results of Endogenous Covariates

We first regress simple OLS regression equations for each endogenous covariate, using IVs and control variables. This is followed by a probit estimation procedure by which the predicted values from the first stage along with the other control and proxy variables are used to determine FLFP.

As per the literature, endogenous covariates are variables that are expected to have a causal relationship with FLFP. Having identified female fertility, co-residence with parents or in-laws, and ownership of home appliances as our endogenous covariates, we need to correct them using the IV technique. These instruments are selected in a manner such that they have a direct impact on the endogenous covariates, but do not have any direct link with FLFP. Instruments representing fertility include proximity to a family planning center, contraceptive use, and sibling sex mix; average ownership of home appliances in the locality is used as an instrument for home appliances; and housing type is used as the instrument for co-residence.

Studying the impact of fertility on the extent of FLFP is complicated by the fact that both are potentially endogenous household decisions and require simultaneous estimation, the most complicated part of which is finding appropriate instruments for fertility. The IVs used in the first-stage regression include proximity to clinics and contraceptive use, which are indicators of access to and general awareness of family planning methods. The gender mix of the first two children in the family is used to estimate the effect of demand for an additional child on the mother's fertility. The results of the OLS equation for females' fertility rate are presented in Table 6.

The coefficients of proximity to a clinic have a positive impact on the fertility rate, indicating that the greater the distance from a family planning center, the greater the number of children born to a female.

Contraceptive use has an inverse relationship with fertility: more frequent use will reduce the probability of having more children. The preference for a son may be stronger in more traditional Pakistan societies, which could result in a substantial increase in family size. Therefore, parents of same-sex siblings are more likely to continue having children. The coefficient of the variable "first two boys" (-0.019) has a negative impact compared to the coefficient of the variable "first two girls" (0.032), which has a positive effect.

Table 6: First-Stage Regression Results for Fertility (Endogenous Covariate)

Instrumental variables

Variable	Coefficient	Standard Error	Variable	Coefficient	Standard Error
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

Variable	Coefficient	Standard Error	Variable	Coefficient	Standard Error
Age	0.3100*	(0.005)	Sialkot	-0.2930*	(0.046)
Age^2	-0.0030*	(0.000)	Hafizabad	-0.1670*	(0.053)
Education level	-0.0310*	(0.004)	M. Bahauddin	-0.3010*	(0.052)
Education $level^2$	-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 person	-0.1910*	(0.004)	Dera Ghazi Khan	-0.1470*	(0.044)
Khyber-Pakhtunkhwa	-0.4130*	(0.023)	Rajanpur	0.1800***	(0.047)
Female household head	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)	Nawabshah	0.1930**	(0.049)
Ownership of 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)

Continued...

Table 6: First-Stage Regression Results for Fertility (Continued)

Variable	Coefficient	Standard Error	Variable	Coefficient	Standard Error
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)
Toba Tek Singh	-0.1520*	(0.046)	Charsadda	0.7410*	(0.027)
Gujrat	-0.3290*	(0.047)	Constant	-9.8520*	(0.078)
No. of observations	77,046		R^2	0.6972	
F (45, 77000)	3,940.04		Adjusted R^2	0.6970	

Note: *, **, *** indicate significance at 1, 5, and 10 percent, respectively. Standard errors are given in parentheses.
Source: Author's calculations.

From this, we infer that mothers whose first two children are female are more likely to have a third child compared to mothers whose first two children are male. This instrument exploits the widely observed phenomenon of parental preference for a mixed sibling-sex composition. The other control variables include a female's age, age squared, level of education, family size, and location dummies (such as provincial, district, rural, and urban dummies). These findings are consistent with the previous studies cited in Section 2.

Co-residence (living with one's own parents or in-laws in a joint family versus a nuclear family) displays reverse causality with FLFP, and so is also treated as an endogenous variable. We use housing type (owned or rented) as an instrument for the dummy variable of co-residence (equal to 1 for a nuclear family and 0 for a joint family). In the first stage, the IV results show an inverse relationship between housing type and co-residence. This means that the decision to live as a joint or nuclear family depends on the house in which they live. If it is a rented house, then there is more likelihood of the female living in a nuclear family. On the other hand, if the house is owned or is an ancestral home, then cultural characteristics dictate that single females live with their parents and married females with their in-laws. The control variables include age, age squared, level of education, marital status, family size, a dummy for a female-headed household, a rural/urban dummy, and household income per capita. The results are reported in Table 7.

