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Decision to be Self-Employed:
Testing for Bidirectional
Causation in Punjab, Pakistan***

**Ayesha Mir
Rabia Arif**



**Innovation and Technology Centre
Lahore School of Economics**

Innovation and Technology Centre (ITC)

Dr. Azam Chaudhry

Professor, Dean & Head of Department (Economics)

Pro-Rector

Co-Director

Dr. Theresa Chaudhry

Professor (Economics)

Co-Director



Innovation and Technology Centre,

The Lahore School of Economics,

Intersection of Main Boulevard, Burki Road,

Phase VI, DHA, Lahore 53200, Pakistan

Tel: +92-(0)42-3656-0969

URL: <https://itc.lahoreschool.edu.pk>

Email: ayeshakh@lahoreschool.edu.pk

Fertility and the Female Decision to be Self-Employed: Testing for Bidirectional Causation in Punjab, Pakistan

Ayesha Mir 

MPhil Economics,
Lahore School of Economics,
Email: ayeshadulli@gmail.com
ORCID ID: 0000-0000-0000-0000

Rabia Arif 

Assistant Professor & Ph.D in Economics,
Department of Economics,
Lahore School of Economics
Email: rabiaarif106@gmail.com
ORCID ID: 0000-0003-0361-6911 (*Corresponding Author*)

Abstract: Numerous studies, primarily concerning developed countries, report a positive correlation between the number of children or fertility decisions and the choice of becoming self-employed amongst women. However, the direction of this relationship has remained ambiguous. Contingent upon the direction of causation between children and women self-employment, policies directed towards achieving a certain goal, such as facilitating women in maintaining an appropriate balance between family and work, may have varying ramifications on female self-employment. Using cross-pooled MICS data for the years; 2011 and 2014, this study aims at testing two competing hypotheses; first whether having more children influence women to prefer self-employment? Second, whether employment-specific attributes associated with self-employed females affect their decision to reproduce. In this paper we test for bidirectional causality between female self-employment and children using an instrumental variable approach for bringing exogenous variation in fertility and female self-employment decisions, respectively. Using this approach and controlling for various individual, household, and regional characteristics, the findings of this study reveal that the direction of causality runs from being self-employed to giving birth to children (fertility) in a positive manner, mostly driven by educated, middle-aged women dwelling in urban areas. We find insignificant impact of fertility on female self-employment decisions. Being self-employed is likely to lower the opportunity costs of raising (more) children, that is, forgone income and depreciation of skills, would be more prominent in dependent employment. This supports the argument that occupation specific characteristics, such as self-employment being self-run, flexible in terms of scheduling working hours and leisure time in between, routine-friendly, and exhibitivite of lower incompatibility between mother and worker roles, bring a considerable degree of ease for women in raising more children. Thus, considering there is a higher degree of compatibility attached to self-employment as well as in expectations of raising a suitable heir of their family business, self-employed

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1. Introduction

Numerous studies, based on empirical evidence, have presented findings that reveal a positive link between children and female's decision of becoming self-employed. However, the direction of the relationship is obscure (Connelly, 1992; Mac-Pherson, 1988; Wellington, 2006). It is extremely significant to gauge the direction, as well as the degree of association, between having children and employment choices of women, particularly self-employment, for theoretical as well as pragmatic concerns. In order for policymakers to design a reasonably appropriate public policy, contingent upon contextual factors, knowing if it is having children at home that may influence women to prefer self-employment, or vice versa, i.e., employment-specific attributes that affect women's decision to reproduce, is of paramount importance. In other words - if policy designers fail to discover as to which causal direction the linkage holds, self-employed females: business owners and entrepreneurs, are prone to face unexpected outcomes.

This research study aims at testing two competing hypotheses: Is it fertility or having children that has an influence on women preferring self-employment, or is it employment-specific attributes associated with self-employed females that impact their decision to reproduce? This work aims to contribute to current literature by testing the bidirectional causation between women's self-employment participation and fertility decisions, thus establishing unidirectional causation moving from fertility to choosing self-employment by females in Pakistan. No past studies are tested for bidirectional causality in the relationship between the two variables of interest; having children and women's decision of becoming self-employed, for a developing country like Pakistan. Thus, employing an identification strategy, which was previously used for testing causality in both directions for a cross-country analysis of European countries (Noseleit, 2014), this study aims to make itself distinctive by applying the same methodology to a completely different context, i.e., Pakistan, whereby dynamics of the female labor market as well as of socioeconomic culture are highly contrasting.

Corroborating the first hypothesis stated above, a plethora of research work has asserted that self-employment is preferred among women, particularly those having young children, in order to maintain a smooth balance between work and family commitments. In other words, women carrying responsibilities for childcare and other family obligations are naturally bound to look for relatively flexible jobs, thereby inducing them to prefer self-employment to salaried work. Several researchers have come to the conclusion that for mothers, entrepreneurship offers a great deal of flexibility and control necessary to manage household and employment responsibilities, in terms of self-determination and autonomy over the scheduling of timings and work premises. Past studies, mostly associated with North American and Western European nations, are evident of postulating that there exists positive association between children and women self-employment; the higher the number of children (especially young) living in a particular household, the greater the likelihood of mothers preferring self-employed work as a result (Hundley, 2000; Lombard, 2001; Budig, 2006; Wellington, 2006). These findings coincide with the results of Boden (1999) and Carr (1996), whereby mothers of younglings are comparatively more inclined towards choosing self-employment than men, for non-pecuniary reasons, such as higher flexibility of schedule and family-related reasons.

However, there are also studies whose findings are indicative of supporting the second hypothesis, and that self-employment certainly results in women exhibiting distinctive childbearing attitudes from those engaged in salaried or dependent employment, i.e., self-employed females tend to have more children than wage-earning mothers owing to various reasons as discussed in the literature.

As argued by a number of researchers, there is a notable role of occupation-specific characteristics in regards to causing fertility differences among women. Research studies supporting the hypothesis significantly stress upon said attributes, which define the "nature" of employment, as well as how they are responsible for enabling women to decide the number of children they prefer to raise. As self-employment offers a great deal of flexibility to women in efficiently managing childcare and work, they are likely to be inclined towards raising more children, thereby predicting that self-employment and decisions of fertility are positively associated with each other. On the other hand, women associated with dependent or salaried-employment may find it very difficult to remain well functional at both jobs: home management/childcare and outdoor (official) work, due to the

inflexible nature of employment (Begall & Mills, 2012; Van Bavel, 2010). Moreover, other similar arguments, as asserted by Rindfuss et al. (2010), are indicative of the view that availability as well as the flexibility of child-care, which may differ across occupations, can have a considerable impact on fertility; the higher the availability of child-care, the greater the likelihood of women preferring more children. In simpler words, as self-employment renders a relatively good degree of time, availability, and flexibility about child-care, women engaged in such occupations are more prone to bear additional children than those involved in other forms of employment.

According to another perspective as put forth by Broussard et al. (2013), self-employed partners or females (alone), running their businesses, are highly motivated or induced to bear more children, particularly in an attempt to raise the probability of finding a suitable successor and to keep the business confined to their family. Therefore, the decision to have more children to raise chances of attaining a perfect fit for pursuing family business is empirically proved to be significantly influenced by the self-employment status of a mother (or both partners). This line of reasoning clearly implies that there could be motivational differences; raising a suitable successor as well as ensuring a successful family business, specifically among aspirational businesspersons, which drives them to experience a stronger desirability for children in comparison to the case of counterparts.

As there is a potential of bidirectional causation between women self-employment participation and decisions of fertility, suggested by both strands of theoretical frameworks discussed above, establishing unidirectional causality might not be inevitable, and hence may result in ambiguous and inconsistent results. Moreover, for a country or region-specific case, generalizing a certain set of results or mechanisms functioning at the back might be abortive. Hence, digging deeper into a developing country's case like Pakistan may unfold intriguing theoretical linkages, which in turn could be generalized to a larger sphere of the developing world.

1.1 Female Employment

Pakistan has an exceptionally low female employment rate, which is about 22.2%, as compared to 80.3% for males, as the majority of women are deprived of work opportunities. Upon comparing female participation rates across self-employment and salaried jobs, statistics reveal that a sizable proportion of females are engaged in self-employment, making it

up to 71%; while 29% of them are salaried workers (World Bank, 2019); thus, an in-depth analysis of factors responsible for creating an upsurge in self-employment rate shall be done. As this paper particularly aims at analyzing trends of childbirth as well as self-employment, while establishing causality (either unidirectional or bidirectional) between the two variables, among married women in the Punjab province, it is indispensable to note that the driving forces or aspirations for both the variables may overlap, change or remain indifferent for married women in comparison to those who are unmarried. For instance, married women, either childless or with children, tend to spend more time outside the labor market than do single, unmarried women (Duncan et al., 1993).

There is a paucity of opportunities for married females in a patrilineal paradigm; they are expected to depend on their husband's approval as to whether or not they should enter the labor market, which in turn implies that their decision to become employed ultimately depends on the individual as well as socioeconomic attributes of their husbands. Also, having more children and a salaried partner might not make it feasible for married women to opt for dependent employment, and instead propel them to become self-employed by setting up their small-scale businesses, such as tailoring or seam stressing, tutoring, and running of private academies, tuition centers, beauty salons, gyms at home or in their privately owned premises, both in urban and rural areas. Being self-employed facilitates them to make optimal utilization of their time devoted to both childcare/household chores and business work, simultaneously, in a compatible manner (Faridi et al., 2011). This is reflective of the fact that, at a micro-level, as the number of children in a particular household increases, so too does the tendency to opt for self-employment over dependent occupation as a means of balancing domestic and work commitments among married women.

Another study, supporting the same line of reasoning, reveals that working women, associated with smaller households and fewer children, are mostly a part of the formal salaried employment sector since costs of entry and incompatibility (between work and childcare) fall with less number of children (Sayeed et al., 2002).

At a macro level, as per the latest report generated by the World Bank (2019), the female labor force participation rate varies almost twice across developing and developed countries, ranging from 15% to 25% and 42% to 55% respectively. A number of factors explain a differential between figures

for both categories; strong social legislation, provisions for maternal leave and child-care are highly prevalent in Scandinavian countries, thereby resulting in a sufficiently large women labor force participation rate. As opposed to a developed economy's labor market, dynamics of Pakistan's labor market, being drastically suppressive in terms of providing opportunities, monetary benefits, and non-monetary reliefs to females, might present an absolutely different picture; a relatively meager share of female salaried workers in comparison to their self-employed counterparts. Also, apart from market-oriented differences, there certainly are sociocultural factors and household-level determinants; family structure, patriarchal system (male-dominance), the attitude of women, and their family towards both child-bearing and work-related decisions, responsible for determining either fertility or female self-employment among married women.

1.2 Fertility

There are several factors, including women's employment status, explaining variation in fertility levels within and across countries. Besides casting light on the role of fertility as a determinant of females' choice of becoming self-employed, this paper also draws attention to how the decision of becoming self-employed itself affects fertility decisions of a married woman, thereby raising controversies regarding the causal direction of the relationship between the two phenomena. According to a general theoretical perspective, women's active engagement in the labor market is presumed to have a depressing impact on their fertility or decision of giving birth to children, as wage-earning mothers find it painstaking to maintain a smooth balance between household chores and outside work. As a result of them being not able to cater to their domestic obligations, inclusive of childcare, they are bound to have a limited family size (Cramer, 1980; Felmler, 1993; Stolzenberg & Waite, 1977). This further escalates the fact that women, either unemployed or self-employed, are expected to have a higher tendency to reproduce or have more children as compared to those engaged in full-time salaried jobs since the flexible nature of their work (self-employment) is likely to mitigate the degree of conflict between occupational and reproductive roles – a positive association between women self-employment participation and fertility.

Though there is a consistently negative pattern of dependent employment-fertility relationship that has been observed at the micro-level in developed countries, no lucid pattern for both dependent and self-employment and its association with fertility has emerged in developing countries (Connelly,

1992; Mac-Pherson, 1988; Wellington, 2006; Lloyd, 1991; Neill et al., 1989). Some research studies are empirically evident in finding no causality running from women's self-employment to fertility, as discussed earlier, in the case of both developed and developing economies. Referring to the case of the developing world, it has been argued that no causal relationship should exist between occupational status (both dependent and self-run) and fertility due to extended family networking, limited access to wage employment, as well as traditional social norms about gender roles and the segregation of domestic duties between men and women. However, these mediating factors are likely to vary across rural and urban settings; married women in rural areas are socially as well as culturally dictated to raise a good number of children, serving as helping hands to the whole clan, regardless of their occupational status, thereby making the causal relationship between the two phenomena dubious and questionable. Therefore, to investigate if this holds for both rural and urban settings in Punjab, this particular research study attempts to test for potential bidirectional causation by employing a unique identification strategy; use of two instrumental variables for both endogenous variables: fertility and female self-employment, in two separate equations, which will be discussed in later sections of the paper.

