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Does Order Matter? The relationship between premarital pregnancy and woman's career interruption in South Korea

by

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Abstract: This thesis is an initial attempt to investigate the relationship between premarital pregnancy and women's career interruption in the Korean context. The case of marriage preceded by pregnancy has increased in South Korea in recent years. Previous studies have focused on the determinants of the premarital conception. However, little research has been done on the relationship between premarital conception and woman's career interruption. Using the National Survey on Fertility and Family Health and Welfare data, this thesis performs multiple logistic regression analysis to investigate how a difference in sequences of marriage, pregnancy and childbirth affects the probability of quitting a job. The results show that a woman having premarital conception has a higher risk of quitting her job around the first childbirth. However, after controlling individual and occupational characteristics, this correlation weakens among the women with premarital birth, while it remains significant for the women with premarital conception and marriage before childbirth. Also, the negative impact of premarital conception and premarital birth tend to be more potent among the cohort born after 1985 and those who reside in rural areas. Also, the correlation weakens by the time of the second childbirth. The main findings indicate that the selection partly explains the difference in the likelihood of career interruption around childbirth between post-martial conception group and premarital conception group, although premarital conception may also have intrinsic effect associated with a higher risk of career interruption of the younger cohort.

Keywords: career interruption, nonmarital pregnancy, premarital conception, premarital birth, South Korea

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1   Introduction

The Second Demographic Transition has altered the relationship between marriage and birth in many societies. During the First Demographic Transition, the most significant change in fertility was the fertility decline within marriage (Hirschman, 1994). However, during the Second Demographic Transition, social norms towards marriage and family formation have also changed along with the persistent decline in fertility rate within marriage (Lesthaeghe, 2010). In many western countries, the prevalence of divorce and remarriage has significantly increased, and cohabitation and childbirth outside wedlock have become a more acceptable choice (Lesthaeghe, 2010). In other words, a secure connection between marriage and birth, along with the social norm regarding the sequence of marriage and pregnancy, has been diluted as many developed countries have experienced the Second Demographic Transition.

South Korea (hereinafter referred to as Korea) also went through drastic changes in fertility during the second half of the 20th century. According to the statistic office of Korea (Statistics Korea, 2019), the total fertility rate (TFR) has decreased from 4.5 in 1970 to 1.05 in 2017. In 1983, the TFR already reached below the replacement level and the fertility rate has remained under the "lowest-low fertility" (Kohler, Billari & Ortega, 2002) level of 1.3 since 2001 (Statistics Korea, 2019). Korean women have also delayed marriage due to extended educational attainment and an increase in labour force participation rates (Choe & Retherford, 2009). Notwithstanding, the Korean society was relatively reluctant to accept cohabitation before marriage and childbirth outside wedlock due to vestigial conservative Confucian social norms which discouraged any birth before marriage (Lee, 2017). However, times have changed.

Recent studies report that post-conception marriage has significantly increased since the early 2000s without a significant increase in childbirth outside wedlock (Kim, 2017; Lee, 2017). This phenomenon indicates more women experience nonmarital conceptions, and they often end up marrying before childbirth, rather than giving birth without marriage (Kim, 2017) or get an abortion. This trend should be understood in the context that childbirth without marriage is still discouraged (Lee, 2017), and abortion has been illegal in Korea since 1953 (Jeon & Seo, 2003).

1.1   Research Problem

Existing Literature on premarital conception in Korea attempt to find the exact trend in premarital conception and investigate the determinants of premarital pregnancy (Kim, 2017; Lee, 2017; Lee & Kim, 2013). Previous studies has focused on the outcomes of premarital conceptions on women with respect to second childbirth or marital disruption as well (Kim,

2016; Kim & Kim, 2016). However, little has been known about the impact of premarital conception and marriage preceded by pregnancy on mothers later socioeconomic status or labour market outcomes until the present time.

Meanwhile, a large amount of existing literature in labour economics has intensively discussed *motherhood penalty*, which refers to the phenomenon that compared to female worker without child or male counterparts, working mothers tend to face lower wage level or wage growth due to the career interruption around childbirth, as the primary contributor to renowned gender pay gap in labour market (Anderson, Binder & Krause, 2003; Budig & England, 2001; Correll, Benard & Paik, 2007). However, the connection between premarital conception and woman's labour market transition around childbirth was not thoroughly investigated until Iwasawa and Kamata (2014) find that the woman who experienced a marriage preceded by pregnancy has a higher risk of quitting the job after marriage. Still, the mechanism behind this finding remains to be clarified. Also, it is questionable that the effect of premarital conception on woman's career decision would be similar in the Korean labour market as well.

Furthermore, previous studies fail to measure the proportion of premarital conception accurately (Kim, 2017; Kim & Kim, 2012; Lee, 2017; Lee & Kim, 2013). This issue may limit the implication of previous research because the erroneous specification can generate a measurement error of the independent variable, which yields a biased estimator. Previous research also did not distinguish the women who premaritally conceive and get married before childbirths from the women who give births without marriage due to an incomplete data source, although the difference in civil status and presence of husband may alter woman's economic incentives to stay in the labour market around childbirth (Kim, 2017; Lee, 2017).

1.2 Aim, Scope and Research Question

This thesis attempts to investigate whether premarital conception increases the possibility of women's career interruption compared to post-marital conception group around the time of her first childbirth. It also aims to find out how the correlation is different between women with only premarital conception and women with premarital birth. In order to address this issue, the following question will be explored:

RQ: Does premarital conception increase the probability of a woman's career interruption?

This thesis uses the 2015 National Survey on Fertility and Family Health and Welfare (NSFFHA) data, which contains information on women's marriage, fertility, and working history for multiple logistic regression analysis.

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1.3 Purpose

This thesis has three significant contributions to existing knowledge. Firstly, it deals with the potential determinants of working mother's career interruption in Korea. A large amount of academic literature has paid keen attention to women's career interruption and solutions to alleviate this problem since it results in relatively low female's labour force participation rate (Cho, 2016; Eun, 2018; Park, Cho & Kim, 2018). Meanwhile, although several recent studies also state that women with premarital conception have been stigmatised and associated with adverse outcomes after childbirth in the Korean context (Kim & Kim, 2016; Korea Institute of Health and Social Affairs, 2015; Lee, Park, Jun, Shin, Ko and Park, 2014), little research has attempted to relate premarital conception to a woman's labour outcomes. Therefore, this thesis aims to examine the relationship between premarital conception and woman's career interruption, particularly in the Korean context.

Secondly, this thesis also attempts to contribute to existing knowledge by trying a more accurate way of distinguishing premarital conception group. This improvement in measurement may help future research to yield unbiased estimator in studies related to this topic. Also, separating women who have the premarital conception to women who have premarital birth may also help recognise the potential heterogeneity between two groups and explain the difference in their behaviours as well.

Lastly, this thesis has policy implications. If the impact of premarital conception or premarital birth on woman's career is due to selection, the nonmarital conception itself does not result in notable social cost regarding woman's career interruption. However, if the association remains after controlling relevant covariates, the finding may support the argument that nonmarital conception generates social cost and thus, policy intervention for those women is needed. Moreover, if the findings are related to the fact that woman's choice was limited by the current legal situation which penalises abortion (Mother and Child Health Act, 2018), the results of this thesis may be another evidence that how restricting abortion may cause unintended yet negative consequence. In this sense, this thesis could yield more general implication where the debate over legalising or banning abortion takes place (Kelly, 2019; Seo, 2019).

1.4 Outline of the Thesis

The remainder of the thesis is organised as follows: Section 2 presents terminology and background regarding nonmarital conception, especially in the Korean context from the previous literature. Section 3 provides theoretical approach and research hypotheses. In Section 4, the description of the survey data and variables are presented. Explanation of methods and empirical model specifications will be shown in Section 5. The empirical analysis results and discussion will be provided in Section 6, along with discussion. Finally, the conclusion is presented in Section 7.

2   Background

2.1   Clarifying Terms Regarding Nonmarital Conception

The existing research has used various terms to refer to a practice that a never-married woman gets pregnant before the first marriage and gets married before the childbirth. This event is called "marriage preceded by pregnancy" (Iwasawa & Kamata, 2014), "post-conception marriage" (England, Shafer & Wu, 2012), "shotgun marriage" (England, Shafer & Wu, 2012; Lee, 2017) or "Mid-pregnancy marriage"(Gibson-Davis, Ananat & Gassman-Pines, 2016). Likewise, different terms has been used to mention a conception before marriage such as "premarital conception"(Goldstein, 1967; Lee, 2017; Wu, 1996), "bridal pregnancy" (Lee & Kim, 2013; Raymo & Iwasawa, 2008) or "nonmarital pregnancy" (Lichter, Sassler & Turner, 2014). Meanwhile, childbirth without marriage can be defined as *premarital birth*, albeit this term assumes that a woman will eventually get married at a certain point. Therefore, it is more appropriate to use terms such as childbirth outside wedlock or childbirth without marriage if one intends to refer to childbirth by an unmarried woman.

To avoid any confusion, this thesis will use the term *nonmarital conception* to refer to any conception before woman's marriage and use *premarital conception* or *wedding preceded by pregnancy* to refer to the combination of premarital conception and the marriage before childbirth. It will use *premarital birth* to refer to childbirth before marriage. If this thesis intends to refer to childbirth by a woman remaining unmarried by the timing of interest, it will use the term *childbirth without marriage*. This thesis also uses terms such as *the post-marital conception group*, *the premarital conception group* and *the premarital birth group*, to mention three different categories of the independent variable. The post-marital conception group is those who conceived their first child after woman's first marriage and the second and the third group are two subgroups of the nonmarital conception group. The post-martial conception group is also referred to as *the reference group* in Section 6. Moreover, ever-married woman's nonmarital conception due to separation or divorce is not going to be discussed nor included in the empirical model as this thesis primarily focuses on the premarital conception of first childbirth.

2.2   Previous Research

2.2.1   The Trend in Nonmarital Conception

It is apparent that the prevalence of premarital conception is associated with having a sexual relationship before marriage. However, not every sexual relationship before marriage during

the fecund period result in a premarital conception. A marriage preceded by pregnancy should be understood as a result of a sequence of a woman's decision (Akerlof, Yellen & Katz, 1996). Figure 2.1 (adapted from Hertog & Iwasawa, 2011, p.1679) briefly summarises the decision making stages. The first step is whether to have a sexual relationship before the first marriage, which is prevalent in many societies after the "contraceptive revolution" (Lesthaeghe, 2010, p.216). The second step is to use contraceptive methods. It depends both on the accessibility and the willingness to use such methods. Successive contraception would prevent couples from unwanted pregnancy. However, in case of unwanted pregnancy, a woman or a couple still choose between getting an abortion and having childbirth. This step is influenced by the economic burden of getting an abortion and the social norm (Hertog & Iwasawa, 2011). Lastly, even if the couple decides to bear and raise the child, it does not necessarily mean that they have to get married before childbirth. A marriage preceded by pregnancy takes place when there are social norms which discourage childbirth without marriage (Akerlof, Yellen & Katz, 1996; Hertog & Iwasawa, 2011). To conclude, a premarital conception is a consequence of a woman's choices shaped by individual and social characteristics. Moreover, there may exist a particular priority or a hierarchy in a woman's decision among abortion, marriage preceded by pregnancy or childbirth without marriage.

premarital sex → Unwanted pregnancy → Abortion / **Marriage preceded by pregnancy (premarital conconception)** / Childbirth before marriage

premarital sex → Succesive contraception → Post-martial pregnancy
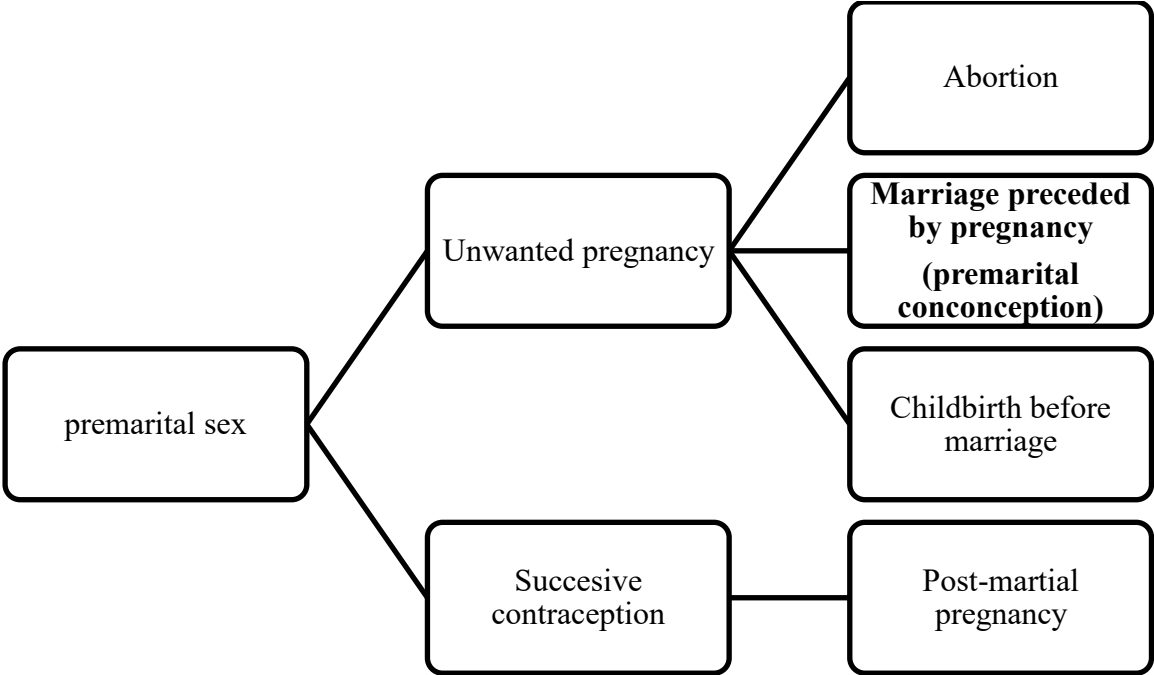
Figure 2.1 The decision tree regarding different consequences of premarital sexual relationship

(Adapted from Hertog & Iwasawa, 2011, p.1679)

The decrease in premarital conception and substitution to childbirth outside wedlock was well documented in previous studies (Akerlof, Yellen & Katz, 1996; England, Shafer & Wu, 2012; Lichter, Sassler & Turner, 2014). During the Second Demographic Transition, more couples choose to have children out of wedlock (Lesthaeghe, 2010). As a consequence, the prevalence of premarital conception has decreased, although the total number of nonmarital conception has increased (Lichter, Sassler & Turner, 2014). Access to contraceptive methods and abortion is also relevant. Akerlof, Yellen and Katz (1996) state that the proportion of

premaritally conceived first child declined due to widespread uses of contraception methods among unmarried women along with the legalisation of abortion from the 1970s. Nonetheless, there are exceptions where childbirth outside wedlock is still discouraged, and an unmarried pregnant woman is likely to get married before childbirth such as Japan (Hertog & Iwasawa, 2011) and Korea (Lee, 2017). Moreover, Japan also experienced a decrease in marriage and a persistent low level of fertility, which further raises the proportion of the marriage preceded by a pregnancy out of the total number of first marriage (Raymo & Iwasawa, 2008).

