Marriage Delay and Catching-up: Does It Differ by Level of Education?

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Abstract

Women with younger cohorts increasingly delay or forgo marriage in many developed countries. Vigorous change in marriage timing across levels of education complicates the association between women's education and marriage. This study provides a better understanding of the marriage delay and catching-up process and also proposes that that the relationship between women's education and marriage is not static, but dynamic. With the census sample data of South Korea, I measure the extent of which cohorts of women postpone marriage until older ages and its variation with level of education. Results demonstrate that younger cohorts of women increasingly delay marriage, but on average about more than 85% of the delayed marriage is recuperated by age 45 compared to the previous five-year cohort. Although the trend toward delaying marriage is common for all groups, the extent and pace of recuperation varies with level of education among recent young cohorts.

In most developed countries, women's age at first marriage has increased in the past decades while the proportion of married women has declined (Lesthaeghe and Moors 2000; Sobotka and Toulemon 2008). For many young women, marriage becomes less desirable and not necessarily required for childbearing, perhaps due to recent ideational or cultural shifts (Lesthaeghe and Neels 2002; Surkyn and Lesthaeghe 2004). Nonetheless, marriage is still an important proximate determinant for fertility and essential part to understand family dynamics. Whether, when, and in what context to marry influence subsequent life-course events, such as education, employment, childbearing, parenthood, and well-being.

Literature suggests that the rise in women's age at first marriage is attributable to marriage delay and increase in lifetime singlehood. Research analyzes whether women delay or forego marriage and how it differs by level of education and commonly concludes that compared to a reference group, women with better education tend to marry "late and less." For the countries with universal marriage, the conclusion can be replaced with "late, but not less" because many women eventually get married later in their life. Similar illustrations can be made for cohort comparisons in a society where age at first marriage gradually increases.

Despite increase in attentions to marriage delay and foregone, empirical studies are limited to providing static information on marriage timing and eventual marriage rate. It is obscure how much marriage delayed and to what extent the delayed marriage is made up later. As more than four years are required to complete college education, it is natural to expect that women with higher education delay their marriage more than those without the same education. Nonetheless, many studies tend to focus on absolute difference in marriage timing and eventual marriage rate across levels of education. If the differences in the required years and subsequent marriage patterns are taken into account, research interest should be placed on cohort comparisons of marriage delay. Then, we can compare its relative change in marriage timing across levels of education, in terms of marriage delay and catching-up process.

This study aims to provide a better understanding of the marriage delay and catching-up process. I focus on the quantitative aspect of this process at the cohort perspective, rather than looking at stationary marriage rate and timing. With a graphical illustration of marriage schedule, I measure the postponement of marriage and its recuperation (catching-up) and how that changes over demographic transition. I also examine how the marriage delay and recuperation process

differs by level of education. As a case study, I focus on South Korea where has experienced rapid demographic changes and remarkable improvements in women's educational attainment. This study contributes to literature by suggesting distinct insights on the dynamic change of marriage timing.

Backgrounds

Literature suggests that women's marriage is associated with level of education. Microeconomic perspective explains that people get benefits from marriage by specializing men for paid work and women for domestic work and child care (Becker 1981). In this sense, better educated women are more likely to remain single as they have more recourses and opportunities costs, resulting in the negative association between women's education and marriage. This perspective, however, does not provide appropriate explanation *why* women delay marriage and *when* they eventually decide to marry. In addition, the negative association between women's education and marriage is easily contradicted by empirical studies that the association varies by local context (Blossfeld 1995; Goldstein and Kenny 2001; Ono 2003). For instance, the association between women's education and marriage becomes positive or insignificant in less transitional societies (Blassfeld 1995; Ono 2003) while it shows strong negative association in gender-inegalitarian societies like in Japan (Raymo 2003).

Oppenheimer (1997) provides important insights that having higher education delays the entry age into marriage, but does not necessarily leads to less marriage. According to him, finding a suitable partner requires substantial time and efforts. Having more recourses, women with better education are advantageous than others to overcome such a demanding process. This describes the shift of marriage to older ages and, to be specific, marriage delay and catching-up effects. Although what Oppenheimer described is about educational difference in marriage with age, it can be applied to change in marriage timing across cohorts: the rise in age at marriage among recent cohorts of women. This indicates a substantial process of marriage *postponement and recuperation*.

Many studies attempt to analyze Oppenheimer's theory in their analysis. In most cases, research examines the risk of marriage (or median age at marriage) and eventual lifetime marriage rate, perhaps at around age 40 or later. Studies using event history analysis or forecasting methods reach a similar conclusion that younger cohorts of women increasingly

marry “late and less” or “late but not less” than the previous cohorts, depending on the context of a society. However, there are a few problems and research gaps in the literature. First, most studies focus on static aspects of marriage schedule, such as overall risk of marriage and ultimate marriage rate (or lifetime singlehood). Such static measures have limitations to illustrate the dynamics of marriage delay and its vigorous change with age. It also simplifies the shift of marriage timing to older age and its variation by level of education. For instance, the risk of marriage, whether it is measured proportionally or non-proportionally, does not represent the extent of marriage delay or catching-up.

Second, a few studies are based on forecasting methods built on deterministic assumption of marriage schedule. For instance, Goldstein and Kenny (2001) employed the diffusion process to estimate marriage schedule for the cohorts who did not complete primary childbearing age. It may be useful for forecasting purposes, but the assumption they used is far from reality and might be deviated from actual observation, in particular in a society where the marriage pattern of certain groups departs from the standard form.