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

Instrumental variables

Variable	Coefficient	Standard Error	Variable	Coefficient	Standard Error
Housing type (owned or rented)	-0.40087*	(0.0013)	Constant	1.648835	(0.00296)

Control variables

Variable	Coefficient	Standard Error	Variable	Coefficient	Standard Error
Age	0.00375	(0.0001)	Family size	-0.08405*	(0.001)
Age^2	-0.00005	(0.0000)	Female-headed household	-0.58509*	(0.005)
Education level	-0.01246*	(0.0001)	Location	-0.09557*	(0.052)
Marital status	0.12818	(0.0016)	Household income per capita	-0.02142*	(0.042)
No. of observations	496,060		R^2	0.4188	
F (9,496050)	39717.66		Adjusted R^2	0.4188	

Note: * indicates significance at 1 percent. Standard errors are given in parentheses.
Source: Author's calculations.

The ownership of home appliances is also subject to reverse causality when considered an explanatory variable for FLFP. The average ownership of home appliances by females in the sampling unit is used as an instrument for ownership of home appliances due to the exogenous nature of average ownership in the locality. In order to determine the standard of living at household level, the home appliances variable is further divided into two categories: (i) the number of labor-saving appliances available to a female, and (ii) the number of time-consuming or luxury home appliances available to her. The labor-saving category includes appliances such as irons, sewing machines, fans, refrigerators, coolers, bicycles, motorcycles, cars, trucks, and tractors. Time-consuming durables include video cassette recorders, video cassette players, televisions, and air-conditioners.

The results in Table 8a indicate a positive relationship between the average ownership of labor-saving appliances by a female in the district

and labor-saving appliances of the household to which a female belongs. This means that, as the rising trend in the number of labor-saving appliances in the district increases on average, the number of labor-saving appliances owned by each household will increase. There are several reasons for this, but one could be that an increase in income per capita among households in that district reflects an improved standard of living. The demonstration effect is also a possible explanation for the trend.

Table 8a: First-Stage Regression Results for Labor-Saving Appliances (Endogenous Covariate)

Instrumental variables

Variable	Coefficient	Standard Error	Variable	Coefficient	Standard Error
Average ownership of labor-saving appliances by females in district	0.821904*	(0.002)	Constant	0.8050*	(0.012)

Control variables

Variable	Coefficient	Standard Error	Variable	Coefficient	Standard Error
Age	-0.00790*	(0.000)	Female-headed household	0.6323*	(0.022)
Marital status	-0.10673*	(0.006)	Household income per capita	-0.0429*	(0.000)
Education level	0.12860*	(0.000)	Location	0.2266*	(0.000)
No. of observations	496,060		R^2	0.4294	
F(7,496052)	5,333.64		Adjusted R^2	0.4294	

Note: * indicates significance at 1 percent. Standard errors are given in parentheses.

The same is the case for luxury appliances. As the living standard of households in the locality improves, the number of luxury home appliances owned on average increases and therefore so does the number of luxury home appliances in the household (of which females are a part). The control variables include age, age squared, marital status, level of education, female household head, a rural/urban dummy, and household income per capita. The results are presented in Table 8b.

Table 8b: First-Stage Regression Results for Time-Consuming/Luxury Appliances (Endogenous Covariate)

Instrumental variables

Variable	Coefficient	Standard Error	Variable	Coefficient	Standard Error
Average ownership of luxury appliances by females in district	0.7786*	(0.0030)	Constant	0.2694*	(0.0060)
Age	-0.0034	(0.0003)	Female-headed household	0.3455	(0.0110)
Age^2	0.0044	(0.0000)	Location	-0.0273	(0.0040)
Marital status	-0.2570	(0.0030)	Household income per capita	0.0060	(0.0004)
Education level	0.0444	(0.0030)			
No. of observations	496,060		R^2	0.3515	
F(8,496051)	12,753.3		Adjusted R^2	0.3515	

Note: * indicates significance at 1 percent. Standard errors are given in parentheses.
Source: Author's calculations.

