Does Age at First and Current Marriage Cause Long-term Female Entrepreneurship? Evidence from Nigeria

EFOBI Uchenna
College of Business and Social Sciences, & Centre for Economic Policy and Development Research (CEPDeR), Covenant University, Ota, Nigeria; Research Fellow - Merian Institute for Advanced Studies in Africa (MIASA), University of Ghana
uche.efobi@covenantuniversity.edu.ng
+234-8036273494

ADEJUMO .O. Oluwabunmi
Institute for Entrepreneurship and Development Studies,
Obafemi Awolowo University, Ile-Ife; Centre for Economic Policy and Development Research (CEPDeR), Nigeria
jumobum@gmail.com
+234-8140322823

ATATA .N., Scholastica
Department of Communication and General Studies
Federal University of Agriculture, Abeokuta Nigeria
atatasn@funaab.edu.ng.com
+2348037473712

Abstract
The age at the first and current marriage matters in determining long-term economic empowerment, and economic outcome of women. The empirical literature suggest that women who marry at early ages experience forgone resources, lost knowledge and skills from low human capital development, health issues, lost earnings from lost time to early marriages and even exclusion from labour market participation. Given the consequences of age at which women enter into marriage, this paper relies on the 2008 and 2013 survey of the Nigerian Demographic and Health Survey, and an instrumental variable estimation strategy to identify the causal effect of the age of a woman at entry into her first and current marriage on the indicators of entrepreneurship. The result shows that at the mean entrepreneurship rate of 80.4 percent, the likelihood of engaging in entrepreneurship for women who marry at older age is about 6 percent. Further, women who marry at older age are more likely to be more intense in their self-employed work by a magnitude of about 18.6 or 5.1 percent. These results do not exhibit any heterogeneous patterns across the location of the household of the sampled women. This paper therefore contribute to the broader debate on understanding the long-term consequences of child marriage, which is relevant for enacting policies that could be helpful for sustainable development in the region.

Keywords: Bargaining power; Child marriage; Empowerment; Entrepreneurship; Nigeria; Sexuality

1. Introduction

Economic empowerment of women includes access to economic resources and the full and effective participation of women in making economic decisions that affect their lives (Yount, Crandall, and Cheong, 2018). The actualization of economic empowerment is embedded in Sustainable Development Goals 5, and its resulting outcome includes women's ability to engage in entrepreneurship, and the intensity of such engagement (see Ajefu, 2019). Despite the importance of economic empowerment for women, one likely issue that could derail its attainment is the age at which women enter into marriage relationships, especially in Africa where patriarchy and male dominance prevails in most socio-economic setups. As noted, early entry into marriage has human development, economic, and social cost, which could have negative impact on the long-term empowerment of the woman (see Dahl, 2005; Dixon-Mueller, 2009; Field and Ambrus, 2008; Yount, Crandall, and Cheong, 2018)

A key question, therefore, is whether or not the age of the woman at first and current marriage drives the extent of long-term participation in entrepreneurship, and if so, are there heterogeneous effect in the relationship, and through what channels is the effect seen. Two possible channels are the resulting change in bargaining power and empowerment, induced by the forgone actions that could have been directed towards human development efforts of women as a result of early marriage. Women who marry at early ages resort to increasing childbirth, forgone schooling, and limited social network that could have been developed assuming they did not enter into marriage at early ages, which alters the broader bargaining power and empowerment of women in the society (Duflo, 2012).

This paper examines these issues using data from the 2008 and 2013 Demographic and Health Survey for Nigeria, where, as in some other developing countries, have strong cultural, religious, and social acceptance of specific expectations of how and when women should enter into marriage relationships. While relying on this data, and an instrumental variable estimation technique, this study shows that: first, early entry into marriage by women has a significant negative impact on the long-term likelihood of engaging in entrepreneurship and the intensity of such engagement. This result was even found to be consistent when invoking the Inverse Probability Weighting (IPW) and Propensity Score Matching (PSM) estimators. Second, the established effect does not exhibit any heterogeneous pattern across the location of the household of the sampled women. In essence, the same effect was found for women who dwell in rural and urban locations. Third, some potential channels through which the effect is seen include increase fertility, low education attainment of the woman and her spouse, and excessive control and domestic abuse by spouse, which we found to be consistent for women who marry at a younger age.

The relevance of the findings of this paper is underscored by the low evidence of the long-term economic consequences of age of women in marriage in developing countries, especially those societies with strong socio-cultural expectations of the role of women. More so, the issue of early marriage of women (i.e. marrying at teenage age) is one harmful practice that is embedded in the Sustainable Development Goals 5, considering that in Nigeria, for instance, an estimated 22 million child brides currently exist, and which accounts for about 40 percent of all child brides in the West and Central African region (see UNICEF, 2018). Therefore, understanding the long-

term consequences of this trend will be relevant for enacting policies that could be helpful for sustainable development in the region.

This paper extends existing literature by examining the impact of age of the woman at her first and current marriage on economic engagement and the mechanism through which these effects are seen, including early marriage increases fertility rate, reduces educational attainment of the woman, increases domestic abuse and excessive control of spouse over the woman. Recent works that have focused on the determinant and consequences of age at first marriage include Cislaghi (2019), and Schaffnit, Urassa, and Lawson (2019) on social norms and attitudes towards child marriage in Cameroon and Tanzania; prevention of child marriage Rasmussen et al (2019) and Santelli et al (2019); the link between child marriage and domestic abuse (Nasrullah et al, 2014; Tenkorang, 2019); age of marriage and its impact on women and their childhood development (Erulkar, 2013; Sekhri, and Debnath, 2014; Chari, Heath, Maertens, and Fatima, 2017; Efevbera et al, 2017), among others. These studies make important contribution in the area of age of women at their current marriage, without considering the effect on their long-term economic outcomes. Another group of studies specifically focus on the economic engagement of women as a result of age at first and current marriage, including Herrera, Sahn, and Villa (2019) who finds from the longitudinal data of Madagascar that teenage motherhood increases the probability of employment, but mostly in low-quality informal jobs. Further, Delprato et al (2015) relate age at first and current marriage on schooling outcomes in SSA and South West Asia.

Those studies that explore the marriage entry and economic outcome of women include Chiappori, Dias, and Meghir (2018) who concludes that marriage thus has the dual role of providing public goods and offering risk sharing, and as a result yields some economic value to women. Recent evidence by Dahl (2010), and Wang and Wang (2017) focus on similar issue based on data from women in developed countries, and conclude that delayed marriage raises the earnings of women in the long-run. The entrepreneurship concept proposed in this paper is more specific to understanding economic activities of women vis-à-vis the age of entry into marriage, and the evidence from Nigeria adds to the budding literature on the consequences of early marriages among women in developing countries.

Finally, studies of this nature have noted that age at first and current marriage is not entirely exogenous, and is most likely encumbered with endogeneity concerns (see Dahl, 2010; Wang and Wang, 2017). This paper therefore introduces an instrument that reflects the stereotypical conditions of early sexuality of individuals within the neighborhood of the household of the sampled women. This instrument is embedded in the socio-cultural and religious framework of countries in developing countries, and how they perceive individuals from locations with high teenage sexuality. Tangentially, the instrument that was used and tested in this paper aligns with the argument of Lee-Rife *et al.* (2012) and Khanna *et al*. (2013) that argues that as a result of preventing teenage sexual activities due to the high price that is placed on virginity in the context of developing countries, women tend to get married at early ages in locations where the probability of engaging in teenage sexual activities is high. Our identification strategy aligns with this argument, and uses the cluster average of teenage sexual activities by boys in the location of the household of the sampled woman as an instrument.

The rest of the paper proceeds as follows: the second section provides a brief background on female age at marriage in Nigeria and some issues on entrepreneurship. The third section describes the data used and the empirical methodology that was applied. The fourth section outlines the empirical results, which were discussed in the fifth section, including the mechanism through which the effects are seen. The sixth section concludes the paper.

2. Context of Study

Considering the age of women at first and current marriage in Table 1, about 46.1 percent women that are age 20-49 were married at the age of 18, while as at 2013 the figure had risen to 47.7 percent. Similarly, in 2008, 48.1 percent of the sampled women age 25-49 were married at the age of 18; while as at 2013 the figure had risen to almost 50 percent. By the age of 20, 59.7 percent of the women are married in 2008, while there is a 1.7% rise by 2013, and by age 25, 80.7 percent of women had married in 2008 and 81.8 percent by 2013, which represent a little above 30 percent of the women who married at 18.