Lastly, despite lots of interest, there is lack of understanding about the extent of marriage delay and catching-up. There does not appear to be any study that provides specific figures on how much marriage delayed and is made-up later. Perhaps, it is because the concept of marriage *delay* is arbitrary and subjective. Abstract illustration without quantifying the dynamic process of changing marriage may impede clear understanding of true aspects on demographic changes. Basically marriage *delay* requires aggregate-level analysis. Due to the relative meaning of *delay*, no one can say whether an individual delays marriage or not until her original plan and outcome are observed. That is, individual plan about marriage frequently changes with conditions and life trajectories. Yet, few data provide such opportunities. At the aggregate level, however, the marriage schedule of a group can be compared to the others’. The difference in marriage rate between two groups and its variation with age can be used to identify whether the gap in marriage rate in younger ages continues to older ages, which can be interpreted as marriage delay or forgone at the aggregate level.

To sum, the process of marriage delay and recuperation is complex and not well understood yet. Prior studies failed to provide specific figures about how much change in marriage timing eventually result in marriage delay (shift to older ages) or marriage foregone

(lifetime singlehood). The current study measures the process at the cohort level and use it for comparisons across levels of education for South Korea (hereafter Korea) as a case study. As other countries in East Asia, Korea has experienced gradual increase in women's age at marriage and remarkable improvements in women's educational attainment. Compositional change in women's educational attainment accounts for only part of the change in marriage timing in this area (Jones and Gubhaju 2009). The rise in age at marriage is more likely due to behavioral change across multiple cohorts of women. It is interesting to see whether such behavioral change differs by level of education.

Measuring marriage delay and catching-up

As remaining single is the result of successive decisions and behaviors that cumulate over the life course, the marriage delay and catching-up is inherently a cohort phenomenon (Ryder 1951). Building on prior studies on the postponement transition of childbearing age, this study attempts to quantify the process of marriage delay and catching-up. In the past decades, demographers have debated whether decline in period fertility rate (e.g., total fertility rate) in many developed countries indicates actual decline in fertility or just reflection of the transition of childbearing age to later ages, also called as "*postponement transition*." As part of the debates, a series of studies have developed and elaborated a way to measure the postponement and recuperation of childbearing in cohort fertility perspective (Frejka 2012; Frejka and Calot 2001; Frejka and Sardon 2004; Lesthaeghe 2001). For instance, in a cohort analysis, younger-age fertility decline is described as fertility postponement while older-age fertility gains is regarded fertility recuperation.[1] Thus, it basically involves in the comparisons of cohort marriage rate. Relying on the latest study (Sobotka et al 2011) that elaborated this method, I apply and extend their method to analyzing marriage timing. To be specific, marriage *delay* is measured by cumulating absolute or relative decline in cohort marriage rate when we compare age-specific marriage rate for a birth cohort of interest with a reference cohort. Marriage *catching-up* is measured by absolute or relative gains in cohort marriage rate from its maximum difference.

The way to measure the marriage delay and catching-up is illustrated in Figure 1. Suppose we are interested in comparing two hypothetical cohorts *b* and *c*, setting up the older

[1] Note that marriage *delay* and *catching-up* can be used interchangeably with marriage *postponement* and *recuperation* although I prefer the former in this paper.

cohort *b* as a benchmark cohort. The cumulative marriage rate by age for the cohort *b* is considered as a baseline, which is a horizontal line at zero. For the cohort *c*, the difference in cumulative marriage rate from the benchmark cohort is depicted as a trend line. The falling curve indicates relative decline in cohort marriage rate for the cohort *c* at younger ages compared to the benchmark (cohort *b*) while the rising curve reflects relative increase in cohort marriage rate at older ages offsetting the marriage deficit in younger ages. As a result, I consider decline in marriage rate at younger ages as marriage postponement (*Pc*) and subsequent rise in marriage rate at older ages as marriage recuperation (*Rc*). Based on marriage postponement and recuperation, I also compute Recuperation Index (*RIc= Pc*100 / Rc*). These measures are used for comparisons over cohorts and levels of education. As Lesthaeghe (2001) suggested, these can be measured through relational models that compare them with a previous cohort setting a moving benchmark. As the procedure to measure the delay and recuperation are essentially identical except for the moving benchmark, I do not repeat it again. However, I use this relational model to check relative change in marriage delay and recuperation between two adjacent birth cohort (*e.g.,* cohort 1956-1960 vs cohort 1961-1965).

<Figure 1 is about here>

These methods provide a useful opportunity to quantify the marriage delay and catching-up process and how it changes over time. In particular, visualization of the process helps intuitive understanding about how much marriage delays and to what extent the delayed marriage is made up later. Three measures (*Pc*, *Rc*, and *RIc*) also enable us to compare educational differences in the process of marriage delay and catching-up.

Korean context

In South Korea, women's education is strongly and negatively associated with marriage. As in Japan, empirical studies commonly point out that women's education delays marriage and result in less marriage. However, most of them observe marriage rate at younger ages or tend to focus on linear relationship between level of education and marriage.

In recent years, two empirical studies analyzed women's marriage schedule by level of education with advanced quantitative methods. Woo (2009) utilized *Hernes* models to estimate marriage schedule for recent cohorts and examined whether it differs by level of education. However, he simply divided analytic cohorts into two groups, those born before 1970 and after

1970 and used dichotomous category for education (relatively high vs relatively low), perhaps due to lacking in sample size. The oversimplified classifications make it difficult to disentangle the influence of higher education on marriage timing from others. More recently, Park et al (2013) used discrete time hazard models of marriage timing by adding diverse interactions between cohort and education. Their study provides overview how women's marriage has changed in Korea. However, they used improbable assumption that all women begin and end their college education between age 19 and 23. Although information on education dates is not available in their data, they included time-variant education into their analysis to control in-school status.