Under the conservative Confucian norms discouraging having a child out of wedlock, Korea also shows a lower prevalence of premarital birth and a higher proportion of first child conceived by premarital birth. Lee (2017) points out that the premarital conception has considerably increased in Korea in the last 15 years, while there is no significant increase in fertility out of wedlock. According to his estimation, the childbirth by premarital conception accounted for 7.5% in 2001 but increased to above 18% since 2010. Also, the proportion of post-conception marriage increased to 12% among all the first marriages in 2015 from 6% in the early 2000s. He also predicts that the trend will be persistent, and the birth cohort born in the 1990s is more likely to have their first childbirth by the premarital conception.

Another crucial aspect to understand the increasing proportion of premaritally conceived first children is that abortion has been penalised in Korea since 1953 (Jeon & Seo, 2003). However, it was mainly after the revision in 2009 that this law was more strictly applied as the lowest low fertility rates became one of the major recognised social issue (Kim & Heo, 2013). The authors state that after the revision, obstetricians who secretly kept performing abortion surgery required considerably higher fee due to increased risk. This finding implies that the woman in the younger cohort may suffer a relatively higher cost of abortion, which increases the risk of giving childbirth instead.

To summarise, the case of marriage preceded by pregnancy has increased in the past two decades, mainly due to the higher cost of abortion and social norms unfavourable towards childbirth without marriage. Therefore, similar to what Hertog and Iwasawa (2011) find in Japan, it can be assumed that there exists a hierarchy in the sequence of pregnancy, childbirth and marriage in the Korean context. While post-marital conception is considered *normal,* having a premarital conception is less desirable and childbirth before marriage the least desirable choice.

2.2.2   The Determinants of Nonmarital Conception

A large amount of existing literature investigates the determinants of nonmarital pregnancy (England, Shafer & Wu, 2012; Powers & Hsueh, 1997; Wu, 1996). Family background and education level have been the most recognised determinants of having a nonmarital conception. Family structure, such as the absence of both or one parents in early life is associated with a higher risk of premarital pregnancy (Wu, 1996). However, other research using sibling study design also reports that the role of family structure may be exaggerated without controlling unobserved family characteristics (Powers & Hsueh, 1997). Education level is also generally associated with nonmarital pregnancy as it determines the knowledge

and attitudes towards premarital sexual behaviour and contraceptive methods (England, Shafer & Wu, 2012; Lee & Kim, 2013; Upchurch, Lillard & Panis, 2002).

The relevance of family background and education to nonmarital pregnancy applies to the Korean context as well. Kim (2017) examines the risk factor of premarital pregnancy using data from Korean Longitudinal Survey of Women and Families (KLoWF). The study finds a similar correlation between family structure and the risk of premarital conception. He reports that being raised without parent increased the odds of premarital conception by 61 per cent compared to those raised by both parents. Meanwhile, contrary to family background, socioeconomic achievements by the woman herself, such as educational attainment or occupation have less impact on premarital conception. However, this finding contradicts the results from Lee and Kim (2013) that lower educational attainment is positively correlated with a higher risk of premarital conception. Therefore, the evidence from the previous study is insufficient to conclude the relationship between education and nonmarital pregnancy in the Korean context, albeit it is reasonable to suspect similar associations found in existing literature in a broader sense.

2.2.3   The Outcomes of Nonmarital Conception

The outcomes of nonmarital conception can be divided into the infant's side and the mother's side. The previous literature investigating the effect on the infant's side is primarily about premature birth and lower birth weight. This effect is worth investigating since infant with adverse health outcome needs more intensive care, and it may increase the risk of mother's quitting job after childbirth. A systemic review by Shah, Zao and Ali (2011) confirms that infant born to unmarried mother is associated with a higher risk of lower birth rate and prematurity. However, Buckles and Price (2013) argue that after controlling heterogeneity among married and unmarried mother, the difference in the possibility of adverse infant health outcomes considerably disappears. In the Korean context, empirical evidence is not conclusive. Kim & Kim (2012) find an insignificant effect of the premarital conception on infant's birthweight. However, this finding is contradicted by Lee et al. (2014), which report that there exists a positive correlation between prematurity and low birth weight and premarital conception. Thus, without follow-up research, it is challenging to conclude the association in the Korean context.

Meanwhile, previous studies concerning the effect on the mother's side are mainly on marital disruption (Furstenberg, 1976; Gibson-Davis, Ananat & Gassman-Pines, 2016; Kim & Kim, 2016). Furstenberg (1976) explains that limited financial resources and a shortened courtship period before marriage mainly generate a higher risk of marital instability. Kim and Kim (2016) also find a similar association between the premarital conception and the risk of divorce in Korea. Nonetheless, the effect of premarital conception on marital disruption may differ by the socioeconomic status of the couple. Gibson-Davis, Ananat and Gassman-Pines (2016) find that premarital conception has negative effect mainly on the established group while it did not show significant influence on the more marginalised population. This variance may generate interaction between the premarital birth and educational attainment or income level.

Previous research also examines the psychological aspect concerning women who experience premarital pregnancy especially in the context that premarital conception is considered as a less desirable choice (Chun, Lee & Kim, 2014; Hertog & Iwasawa, 2011). Hertog and Iwasawa (2011) compare women's attitudes towards premarital conception, abortion and childbirth without marriage in the US with those of Japan. They show that Japanese women perceive getting pregnant before marriage as a less desirable choice and getting married before childbirth is preferred in any circumstance to giving childbirth without marriage, whereas a hastened marriage only because of the pregnancy is considered less desirable in the US (Hertog & Iwasawa, 2011). The notion of inferior choice may also affect a woman's attitudes towards childbearing. Chun, Lee and Kim (2014) report that mothers with premarital conception answered they feel more responsibility for childcare to compensate any potential social stigma towards her child (Chun, Lee & Kim, 2014). The authors explain this pressure to perform better childcare is based on the perception that those women have chosen morally inferior choices.

Lastly, a thorough review of the relevant literature yields one study on the relationship between premarital conception and woman's career interruption. Iwasawa and Kamata (2014) suggest meaningful insight on this topic. The study reports two critical points: Firstly, women who experienced marriage preceded by conception shows a higher risk of being unemployed immediately after the marriage. They suggest that particular aspects of premarital conception, such as getting married with younger age and having a shorter relationship with her spouse are associated with having difficulties in continuing her career upon marriage. Secondly, according to the authors, there is no statistically significant disadvantage against women's employment status neither after one year from the first childbirth nor the time of the survey. Instead, the study finds a slightly positive correlation between premarital conception and women's later employment rate and income. They explain that the women delaying their marriage until they get pregnant may be a more motivated group who perceive the opportunity cost of marriage is relatively higher, similar to "Work-centred" group by Hakim (2002). This explanation indicates that the correlation between premarital conception and woman's career interruption may be partly explained by the selection, albeit it is questionable whether the same selection mechanism takes place among the Korean women as well.

2.2.4   Woman's Career Interruption in Korea Related to Childbirth

While the women's labour force participation rate has consistently increased the traditional gender role yet requires more contribution to childcare (Sung, 2003). Therefore, Korean working women often suffer conflict to balance their career and care work (Won & Pascall, 2004). This conflict shapes a peculiar pattern of the percentage of economically active female or so-called *M-shaped Curve*, which shows a drastic decline in labour force participation rate around the marriage or childbirth and rebounds after the child grows to require less intensive care. (Eun, 2018). The author states that this pattern has remained constant since the 2000s with a shift in the timing of the first exit to labour force from late 20s to early 30s due to postponement in the timing of first marriage and childbirth.

Therefore, conditions which alleviate this difficulty can take a crucial role in a woman's career decision after childbirth. A couple of previous studies emphasise the importance of

family-friendly work environment and the accessibility to maternity leave and parental leave to reduce women's labour market exit around childbirth (Cho, 2016; Park, Cho & Kim, 2018). According to Cho (2016), sector difference and the entitlement of the maternity leave are significant factors which lower the risk of career interruption. Indeed, the accessibility to maternity leave lowered the risk by about 30%. Park, Cho and Kim (2018) also prove that both maternity leave and parental leave lowers the risk of career interruption. To sum up, job characteristics related to family-friendly conditions should be taken into account as a critical factor in a woman's labour market transition around childbirth in the Korean context.

3   Theory

3.1   Theoretical approach

To date, the existing research has not provided a valid theoretical approach to explain the relationship between the order of pregnancy, childbirth and marriage and woman's labour market participation decision. Although Iwasawa & Kamata (2014) seek an explanation to the positive correlation between marriage preceded by pregnancy and woman's career interruption, the explanation is insufficient to predict the difference in risk of quitting a job around the childbirth among post-marital conception group, premarital conception group and premarital birth group. This thesis suggests four theoretical explanations for the link between nonmarital conception and career interruption concerning the labour supply and the demand side factors.

3.1.1   Economic Incentives to Withdraw from the Labour Market around childbirth

The theoretical approach regarding the supply side of the labour market primarily deals with the economic incentives which women consider when she decides to continue working. Existing literature has used this approach to analyse the woman's labour market exit due to marriage or childbirth (Raymo & Lim, 2011; Vlasblom & Schippers, 2006). Human capital theory can primarily explain the differences in economic incentives among female workers. Human capital is "the stock of productive skills, talents, health, and expertise of the labour force" (Goldin, 2016, p.83) which is mainly acquired by education, job training or improvement in health status. Based on Human Capital Theory, Jacob Mincer developed equation model which explains wages as a function of education level and experience, often referred as to *Mincerian wage equation* (Mincer, 1974). According to the Mincerian wage equation, the years of education and the job experience increases the wage level. Higher wage level, in turn, increases the opportunity costs of quitting job around childbirth. Besides, a higher level of human capital accumulation leads to the non-income such as the safe workplace, more stable employment contract, or more flexible working schedule. These favourable working conditions, in turns, also negatively correlated the probability to quit the job.

With the human capital perspective, the relationship between nonmarital conception and the risk of quitting job can be explained by selection. Selection problem occurs when factors which affect the independent variable also affects the outcome variable. Concerning nonmarital pregnancy and woman's exit to labour market around childbirth, education level and job experience are predicted to be primary sources of selection bias. As discussed above,

both premarital conception and premarital birth are associated with lower educational attainment. Moreover, lower age at first childbirth implies they have acquired less experience when they ought to make the decision. Therefore, nonmarital conception could be positively associated with the probability of resigning from work around childbirth, but this association is expected to weaken after controlling factors regarding selection. Meanwhile, it is difficult to predict whether a premarital conception group or premarital birth group has lower educational attainment and job experience on average based on the theoretical approach. Nonetheless, if the premarital birth group is a more marginalised group in Korean society as Hertog and Iwasawa (2011) suggest, it is appropriated to predict that the premarital birth group has lower education level and faces inferior working condition on average.

Another notable difference in economic incentives can originate from the household's dependency on woman's income. If a woman's household has another source of income, mainly from her partner, the woman has more possibility of specialising in unpaid labour. However, if a woman is the only income source of her household due to the absence of her partner or partner's unemployment, the woman has a more financial responsibility to support herself and other household members, especially her child. Therefore, even if she has to invest more time and effort on childcare, quitting her job is less likely to happen. Thus, the premarital birth group could have a stronger incentive to stay in the labour market compared to premarital conception group.

To summarise, heterogeneity in economic incentives to continue working can explain the difference in probability of quitting job around childbirth among post-marital conception, premarital conception and premarital birth groups. This difference can be a consequence of selection in human capital accumulation or results of different level of economic responsibility women have due to the presence of the partner. However, the economic incentive may not be sufficient to explain women's labour market transition around childbirth when other factors are influencing a woman's decision as well.