Table 1: Percentage and Median Age at First Marriage for Women in Nigeria

	2008		2013	
Age at first marriage	20-49	25-49	20-49	25-49
15	21.9	23.5	22.4	23.8
18	46.1	48.1	47.7	49.1
20	57.8	59.7	60.2	61.4
22	na	69.9	na	71.1
25	na	80.7	na	81.8
Median Age at First Marriage	18.6	18.3	18.3	18.1

Source: Nigerian Demographic and Health Survey 2008 and 2013

Interestingly, the rising trend of early marriage is disproportionately spread across the regions and settlements in Nigeria. Therefore, a closer look at the distribution of the rise in the age at first marriage for women in Nigeria is presented in Table 2. The statistics showed that women in rural locations and those in the Northern region marry earlier than those in other locations. For 2008 and 2013 the median age at first marriage for rural women was 16.6 and 16.9 respectively, as opposed to 20.8 and 21.1 for the urban women. Further, the median age of the first marriage for women in the Northern region is between 15.4 and 19.1 in the 2008 period for women in the age range of 20-49. This statistic is not entirely different for the 2013 period.

The age of marriage in Nigeria is mostly influenced by social, cultural, and religious expectations of the 'right' age for women to get married. For instance, in some regions of Nigeria, the definition of the 'right' age for marriage is embedded in the religious and cultural expectations of women, which culminates in issues around child marriage (Bunting, 2005). Poor education and economic wellbeing of the households of women could be another important culprit for child marriage (Erulkar and Bello, 2007).

Table 2: The Median Age at First Marriage for Women in Nigeria by Location

	2008		2013	
Age category	20-49	25-49	20-49	25-49
Residence				

Urban	a	20.8	a	21.1
Rural	16.7	16.6	17.2	16.9
Zone				
North Central	19.1	18.9	18.7	18.3
North East	16.4	16.3	15.6	15.6
North West	15.4	15.3	15.3	15.2
South East	a	22.7	A	22.8
South South	a	21.5	A	20.9
South West	a	21.8	A	21.8

Source: NDHS, 2008 and 2013. The alphabet 'a' implies Omitted because less than 50 percent of the women married for the first time before reaching the beginning of the age group

Focusing on the second concept of this study, female entrepreneurship, has been identified as a standing and viable channel of influence to actualizing women empowerment in Nigeria (Aderemi et al. 2008). Odoemene (2003) noted that while women constituted more than 50 percent of the population, just about 35 percent of women could be categorized as real entrepreneurs or engaging in entrepreneurship venture. However, what is not clear is how these number of female entrepreneurship participation can be jeopardized by low bargaining power, social, and economic preparedness of young women who enter into marriage at early age. This is even more important in the context of Nigeria, which is a patriarchal society, and male dominance prevails. This study takes up this issue using a nationally representative data, which will be discussed in subsequent section.

3. Data and Empirical Methodology

3.1 Data

The data for this study is sourced from the 2008 and 2013 survey of the Nigerian Demographic and Health Survey (NDHS). This survey is relied upon as it is nationally representative, and was collected by a collaborative effort of the National Population Commission of Nigeria and other international agencies such as the United States Agency for International Development (USAID). The survey includes women within the age range of 15 – 49 years for both urban and rural residents from the 36 states of Nigeria, including the Federal Capital Territory, Abuja. The survey is gathered from women who are permanent residents within the households or who are present over the night before the survey was conducted on the selected households.

The survey includes different modules that focused on the characteristics of the woman, the children, the extended and nuclear household, and the husband/spouse information. Information about the economic engagement of the woman, and other issues related to her marriage and sexuality are also carefully gathered in the survey.

The implementation of the survey follows a two-stage cluster design for the 2008 sample collection, while the 2013 sample collection follows a three-stage cluster design. 286 clusters were selected in the urban location, while 602 were from rural locations in the 2008 sample collection for the 2013 collection period, 372 were from the urban areas and 532 were from the rural areas. In the 2008 survey 34,070 were interviewed, which consist of the interview of 33,385 and 15,486 eligible women and men, while in 2013 survey 38,522 households were interviewed, and 38,948 eligible women and 17,359 eligible men were interviewed.

The sample of this study is constructed as women within the age range of 15 – 49 years, who are wives, and are currently married. The NDHS module that focus on female entrepreneurship outcome considers questions relating to: (a) whether the woman has worked for family members, someone else, or self employed; (b) whether the woman is not working, worked in the past year, currently working, or have a job, but on leave for the past 7 days; (c) whether the work of the woman is all year, seasonal, or occasional. This study therefore relies on this module to construct two main outcome variables, including: **Entrepreneurship**, which is measured as a dichotomous variable '1' if the female works in a self-employed venture and is currently working in such venture. **Entrepreneurship intensity**, which is also measured as a dichotomous variable that equals to '1' if the female works in a self-employed venture, is currently working, and works all year round.

The summary statistics of these indicators of entrepreneurship are presented in Table 3.1. For the 2008 period, about 77 percent of the sampled women engage in self-employed enterprise and they are currently working in such enterprise, while in 2013, the proportion of women who engage in self-employed enterprise increased to about 84 percent. Overall, about 80 percent of the respondents are self-employed for the two periods that was considered. However, when considering the intensity of such engagement, a stark contrast is seen in the proportion of engagement. In the 2008 period, we see that about 55 percent work in such enterprise for all year round, while about 69 percent do the same for the 2013 period. Overall, about 62 percent work in such self-employed enterprise for the entire sample period.

The main explanatory variable is the age of the woman at her first and current marriage, which we hypothesize will have a negative impact on the extent to which the woman engages in entrepreneurial action, is measured as the age of the woman at the time when she becomes the wife of her current husband. This of course implies that women who have multiple marriages were excluded from the sample, and those who are currently not married, or in some form do not live with their husband, divorced, or bereaved were also excluded from the sample. The aim of this restriction is to avoid any form of over-estimation of the effect of the relationship of interest.

The summary statistics of the main explanatory variable is also included in Table 3.1. The average age of first and current marriage in Nigeria is about 18 years, which does not significantly change across the sample period. For 2008, the average age of first and current marriage is about 17 years, which later increased to about 18 years in the period 2013.

We also include series of covariates such as the characteristics of the sampled female, their household characteristics, and those of their husband/spouse. The characteristics of the female include her educational attainment level, her age and fertility rate. The household characteristics include the location of the dwelling and the wealth status. The husband/spouse characteristics include the educational attainment and age. The motivation of the inclusion of these covariates was motivated by recent studies on the determinant of labor force participation of women in developing countries, including Lenze and Klasen (2017) for Jordan, Nagler and Naude (2017) for five countries in sub-Saharan Africa, Ajefu (2019) for Nigeria, among others.

The summary statistics for these covariates are also included in Table 3.1. We find from Table 3.1 that only about 27.1 percent of the sampled females have educational attainment of secondary school and above, are about 32 years old, and have about 2 children on the average. The respective husband/spouse of these females are about 42 years old, and about 30 percent of them have educational attainment of secondary school degrees and above. Focusing on the household characteristics, we also find from Table 3.1 that about 70 percent reside in rural locations, and are about middle income in their wealth classification.

Table 3.1: Summary Statistics from Survey

	Definition	2008		2013		All years	
		Mean	SD	Mean	SD	Mean	SD
Entrepreneurship	Female is identified as self-employed in the current year (1/0)	0.767	0.423	0.835	0.370	0.804	0.397
Entrepreneurship intensity	Female is self-employed and currently working all year, and not seasonal or occasional (1/0)	0.554	0.497	0.685	0.464	0.624	0.484
Age at first and current marriage	This is the age of the female at her first and current marriage.	17.303	4.501	17.532	4.596	17.423	4.553
Education of woman	The current highest educational attainment of the sampled woman, such that 1 for above primary education and 0 otherwise (1/0)	0.243	0.429	0.295	0.456	0.271	0.444
Age of woman	The current age of the woman (#)	31.265	8.802	31.736	8.869	31.512	8.840
Fertility rate	The total number of children ever born by the sampled female (#).	1.642	1.346	1.622	1.333	1.632	1.339
Wealth	The household's NDHS computed wealth index, '1' poorest, '2' poorer, '3' middle, '4' richer, and '5' richest.	2.668	1.410	2.816	1.427	2.746	1.421
Location of household	The type of place of the residence of the sampled female, where '1' urban dweller, and '2' rural dweller.	1.729	0.445	1.670	0.471	1.697	0.459
Partner's education	The current highest educational attainment of the spouse, such that 1 for above primary education and 0 otherwise (1/0).	0.272	0.444	0.324	0.468	0.299	0.458
Partner's age	The current age of the partner (#)	42.056	11.636	42.854	12.457	42.479	12.084

Note: Coefficients for dummy variables (indicated by 1/0), and the statistics shows sample percentages.