Both studies agree that recent young cohorts increasingly delay marriage and the proportion of ever married women is also less than their older cohorts. Using 10-year cohort intervals or longer, however, these studies missed the dynamic change in marriage timing during the demographic transition in Korea. Instead, both seem to consider the change in marriage pattern after the Asian financial crisis, which occurred at the end of 1990s. As a result, the process of marriage delay and catching-up across cohorts remain unexplored.

This study documents the degree to which a cohort of women postpones marriage and recuperate it later at older ages. In Korea where rapid demographic transition has been reported, increasing age at marriage is not confined to recent years, but has been lasted for decades. Instead of looking at the effect of a certain event on marriage timing (e.g., Asian financial crisis), I explore how the pattern of marriage delay has changed over the demographic transition, every five-year cohort from the baby-boomer (1956-1960 cohort) who were born soon after Korean war (1950-1953) to the youngest cohort (1980-1985 cohort) that reports very low birth rates and high educational attainment. The current study offers distinct demographic insights on the tempo of marriage timing and how it differently evolves over the transition by level of education. Results will demonstrate how women with different educational levels adjust their marriage pattern in particular in a society with rapid demographic changes.

Data and methods

This study uses data from the 1975, 1990, 2005 and 2010 Korean census 1% samples data which age at first marriage is available. The Population and Housing Census of Korea is conducted by Statistics Korea every five years. The census data provide basic demographics, such as age, sex,

education, and marital status and often include women's age at first marriage. Having larger sample sizes, these data make it easier to estimate marriage schedule by level of education. For this study, women aged between 30 and 59 are extracted from each of four censuses sample data. Most women finish their education by age 30, and primary age for women's first marriage also remain around 30 or below. In addition, using women aged 60 or more may lead to biased results, probably due to misreporting or mortality selection. Thus, the women's ages 30-59 are regarded as appropriate to get relevant information while securing enough sample size for each cohort. However, I consider women who reach age 45 without marriage as lifetime singlehood.

I employ the cohort analysis that was originally developed for the 'postponement transition' of childbearing. As mentioned earlier, this method is useful to demonstrate the shift of childbearing to older ages. Taking advantages of the method, I apply it to studying change in marriage timing in order to understand the dynamic of marriage timing. The analysis of this study is divided into two parts: 1) historic change in the marriage delay and recuperation process, and 2) the recent variation of the process by level of education. Although both parts utilize same methods and terminology, the analytic sample is different.

For the first part, I use five-year birth cohorts of women born between 1916 and 1980. I illustrate how the process of marriage delay and recuperation has evolved over the demographic transition. With more than 60 year birth cohorts, I demonstrate whether the shift of marriage timing to older ages has continued over the transition or not.

This study gives more importance to the second part that analyzes educational variation in the marriage delay and recuperation process. In this part, I focus on recent birth cohorts born between 1956 and 1980, which have shown different demographic patterns from previous cohorts. As college education has been widely available since the early 1980s, many recent young women in Korea have achieved higher education. The corresponding women who born between 1961 and 1965 were the first cohort to reach below replacement level of fertility; on average they had less than two children through their entire life. For that reason, the 1961-1965 cohort was considered as a threshold for the second demographic transition, which distinguish it from the first demographic transition (Yoo 2014). For older cohorts born before 1956, it is hard to analyze educational variation because the great majority (more than 90 percent) of women completed high school or below. In addition, due to small sample size for the corresponding

cohorts, the detailed marriage schedule by age and level of education is very unstable to use it for this study. Thus, I set the 1956-1960 birth cohort as a benchmark and then, compare marriage schedules of following cohorts with the benchmark. The benchmark cohort presents baby-boomers who were born soon after successive wars, Korean War (1950-1953) and World War II. Therefore, subsequent change in marriage schedule and its variation by level of education reflect rapid social and demographic change and how it differently influences women's marriage.

As a result, the final analytic sample includes 338,307 cases, and sample size for every five-year birth cohort varies from minimum 4,886 to maximum 58,286 cases. The subsample for the second part has 192,041 cases and has larger sample size for each cohort ranging from 16,948 to 58,286 cases.

Preliminary results

Historical trends of marriage delay and recuperation

Figure 2 shows the proportion of never-married women for all five-year cohorts, from the 1916-1920 cohort to the 1976-1980 cohort. The far-left blue line indicates the proportion of remaining singlehood for the 1916-1920 cohort implies that the earliest marriage schedule among the cohorts observed here. As the line reaches at age 45, it is placed at the bottom among other trend lines, suggesting one of the lowest never-married rates. By contrast, the far-right navy line represents the 1976-1980 cohort which shows late and less marriage to a great extent. Overall, it is interesting that all trend lines for the following cohorts gradually move toward right side in the figure. The falling curve in the figure indicates rapid transition to first marriage among the corresponding cohort of women. Although the steep slope of the curve moves from their early twenties to late twenties, the tail of the curve tends to converge at age 45. The figure illustrates that despite considerable change of marriage timing across birth cohorts, universal marriage still remain in Korea until recent birth cohorts that finished reproductive span. But there is a clear sign for further change in marriage among women born in the 1970s.