5.2. Second-Stage Results

The predicted or fitted values obtained from each first-stage regression are used as an exogenous variable along with other explanatory variables included in the females' own characteristics and household characteristics categories and proxy variables for female empowerment. We estimate a 2SLS regression using the binary variable FLFP (a dummy variable for which working females = 1, and nonworking females = 0). Table 9 reports the estimated parameters and probability derivatives or marginal effects of the probit model for Pakistan overall. The probability derivatives indicate the change in probability on account of a one-unit change in the given independent variable after holding all other remaining variables constant at their mean.

Table 9: Probit Model Results for FLFP in Pakistan Overall (with FLFP as Dependent Variable)

Explanatory Variables	With Unpaid Family Helper			Without Unpaid Family Helper		
	Coefficient	Marginal Effect	Standard Error	Coefficient	Marginal Effect	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 level	-0.0904	-0.0033	(0.000)*	-0.1077	-0.0003	(0.000)*
Education level^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 per capita	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)*
Female household head	-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)*
Luxury appliances hat	-0.0974	-0.0036	(0.001)*	-0.1317	-0.0003	(0.000)*
Luxury 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/Federally Administered Tribal Areas	-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)*

Continued...

Table 9: Probit Model Results for FLFP in Pakistan Overall (Continued)

Explanatory Variables	With Unpaid Family Helper			Without Unpaid Family Helper		
	Coefficient	Marginal Effect	Standard Error	Coefficient	Marginal Effect	Standard Error
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)*
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)*
Toba Tek 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)*
Hafizabad	-0.4780	-0.0107	(0.002)*	-0.0801	-0.0002	(0.000)*
Mandi 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)*
Dera Ghazi 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)*
Nawabshah	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)*

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Table 9: Probit Model Results for FLFP in Pakistan Overall (Continued)

Explanatory Variables	With Unpaid Family Helper			Without Unpaid Family Helper		
	Coefficient	Marginal Effect	Standard Error	Coefficient	Marginal Effect	Standard Error
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)*
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)*
Buner	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)*

Note: *, **, *** indicate significance at 1, 5, and 10 percent, respectively. Standard errors are given in parentheses.
Source: Author's calculations.

No. of observations	113,026	Wald χ^2 (82)	4,396,932 (0.000)	Wald χ^2 (82)	42,946.43 (0.000)
		Pseudo R^2	0.5566	Pseudo R^2	0.87

As mentioned earlier, the explanatory variables have been classified into four categories: (i) females' own characteristics, (ii) household characteristics, (iii) proxy variables for female empowerment, and (iv) endogenous covariates. Having applied the IV technique in the first stage, we use the endogenous variables—fertility, co-residence, and ownership of home appliances—in the second stage, taking their predicted values. In this stage, all the variables are incorporated into a final equation. Females' own characteristics and household characteristics are the control variables and the proxy and endogenous covariates are treated as variables of interest.

Females' own characteristics include age and age squared. As age increases, after a certain optimal level its relationship with FLFP becomes negative. Age and education are both conventional variables; previous studies have also used these as control variables in econometric analysis. A female's age is positively related to labor force participation. The coefficients of age and age squared show that, as a female's age increases, the likelihood of her participation in the labor market rises until the age of 42, after which any further increases in age reduce the likelihood of participation.[5]

The coefficient of marital status shows that married females are less likely to participate in the labor market than those who are unmarried because the former are more likely to be constrained by household responsibilities. The variable of education measured by years of schooling completed is taken in both level and squared form, the coefficients of which imply that attaining an education level beyond 12 years of schooling (intermediate) increases a female's probability of participating in the labor market, while less educated females (matriculates or below) are discouraged from entering the labor market.

Household characteristics include household income per capita, family size, whether or not the household is agricultural, and a dummy for rural versus urban locations. Household income per capita has a positive and significant relationship with FLFP: the higher the level of income, the greater the probability of a female working. Females living in agricultural households are more likely to participate in economic activities than those in nonagricultural households.[6]

The coefficient of family size indicates that the greater the number of family members in a household, the higher the probability that its

[5] In equations of the form $Y = \alpha + \beta_1 X + \beta_2 X^2$

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

$\beta_1 + 2\beta_2 X = 0$ (optimization)

$2\beta_2 X = -\beta_1$

$x = -\frac{\beta_2}{2\beta_2}$

Applying this to the variables with the squared term, we calculate that x = 42 (age in years), 11 for level of education, 15 for household members, and 7 for the number of home appliances in a household. They are used as a turning point in the analysis.

