Premarital Cohabitation and Marital Dissolution in Post-Reform China¹

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Abstract

I use cohabitation data from the Chinese Family Panel Studies in 2010 to analyze the association of premarital cohabitation with subsequent divorce of first marriage. After balancing selection factors that influence premarital cohabitation through propensity score matching, I use Cox Proportional Hazards Models to examine the selection, causation, and diffusion perspectives on the relationship between premarital cohabitation and marital dissolution. Results show that premarital cohabitation was positively associated with divorce for those married in the early-reform period (1980-1994) when cohabitation was uncommon. However, this relationship disappeared for those married in the late-reform period (1995-2010) when cohabitation became more prevalent. The findings suggest variation in the link between premarital cohabitation and divorce across different marriage cohorts and provide strong evidence for the diffusion perspective in post-reform China. Supplemental sensitivity analyses support the robustness of the conclusion.

Key Words: Cohabitation, Divorce, Family, Marital Status

Running Head: Cohabitation and Divorce in China

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INTRODUCTION

Cohabitation has been prevalent in Western societies since the 1980s (Smock, 2000). For instance, in the United States, the number of cohabiting couples had reached 7.7 million by 2010 (U.S. Census Bureau, 2010) and the percentage of marriages preceded by cohabitation is greater than 60% for those married after 1996 (Manning & Cohen, 2012). In Europe, cohabitation has experienced a similar rise (Kasearu & Kutsar, 2011), as more than 80% of men cohabit before marriage in Northern Europe (Kalmijn, 2011; Kiernan, 2004). Although cohabitation can be used to evaluate partners and strengthen the marital bond by serving as a trial marriage (Heuveline & Timberlake, 2004; Kulu & Boyle, 2010), scholars have found that premarital cohabitation is positively associated with marital dissolution (Axinn & Thornton, 1992; Bumpass, Sweet, & Cherlin, 1991; Cohan & Kleinbaum, 2002).

Scholars have offered several theoretical perspectives to explain the link between cohabitation and marital dissolution in Western societies (Manning & Cohen, 2012). The *selection perspective* argues that cohabitators are a select group of individuals with divorce-prone characteristics that make them more open to the idea of divorce (Axinn & Thornton, 1992).

Thus, controlling for selection effects can significantly eliminate the association between

cohabitation and marital instability (Woods & Emery, 2002). Meanwhile, the *causation perspective* posits that the relationship is causal, and the experience of cohabitation per se can increase the likelihood of marital dissolution by changing cohabitators' commitment to marriage (Kamp Dush, Cohan, & Amato, 2003; Stanley, Whitton, & Markman, 2004).

In contrast to these perspectives, the *diffusion perspective* does not attempt to explain why cohabitation is associated with greater marital instability. Rather, it focuses on variation in the association of cohabitation with divorce among different national or cultural contexts (Hewitt & De Vaus, 2009; Kiernan, 2002; Liefbroer & Dourleijn, 2006). Particularly, it suggests that whether the association between cohabitation and divorce can be explained by the selection perspective and/or the causation perspective depends on the meaning and popularity of cohabitation within specific structural, cultural and historical contexts. Previous research has found that both selection and causation perspectives can partially explain the positive relationship between cohabitation and divorce when cohabitation is uncommon (Lu et al., 2012). However, they may not be able to explain the relationship when cohabitation becomes popular,

because cohabitation may not be related to marital instability (Manning & Cohen, 2012) or it may even reduce the risk of marital dissolution in some contexts (Hewitt & De Vaus, 2009).

This literature examining the relationship between cohabitation and divorce has several limitations. First, most prior research focusing on Western societies began after the 1980s when cohabitation was already relatively common (Smock, 2000). Thus, current scholarship cannot easily disentangle causation from selection in understanding why cohabitation is associated with divorce (Yu & Xie, 2015b). Second, the diffusion perspective has received little attention although it is likely that the relationship between cohabitation and marital instability varies across countries due to distinct cultural and institutional contexts (Liefbroer & Dourleijn, 2006). Few scholars have examined the relationship in developing countries and East Asian societies (Raymo, Park, Xie, & Yeung, 2015).

China affords us a unique setting to advance our understanding of the relationship between cohabitation and marital dissolution in different social contexts. Compared to other East Asian countries, China has undergone dramatic societal changes, which stem primarily from the market-oriented economic reform that began in 1978 (Xie, 2011; Yu & Xie, 2015a). The recent

emergence and growing acceptance of cohabitation after the 1980s in China allows an examination of whether and how the association between cohabitation and divorce has changed in traditional Confucian society (Yu & Xie, 2015b). In the remainder of this article, I first introduce the background of the emergence of cohabitation, and then I systematically examine the three aforementioned perspectives on the relationship between premarital cohabitation and divorce in post-reform China.

BACKGROUND: COHABITATION IN CHINA

Cohabitation has been increasingly common in recent marriage cohorts in China (Yu & Xie, 2015b). The emergence of cohabitation in China is a result of ideational change, economic development and institutional change since the early 1980s (Parish, Laumann, & Mojola, 2007; Yu & Xie, 2015b). In traditional Chinese society, cohabitation was prohibited due to the ideas of Confucianism, which advocated for patriarchy, filial piety and chastity. This tendency against cohabitation was strengthened by the socialist government's regulations on marriage and divorce during the Maoist era (1949-1976) (Parish et al., 2007). During the Cultural Revolution (1966-1976), the subject of sexuality disappeared from public discourse, and non-marital sex was

sanctioned as immoral behavior (Parish et al., 2007). Given that cohabitation was nearly non-existent during the pre-reform period (before 1980), I solely focus on cohabitation and marital dissolution during the post-reform period (after 1980).