<Figure 2 is about here>

Figure 3 is to illustrate the marriage delay and recuperation (catching-up) process over five-year birth cohorts. Each line represents the cumulative difference in cohort marriage rate by age from the benchmark, the 1916-1920 cohort. The *U* shape of the curves represent how women's

marriage schedule for each cohort deviates from the benchmark. Thus, falling curves in the left side reveal the extent of which the corresponding cohort delays marriage compared to the benchmark. At the same time, rising curves in the right side illustrate the extent of which the cohort resumes the benchmark's marriage schedule, catching-up effect of the delayed marriage. In the figure, the trough and width of the curve gradually become deeper and wider among recent cohorts. It demonstrates that younger cohorts of women increasingly marry late and less, compared to the benchmark 1916-1920 cohort. These figures clearly show a historical pattern of marriage delay and catching-up, but the figures are bounded to visual comprehension.

<Figure 3 is about here>

Table 1 and 2 summarize several measures, such as postponement (*Pc*), recuperation (*Rc*), and recuperation index (*RIc*), for the marriage delay and catching-up process. Table 1 is derived from the base model (Figure 3), which measures difference in cohort marriage rate from a fixed benchmark, while Table 2 comes from relational model that measures the difference from a moving benchmark, the previous five-year cohort here. All the essential indicators in Table 1 and 2 are also illustrated as bar and line graphs in Figure 4 and 5, respectively.

In Table 1, the indicator for marriage postponement (*Pc*) gradually increases over the birth cohorts. For instance, *Pc* for the latest 1976-1980 cohort is .840, which indicates that the absolute difference in the proportion of ever married women at age 22, in which it is the largest, from the benchmark is .840. That is, the majority of women in the 1976-1980 cohort remains single at age 22 while only marginal women in the 1916-1920 cohort did so at the same age. The sudden rise in *Pc* around the 1931-1935 cohort is probably due to successive political turbulences in the 1940s and 1950s, such as World War II and the Korean War. The insecure social environments interrupted their marriage schedule to a greater extent, but nearly 99% of the delayed marriage was recuperated by age 30, contributing to baby boom soon after the Korean War. Although the marriage postponement has gradually increased, its recuperation did not change much until the recent birth cohorts. Except for the cohorts that did not finish their reproductive span, recuperation index (*RIc*) still remains above 0.9. In Figure 4, however, absolute recuperation (*Rc*) by age 30 began to fall between the 1956-1960 and 1961-1965 cohorts, which is clearly differentiated from the previous pattern. This is consistent with the prior study that distinguishes between first and second demographic transition in Korea (Yoo 2014).

In Table 2 of relational model, postponement and recuperation indicate difference in cohort marriage rate from the previous five-year cohort. As seen in Figure 5, the trends in the postponement (absolute decline at 'trough' age) show up and down pattern. The first rise appears among the 1931-1935cohorts who experienced successive wars in their late teens and twenties. The subsequent postponements are perhaps due to introduction to free primary education in the 1950s. The second rise in marriage postponement happens in most recent birth cohorts born in late 1960s and 1970s. Unlike the previous one, the recuperation of the delayed marriage is remarkably low. The recuperation index (*RIc*) in the relational model indicates that compared to the previous five-year cohort, overall more than 85% of the delayed marriage is recuperated by age 45, resulting in marginal difference in lifetime singlehood.

<Table 1 and 2 are about here>

<Figure 4 and 5 are about here>

Next steps

As I prepare the paper for presentation, I plan to refine the demographic analyses to better account for marriage delay and recuperation process. As I am working on the educational differentials in this process (see Figure 6), the final paper will include detailed analyses about how the pattern of marriage delay and catching-up differs by level of education. It is expected that the results demonstrate the divergence in marriage schedule across levels of education. As young women have distinct values and attitudes toward family, the relationship between women's education and marriage may differ from conventional wisdom: it can be more complex or dynamic with age. The findings of this study will provide a rare opportunity to test the dynamic relationship in the context of rapid demographic change. Finally, I will relate these findings to stages of the demographic transition, especially the entry stage of the second demographic transition and discuss how it differs from western models.