3.2 Empirical Methodology

The objective of this study is to investigate the causal effect of the age at first marriage on women's economic engagement. The following equation is estimated to underscore the effect of the age of the woman at her first and current marriage on self-employment, and the intensity of self-employment:

$$Ee_{i,t} = \alpha + \beta Am_{i,t} + \delta X'_{i,t} + \tau + \lambda + \varepsilon_{i,t} \qquad (1)$$

Where the $'Ee_{i,t}'$ is the measure of economic engagement, which is the main outcome variable that includes dummy variables for self-employment and intensity of self-employment. This is such that a woman takes the value '1' if she has being self-employed in the current year, and has worked all year in such self-employment, and '0' otherwise. $'\beta'$ is the coefficient of interest that captures the age of the woman at

her first marriage (a count variable). However, for robustness check, this study will also use a dummy variable that represents '1' if the woman married as a child (i.e. age is less than 18), and '0' otherwise. The vector of the characteristics of the woman, her husband, and the household is captured as X'. The characteristics include education attainment and fertility of the woman, education attainment of the husband, and the wealth index of the household. $'\tau'$ is the time effect, and 'λ' is the ethnic fixed effect. The ethnic fixed effect was included to control for unique time-invariant differences that exist across different ethnicities in Nigeria, which could also be seen as a cultural fixed effect. The usual error term is denoted as $'\varepsilon'$.

Although not reported, the OLS estimation of equation (1) shows that a significant relationship exist between age of the woman and her economic engagement. Suggesting that women who marry at older age are more likely to have better economic engagement outcomes. However, this relationship is obviously unreliable especially because of the endogeneity concern that could arise from two sources, namely – simultaneous causality and omitted variables. The economic engagement of women may result in increase in the age of her first marriage. Most studies suggest that economic engagement shapes marriage and the age of entry to marriage, hence, individuals who are actively engaged in an economic venture are more likely to marry at older age compared to those who are less engaged (Mortimer and Kim, 2010; Kuo and Raley, 2016). This is in part because economic engagement positively influences the accumulation of human capital and income (Ahituv and Lerman, 2007), which may lessen the urgency of marriage due to self-reliance of the woman and the fear of diminishing earning premium after marriage. In this case, causality would run both ways, leading to a biased coefficient on age of marriage, which we found from the earlier OLS estimation.

Age at first and current marriage may also be driven by a third unobserved factor such as cultural believes, which are not easily estimated. For instance, some cultures in the eastern region of Nigeria believe that early marriages are necessary sequence of female children at specific age (i.e. age 20), and it is expected that they support their husbands by the number of hours put into household non-paid work. In other cultures in the Northern region of Nigeria, some permit child marriage and the women are confined to specific household roles. Cultures from the western region of Nigeria permit women marrying at older age and encourage more economic engagement for women.

Noting these two sources of endogeneity, it is therefore apparent that the observed relationship between economic engagement and the age of first and current marriage as presented in equation (1) is evidently biased and spurious. Although the direction of bias is ambiguous, we suspect from the sources of endogeneity that the estimate from the regression result is underestimated. As discussed previously, since the omitted variable is classical patriarchy and cultural, the relationship between the omitted factor and age at first and current marriage would be negative and the coefficient of unobserved factor with economic engagement should be positive implying the sign of the bias to be negative.

To tackle the endogeneity concerns, this study invokes the two-stage linear probability model, exploring the cluster average of sexual activities of young males (i.e. less than 18 years of age) in the communities of the sampled woman, as an

instrument. The sampling of the NDHS is divided into census enumeration areas as prepared for the 2006 population census of the Nigerian federal government, which are usually smaller manageable communities. By using this instrument, we capture the effects of the intensity of teenage sexual activities by young males in the vicinity of the household of the woman on her age of marriage. This may proxy for the extent of culturally 'unacceptable' behavior that influences the age of entry into marriage, which is tangentially related to the instrument that was used in Delprato *et al* (2015).

The first-stage estimation is generally defined as:

$$Am_{i,t} = \alpha + \beta Inst_{i,t} + \delta X'_{i,t} + \tau + \lambda + \varepsilon_{i,t} \qquad (2)$$

Where age of the woman at first and current marriage $'Am_{i,t}'$ is predicted by the exogenous instrument $'Inst_{i,t}'$ and the control variables, which overlap with the variables in equation *(1)*. The usual error term $'\varepsilon_{i,t}'$ captures the remaining variance of $'Am_{i,t}'$, which is not explained by the covariates and the instruments as displayed in equation *(2)*.

The second stage regression on the other hand, includes the outcome variables, denoted as $'Ee_{i,t}'$, which are regressed on the predicted value of the endogenous variable $'Am_{i,t}'$, along with other covariates as earlier defined. To perform the second-stage regression, studies have shown that a two-stage least square regression (*2sls*) is a good fit for easy identification of coefficients and it provides a better estimate of the average effect (see Lenze and Klasen, 2017). However, there are still eminent questions regarding the consistency of the *2sls* when the outcome variable is in its binary form (see Kumar, Dansereau, and Murray, 2014; Lenze and Klasen, 2017). As a result, we also estimate the two-stage residual inclusion method (2SRI)[1] as a further robustness check. The estimates of the 2SRI are also consistent (see Terza *et al*, 2008). The second-stage regression model is:

$$Ee_{i,t} = \alpha + \beta Am_{i,t} + \delta X'_{i,t} + \tau + \lambda + \gamma \hat{v}_1 + \varepsilon_{i,t} \qquad (1)$$

A key issue, therefore, with our identification strategy is the validity of the instrument. Two conditions are to be met to ascertain the validity of the instrument: first, it should be relevant and strongly correlated with the endogenous variable. Second, the instrument must comply with the so-called exclusion restriction – that is, the instrument is highly unlikely to be correlated with the indicators of economic engagement, except through changes in the age of marriage. The first condition is evidently displayed in the regression Tables in the subsequent section, which shows that the F-statistics for the first-stage regression are above 10 percent for the respective models as iterated in Staiger and Stock (1997). The statistics of the Anderson-Rubin wald test and Stock-Wright LM S statistics further reveals the strength of the instrument.

The second condition is difficult to verify, however, it is important to note that the use of cluster average of teenage boys sexual activity in the community of the household

[1] The implementation of the 2SRI is such that the residual of the first stage is stored and included as an additional regressor in the second stage alongside the endogenous variable.

of the woman is an adequate candidate for an instrument, considering that the variable is constructed in such a way that the age of the male with whom females who have always lived in such community had first sexual intercourse is computed as 1 if he is a teen, and then the average for the cluster (i.e. community) is further computed using the sample population for such cluster. The identification of the age of the male and using this to compute the intensity of teenage boys sexual activities within the community of the household of women who have always being in such community were used to compute the instrument to avoid an in-built correlation.

This instrument is then used to identify the effect of age of the woman at first and current marriage on entrepreneurship outcome. However, there are some likely threats to our identification strategy and the validity of the instrument. First, communities where there are increased young male sexual activities may be correlated with female economic engagement as studies have shown that sexual activities have important potential effect on the health, physical, and mental wellbeing of those that indulge in such (Hooghe, 2011; Vrangalova and Savin-Williams, 2011; Drydakis, 2013). More so, these effects are sets of productive traits that affect economic outcomes of individuals (see Jones et al, 2006; Heineck and Anger, 2010). This therefore suggest that the instrument may violate the condition of exclusion restriction, and for the same reason, we expect a significant relationship between the instrument and the indicators of economic engagement for women who have never been married and are currently residing in such community. We check this threat by estimating the correlation between the instrument and the outcome variables for a restricted sample that comprise of women who have never been married and who have consistently resided in the respective communities.