Since the early 1980s, China has experienced an unprecedented social transformation, shifting from a planned to a market-oriented economy. This significant economic reform was first introduced into rural areas in 1978, and later expanded to urban areas after 1992 (Yu & Xie, 2015a). During the same period, family behaviors regarding marriage and divorce also underwent substantial changes. Different from Western societies, the traditional Chinese family was featured as “patriarchal, patrimonial, patrilineal and patrilocal” (Thornton & Lin, 1994). The patrilineal kinship system allowed authoritarian parents to arrange marriages for their children; however, the founding of the People’s Republic of China weakened this system (Xu & Whyte, 1990). During the early-reform period, the passage of a new marriage law in 1980 that advocates “freedom of marriage choices” continued to challenge the dominance of parental control over children’s marriages (Engel, 1984). Meanwhile, implementation of the open door policy opened China’s market to the rest of the world, ending China’s near-total isolation from Western

countries. Western culture, including norms regarding cohabitation and divorce, began to influence Chinese people via mass media (Parish et al., 2007). As a result, an increasing number of urban youth with high socioeconomic family backgrounds began to choose their own partners and accept cohabitation as a novel behavior (Yu & Xie, 2015b).

During the late-reform period (after the mid-1990s), with rapid economic growth, urbanization, and the expansion of higher education, a growing number of rural elites, migrant workers, and college students moved to cities. Meanwhile, the relaxation of the household registration system (*hukou*), which restricts peasants in rural areas, and the decline of the work-unit system, which controls urban workers, enabled large-scale social mobility from rural to urban and from inland China to coastal China (Wu & Treiman, 2007). These societal changes led to an increase in young people's autonomy and a decline in parental control over children, especially in rural areas. During this period, men's economic prospects became more important in marriage entry, and the husband was usually expected to provide the necessary housing unit for marriage (Yu & Xie, 2015a). In pre-reform China, urban families' housing units were provided by the working unit system, and this housing allocation system favored people with

higher socioeconomic and political status (Logan, Bian, & Bian, 1999). After the early 1990s, the market-driven reform spurred the emergence of the commercial housing market, but the sharp increase of housing prices in urban areas has led more people to delay marriage (Yu & Xie, 2015a). Therefore, many couples may postpone marriage and cohabit first due to insufficient financial resources. Taken together, the association of cohabitation with marital dissolution in post-reform China might be contingent upon the foregoing institutional and cultural factors.

EXPLAINING THE RELATIONSHIP BETWEEN PREMARITAL COHABITATION AND DIVORCE IN CHINA

Recent scholarship has investigated the selection, causation, and diffusion perspectives on the link between cohabitation and marital dissolution in Western countries (Hewitt & De Vaus, 2009; Lu et al., 2012). Hewitt and De Vaus (2009) found that the increased risk of divorce for cohabitators relative to non-cohabitators decreases each year for marriages before 1988 in Australia and premarital cohabitation even reduces the risk of divorce for more recent marriages. Lu and his colleagues (2012) found that the association of cohabitation with divorce in the U.S. can be partially explained by selection and causation perspectives when cohabitation is uncommon, but the positive relationship disappears when cohabitation becomes prevalent. These findings

indicate that the association of cohabitation with marital instability varies across different marriage cohorts and thus the diffusion perspective can explain the relationship in Western societies. But whether these three different perspectives can be meaningfully applied to post-reform China remains unknown.

The Selection Perspective

The selection perspective argues that cohabitators are a select group of individuals who differ from non-cohabitators on a number of important characteristics that are also positively associated with the risk of marital instability. Scholars have attributed the appearance of cohabitation in Western societies to a series of factors such as individualism, secularism, industrialization, and modernization (Heuveline & Timberlake, 2004; Lesthaeghe, 2010; Rindfuss & VandenHeuvel, 1990; Thornton, Axinn, & Teachman, 1995). Thus, cohabitation in Western societies is more common among people who are less religious and more supportive of liberal and egalitarian values (Smock, 2000; Van de Kaa, 2002). Past studies have also found higher cohabitation rates among disadvantaged groups in the U.S. characterized by less education, fewer financial resources, belonging to a racial minority, limited migration experience, and low socioeconomic

or divorced family backgrounds (Manning & Cohen, 2012). Researchers have also linked cohabitation to unemployment, a dearth of work experience, low income levels, and temporary employment in European countries (Kalmijn, 2011). These pre-cohabiting characteristics are related to lower commitment to marriage, greater approval of divorce (Booth & Johnson, 1988; Lillard, Brien, & Waite, 1995; Thomson & Colella, 1992; Woods & Emery, 2002) and, therefore, a higher risk of marital instability (Manning & Cohen, 2012). Thus, the association of cohabitation with a higher risk of instability may be partially or wholly spurious.

However, the determinants of cohabitation in post-reform China differ from those in Western societies. Instead of belonging to disadvantaged groups, cohabitators in China are more likely to be individuals with greater exposure to Western culture and fewer institutional constraints (Yu & Xie, 2015b). More specifically, Yu and Xie (2015b) found that individuals with better education, high socioeconomic family background, migration experience from rural to urban areas, and previous experience living in developed areas are more likely to cohabit before first marriage. Due to the dramatic societal changes that undermine the influence of the patrilineal kinship system, these pre-cohabiting characteristics allow cohabitators to choose their

partners in a love-match way, which may result in an increase of marital stability. Thus, I expect that the selection perspective may not explain the relationship between cohabitation and marital dissolution in post-reform China.

The Causation Perspective

The causation perspective assumes that the cohabitation experience itself significantly increases the risk of marital dissolution, rather than selective divorce-prone features that bring them into cohabitation (Bennett, Blanc, & Bloom, 1988; Kamp Dush et al., 2003). Scholars of this perspective argue that the cohabitation experience may increase the constraints of terminating the relationship (e.g., financial obligations and fewer possible alternatives), and therefore some cohabitators may slide into marriage due to relationship inertia, even though they may find themselves not ideally compatible (Stanley, Rhoades, & Markman, 2006). Given that cohabitators may not be satisfied with their spouses, cohabitation may not increase or even reduce levels of dedication and commitment to marriage. For instance, using data from the 1987-1988 and 1992-1994 National Survey of Families and Households, Stafford et al. (2014) found that cohabitators' companionship, sexual interaction, relational satisfaction, and commitment decrease

across time, but the frequency of conflict and the risk of separation increase. Past research has also found some evidence that after controlling for socio-demographic factors, premarital cohabitation is still associated with lower marital satisfaction (Brown & Booth, 1996; Teachman, 2003), higher rates of marital infidelity (Forste & Tanfer, 1996), and lower commitment to the marital bond (Stanley et al., 2004). As a result, premarital cohabitation may lead to a greater acceptance of divorce (Cunningham & Thornton, 2005; Stafford, Kline, & Rankin, 2004; Stanley et al., 2004).