<Figure 6 is about here>

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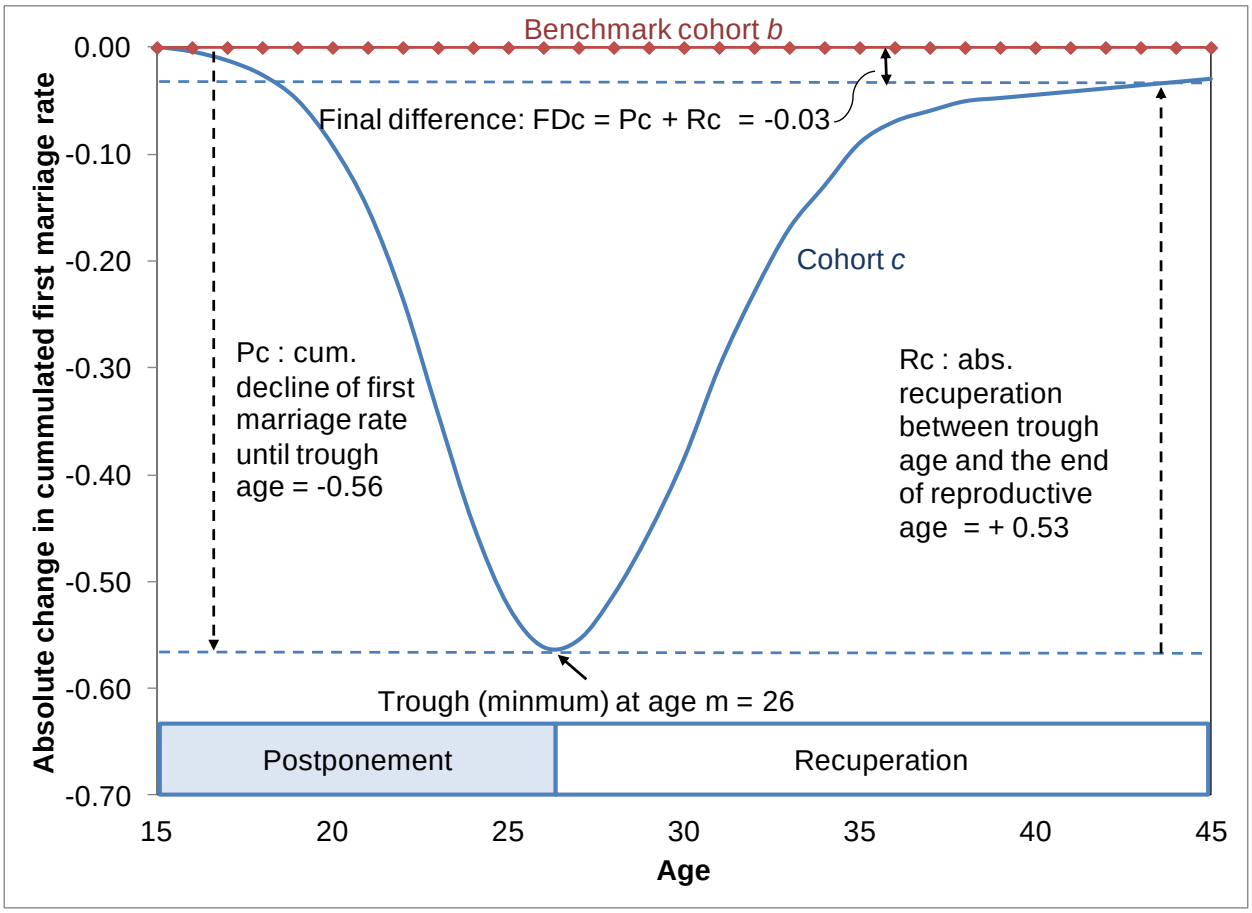
Table 1: Marriage delay and recuperation process by birth cohort, compared to women of 1916-1920 birth cohort: base model

Birth cohort	Postponement (Pc)	Age at the lowest Pc	Recuperation (Rc) at age				Recuperation Index (RI = Rc/Pc) at age			
			30	35	40	45	30	35	40	45
c1916-1920	0.000	0	0.000	0.000	0.000	0.000				
c1921-1925	0.068	18	0.069	0.069	0.069	0.069	1.015	1.009	1.007	1.005
c1926-1930	0.102	19	0.099	0.101	0.102	0.102	0.979	0.999	1.006	1.002
c1931-1935	0.341	20	0.337	0.341	0.341	0.340	0.989	0.999	1.000	0.997
c1936-1940	0.504	20	0.493	0.502	0.503	0.502	0.979	0.997	0.999	0.997
c1941-1945	0.607	20	0.590	0.603	0.604	0.603	0.971	0.994	0.995	0.994
c1946-1950	0.652	21	0.609	0.635	0.640	0.642	0.935	0.975	0.983	0.985
c1951-1955	0.665	21	0.612	0.638	0.645	0.648	0.921	0.959	0.969	0.974
c1956-1960	0.718	21	0.639	0.681	0.692	0.696	0.890	0.948	0.964	0.969
c1961-1965	0.734	21	0.632	0.677	0.696	0.704	0.860	0.921	0.948	0.958
c1966-1970	0.787	21	0.633	0.703	0.730	0.741	0.804	0.893	0.928	0.942
c1971-1975	0.812	22	0.574	0.678	0.722		0.706	0.835	0.889	
c1976-1980	0.840	22	0.463	0.648			0.551	0.772		

Table 2: Marriage delay and recuperation process by birth cohort, compared to the previous five-year cohort: relational model