2. Literature Review

Employing data from the European Social Survey, the author analyses the association between women self-employment participation and their fertility decisions. Unlike many past studies, the emphasis of this paper revolves around establishing a unidirectional causation between the two above mentioned phenomena. Although numerous studies are based on investigating the influence of fertility on women's decision to become self-employed, it has been argued that there is a potential of bidirectional or reverse causality, which in turn makes the theorized direction dubious; self-employment status of both males and females could arguably have a significantly considerable effect on decisions of fertility. To identify unidirectional link of causation, the researcher employs IV techniques; instruments childbirth or fertility with parental choices for a mix of sex composition of children, while self-employment by the share of workers employed in small-scale businesses across regions. Findings of the research reveal a significant, positive effect of children on self-employment, whereas no evidence of causality running in the reverse direction; female self-employment resulting in higher rates of fertility among women, is found. However, traces of a significantly positive effect of self-employment on fertility across women, aged 31-5 years, are noticeable (Noseleit, 2014).

Wellington (2006), aims to test the hypothesis that self-employment is increasingly being preferred by married women as a tool of managing work and household specific duties. While employing both longitudinal and cross-sectional data from the U.S., the author conducts an econometric analysis to estimate the impact of children on the likelihood of being as well as becoming self-employed. The results indicate that the existence of younglings accentuates the degree of preference for self-employment among women, but the influence of children does not seem to have risen over time. It is concluded that a mother's rising inclination towards participation in the market arises at a direct expense of the amount of time devoted to children. While examining the effects of family set-up on self-employment, Budig (2006), on one hand, distinguishes non-managerial from non-professional self-employment, and professional from managerial forms of self-employment on the other. Using U.S. - based survey data, the hypothesis is tested. The findings in turn imply that the presence of children raises female's non-professional self-occupation. However, the presence of children leaves no impact on professional level self-employment. The inferences, drawn from the results, suggest that as professional wage employments are already highly flexible, the degree of demand for increased flexibility as well as autonomy over employment schedules is relatively less among women engaged in such forms of occupation. Another explanation could be that women involved in the professional salaried occupations are burdened with comparatively less domestic responsibilities; childcare and household chores, having a fewer number of children, as opposed to those in non-professional employment; thus, escalating no significant effect of children on them.

Joona (2017) carries out a research study whereby the link of fertility decisions with self-employment participation amongst Swedish women is studied. In a country like Sweden, it is initially hypothesized that the presence of children does not necessarily have a favorable effect on the choice of women to become self-employed, as Sweden is a welfare state wherein enactment of family-friendly policies, and availability of child care and institutions aimed at easing the combination of domestic chores and work, are in theory likely to facilitate women engaged in salaried or dependent employment. However, using the country's register archives for the time frame, 2004 to 2008, the findings of the study indicate that having young children among Swedish women raises the probability of opting for self-employment. The effect appears to be prominent and strongest for mothers carrying very young children, aged 0-3 years. Similar

results are drawn using the panel data that accounts for unobserved heterogeneity on an individual level. On the contrary, time-use data analysis reveals that self-employed females have more or less the same number of working hours as wage-earning females do.

One of the empirical studies from Pakistan, conducted by Faridi & Chaudhry (2011), investigates various socio-economic variables that are responsible for determining the choice of women to get self-employed. Using the primary source of data for Bahawalpur, the logistic regression estimates reveal that age and experience are significantly positively related to women's decision of participating in self-employment. It is intriguing to notice that women on the lower bound of education are more motivated to set up their businesses than those on the upper bound. Other factors significantly affecting self-employment participation among women in a positive manner include the number of children (fertility), number of household assets (if any), and employment status of the spouse. Additionally, per capita income, location, and the size of dependents are negatively associated with self-employment participation amongst females. The results of the study imply that the availability of formal jobs is limited, particularly for women in Pakistan. Also, as a sizable proportion of women in Pakistan do not find it feasible to attain a higher level of education, they are pulled into self-employment. Aside from that, women living in joint family structures with a good number of children are mostly inclined towards choosing self-employment.

Several scholars present arguments claiming that it is occupation-specific attributes that are responsible for causing differences in fertility levels among women, not only the fertility of women that impacts their decision to be employed (Begall & Mills, 2012; Van Bavel, 2010). In other words, the direction of causality between fertility and female self-employment participation has been considered skeptical. Many sociologists have argued that working mothers are attracted to occupations that have a lower degree of incompatibility of women's dual roles, both as a worker and a mother, or that provide childcare facilities. As the structure of self-employment offers flexibility and compatibility of maternal and laborer roles, self-employed mothers have a higher tendency to raise (more) children than those engaged in salaried employment (Rindfuss et al., 2010). From an economics perspective, there are opportunity costs associated with giving birth to an additional child, in the form of forgone income from employment and depreciation of skills, which are more prominent in employment structures having lower compatibility of worker and mother

roles – dependent or salaried employment. Therefore, being self-employed tends to lower the opportunity costs involved in raising (more) children.

Another line of reasoning that corroborates causality running from self-employment status to fertility can be found in an empirical analysis that hypothesizes that self-employed mothers tend to be more fertile (than the wage-earners) in an expectation of raising an appropriate heir or carrier for their self-owned business (Broussard et al., 2013). While controlling for endogeneity instrumental variable technique has been used to establish an empirical relationship between the two variables of interest, using the U.S census data. The estimates reveal that a robust empirical relationship exists between family size or structure and the respondent's self-employment status. To ensure success and perpetual control over the family business, parents need a perfect successor; thus, they prefer raising more children, particularly sons if there are two daughters already. This is mostly observed for parents aged 40 or above; however, the effect seems to disappear for later generations.

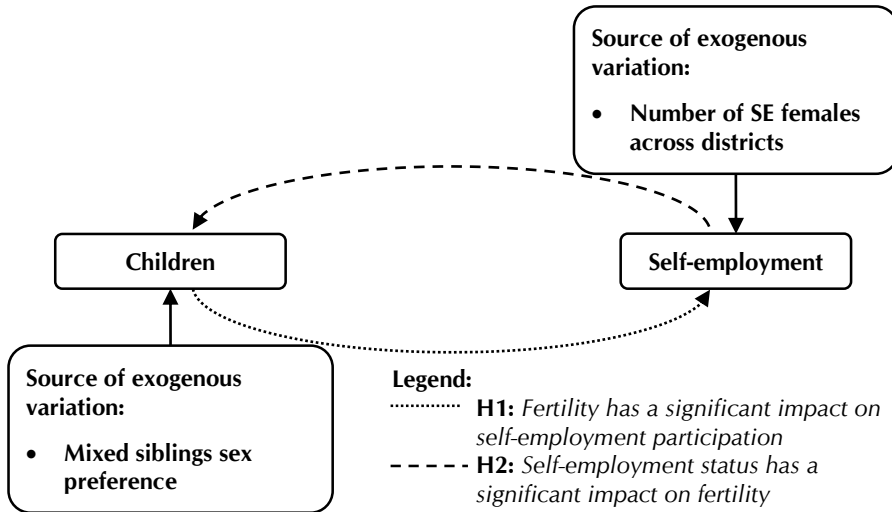
3. Methodology

With the use of pooled cross-sectional data, regular Probit or OLS estimation techniques for determining the relationship between women's self-employment participation and their respective fertility decisions are prone to cause biased estimates due to endogeneity; a correlation existing between the variable that is presumably endogenous and the error term leading to biased, inconsistent estimates. As endogeneity may arise from reverse causality between fertility and female's decision to become self-employed, inferring causality in one direction using simple OLS/Probit techniques might not be possible.

To test for bidirectional causation or two competing hypotheses that assume conflicting causal directions, this research study employs an instrumental variable approach for bringing exogenous variation in both endogenous variables of interest; fertility (childbirth) and female self-employment decisions. To instrument fertility or number of children, priorities for a mixed set of children (in terms of gender) are utilised as an instrumental dummy variable (Angrist & Evans, 1998). For instrumenting the self-employment status of females, the association between share of self-employed females across districts, and the probability of becoming self-employed is used (Noseleit, 2014; Mueller, 2007).

3.1 Conceptual Framework

Figure 1: Conceptual Framework



Note. This figure outlines the conceptual framework for two competing hypotheses to be tested in the study. From “Female self-employment and children”, by F. Noseleit, 2014, *Small Business Economics*, 43(3), p.555 (<https://www.jstor.org/stable/43553004>)

Figure I. illustrates the conceptual framework for the following two competing hypotheses:

H1: Fertility (childbirth) has a positive effect on female’s decision of becoming self-employed.

H2: Self-employment status of females has a positive effect on fertility (children).

As there is a possibility of bidirectional causation, the two variables; children and self-employment, are treated as endogenous; thus, to identify unidirectional causality and allow testing for the above stated competing hypotheses, the sources of exogenous variation are introduced as shown in Figure I. For “number/share of self-employed females across districts” to be a valid instrumental variable, it should be highly correlated with female’s decision of becoming self-employed, but should not affect the number of children (fertility) apart from an indirect channel. For “mixed sibling sex preference” to be a valid dummy variable, it should be strongly

correlated with the number of children born, while uncorrelated with the possibility of becoming self-employed among married women.

To identify causality between fertility and employment decisions, preference for a mixed sibling-gender composition can be used as a well-established strategy (Angrist & Evans, 1998). As highlighted by these researchers, priorities for mixed-sibling-gender-composition cause parents, having children of the same sex, to have a relatively strong desire for an additional son/daughter in expectation of obtaining one with a different gender. Since the gender mix of children is a random occurrence (the likelihood of raising a boy is 0.51), it has been demonstrated that a dummy variable for if gender of the first child born matches that of the second child is a valid and plausible IV against differences in the number of children among women having two or more children. This allows us to restrict our sample to women with at least two or more children.

As for the female's decision of becoming self-employed, the number/share of self-employed females across 36 districts of Punjab is used as an instrument, as entrepreneurial spawning is mostly practiced by employees working in small economic organizations (Mueller, 2006; Parker, 2009). As per Mueller's (2006) findings, the rising share of self-employed females, engaged in small or large scale business set-ups across various districts, has a strong influence on emerging entrepreneurship or the individual likelihood of becoming self-employed. In other words, it can act as a strong predictor of women's decision to choose self-employment; thus, it serves to be a valid instrument while assuring that the fertility decisions are not influenced by it directly or indirectly through other unobserved factors.

3.2 Econometric Model

Based on the conceptual framework outlined above, the empirical specification of the two models is as follows:

Model I

$$y_i = \alpha_0 z_i + \alpha_1 s_{1i} + \alpha_2 s_{2i} + \beta x_i + \varepsilon_i \quad (1)$$

$$y_i = 1 \text{ if } y_i > 0, 0 \text{ otherwise}$$

Where:

Equation (1)

y_i : the decision of becoming self-employed (= 1 if self-employed)

z_i : vector of controls

s_{1i} : gender of the first child

s_{2i} : gender of the second child

x_i : more than 2 children born to a woman (1 = yes)

$$x_i = \delta_0'v_i + \delta_1s_{1i} + \delta_2s_{2i} + \gamma(SS) + \eta_i, \quad (2)$$

$y_i = 1$ if $x_i > 0$, 0 otherwise.

Where:

Equation (2)

x_i : endogenous dummy variable; whether more than 2 children are living in the same household (= 1 if more than 2 children)

SS: Same-Sex dummy; if gender of the first child matches that of the second (1 = yes) – IV for x_i (fertility/number of children)

γ : effect of the IV

Model II

$$x_i = \alpha_0'z_i + \alpha_1\rho_1 + \beta y_i + \varepsilon_i, \quad (3)$$

$x_i = 1$ if $x_i > 0$, 0 otherwise

Where:

Equation (3)

x_i : the decision to have a third child

z_i : vector of controls (including the SS dummy variable)

ρ_1 : Total fertility rate across districts

y_i : woman's self-employment status (= 1 if self-employed)

$$y_i = \delta_0'v_i + \delta_1\rho_1 + \phi(SEF)QUOTE\phi(RSE_i) + \eta_i, \quad (4)$$

$y_i = 1$ if $x_i > 0$, 0 otherwise.

Where:

Equation (4)

y_i : endogenous dummy variable; women's decision of becoming self-employed

v_i : vector of controls

SEF: IV for y_i ; number of self-employed females across 36 districts of Punjab (for predicting female self-employment participation or women's decision to become self-employed)

ϕ : effect of the IV

Several authors including Angrist (2001), have used the 2SLS estimation technique, it would be appropriate to follow such linear instrumental variable techniques, and analyze the first and second stage results of the baseline regressions in comparison to those obtained using OLS, so as to exhibit a more accurate examination.

4. Data

For testing whether fertility or having children has a causal effect on the decision of mothers to prefer self-employment over salaried employment, or if self-employment status of females has a causal influence on their decisions regarding fertility, the analysis makes use of pooled cross-sectional data, obtained from MICS for the years 2011 and 2014.

The unit of analysis is female employees having at least two children, primarily falling under the age bracket of 18 years or above. According to the applied identification strategy discussed later, the restriction to women with at least two children is essential. As the restricted “Two or more children” sample of working females is expected to generate a limited number of observations, pooled data sets for two years, 2011 and 2014, have been appended to have adequate observations; a sample size of about 226,900 married women. Both the data sets provide information on a wide range of indicators, ranging from women’s fertility and socioeconomic conditions to that of children and household head, covering rural and urban districts of Punjab. Employment information is provided for all members of the household, aged 10 years or above, who have rendered at least one working hour within the reference timeframe (one week before the interview date) whether engaged in salaried or self-employment.