As in Western countries, cohabitation in post-reform China also increases the relationship inertia due to social pressure and institutional constraints. Although the weakening of arranged marriages under the patrilineal kinship system provided young generations more freedom to choose their partners, cohabitators were still expected to marry after cohabiting in post-reform China, especially during the early reform period (Parish et al., 2007). It is likely that cohabitators may not be satisfied with their spouses, but slide into rather than intentionally commit to marriage due to social pressure and institutional constraints (Stanley, Rhoades, & Markman, 2006). In this sense, cohabitation may lead to a higher risk of divorce. Thus, I expect cohabitators

to show lower marital stability compared to non-cohabitators, and the causation perspective may explain the relationship between cohabitation and divorce.

The Diffusion Perspective

The diffusion perspective suggests heterogeneity in the association of cohabitation with marital dissolution. It argues that the relationship between cohabitation and marital dissolution varies across different marriage cohorts, depending on the popularity and meaning of cohabitation within the population among different countries and cultures (De Vaus, Qu, & Weston, 2003; Hewitt & De Vaus, 2009; Manning & Cohen, 2012). Theories based on the second demographic transition assume that the diffusion of cohabitation passes through multiple stages: it is first seen as a deviant behavior, then as a prelude or trial to marriage, and finally as an alternative to marriage (Kiernan, 2002; Liefbroer & Dourleijn, 2006). Thus, the influence of cohabitation on marital stability varies across distinct stages. When cohabitation is uncommon, it increases marital instability; however, this effect decreases or disappears when cohabitation becomes widespread. Previous research has shown that in Western and Northern Europe, where cohabitation rates are high, cohabitation as an alternative to marriage is more prevalent, while in

Central and Eastern European countries, where cohabitation is less widespread, many cohabitators intend to marry despite holding unfavorable attitudes toward marriage (Hiekel, Liefbroer, & Poortman, 2014). Correspondingly, Liefbroer and Dourleijn (2006) found that the effect of cohabitation on marital instability in European countries varies across the Nordic countries (high), Western Europe (medium), Central and Eastern Europe (medium), and Southern Europe (low).

The diffusion pattern of cohabitation in post-reform China shows that, as a deviant behavior, cohabitation was rare during the Maoist era (1949-1978), but it increased rapidly since the early 1980s and became relatively common after the mid-1990s. Given the popularity of cohabitation at different reform stages, I anticipate that the diffusion perspective may explain the association of cohabitation with divorce in post-reform China. More specifically, since the early 1980s, institutional and cultural changes began to weaken the patrilineal kinship system (e.g., arranged marriages). Therefore, those who had more exposure to Western culture, fewer institutional constraints, and who lived in urban areas began to choose their partners and accept cohabitation as a novel behavior; but during this early-reform period, cohabitation was treated as

a precursor to marriage (Yu & Xie, 2015b) and cohabitators were still expected to marry after living together. Thus, it is likely that cohabitators with less marital commitment would marry due to institutional and cultural constraints and end up divorced (Stanley et al., 2006). However, during the late-reform period, Chinese society became more tolerant of cohabitation, and cohabitators experienced less pressure to get married after cohabiting. Under these circumstances, cohabitation might begin to serve as a trial marriage. Notably unlike Western societies, following extremely low divorce rate in the pre-reform period, though the crude divorce rate increased from 0.33 in 1979 to 1.59 in 2007 (Wang & Zhou, 2010), divorce in post-reform China was still not highly accepted. In this sense, it is possible that the association of cohabitation with marital instability might disappear during the late-reform period.

METHOD

Data and Sample

I drew on cohabitation data from the Chinese Family Panel Studies (CFPS, see <http://www.issse.edu.cn/cfps/EN/>) carried out by the Institute of Social Science Survey of Peking University in 2010. The CFPS 2010 data is a nationally representative sample of 33,600 adult

respondents in 14,798 households, including 29,213 respondents with first marriage experience and 2,331 respondents with cohabitation experience prior to first marriage. It also includes the detailed cohabitation and divorce history of one's first marriage.

Given the over 20% missingness of respondents' fathers' education and party membership, I did not drop cases with missing values on these two variables. Instead, I first retrieved partial information from CFPS 2012 data on fathers' education and party membership and then used a new "unknown" category to indicate the missing values on these two variables (Yu & Xie, 2015b). After this procedure, the percentage of missing cases in the final analytical sample is less than 10% and thus appropriate for conducting complete case analyses. I also used the multiple imputation method with chained equations to impute variables with missing values and obtained similar results with complete case analyses (shown in supplemental materials).

The main purpose of this article is to examine the relationship between premarital cohabitation and marital dissolution in post-reform China. Thus, I dropped 4,387 respondents without first marriage experience. Past research and preliminary data analysis have indicated that cohabitation was nearly non-existent during the Maoist era (Yu & Xie, 2015b), and the

cohabitation rate in CFPS 2010 was 1.34% for those married before 1980. I therefore excluded 7,822 respondents married before 1980. The final analytic sample consists of 17,877 respondents married between 1980 and 2010. During the period of 1990-1995, China had completed the second demographic transition, characterized by low fertility rate, delayed marriage, and growing divorce rate (Xie, 2011). To test the diffusion perspective, I divided respondents into the early-reform marriage cohort (1980-1994) and the late-reform marriage cohort (1995-2010), based on the economic reform stage, the prevalence of cohabitation, and the completion of the second demographic transition. I also presented additional analyses in supplemental materials using marriage cohort 1978-1992 and marriage cohort 1993-2008 to represent the early- and late-reform stages, because the economic reform was expanded to the urban economy after 1992 (Yu and Xie, 2015a). Both results are consistent.