[6] Of 5,730 agricultural households, 13.3 percent of females (aged 15–50) participate in the labor force. Of 5,730 households, 437 are urban and 5,293 are rural, which constitute 7.6 and 92.4 percent, respectively.

female members will participate in the labor market. However, when family size increases beyond 15 members, the probability of FLFP becomes negative. It is reasonable to infer from this that, owing to their lower income levels and large families, females are more likely to work—up to a certain level—because more income is needed. However, the greater the number of people in a household, the higher the workload for female members as they will be involved in cooking, washing, and looking after other family members. The turning point is 15 members, after which the association becomes negative.

In the first stage, the results of the IV technique showed an inverse relationship between housing type and co-residence (the predicted variable co-residence hat has a positive and significant relationship with FLFP) (Sasaki, 2002). This suggests that living in a joint family allows a female to share the burden of domestic work with her parents or in-laws. On the other hand, if she lives in a nuclear family, she may be unable to manage domestic work along with work outside her home. It is interesting that, in Pakistan's case, the factor associated with traditional norms encourages a female to take part in economic activities.

The coefficient of the level of predicted variable for ownership of labor-saving appliances is negative with respect to labor force participation but the square is positive, indicating that the likelihood of participation increases when the number of labor-saving appliances rises beyond seven. This category belongs to lower and middle class households where home appliances comprise basic necessities and durable goods. It is reasonable to infer that, owing to her lower household income level, a female is more likely to move toward the labor market to help meet household needs.

Similarly, the coefficient of level of time-consuming or luxurious appliances has a negative relationship and its square has a positive relationship with FLFP. This variable is representative of upper class households where females spend more time using luxury goods (such as computers, televisions, etc.) at home and so have time for and access to more opportunities such as better education and health. They are likely to be more competitive than females who have to spend more time on housework, and so more likely to be active participants in labor market activities.

The regression results for Pakistan overall indicate a negative relationship between ownership of labor-saving appliances and FLFP, including

among unpaid family helpers. There is, however, a positive relationship if we exclude unpaid family helpers. The turning point for Pakistan overall in the case of unpaid family helpers is ownership of seven labor-saving appliances; if unpaid family helpers are excluded, the threshold is three.

The coefficient of the female-headed household variable is negative for unpaid family helpers and positive for paid workers. This shows that female household heads are likely to prefer paid jobs and be reluctant to work as unpaid family helpers, i.e., without any monetary benefits. Monetized pay is preferred in urban areas, while females in rural agricultural households are more likely to support the family as unpaid helpers. Thus, the coefficients of the urban area variable in Punjab and Sindh are negative for unpaid family helpers and positive for paid employees.

The interacted term of the wage gap and Punjab has been constructed to gauge the diversified impact of the gender wage gap in Punjab on FLFP. The coefficient of the overall Pakistan gender wage gap is -0.9345 while that of Punjab is 0.5964. The positive sign indicates that the relationship is a direct one in the case of Punjab, but our computation shows that it is implicitly negative.[7] The overall impact of wage discrimination is negative as indicated by the derived coefficient of the interactive term. The overall wage gap is negative and of higher magnitude, and Punjab is characterized by a relatively lower level of gender wage discrimination. The interacted term confirms that this negative relationship holds but it is less sensitive relative to the overall impact when we include unpaid family helpers.

We have estimated two dimensions of female empowerment: within the household and within society. The gender wage gap is used as a proxy for female empowerment in society, while females' fixed assets are used to indicate intra-household empowerment. The wage gap has a negative impact on labor force participation, implying that the higher the level of discrimination against females, the lower their participation. The second variable, females' assets, has a negative impact on participation. The greater a female's fixed current assets, the smaller the likelihood that she will work for a wage. If she owns substantial fixed assets such as agricultural or nonagricultural land, then she may be considered powerful enough to make her own decisions, even if she happens to be unmarried.

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[7] -0.9345*(wage gap) + 0.5964 (wage gap*Punjab)
If Punjab = 1, then -0.9345* (wage gap) + 0.5964 (wage gap*1). By taking a common wage gap, wage gap (-0.9345 + 0.5964) = -0.3381*(wage gap).