Next, using the original sample of the study, we also considered alternative outcome variables that may have similar confounder with economic engagement (the main outcome variable of this study) to understand whether the IV of this study is significantly associated with the alternative outcome variables. We focus on the employment status of the female in - (a) a family business; (b) business owned and managed by someone else. Assuming the instrument is significantly associated with the alternative outcome variables, it will reveal that there are residual confounding effects with the instrument and that the exclusion restriction assumption is violated (see Davies et al, 2017).

We report in Table A1 in the appendix the results of these falsification tests, and for brevity we only present the estimates for the instruments. Panel A includes the results for the first falsification test, while Panel B are the results for the second falsification tests. From both tests, it is evident that the instrument is likely to satisfy the exclusion restriction, and therefore increases our confidence in our identification strategy. For instance, seeing that the instrument does not correlate with the same outcome variables as used in this study for women who have never been married, and there is no significant relationship between the instrument and alternative outcome for the original sample of this study, we are confident in the identified instrument to handle the endogeneity concerns as earlier stated.

4. Estimation Results

4.1 Age at first and current marriage, and Entrepreneurship Outcomes

The discussion of the estimation results begins by reiterating the relevance of the instrument, which is the cluster average of sexual activities of young males (i.e. less than 18 years of age) in the communities of the sampled woman, in relation to the endogenous variable – i.e. age at first and current marriage. The result of this first-stage regression is presented in Table 4.1.

The first stage regression in Table 4.1 confirms the relevance of the instrument. The estimates suggest that there is a significant relationship between the instrument and the endogenous variable; as expected, a percentage increase in the average sexual activities of young males in the communities of the sampled woman results in an increase of about a year and 3 months in the age of first marriage of females that resides in such community, holding everything else constant. This association is logical in the context of Nigeria for at least two reasons: first, sexual activities by young people are morally unacceptable in vast communities in Nigeria, and there are eminent stigmatizations that face individuals who are associated with such activities (see Okoro and Obozokhai, 2005; Agunbiade, 2013; Cortez, Saadat, Marinda, and Odutolu, 2016; Rodriguez-Hart *et al*, 2018). As a result, women who reside in such communities at young age get discriminated against and it is more difficult for them to get into marriage than those who reside in more 'descent' communities. Second, females who grow up in such communities could be associated with early pregnancy, increased abortion, and other consequences of teenage sexual activities. In a typical Nigerian community, women who face such consequences tend to experience higher loss of social capital and 'self-worth' that are important components for entry into marriage (see Mberu and White, 2011; Nwudego, 2015).

The second stage of the IV estimation is also presented in Table 4.1, which records the causal effect of age at first and current marriage on the main outcome variables as displayed across the Panels. The coefficients of age at first and current marriage have a positive and significant effect on the likelihood of the sampled female currently engaging in self-employed enterprise (see Panel A). This finding suggest that women who enter into marriage at older age are more likely to engage in self-employed enterprise while in marriage compared to those who enter marriage at a younger age. The estimates from the IV-LPM and 2SRI methods suggest that such women from the sample who marry at older age are about 5 percentage point more likely to engage in entrepreneurship. This means that at the mean entrepreneurship rate of 80.4 percent, the likelihood of engaging in entrepreneurship for female who marry at older age is about 6.3 or 6.2 percent depending on the estimation method that is being considered.

For the second outcome variable, which is the intensity of engaging in such entrepreneurial work, we report in Panel B of Table 4.1 that women who marry at older age are about 11.6 or 3.2 percentage points more likely to be more intense in their entrepreneurial ventures. While in their current marriage, women who marry at older age are more likely to be more intense in their self-employed work by a magnitude of about 18.6 or 5.1 percent at the mean intensity rate of 62.4 percent. The variance in the magnitude is based on the two estimation techniques that are being discussed. This effect is significant at the one percent level.

Despite the two estimation methods that were engaged in this analysis (i.e. IV-LPM and 2SRI), the results are similar, especially when considering the magnitude of the coefficient and the level of significance. The positive effect of age at first marriage on

the likelihood of engaging in entrepreneurship and the intensity of such engagement aligns with the literature that argues that women who marry at older age have better socio-economic outcomes, such as education, health, and human capital development, which increases their bargaining power in marriage compared to those who marry at younger age (see Field and Ambrus 2008; Sekhri and Debnath 2014; Chari *et al*., 2017; Dhamija and Roychowdhury 2018). As a result, women who marry at older age, and who are seen to have better bargaining power, are able to negotiate their economic choices with their husbands/spouses, which could result in a higher likelihood of engaging in their own ventures later in life.

Further, in relation to empowerment, which includes the acquisition of enabling resources to exercise agency and make strategic life choices, especially where such choices are limited, increase in age before entering into marriage could be beneficial for women. For instance, studies show that women who get married at younger age face long-term disruption in economic empowerment that arises as a result of lost knowledge, skills, limited role models and social network from outside relations, and poor emotional and cognitive development to effectively negotiate her own life outcome (see Dahl, 2005; Dixon-Mueller, 2009; Field and Ambrus, 2008; Yount, Crandall, and Cheong, 2018). Of course, women who marry at older age will be more empowered for intra-household negotiations with their husband on issues related to time allocations, resource use, and even economic engagement. In the context of a patriarchal society, such empowerment and bargaining power are important for better female outcomes, including engaging in entrepreneurial ventures.

The estimates of the characteristics of the sampled woman, her husband/spouse, and the household are also included in Table 4.1 for both the IV-LPM and 2SRI estimation methods. Although the signs and significant values of the covariates are fairly consistent across the estimation methods, we find that education attainment and age of the woman has a negative and significant effect on the likelihood of engaging in entrepreneurship and the intensity of such engagement. This negative relationship may be because women in these categories are more likely to engage in paid employment and there is a likely inverted u-shape in entrepreneurship engagement that arises with age (see Verick, 2014; Thorgren, Siren, Nordstrom, and Wincent, 2016). The positive relationship between fertility and entrepreneurship engagement and the intensity is consistent with the findings in Noseleit (2014), Joona (2017), and Ajefu (2019) that a positive association exists between fertility and women's entrepreneurship decision. As a result of increased fertility, the household labor supply could increase, and subsequently the likelihood of engaging in entrepreneurship. The negative relationship between wealth and the indicators of entrepreneurship supports the argument that more household wealth discounts the incentive to engage in entrepreneurship ventures by females. Further, the negative association that is seen for the education of the husband could imply that the household is more economically stable, which could also be a disincentive to engage in entrepreneurship. The positive relationship between age of the husband and female entrepreneurship aligns with the supportive role of older husbands to wives in some context.

Table 4.1: IV Estimation and 2SRI – Female Entrepreneurship and Age at First and Current Marriage

	Panel A - Entrepreneurship: 1 if currently working in self run enterprise	**Panel B -** Intensity of entrepreneurship: 1 if currently

				working in self run enterprise all year		
	Age at first marriage	IV-LPM	2SRI	Age at first marriage	IV-LPM	2SRI
First stage						
Instrument – Cluster average of sexual activities by young males in communities of the female	1.152*** (0.177)	----	----	1.146*** (0.178)	----	----
Second stage						
Age at first marriage	----	0.051*** (0.017)	0.050*** (0.003)	----	0.116*** (0.026)	0.032*** (0.003)
Education of woman	2.715*** (0.067)	-0.256*** (0.048)	-1.884*** (0.336)	2.715*** (0.067)	-0.417*** (0.073)	-2.280*** (0.282)
Age of woman	0.132*** (0.004)	-0.009*** (0.002)	-0.068*** (0.015)	0.132*** (0.004)	-0.017*** (0.003)	-0.089*** (0.012)
Fertility of woman	-0.092*** (0.018)	0.015*** (0.002)	0.114*** (0.018)	-0.091*** (0.018)	0.015*** (0.004)	0.088*** (0.015)
Education of spouse	0.444*** (0.063)	-0.064*** (0.010)	-0.407*** (0.059)	0.443*** (0.063)	-0.085*** (0.016)	-0.392*** (0.049)
Age of spouse	-0.053*** (0.003)	0.004*** (0.000)	0.029*** (0.006)	-0.053*** (0.002)	0.007*** (0.001)	0.035*** (0.005)
Wealth index of HH	0.656*** (0.025)	-0.023* (0.011)	-0.197 (0.079)	0.657*** (0.025)	-0.017 (0.017)	-0.154** (0.066)
Location of HH	-0.390*** (0.062)	0.013 (0.009)	0.091* (0.055)	-0.392*** (0.062)	0.029** (0.015)	0.126*** (0.046)
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-paap F-stat (H_0 = weak IV)	42.16	----	----	41.65	----	----
Anderson-Rubin Wald test	11.65	----	----	40.95	----	----
Stock-Wright LM S statistic	11.65	----	----	40.89	----	----
Obs.	29,562	29,562	29,562	29,518	29,518	29,518

Note: The 2SRI includes the endogenous variable and the predicted residual values for the first-stage regression. IV-LPM means instrumental variable linear probability model, while 2SRI means the two-stage residual inclusion. The values in parenthesis are the standard errors. The superscripts are significant levels: *p<0.10; **p<0.05; ***p<0.01

Noting the effect of age of the woman at entry into her first and current marriage on her entrepreneurship engagement, the next issue is to examine whether a heterogeneous effect exist when subjecting this relationship to the differences in the location of the household of the female. For instance, it is likely that the location of the household of the female may influence the direction and significance of the result, as female who reside in rural areas, who may have limited economic opportunities, could be affected more by early marriages compared to those who reside in urban locations (see Field and Ambrus, 2008; Chari *et al*, 2017).