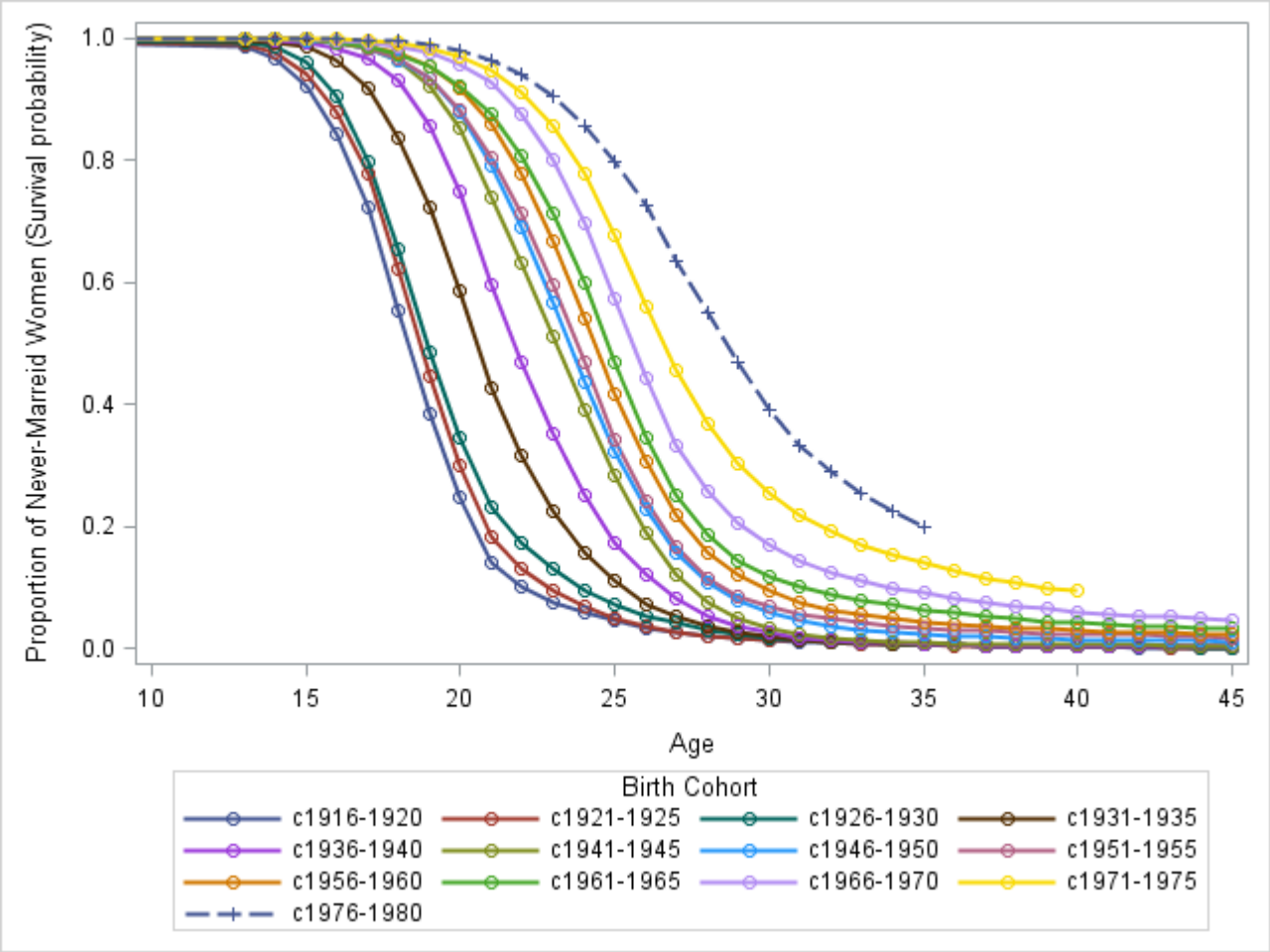
Birth cohort	Postponement (Pc)	Age at the lowest Pc	Recuperation (Rc) at age				Recuperation Index (RI = Rc/Pc) at age			
			30	35	40	45	30	35	40	45
c1916-1920	0.000	0	0.000	0.000	0.000	0.000				
c1921-1925	0.068	18	0.069	0.069	0.069	0.069	1.015	1.009	1.007	1.005
c1926-1930	0.046	21	0.043	0.045	0.046	0.046	0.931	0.985	1.001	0.996
c1931-1935	0.243	20	0.241	0.243	0.242	0.242	0.993	0.999	0.997	0.995
c1936-1940	0.169	21	0.163	0.168	0.169	0.169	0.962	0.994	0.999	0.996
c1941-1945	0.161	22	0.154	0.159	0.159	0.159	0.956	0.985	0.984	0.988
c1946-1950	0.059	22	0.034	0.046	0.050	0.053	0.574	0.783	0.855	0.893
c1951-1955	0.033	24	0.023	0.022	0.024	0.026	0.698	0.679	0.725	0.785
c1956-1960	0.073	23	0.047	0.063	0.068	0.068	0.638	0.858	0.923	0.928
c1961-1965	0.057	24	0.033	0.037	0.045	0.048	0.583	0.644	0.791	0.851
c1966-1970	0.104	25	0.052	0.077	0.085	0.089	0.506	0.745	0.820	0.855
c1971-1975	0.125	27	0.041	0.076	0.092		0.326	0.602	0.732	
c1976-1980	0.181	28	0.042	0.123			0.235	0.681		

Figure 1: The conceptual illustration of measuring marriage postponement (*Pc*), recuperation (*Rc*), and recuperation index (*RIc*)