3.1.2   Attitudes and Norms

Although the economic incentives have a major influence on woman' s career decision, norms and values may function as an intermittent variable, which affects an individual's response to economic incentive (Vlasblom & Schippers, 2006). For instance, the Preference Theory by a sociologist Catherine Hakim (Hakim, 1998; 2000 cited in McRae, 2003) gives insights into understanding the role of women's orientation to work on labour market participation decision after marriage or childbirth. According to Hakim (2002), the heterogeneity in employment rates and occupational choices within female workers can be explained by the difference in personal preference. She separates females into three groups: *Adaptive, Work-Centred* and *Home-Centred* women. The author explains that adaptive women, who try to balance her career and the household labour, tend to respond to government social or employment policy sensitively. The work-centred group are more committed to other groups and most responsive to economic incentives. Meanwhile, home-centred women prefer not to participate in the labour market unless it is necessary and less responsive to both economic incentives and governmental policies (Hakim, 2002). Although it is not thoroughly discussed in the original study, this preference difference may affect a woman's labour market

participation decision around childbirth. According to the theory, home-centred women are more likely to withdraw labour market around her first childbirth, while work-centred group are more likely to continue to work after maternity leave or even decide not to have a child at all (Hakim, 2002).

However, this theory faces criticism from other scholars for two reasons. Firstly, Hakim's theory underestimates economic and social constraint in reality and put too much emphasis on an individual's preference without clarifying the mechanism of developing such preferences (McRae, 2003). Particularly in the Korean context, it is not appropriate to assume that the influence of the traditional norms of gender role is irrelevant (Won & Pascall, 2004). Secondly, Hakim's theory assumes that personal preference is "fixed and predetermined" (Vlasblom & Schippers, 2006, p.331), and therefore, it determines woman's behaviour. However, Crompton and Harris (1998) raise the question to this argument suggesting that attitudes could also be influenced by behaviours, which also indicates attitudes itself is not fixed. This criticism also indicates that when the effect of preference is empirically tested, there could be a reverse causality issue between independent and dependent variable which fundamentally limits the implication of the empirical analysis.

Applying this discussion to findings in Chun, Lee and Kim (2014), *home-centred* attitudes may be related to premarital conception. However, it is also possible that more *home-Centred* woman is prone to have a premarital conception, and the event of premarital conception confirms her initial preference. Another problem is that it is challenging to explain the difference between premarital conception group and premarital birth group with this theoretical approach. The premarital birth group may share similar attitudes with the premarital conception group in terms of their orientation to work. Meanwhile, it is also plausible that the premarital birth group intentionally does not follow general social norms regarding childbirth and marriage, which also implies they are not as adaptive as their counterparts.

Given these points, the norms and attitudes is an important factor in explaining the woman's labour market transition around childbirth since it can moderate the responses to economic incentives. However, the causal relationship between attitudes and behaviour is arguable. Moreover, this approach presents a less clear picture for the comparison between nonmarital conception group and post-marital conception group or between the premarital conception group and the premarital birth group as well. Nonetheless, the emphasis on the social norms in the previous literature brings another relevant point into consideration.

3.1.3   Negotiations Regarding the Division of Household Labour

The division of household and care work can also influence a woman's decision to withdraw from the labour market. The Neoclassical economic explanation to the division of labour is based on the explanation that a couple aims to maximise the household utility, and they specialise accordingly (Becker, 1985). However, other studies on this topic suggest that this specialisation is not solely based on competitive advantage (Davies & Carrier, 1999; DeMaris & Longmore, 1996; Mannino & Deutsch, 2007). Rather, the division of household labour is negotiated between partners (Mannino & Deutsch, 2007). Also, the power-relation and gender

roles shape the negotiation process (Davies & Carrier, 1999; DeMaris & Longmore, 1996). Therefore, a woman with a strong orientation to work may have difficulty in balancing her paid and unpaid labour if she relatively lacks negotiating power compared to her partner. As a consequence, she may involuntarily choose to specialise in household labour and withdraw from the labour market.

This approach can be applied to explain the difference in probability of resigning from work between premarital conception group and post-marital conception group if there is a notable difference in woman's decision-making power between two groups. If premarital conception group perceive their behaviour as a less desirable or morally inferior choice (Chun, Lee & Kim, 2014; Hertog & Iwasawa, 2011), this perception may also negatively affect women's negotiation power. Moreover, inferior matching among premarital conception group, found in existing literature (Furstenberg, 1976; Kim & Kim, 2016), may also make the negotiation process more frustrating.

Although the negotiation of the division in household labour could be related to woman's labour market withdrawal, it is challenging to predict the difference between premarital conception group and premarital birth group by this approach since the premarital birth group is not likely to experience this negotiation with the absence of her partner. Women with premarital birth are both responsible for economic support and childcare without the help of other family members or her unmarried partner. Therefore, this approach primarily explains the difference between the post-martial conception and premarital conception group.

3.1.4   Discrimination

The theoretical approach concerning the demand side of the labour market in explaining woman's labour market withdrawal around childbirth focuses on discrimination. Borjas (2016) explains that labour market discrimination takes place when individuals with the same productivity are treated differently due to characteristics irrelevant to productivity such as sex, race or national origin. He further explains that there exist two major theories explaining the mechanism of discrimination. The first type of discrimination is taste discrimination proposed by Becker (1957) in his doctoral dissertation. The taste discrimination theory explains that an individual of a particular type of characteristic can be discriminated against either by employers, employees or customers due to their *taste* irrelevant to productivity level. This theory implies that the discriminatory behaviour may happen even if it does not maximise the utility since the taste is irrelevant to productivity itself. Therefore, taste discrimination cannot be entirely solved by mere change in economic incentives.

The other way of explaining labour market discrimination is a statistical theory of discrimination firstly proposed by Phelps (1972). This type of discrimination occurs when an employer measures an individual's productivity not by the real productivity of the individual, but by the average productivity of a group the individual belongs to (Borjas, 2016). The statistical discrimination occurs whenever there exists insufficient information on an individual productivity level, although the employer has unprejudiced in terms of her or his preference. Also, this theory predicts that statistical discrimination will be solved if accurate information on an individual's productivity becomes available to employers.

Even so, there is little evidence that labour market discrimination against the premarital conception group or premarital birth group takes places in the Korean context. No official statistics or survey addressing this type of discrimination nor any previous research on this topic is available, although existing literature consistently recognises premarital conception and premarital birth has been stigmatised in the Korean context (Kim, 2017; Korea Institute of Health and Social Affairs, 2015). There exists only one news article on a decision that laying off an employee due to premarital conception is illegal (Moon, 2018). Still, there may exist institutional discrimination against nonmarital conception if the accessibility to family policy benefits is limited by civil status. However, current law states that such benefits are based on the birth registration, and the individual should not be discriminated by the mother's civil status (Act on Equal Employment and Support for Work-Family Reconciliation, 2019). Besides, to estimate the effect of such discrimination, a particular type of research designs such as the audit study (Neumark, Bank & Van Nort, 1996) or the correspondence testing (Abubaker & Bagley, 2017; Carlsson & Rooth, 2012) are needed. Therefore, this approach will not be further addressed in the empirical analysis even though there remains the possibility of discriminatory practice against women with nonmarital conception.

To conclude, theoretical approaches on the relationship between nonmarital conception and career interruption and main findings from previous studies indicate four important points: First, selection in education and experience may generate the heterogeneity in economic incentives to withdraw from the labour market around childbirth between post marital conception group and nonmarital conception group. Second, the difference financial responsibility due to civil status can also result in variance in economic incentive between premarital conception group and premarital birth group. Third, premarital conception group may have more difficulty in negotiating the division of household labour compared to the post-marital conception group, which can increase the probability of resigning from work and specialising in unpaid labour, while this prediction does not apply to the premarital birth group. Lastly, although the difference in attitudes towards gender role and labour market discrimination can influence female worker's decision to continue working around childbirth, it is challenging to deal with these approaches in the empirical analysis of this thesis due to reverse causality and research design issues. Therefore, this thesis primarily attempts to investigate the difference in economic incentives resulting from the selection issue in the empirical analysis.

3.2 Research Hypotheses

As mentioned in Section 3.1, this thesis mainly examines the differences in the risk of woman's resigning from the work among the post-marital conception, premarital conception and premarital birth group by focusing on the explanation related to economic incentives. This thesis expects the difference in economic incentives is due to selection. Therefore, without controlling the relevant variable, the nonmarital conception group may show a higher probability of quitting the job. However, this correlation will weaken after controlling the selection bias. Also, this thesis predicts heterogeneity between the premarital conception group and the premarital birth group, albeit the discussion above is insufficient to conclude

which group has a higher risk of quitting a job around childbirth. On top of that, this thesis also aims to test whether this association is persistence for two reasons: Firstly if the correlation is persistent around second childbirth, which is seemingly irrelevant to first childbirth itself, it may indicate that unobserved individual heterogeneity should be taken into consideration. Secondly, if the correlation lasts for a longer period, it may also imply that the social cost of nonmarital conception in terms of women's disadvantage at the labour market is larger.

Given these points, this thesis tests the two main research hypotheses as follows:

Research hypothesis 1: The nonmarital conception will increase the risk of a woman's quitting her job around childbirth.

RH 1a: The magnitude of the coefficient of the independent variable will decrease after controlling individual and job characteristic covariates.

RH 1b: There is a difference in the probability of quitting a job between the premarital conception group and the premarital birth group.

Research hypothesis 2: The impact of a premarital conception of the first child will be insignificant on a woman's decision to quitting a job around the time of second childbirth.

4 Data and variable

4.1 Data

4.1.1 The National Survey on Fertility and Family Health and Welfare

This thesis uses the 2015 National Survey on Fertility and Family Health and Welfare (NSFFHA) data to test the research hypotheses. The Korea Institute for Health and Social Affairs (KIHSA), a government-funded institution affiliated with the Ministry of Health, Welfare, has conducted this cross-sectional survey every three years since 1982. The latest survey was done in 2018. However, the microdata of the latest one is planned to be revealed after June 2019. Thus, this thesis uses the microdata collected in the 2015 survey, which is the most recent available dataset. The latest and previous microdata can be purchased and downloaded from KIHSA website.

The microdata from the 2015 survey was collected during August 2015 and made public in June 2016. The main population of this survey is an ever-married female who is in her fecund age (15-49) at the time of interview. It also includes responses from unmarried females and males between 20 and 44 to grasp general opinion on family formation and fertility. To collect national representative samples, it stratified two-stage cluster sampling method based on 2010 Census result (KIHSA, 2015). Also, according to the estimated survey success rate (83%), it surveyed 12,000 households to meet the intended sample size of 10,000 households in the 2015 survey. As a consequence, the final dataset included 11,009 married women between age 15 and 49 and 2,383 unmarried men and women between age 20 and 44. This thesis primarily uses the responses from the married women for the quantitative analysis.

The questionnaire provides comprehensive information on women's marriage and fertility. It includes information on the month and year of the individual's first marriage, each pregnancy and each childbirth. This information has to direct limitations. First, it does not include the exact date of marriage or childbirth. Second, even though the trained interviewer visited each household and assisted interviewees (KIHSA, 2015), it may be difficult for women to recall the exact months of pregnancy. Therefore, it may generate a measurement error.

The survey also contains information concerning socio-economic status such as current civil status, education attainment, employment status, residence, occupation, type of housing, average income, wealth at the time of the survey. As career interruption due to marriage and childbirth has been recognised as an important social issue recently, the survey also tracks the change in woman's employment status six months before and after her first marriage until fifth childbirth. This information is crucial in estimating the effect of premarital conception on mother's career decision.

4.1.2 Sample Selection Procedure

As mentioned above, the initial 2015 survey of married women includes 11,009 observations between age 15 and 49. Among those are 18 single mothers, both recognised by lack of civil status information. Those observations are excluded. Two observations lacking information on the marriage month are also dropped out. Eight hundred eighty-two women without a child are excluded because, for those women, the time at risk of experiencing career interruption is different from those who already have the first child. Also, Observations from individuals who responded that they are foreigners or have been naturalised were excluded for it is not certain where those women had their education, work experience, marriage and childbirth. Moreover, some observations showed abnormal gestation age, such as less than 5 months or more than 10 months. By looking through the actual data, it is found that this anomaly is due to coding mistake either in the year of pregnancy or year of childbirth. In total, 103 cases of miscoding in first birth and 53 cases of miscoding in second birth were recognised. The most frequent anomaly was 21 months, which are 9 months plus one year (12 months). Based on the previous finding that gestation age statistics from Korea is mostly distributed between 21 and 43 weeks (Park, Shin, Kim and Lim, 2015), this thesis excluded observations with less than 5 months and above 10 months gestation age.

The largest sample limitation is due to the fact the majority of observations had no information on working experience or did not work. Out of 10,109 women who have more than one child, 5998 answered that this question is not applicable or have not worked six months before or after her first childbirth, which leads to excluding those observations as well. This attrition also indicates that those who are included in the final sample are not representative samples in terms of orientation to work in the Korean context. This selection also can be observed when comparing the total years of job experience among the initial observations from the raw data, observations included in the first analysis and observations included in the second analysis (See Appendix A.1, A.2 and A.3 for more detail). This selection should be kept in mind while interpreting the main findings as well.

As a consequence, for the first empirical model which tests the impact of premarital conception on woman's career interruption around the first childbirth, 4,073 observations are included. For the second model which investigates whether the association tested in the first model remains by the time of second childbirth, those who excluded in the first analysis were included on condition that they responded they worked six months before second childbirth. However, more respondents were excluded from the first model dataset because they withdrew from work and did not return by second childbirth. As a result, 1712 observations are included in the second analysis.