Table 1a: Descriptive Statistics

Variable	Observations	Mean	SD	Min	Max
Individual Characteristics					
More than 2 children (1 = yes)	226,900	0.8484046	0.3586291	0	1
Self-employed (1 = yes)	226,900	0.398237	0.1955453	0	1
Boy first (1 = yes)	130,006	0.2919404	0.4546568	0	1
Boy second (1 = yes)	130,006	0.222159	0.415699	0	1
Same sex (male or female) (1 = yes)	226,900	0.2520758	0.4342055	0	1
Same sex (females) (1 = yes)	226,900	0.1195857	0.3244772	0	1
Age in years	226,900	34.47235	7.703691	15	87
Age 18 - 30	226,900	0.3384398	0.47318	0	1
Age 31 - 35	226,900	0.2439136	0.4294422	0	1

Variable	Observations	Mean	SD	Min	Max
Age 36 - 40	226,900	0.2029484	0.4021953	0	1
Age > 40	226,900	0.2132525	0.4096055	0	1
Years of full-time education	226,853	3.463525	4.324538	0	1
Household Characteristics					
Household head years of education	226,900	5.887739	3.715354	0	12
Household head self-employed (1 = yes)	226,900	0.0454074	0.2081961	0	1
Availability of childcare (1 = yes)	226,900	0.3198159	0.4664054	0	1
Wealth quintiles					
Wealth-1 quintile (1 = yes)	226,900	0.1913398	0.3933568	0	1
Wealth-2 quintile (1 = yes)	226,900	0.1989863	0.3992386	0	1
Wealth-3 quintile (1 = yes)	226,900	0.2124636	0.409052	0	1
Wealth-4 quintile (1 = yes)	226,900	0.219167	0.413683	0	1
Wealth-5 quintile (1 = yes)	226,900	0.1780432	0.3825499	0	1
Regional/District wise Characteristics					
Number of SE females across districts	226,900	6084.879	2621.783	1917	12563
Total fertility rate across districts	226,900	3.667509	0.5918004	2.51	6.2
Urban (1 = yes)	226,900	0.3851476	0.4866313	0	1
Districts	226,900	15.37149	10.26185	1	36
Other Controls					
Year 2014 (1 = yes)	226,900	0.1305201	0.3368755	0	1

Note: The number of observations in the sample is 226,900. Years of full-time education of both head and mothers are measured on a 12-point scale from 0 = *never attended school* to 12 = *qualification above matriculation*. Availability of child care¹ is taken as a dummy variable. All 36 district dummies of Punjab are controlled for. The dummy used for year indicates if observations taken are from 2014 or 2011.

Table 1b: Summary of Children across Mother's Age & Occupation

Variable	Summary of children ever born	
	Mean	SD
Mother employment status		
Self-employed	5.5025504	2.3692442
Non-self-employed	4.7006468	2.3877508
Age brackets		
	Mean	SD
Age 18 - 30	3.2339299	1.6830111
Age 31 - 35	4.7090645	1.9277087
Age 36 - 40	5.5889895	2.2187084

Note: Summary of children ever born is presented across employment status and age brackets of the sampled mothers.

¹ Availability of child care accounts for women living in an extended family set-up, whereby those present at home are unemployed or are absolutely available to look after children

The primary purpose of this research study is to test for bidirectional causation between fertility and women's decision of opting for self-employment in Punjab, Pakistan. Table 1 presents the descriptive statistics of data or information collected on 226,900 married women, aged 18 years or above, with at least two child. As per the above stated statistics, 85% of the sampled women have more than two children, and about 40% of them are engaged in self-employment. Considering women with two or more children, we see 25% of them having their first two children of the same gender, out of which 12% are females born in a successive manner. The mean age of women under observation is 34 years; however, looking at women across different age brackets, ranging from 18-30 to 40 or above, we realize that a major chunk, of about 34%, falls in an age bracket of 18-30, that is most of them are young.

On a 12-point scale, 3.5 years of full-time education is observed for the sampled women on average. Household characteristics, including household's head's education & employment status, wealth quintiles, ranging from 1 to 5, with 1-3 amalgamated as a "lower wealth quintile" while 4 and 5 as a "higher wealth quintile, are controlled for. Another variable relates to availability of childcare; an average of 32% of the sampled women lives in an extended family structure, indicating that there is availability of childcare at home. On average, there are 6086 number of self-employed females across 36 districts of Punjab. Considering a district wise analysis, the figures reveal that the mean number of children born is approximately 4. Additionally, 39% of women are from urban region. Since data is pooled across two years, 2011 and 2014, a year dummy is inevitably accounted for.

Referring to Table 1b, it can be seen that the mean number of children born to self-employed mothers is greater than born to those engaged in other forms of employment. Self-employed mothers are observed to have up to 6 children on average as opposed to others bearing about 5 children. Not surprisingly, mean count of children increases with an increase in age of mothers; the higher the age bracket, the greater the total number of children ever born. Whilst middle-aged women have a mean of about 5-6 children, the count does not rise beyond 3 for those not exceeding their 30s.

5. Results

This section comprises of main results, subdivided into Model 1 and Model II regression estimates, followed by a statistical analysis on sub-samples.

5.1 Main Results

5.1.1 Model I

Table 2: The effect of children on female's self-employment status (first stage results reported)

VARIABLES	(1)
Dependent Variable: More than two = 1	IV - First Stage More than two
Same sex	0.0786*** (0.00348)
Sex dummies of the 1 st and 2 nd child	Yes
Controls	Yes
Constant	-0.828*** (0.0491)
Observations	118,553
R-squared	0.304

Note: Estimation includes dummy variables for gender of the first two children born (Boy first & Boy second), mother's education measured on a 12-point scale (1-12), mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head's education & employment status, availability of child care, dummies for wealth quintiles, all 36 districts, region, and year. Instrumental Variable: Same sex (1 = yes).

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 2 reports the first stage regression estimates, in correspondence to Eq. (2), discussed under Model I earlier. The first model is designed to test whether fertility or number of children has a significant influence on women's decision to be self-employed. As there is a potential of endogeneity associated with the number of children born, in order to control for it, the "Same sex" dummy variable is employed as an instrument. The table above suggests that the instrumental variable is highly significantly related to fertility or number of children in a positive manner, after controlling for gender dummies of the first and second child born. Thus, the level of significance found empirically ensures the validity and relevance of this instrumental variable against childbirth (endogenous variable). In other words, if gender of the first child matches that of the second, parents would prefer having a third child (or more than two children) – a random occurrence, thereby proving it to be a strong exogenous predictor of fertility (Angrist & Evans, 1998).

Table 3: The effect of children on female's self-employment status (OLS & 2SLS)

VARIABLES	(1)	(2)
	OLS Self-employed	2SLS Self-employed
More than two	0.00559*** (0.00154)	0.0172 (0.0190)
Sex dummies of the 1 st and 2 nd child	Yes	Yes
Controls	Yes	Yes
Constant	-0.00957 (0.0160)	0.0207 (0.0280)
Observations	118,553	118,553
R-squared	0.040	0.040

Note: Estimation includes dummy variables for gender of the first two children born (Boy first & Boy second), mother's education measured on a 12-point scale (1-12), mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head's education & employment status, availability of child care, dummies for wealth quintiles, all 36 districts, region, and year. Instrument Variable: Same sex (1 = yes).

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3 presents regression estimates for both OLS and 2SLS techniques run under Model I. The findings obtained from OLS tend to be biased as endogeneity associated with the number of children or fertility has not been controlled for, while estimates reported using 2SLS are indicative of the fact that once the potential endogeneity is accounted for, there is no significant impact found of fertility on self-employment participation of females. In other words, the more the children a woman has, the lesser may be her participation in self-employment activities. The results would imply that there exists no significant causation between fertility and the decision by women towards becoming self-employed in the province of Punjab, Pakistan. As per the findings of this model, it can be argued that factors such as religion, family dynamics, and societal as well as cultural constraints, might be of larger significance in determining mother's decision to choose self-employment as her primary occupation. In other words, children cannot necessarily be regarded as a difficulty on the road to self-employment.

5.1.2 Model II

Table 4: The effect of female's self-employment status on children (first stage results reported)

VARIABLES	(1)
Dependent Variable:	IV - First Stage
Self-employed = 1	Self-employed
Number of SE females across districts	3.86e-06*** (1.39e-06)
Total fertility rate across districts	Yes
Controls	Yes
Constant	-0.0338** (0.0147)
Observations	207,495
R-squared	0.043

Note: Estimation includes total fertility rate across districts, mother's education measured on a 12-point scale (1-12), mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head's education & employment status, availability of child care, dummies for wealth quintiles, all 36 districts, region, and year. Instrument Variable: Number of SE (self-employed) females across districts.

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4 reports the first stage regression estimates, in correspondence to Eq. (3), discussed under Model II earlier. This model aims to determine if the direction of causation runs from women's self-employment status to fertility decisions or the number of children she prefers giving birth to. In order to account for endogeneity, potentially associated with women's self-employment participation, the number or share of self-employed females across districts has been used as an instrument. The table above exhibits that there exists a significant, positive causal link between the instrumental variable (number/share of SE females across districts) and women being self-employed. To proxy potential differences in fertility that might be correlated with factors affecting share of females engaged in self-employment across space, total fertility rate across districts is incorporated as a control (Noseleit, 2014). Thus, on empirical grounds, the level of significance seen in the table validates the use of this variable as a relevant instrument against self-employment status of females (endogenous variable). The higher the share of women engaged in self-employment across districts or regions, the greater may be their degree of motivation to choose self-employment amidst a plethora of job opportunities springing up in the market (Mueller, 2006).

Table 5: The effect of female's self-employment status on fertility/children (OLS & 2SLS results reported)

VARIABLES	(1)	(2)
Dependent Variable:	OLS	2SLS
More than two = 1	More than two	More than two
Self-employed	0.0250*** (0.00579)	1.294** (0.565)
Total fertility rate across districts	Yes	Yes
Controls	Yes	Yes
Constant	-1.072*** (0.0493)	-1.052*** (0.0503)
Observations	207,495	207,495
R-squared	0.271	0.271

Note: Estimation includes total fertility rate across districts, mother's education measured on a 12-point scale (1-12), mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head's education & employment status, availability of child care, dummies for wealth quintiles, all 36 districts, region, and year. Instrument Variable: Number of SE (self-employed) females across districts.

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Using OLS and 2SLS regression techniques, the estimates obtained in Table 5 are shown in their respective columns, (1) and (2). As compared to findings reported using 2SLS, OLS estimates tend to be biased and inaccurate it doesn't account for any potential endogeneity associated with women's self-employment status in Model II. However, in the case of 2SLS, after bringing exogenous variation through the use of a suitable instrument, more accurate estimates are obtained. The results imply that a marginally significant relationship exists between women's self-employment status and their decision to have a third child. On average, it can arguably be put forth that self-employed women prefer having more than two children – a positive association rests between the two phenomena. This supports the argument that occupation specific characteristics, such as self-employment being self-run, flexible in terms of scheduling working hours and leisure time in between, home-friendly, and exhibitivie of higher compatibility between maternal and worker roles, bring a considerable degree of ease for women in raising more children (Rindfuss et al., 2010; Bernhardt, 1993). Being self-employed is likely to lower the opportunity costs of raising (more) children, that is, forgone income and depreciation of skillset, would be more prominent in dependent employment structures that are susceptible to higher

incompatibility between dual roles of a working mother than in self-employment (Van Bavel, 2010). Considering there is a higher degree of compatibility attached to self-employment, self-employed mothers in Pakistan tend to possess a relatively strong desire for an additional child. Another line of reasoning could be based on expectations with regards to raising a suitable successor, typically a son, for self-employed women's or her joint family business (Broussard et al., 2013). In later sub-sample regression results, it will become clearer where this impact strongly holds.

5.2 Sub-Sample Results

Table 6: The effect of fertility on female's self-employment status (2SLS), across three age brackets

MODEL I	(1)	(2)	(3)
VARIABLES			
Dependent Variable	Age 18-30	Age 31-40	Age > 40
Self-employed = 1			
More than two	0.0409*** (0.0153)	-1.62e-05 (0.0428)	0.215 (0.206)
Sex of the 1 st and 2 nd child	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Constant	0.0306*** (0.0107)	0.0728* (0.0397)	-0.131 (0.200)
Observations	45,034	47,209	26,093
R-squared	0.018	0.036	0.019

Note: Estimation includes dummy variables for gender of the first two children born (Boy first & Boy second), mother's education measured on a 12-point scale (1-12), household head's education & employment status, availability of child care², dummies for wealth quintiles, all 36 districts, region, and year. Instrument Variable: Same sex (1 = yes).

Omitted: mother's age, squared age, dummies of age brackets.