Table 4.2 presents the estimates for the heterogeneous effect by location of the household – that is, whether the household is located in urban or rural area. Panel A include the estimates for females who dwell in urban locations, while Panel B are estimates for those who dwell in rural areas. The estimates from both Panels indicates that increasing age of the woman at the time of marriage entry do have a positive effect on the likelihood of engaging in entrepreneurship and the intensity of such

engagement. These effects are significant at the 1 percent level in most of the estimations. These results indicate that there is an important role for increasing age before rural and urban women enter into marriage for them to engage in self-employment ventures and for increase intensity in such engagement. The result from Table 4.2 confirms that no heterogeneous pattern is observed when the initial estimates are observed across the locations of the households. As a result, our result can be attributed to women who reside in both rural and urban locations.

Table 4.2: Female Entrepreneurship and Age at First and Current Marriage by Location of the Household of Sample Females

	Panel A: Urban Location						Panel B: Rural Location					
	Entrepreneurship: 1 if currently working in self run enterprise			Intensity of entrepreneurship: 1 if currently working in self run enterprise all year			Entrepreneurship: 1 if currently working in self run enterprise			Intensity of entrepreneurship: 1 if currently working in self run enterprise all year		
	Age at first marriage	IV-LPM	2SRI	Age at first marriage	IV-LPM	2SRI	Age at first marriage	IV-LPM	2SRI	Age at first marriage	IV-LPM	2SRI
First stage												
Instrument – Cluster average of sexual activities by young males in communities of the female	1.616*** (0.325)	----	----	1.596*** (0.325)	----	----	0.703*** (0.210)	----	----	0.705*** (0.210)	----	----
Second stage												
Age at first marriage	----	0.065*** (0.023)	0.065*** (0.006)	----	0.049** (0.020)	0.050*** (0.005)	----	0.067* (0.037)	0.038*** (0.004)	----	0.226*** (0.088)	0.020*** (0.003)
Education of woman	3.042*** (0.067)	-0.345*** (0.074)	-3.002*** (0.568)	3.042*** (0.113)	-0.239*** (0.073)	-1.557*** (0.486)	2.366*** (0.083)	-0.250*** (0.088)	-1.511*** (0.422)	2.366*** (0.083)	-0.712*** (0.211)	-2.827*** (0.349)
Age of woman	0.197*** (0.008)	-0.018*** (0.004)	-0.119*** (0.026)	0.199*** (0.009)	-0.009* (0.005)	-0.048** (0.022)	0.105*** (0.004)	-0.008** (0.004)	-0.054*** (0.019)	0.105*** (0.004)	-0.029*** (0.009)	-0.119*** (0.016)
Fertility of woman	-0.093** (0.038)	0.015*** (0.005)	0.146*** (0.033)	-0.091** (0.038)	0.006 (0.005)	0.046* (0.027)	-0.081*** (0.020)	0.015*** (0.004)	0.101*** (0.022)	-0.080*** (0.018)	0.026*** (0.009)	0.113*** (0.017)
Education of spouse	0.605*** (0.108)	-0.111*** (0.018)	-0.717*** (0.097)	0.601*** (0.108)	-0.070*** (0.019)	-0.343*** (0.083)	0.310*** (0.077)	-0.043*** (0.014)	-0.263*** (0.074)	0.310*** (0.077)	-0.108*** (0.035)	-0.443*** (0.062)
Age of spouse	-0.103*** (0.006)	0.008*** (0.002)	0.043*** (0.011)	0.199*** (0.009)	0.004* (0.002)	0.012 (0.009)	-0.032*** (0.003)	0.003*** (0.001)	0.025*** (0.007)	-0.032*** (0.003)	0.009*** (0.003)	0.049*** (0.006)
Wealth index of HH	0.588*** (0.052)	-0.033** (0.015)	-0.433 (0.134)	0.589*** (0.052)	0.022 (0.015)	-0.008 (0.114)	0.703*** (0.027)	-0.037 (0.026)	-0.157 (0.099)	0.704*** (0.027)	-0.126** (0.063)	-0.299*** (0.082)
Location of HH	----	----	----	----	----	----	----	----	----	----	----	----
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-paap F-stat (H_0 = weak IV)	24.75	----	----	24.11	----	----	11.19	----	----	11.23	----	----
Anderson-Rubin Wald test	12.98	----	----	16.38	----	----	11.20	----	----	51.47	----	----
Stock-Wright LM S statistic	12.96	----	----	16.38	----	----	11.19	----	----	51.34	----	----
Obs.	9611	9,611	9,611	9,591	9,591	9,591	19,951	19,951	19,951	19,927	19,927	19,927

Note: The 2SRI includes the endogenous variable and the predicted residual values from the first-stage regression. IV-LPM means instrumental variable linear probability model, while 2SRI means the two-stage residual inclusion. The values in parenthesis are the standard errors. The estimates for the location of the HH were not included because of the categorization for the heterogeneous estimation. The superscripts are significant levels: *p<0.10; **p<0.05; ***p<0.01

4.2 Re-computing Age at First and Current Marriage

One concern from the estimation that was earlier presented is that it is not clear about the relationship when considering women who got married as a child and those who got married as an adult. The importance of this distinction is to clearly identify the effect of child marriage on the long-term economic outcome of women. This distinction is important as there are an estimated 22 million child brides in Nigeria, which accounts for about 40 percent of all child brides in the West and Central African region (see UNICEF, 2018). Therefore, understanding the effect when categorizing the age at first and current marriage across child and adult entry will accentuate well-identified policy evaluations of the relationship.

To further evaluate this effect, this study categorized the sample into two groups – (a) those women who married as a child, within the age range that is lower than 18 years at first and current marriage; (b) those women who married as an adult, within the age range that is higher than 20 years at first and current marriage. Once this categorization is completed, the *IV-LPM* and *2SRI* is then executed, including the covariates as in Table 4.1. The estimates of the first-stage regression and the F-statistics are also estimated to further validate the relevance of the instrument. The results of this additional analysis are presented in Table 4.3.

The first-stage statistics in Table 4.3 further reveal the validity and relevance of the instrument, as we find that women who resides in communities with less sexual activities of teenage boys tends to marry at younger age compared to those who resides in communities with higher intensity of sexual activities by teenage boys. The F-statistics are within range: the values are higher than the 10 percent threshold as seen in Staiger and Stock (1997). The second stage regression in Panel A

It is evident from Panel A of Table 4.3 that child marriage has a negative impact on long-term engagement in entrepreneurship ventures of women. In fact, the statistics reveal that at the mean entrepreneurship rate of 80.4 percent, women who entered into marriage at ages lower than 18 years are about 74 or 47 percent less likely to engage in entrepreneurship, depending on the estimation technique that is being considered. Likewise, for the entrepreneurship intensity, which is measured as the extent to which the sampled woman worked all year on her self-owned enterprise, we find from Panel B that a negative relationship also exist for marriage as a teen and the long-term intensity in entrepreneurship ventures. The result also reveals that at the mean intensity rate of 62.4, a woman who marries as a child is about 57 or 37 percent less likely to intensely engage in their entrepreneurship ventures.