4.2   Variable

The list of descriptions of variables used in the empirical analyses is as follows:

Independent variable: The independent variable is a categorical variable which indicates a woman experienced post-marital conception or premarital conception during her first childbearing. Premarital conception group is divided into two subgroups by order of her marriage and childbirth. It is coded as 1 if a woman falls into the post-marital conception group, 1 in case of the premarital conception and 2 in case of the premarital birth. Every woman coded as 2 eventually got married before the time of the survey. There was no explicit question asking a woman experienced premarital conception. Therefore, this thesis measures the independent variable using the information on the timing of pregnancy, the timing of marriage and the timing of first childbirth. In other words, it is coded as 0 if the year and month of pregnancy is preceded by the marriage year and month or in the same month, 1 if the year and month of pregnancy is prior to the marriage and 1 if the end month and year of pregnancy with live birth outcome is prior to the marriage. The reason individuals with the same months of pregnancy and marriage are coded as post-marital birth is that it is common to adjust the timing of marriage to have a "honeymoon baby" in Korea. Thus, it is reasonable to label those women with post-marital conception group. As mentioned above, recognising premarital conception and distinguish women with only premarital conception from women with premarital birth is one of the contributions this thesis is aiming for. By using an older version of the same survey or the Population Trend Survey data which lack information on the exact timing of pregnancy, most previous studies could not accurately specify premarital conception (Kim, 2017; Lee, 2017; Lee & Kim, 2013). Instead, those studies rely on the method that specifies women with childbirth within 7 months from her marriage as a premaritally conceived group. However, this method may underestimate the actual proportion of premarital conception because it exerts too strict criteria to avoid including premature births as the outcomes of premarital births. Therefore, this thesis can make a more realistic specification of premarital conception and also distinguish the premarital birth group as a separate subgroup.

Dependent variable: In the first analysis, the dependent variable is a dummy variable which is coded as 0 if a woman continued working six months before or after the first childbirth and coded as 1 if a woman responded she quit working. Likewise, in the second analysis, the dependent variable is a dummy to indicate whether a woman continued working before or after six months from the second childbirth.

Cohort: It is coded as 1=born between 1965-1974, 2=1975-1984 and 3=after 1985.

Age at first birth: It is calculated with information on birth year and month and the timing of the first childbirth from the survey. It is calculated by month because the exact date of birth or childbirth is not provided. If it is assumed that both the date of birth is uniformly distributed around a month, the measurement error is not expected to affect the result seriously.

Age at second birth: It is calculated with information on birth year and month and the timing of the second childbirth from the survey. Similar to the age at first birth, it is calculated by

month because the exact date of birth or childbirth is not provided. Therefore, a uniform distribution of the date of birth is also assumed.

Region: The regions variable indicates the residence at the time of the survey. It is coded as 1=metropolitan cities (Seoul and 6 other designated metropolitan cities in Korea which are Busan, Daegu, Daejeon, Gwangju, Incheon and Ulsan), 2=normal cities (defined as a municipal administrative unit more than 150,000 population or designated by National Assembly), and 3=rural areas (other than Metropolitans and cities) (KIHSA, 2015).

Education: The information on the years of education is not available in the survey. Instead, respondents reported the last degree and whether she graduated and if not, the reason to suspend her study. The initial educational attainment has six categories. However, considering that only a few observations did not graduate elementary or middle school, it is coded as 1=high school graduate or less, 2=professional college graduate (either 2-year or 3-year programme), 3=university graduate (for the four-year programme) and 4=Master's degree or more.

Unwanted: It measures whether the live birth was by unwanted or wanted pregnancy. It is based on the self-reported response. It is coded as 0=wanted and 1=unwanted.

Prematurity: It measures whether the baby was born within 8 months of pregnancy. The general definition of premature birth is being born within 37 weeks of pregnancy (Wolrd Health Organization, 2019), but the actual pregnant week is not available on the survey. Thus, this thesis uses within 8 months criterion as a proxy. It is coded as 0=normal birth and 1=premature birth.

Spacing: It measures the gap between the first childbirth and the second childbirth by months. This variable is only used in the second analysis.

Employment type: It measures the employment type of an individual. It is coded as 0 if she works as a regular worker, 1 if she works as self-employed or as *a family worker without income* and 2 if she works as an irregular worker, which means either temporary worker or daily labourer.

Occupation: It measures the woman's occupation. The initial response is coded according to the Korean Standard Classification of Occupation in the survey (KIHSA, 2015). It is sorted into two categories: blue-collared occupation and white-collared occupation. The white-collared occupation consists of Managers, Professionals and related, Clerks, Service workers and Sale workers, which is coded as 1 and the blue-collared occupation consists of Skilled agricultural, forestry and fishery, Craft and related trade workers, Plant, machine operational and assemblers, Elementary occupation and Armed forces, which is coded as 0.

Sector: It measures whether the job belongs to the public or private sector. The public sector, coded as 0, includes central and municipal government office, state-owned firms and government-funded or affiliated institutions. The private sector, coded as 1, includes private firms, self-employment and nine responses of *other type* of workplace.

5   Methods

As mentioned in Section 4, two steps of analyses are proposed to answer the research hypotheses. The first analysis tests the correlation between premarital conception and woman's career interruption around the time of first childbirth. The second analysis tests the persistence of the potential effect tested in the first analysis. The research hypotheses indicate that the outcome variable of the analyses is the probability of woman's resigning a job within six months before or after childbirth or the first childbirth. This probability is identified with a binary dependent variable. This setting is also called "Limited Dependent Variable (LDV) analysis" (Wooldridge, 2016, p.583).

5.1   Empirical Analysis Method

5.1.1   Logistic Regression Model

According to Wooldridge (2016), when it comes to using the LDV regression model, it is inappropriate to estimate outcome by using a linear regression model. If the Linear Probability Model (LPM) regression model is used in the estimation, the estimates of the probability of an event $y_i|x_i$ could either be below 0 or above 1, which violates the first probability axiom. He explains that a Logit model which assumes the probabilistic distribution of the outcome variable is generally used to solve this issue. This thesis uses the standard logistic distribution model (logit) for empirical analysis.

Logit model uses a logistic distribution function. Defining the function of interest as $t = \alpha + x'_i\beta$, the standard logistic distribution function is given by:

$$G(t) = \frac{e^t}{1 + e^t}$$

By using a logit model, the odds ratio, which is defined as "which is the probability of success over the probability of failure" (Wooldridge, 2016, p.792) could also be easily calculated. Defining the probability of $y_i = 1$ as $p_i = \Pr(y_i = 1 \,|\, x_i)$, the log odds ratio of an event is defined as below:

$$logit(p_i) = log\ \frac{p_i}{1 - p_i} = \alpha + x'_i\beta$$

5.1.2 Weighted Regression

In the case of using complex survey data involving stratification and clustering sampling methods in statistical analysis, weighting can be an appropriated strategy for more accurate estimation. According to Angrist and Pischke (2009), there is no consensus on the necessity of using weighting in regression analysis. In the case of the grouped dataset, the authors recommend using a weighted regression model. According to Wooldridge (2016), heteroscedasticity is another case when the weighted regression model yields a more efficient result than a simple OLS model. Meanwhile, Angrist and Pischke (2009) state that it is rather arguable to use weighting in case of heteroscedasticity in microdata analysis.

According to KIHSA (2015), it is recommended to use the sample weight provided in the dataset. The institution used two-stage stratification methods to construct samples, and the final weight variable is a product of a sample design weight, non-response adjustment weight and the post-stratification weight (KIHSA, 2015). Notwithstanding, it also remarks that responses from the outliers in the sample may inflate the variance of the estimates, which leads to inefficient estimation, albeit the adjustment for potential extreme weight has been made. Considering the discussion above, it is reasonable to assume that there is sufficient reason to use weighted regression model in this thesis. Therefore, this thesis attempts to include sample weight variable in the empirical analysis. Weighting option for logistic regression analysis is provided by STATA 15 software. For the sensitivity testing, unweighted regression result is also presented in Section 6.

5.2 Models

5.2.1 Model 1

For the first analysis, the baseline model includes a dependent variable and an independent variable. In the second model, variables relevant to individual characteristics such as cohort, age at first birth, region, education attainment, premature birth and unwanted pregnancy variable are added. In the final model, variables related to job characteristics such as occupation, sector, employment type are included. The baseline model (Model 1a) is a binary logit model using the following specification:

$$y_i = \beta_1 x_i independent + u_i \quad (1)$$

Where y_i is the probability of resigning a job, $x_i independent$ is the categorical independent variable and u_i is the error term. The coefficient of the independent variable in the baseline model will be the reference and be compared with an advanced model to investigate the expected omitted variable bias.

In an alternative model (Model 1b), controlling variable regarding individual characteristics are added to the baseline Model 1a:

$$y_i = \beta_1 x_i independent + X'_i \gamma_1 + u_i \quad (2)$$

Where y_i is the probability of resigning a job, $x_i independent$ is the categorical independent variable, X'_i is the vector of individual characteristics variable such as cohort, age at first birth, region, educational attainment, unwanted pregnancy, premature birth, and u_i is the error term.

The cohort variable is included instead of individual's age itself because the age at first birth is already included and it is suspected that different cohort groups may share the different possibility of choosing an abortion partly due to the change in the application of penalizing abortion mentioned in Section 2. Also, Growing in a different birth cohort could be associated with the difference in attitudes towards marriage and childbirth, as discussed in Kim (2017). Unwanted pregnancy variable is used as a proxy of unexpected or unplanned pregnancy, which may distort women's initial plan to balance career and childcare. Premature birth is included since prematurely born new borne can have an adverse health condition and need extra care from the parents, which may affect a woman's decision to stop working.

In the final model of the first analysis (Model 1c) variables related to the workplace, characteristics are added at equation (2). It follows the specification as below:

$$y_i = \beta_1 x_i independent + + W'_i \delta_1 + X'_i \gamma_1 + u_i \quad (3)$$

In Model 1c, W' is a vector of control variables related to workplace characteristics, and the rest is the same as Model 1b. Employment type variable especially captures the difference in work time flexibility. For instance, self-employed or freelancer women may have the most flexible working schedule. Also, regular workers may have the least flexible working schedule after controlling maternity and parental leave, which will be used as a reference value in the regression. According to previous research (Cho, 2016; Park, Cho & Kim, 2018), it would be ideal to include the entitlement of maternity and parental leave in the final model. However, the survey only asked the actual use of maternity and parental leave. This survey design is problematic because those who quit working around childbirth are unable to *use* maternity leave or parental leave regardless of the initial accessibility of such leaves. Therefore, including these factors is predicted to distort the results, and the final model does not include covariates indicating maternity leave or parental leave.

5.2.2 Model 2

The second analysis is to estimate the effect of premarital conception on woman's career decision around the time of the second childbirth. This analysis also contains three steps from the baseline models to the model, including individual and occupational covariates. The baseline model (Model 2a)'s specification is as follows:

$$y_i = \beta_2 x_i independent + u_i \quad (4)$$

The dependent variable is now the probability of resigning a job six months before or after the second childbirth. The independent variable is the same. Model 2b includes individual characteristics and specified as follows:

$$y_i = \beta_2 x_i independent + X'_i \gamma_2 + u_i \quad (5)$$

Model 2b includes spacing variable since the gap between first and second childbirth may influence the woman's decision to continue working as well. The rest of the variable is the same as Model 1b.

Lastly, Model 2c includes occupational characteristic variables. Its specification is as follows:

$$y_i = \beta_2 x_i independent + W'_i \delta_2 + X'_i \gamma_2 + u_i \ (6)$$

Except for the fact that spacing is added from Model 2b, Model 2c includes the same type of variables relevant to the occupation a woman had around second childbirth.

5.2.3   Sensitivity Testing

This thesis performs four types of sensitivity testing for each model to check the robustness of the main regression results. The first two tests are about using differently specified independent variables. Model 1d and 2d are under the assumption that a woman with the same marriage and pregnancy timing is assigned to the premarital conception group instead of the post-marital conception group. Model 1e and 2e use the methods from the previous research mentioned in Section 4. The second group is related to the sample weight. As mentioned in Section 5.1, it is still controversial to use weighted regression model. Therefore, Model 1f and 2f provide the results without weighting. The last testing is limiting the samples by excluding the self-employed individuals from the initial model. Model 1g and 2g are regarding this procedure. There are two main reasons for this exclusion. Firstly, a family policy such as maternity leave and parental leave is more relevant to regular or irregular workers following a specific work schedule. In most of the cases, self-employed workers have more flexibility in their working schedule, and their *leave* is based on self-made decisions. Secondly, the descriptive analysis of Model 2 shows a considerable portion of self-employed women in the premarital birth group compared to Model 1. This feature may be correlated with the premarital birth group's higher probability of quitting job observed in Model 2. The detailed specification of models for sensitivity tests is not presented.

5.2.4   Interaction Testing

This thesis also attempts to detect potential interactions between the independent variable and other covariates. Particularly, this thesis tests interaction with cohort, region and education variable. Model 1h and 2h test the interaction between the independent variable and cohort. The second interaction term this thesis investigates is the interaction between the independent variable and region (Model 1i and 2i). The last interaction testing is between the independent variable and educational attainment (Model 1j and 2j). The results will be discussed in Section 6.