Variables and Measures

The core dependent variable, the timing for the divorce of first marriage, was constructed from the duration (years) of first marriage and whether it ended in divorce at the time of the survey. If the respondent was reported not divorced at the time of the survey, the duration was

computed based on the time from first marriage to the time of the survey. The independent variable of cohabitation was a dummy variable indicating whether the respondent cohabited with the future spouse prior to first marriage.

With respect to selection variables that influence cohabitation, I followed Yu and Xie (2015b)'s findings about the determinants of cohabitation in China. They found that cohabitators in China are more likely to be those with high socioeconomic family backgrounds. Family background was operationalized as father's education (1 = *primary school degree or less*; 2 = *middle school degree*; 3 = *high school degree*; 4 = *college degree or above*; 99=*unknown*), father's party membership (1=*CCP member*; 0=*non-CCP member*; 99=*unknown*) and respondent's education (1 = *primary school degree or less*; 2 = *middle school degree*; 3 = *high school degree*; 4 = *college degree or above*). They also found that individuals with fewer institutional constraints, such as those with rural-urban migration experience (1 = *always rural*; 2 = *always urban*; 3 = *from rural to urban*) and non-CCP members (1=*CCP member*; 0=*non-CCP member*), are more likely to cohabit before first marriage. But I included one more institutional variable that relates to mate selection pattern (1 = *free selection*; 0 = *arranged marriage or*

others). Free mate selection appears to have significant impacts on marital satisfaction in urban China (Xu & Whyte, 1990). In addition, based on previous studies in Western societies, I controlled for other relevant socio-demographic characteristics that affect cohabitation, including ethnicity (1 = *minorities*; 0 = *Han ethnicity*), religiosity (1 = *religion affiliated*; 0 = *not affiliated*), age, annual income (log), gender (1 = *female*; 0 = *male*), and number of siblings (1 = *zero sibling*; 0 = *more than 1 sibling*) (for more details, please see Lu et al., 2012). As suggested by Yu and Xie (2015b), cohabitation varies across different regions, and individuals living in more developed areas are more likely to cohabit in China. Regional variance was measured by the marketization index and regional indicators. Marketization was a measurement of the level of provincial economic development ranging from 0 to 10 (Fan, Wang, & Ma, 2011) and the region indicator was based on respondents' sampling provinces, coded as 1=*small provinces*, 2=*Shanghai*, 3=*Liaoning*, 4=*Henan*, 5=*Gansu*, and 6=*Guangdong*.

Propensity Score Matching

Propensity Score Matching (PSM) has been widely used in observational studies to balance selection biases from observed covariates (Morgan & Winship, 2007; Rosenbaum & Rubin,

1983). In a binary treatment effect design, Y^T ($T=1$ if treated; 0, otherwise) denotes the potential outcomes for a subject under binary treatment conditions and vector $\mathbf{X}$ denotes a set of observed covariates. Thus, a valid causal inference relies on the strongly ignorable treatment assignment assumption: $T \perp Y^T \mid e(\mathbf{X})$, where $e(\mathbf{X})$ is the balancing score defined as $P(T=1|\mathbf{X})$. This assumption assures that individual i can be randomly assigned into a treatment group, which leads to a random-like situation (Rosenbaum & Rubin 1983).

In this article, whether a person chooses to cohabit before first marriage can be seen as a non-random experiment because the differences in pre-existing cohabiting characteristics, such as family backgrounds and institutional factors, would affect the treatment effect on marital dissolution (Lu et al. 2012). Hence, it is important to remove observed biases that influence the probability of cohabitation to estimate the effect of premarital cohabitation on marital dissolution. If the selection effect exists, the influence of cohabitation on marital instability should decrease or disappear after balancing the selection biases. I employed binary logistic models to estimate the probability of accepting treatment (cohabiting with the spouse prior to first marriage) and used the logistic transformation of predicted probability as the propensity

score due to its proximity to normal distribution (Rosenbaum, 2002). I also used the complex survey design element, the strata indicator (sampling regions), as a predictor in the propensity score models.

After obtaining the propensity score, I used this scalar score to balance distributions of covariates by matching cohabitators and non-cohabitators. I took the optimal full matching as the main matching strategy because it could minimize the total distance of propensity scores and take full advantage of every case in my data (Hansen & Klopfer, 2006). In an optimal full matching, each treated participant matches to one or more controls, and similarly each control participant matches to one or more treated participants (Guo & Fraser, 2014, p. 151).

Survival Analysis

After obtaining the matched data and the matching structures, I applied Stratified Cox Proportional Hazards Models to estimate the divorce hazard of first marriage. The model is specified as follows (Cleves, 2008):

$$h_i(t) = h_{0i}(t) \exp (\beta_1 \text{Cohabitation} + \sum_{j=2}^p \beta_j \text{Control}_j).$$

β_1 denotes the log hazard ratio of cohabitation and β_j denotes the log hazard ratio of j-th control variable. $h_i(t)$ refers to the hazard function of the i-th group. Stratified Cox models assume that the i-th group has its specific baseline hazard function $h_{0i}(t)$, but the coefficients of explanatory variables are the same across groups. This feature allows us to use obtained PSM structures as strata to adjust the influence of selective factors and to test the different perspectives of the relationship between cohabitation and divorce (Lu et al., 2012). All observed covariates used in PSM models were added into Cox models as control variables. Considering the potential influence of unobserved variables, I also conducted a sensitivity analysis to examine the unobserved confounding effects as shown in the supplemental materials.