The consistency of this additional measure of the explanatory variable – whether the sampled woman married at ages considered to be a child (i.e. less than 18 years) or as an adult (i.e. 20 years and above) – reveals that indeed, ages at current and first marriage has a significant impact on the long-term entrepreneurship outcomes of women. That is, women who marry at younger ages are more likely to be less engaged in their self-employed businesses compared to those who marry at older age. This result further points to the fact that the time taken before entering into marriage for women are important in social, economic, and human capital development, which are needed to enhance their capacity for self-employment in later periods of their life. These issues will be further discussed in the subsequent section (section 5).

Table 4.3: IV Estimation and 2SRI – Female Entrepreneurship and Child Marriage

	Panel A - Entrepreneurship: 1 if currently working in self run enterprise			**Panel B -** Intensity of entrepreneurship: 1 if currently working in self run enterprise all year		
	Married as a child = 1	IV-LPM	2SRI	Married as a child = 1	IV-LPM	2SRI
First stage						
Instrument – Cluster average of sexual activities by young males in communities of the female	-0.098*** (0.018)	----	----	-0.098*** (0.018)	----	----
Second stage						
Married as a child = 1	----	-0.596*** (0.211)	-0.380*** (0.035)	----	-0.353*** (0.330)	-0.232*** (0.031)
Education of woman	-0.254*** (0.006)	-0.270*** (0.055)	-1.613*** (0.269)	-0.254*** (0.007)	-0.446*** (0.085)	-1.885*** (0.226)
Age of woman	-0.011*** (0.000)	-0.009*** (0.002)	-0.077*** (0.018)	-0.011*** (0.000)	-0.017*** (0.003)	-0.102 (0.014)
Fertility of woman	0.003*** (0.001)	0.012*** (0.002)	0.082*** (0.013)	0.003* (0.002)	0.009** (0.004)	0.040*** (0.010)
Education of spouse	-0.041*** (0.006)	-0.066*** (0.011)	-0.388*** (0.055)	-0.041*** (0.006)	-0.088*** (0.017)	-0.365*** (0.047)
Age of spouse	0.004*** (0.000)	0.004*** (0.001)	0.031*** (0.006)	0.004*** (0.000)	0.006*** (0.001)	0.038*** (0.005)
Wealth index of HH	-0.053*** (0.002)	-0.022* (0.012)	-0.179** (0.075)	-0.053*** (0.002)	-0.014 (0.018)	-0.128** (0.062)
Location of HH	0.037*** (0.006)	0.015 (0.011)	0.049 (0.048)	0.037*** (0.006)	0.034** (0.017)	0.063 (0.040)
Ethnic FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-paap F-stat (H_0 = weak IV)	30.59	----	----	30.61	----	----
Anderson-Rubin Wald test	11.65	----	----	40.95	----	----
Stock-Wright LM S statistic	11.65	----	----	40.89	----	----
Obs.	29,562	29,562	29,562	29,518	29,518	29,518

Note: The 2SRI includes the endogenous variable and the predicted residual values for the first-stage regression. IV-LPM means instrumental variable linear probability model, while 2SRI means the two-stage residual inclusion. The values in parenthesis are the standard errors. The superscripts are significant levels: *p<0.10; **p<0.05; ***p<0.01

4.3 Alternative Estimation Techniques

Despite the logical and statistical proof of the relevance of the instrument that we used in this paper, however, some may still worry that certain unobserved and unidentifiable relationship that are not discussed in this paper may defeat the exclusion restriction condition, which is an important criteria for a strong instrument that is needed to address the endogeneity concern as earlier noted. We further tackle this concern by using different estimation techniques as further robustness checks. We estimate the Inverse Probability Weighting (IPW) and Propensity Score Matching (PSM) estimators. The IPW strategy is a double-robust estimation strategy that uses different model to compute the so-called treatment status, which is entry into marriage as a child, and the specific outcome. This computation is based on a three-step approach: first, the parameters of the treatment model are estimated and then the inverse-probability weights are further computed. Second, the different outcomes for

each treatment level is predicted; and third, the weighted means of the treatment-specific predicted outcomes, and the difference of the weighted averages is computed to predict the Average Treatment Effects (ATEs) of the population.

The PSM strategy on the other hand estimates the ATE and the Average Treatment Effect on the Treated (ATET) by computing the difference in the average outcomes of the treatment group with a similar match from the comparison – which is females who marry at ages above 20 years. The basis for the matching process is the computed propensity scores (see Abadie and Imbens, 2016). The ATE measures the average causal effects in the treatment effects context i.e. $E\,[Y_{1i} - Y_{0i}]$, and the average treatment effect on the treated i.e. $E\,[Y_{1i} - Y_{0i}|D_i = 1]$ estimators predict treatment status. Overall, the ATE is relevant in cases where the treatment is applicable to the entire population represented by the sample data, ATET is relevant when the interest lies on the effect of the treatment for those who are treated. Both techniques adjust for differences in the distribution between the two groups of women, and therefore eliminate all confounding differences to estimate the effect (Abadie and Imbens, 2016).

The result of the IPW and the PSM estimations are presented in Table 4.4. The results presented for the ATE and ATET for the IPW and matching process further confirms the earlier estimates in Table 4.1, that women who marry as a child are less likely to engage in entrepreneurship and are less intense in such engagement in later parts of their life. Put differently, women who marry at older age are more likely to engage in entrepreneurship ventures, and intensely so, later in life. The results are significant at the traditional 1 percent level.

Table 4.4: IPW and PSM Estimators – Female Entrepreneurship and Age at First and Current Marriage

Treatment/ Outcome Variables	**ATE - IPW**	**ATET – Matching**	**ATE – Matching (4 NN)**
Treatment status: '1' if age at first and current marriage is less than 18 years, and '0' otherwise			
Entrepreneurship	-0.062*** (9.450)	-0.064*** (6.470)	-0.065*** (9.130)
Entrepreneurship intensity	-0.057*** (7.230)	-0.062*** (5. 600)	-0.059*** (6.920)

Note: This study relied on the computation of the treatment status as *'1' if age at first and current marriage is less than 18 years, and '0' otherwise*. This computation is logical to achieve the aim of the robustness check, which is to underscore the earlier result when subjected to an alternative estimation technique that computes the causal effect of age at first and current marriage on entrepreneurship outcomes. The superscripts are significance levels: *p<0.10, **p < 0.05, ***p < 0.01. The values in parenthesis are the z statistics. ATE and ATET respectively imply average treatment effect and average treatment effect on the treated. 4 NN means 4 nearest neighbors.

5. Discussion of Result

The major finding in relation to age at first and current marriage on entrepreneurship engagement of women in later life in Nigeria is that women who get married at older age are more likely to engage in entrepreneurship ventures and are more intense in such engagement, compared to women who get married at young age (or even as a child). The effect of age at current and first marriage on entrepreneurship engagement of women does not reveal any asymmetric pattern across the location of the households of the sampled women. These results are logical with an explanation that

there is a long-term economic cost of marriage at younger age for women in general, and which is applicable to both those living in rural and urban locations. Noting that self-employment creates job, develop skills, and give unemployed and vulnerable individuals an opportunity to fully participate in society and the economy, which in fact is included in the 2020 strategy of the European Union as a key for the achievement of smart, sustainable, and inclusive growth (see European Commission, 2019), and an instrument for inclusive growth in the African region (World, 2017), the result of this study has clear implications for sustainable and inclusive development for developing countries.

Although some may argue that self-employment could be informal businesses, and micro-enterprises, which may not contribute substantially to the overall development and growth of countries, however, it is important to note that in contexts where there are rising unemployment, inequality of opportunity as a result of social and cultural acceptable roles along gender lines, and other issues that limit the potentials of females in this region, the consideration of self-employment is an important instrument for empowerment. However, while such enterprises are important, the participation rate of women in such ventures will be limited depending on the age at which they enter into marriage.

Women who get into marriage at younger ages are likely to be significantly lacking in their bargaining power and level of empowerment, which limits their chances of engaging in self-employment in later parts of their life. For instance, the education of such women are cut short in most cases, they have more children that may increase the demand for their time for household activities, they tend to get married to less empowered husbands (in terms of educational attainment), the husbands of such women tends to have stronger control over their decisions, they are more susceptible to domestic abuse, among others. We check the likely mechanisms that could explain the result in the context of our study, and we present in Table A2 in the appendix some channels through which the effect exist.