6   Empirical Analysis

6.1   Results

6.1.1   Descriptive Analysis

Model 1

Table 6.1 Descriptive statistics of Model 1

Variable	Category	Post-marital conception	Premarital conception	Premarital birth	Total
Quitting job	Worked	59.58	43.56	40.83	55.73
	Quit	40.42	56.44	59.17	44.27
Cohort	1965-1974	40.26	32.46	40.83	38.67
	1975-1984	54.51	51.79	45	53.67
	After 1985	5.23	15.75	14.17	7.66
Age	(Mean)	38.69	36.85	37.86	38.28
	(Std. Dev.)	5.48	6.38	6.22	5.75
Age at first birth	(Mean)	28.58	26.61	24.66	28.06
	(Std. Dev.)	3.49	3.64	3.90	3.67
Region	Metropolitans	44.4	37.95	37.5	42.87
	Cities	37.46	40.33	35	37.98
	Rural areas	18.14	21.72	27.5	19.15
Educational attainment	High school or less	26.42	42.24	61.67	30.71
	Professional college	21.09	22.08	19.17	21.24
	University	44.11	31.86	19.17	40.85
	Master or more	8.38	3.82	0	7.19
Unwanted pregnancy	Wanted	97.91	69.81	74.17	91.43
	Unwanted	2.09	30.19	25.83	8.57
Prematurity	Normal	95.83	96.42	93.33	95.88
	Premature	4.17	3.58	6.67	4.12
Employment type	Regular workers	77.4	73.15	65.83	76.18
	Self-employed	9.98	10.62	11.67	10.16
	Irregular workers	12.62	16.23	22.5	13.65
Occupation	Blue-collar	5.36	8.23	15	6.24
	White-collar	94.64	91.77	85	93.76
Sector	Public sector	16.6	10.14	5.83	14.95
	Private sector	83.4	89.86	94.17	85.05
Total		3 115	838	120	4 073

Table 6.1 provides descriptive statistics for model 1 variables. The table reports sample mean and standard deviation for continuous variables and percentage in cases of binary or factor variables. Total row presents the number of the post-marital conception, premarital conception and premarital birth group with the total number of observations.

As mentioned in Section 4, this thesis uses alternative methods to measure premarital conception instead of using the gap between marriage and childbirth as many previous studies estimate. To separate the case of premature birth from the case of premarital conception, those studies seven-month restriction has been used, and this restriction may result in underestimating the proportion of premarital conception. Also, this thesis also distinguishes premarital conception from a premarital birth case and assign them to a different category. Table 6.2 compares the result of the new method with the previous one.

Table 6.2 Comparison between independent variable measurements

Independent variable category	This thesis			Previous method		
	Freq.	Per cent	Cum.	Freq.	Per cent	Cum.
Post-marital conception	7,612	75.31	75.31	7,987	79.02	79.02
Premarital conception	2,119	20.97	96.28	1,744	17.26	96.28
Premarital birth	376	3.72	100	376	3.72	100

The new method estimates that 20.97 % of all first childbirth by women included in the survey were by premarital conception and 3.72 % were by premarital birth. Meanwhile, the methods used in existing literature estimates that 17.26 % of all first childbirth were by premarital conception. Therefore, it is apparent that the older method underestimates the proportion of premarital birth using the same data source.

However, it is worth considering that there exists a common limitation that both methods share. Neither of them can use the exact date of pregnancy, marriage and childbirth. As a consequence, there could be measurement error in estimating the premarital conception or the premarital birth. In this survey, 689 women responded the month and year of their marriage and pregnancy were the same, and 38 women responded the month and year of their marriage and childbirth were the same. As mentioned in Section 4, this thesis assigned the former group to the post-marital conception group. However, there exists no valid criterion to assign them to a particular group, albeit this thesis chooses to assign them to premarital conception group.

Nonetheless, if it is assumed that the measurement error at the data collection stage was controlled after excluding observations with abnormal gestation age and that the actual dates of pregnancy, marriage and childbirth follow a uniform distribution, the new method is more likely to yield better defines the independent variable. To check the robustness, the results of regression models using two alternative specifications of the independent variable will be provided as part of the sensitivity test.

The dependent variable or *quitting job* shows that 40.4 % of the post-marital conception group quit working while the percentage increases to 56.4% for the premarital conception group and 59.2% for the premarital birth group. A chi-square test also supports that the correlation between the independent variable and dependent variable is significant (Pearson's $\chi^2=79.87$ and p-value <0.001).

There also exist several notable features with respect to control variables. Firstly, while the overall distribution of age at first birth is similar to a normal distribution as shown in Figure 6.1, the average age of first birth is lowest in the premarital birth group. The proportion of the latest cohort is also higher in the premarital conception group (15.8 %) and premarital birth group (14.2 %) compared to the post-marital conception group (5.2 %). There is an overall difference in educational attainment. In the post-marital group, 73.6 % attended or graduated any tertiary education, whereas the per cent decrease to 57.8 % for the premarital conception group and 38.3 % for the premarital birth group. An extreme case is that there is no observation from the premarital birth group who has a Master or higher degree.
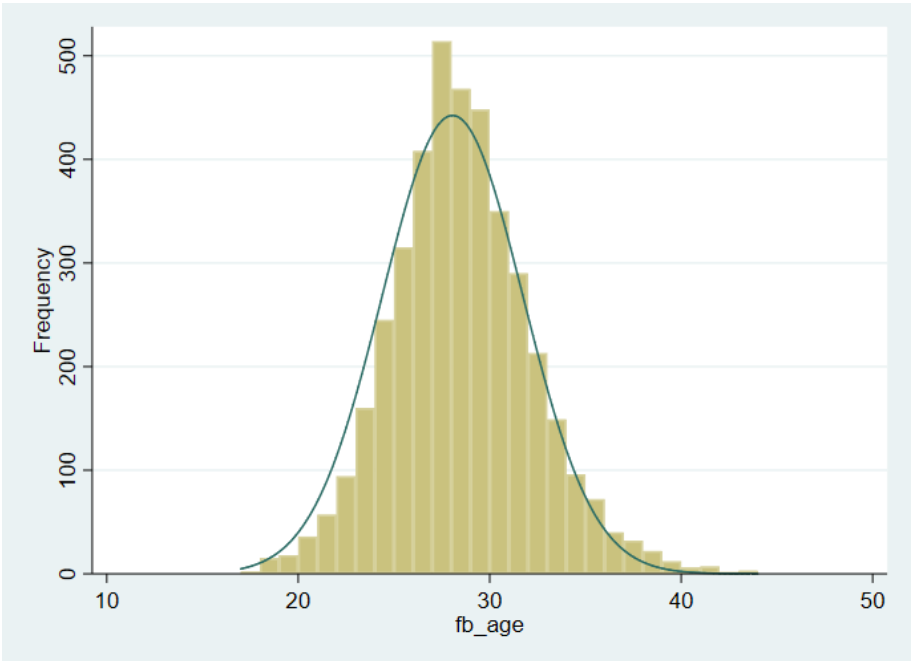
Figure 6.1 Distribution of age at first birth

Secondly, one can observe a higher rate of unwanted pregnancy for the premarital conception and birth group (30.2 % and 25.8 %, respectively) compared to the reference group (2.1 %). It is also noteworthy that premarital conception group has a higher rate of unwanted pregnancy than the premarital birth group. However, there exists limitation in interpreting this without accurate information on abortion because marriage preceded by pregnancy and abortion are two alternatives which a woman with nonmarital pregnancy would usually choose. On the other hand, there is also a minor difference in the percentage of premature birth among subgroups, but the correlation is not statistically significant (Pearson's $X^2=2.6082$ and p-value=0.271).

Thirdly, 93.8 % of observations included in the first analysis reported they work in white-collared occupations, but the proportion of blue-collared worker is more than three times

higher in the premarital birth group than the reference group. Meanwhile, 85 % of women worked in the private sector, but the proportion of working in the public sector was higher in the reference group (16.6 % in the reference group, 10.1 % in the premarital conception group and 5.8 % for the premarital birth group). For the employment type distribution, there was no meaningful difference in the proportion of self-employed workers, but the proportion of irregular worker was higher in the premarital birth group (22.5 %) than the premarital conception group (16.2 %) or the post-marital conception group (12.6 %).

In summary, the premarital conception group and the premarital birth group shows a lower level of educational attainment on average and younger age at the first birth. They also generally work in different condition compared to the post-marital conception group. The role of these heterogeneities in explaining the difference in the probability of quitting a job is to be tested in the subsequence regression analyses.

Model 2

Table 6.3 provides descriptive statistics for model 2 variables. The table is constructed in the same way as Table 6.1 except that variables included in the table are relevant to second childbirth. In Model 2, the probability of quitting a job decreases compared to Model 1. The differences in probability between subgroups decrease as well. The probability is 19.4% for the post-marital conception group, 23.3 for the premarital conception group and 31.7 for the premarital birth group (Pearson's χ^2=7.1492 and p-value=0.028). This phenomenon may be due to the selection that those who remain in the labour force around second childbirth have a higher motivation to develop a career or higher incentives to stay in the labour market. The smaller number of observations indicate a significant selection as well.

The percentage of unwanted pregnancy decreases and becomes similar among the three groups. This result is trivial since the independent variable should not be correlated to the second birth in theory. Notwithstanding, the premarital birth group shows a higher rate of unwanted pregnancy. It may be related to a couple's accessibility or knowledge to contraceptive methods (Pearson's χ^2=4.3327 and p-value=0.115).

Another notable feature is that whilst the overall distribution is similar to a normal distribution as shown in Figure 6.2, the difference in age at second childbirth becomes smaller because the premarital birth group has longer months of spacing on average. Compared to the post-marital group (41.3 months of spacing), the premarital conception group shows 39.2 months of spacing and the premarital birth group 50.8 months of spacing. The previous finding that the gap between first and second childbirth is smaller in case of premarital conception group can explain this result (Kim, 2016).

For educational attainment, the premarital conception group shows better educational attainment compared to the first analysis, while the other two groups show a similar pattern. The proportion of those who graduated any tertiary education is 63.8% in the premarital conception group, which is about 6%-point higher than previous analysis. It may also be the result of selection within the group.

The increase in the proportion of self-employed women in the second analysis may indicate that flexibility for self-employed working schedule makes it possible for more women to

remain in the labour force. The increase was especially relevant for the premarital birth group with 25%-point increase from the previous analysis.

In sum, at the time of the second childbirth, the overall difference between the post-marital group and the premarital group considerably declined while the premarital birth group remains with the most unfavourable conditions.
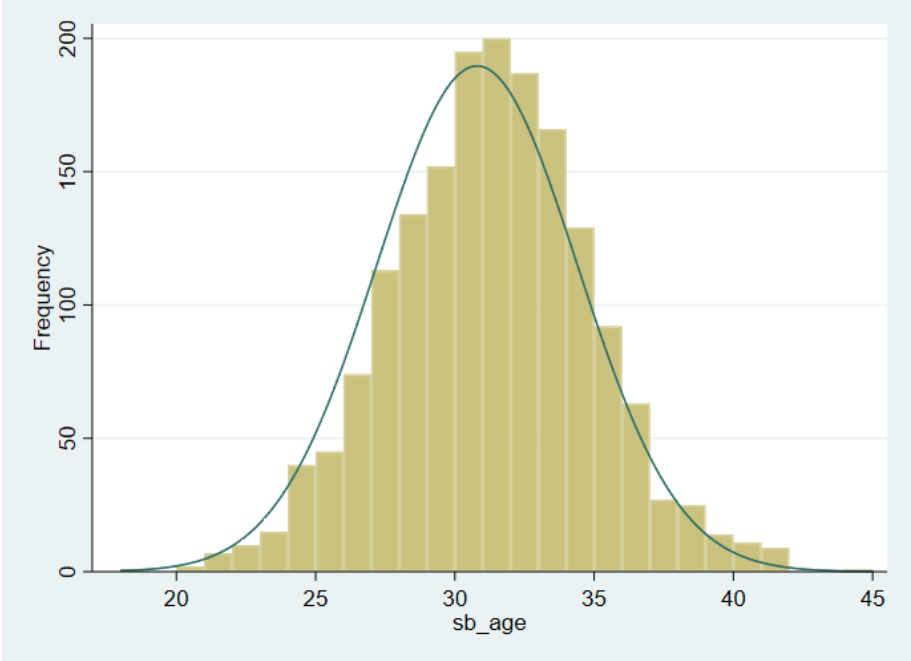

Figure 6.2 Distribution of age at second birth

Table 6.3 Descriptive statistics of Model 2

Variable	Category	Post-marital conception	Premarital conception	Premarital birth	Total
Quitting job	Worked	80.64	76.7	68.33	79.5
	Quit	19.36	23.3	31.67	20.5
Cohort	1965-1974	48.7	41.1	55	47.55
	1975-1984	49.74	50.16	43.33	49.59
	After 1985	1.56	8.74	1.67	2.86
Age	(Mean)	39.97	38.51	40.03	39.71
	(Std. Dev.)	4.96	6.15	5.33	5.23
Age at second	(Mean)	31.16	29.52	29.18	30.80
	(Std. Dev.)	3.46	3.73	4.09	3.60
Region	Metropolitans	42.14	35.92	38.33	40.89
	Cities	39.17	42.39	36.67	39.66
	Rural areas	18.69	21.68	25	19.45
Educational attainment	High school or less	26.36	36.25	65	29.5
	Professional college	19.88	22.33	15	20.15
	University	43.63	34.63	18.33	41.12
	Master or more	10.13	6.8	1.67	9.23
Unwanted pregnancy	Wanted	96.8	94.82	93.33	96.32
	Unwanted	3.2	5.18	6.67	3.68
Premature birth	Normal	95.53	97.09	95	95.79
	Premature	4.47	2.91	5	4.21
Spacing (months)	(Mean)	41.27	39.30	51.90	41.29
	(Std. Dev.)	24.35	23.90	38.10	24.95
Employment type	Regular workers	69.99	64.4	45	68.11
	Self-employed	18.62	22.33	36.67	19.92
	Irregular workers	11.39	13.27	18.33	11.97
Occupation	Blue-collar	5.73	9.71	13.33	6.72
	White-collar	94.27	90.29	86.67	93.28
Sector	Public sector	23.98	16.18	10	22.08
	Private sector	76.02	83.82	90	77.92
Total		1343	309	60	1712

6.1.2 Multiple Regression Analysis

Model 1

The first analysis is to test whether premarital conception and premarital birth increase the probability of resignation six months before or after the first childbirth. Table 6.4 presents the results of Model 1a, 1b and 1c. The baseline model (Model 1a) shows that both the premarital conception group and the premarital birth group has higher odds than the reference group without any control variable. The model is generally significant with a pseudo-R^2 of 0.012. The premarital conception group has 83% higher odds than the post-marital conception group

and the premarital birth group has 93% higher odds than the reference group. This result is significant at 0.1% level for both groups

The Model 1b with individual characteristic variables presents improved pseudo-R^2 of 0.054. Generally, the magnitude of the coefficient of the independent variable decreases. In Model 2, the premarital conception group has 43% higher odds than the reference group and the premarital birth group has 16% higher odds. However, the odds ratio for the premarital birth group is not significant at 5% level in Model 1b while that of the premarital conception group is still significant at 0.1% level.