RESULTS

Descriptive Analysis of Premarital Cohabitation in China

Cohabitation has gradually become relatively popular in post-reform China. Table 1 shows the cohabitation rate among different marriage cohorts. The percentage of cohabitators before first marriage increased from 5.05% for those married in the early-reform period to 24.54% for those married in the late-reform period. Table 1 also reports higher cohabitation rates among people

with higher education for both marriage cohorts. In addition, CFPS reveals that the average duration of cohabitation (not shown) in China was around 13 months for the early-reform marriage cohort and 10 months for the late-reform marriage cohort. But the median duration of cohabitation was 6 months for both marriage cohorts.

[Table 1 Here]

Illustration of Propensity Score Matching Analysis

Table 2 presents available covariates used to predict odds ratios of premarital cohabitation. As shown in Model 1 and 2, for both marriage cohorts, those who were more likely to cohabit include people living in economically developed areas, those who migrated from rural to urban areas, and those who chose their future spouses themselves. The findings are consistent with Yu and Xie (2015b)'s conclusion. Table 2 also reports that when cohabitation was uncommon, respondents who entered marriage in the early-reform period from high status families were more likely to cohabit with their spouses, but this was not statistically significant for the late-reform marriage cohort. In short, PSM models show that cohabitators in China were more likely to be individuals with greater exposure to Western culture and fewer institutional constraints.

[Table 2 Here]

After checking the overlapping of propensity scores, I ran optimal full matching in R to balance selection biases of covariates between cohabitators and non-cohabitators to obtain the matched data. The imbalance checking through absolute standardized differences before and after matching shows that optimal full matching balanced those distributions of covariates very well. Then I used matched data to run Cox Proportional Hazards Models with all covariates used in PSM models to examine the aforementioned three perspectives on the relationship between premarital cohabitation and divorce in post-reform China.

Comparative Analysis of Cox Proportional Hazards Models

Table 3 reports divorce hazard ratios of first marriage before matching. The result from before-matching reveals that the relationship between cohabitation and divorce changed across different marriage cohorts. Model 3 shows that, for the early-reform marriage cohort, prior cohabitation experience was significantly associated with subsequent dissolution of first marriage (HR=2.37, $p<.001$). However, this positive relationship disappeared when cohabitation became more common for the late-reform marriage cohort as shown in Model 4 (HR=1.05,

$p > .05$). The interaction test in Model 5 shows that, compared with cohabitators married in the early-reform period, the divorce hazard of first marriage decreased significantly ($HR = 0.42$, $p < .001$) for cohabitators married in the late-reform period. This provides evidence for the diffusion perspective on the link between cohabitation and marital dissolution. Nonetheless, it is still not reasonable to conclude that the causation perspective existed when cohabitation was uncommon due to selection biases that influence premarital cohabitation.

[Table 3 Here]

The post-matching result in Model 6 from Table 4 shows that, after balancing selection factors that influence cohabitation, the association of cohabitation with divorce was still statistically significant for the early-reform marriage cohort ($HR = 2.29$, $p < .001$). But for the late-reform marriage cohort, Model 7 still shows no significant association between premarital cohabitation and divorce ($HR = 1.52$, $p > .05$). Based on these post-matching results, we could conclude that after accounting for observed selection effects, cohabitation was positively associated with marital dissolution for those married in the early-reform period when cohabitation was uncommon. However, this positive relationship disappeared for the late-reform

marriage cohort when cohabitation became more popular. This finding provides strong evidence for the diffusion perspective in post-reform China.

[Table 4 Here]

CONCLUSION AND DISCUSSION

This study advances existing literature by systematically examining the selection, causation and diffusion perspectives on the relationship between premarital cohabitation and divorce in China. Previous research focusing mostly on Western societies has failed to account for the relationship in East Asian societies. This study reveals that, in post-reform China, for those married in the early-reform period, when cohabitation was uncommon, cohabitation was positively associated with subsequent divorce. But this relationship disappeared for those married in the late-reform period when cohabitation became more common. The findings suggest variation in the association between cohabitation and divorce, and provide the first strong empirical evidence in East Asian society for Liefbroer and Dourleijn (2006)'s diffusion perspective. It should be noted that the cohabitation rate in contemporary China is lower

compared to Western societies, and traditional Confucian culture, such as the patrilineal kinship system and the norm of filial piety, is still shaping the meaning and popularity of cohabitation.

This study also provides evidence for the causation perspective during the period in which cohabitation was uncommon. But this still needs further examination. Meanwhile, I found no strong evidence supporting the selection perspective, even though the divorce hazard for cohabitators decreased slightly after balancing selection factors during the early-reform period. In contrast to Western societies, my findings suggest that these observed selection factors that influence cohabitation, including migration experience and non-arranged marriages, were not necessarily linked to marital instability. This contradicts existing literature that suggests that cohabitators are a select group of individuals with divorce-prone characteristics in Western societies. I intend to address this puzzle in the future with a follow-up interview study.

Nonetheless, this does not imply that the selection perspective could not explain the positive relationship between cohabitation and marital instability. It is likely that unobserved personality factors, such as delinquent behavior and unconventional attitudes, might affect the link between cohabitation and divorce to some extent. Additionally, scholars have shown that economic

conditions became more important in the determinants of marriage and cohabitation in post-reform China (Yu & Xie, 2015a 2015b). For instance, Yu and Xie (2015a) found evidence that the housing market plays a crucial role in delayed marriage entry. Even I cannot directly test the influence of the housing market on the relationship between cohabitation and divorce due to lack of data, it is plausible that the sharp increase of housing prices may spur cohabitation when couples are not able to purchase housing units for marriage. These selection factors may further influence marital stability.