Evidently, the results of the estimation in Table A2 suggest that women who marry at older age are better educated and are married to men who also have better education. These findings suggest that in such households, women could have better bargaining power, which could influence their decisions to engage in self-employment enterprises. Further, women who marry at older age have fewer children, which is a significant benefit to the time available for such women to engage in self-employment enterprises. In terms of empowerment, which could inversely be seen from the extent of control of husbands over their wives and experiences of domestic abuse (see Sethuraman, Lansdown, and Sullivan, 2006; Kwagala, Wandera, Ndugga, and Kabagenyi, 2013; Yount, Crandall, and Cheong, 2018; Gautam and Jeong, 2019), we also find that women who marry at older ages are more likely to have better autonomy and are less likely to experience domestic abuse.

6. Conclusion

The age at the first and current marriage of a woman matters in determining her long-term economic empowerment, and economic outcome. For instance, there are forgone resources, lost knowledge and skills from low human capital development, health issues, lost earnings from lost time to early marriages and exclusion from labour market participation, low emotional and cognitive development, and even limited

social networks are some important issues that arises from early entry into marriage. Given the severity in the consequences of age at which women enter into marriage, this paper considers how it matters in the long-term economic engagement outcome of women in Nigeria. We rely on the 2008 and 2013 survey of the Nigerian Demographic and Health Survey, and an instrumental variable estimation method to identify the causal effect of the age of a woman at entry into her first and current marriage on the indicators of entrepreneurship. This approach addresses the endogeneity concern with the main relationship, and we further confirmed the effect using two additional techniques in the form of Inverse Probability Weighting (IPW) and Propensity Score Matching (PSM) techniques.

Our results show that at the mean entrepreneurship rate of 80.4 percent, the likelihood of engaging in entrepreneurship for women who marry at older age is about 6 percent. For the second outcome variable, which is the intensity of engaging in such entrepreneurial work, we find from the estimation that at the mean intensity rate of 62.4 percent, women who marry at older age are more likely to be more intense in their self-employed work by a magnitude of about 18.6 or 5.1 percent. We also find that when considering the location of the household of the sampled women, the effect is consistent and do not vary. What becomes deleterious about the findings of this paper is that women who marry as a child are more negatively impacted (in terms of entrepreneurship outcome) than those who marry as an adult.

This paper contributes to the literature on the consequences of child marriage, and public policies that discourage this action can rely on our findings that such actions have long-term consequences on the entrepreneurial engagement outcome of women who are ‘victims’ of such marriage. However, one important caveat to the results presented in this paper is that the main outcome variable – entrepreneurship and the intensity of engagement in such venture – did not include the distinction on the type of businesses that the sampled women are engaging in. It would have been useful to have this data on the formality status, size, and years of existence, among others, to estimate the impact of early marriage (or not) on the quality of entrepreneurship engagement of women. Still, this study sheds new light on the impact of the woman’s age at first and current marriage on long-term entrepreneurship outcomes through changes in empowerment and bargaining power of the women as at the age when they enter into their marriages.

Reference

Abadie, A., and Imbens, G.W., (2016), Matching on the Estimated Propensity Score, Econometrica, 84(2): 781-807

Aderemi, H. O., Ilori, M. O., Siyanbola, W. O., & Adegbite, S. A. (2008). An assessment of the choice and performance of women entrepreneurs in technological and non-technological enterprises in southwestern Nigeria. African Journal of Business Management, 2(10), 165.

Agunbiade, O.M., (2013), Sexual Exploitations, Concealment and Adolescent Mothers' Agency in a Semi-urban Community in Southwest Nigeria, Journal of Applied Social Sciences, 8: 24-40, https://doi.org/10.1177/1936724412475139

Ahituv, A., and Lerman, R.I., (2007), How Do Marital Status, Work Effort, and Wage Rates Interact? *Demography*, 44(3): 623-647.

Ajefu, J.B., (2019), Does having children affect women's entrepreneurship decision? Evidence from Nigeria, Review of Economics of the Household, https://doi.org/10.1007/s11150-019-09453-2

Bunting, A. (2005). Stages of development: marriage of girls and teens as an international human rights issue. Social & Legal Studies, 14(1), 17-38.

Chari, A.V., Heath, R., Maertens, A., and Fatima, F. (2017), The causal effect of maternal age at marriage on child wellbeing: Evidence from India, *Journal of Development Economics*, 127: 42-55.

Chiappori, P., Dias, M.C., and Meghir, C., (2018) The Marriage Market, Labor Supply and Education Choice, NBER Working Paper No. 21004, Retrieved from https://www.nber.org/papers/w21004

Cislaghi, B., (2019), Social norms and child marriage in Cameroon: An application of the theory of normative spectrum, Global Public Health: An International Journal for Research, Policy and Practice, 14(10): 1479-1494

Cortez, R., Saadat, S., Marinda, E., and Odutolu, O., (2016), Adolescent Fertility and Sexual Health in Nigeria, World Bank Discussion Paper, Washington: World Bank, http://documents.worldbank.org/curated/en/507641468190770251/pdf/103667-WP-ASRH-Nigeria-PUBLIC.pdf

Dahl G.B. (2010), Early teen marriage and future poverty, Demography, 47, 689-718.

Dahl, G., (2005), Early Teen Marriage and Future Poverty, NBER Working Paper No. 11328, National Bureau of Economic Research, Cambridge, MA.

Davies NM, Thomas KH, Taylor AE, Taylor GMJ, Martin RM, Munafò MR, et al. (2017), How to compare instrumental variable and conventional regression analyses using negative controls and bias plots, International Journal of Epidemiology, 46(6): 2067–2077.

Delprato, M., Akyeampong, K., Sabates, R., Hernandez-Fernandez, J., (2015), On the impact of early marriage on schooling outcomes in Sub-Saharan Africa and South West Asia, *International Journal of Educational Development*, 44: 42-55

Dhamija, G., and Roychowdhury, P., (2018), The impact of women's age at marriage on own and spousal labor market outcomes in India: causation or selection? MPRA Paper No. 86686.

Dixon-Mueller, R., (2009), Starting Young: Sexual Initiation and HIV Prevention in Early Adolescence, *Aids and Behavior*, 13(1): 100-109

Drydakis, N., (2013), The Effect of Sexual Activity on Wages, IZA Discussion Paper Nos. 7529, Bonn: Germany

Duflo, E., (2012), Women Empowerment and Economic Development, Journal of Economic Literature, 50(4): 1051-1079

Efevbera, Y., Bhabha, J., Farmer, P.E., and Fink, G., (2017), Girl child marriage as a risk factor for early childhood development and stunting, Social Science and Medicine, 185: 91-101

Erulkar, A., (2013), Adolescence Lost: The Realities of Child Marriage, Journal of Adolescent Health, 52(5): 513-514

Erulkar, A., and Bello, M. V. (2007). The experience of married adolescent girls in northern Nigeria. New York: Population Council.

European Commission (2019), Supporting entrepreneurs and the self-employed, European Commission, Retrieved from https://ec.europa.eu/social/main.jsp?catId=952&langId=en

Field, E., and Ambrus, A. (2008), Early marriage, age of menarche, and female schooling attainment in Bangladesh, *Journal of Political Economy*, 116: 881-930.

Gautam, S., and Jeong, H., (2019), Intimate Partner Violence in Relation to Husband Characteristics and Women Empowerment: Evidence from Nepal, International Journal of Environmental Research and Public Health, 16(5): 895, DOI: 10.3390/ijerph16050895

Heineck, S. and Anger, G. (2010), The Returns to Cognitive Abilities and Personality Traits in Germany, Labour Economics, 17(3): 535-546.

Herrera, C., Sahn, D.E., and Villa, K.M., (2019), Teen Fertility and Female Employment Outcomes: Evidence from Madagascar, Journal of African Economies, 28(3): 277-303

Hooghe, M. (2011). Is Sexual Well-Being Part of Subjective Well-Being? An Empirical Analysis of Belgian (Flemish) Survey Data Using an Extended Well-Being Scale, Journal of Sex Research, 49(2-3): 264-273

Jones, K. M. Latreille, P. L. and Sloane, P. J. (2006), Disability, Gender, and the British Labour Market, Oxford Economic Papers, 58(3): 407-449.

Joona, P. A. (2017), Are mothers of young children more likely to be self-employed? The case of Sweden, Review of Economics of the Household, 15, 307-303.