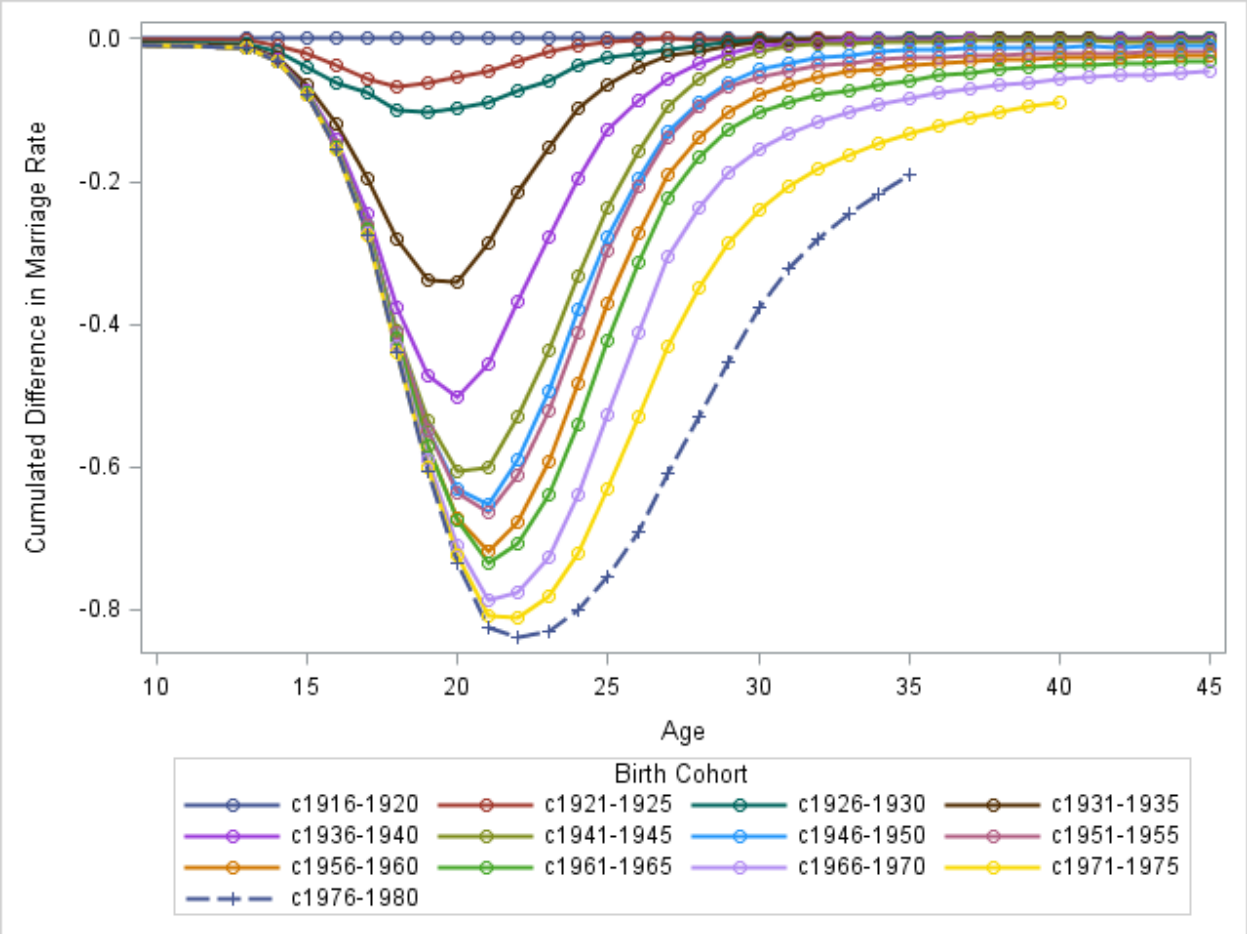
Source: Frejka (2012) and Sobotka et al. (2011).

Figure 2: Proportion of never-married women between the 1956-1960 and 1981-1985 birth cohorts, South Korea



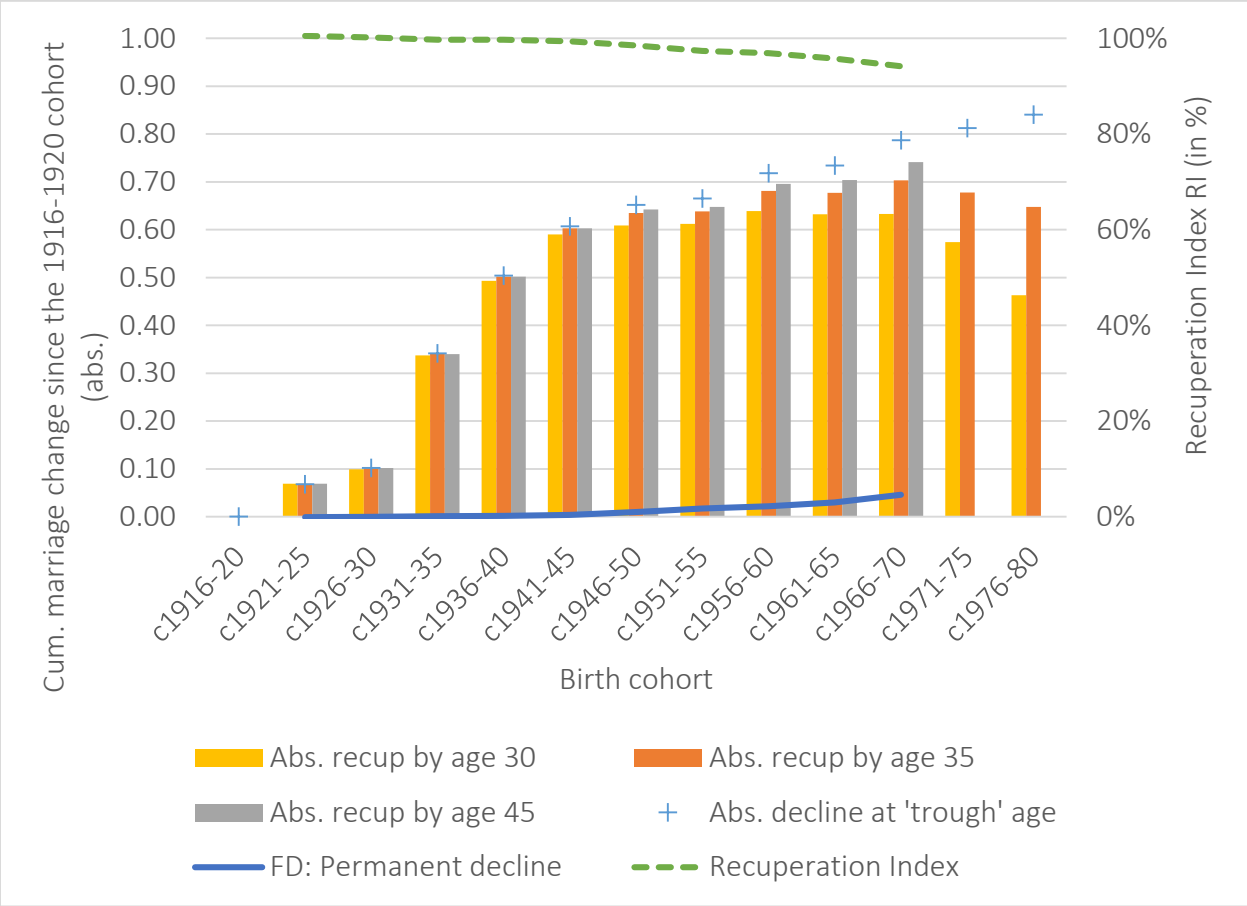
Source: own calcalation from the 1975, 1990, 2005, and 2010 Korean census sample data