Educational attainment shows a consistent and significant pattern of odds ratio change in Model 1b. Women graduated from a professional college, or university shows lower odds compared to women with less attainment. The group of highest educational attainment also shows the lowest odds. Unwanted pregnancy increases the risk by 13%, but the coefficient is not significant. Meanwhile, having premature birth is associated with having 49% higher odds and the odds ratio is significant at 5% level.

The final model (Model 1c) shows a notable increase in explanatory power (pseudo-R^2 = 0.125) after adding job characteristic variables. The odds ratios of the premarital conception group have negligible change while that of the premarital birth group decreases to 9%. Educational attainment remains significant, and so does premature birth. Regarding job characteristics, self-employed women have a significantly lower odds ratio, while the irregular workers have higher odds. The odds for working in a white-collar occupation and a private sector firm are also shown to increases the risk of quitting job around first childbirth. This results may be due to the difference in flexibility of work schedule and accessibility to maternity and parental leave between different sectors.

Table 6.4 Regression results of Model 1

Variable	Category	Model 1a	Model 1b	Model 1c
Independent variable	Premarital conception	1.827***	1.433***	1.442***
		(6.43)	(3.38)	(3.31)
	Premarital birth	1.929**	1.161	1.091
		(3.00)	(0.65)	(0.36)
Cohort	1975-1984		1.023	0.919
			(0.27)	(-0.95)
	After 1985		1.263	1.094
			(1.55)	(0.57)
Age at first birth	Age at first birth		0.874	0.873
			(-1.24)	(-1.14)
	Age at first birth squared		1.002	1.002
			(1.08)	(0.95)
Region	Cities		0.876	0.880
			(-1.57)	(-1.45)
	Rural areas		1.019	1.063
			(0.17)	(0.51)
Educational attainment	Professional college		0.649***	0.657***
			(-3.93)	(-3.59)
	University		0.433***	0.493***
			(-8.60)	(-6.70)
	Master or more		0.190***	0.245***
			(-8.67)	(-6.38)
Unwanted pregnancy	Unwanted		1.139	1.138
			(0.81)	(0.80)
Prematurity	Premature birth		1.487*	1.545*
			(2.18)	(2.28)
Employment type	Self-employed			0.455***
				(-5.35)
	Irregular workers			3.151***
				(8.96)
Occupation	White collar			1.760**
				(3.16)
Sector	Private sector			4.900***
				(10.04)
	Observations	4073	4073	4073
	Pseudo R^2	0.012	0.054	0.125

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

Model 2

The second Model is to investigate whether the association between premarital conception / premarital birth and women's career decision persists by the time of second childbirth. Iwasawa and Kamata (2014) show that the effect of wedding preceded pregnancy on women's employment status mostly disappears after one year. If the correlation observed in the first

analysis is due to the event of premarital conception or premarital birth itself, it is predicted to become insignificant. Meanwhile, if the correlation observed in Model 1c is mainly due to the unobservable selection, it may last for a longer period.

Table 6.5 provides the results of Model 2a, 2b and 2c. The overall significance of Models are confirmed, and Model 2c shows a pseudo-R^2 of 0.177. These model show complicated results. For the premarital conception group, the odds ratio shows little difference compared to the reference group, and the coefficients are not significant at 5% level. However, the odds ratios of the premarital birth group are much higher, albeit it is not significant. This result should be dealt with caution because Model 2 includes those who did not work around first birth but participated in the labour market around the second childbirth. Still, the higher the odds ratio in the premarital birth group cannot be expected from the results of Model 1.

Similar to Model 1b and 1c, educational attainment is significantly associated with the probability of quitting a job in Model 2b and 2c. Unwanted pregnancy shows higher odds ration compared to the first, being significant at 5 % level. Unlike Model 1c, the correlation between occupation variable and the dependent variable becomes insignificant in Model 2c. However, the odds ratio of working in the private sector becomes more distinctive as well (Odds ratio is 7.56).

To summarise, the correlation between the premarital conception and quitting a job becomes insignificant around second childbirth while the correlation between the premarital birth variable and the dependent variable remains even though it is statistically insignificant. Therefore, it may indicate that the premarital birth group's negative correlation may be due to other time-invariant unobserved heterogeneity, other than workplace environment or education level.

Table 6.5 Regression results of Model 2

Variable	Category	Model 2a	Model 2b	Model 2c
Independent variable	Premarital conception	1.156	1.025	0.993
		(0.81)	(0.12)	(-0.03)
	Premarital birth	1.982*	1.387	1.422
		(1.98)	(0.97)	(0.81)
Cohort	1975-1984		1.361*	1.231
			(2.06)	(1.27)
	After 1985		1.932	1.592
			(1.79)	(1.28)
Age at second birth	Age at second birth		0.885	0.858
			(-0.54)	(-0.65)
	Age at second birth squared		1.002	1.003
			(0.57)	(0.67)
Region	Cities		0.763	0.754
			(-1.73)	(-1.66)
	Rural areas		0.625*	0.645
			(-2.07)	(-1.81)
Educational attainment	Professional college		0.584**	0.657
			(-2.64)	(-1.91)
	University		0.443***	0.566**
			(-4.51)	(-2.84)
	Master or more		0.278***	0.256***
			(-3.93)	(-3.52)
Unwanted pregnancy	Unwanted		1.984*	2.223*
			(2.05)	(2.20)
Prematurity	Premature		1.754	2.082*
			(1.80)	(2.04)
Spacing (months)	Spacing		1.004	1.001
			(1.14)	(0.27)
Employment type	Self-employed			0.569**
				(-2.60)
	Irregular workers			7.035***
				(9.25)
Occupation	White collar			1.865
				(1.82)
Sector	Private sector			7.561***
				(6.75)
	Observations	1712	1712	1712
	Pseudo R^2	0.003	0.045	0.177

Exponentiated coefficients; t statistics in parentheses

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

6.1.3 Sensitivity Testing

Table 6.6 presents the summary of sensitivity tests (See Appendix B.1 and B.2 to see the complete results).

Table 6.6 The summary of sensitivity test results

Category	Model 1d	Model 1e	Model 1f	Model 1g
Premarital conception	1.429**	1.395**	1.436***	1.432**
	(3.21)	(2.83)	(3.82)	(3.04)
Premarital birth	1.187	1.057	1.176	1.063
	(0.74)	(0.23)	(0.77)	(0.23)
Observations	4073	4073	4073	3659
Pseudo R^2	0.125	0.124	0.130	0.140

Category	Model 2d	Model 2e	Model 2f	Model 2g
Premarital conception	0.963	0.982	1.046	0.893
	(-0.18)	(-0.08)	(0.26)	(-0.51)
Premarital birth	1.580	1.420	1.400	0.723
	(1.12)	(0.81)	(0.98)	(-0.63)
Observations	1712	1712	1712	1371
Pseudo R^2	0.177	0.177	0.157	0.202

Exponentiated coefficients; *t* statistics in parentheses

$^{*} p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

For the tests based on Model 1, there exist only minor changes in the magnitude of coefficients and no distinctive change in significance. The change in the odds ratio of the premarital birth group in Model 1e is explained by the fact that Model 1e assigns observations assigned to the premarital conception group in Model 1c to post-marital conception group, which increases the overall probability of quitting a job for the reference group. The decreases in the odds ratio of the premarital birth group in Model 1g may be related to the sample restriction. Notwithstanding, the changed odds ratio remains insignificant.

For the tests regarding Model 2, there exists only minor changes in Model 2d, 2e and 2f, whereas a notable change in the magnitude of the coefficients is shown in Model 2g. From the descriptive analysis, the higher proportion of self-employed in premarital conception group and the premarital birth group was recognised. Without those observations, the premarital conception and the premarital birth group shows a lower risk of quitting a job around second birth compared to the reference group, even though it is insignificant. This finding may be related to Iwasawa and Kamata (2014)'s finding that premarital conception group shows a higher employment rate after one year from their birth. However, a more precise explanation requires further research.

In summary, the sensitivity tests generally support the robustness of the main results except for the case of restricting samples. Especially, tests with different independent variable specification may indicate the new method which this thesis proposes is reliable as well. In cases of the sample restrictions, the premarital birth groups show a lower risk of quitting job around childbirths, albeit the coefficients are statistically insignificant.

6.1.4 Interaction

Figure 6.3 shows the coefficient plot with confidence intervals of Model 1h result (See Appendix C.1 for Model 2h result). The result shows that odds ratio of premarital conception and premarital birth variable is higher in the cohort born after 1985 compared to other cohort subgroups. However, the confidence interval also shows that the odds ratio of premarital birth has more variance, which makes it insignificant overall.

Figure 6.4 shows the coefficient plot with confidence intervals of Model 1i result (See Appendix C.2 for Model 2i result). The Figure shows that the premarital conception and premarital birth has a higher odds ratios in rural areas compared to metropolitans or cities. Similar to Model 1h, the interaction between premarital birth and rural area shows a wide confidence interval, which includes the odds ratio of 1, leading to an insignificant result.

Figure 6.5, based on Model 1j, presents the coefficient plot of the result (See Appendix C.3 for the result of Model 2j). The distinctive association between educational attainment and the dependent variable is also shown in this plot. One noteworthy feature is that the interaction term between the premarital birth group and professional college graduate has the odds ratio higher than 2, albeit it is not significant at 5 % level. Also, Within University graduate group, the premarital birth group has lower odds ratio than the premarital conception group, as shown in Figure 6.5.

To sum up, these tests report that the impact of the premarital conception and premarital birth might be different by cohort, region or education level. Younger cohort group and those who reside in rural areas are more influenced by the independent variable. Among University graduates, the positive correlation to woman's withdrawal from the labour market around childbirth was weaker in the premarital conception group compared to the premarital birth group. However, the interpretation could be with caution since this finding is not statistically significant.
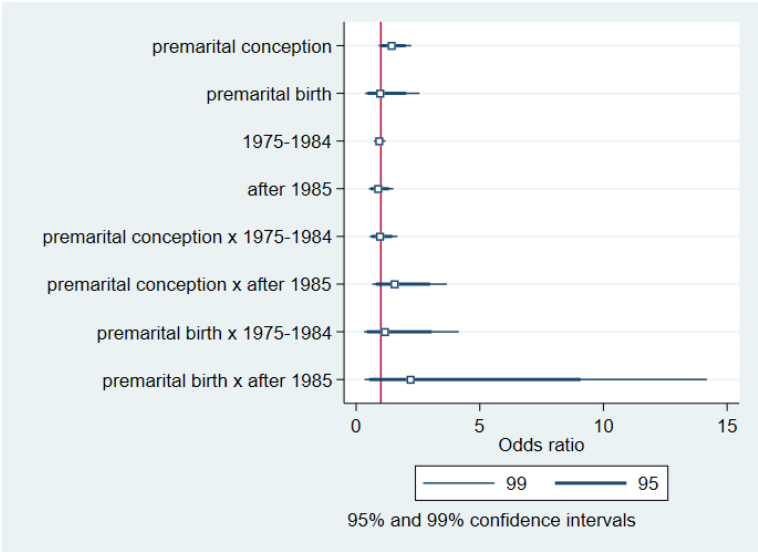