Khanna, T., Verma, R., and Weiss, E., (2013), Child Marriage in South Asia: Realities, Responses, and the Way Forward, Bangkok: UNFPA Asia Pacific Regional Office

Kumar, S., Dansereau, E.A., and Murray, C.J.L., (2014), Does distance matter for institutional delivery in rural India?, Applied Economics, 46:33, 4091-4103, DOI: 10.1080/00036846.2014.950836

Kuo, J.C., and Raley, K.R., (2016), Is It All about Money? Work Characteristics and Women's and Men's Marriage Formation in Early Adulthood, Journal of Family Issues, 37(8): 1046-1073

Kwagala, B., Wandera, S.O., Ndugga, P., and Kabagenyi, A., (2013), Empowerment, partner's behaviors and intimate partner physical violence among married women in Uganda, BMC Public Health, 13: 1112, https://doi.org/10.1186/1471-2458-13-1112

Lee-Rife, S., Malhotra, A., Warner, A., and Glinski, A.M., (2012), What Works to Prevent Child Marriage: A Review of the Evidence, Studies in Family Planning, 43(4): 287-303

Lenze, J., and Klasen, S., (2017), Does Women's Labor Force Participation Reduce Domestic Violence? Evidence from Jordan, *Feminist Economics*, 23:1, 1-29, DOI: 10.1080/13545701.2016.1211305

Mberu, B.U., and White, M.J., (2011), Internal migration and health: Premarital sexual initiation in Nigeria, Social Science and Medicine, 72(8): 1284-1293

Mortimer, J.T., and Kim, M., (2010), Unemployment and self-efficacy during the transition to adulthood: A prospective longtiduinal study. Paper presented at the World Congress of Sociology; Gothenburg, Sweden. 2010

Nagler, P., and Naude, W., (2017), Non-farm entrepreneurship in rural sub-Saharan Africa: New empirical evidence, *Food Policy*, 67: 175-191

Nasrullah, M., Zakar, R., and Zakar, M.Z., (2014), Child Marriage and Its Associations With Controlling Behaviors and Spousal Violence Against Adolescent and Young Women in Pakistan, Journal of Adolescent Health, 55(6): 804-809

Noseleit, F. (2014). Female Self-employment And Children, Small Business Economics, 549-569.

Nwudego, N.C., (2015), Human Identity: Child Rights and the Legal Framework for Marriage in Nigeria, Marriage and Family Review, 51(4): 305-336

Odoemene, A. C., African Women and Economic Development, 1900-1995: The Nigerian Experience, Paper Presented at South African Sociological Association (SASA) Annual Congress, 2003.

Okoro, F.I., and Obozokhai, O., (2005), Sexual Harassment: The Experience of Out-of-School Teenagers in Benin City, Nigeria, African Journal of Reproductive Health, 9(3): 118-127

Rasmussen, B., Maharaj, N., Sheehan, P., and Friedman, H., (2019), Evaluating the Employment Benefits of Education and Targeted Interventions to Reduce Child Marriage, Journal of Adolescent Health, 65(1): S16-S24

Rodriguez-Hart, C., Musci, R., Nowak, R.G., German, D., Orazuike, I., Ononaku, U., Liu, H., Crowell, T.A., Baral, S., Charurat, M., and TRUST/RV368 Study Group (2018), Sexual Stigma Patterns Among Nigerian Men Who Have Sex with Men and Their Link to HIV and Sexually Transmitted Infection Prevalence, Aids Behavior, 22(5): 1662-1670, DOI: 10.1007/s10461-017-1982-4.

Santelli, J.S., Spindler, E., Moore, E., and McGovern, T., (2019), Criminalising sexuality or preventing child marriage: legal interventions and girls' empowerment, Child and Abuse Health, 3(4)206-208

Schaffnit, S.B., Urassa, M., and Lawson, D.W., (2019), "Child marriage" in context: exploring local attitudes towards early marriage in rural Tanzania, Sexual and Reproductive Health Matters, 27(1): DOI: 10.1080/09688080.2019.1571304

Sekhri, S., and Debnath, S. (2014), Intergenerational consequences of early age marriages of girls: effect on children's human capital, *Journal of Development Studies*, 50: 1670-1686.

Sethuraman, K., Lansdown, R., and Sullivan, K., (2006), Women's empowerment and domestic violence: The role of sociocultural determinants in maternal and child undernutrition in tribal and rural communities in South India, Food and Nutrition Bulletin, 27(2): 128-143

Staiger, D., and Stock, J.H., (1997), Instrumental Variables Regression with Weak Instruments, *Econometrica*, 65(3): 557-586

Tenkorang, E.Y., (2019), Explaining the links between child marriage and intimate partner violence: Evidence from Ghana, Child Abuse and Neglect, 89: 48-57

Terza, J., Basu, A. and Rathouz, P. (2008) Two-stage residual inclusion estimation: addressing endogeneity in health econometric modeling, *Journal of Health Economics*, 27, 531–43. doi:10.1016/j.jhealeco.2007.09.009

Thorgren, S., Siren, C., Nordstrom, C., and Wincent, J., (2016), Hybrid entrepreneurs' second-step choice: The nonlinear relationship between age and intention to enter full-time entrepreneurship, Journal of Business Venturing Insights, 5: 14-18

UNICEF (2018), Child Marriage in West and Central Africa at a Glance, Retrieved from https://www.unicef.org/wca/media/2596/file

Verick, S., (2014), Female labor force participation in developing countries, IZA World of Labor, 87: 1-10, doi: 10.15185/izawol.87

Vrangalova, Z. and Savin-Williams, R. C. (2011). Adolescent Sexuality and Positive Well-Being: A Group-Norms Approach, Journal of Youth and Adolescence, 40(8): 931-944.

Wang, C., and Wang, L. (2017), "Knot yet: minimum marriage age law, marriage delay, and earnings", *Journal of Population Economics*, 30, 771-804.

World (2017), An Analysis of Issues Shaping Africa's Economic Future, Washington: World Bank, 16, http://documents.worldbank.org/curated/en/572941507636665377/pdf/120334-REVISED-100p-WB-AfricasPulse-Fall2017-vol16-webfinal-english.pdf

Yount, K.M., Crandall, A., and Cheong, Y.K., (2018), Women's Age at First Marriage and Long-Term Economic Empowerment in Egypt, World Development, 102: 124-134

Appendix

Table A1: Falsification Test

	Panel A		**Panel B**	
	Restricted sample: Outcome variables		**Original sample: Alternative outcome variables**	
	Entrepreneurship	Intensity of Entrepreneurship	Work for family member	Work for someone else
Instrument	-0.180 (0.169)	-0.075 (0.176)	-0.325 (0.699)	-0.222 (0.169)
Covariate – woman	Yes	Yes	Yes	Yes
Covariate of household	Yes	Yes	Yes	Yes
Covariate – husband	No	No	Yes	Yes
Ethnic FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observation	6,147	6,138	29,562	29,725

Note: The covariate for husband's characteristics was not included because the sample consists of only women who have never been married and who have always resided in the community. The values in parentheses are the standard errors. The estimates of the covariates were not displayed, as their values are not of interest for the discussion. However, they are available upon request.

Table A2: Potential Mechanisms through which Effect is Seen

Outcomes ↓	Explanatory Variable -Age at first marriage
Fertility: Total number of children of the woman	-0.041*** (0.001)
Human capital: Current education of woman (0, no education; 1, primary; 2, secondary; 3, higher)	0.108*** (0.001)
Human capital of Spouse: Education of partner (0 if primary education is highest, and 1 if secondary education and above)	0.033*** (0.000)
Excessive control 1: Husband jealous of male interactions (0 if no, and 1 if yes)	-0.012*** (0.001)
Excessive control 2: Husband accuses her of unfaithfulness (0 if no, and 1 if yes)	-0.004*** (0.001)
Excessive control 3: Husband controls her movement and insists on knowing where she is (0 if no, and 1 if yes)	-0.002* (0.001)
Domestic abuse 1: Woman ever had injury, sprain, dislocations or burns from domestic abuse	-0.005** (0.002)
Domestic abuse 2: Woman ever had wounds, broken bones, broken teeth, or other serious injuries	-0.004* (0.002)

Note: The values in parentheses are the standard errors. The superscripts are significance levels: *p<0.10, **p < 0.05, ***p < 0.01.