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6 presents results of 2SLS, obtained for Model I, for three sub-samples of age across brackets, ranging from 18-30, 31-40 to 40 years and above. Although there is no overall significant impact found of fertility on self-employment decisions on average, women falling in the age bracket of 18 to 30 are likely to choose self-employment as their primary occupation if they have more than two children. No significance is found for women who are 31 years or older. Thus, an in-depth analysis of the study reveals that despite observing no significant relationship between

² Regressions are rerun for all sub-samples after controlling for childcare availability

fertility/number of children and self-employment participation on the whole, this very niche of women might be susceptible of choosing self-employment as an attempt to maintain an appropriate balance between work and domestic responsibilities in response to having more than two children (Wellington, 2006; Lombard, 2001).

Table 7: The effect of female self-employment status on fertility/children (2SLS), across three age brackets

MODEL II	(1)	(2)	(3)
VARIABLES			
Dependent Variable:	Age 18-30	Age 31-40	Age > 40
More than two = 1			
Self-employed	0.980* (0.551)	0.832*** (0.213)	-0.0342 (0.139)
Total fertility rate across districts	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Constant	0.701*** (0.0551)	0.884*** (0.0277)	0.966*** (0.0167)
Observations	69,894	93,016	44,303
R-squared	0.046	0.031	0.013

Note: Estimation includes total fertility rate across districts, mother's education measured on a 12-point scale (1-12), household head's education & employment status, availability of childcare, and dummies for wealth quintiles, all 36 districts, region, and year. Instrument Variable: Number of SE females across districts.

Omitted: mother's age, squared age, dummies of age brackets.

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

When 2SLS regressions are run across sub-samples of the same age brackets as above, but under Model II, the estimates for the following age brackets; 18-30 and 31-40, come out to be marginally and highly significant, respectively. A thorough analysis of this model across three different age brackets provides insightful facts regarding a certain type of women being responsible for driving up this causal direction of link between women's self-employment status and decisions of fertility. Quite similar to what Noseleit (2014) found as an exception that self-employment has a positive effect on fertility amongst women lying within the age group of 31-45 years, our results also highlight that middle-aged women in Pakistan, when self-employed, prefer to have more than two children. This finding may be indicative of the fact that a sizable proportion of middle-aged, self-employed women in a developing country like Pakistan have a relatively high desirability for additional children (or sons) in an expectation of raising a suitable successor for her business (Broussard et al., 2013).

Table 8: Subsets of women with No-Education versus Education (2SLS results reported), across both models.

VARIABLES	Model I		Model II	
	(1)	(2)	(1)	(2)
Dependent Variables:	No	Education	No	Education
Self-employed = 1	Education		Education	
More than two = 1				
More than two	0.0446 (0.0403)	0.0336 (0.0236)		
Self-employed	-	-	-0.0772 (0.322)	1.058*** (0.400)
Sex dummies of the 1 st and 2 nd child	Yes	Yes	-	-
Total fertility rate across districts	-	-	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Constant	0.0137 (0.0466)	0.0525* (0.0308)	-1.018*** (0.0542)	-1.256*** (0.0491)
Observations	61,080	57,473	115,340	92,155
R-squared	0.058	0.021	0.208	0.211

Note: Estimation includes dummy variables for gender of the first two children born (Boy first & Boy second), total fertility rate across districts, mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head's education & employment status, availability of child care, and dummies for wealth quintiles, all 36 districts, region, and year. Omitted: mother's full time years of education, measured on a 12-point scale. Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The two subsets shown above are drawn from women with 0-2 years (pre-school) of education – no education, and those having 5-12 years of full-time education, respectively. As per the finding of the study registered in Table 8, Model I doesn't exhibit significance at any level for both subsets, while in the case of Model II; the positive effect of female's self-employment status on having an additional child is found to be highly significantly driven by educated women. This, too, has an implication regarding the type of women interested in raising more children in response to their self-employed status. In other words, a specific niche of women who're educated and aged 31-40 (or middle-aged), as suggested by the findings of this study, exhibits a relatively large significance of the positive association between self-employment status of women and their decision to have a third child. Both lines of reasoning could be proposed for observing such an impact amongst these women – higher degree of compatibility of childcare and work related duties associated with self-employment, and expectations of raising a suitable carrier of women's own or family business (Broussard et al., 2013; Van Bavel, 2010).

Table 9: Subsets of women from Urban versus Rural regions (2SLS results reported), across both models.

VARIABLES	Model I		Model II	
	(1)	(2)	(1)	(2)
Dependent Variables:	Urban	Rural	Urban	Rural
Self-employed = 1				
More than two = 1				
More than two	0.0129 (0.0233)	0.0548* (0.0332)	-	-
Self-employed	-	-	5.357** (2.133)	0.311 (0.189)
Sex dummies of the 1 st and 2 nd child	Yes	Yes	-	-
Total fertility rate across districts	-	-	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Constant	0.0226 (0.0281)	0.0201 (0.0391)	-1.147*** (0.0563)	-1.069*** (0.0280)
Observations	47,692	70,861	80,583	126,912
R-squared	0.008	0.058	0.223	0.228

Note: Estimation includes dummy variables for gender of the first two children born (Boy first & Boy second), total fertility rate across districts, mother's education measured on a 12-point scale (1-12), mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40 household head's education & employment status, availability of child care, and dummies for wealth quintiles, all 36 districts, and year. Omitted: regional dummy (urban). Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 9 reports findings obtained from subsets of urban and rural regions, using the 2SLS approach. The first column under Model I confirms that there is no significant effect of fertility on self-employment decisions amongst females living in urban areas; a marginal degree of significance is seen, however, in the case of rural region. Interestingly, the second model comes out to be significant for women dwelling in urban areas, whilst those of rural region exhibit no significance. Overall, the effect of women's self-employment status on decisions regarding children is mostly driven by urban women. This finding, in tandem with results drawn from education subset, suggests that urbanized women are likely to be more educated in comparison to those of rural dwellings, thereby exhibiting nearly the same direction of causality found at a higher level of significance.

Table 10: Subsets of women from Low versus High Wealth Quintiles (2SLS results reported), across both models.

VARIABLES	Model I		Model II	
	(1)	(2)	(1)	(2)
Dependent Variables:	Low	High	Low	High
Self-employed = 1	Wealth	Wealth	Wealth	Wealth
More than two = 1				
More than two	0.0405 (0.0384)	0.0428** (0.0216)	-	-
Self-employed	-	-	0.212 (0.143)	-0.281 (0.382)
Sex dummies of the 1 st and 2 nd child	Yes	Yes	-	-
Total fertility rate across districts	-	-	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Constant	-0.000543 (0.0448)	0.0215 (0.0252)	-1.083*** (0.0512)	-1.233*** (0.0912)
Observations	65,427	53,126	123,174	84,321
R-squared	0.052	0.011	0.227	0.221

Note: Estimation includes dummy variables for gender of the first two children born (Boy first & Boy second), total fertility rate across districts, mother's education measured on a 12-point scale (1-12), mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head's education & employment status, availability of child care, all 36 districts, region, and year. Omitted: wealth quintiles.

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The table above reports the estimates of 2SLS for two subsets of two wealth samples, "low" and "high" wealth quintiles. An aggregation of 1st, 2nd and 3rd wealth quintiles generates "low" wealth subset, while combination of 4th and 5th quintiles results in a relatively "high" wealth subset. The findings of the first model, presented in the first two columns, indicate that there is a significant influence of children/fertility on self-employment participation amongst economically stable women – those falling in a relatively high wealth quintile. However, there is no significance found in case of those associated with a relatively low wealth status. For Model II, no significance is found for either of the subsets – lower and higher wealth quintiles. This finding clearly implies that wealth, on the whole, has no significant role in making this direction of causation, running from self-employed females to choosing an additional child, work. Also, it can be highlighted that females in wealthier households have a relatively high tendency of opting for self-employment as a tool of balancing domestic chores, childcare and work-specific responsibilities, in response to having more than two children (Hundley 2000; Wellington 2006).

6. Robustness Check

In order to check robustness of the results, for instance, of Model I, rather than applying the “Same sex” variable, whereby gender of either the first or second child born isn’t restricted, that is, it could be both males, females, or either of them in any order, first or second, as an instrument against childbirth or more than two children, a different identification strategy in instrumenting childbirth is applied. Since the study involves the case of a developing country like Pakistan, it might be suitable to use both females/or daughters in constructing the “Same sex” dummy variable, so as to determine the trend of fertility level, or the desire to have an additional child, in expectation of a “son”, amongst couples, and hence investigate if a significant causal relationship can be established between fertility and women’s decision to be self-employed.

Table 11: The effect of children on female’s self-employment status (first stage results reported in (1) and 2SLS reported in (2)), using “Both girls” as an instrumental variable

VARIABLES	(1)	(2)
	First Stage More than two	2SLS Self-employed
Both girls	0.0670*** (0.00358)	-
More than two	-	-1.156 (1.927)
Controls	Yes	Yes
Constant	-1.016*** (0.0386)	-1.314 (2.144)
Observations	118,553	207,495
R-squared	0.253	

Note: Estimation includes dummy variables for gender of the first two children born (Boy first & Boy second), mother’s education measured on a 12-point scale (1-12), mother’s age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head’s education & employment status, availability of child care dummies for wealth quintiles, all 36 districts, region, and year. Instrumental Variable: Both girls (1 = yes).

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Using “Both girls” as an instrumental dummy variable in place of the “Same sex” dummy in equation (2) of Model I, while controlling for the same factors as above, the first stage results suggest that the instrument is highly significantly related to fertility or more than two children in a positive manner. Although the first stage results ensure validity and

relevance of this instrument, the second stage estimates come out to be insignificant; no causal relationship can be identified between fertility and women's self-employment decision. The results are similar to those obtained using the "Same sex" instrument against fertility, thereby escalating the earlier finding that having more than two children does not leave a robust, significant effect on female's decision to participate in self-employment across the province of Punjab, Pakistan.

7. Conclusion

The paper tests for bidirectional causation between children and self-employment status of females using an instrumental variable approach for bringing exogenous variation in fertility (number of children) and female self-employment decisions, respectively. This paper is the first of its kind to look at the case of a developing country, that is, Pakistan, whose labor market structure for both males and females and other household dynamics are substantially different from that of the Western world. Using this approach we intend to identify unidirectional causality between fertility and self-employment decisions of women in Punjab where lack of family-friendly policies and availability of childcare facilities could create potential barriers to female participation in the labor market, or fertility levels are expected to experience a depressing impact by women's employment status.

Using this approach and controlling for various individual, household, and regional characteristics, the findings of this study reveal that the direction of causality runs from being self-employed to giving birth to children (fertility) in a positive manner. This impact is mostly pronounced amongst a certain type of women, those falling in the age bracket of 31-40 years, in tandem with them being educated and dwelling in urban areas. There is no significant impact found of fertility on female self-employment decisions. Being self-employed is likely to lower the opportunity costs of raising (additional) children, that is, forgone income and depreciation of skillset, would be more pronounced and inevitable in dependent employment structures that are susceptible to higher incompatibility between roles of working mothers than in self-employment (Van Bavel, 2010). This supports the argument that occupation specific characteristics, such as self-employment being self-run, flexible in terms of scheduling working hours and leisure time in between, home-friendly, and exhibit of lower incompatibility between mother and worker roles, bring a considerable degree of ease for women

in raising more children (Rindfuss et al., 2010; Bernhardt, 1993). Thus, considering there is a higher degree of compatibility attached to self-employment as well as in expectations of raising a suitable heir of their family business (Broussard et al., 2013), self-employed women in Pakistan are likely to be inclined towards raising an additional child – a striking finding that has a tad bit of empirical evidence in the past literature. However, due to inadequacy of data or information available, it is hard to conclude if these women continue to prefer having more children in the face of their household-friendly employment structures or for whatever plausible excuse, as the very preference might have a depressing impact on their health status in the long run.

Appendices

Table 1a: Descriptive Statistics

Variable	Observations	Mean	SD	Min	Max
Individual Characteristics					
More than 2 children (1 = yes)	226,900	0.8484046	0.3586291	0	1
Self-employed (1 = yes)	226,900	0.398237	0.1955453	0	1
Boy first (1 = yes)	130,006	0.2919404	0.4546568	0	1
Boy second (1 = yes)	130,006	0.222159	0.415699	0	1
Same sex (male or female) (1 = yes)	226,900	0.2520758	0.4342055	0	1
Same sex (females) (1 = yes)	226,900	0.1195857	0.3244772	0	1
Age in years	226,900	34.47235	7.703691	15	87
Age 18 - 30	226,900	0.3384398	0.47318	0	1
Age 31 - 35	226,900	0.2439136	0.4294422	0	1
Age 36 - 40	226,900	0.2029484	0.4021953	0	1
Age > 40	226,900	0.2132525	0.4096055	0	1
Years of full-time education	226,853	3.463525	4.324538	0	1
Household Characteristics					
Household head years of education	226,900	5.887739	3.715354	0	12
Household head self-employed (1 = yes)	226,900	0.0454074	0.2081961	0	1
Availability of childcare (1 = yes)	226,900	0.3198159	0.4664054	0	1
Wealth quintiles	226,900	2.993587	1.376827	0	5
Wealth-1 quintile (1 = yes)	226,900	0.1913398	0.3933568	0	1
Wealth-2 quintile (1 = yes)	226,900	0.1989863	0.3992386	0	1
Wealth-3 quintile (1 = yes)	226,900	0.2124636	0.409052	0	1
Wealth-4 quintile (1 = yes)	226,900	0.219167	0.413683	0	1
Wealth-5 quintile (1 = yes)	226,900	0.1780432	0.3825499	0	1
Regional/District wise Characteristics					
Number of SE females across districts	226,900	6084.879	2621.783	1917	12563
Total fertility rate across districts	226,900	3.667509	0.5918004	2.51	6.2
Urban (1 = yes)	226,900	0.3851476	0.4866313	0	1
Districts	226,900	15.37149	10.26185	1	36
Other Controls					
Year 2014 (1 = yes)	226,900	0.1305201	0.3368755	0	1

Note: The number of observations in the sample is 226,900. Years of full-time education of both head and mothers are measured on a 12-point scale from 0 = *never attended school* to 12 = *qualification above matriculation*. All 36 district dummies of Punjab are controlled for. The dummy used for year indicates if observations taken are from 2014 or 2011.