Figure 3: Marriage delay and recuperation process between the 1916-1920 and 1976-1980 cohorts, South Korea



Source: own calcalation from the 1975, 1990, 2005, and 2010 Korean census sample data

Figure 4: Graphical summary of the marriage delay and recuperation process – base model: first marriage in Korea among women born since 1916



Source: own calcalation from the 1975, 1990, 2005, and 2010 Korean census sample data

Figure 5: Graphical summary of the marriage delay and recuperation process – relational model: first marriage in Korea among women born since 1916

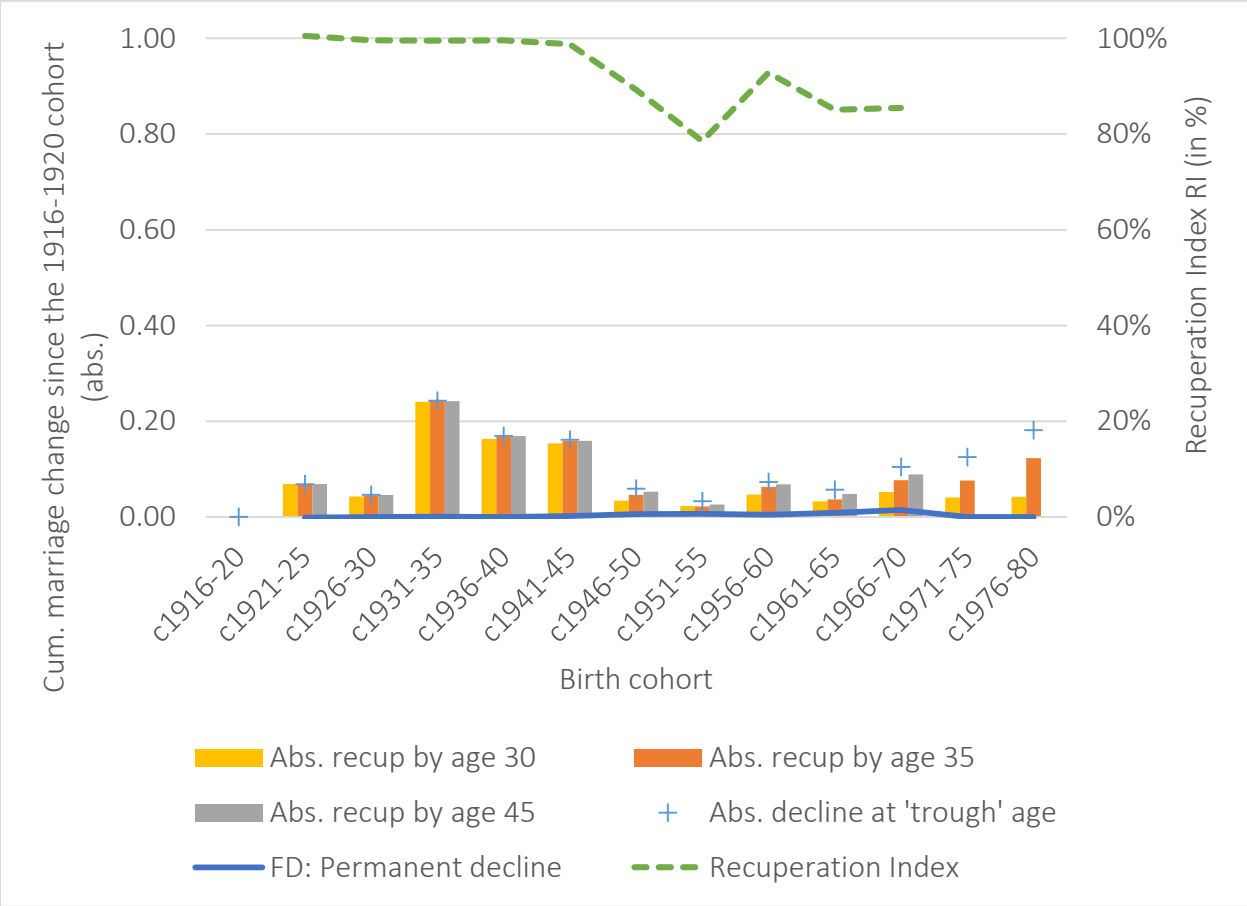


Figure 6: Marriage delay and recuperation by level of education between the 1956-1960 and 1981-1985 cohorts, South Korea