This study also reveals how macro structural and cultural changes shape the link between cohabitation and marital dissolution. The Chinese case suggests that the association between cohabitation and divorce is changing across different reform periods and the extent to which selection versus causation explains the relationship depends on specific structural, cultural, and historical contexts. During the early-reform period, institutional and cultural changes, largely due to economic reform, weakened the patrilineal kinship system (e.g., arranged marriages), allowing people with greater Western-culture exposure and fewer institutional constraints to choose their own partners and cohabit before marriage. Nonetheless, cohabitation was still relatively rare and

mostly seen as a precursor to marriage during this period. Even though cohabitators might find their partners not ideally comparable, they were still forced into marriage due to social pressure. Therefore, I speculate that sliding into marriage rather than consciously deciding to marry could potentially lead to a higher risk of divorce due to an unfavorable attitude towards marriage. In this sense, cohabitators were a selective group of “norm conformists” with less commitment to marriage compared to those married who did not cohabit (Hiekel et al., 2014). It is possible that these conformists might be less likely to enter into marriage under a different cultural milieu in Western societies. This further indicates that cohabitation itself might not increase the risk of divorce and it is the cultural environment that created a “selection” effect--pushing cohabitators into marriage and producing a situation that causes cohabitators to be less committed to subsequent marriage relative to non-cohabitators.

During the late-reform period, particularly after China joined the WTO in 2001, Chinese society became more westernized, and family behaviors began to converge with those in Western societies (Yu & Xie, 2015b). Cohabitators were not required to marry in order to conform to social norms. Given that cohabitation became relatively popular, it is reasonable to assume that

cohabitation might begin to serve as a trial marriage, which strengthens the marital bond (Hiekel et al., 2014). Critics may argue that this is not a sufficient explanation because the positive link between cohabitation and marital instability still exists in Western countries even though cohabitation is regarded as a trial marriage. Unlike Western countries, despite the growing acceptance of divorce in China, divorce was still not a normative and widely accepted behavior due to cultural norms of Confucianism. In this sense, the link between cohabitation and marital dissolution might disappear when cohabitation became more popular but divorce was still not widely accepted.

Readers should be cautious when interpreting these results because the findings can only be generalized to East Asian societies and other developing countries with similar Confucian cultural norms. In addition, readers should be aware that this research has several limitations. First, this article focuses solely on cohabitators before first marriages, and thus these results cannot extend to remarriages. Second, CFPS 2010 did not collect respondents' complete cohabitation histories, so the effect of serial cohabitation and turbulent partnership on the risk of subsequent marital instability remains unknown. However, it is reasonable to assume that serial cohabitation

was very rare during the early-reform period (Yu & Xie, 2015b), and it might influence subsequent divorce during the late-reform period. Third, further evidence on the nature of cohabitation is needed to better understand the relationship between cohabitation and divorce in post-reform China, given that cohabitation plays a different role in marital instability when it is a precursor to marriage, a trial marriage, or an alternative to marriage. Lastly, previous studies have shown that the relationship between cohabitation and divorce varies across different gender groups, but this goes beyond the scope of this research (Yu & Xie, 2015b). I leave these limitations to future research.

Despite these limitations, the findings in this article provide a starting point for examining the association of cohabitation with divorce and contribute to our understanding of recent family changes in post-reform China.

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TABLES

Table 1. *Cohabitation Rate before First Marriage by Marriage Cohort and Education*

	Marriage Cohort	
	Early-Reform (1980-1994)	Late-Reform (1995-2010)
Total Sample	5.05%	24.54%
Education Level		
Primary School	4.82%	18.80%
Middle School	4.78%	24.38%
High School	5.68%	35.34%
College	6.86%	26.86%
Observations	10438	7439

Note: all descriptive results were weighted to be nationally representative.

Table 2. *Logit Models Predicting Odds Ratio of Cohabitation among Two Marriage Cohorts*

	Model 1		Model 2	
	Early-Reform (1980-1994)		Late-Reform (1995-2010)	
	OR	SE	OR	SE
<i>Family Background:</i>				
Education (ref: primary school)				
Middle School	0.87	0.11	1.13	0.09
High School	0.74	0.13	1.46***	0.17
College	0.49*	0.14	1.03	0.14
Father's Education (ref: primary school)				
Middle School	1.11	0.19	1.05	0.08
High School	1.26	0.28	0.91	0.10
College	1.95*	0.61	0.88	0.17
Unknown	1.10	0.18	1.11	0.15
Father's Party Membership (ref: non-CCP)				
CCP Member	0.80	0.12	1.01	0.10
Unknown	1.12	0.18	1.19	0.11
<i>Institutional Constraints:</i>				
CCP Member (ref: non-CCP)	0.84	0.18	0.80	0.12
Migration Experience (ref: always rural)				
Always Urban	1.26	0.24	1.14	0.13
From Rural to Urban	1.91***	0.31	1.51***	0.16
Free Mate Selection (ref: arranged)	2.26***	0.30	3.13***	0.24
<i>Socio-Demographic Features:</i>				
Age	0.92***	0.01	0.92***	0.01
Logged Annual Income	1.06**	0.02	1.04***	0.01
Minorities (ref: <i>Han</i> ethnicity)	0.81	0.20	0.84	0.11
Female (ref: male)	0.81**	0.07	0.87**	0.04
Religion Affiliated (ref: no)	1.46	0.65	1.20	0.36
No Sibling (ref: > 1)	0.47*	0.15	0.74**	0.08
<i>Regional Variance:</i>				
Provincial Marketization Index	1.34***	0.08	1.35***	0.06
Sampling Region (ref: small provinces)				
Shanghai	0.79	0.19	0.95	0.18
Liaoning	0.84	0.17	1.17	0.16
Henan	0.50**	0.13	0.56***	0.07
Gansu	0.35**	0.14	0.40***	0.09
Guangdong	0.89	0.18	0.87	0.13
Constant	0.29*	0.18	0.29***	0.10
<i>N</i>	10438		7439	
<i>Log Lik.</i>	-1797		-3357	

Note: given the over 20% missingness of respondents' fathers' education and party membership, I included a category "unknown" indicating the missing values on these two variables.