Table 1b: Summary of Children across Mother's Age & Occupation

Variable	Summary of children ever born	
	Mean	SD
Mother employment status		
Self-employed	5.5025504	2.3692442
Non self-employed	4.7006468	2.3877508
Age brackets	Mean	SD
Age 18 - 30	3.2339299	1.6830111
Age 31 - 35	4.7090645	1.9277087
Age 36 - 40	5.5889895	2.2187084

Note: Summary of children ever born is presented across employment status and age brackets of the sampled mothers.

Table 2: The effect of children on female's self-employment status (first stage results reported)

VARIABLES	(1) IV - First Stage More than two
Same sex	0.0786*** (0.00348)
Boy first	-0.0367*** (0.00353)
Boy second	0.0320*** (0.00375)
Mother's Age	0.0763*** (0.00184)
Squared Age	-0.000700*** (1.91e-05)
Mother's education	-0.0122*** (0.000514)
Age 18-30	-0.172*** (0.0424)
Age 31-35	-0.143*** (0.0441)
Age 36-40	-0.168*** (0.0450)
Age > 40	-0.229*** (0.0459)
HH's education	0.00130** (0.000540)
HH's self-employed	-0.0306*** (0.00276)
Wealth 2	-0.00413 (0.00585)
Wealth 3	-0.00849 (0.00608)

VARIABLES	(1) IV - First Stage More than two
Wealth 4	-0.0196*** (0.00655)
Wealth 5	-0.0276*** (0.00789)
Bahawalpur	0.0341*** (0.0106)
BNagar	0.0332*** (0.0115)
RYKhan	0.0332*** (0.0103)
DGKhan	0.0512*** (0.0128)
Mgarh	0.0263** (0.0103)
Rajanpur	0.0434*** (0.0121)
Faisalabad	0.0235*** (0.00906)
Jhang	-
TTsingh	0.0486*** (0.0128)
Gujranwala	0.0501*** (0.00966)
Gujrat	0.0143 (0.0121)
MBahauddin	0.00997 (0.0150)
Narowal	0.0207* (0.0123)
Sialkot	0.0386*** (0.0106)
Lahore	0.0457*** (0.00994)
Kasur	0.0436*** (0.0111)
NSahib	0.0381*** (0.0125)
Sheikhupura	0.0538*** (0.0114)
Multan	0.0281*** (0.0104)
Khanewal	-
Vehari	0.0124 (0.0123)

VARIABLES	(1) IV - First Stage More than two
Sahiwal	-0.0105 (0.0142)
Pakpattan	0.0349** (0.0140)
Okara	0.0153 (0.0118)
RWP	-0.0154 (0.0105)
Attock	-
Chakwal	-0.0375*** (0.0136)
Jhelum	0.00456 (0.0132)
Sarghoda	0.0253** (0.0106)
Bhakkar	-0.0365*** (0.0128)
Khushab	-
Layyah	0.00551 (0.0122)
Hafizabad	0.0410*** (0.0158)
Urban	0.00868** (0.00412)
Year 2014	-0.0480*** (0.00695)
Childcare Availability	-0.00306 (0.00196)
Constant	-0.828*** (0.0491)
Observations	118,553
R-squared	0.304

Note: Estimation includes dummy variables for gender of the first two children born (Boy first & Boy second), mother's education measured on a 12-point scale (1-12), mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head's education, dummies for wealth quintiles, all 36 districts, region, and year. Instrumental Variable: Same sex (1 = yes).

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3: The effect of female self-employment status on children (first stage results reported)

VARIABLES	(1) IV - First Stage
Number of SE females across districts	3.86e-06*** (1.39e-06)
Total fertility rate across districts	-0.00284 (0.00293)
Mother's Age	0.00516*** (0.000489)
Squared age	-5.88e-05*** (5.76e-06)
Mother's education	-0.000737*** (0.000168)
Age 18-30	-0.0117 (0.00767)
Age 31-35	-0.0125 (0.00844)
Age 36-40	-0.00599 (0.00897)
Age > 40	-0.00271 (0.00963)
HH's education	0.000355* (0.000205)
HH's self-employed	0.0108*** (0.00111)
Wealth 2	-0.00959*** (0.00308)
Wealth 3	-0.0262*** (0.00296)
Wealth 4	-0.0367*** (0.00295)
Wealth 5	-0.0328*** (0.00328)
Bahawalpur	-0.0202*** (0.00606)
BNagar	-0.0397*** (0.00503)
RYKhan	-0.0280*** (0.00660)
DGKhan	-0.0311*** (0.00664)
Mgarh	-0.0313*** (0.00691)
Rajanpur	-0.0211** (0.00872)
Faisalabad	0.0339*** (0.0106)

VARIABLES	(1) IV - First Stage
Jhang	-
TTsingh	0.0743*** (0.00914)
Gujranwala	-0.0372*** (0.00896)
Gujrat	0.0132** (0.00548)
MBahauddin	-0.00486 (0.00590)
Narowal	-0.0142*** (0.00493)
Sialkot	-0.0116** (0.00586)
Lahore	-0.0243*** (0.00723)
Kasur	-0.0201*** (0.00615)
NSahib	-0.00707 (0.00519)
Sheikhupura	-0.0149*** (0.00510)
Multan	-0.00677 (0.00671)
Khanewal	-
Vehari	0.0355*** (0.00750)
Sahiwal	-0.00248 (0.00597)
Pakpattan	0.0402*** (0.00958)
Okara	0.00843 (0.00621)
RWP	-0.00492 (0.00602)
Attock	-
Chakwal	-0.0102* (0.00553)
Jhelum	-0.0146*** (0.00459)
Sarghoda	0.00924 (0.00674)
Bhakkar	0.0195** (0.00762)

VARIABLES	(1) IV - First Stage
Khushab	-
Layyah	-0.0369*** (0.00444)
Hafizabad	-0.0142** (0.00634)
Urban	-0.0253*** (0.00140)
Year 2014	0.0113** (0.00488)
Childcare Availability	-0.0101*** (0.000872)
Constant	-0.0338** (0.0147)
Observations	207,495
R-squared	0.043

Note: Estimation includes total fertility rate across districts, mother's education measured on a 12-point scale (1-12), mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head's education, dummies for wealth quintiles, all 36 districts, region, and year. Instrument Variable: Number of SE (self-employed) females across districts.

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4: The impact of children on women's self-employment status (OLS & 2SLS)

VARIABLES	(1)	(2)
Dependent Variable: Self-employed = 1	OLS Self-employed	2SLS Self-employed
More than two	0.00559*** (0.00154)	0.0172 (0.0190)
Boy first	-0.000519 (0.00140)	-5.26e-05 (0.00156)
Boy second	0.00134 (0.00167)	0.000842 (0.00190)
Mother's age	0.00398*** (0.000506)	0.00306* (0.00157)
Squared age	-4.79e-05*** (6.16e-06)	-3.94e-05*** (1.49e-05)
Mother's education	-0.000350** (0.000177)	-0.000206 (0.000301)
Age18_30	-0.00964 (0.00876)	-0.00770 (0.00916)
Age31_35	-0.00791 (0.00947)	-0.00631 (0.00970)
Age36_40	0.00122 (0.00996)	0.00316 (0.0103)

VARIABLES	(1)	(2)
Dependent Variable:	OLS	2SLS
Self-employed = 1	Self-employed	Self-employed
Age > 40	0.00520 (0.0106)	0.00791 (0.0114)
HH's education	0.000251 (0.000211)	0.000234 (0.000213)
HH's self-employed	0.0115*** (0.00136)	0.0118*** (0.00149)
Wealth 2	0.00891*** (0.00343)	-0.008855*** (0.00343)
Wealth 3	-0.0272*** (0.00320)	-0.0271*** (0.00320)
Wealth 4	-0.0384*** (0.00316)	-0.0382*** (0.00317)
Wealth 5	-0.0356*** (0.00346)	-0.0352*** (0.00347)
Bahawalpur	-0.00398 (0.00462)	-0.00438 (0.00466)
B.Nagar	-0.0288*** (0.00338)	-0.0292*** (0.00343)
RY.Khan	-0.0107*** (0.00401)	-0.0112*** (0.00405)
DG.Khan	-0.0274*** (0.00356)	-0.0280*** (0.00365)
M.Garh	-0.0198*** (0.00405)	-0.0202*** (0.00409)
Rajanpur	-0.0219*** (0.00479)	-0.0224*** (0.00487)
Faisalabad	0.0573*** (0.00502)	0.0570*** (0.00504)
Jhang	-	-
TT.Singh	0.0646*** (0.00861)	0.0640*** (0.00865)
Gujranwala	-0.00970*** (0.00328)	-0.0103*** (0.00336)
Gujrat	0.0196*** (0.00536)	0.0194*** (0.00536)
M.Bahauddin	-0.00764 (0.00511)	-0.00774 (0.00511)
Narowal	-0.00714 (0.00459)	-0.00740 (0.00460)
Sialkot	0.00233 (0.00448)	0.00191 (0.00451)
Lahore	-0.00173 (0.00326)	-0.00226 (0.00333)
Kasur	-0.00982** (0.00432)	-0.0103** (0.00440)

VARIABLES	(1)	(2)
Dependent Variable:	OLS	2SLS
Self-employed = 1	Self-employed	Self-employed
N.Sahib	-0.00448 (0.00474)	-0.00492 (0.00476)
Sheikhupura	-0.00487 (0.00408)	-0.00552 (0.00418)
Multan	0.00640 (0.00437)	0.00607 (0.00438)
Vehari	0.0349*** (0.00703)	0.0348*** (0.00702)
Sahiwal	-0.00299 (0.00534)	-0.00285 (0.00535)
Pakpattan	0.0328*** (0.00854)	0.0324*** (0.00859)
Okara	0.0140** (0.00588)	0.0138** (0.00588)
RWP	0.00972** (0.00446)	0.00991** (0.00449)
Chakwal	-0.00747 (0.00499)	-0.00703 (0.00505)
Jhelum	-0.0136*** (0.00422)	-0.0136*** (0.00422)
Sarghoda	0.0195*** (0.00531)	0.0192*** (0.00532)
Bhakkar	0.0166** (0.00712)	0.0170** (0.00716)
Layyah	-0.0310*** (0.00337)	-0.0311*** (0.00336)
Hafizabad	-0.0205*** (0.00387)	-0.0210*** (0.00390)
Urban	-0.0215*** (0.00146)	-0.0216*** (0.00146)
Year 2014	-0.00284 (0.00278)	-0.00234 (0.00288)
Childcare Availability	-0.0101*** (0.000828)	-0.0101*** (0.000832)
Constant	-0.0129 (0.0113)	-0.00296 (0.0199)
Observations	118,533	118,553
R-squared	0.040	0.040

Note: Estimation includes dummy variables for gender of the first two children born (Boy first & Boy second), mother's education measured on a 12-point scale (1-12), mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head's education, dummies for wealth quintiles, all 36 districts, region, and year. Instrument Variable: Same sex (1 = yes).