6. Conclusion

The aim of this study was to identify the determinants of FLFP for the country overall as well as for three provinces. Given that FLFP in Pakistan is quite low, we discussed the role of underlying demand and supply factors. To tackle the problem of reverse causality due to fertility, ownership of home appliances, and co-residence, we applied the IV and 2SLS technique. In the first stage, the appropriate instruments and exogenous control variables were used to attain the predicted values of endogenous covariates using a simple OLS method. In the second stage, other explanatory exogenous variables and the fitted values of the endogenous covariates were regressed to determine FLFP, using a probit estimation procedure.

The explanatory variables were classified as (i) females' own characteristics, (ii) household characteristics, (iii) proxy variable for female empowerment, and (iv) endogenous covariates. Females' own characteristics and household characteristics comprised age, work experience, marital status, education level, household income per capita, residential status, and whether the household head was female; these were also used as control variables in the first-stage regression. The set of proxy variables for female empowerment included the gender wage gap and current assets. The endogenous covariates were co-residence, fertility, and ownership of home appliances, which were also our variables of interest.

Our empirical results showed that there was an inverse U-shaped relationship between female age and labor force participation. The likelihood of females participating in economic activity increased until the age of 42, after which further increases in age reduced the likelihood of participation in the labor market. Married females were less likely to participate in the labor market compared to unmarried females, because the former were constrained by household responsibilities. A rise in education level beyond 12 years of schooling (intermediate) increased the probability of FLFP whereas less educated (matriculate or below) females were discouraged from entering the labor market.

Household income per capita had a positive and significant relationship with FLFP, implying that the higher the level of income, the higher the probability of a female working. Females living in agricultural households were more likely to participate in the labor market than

those from nonagricultural households. With an increase in family size, the probability of FLFP rose, but if family size increased beyond 15 members, the probability of females participating in the labor market became negative. If a female is the household head and lives in an urban area, she is more likely to prefer a paid job than unpaid family help without any monetary benefits. Conversely, in rural agricultural households, female household heads were likely to support their families as unpaid helpers.

There was a U-shaped relationship between labor-saving appliances and FLFP: when the number of appliances owned increased beyond seven, there was greater likelihood of a female moving toward the labor market to meet household needs. Similarly, the ownership of luxurious appliances showed a negative relationship with FLFP, while the squared term had a positive relationship, representing upper-class households in which females were more likely to spend time utilizing the facilities at home to gain access to other opportunities such as education and health, etc. Therefore, being more competitive, they were more likely to be active participants of the labor market. Fertility had a negative and significant impact on FLFP. Living in a joint family increased the possibility of females participating in economic activities. Ownership of fixed assets had a positive and significant impact on female participation in the labor market.

Local labor market conditions also exhibited varying impacts on the probability of FLFP. Married females were subject to greater discrimination than unmarried females, implying that females of different marital status were not treated equally in the labor market. The findings validate the hypothesis that wage discrimination between females and males exists in all sectors but is highest in manufacturing. The empowerment indicators revealed that less empowered females were less likely to take part in economic activities.

The low labor participation rate among females in Pakistan likely reflects the penalty for the possible disruption of human capital formation among females resulting from their discontinuous market activity due to marriage, childcare, and discriminatory practices by employers or co-workers. These factors may lead not only to lower wage offers by employers, but also push females down the occupational ladder. Therefore, demand deficiency and low market wages combined with high reservation wages may be responsible for the low participation of females in Pakistan's labor market.

References

Ackerly, B. A. (1995). Testing the tools of development: Credit programmes, loan involvement, and women's empowerment. *IDS Bulletin*, *26*(3): 56–68.

Anderson, D., & Shapiro, D. (1996). Racial differences in access to high-paying jobs and the wage gap between black and white women. *Industrial and Labor Relations Review*, *49*(2), 273–286.

Angrist, J. D., & Evans, W. N. (1998). Children and their parents' labor supply: Evidence from exogenous variation in family size. *American Economic Review*, *88*(3), 450–477.

Asim, S. (2008). *Evaluating the impact of microcredit on women's empowerment in Pakistan*. Retrieved from http://www.microfinancegateway.org/gm/document-1.9.40843/Evaluating%20The%20Impact.pdf

Assaad, R., & Zouari, S. (2003). *Estimating the impact of marriage and fertility on the female labor force participation when decisions are interrelated: Evidence from urban Morocco*. University of Minnesota project on Gender, Work and Family in the Middle East.

Bailey, M. J. (2004). *More power to the pill: The impact of contraceptive freedom on women's labor supply*. Unpublished manuscript. University of Michigan, Ann Arbor.