Figure 6.3 Coefficient plot for the interaction between the independent variable and cohort (Model 1h) with 95% and 99% confidence intervals
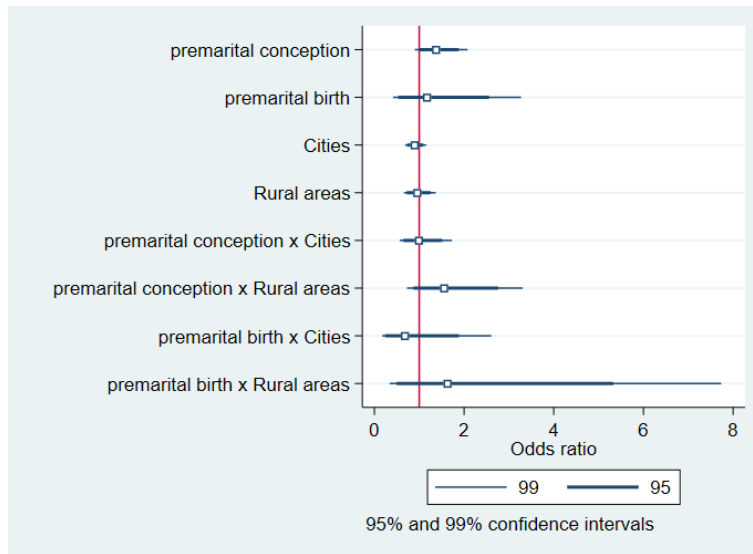
Figure 6.4 Coefficient plot for the interaction between the independent variable and region (Model 1i) with 95% and 99% confidence intervals
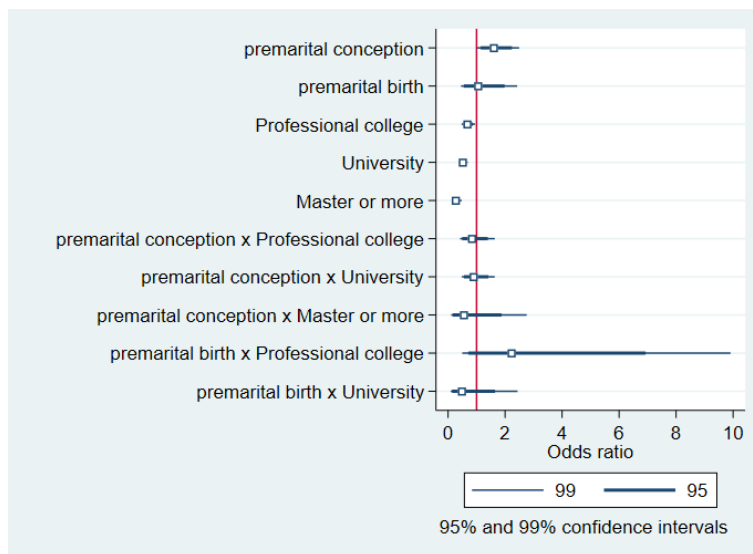

Figure 6.5 Coefficient plot for the interaction between the independent variable and educational attainment (Model 1j) with 95% and 99% confidence intervals

6.2   Discussion

6.2.1   Selection and Omitted Variable Bias

The main findings from Model 1a, 1b, 1c implies that the model without control variables has the omitted variable bias to overestimate the coefficient of the premarital conception and premarital birth variable. Controlling for individual heterogeneity accounts for the major part of the changes. Meanwhile, controlling for occupational characteristics almost did not affect the premarital conception variable and made minor change on the premarital birth variable, albeit those variables show significant associations with the dependent variable. Indeed, controlling for education level alone brings crucial change in terms of size and significance of the independent variable. As discussed in Section 3.1, the selection related to the difference in economic incentive, namely education level in this model, explains a considerable amount of the difference in probability. Therefore, these results support RH 1a and 1b.

Although educational attainment is recognised as a crucial factor in this analysis, it needs cautions to interpret this finding as well. Other important factors related to economic incentives such as wage level, the presence of the partner and work experience were not included in the model. This limitation may generate another omitted variable bias or leaves it difficult to explain the exact reason why the premarital birth group has a lower probability of quitting job compared to the premarital conception group. Meanwhile, premature birth is also found to increase the risk of quitting a job in Model 1b and Model 1c. If it is assumed that prematurity is positively associated with nonmarital conception, it could generate another selection. However, the empirical evidence from Korea is insufficient to claim such an association (Kim & Kim, 2012; Lee et al., 2014). Therefore, it might also be possible that premature birth variable's association is independent of the nonmarital conception itself in this dataset.

The significant and considerably high odds ratios of employment status variable or sector variable might be partly explained by the omitted variable bias as well. The actual variable to measure the flexibility of working schedule or the accessibility to (paid) maternity leave was not included in the model, which is found to be a crucial factor in woman's career interruption and related to employment type and sector difference as well. It implies the odds ratio may be overestimated for those occupational characteristics variable.

6.2.2   Persistency of the correlation

Discussing the persistence of the association between nonmarital conception and woman's career decision is critical because the social cost of having premarital conception or premarital birth would be more serious when the negative correlation does not fade away and keeps influencing over a woman's career path, According to the findings from Model 2c, the association disappears while that of the premarital birth group remains. Therefore, RH 2 is partially supported by these findings. This result might be contradicting to Iwasawa and Kamata (2014)'s main findings. However, this thesis measured the probability of quitting job

around the second childbirth instead of the employment rate or income. The main reason for the second analysis is to test the persistence of the association found in the first analysis and thus to test whether time-invariant unobserved heterogeneity relevant to career decision around childbirth exists in Model 1c. Table 6.3 reports that the premarital birth group is still associated with a much inferior position in the labour market around the time of second childbirth. So, if the odds ratio of the premarital birth group were significant in Model 2b and 2c, it might indicate that such time-invariant and unobservable heterogeneity explains the difference in probability of quitting job between the premarital birth group and other groups. However, the evidence turns out to be statistically insignificant.

6.2.3   Interaction

The results from interaction tests shed light on the heterogeneity among subgroups by cohort, region or educational attainment in terms of their responsiveness to the premarital conception or premarital birth. According to the results from Model 1h, the significant correlation between the independent variable and the dependent variable within the latest cohort is likely to shape the overall magnitude and significance of the independent variable in previous models as well. Iwasawa and Kamata (2014) attempt to explain the link between marrying at a younger age due to premarital conception and a higher risk of discontinuing work after childbirth. However, the possible effect of the cohort should be distinguished from the effect of age itself. One possible explanation for this cohort difference is the recent change in the cost of abortion surgery mentioned in Section 2. The younger cohort faces the higher economic and social cost of abortion, which leads them to marriage preceded by pregnancy or premarital birth rather than abortion. That marriage or childbirth is likely to be unexpected, and it may discourage women from continuing working around childbirth. Nonetheless, this thesis does not include variable to test this explanation empirically. Therefore, the exact mechanism behind this interaction remains to be clarified.

Similarly, the interaction between the independent variable and region needs an explanation as well. The higher odds ratio of premarital birth and premarital conception in a rural area could be either due to lower economic incentives to stay in the labour market or more influential traditional gender role on the division of paid and unpaid labour. Since there is no available information on wage level or individual values to include, two main models do not have sufficient evidence to test these explanations either. Besides, even though the region variable is used as a proxy to the region where a woman used to leave around first childbirth, individuals might change the residential area in between childbirth and the time of the survey and this survey does not track this change. Thus, the interpretation of the odds ratios is also limited.

7   Conclusion

This thesis has investigated the association between nonmarital pregnancy and woman's career interruption in Korea. More specifically, this thesis aims to provide a theoretical explanation to the relationship between premarital conception and premarital birth and the woman's labour market exit around childbirth based on findings on previous literature. From the previous research, the possibility of the difference in the economic incentives and preference among post-martial conception, premarital conception and the premarital birth group is found, and this thesis has tested the research hypotheses using logistic regression models.

The main findings from Model 1a, 1b and 1c confirm that the premarital conception group has a higher risk of quitting a job compared with the post-marital group around the first childbirth after controlling other covariates. The similar correlation is shown in Model 1a for the premarital group, but the odds ratio becomes insignificant and smaller after controlling individual and occupational heterogeneity. Also, the main findings from Model 2a, 2b and 2c is similar to the previous research (Iwasawa & Kamata, 2014) in that the odds ratio of premarital conception approximates to 1 by the time of second childbirth, albeit the odds ratio of the premarital group remains higher than 1 even though it is insignificant. On top of that, the results from the sensitivity test generally support the robustness of the model but also show heterogeneity between the self-employed group and the others. Interaction test indicates noteworthy, yet statistically insignificant interactions between the independent variable and cohort, region and educational attainment.

As has been discussed in Section 6.2, there are several issues to keep in mind when interpreting the results found in this thesis. Firstly, the NSFFHA survey data only includes married and fecund women's fertility and family formation information. Moreover, as a cross-Sectional data, the survey does not follow individuals as a penal dataset. As a consequence, insufficient control variables may generate the omitted variable bias of the estimates. The limitation in the dependent variable also restricts the findings. The time at risk was either six months before or after each childbirth, which make it unable to capture those who decided to quit working immediately before or after that period. This issue can be solved if a future study uses a longitudinal or a panel dataset which tracks a woman's labour market outcome, including wage level, experience and employment status in more detail. The measurement of the independent variable could also be erroneous since this thesis has to estimate the premarital conception and premarital birth by using the year and month data. The exact date is missing so that this thesis assumes a uniform distribution of the date on every occasion. The measurement error in variables which is used to calculate the independent variable is recognised during this research as well. A relatively smaller number of the latest cohort group may affect the significance of the coefficient of the independent variable should also be noticed. Lastly, the considerable selection due to low labour force participation rate among the sample, the generalisability of the main finding is restricted.

Notwithstanding, the results of this thesis contribute to examining the consequences of premarital conception in Korea. Previous studies focusing on the effect of premarital conception primarily on the infant concludes that the social cost of the increase in premarital conception is negligible (Kim & Kim, 2012). However, the findings from this thesis may imply that woman who experiences premarital pregnancy, and premarital birth may have a higher risk of career interruption compared to the reference group especially in the early stage of their career development which can lead to the considerable social cost. This thesis also contributes to understanding how social norms towards the relationship between marriage and childbirth, along with the banning of abortion can influence a particular group of women's lives in the Korean context. As has mentioned, the relationship between premarital conception and a woman's career development has not received sufficient attention. The main findings from this thesis state that it is essential to consider the link between premarital conception and career interruption, especially understanding the career break of the younger female workers.

Future research on this topic is required to use dataset, which enables a researcher to track a woman's socioeconomic background, fertility, marriage and work histories and information on her partner as well. Korean Longitudinal Survey of Woman and Family (KloWF) dataset may be one alternative. Also, a woman's employment rate or income level can be used as the outcome variable for a more comprehensive understanding of this topic. Lastly, this thesis suggests future research to further investigate the role of individual value towards childbearing and gender role, along with the actual negotiation process of paid and unpaid labour to understand how those factors moderates a woman's response to economic incentives concerning labour market transition around childbirth in the Korean context.

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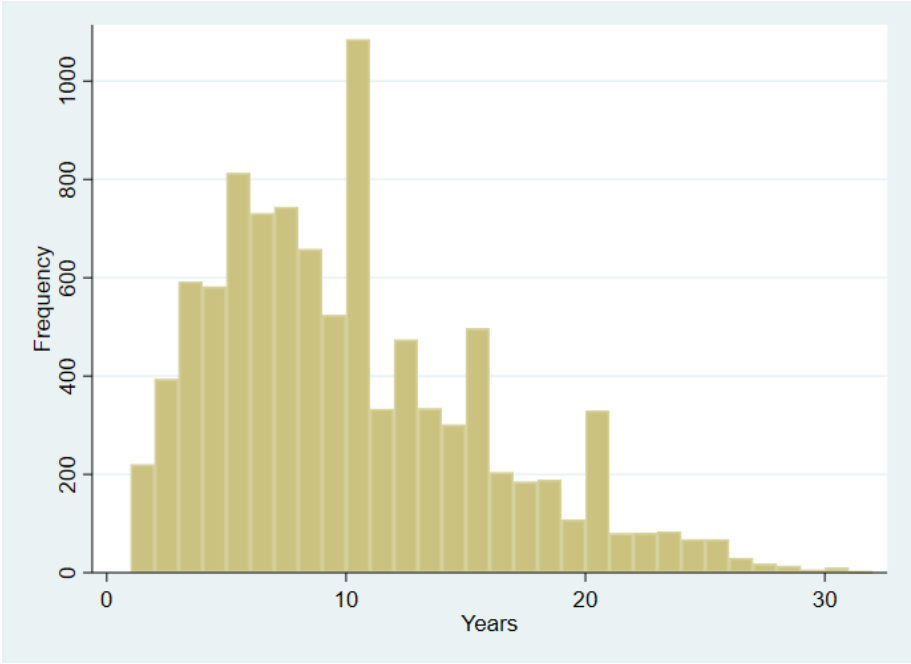
Appendix A

Figure A.1 Histogram of the total years of work experience from the initial dataset
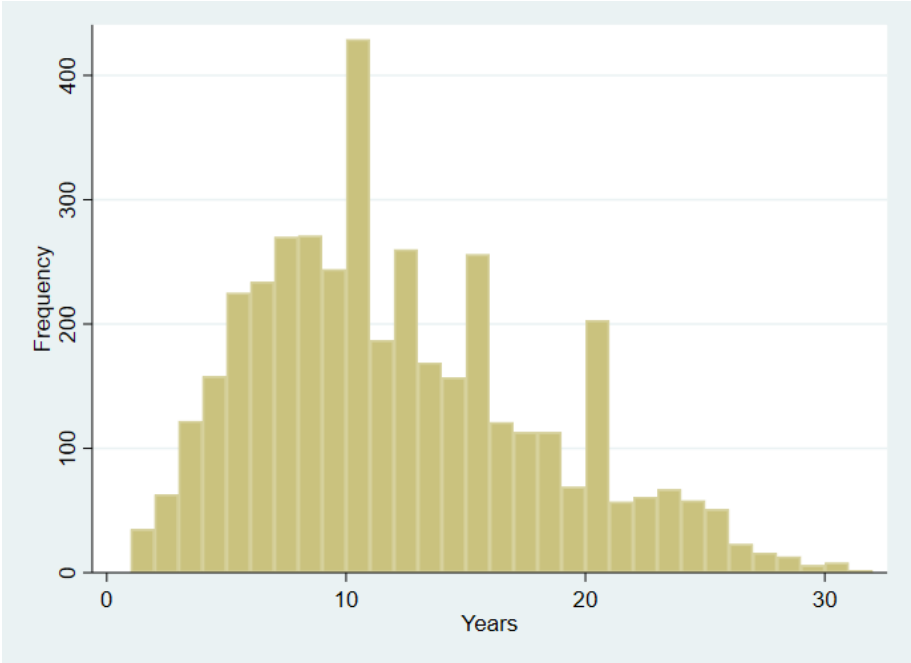