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

**Table 5: The impact of women's self-employment status on children
(OLS & 2SLS results reported)**

VARIABLES	(1)	(2)
Dependent Variable: More than two = 1	OLS	2SLS
Self-employed	0.0250*** (0.00579)	1.294** (0.565)
Total fertility rate across districts	-0.00376 (0.00691)	-1.54e-05 (0.00702)
Mother's Age	0.0938*** (0.00169)	0.0872*** (0.00338)
Squared Age	-0.000889*** (1.86e-05)	-0.000815*** (3.81e-05)
Mother's education	-0.0116*** (0.000415)	-0.0107*** (0.000587)
Age18_30	-0.127*** (0.0380)	-0.112*** (0.0386)
Age31_35	-0.143*** (0.0393)	-0.127*** (0.0400)
Age36_40	-0.226*** (0.0401)	-0.218*** (0.0402)
Age > 40	-0.326*** (0.0408)	-0.322*** (0.0408)
HH's education	0.00197*** (0.000426)	0.00154*** (0.000466)
HH's self-employed	-0.0392*** (0.00213)	-0.0529*** (0.00644)
Wealth 2	-0.00579 (0.00424)	0.00618 (0.00687)
Wealth 3	-0.0103** (0.00450)	0.0222 (0.0153)
Wealth 4	-0.0214*** (0.00497)	0.0241 (0.0210)
Wealth 5	-0.0375*** (0.00606)	0.00264 (0.0190)
Bahawalpur	0.0227** (0.00897)	0.0331*** (0.0102)
B.Nagar	0.0310*** (0.0109)	0.0710*** (0.0214)
RY.Khan	0.0334*** (0.0101)	0.0498*** (0.0125)
DG.Khan	0.0598*** (0.0157)	0.0965*** (0.0233)
M.Garh	0.0374*** (0.0135)	0.0622*** (0.0178)
Rajanpur	0.0564*** (0.0173)	0.0792*** (0.0207)
Faisalabad	0.0172** (0.00731)	-0.0610* (0.0358)
Jhang	-	-

VARIABLES	(1)	(2)
Dependent Variable:		
More than two = 1	OLS	2SLS
TT.Singh	0.0319*** (0.0109)	-0.0608 (0.0427)
Gujranwala	0.0440*** (0.00848)	0.0614*** (0.0115)
Gujrat	0.00665 (0.0104)	-0.0120 (0.0134)
M.Bahauddin	-0.00466 (0.0126)	0.00856 (0.0138)
Narowal	0.0203* (0.0106)	0.0347*** (0.0124)
Sialkot	0.0315*** (0.00896)	0.0329*** (0.00897)
Lahore	0.0362*** (0.00846)	0.0440*** (0.00910)
Kasur	0.0434*** (0.0127)	0.0585*** (0.0145)
N.Sahib	0.0264** (0.0105)	0.0348*** (0.0112)
Sheikhupura	0.0419*** (0.00966)	0.0516*** (0.0106)
Multan	0.0248*** (0.00924)	0.0163 (0.00998)
Vehari	0.000601 (0.0112)	-0.0466** (0.0237)
Sahiwal	-0.0102 (0.0121)	-0.000926 (0.0128)
Pakpattan	0.0287** (0.0141)	-0.0165 (0.0243)
Okara	0.0138 (0.0108)	0.00102 (0.0122)
RWP	-0.0267*** (0.00903)	-0.0342*** (0.00968)
Chakwal	-0.0463*** (0.0126)	-0.0265* (0.0152)
Jhelum	-0.000518 (0.0118)	0.0230 (0.0158)
Sarghoda	0.0165* (0.00980)	-0.00868 (0.0148)
Bhakkar	-0.0316*** (0.0109)	-0.0556*** (0.0153)
Layyah	0.0114 (0.0106)	0.0539** (0.0220)
Hafizabad	0.0263* (0.0146)	0.0538*** (0.0192)
Urban	0.00970*** (0.00323)	0.0423*** (0.0149)
Year 2014	-0.0590*** (0.00486)	-0.0534*** (0.00532)

VARIABLES	(1)	(2)
Dependent Variable: More than two = 1	OLS	2SLS
Childcare Availability	-0.0181*** (0.00160)	-0.00524 (0.00592)
Constant	-1.072*** (0.0493)	-1.052*** (0.0503)
Observations	207,495	207,495
R-squared	0.271	0.271

Note: Estimation includes total fertility rate across districts, mother's education measured on a 12-point scale (1-12), mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head's education, dummies for wealth quintiles, all 36 districts, region, and year. Instrument Variable: Number of SE (self-employed) females across districts.

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6: The impact of fertility on women's self-employment status (2SLS), across three age brackets

MODEL I	(1)	(2)	(3)
VARIABLES	Age 18-30	Age 31-40	Age > 40
Dependent Variable: Self-employed = 1			
More than two	0.0409*** (0.0152)	-1.62e-05 (0.0429)	0.215 (0.203)
Boy first	0.00400** (0.00176)	-0.000354 (0.00229)	-0.00610* (0.00363)
Boy second	-0.000718 (0.00170)	0.000427 (0.00198)	-0.00584 (0.00357)
Mother's education	2.23e-05 (0.000313)	-0.000479 (0.000576)	0.000185 (0.00103)
HH's education	0.000626** (0.000287)	5.40e-05 (0.000357)	0.000527 (0.000543)
Wealth 2	-0.0250*** (0.00447)	-0.00683 (0.00557)	-0.00179 (0.00751)
Wealth 3	-0.0375*** (0.00434)	-0.0260*** (0.00533)	-0.0263*** (0.00693)
Wealth 4	-0.0400*** (0.00438)	-0.0442*** (0.00529)	-0.0406*** (0.00759)
Wealth 5	-0.0369*** (0.00493)	-0.0363*** (0.00596)	-0.0453*** (0.00778)
Bahawalpur	-0.0128** (0.00640)	-0.00816 (0.00797)	-0.00430 (0.00970)
BNagar	-0.0284*** (0.00474)	-0.0401*** (0.00582)	-0.0325*** (0.00794)
RYKhan	-0.0150*** (0.00551)	-0.0177** (0.00708)	-0.0147 (0.00910)
DGKhan	-0.0274*** (0.00543)	-0.0429*** (0.00635)	-0.0358*** (0.00865)

MODEL I	(1)	(2)	(3)
VARIABLES			
Dependent Variable:	Age 18-30	Age 31-40	Age > 40
Self-employed = 1			
Mgarh	-0.0228*** (0.00528)	-0.0304*** (0.00668)	-0.0262*** (0.00891)
rajanpur	-0.0186*** (0.00711)	-0.0313*** (0.00881)	-0.0388*** (0.0103)
Faisalabad	0.0319*** (0.00699)	0.0709*** (0.00841)	0.0909*** (0.0111)
Jhang	-	-	-
TTsingh	0.0562*** (0.0125)	0.0587*** (0.0133)	0.128*** (0.0214)
Gujranwala	-0.00976* (0.00514)	-0.0189*** (0.00579)	-0.0154* (0.00795)
Gujrat	-0.00856 (0.00524)	0.0130 (0.00898)	0.0888*** (0.0172)
MBahauddin	-0.0185*** (0.00503)	0.000345 (0.00999)	-0.00954 (0.0133)
Narowal	-0.0129** (0.00564)	-0.0142* (0.00766)	-0.00265 (0.0120)
Sialkot	-0.0128** (0.00508)	0.000689 (0.00766)	0.0210 (0.0127)
Lahore	-0.00987** (0.00477)	-0.00393 (0.00613)	0.000755 (0.00803)
Kasur	-0.0163*** (0.00568)	-0.0171** (0.00739)	-0.0134 (0.0103)
NSahib	-0.00264 (0.00765)	-0.0117 (0.00802)	0.00400 (0.0125)
Sheikhupura	-0.0108* (0.00608)	-0.00403 (0.00762)	-0.0110 (0.00997)
Multan	0.000752 (0.00620)	-0.000339 (0.00752)	0.0270** (0.0124)
Khanewal	-	-	-
Vehari	0.0129 (0.00841)	0.0298*** (0.0112)	0.0858*** (0.0184)
Sahiwal	-0.00168 (0.00853)	-0.00265 (0.00996)	-0.00446 (0.0131)
Pakpattan	0.0310** (0.0124)	0.0361** (0.0144)	0.0412** (0.0179)
Okara	0.00925 (0.00831)	0.00611 (0.0100)	0.0248* (0.0144)
RWP	0.00963 (0.00662)	0.00675 (0.00779)	0.0272** (0.0126)
Attock	-	-	-
Chakwal	-0.00861 (0.00646)	-0.0148* (0.00857)	-0.000815 (0.0137)
Jhelum	-0.0122** (0.00525)	-0.0226*** (0.00652)	-0.0151 (0.0105)

MODEL I	(1)	(2)	(3)
VARIABLES			
Dependent Variable:	Age 18-30	Age 31-40	Age > 40
Self-employed = 1			
Sarghoda	0.00540 (0.00715)	0.0260*** (0.00911)	0.0336*** (0.0128)
Bhakkar	0.00341 (0.00931)	0.0214* (0.0123)	0.0207 (0.0146)
Khushab	-	-	-
Layyah	-0.0284*** (0.00513)	-0.0405*** (0.00619)	-0.0374*** (0.00847)
Hafizabad	-0.0229*** (0.00551)	-0.0240*** (0.00836)	-0.0301*** (0.00963)
Urban	-0.0138*** (0.00158)	-0.0226*** (0.00247)	-0.0412*** (0.00364)
Year 2014	0.00462 (0.00370)	0.000662 (0.00747)	0.00338 (0.00989)
Constant	0.0306*** (0.0106)	0.0728* (0.0397)	-0.131 (0.197)
Observations	45,034	47,209	26,093
R-squared	0.031	0.036	0.055

Note: Estimation includes dummy variables for gender of the first two children born (Boy first & Boy second), mother's education measured on a 12-point scale (1-12), household head's education, dummies for wealth quintiles, all 36 districts, region, and year. Instrument Variable: Same sex (1 = yes)

Omitted: mother's age, squared age, dummies of age brackets.

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7: The impact of women's self-employment status on children (2SLS), across three age brackets

VARIABLES	(1)	(2)	(3)
Dependent Variable:	Age 18-30	Age 31-40	Age > 40
More than two = 1			
Self-employed	0.980* (0.551)	0.832*** (0.213)	-0.0342 (0.139)
Total fertility rate across districts	-0.00995 (0.00939)	0.00142 (0.00538)	0.00706* (0.00369)
Mother's education	-0.0157*** (0.000749)	-0.00740*** (0.000284)	-0.00378*** (0.000316)
HH's education	0.00554*** (0.000717)	0.000426 (0.000271)	-0.000369 (0.000267)
Wealth 2	0.00163 (0.0150)	0.0101*** (0.00339)	0.00157 (0.00259)
Wealth 3	0.00582 (0.0217)	0.0245*** (0.00611)	-0.00178 (0.00382)

VARIABLES	(1)	(2)	(3)
Dependent Variable:	Age 18-30	Age 31-40	Age > 40
More than two = 1			
Wealth 4	-0.0156 (0.0232)	0.0300*** (0.00945)	0.00457 (0.00501)
Wealth 5	-0.0508** (0.0221)	0.0105 (0.00801)	0.00215 (0.00580)
Bahawalpur	0.0375** (0.0154)	0.0207*** (0.00639)	-0.000622 (0.00557)
B.Nagar	0.0744*** (0.0209)	0.0466*** (0.00999)	-0.00959 (0.00779)
RY.Khan	0.0683*** (0.0163)	0.0374*** (0.00732)	-0.000768 (0.00609)
DG.Khan	0.0949*** (0.0241)	0.0630*** (0.0125)	-0.0105 (0.0102)
M.Garh	0.0654*** (0.0207)	0.0358*** (0.0101)	-0.00732 (0.00859)
Rajanpur	0.0882*** (0.0240)	0.0459*** (0.0127)	-0.00123 (0.0114)
Faisalabad	-0.00646 (0.0236)	-0.0623*** (0.0163)	0.00152 (0.0136)
Jhang	-	-	-
TT.Singh	-0.0201 (0.0395)	-0.0406** (0.0169)	-0.0107 (0.0209)
Gujranwala	0.100*** (0.0123)	0.0422*** (0.00678)	0.00117 (0.00631)
Gujrat	-0.00350 (0.0165)	0.0110 (0.00707)	-0.0149 (0.0132)
M.Bahauddin	0.0283 (0.0211)	-0.000971 (0.00778)	-0.0138* (0.00805)
Narowal	0.0624*** (0.0165)	0.0352*** (0.00719)	-0.00784 (0.00696)
Sialkot	0.0798*** (0.0149)	0.0255*** (0.00581)	-0.00102 (0.00627)
Lahore	0.0796*** (0.0130)	0.0229*** (0.00568)	-0.00496 (0.00601)
Kasur	0.0949*** (0.0177)	0.0259*** (0.00892)	-0.00701 (0.00841)
N.Sahib	0.0772*** (0.0147)	0.0184*** (0.00704)	-0.0159** (0.00677)
Sheikhupura	0.0799*** (0.0147)	0.0238*** (0.00632)	0.00472 (0.00674)
Multan	0.0396*** (0.0119)	0.00945 (0.00616)	-0.00485 (0.00741)
Vehari	-0.00374 (0.0158)	-0.0357*** (0.0113)	-0.0159 (0.0118)
Sahiwal	0.00789 (0.0163)	-0.00464 (0.00775)	-0.0135* (0.00775)

VARIABLES	(1)	(2)	(3)
Dependent Variable:	Age 18-30	Age 31-40	Age > 40
More than two = 1			
Pakpattan	0.0259 (0.0289)	-0.0179 (0.0131)	-0.00900 (0.0107)
Okara	0.0197 (0.0150)	0.00282 (0.00776)	-0.00441 (0.00796)
RWP	-0.0477*** (0.0122)	-0.0366*** (0.00577)	-0.0222*** (0.00607)
Chakwal	-0.0392* (0.0215)	-0.0285*** (0.00940)	-0.0331*** (0.00828)
Jhelum	0.0111 (0.0194)	0.00973 (0.00893)	2.34e-07 (0.00807)
Sarghoda	0.00869 (0.0138)	-0.0236*** (0.00915)	-0.00925 (0.00744)
Bhakkar	-0.0478*** (0.0159)	-0.0442*** (0.00904)	-0.00943 (0.00700)
Layyah	0.0423* (0.0225)	0.0347*** (0.00989)	-0.00468 (0.00878)
Hafizabad	0.0983*** (0.0228)	0.0370*** (0.0104)	-0.0180* (0.0105)
Urban	0.0363*** (0.0102)	0.0301*** (0.00589)	-0.000138 (0.00666)
Year 2014	-0.176*** (0.00606)	-0.0806*** (0.00346)	-0.0298*** (0.00256)
Constant	0.701*** (0.0551)	0.884*** (0.0277)	0.966*** (0.0167)
Observations	69,894	93,016	44,303
R-squared	0.046	0.031	0.013

Note: Estimation includes total fertility rate across districts, mother's education measured on a 12-point scale (1-12), household head's education, and dummies for wealth quintiles, all 36 districts, region, and year. Instrument Variable: Number of SE females across districts
Omitted: mother's age, squared age, dummies of age brackets.