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

Table 3. Cox Models Predicting Hazard Ratio of Marital Dissolution before Matching

	Model 3		Model 4		Model 5	
	Early-Reform (1980-1994)		Late-Reform (1995-2010)		Post-Reform (1980-2010)	
	<i>HR</i>	<i>SE</i>	<i>HR</i>	<i>SE</i>	<i>HR</i>	<i>SE</i>
Cohabitation	2.37***	0.45	1.05	0.20	2.39***	0.43
<i>Family Background:</i>						
Education (ref: primary school)						
Middle School	1.14	0.17	0.96	0.17	1.08	0.12
High School	1.46*	0.26	1.03	0.25	1.30	0.18
College	2.00**	0.47	0.67	0.21	1.21	0.23
Father's Education (ref: primary school)						
Middle School	1.43*	0.23	1.26	0.22	1.31*	0.16
High School	1.53*	0.32	1.00	0.26	1.23	0.20
College	0.95	0.33	1.49	0.51	1.12	0.27
Unknown	1.11	0.22	1.51	0.37	1.23	0.18
Father's Party Membership (ref: non-CCP)						
CCP Member	1.09	0.16	0.67	0.14	0.93	0.11
Unknown	1.23	0.22	0.95	0.18	1.11	0.14
<i>Institutional Constraints:</i>						
CCP Member (ref: non-CCP)	0.36***	0.09	0.89	0.25	0.53***	0.10
Migration Experience (ref: always rural)						
Always Urban	3.24***	0.51	2.26***	0.47	2.84***	0.36
From Rural to Urban	2.06***	0.35	1.31	0.31	1.71***	0.24
Free Mate Selection (ref: arranged)	1.03	0.14	1.06	0.16	1.04	0.11
<i>Socio-Demographic Features:</i>						
Age	0.97**	0.01	1.00	0.01	0.97**	0.01
Logged Annual Income	1.00	0.02	1.00	0.02	1.01	0.01
Minorities (ref: Han ethnicity)	1.80**	0.34	0.94	0.23	1.39*	0.21
Female (ref: male)	0.70**	0.08	0.78	0.12	0.72***	0.06
Religion Affiliated (ref: no)	1.21	0.46	1.96	1.01	1.42	0.44
No Sibling (ref: > 1)	0.96	0.23	0.79	0.19	0.78	0.14
<i>Regional Variance:</i>						
Provincial Marketization Index	0.95	0.07	1.03	0.10	0.98	0.06
Sampling Region (ref: small provinces)						
Shanghai	1.52	0.46	0.83	0.33	1.29	0.32
Liaoning	1.81***	0.32	1.99**	0.44	1.87***	0.27
Henan	0.89	0.21	0.67	0.18	0.79	0.14
Gansu	1.21	0.31	1.03	0.33	1.14	0.23
Guangdong	0.42*	0.16	0.60	0.21	0.52*	0.14
Marriage Cohort (ref: early-reform)						
Late-Reform					1.56**	0.23
<i>Interaction Term Test:</i>						
Cohabitor # Late-Reform					0.42***	0.10
<i>N</i>	10438		7439		17877	
<i>Log Lik.</i>	-3116		-1844		-5292	

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4. Cox Models Predicting Hazard Ratio of Marital Dissolution after Matching

	Model 6		Model 7	
	Early-Reform (1980-1994)		Late-Reform (1995-2010)	
	<i>HR</i>	<i>SE</i>	<i>HR</i>	<i>SE</i>
Cohabitation	2.29***	0.47	1.52	0.32
<i>Family Background:</i>				
Education (ref: primary school)				
Middle School	1.22	0.23	0.60*	0.13
High School	2.07*	0.59	0.41*	0.16
College	4.90**	2.74	0.53	0.22
Father's Education (ref: primary school)				
Middle School	1.27	0.22	1.07	0.22
High School	1.18	0.30	1.55	0.49
College	0.40	0.24	2.27	1.22
Unknown	1.04	0.21	1.36	0.39
Father's Party Membership (ref: non-CCP)				
CCP Member	1.48	0.30	0.59*	0.15
Unknown	0.98	0.20	0.55*	0.14
<i>Institutional Constraints:</i>				
CCP Member (ref: non-CCP)	0.45**	0.13	1.67	0.60
Migration Experience (ref: always rural)				
Always Urban	2.57***	0.60	1.75*	0.47
From Rural to Urban	1.09	0.53	0.43*	0.17
Free Mate Selection (ref: arranged)	0.41	0.25	0.06***	0.05
<i>Socio-Demographic Features:</i>				
Age	1.07	0.06	1.20***	0.07
Logged Annual Income	0.94	0.04	0.91**	0.03
Minorities (ref: Han ethnicity)	2.65***	0.66	1.66	0.49
Female (ref: male)	0.89	0.17	1.04	0.20
Religion Affiliated (ref: no)	0.75	0.36	1.12	0.53
No Sibling (ref: > 1)	2.51	1.44	1.26	0.50
<i>Regional Variance:</i>				
Provincial Marketization Index	0.69	0.15	0.49**	0.11
Sampling Region (ref: small provinces)				
Shanghai	1.96	0.71	0.99	0.44
Liaoning	2.15***	0.47	1.81*	0.51
Henan	2.01	1.07	2.46	1.18
Gansu	3.70	2.99	7.33*	5.81
Guangdong	0.47	0.19	0.82	0.36
<i>N</i>	10438		7439	
<i>Log Lik.</i>	-1106		-380	

* $p < .05$, ** $p < .01$, *** $p < .001$

SUPPLEMENTAL MATERIALS

Here I provide supplemental materials omitted from the main text for parsimony. These include propensity score overlapping check, imbalance check before and after matching, results using imputed data, results using alternative marriage cohorts (1978-1992 and 1993-2008), and imputation-based sensitivity check for unobserved heterogeneity. These additional analyses confirm the robustness of the conclusion in the main text.

Propensity Score Overlapping Check

FIGURE S1. PROPENSITY SCORE OVERLAPPING CHECK FOR TWO MARRIAGE COHORTS BETWEEN COHABITORS AND NON-COHABITORS.

Figure S1 shows the distribution of propensity score for both marriage cohorts before matching. The adequate overlapping between cohabitators and non-cohabitators indicates that it is appropriate to use propensity score matching to balance selection bias.