Bar, M., & Leukhina, O. (2005). *Accounting for labor force participation of married women: The case of the US since 1959*. Unpublished manuscript. University of Minnesota and Federal Reserve Bank of Minneapolis.

Becker, G. S. (1965). A theory of the allocation of time. *Economic Journal*, *75*(299), 493–517.

Belker, R., Cockerell, L., & Edwards, R. (2000). *Labor force participation and household debt* (Working Paper). Sydney: Reserve Bank of Australia.

Berndt, E. R. (1991). *The practice of econometrics: Classic and contemporary*. Reading, MA: Addison-Wesley.

Blau, F. D., & Kahn, M. L. (1992). The gender earnings gap: Learning from international comparisons. *American Economic Review*, *82*(2), 533–538.

Cardia, E. (2007). *Household technology: Was it the engine of liberation?* (Doctoral dissertation, University of Montreal and CIREQ).

Chiappori, P.-A. (1988). Rational household labor supply. *Econometrica*, *56*(1), 63–90.

Chiappori, P.-A. (1992). Collective labor supply and welfare. *Journal of Political Economy*, *100*(3), 437–467.

Chishti, S., Lodhi, A., & Rashid, S. (1989). Women labor participation behavior: A case study of Karachi. *Pakistan Journal of Applied Economics*, *8*(2), 157–165.

Chun, H., & Oh, J. (2002). An instrumental variable estimate of the effect of fertility on labor force participation of married women. *Applied Economics Letters*, *9*, 631–634.

Chun, H., Kim, O., & Lee, I. (2008). Living arrangements and labor supply of married women: An instrumental variable approach. *경제학 공동국제학술대회* [*Joint International Conference on Economics*], 75–94.

Cogan, J. (1981). Fixed costs and labor supply. *Econometrica*, *49*(4), 945–963.

Ejaz, M. (2007). Determinants of female labor force participation in Pakistan: An empirical analysis of PSLM (2004–05) micro data [Special Edition]. *Lahore Journal of Economics*, 203–223.

Ettner, S. L. (1995). The impact of ''parent care'' on female labor supply decisions. *Demography*, *32*(1), 63–80.

Fernandez, R., Fogli, A., & Olivetti, C. (2002). *Marrying your mom: Preference transmission and women's labor and education choices* (Working Paper No. 9234). Cambridge, MA: National Bureau of Economic Research.

Francis, A. M. (2005). *Sex ratios and the Red Dragon: Using the Chinese Communist Revolution to explore the effect of the sex ratio on women and children in Taiwan*. Unpublished manuscript. University of Chicago, Illinois.

Gage, A. J. (1995). Women's socioeconomic position and contraceptive behavior in Togo. *Studies in Family Planning*, *26*(5), 264–277.

Galor, O., & Weil, D. N. (1996). The gender gap, fertility and growth. *American Economic Review*, *86*(3), 374–387.

Gangadharan, J., & Rosenbloom, J. L. (1996). *The effects of childbearing on married women's labor supply and earnings: Using twin births as a natural experiment* (Working Paper No. 5647). Cambridge, MA: National Bureau of Economic Research.

Goldin, C. (1990). *Understanding the gender-gap: An economic history of American women*. Oxford, UK: Oxford University Press.

Government of Pakistan, Federal Bureau of Statistics. *Labour force survey* (various issues). Islamabad: Author.

Government of Pakistan, Federal Bureau of Statistics. (2005). *Pakistan social and living standards measurement survey 2004–05*. Islamabad: Author.

Government of Pakistan, Federal Bureau of Statistics. (2006). *Pakistan social and living standards measurement survey 2005–06*. Islamabad: Author.

Government of Pakistan, Ministry of Finance. *Pakistan economic survey* (various issues). Islamabad: Author.

Greenwood, J., Seshadri, A., & Yorukoglu, M. (2005). Engines of liberation. *Review of Economic Studies*, *72*(1), 109–133.

Gronau, R. (1973). The effect of children on the housewife's value of time. *Journal of Political Economy*, *81*(2, Pt. 2), S168–S199.

Heckman, J. J. (1974). Shadow prices, market wages and labor supply. *Econometrica*, *42*(4), 679–694.

Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica*, *47*(1), 153–161.