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 8: Subsets of women with No-Education versus Education (2SLS results reported), across both models.

VARIABLES	Model I		Model II	
	(1)	(2)	(1)	(2)
Dependent Variables:	No Education	Education	No Education	Education
Self-employed = 1				
More than two = 1				
More than two	0.0446 (0.0403)	0.0336 (0.0236)	-	-
Self-employed	-	-	-0.0772 (0.322)	1.058*** (0.400)

VARIABLES	Model I		Model II	
	(1)	(2)	(1)	(2)
Dependent Variables:	No Education	Education	No Education	Education
Self-employed = 1				
More than two = 1				
Boy first	-0.00107 (0.00212)	0.000603 (0.00163)	-	-
Boy second	-0.00146 (0.00202)	-0.00122 (0.00152)	-	-
Mother's Age	0.00348 (0.00352)	-0.00282 (0.00251)	0.0860*** (0.00345)	0.108*** (0.00168)
Squared Age	-5.08e-05 (3.23e-05)	4.70e-05 (2.89e-05)	-0.000802*** (3.81e-05)	-0.00109*** (2.25e-05)
Age18_30	-0.0412* (0.0221)	0.0119* (0.00620)	0.0547 (0.0433)	-0.147*** (0.0372)
Age31_35	-0.0433* (0.0232)	0.0152** (0.00740)	-0.0103 (0.0461)	-0.196*** (0.0380)
Age36_40	-0.0334 (0.0248)	0.0171* (0.00884)	-0.122*** (0.0466)	-0.288*** (0.0385)
Age > 40	-0.0237 (0.0269)	0.00993 (0.0113)	-0.222*** (0.0473)	-0.369*** (0.0391)
HH's education	0.000329 (0.000349)	0.000287 (0.000241)	-0.000134 (0.000430)	-0.000354 (0.000371)
Wealth 2	-0.0134*** (0.00374)	-0.00614 (0.00712)	-0.00894 (0.00551)	0.000323 (0.00682)
Wealth 3	-0.0308*** (0.00379)	-0.0192*** (0.00668)	-0.0151 (0.0103)	-0.00625 (0.00912)
Wealth 4	-0.0395*** (0.00406)	-0.0320*** (0.00666)	-0.0215* (0.0130)	-0.0244* (0.0136)
Wealth 5	-0.0353*** (0.00474)	-0.0317*** (0.00696)	-0.0291** (0.0122)	-0.0617*** (0.0138)
Bahawalpur	-0.0143** (0.00614)	0.000530 (0.00637)	0.00510 (0.0102)	0.0239** (0.00974)
BNagar	-0.0433*** (0.00491)	-0.0210*** (0.00439)	0.00260 (0.0179)	0.0808*** (0.0149)
RYKhan	-0.0185*** (0.00562)	-0.0115** (0.00486)	0.00925 (0.0114)	0.0682*** (0.0121)
DGKhan	-0.0444*** (0.00495)	-0.0137** (0.00552)	0.0164 (0.0199)	0.105*** (0.0185)
Mgarh	-0.0340*** (0.00528)	-0.00815 (0.00525)	0.0150 (0.0158)	0.0684*** (0.0160)
Rajanpur	-0.0299*** (0.00645)	-0.0141** (0.00603)	0.0181 (0.0175)	0.125*** (0.0219)
Faisalabad	0.110*** (0.00884)	0.0294*** (0.00550)	0.0201 (0.0394)	-0.0217 (0.0133)
Jhang	-	-	-	-
TTsingh	0.137*** (0.0164)	0.0205*** (0.00791)	0.0224 (0.0511)	0.000399 (0.0129)
Gujranwala	-0.0252*** (0.00490)	-0.00801* (0.00458)	0.0191* (0.0111)	0.0606*** (0.00932)

VARIABLES	Model I		Model II	
	(1)	(2)	(1)	(2)
Dependent Variables:	No Education	Education	No Education	Education
Self-employed = 1				
More than two = 1				
Gujrat	0.0446*** (0.0130)	0.0116* (0.00606)	-0.0172 (0.0184)	0.000407 (0.00883)
MBahauddin	-0.0147* (0.00888)	-0.00536 (0.00625)	-0.0199 (0.0130)	0.00540 (0.0114)
Narowal	-0.0120 (0.00754)	-0.0127** (0.00514)	-0.00763 (0.0105)	0.0440*** (0.0121)
Sialkot	0.00297 (0.00843)	-0.00230 (0.00514)	0.0156* (0.00876)	0.0297*** (0.00865)
Lahore	-0.0194*** (0.00499)	0.000925 (0.00454)	0.0274** (0.0109)	0.0238*** (0.00779)
Kasur	-0.0206*** (0.00589)	-0.00824 (0.00578)	0.0152 (0.0131)	0.0879*** (0.0147)
NSahib	-0.00965 (0.00762)	-0.00183 (0.00646)	0.0119 (0.00945)	0.0384*** (0.0103)
Sheikhupura	-0.0163*** (0.00605)	0.000359 (0.00593)	0.0214** (0.00983)	0.0454*** (0.00940)
Multan	0.00914 (0.00704)	0.000774 (0.00519)	0.0201** (0.00949)	0.0338*** (0.00941)
Vehari	0.0531*** (0.0100)	0.00637 (0.00732)	-0.0153 (0.0206)	0.0195* (0.0116)
Sahiwal	-0.000245 (0.00974)	-0.00637 (0.00601)	-0.00939 (0.0109)	-0.00401 (0.0124)
Pakpattan	0.0507*** (0.0129)	0.00780 (0.00884)	0.0162 (0.0229)	0.0511*** (0.0155)
Okara	0.00822 (0.00816)	0.0164** (0.00830)	0.00271 (0.0104)	0.0157 (0.0131)
RWP	0.00193 (0.00793)	0.0158*** (0.00580)	-0.0145 (0.00949)	-0.0679*** (0.00841)
Attock	-	-	-	-
Chakwal	-0.0171* (0.00936)	-0.00650 (0.00584)	-0.0748*** (0.0186)	-0.0419*** (0.0125)
Jhelum	-0.0275*** (0.00745)	-0.0137*** (0.00488)	-0.0320* (0.0181)	0.0168 (0.0130)
Sarghoda	0.0311*** (0.00849)	0.00818 (0.00620)	0.00961 (0.0148)	0.00294 (0.0100)
Bhakkar	0.0155* (0.00896)	0.0151 (0.0103)	-0.0252** (0.0111)	-0.0364*** (0.0138)
Layyah	-0.0464*** (0.00498)	-0.0158*** (0.00494)	-0.00646 (0.0181)	0.0441*** (0.0135)
Hafizabad	-0.0340*** (0.00668)	-0.0149*** (0.00516)	0.00740 (0.0155)	0.0710*** (0.0163)
Urban	-0.0360*** (0.00223)	-0.0125*** (0.00173)	0.00266 (0.0127)	0.0238*** (0.00727)
Year 2014	0.00991** (0.00495)	-0.00851** (0.00429)	-0.0751*** (0.00558)	-0.111*** (0.00678)

VARIABLES	Model I		Model II	
	(1)	(2)	(1)	(2)
Dependent Variables:	No Education	Education	No Education	Education
Self-employed = 1				
More than two = 1				
Total fertility rate across districts	-	-	0.00267 (0.00791)	-0.0226*** (0.00774)
Constant	0.0137 (0.0466)	0.0525* (0.0308)	-1.018*** (0.0542)	-1.256*** (0.0491)
Observations	61,080	57,473	115,340	92,155
R-squared	0.058	0.021	0.208	0.211

Note: Estimation includes dummy variables for gender of the first two children born (Boy first & Boy second), total fertility rate across districts, mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head's education, and dummies for wealth quintiles, all 36 districts, region, and year. Omitted: mother's full time years of education, measured on a 12-point scale.

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 9: Subsets of women from Urban versus Rural regions (2SLS results reported), across both models.

VARIABLES	Model I		Model II	
	(1)	(2)	(1)	(2)
Dependent Variables:	Urban	Rural	Urban	Rural
Self-employed = 1				
More than two = 1				
More than two	0.0129 (0.00134)	0.0548* (0.00208)	-	-
Self-employed	-	-	5.357** (2.133)	0.311 (0.189)
Boy second	-0.00133 (0.00132)	-0.00127 (0.00192)		
Mother's Age	-0.000141 (0.00217)	0.00196 (0.00300)	0.0907*** (0.00327)	0.0894*** (0.00177)
Squared Age	4.59e-06 (2.08e-05)	-3.62e-05 (2.81e-05)	-0.000889*** (2.81e-05)	-0.000835*** (2.07e-05)
Mother's education	0.000779** (0.000328)	-0.00136*** (0.000462)	-0.0116*** (0.000897)	-0.00853*** (0.000541)
Age18_30	-0.000792 (0.00324)	-0.0278 (0.0182)	0.0372 (0.0489)	-0.0121 (0.0218)
Age31_35	0.00425 (0.00487)	-0.0284 (0.0193)	-0.0335 (0.0486)	-0.0677*** (0.0230)
Age36_40	0.00508 (0.00626)	-0.0143 (0.0209)	-0.118** (0.0492)	-0.188*** (0.0230)
Age > 40	0.00124 (0.00834)	0.000226 (0.0230)	-0.206*** (0.0509)	-0.299*** (0.0231)
HH's education	-2.68e-05 (0.000205)	0.000149 (0.000336)	0.00128*** (0.000360)	0.00196*** (0.000280)

VARIABLES	Model I		Model II	
	(1)	(2)	(1)	(2)
Dependent Variables:				
Self-employed = 1	Urban	Rural	Urban	Rural
More than two = 1				
Wealth 2	-0.0186*** (0.00676)	-0.0124*** (0.00367)	0.0723** (0.0341)	-0.00220 (0.00347)
Wealth 3	-0.0207*** (0.00660)	-0.0320*** (0.00378)	0.0869** (0.0393)	-0.00374 (0.00658)
Wealth 4	-0.0219*** (0.00660)	-0.0470*** (0.00416)	0.0764* (0.0402)	-0.0150 (0.00930)
Wealth 5	-0.0230*** (0.00668)	-0.0436*** (0.00502)	0.0542 (0.0401)	-0.0269*** (0.00891)
Bahawalpur	0.0171** (0.00694)	-0.0234*** (0.00602)	-0.0425 (0.0273)	0.0187** (0.00780)
BNagar	-0.0157*** (0.00417)	-0.0468*** (0.00513)	0.132*** (0.0402)	0.0347*** (0.0111)
RYKhan	-0.00867** (0.00434)	-0.0216*** (0.00600)	0.0838*** (0.0216)	0.0295*** (0.00770)
DGKhan	-0.00976* (0.00537)	-0.0499*** (0.00505)	0.159*** (0.0312)	0.0327** (0.0131)
Mgarh	-0.0114*** (0.00411)	-0.0366*** (0.00588)	0.120*** (0.0374)	0.0404*** (0.0102)
Rajanpur	-0.00823 (0.00598)	-0.0335*** (0.00684)	0.129*** (0.0259)	0.0377*** (0.0121)
Faisalabad	-0.00657 (0.00404)	0.124*** (0.00856)	0.0604*** (0.0190)	-0.0324 (0.0257)
Jjhang	-	-	-	-
TTsingh	-0.00853 (0.00539)	0.124*** (0.0137)	0.0727*** (0.0193)	-0.0307 (0.0276)
Gujranwala	-0.00830** (0.00416)	-0.0173*** (0.00529)	0.0786*** (0.0190)	0.0445*** (0.00698)
Gujrat	-0.00897* (0.00485)	0.0417*** (0.00854)	0.0557** (0.0253)	-0.00679 (0.00976)
MBahauddin	-0.00677 (0.00642)	-0.00782 (0.00760)	0.00759 (0.0134)	-0.00334 (0.00838)
Narowal	-0.0131*** (0.00451)	-0.00732 (0.00654)	0.0916*** (0.0309)	0.0143** (0.00700)
Sialkot	-0.0107** (0.00451)	0.00911 (0.00688)	0.0796*** (0.0264)	0.0257*** (0.00609)
Lahore	-0.00623 (0.00402)	-0.0230*** (0.00544)	0.0567*** (0.0151)	0.0492*** (0.00889)
Kasur	-0.00284 (0.00540)	-0.0243*** (0.00620)	0.0882*** (0.0194)	0.0335*** (0.00912)
NSahib	-0.0107** (0.00494)	-0.00124 (0.00784)	0.0849*** (0.0230)	0.0193*** (0.00706)
Sheikhupura	0.00294 (0.00590)	-0.0155** (0.00637)	0.000558 (0.00962)	0.0500*** (0.00729)
Multan	-0.00841** (0.00415)	0.0145* (0.00780)	0.0804*** (0.0200)	0.0101 (0.00705)
Khanewal	-	-	-	-