Figure A.2 Histogram of the total years of work experience from Model 1 observations
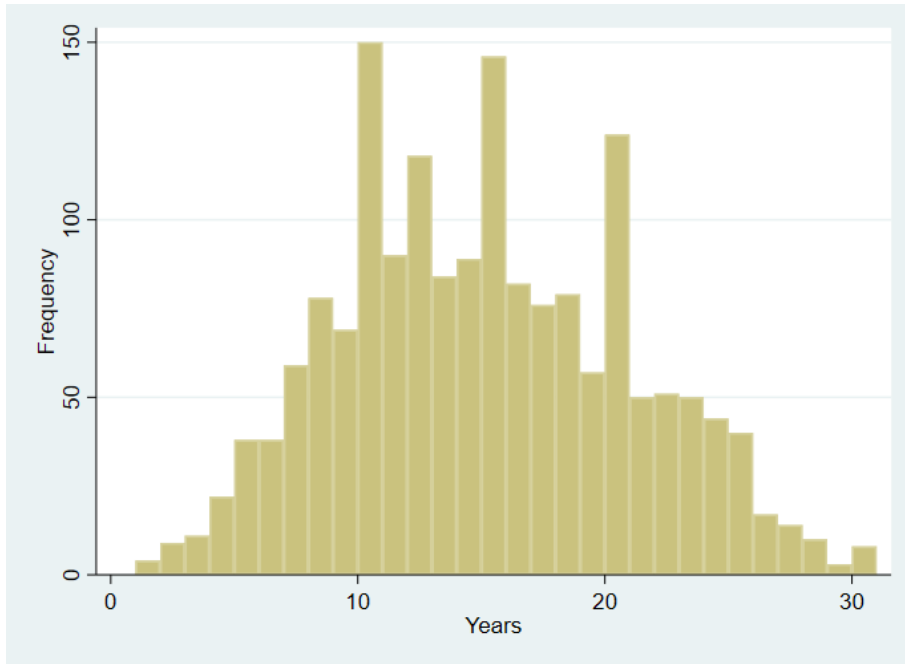
Figure A.3 Histogram of the total years of work experience from Model 2 observations

Appendix B

Table B.1 Sensitivity test results for Model 1

Variable	Category	Model 1d	Model 1e	Model 1f	Model 1g
Independent variable	Premarital conception	1.429**	1.395**	1.436***	1.432**
		(3.21)	(2.83)	(3.82)	(3.04)
	Premarital birth	1.187	1.057	1.176	1.063
		(0.74)	(0.23)	(0.77)	(0.23)
Cohort	1975-1984	0.918	0.915	0.938	0.869
		(-0.96)	(-0.99)	(-0.83)	(-1.48)
	After 1985	1.095	1.095	1.176	1.008
		(0.58)	(0.58)	(1.17)	(0.05)
Age at first birth	Age at first birth	0.876	0.874	0.891	0.798
		(-1.11)	(-1.12)	(-1.14)	(-1.67)
	Age at first birth squared	1.002	1.002	1.002	1.003
		(0.92)	(0.92)	(0.90)	(1.48)
Region	Cities	0.880	0.882	0.943	0.899
		(-1.44)	(-1.42)	(-0.76)	(-1.14)
	Rural areas	1.061	1.067	1.185	1.135
		(0.49)	(0.54)	(1.78)	(0.97)
Educational attainment	Professional college	0.658***	0.654***	0.679***	0.601***
		(-3.59)	(-3.64)	(-3.91)	(-4.13)
	University	0.493***	0.490***	0.510***	0.435***
		(-6.69)	(-6.76)	(-7.43)	(-7.32)
	Master or more	0.246***	0.243***	0.272***	0.189***
		(-6.38)	(-6.43)	(-7.02)	(-7.10)
Unwanted pregnancy	Unwanted	1.139	1.192	1.233	1.231
		(0.80)	(1.10)	(1.50)	(1.16)
Prematurity	Premature birth	1.542*	1.517*	1.444*	1.581*
		(2.26)	(2.18)	(2.15)	(2.30)
Employment type	Self-employed	0.455***	0.455***	0.501***	
		(-5.35)	(-5.37)	(-5.54)	
	Irregular workers	3.152***	3.132***	3.503***	3.157***
		(8.96)	(8.91)	(10.99)	(8.76)
Occupation	White collar	1.756**	1.759**	1.689***	1.841**
		(3.15)	(3.17)	(3.45)	(3.11)
Sector	Private sector	4.895***	4.867***	5.168***	4.870***
		(10.03)	(9.98)	(12.88)	(9.84)
	Observations	4073	4073	4073	3659
	Pseudo R^2	0.125	0.124	0.130	0.140

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

Table B.2 Sensitivity test results for Model 1

Variable	Category	Model 2d	Model 2e	Model 2f	Model 2g
Independent variable	Premarital conception	0.963	0.982	1.046	0.893
		(-0.18)	(-0.08)	(0.26)	(-0.51)
	Premarital birth	1.580	1.420	1.400	0.723
		(1.12)	(0.81)	(0.98)	(-0.63)
Cohort	1975-1984	1.232	1.232	1.292	1.208
		(1.27)	(1.27)	(1.82)	(1.06)
	After 1985	1.615	1.597	1.860	1.522
		(1.31)	(1.28)	(1.89)	(1.09)
Age at second birth	Age at second birth	0.857	0.858	0.929	0.834
		(-0.66)	(-0.65)	(-0.35)	(-0.69)
	Age at second birth squared	1.003	1.003	1.001	1.003
		(0.68)	(0.67)	(0.28)	(0.74)
Region	Cities	0.757	0.754	0.871	0.790
		(-1.65)	(-1.66)	(-0.92)	(-1.26)
	Rural areas	0.649	0.645	1.085	0.787
		(-1.79)	(-1.81)	(0.44)	(-0.86)
Educational attainment	Professional college	0.661	0.657	0.720	0.576*
		(-1.88)	(-1.91)	(-1.73)	(-2.30)
	University	0.570**	0.566**	0.665*	0.480***
		(-2.80)	(-2.84)	(-2.35)	(-3.39)
	Master or more	0.258***	0.256***	0.405**	0.193***
		(-3.51)	(-3.52)	(-2.61)	(-3.85)
Unwanted pregnancy	Unwanted	2.232*	2.225*	1.772	2.513*
		(2.21)	(2.21)	(1.79)	(2.24)
Prematurity	Premature	2.082*	2.082*	1.707	1.698
		(2.04)	(2.04)	(1.73)	(1.28)
Spacing (months)	Spacing	1.001	1.001	1.005	1.001
		(0.26)	(0.27)	(1.64)	(0.22)
Employment type	Self-employed	0.567**	0.569**	0.548**	
		(-2.61)	(-2.60)	(-3.17)	
	Irregular workers	7.013***	7.036***	6.016***	7.120***
		(9.23)	(9.25)	(9.86)	(9.14)
Occupation	White collar	1.880	1.864	2.184*	2.063
		(1.85)	(1.82)	(2.55)	(1.76)
Sector	Private sector	7.563***	7.569***	6.464***	7.447***
		(6.75)	(6.75)	(7.39)	(6.67)
	Observations	1712	1712	1712	1371
	Pseudo R^2	0.177	0.177	0.157	0.202

Exponentiated coefficients; t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
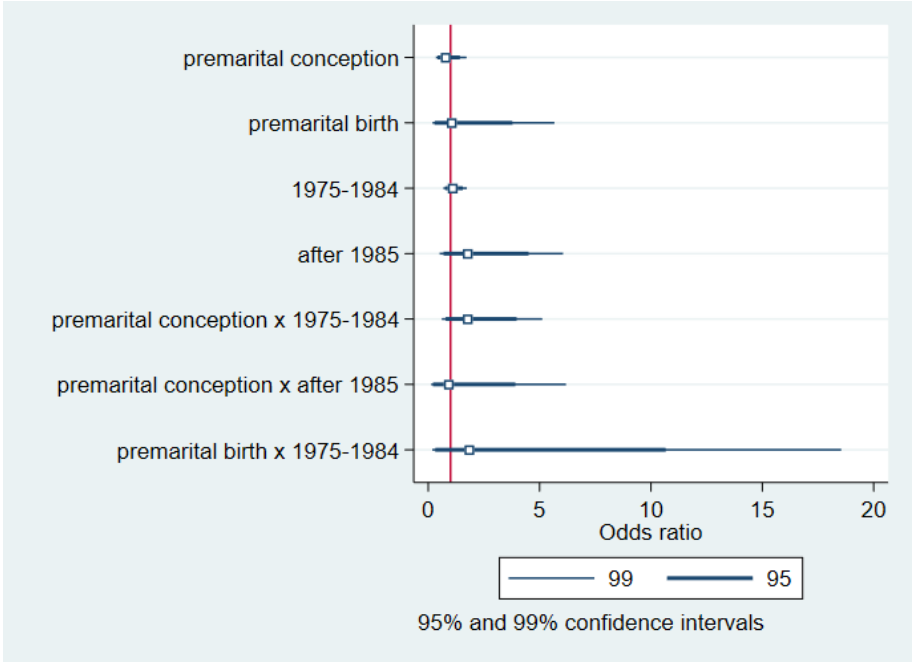
Appendix C

Figure C.1 Coefficient plot for the interaction between the independent variable and cohort (Model 2h) with 95% and 99% confidence intervals
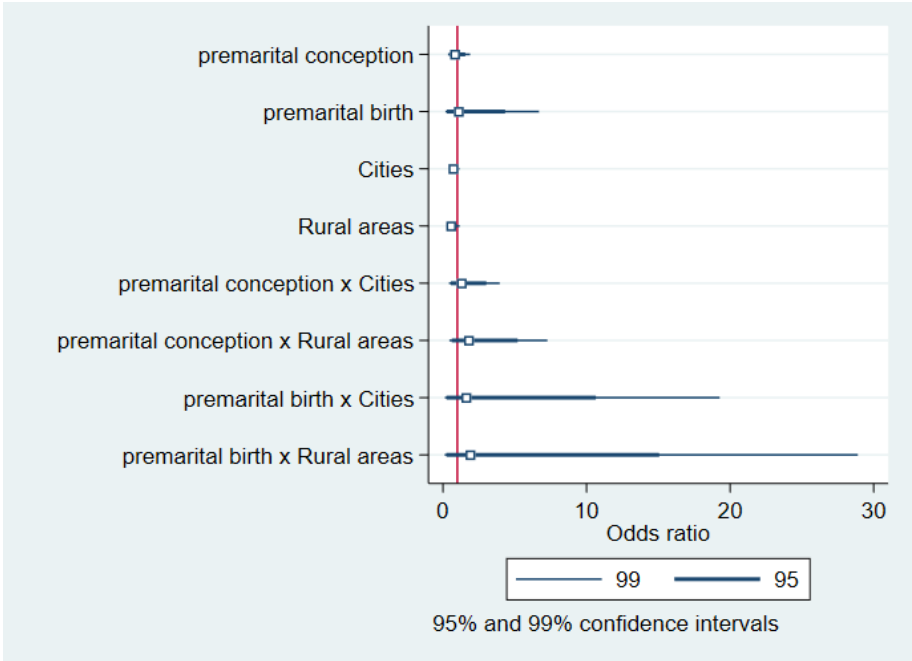

Figure C.2 Coefficient plot for the interaction between the independent variable and region (Model 2i) with 95% and 99% confidence intervals
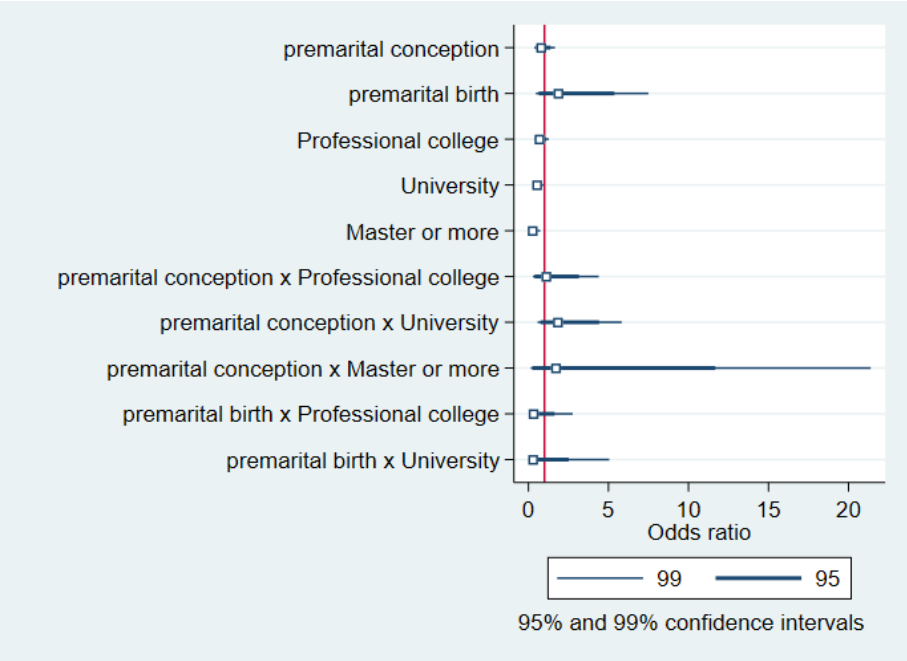
Figure C.3 Coefficient plot for the interaction between the independent variable and educational attainment (Model 2j) with 95% and 99% confidence intervals