Heckman, J., Killingsworth, M., & MaCurdy, T. (1981). Empirical evidence on static labour supply models: A survey of recent developments. In Z. Hornstein, J. Grice, & A. Webb (Eds.), *The economics of the labour market: Proceedings of a conference on the labour market, 10–12 September 1979, at Magdalen College, Oxford*. London, UK: HMSO.

Hotchkiss, J. L., & Pitts, M. M. (2005). Female labor force intermittency and current earnings: Switching regression model with unknown sample selection. *Applied Economics*, *37*(5), 545–560.

Ibraz, T. S. (1993). The cultural context of women's productive invisibility: A case study of a Pakistani village. *Pakistan Development Review*, *32*(1), 101–125.

Kim, J. S., & Lee, S. H. (2007). Female working poor and labor market policies. *Women's Studies Forum*, *23*, Seoul: Korean Women's Development Institute.

Lee, B. S., Jang, S., & Sarkar, J. (2008). Women labor force participation and marriage: The case of Korea. *Journal of Asian Economics*, *19*, 138–154.

Mincer, J. (1962). Labor force participation of married women: A study of labor supply. In H. G. Lowis (Ed.), *Aspects of labor economics*. Princeton, NJ: Princeton University Press.

Mroz, T. A. (1987). The sensitivity of an empirical model of married women's hours of work to economic and statistical assumptions. *Econometrica*, *55*(4), 765–799.

Nakamura, M., Nakamura, A., & Cullen, D. (1979). Job opportunities, the offered wage and the labor supply of married women. *American Economic Review*, *69*(December), 787–805.

Naqvi, Z., & Shahnaz, L. (2002). How do women decide to work in Pakistan? *Pakistan Development Review*, *41*(4), 495–513.

Pirani, D. C., León, A., & Lugauer, S. (2008). *The effect of household appliances on female labor force participation: Evidence from micro data* (Working Paper No. 355). Pittsburgh, PA: University of Pittsburgh, Department of Economics.

Quisumbing, A. R., & de la Briere, B. (2000). *Women's assets and intra-household allocation in rural Bangladesh: Testing measures of bargaining power* (Discussion Paper No. 86). Washington, DC: International Food Policy Research Institute, Food Consumption and Nutrition Division.

Quisumbing, A. R., & Maluccio, J. (1999). *Intra-household allocation and gender relations: New empirical evidence*. Mimeo. Washington, DC: International Food Policy Research Institute.

Rosenzweig, M. R., & Wolpin, K. I. (1980a). Life-cycle labor supply and fertility: Causal inferences from household models. *Journal of Political Economy*, *88*(2), 328–48.

Rosenzweig, M. R., & Wolpin, K. I. (1980b). Testing the quantity-quality model: The use of twins as a natural experiment. *Econometrica*, *48*(1), 227–240.

Sasaki, M. (2002). The causal effect of family structure on labor force participation among Japanese married women. *Journal of Human Resources*, *37*(3), 429–440.

Schultz, T. P. (1978). Fertility and child mortality over the life cycle: Aggregate and individual evidence. *American Economic Review*, *68*(2), 208–215.

Schultz, T. P. (1981). *Economics of population*. Reading, MA: Addison-Wesley.

Shah, N. M., Abbasi, N., & Alam, I. (1976). Inter-district and inter-provisional differentials in correlates of female labor force participation. *Pakistan Development Review*, *15*(4), 424–445.

Shah N. M. (1986). Changes in women's role in Pakistan: Are the volume and pace adequate? *Pakistan Development Review*, *25*(3), 339–363.

Shannon, M., & Kidd, M. P. (2003). Projecting the US gender wage gap 2000–40. *Atlantic Economic Journal*, *31*(4), 316–330.

Smith, J. D. (1975). White wealth and black people: The distribution of wealth in Washington DC in 1967. In J. D. Smith (Ed.), *The personal distribution of income and wealth*. New York, NY: Columbia University Press.

Tzannatos, Z. (1999). Women and labor market changes in the global economy. *World Development*, *27*(3), 551–570.

United Nations Development Programme. (1995). *Human development report 1995*: Gender and human development. Author.

United Nations Development Programme. (1998). *Human development report 1998: Consumption for human development*: Author.

Winter, C. (1994). *Working women in Latin America: Participation, pay and public policy*. Washington, DC: World Bank, Latin America and the Caribbean Region Technical Department.

World Bank. (2007). *GenderStats* [Data file]. Retrieved from http://go.worldbank.org/MRER20PME0

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