VARIABLES	Model I		Model II	
	(1)	(2)	(1)	(2)
Dependent Variables: Self-employed = 1 More than two = 1	Urban	Rural	Urban	Rural
Vehari	0.00788 (0.00677)	0.0538*** (0.0105)	-0.0373** (0.0150)	-0.0168 (0.0125)
Sahiwal	-0.0113** (0.00493)	0.00194 (0.00912)	0.0638** (0.0293)	-0.0112 (0.00787)
Pakpattan	-0.00186 (0.00685)	0.0592*** (0.0138)	0.0701*** (0.0168)	-0.00133 (0.0156)
Okara	-0.00487 (0.00539)	0.0202** (0.00919)	0.0654*** (0.0206)	0.00255 (0.00821)
RWP	-0.00770* (0.00425)	0.0272*** (0.00724)	0.0298 (0.0220)	-0.0484*** (0.00699)
Attock	-	-	-	-
Chakwal	-0.00780 (0.00587)	-0.00494 (0.00700)	0.00976 (0.0244)	-0.0436*** (0.00876)
Jhelum	-0.00181 (0.00672)	-0.0201*** (0.00530)	0.0279 (0.0177)	-0.000740 (0.00907)
Sarghoda	0.00549 (0.00594)	0.0309*** (0.00802)	-0.0114 (0.0114)	-0.00281 (0.00904)
Bhakkar	-0.00354 (0.00669)	0.0261*** (0.00972)	-0.00630 (0.0132)	-0.0340*** (0.00845)
Khushab	-	-	-	-
Layyah	-0.0120*** (0.00422)	-0.0418*** (0.00518)	0.0683** (0.0326)	0.0213** (0.0104)
Hafizabad	-0.00506 (0.00667)	-0.0419*** (0.00580)	0.0245* (0.0128)	0.0390*** (0.0129)
Year 2014	-0.00143 (0.00358)	0.0125*** (0.00468)	-0.0834*** (0.00664)	-0.0839*** (0.00314)
Total fertility rate across districts			-0.0286*** (0.00853)	0.00258 (0.00461)
Constant	0.0226 (0.0281)	0.0201 (0.0391)	-1.147*** (0.0563)	-1.069*** (0.0280)
Observations	47,692	70,861	80,583	126,912
R-squared	0.008	0.058	0.223	0.228

Note: Estimation includes dummy variables for gender of the first two children born (Boy first & Boy second), total fertility rate across districts, mother's education measured on a 12-point scale (1-12), mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head's education, and dummies for wealth quintiles, all 36 districts, and year. Omitted: regional dummy (urban). Robust standard errors in parentheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 10: Subsets of women from Low versus High Wealth Quintiles (2SLS results reported), across both models.

VARIABLES	Model I		Model II	
	(1)	(2)	(1)	(2)
Dependent Variables:				
Self-employed = 1	Low Wealth	High Wealth	Low Wealth	High Wealth
More than two = 1				
More than two	0.0405 (0.00221)	0.0428** (0.00143)		
Self-employed			0.212 (0.143)	-0.281 (0.382)
Boy second	-0.000715 (0.00207)	-0.00182 (0.00131)		
Mother's Age	0.00350 (0.00347)	-0.00212 (0.00204)	0.0899*** (0.00228)	0.101*** (0.00293)
Squared Age	-4.76e-05 (3.21e-05)	1.79e-05 (1.99e-05)	-0.000840*** (2.55e-05)	-0.000976*** (3.43e-05)
Mother's education	-0.00151*** (0.000480)	0.000572* (0.000316)	-0.00751*** (0.000617)	-0.0107*** (0.000461)
Age18_30	-0.0384** (0.0195)	0.00874* (0.00451)	0.00518 (0.0379)	-0.0608 (0.0640)
Age31_35	-0.0392* (0.0207)	0.0126** (0.00580)	-0.0614 (0.0396)	-0.0946 (0.0656)
Age36_40	-0.0277 (0.0227)	0.0175** (0.00714)	-0.181*** (0.0404)	-0.194*** (0.0666)
Age > 40	-0.0208 (0.0252)	0.0227** (0.00910)	-0.290*** (0.0413)	-0.298*** (0.0675)
HH's education	-0.000675* (0.000355)	0.000142 (0.000208)	0.00162*** (0.000469)	0.000668 (0.000552)
Bahawalpur	-0.00703 (0.00593)	0.0117 (0.00727)	0.0191** (0.00870)	0.00519 (0.0161)
BNagar	-0.0340*** (0.00501)	-0.0180*** (0.00353)	0.0317** (0.0125)	0.0108 (0.0243)
RYKhan	-0.0167*** (0.00578)	-0.00740* (0.00429)	0.0279** (0.0112)	0.00981 (0.0201)
DGKhan	-0.0395*** (0.00487)	-0.0102* (0.00567)	0.0340** (0.0173)	0.0476 (0.0336)
Mgarh	-0.0265*** (0.00523)	-0.00807 (0.00510)	0.0285* (0.0147)	0.0115 (0.0309)
rajanpur	-0.0237*** (0.00627)	-0.000274 (0.00905)	0.0415** (0.0175)	0.0289 (0.0391)
Faisalabad	0.108*** (0.00884)	0.0215*** (0.00453)	-0.0140 (0.0193)	0.0124 (0.0128)
Jhang	-	-	-	-
TTsingh	0.137*** (0.0158)	0.00154 (0.00558)	-0.0136 (0.0252)	0.00951 (0.0146)
Gujranwala	-0.0391*** (0.00574)	-0.00764** (0.00358)	0.0501*** (0.00998)	0.0190 (0.0132)

VARIABLES	Model I		Model II	
	(1)	(2)	(1)	(2)
Dependent Variables:				
Self-employed = 1	Low Wealth	High Wealth	Low Wealth	High Wealth
More than two = 1				
Gujrat	0.0373*** (0.0130)	0.0113** (0.00541)	0.00420 (0.0140)	-0.0128 (0.0124)
MBahauddin	-0.0186** (0.00817)	-0.00173 (0.00591)	-0.00440 (0.0129)	-0.0191 (0.0166)
Narowal	-0.0202*** (0.00647)	-0.00588 (0.00512)	0.00359 (0.0105)	0.0190 (0.0167)
Sialkot	-0.00314 (0.00883)	-0.00267 (0.00438)	0.0198** (0.00920)	0.0138 (0.0122)
Lahore	-0.0474*** (0.00553)	-0.00188 (0.00361)	0.0555*** (0.0124)	0.0136 (0.0106)
Kasur	-0.0260*** (0.00598)	-0.00202 (0.00527)	0.0297** (0.0131)	0.0280 (0.0246)
NSahib	-0.0100 (0.00801)	-0.00446 (0.00479)	0.0295*** (0.00930)	0.00453 (0.0161)
Sheikhupura	-0.0278*** (0.00702)	0.00186 (0.00495)	0.0482*** (0.00990)	0.00892 (0.0131)
Multan	0.00899 (0.00770)	-0.000395 (0.00416)	0.0200** (0.00944)	0.0145 (0.0140)
Khanewal	-	-	-	-
Vehari	0.0472*** (0.00983)	0.0103 (0.00665)	-0.00951 (0.0129)	-0.0247 (0.0189)
Sahiwal	-0.00208 (0.00958)	-0.00628 (0.00449)	-0.00532 (0.0115)	-0.0256 (0.0186)
Pakpattan	0.0482*** (0.0120)	0.00349 (0.00788)	0.00890 (0.0169)	0.0232 (0.0254)
Okara	0.0186** (0.00875)	-0.00239 (0.00519)	0.00163 (0.0112)	0.0140 (0.0187)
RWP	0.0330*** (0.00953)	-0.00294 (0.00382)	-0.0545*** (0.0116)	-0.0381*** (0.0121)
o.Attock	-	-	-	-
Chakwal	-0.0212*** (0.00779)	-0.00148 (0.00541)	-0.0467*** (0.0149)	-0.0459** (0.0184)
Jhelum	-0.0389*** (0.00555)	-0.00368 (0.00499)	-0.000733 (0.0144)	-0.0241 (0.0169)
Sarghoda	0.0243*** (0.00762)	0.0128** (0.00610)	0.000248 (0.0106)	-0.00403 (0.0156)
Bhakkar	0.0218*** (0.00822)	0.00663 (0.00996)	-0.0292*** (0.0103)	-0.0255 (0.0260)
Khushab	-	-	-	-
Layyah	-0.0407*** (0.00484)	-0.0165*** (0.00487)	0.00778 (0.0120)	-0.0120 (0.0229)
Hafizabad	-0.0356*** (0.00651)	-0.00840* (0.00478)	0.0285** (0.0137)	0.00942 (0.0264)

VARIABLES	Model I		Model II	
	(1)	(2)	(1)	(2)
Dependent Variables:				
Self-employed = 1	Low Wealth	High Wealth	Low Wealth	High Wealth
More than two = 1				
Urban	-0.0387*** (0.00210)	-0.0125*** (0.00170)	0.0160** (0.00661)	-0.000278 (0.00726)
Yea 2014	-0.00806 (0.00549)	0.0164*** (0.00428)	-0.0951*** (0.00638)	-0.0676*** (0.0113)
Total fertility rate across districts			0.00264 (0.00837)	0.00109 (0.0150)
Constant	-0.000543 (0.0448)	0.0215 (0.0252)	-1.083*** (0.0512)	-1.233*** (0.0912)
Observations	65,427	53,126	123,174	84,321
R-squared	0.052	0.011	0.227	0.221

Note: Estimation includes dummy variables for gender of the first two children born (Boy first & Boy second), total fertility rate across districts, mother's education measured on a 12-point scale (1-12), mother's age, squared age, age brackets (Age 18-30, 31-35, 36-40, >40), household head's education, all 36 districts, region, and year. Omitted: wealth quintiles.

Robust standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

References

- Angrist, J. D. (2001). Estimation of limited dependent variable models with dummy endogenous regressors: Simple strategies for empirical practice. *Journal of Business and Economic Statistics*, 79(1), 2-16.
- 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.
- Arai, A. B. (2000). Self-employment as a response to the double day for women and men in Canada. *Canadian Review of Sociology/Revue Canadienne De Sociologie*, 37(2), 125-142.
- Bernhardt, E. M. (1993). Fertility and employment. *European sociological review*, 9(1), 25-42.
- Boden, R. J., Jr. (1999). Flexible working hours, family responsibilities, and female self-employment. *American Journal of Economics and Sociology*, 58(1), 71-83
- Broussard, N. H., Chami, R., & Hess, G. D. (2013). (Why) do self-employed parents have more children? *Review of Economics of the Household*. doi:10.1007/s11150-013-9190-0.
- Connelly, R. (1992). Self-employment and providing child care. *Demography*, 29(1), 17-29.
- Cramer, J. A. C. (1980). Fertility and female employment: Problems of causal direction. *American Sociological Review*, 45(2), 167-190.
- Hundley, G. (2000). Male/female earnings differences in self-employment: The effects of marriage, children, and the household division of labor. *Industrial and Labor Relations Review*, 54(1), 95-114.
- Khan, R. E. A., & Khan, T. (2009). Labor force participation of married women in Punjab (Pakistan). *Journal of Economic and Social research*, 11(2), 77-106.
- Lombard, K. V. (2001). Female self-employment and demand for flexible, nonstandard work schedules. *Economic Inquiry*, 39(2), 214-237.
- MacPherson, D. A. (1988). Self-employment and married women. *Economics Letters*, 28(3), 281-284.

McManus, P. A. (2001). Pathways into self-employment in the United States and Germany. *Vierteljahrshefte Zur Wirtschaftsforschung (Quarterly Journal of Economic Research)*, 70(1), 24-30.

Noseleit, F. (2014a). Female self-employment and children. *Small Business Economics*, 43(3), 549–569.

Wellington, A. J. (2006). Self-employment: The new solution for balancing family and career? *Labour Economics*, 13(3), 357–386.

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Innovation and Technology Centre,
The Lahore School of Economics,
Intersection of Main Boulevard, Burki Road,
Phase VI, DHA, Lahore 53200, Pakistan
Tel: +92-(0)42-3656-0969
URL: <https://itc.lahoreschool.edu.pk>
Email: ayeshakh@lahoreschool.edu.pk