Imbalance Check before and after Propensity Score Matching

Tables S1 and S2 report descriptive statistics and absolute standardized differences before and after matching for those variables used in the analyses. They show that optimal full matching balanced those distributions of covariates very well. This further suggests that propensity score matching could balance selection biases that influence premarital cohabitation.

Table S1. *Imbalance Checking of Covariates before and after Optimal Full Matching for Early-Reform Marriage Cohort (1980-1994)*

	Before Matching			After Matching		
	Cohabitor	Non-Cohabitor		Cohabitor	Non-Cohabitor	
	Mean/%	Mean/%	Standardized Diff.	Mean/%	Mean/%	Standardized Diff.
<i>Family Background:</i>						
Education (%)						
Primary School	44.60	46.70	-0.042	44.60	43.40	0.025
Middle School	36.20	33.40	0.06	36.20	36.20	0
High School	14.30	15.40	-0.03	14.30	15.60	-0.036
College	4.90	4.60	0.014	4.90	4.80	0.004
Father's Education (%)						
Primary School	62.80	68.80	-0.126	62.80	62.00	0.016
Middle School	10.20	8.50	0.058	10.20	10.20	-0.001
High School	5.30	4.10	0.057	5.30	5.70	-0.019
College	2.70	1.50	0.085	2.70	2.50	0.013
Unknown	19.00	17.10	0.049	19.00	19.60	-0.013
Father's Party Membership (%)						
Non-CCP	62.80	65.00	-0.047	62.80	61.90	0.019
CCP Member	12.50	14.50	-0.059	12.50	12.40	0.001
Unknown	24.70	20.50	0.102	24.70	25.70	-0.022
<i>Institutional Constraints:</i>						
CCP Member (%)	5.70	7.20	-0.061	5.70	5.50	0.011
Migration Experience (%)						
Always Rural	62.80	72.10	-0.2	62.80	61.70	0.021
Always Urban	17.20	16.50	0.019	17.20	17.70	-0.014
From Rural to Urban	20.00	11.40	0.238	20.00	20.50	-0.012
Free Mate Selection (%)	33.90	16.90	0.399	33.90	33.70	0.005
<i>Socio-Demographic Features:</i>						
Age (mean)	44.42	46.36	-0.35	44.42	44.42	0.001
Logged Annual Income (mean)	8.20	7.20	0.294	8.20	8.17	0.009
Minorities (%)	5.50	7.30	-0.073	5.50	5.70	-0.007

Female (%)	49.10	52.00	-0.058	49.10	50.30	-0.025
Religion Affiliated (%)	1.40	1.50	-0.003	1.40	1.50	-0.007
No Sibling (%)	2.50	4.60	-0.116	2.50	2.50	-0.004
<i>Regional Variance:</i>						
Provincial Marketization Index (mean)	6.64	5.89	0.492	6.64	6.65	-0.007
Sampling Region (%)						
Small Provinces	51.70	50.40	0.027	51.70	50.90	0.016
Shanghai	15.70	8.50	0.224	15.70	17.00	-0.033
Liaoning	9.20	10.00	-0.027	9.20	9.40	-0.007
Henan	6.10	11.00	-0.175	6.10	6.40	-0.011
Gansu	2.20	12.00	-0.386	2.20	1.80	0.033
Guangdong	14.90	8.10	0.214	14.90	14.50	0.012

Table S2. *Imbalance Checking of Covariates before and after Optimal Full Matching for Late-Reform Marriage Cohort (1995-2010)*

	Before Matching			After Matching		
	Cohabitor	Non-Cohabitor	Standardized Diff.	Cohabitor	Non-Cohabitor	Standardized Diff.
	Mean/%	Mean/%		Mean/%	Mean/%	
<i>Family Background:</i>						
Education (%)						
Primary School	23.50	37.50	-0.307	23.50	23.70	-0.004
Middle School	39.10	37.30	0.037	39.10	39.90	-0.015
High School	21.00	12.70	0.221	21.00	20.70	0.007
College	16.40	12.50	0.112	16.40	15.80	0.018
Father's Education (%)						
Primary School	50.60	57.80	-0.145	50.60	50.70	-0.002
Middle School	26.60	21.60	0.117	26.60	26.70	-0.003
High School	10.90	9.70	0.038	10.90	11.20	-0.01
College	3.10	2.70	0.023	3.10	2.90	0.014
Unknown	8.80	8.10	0.025	8.80	8.50	0.011
Father's Party Membership (%)						
Non-CCP	63.60	68.50	-0.104	63.60	63.80	-0.003

CCP Member	11.80	12.40	-0.017	11.80	12.40	-0.019
Unknown	24.60	19.10	0.132	24.60	23.80	0.019
<i>Institutional Constraints:</i>						
CCP Member (%)	5.30	5.60	-0.016	5.30	5.20	0.002
<i>Migration Experience (%)</i>						
Always Rural	62.00	71.40	-0.201	62.00	61.70	0.006
Always Urban	18.70	15.90	0.075	18.70	18.90	-0.004
From Rural to Urban	19.30	12.70	0.181	19.30	19.40	-0.003
Free Mate Selection (%)	55.00	26.90	0.595	55.00	54.80	0.003
<i>Socio-Demographic Features:</i>						
Age (mean)	30.21	32.54	-0.393	30.21	30.18	0.005
Logged Annual Income (mean)	8.19	7.37	0.232	8.19	8.22	-0.008
Minorities (%)	8.90	10.70	-0.061	8.90	9.10	-0.004
Female (%)	51.80	53.60	-0.035	51.80	51.50	0.007
Religion Affiliated (%)	1.00	1.00	0.001	1.00	1.10	-0.004
No Sibling (%)	14.20	10.20	0.123	14.20	13.70	0.016
<i>Regional Variance:</i>						
Provincial Marketization Index (mean)	6.54	5.76	0.512	6.54	6.53	0.007
<i>Sampling Region (%)</i>						
Small Provinces	50.10	51.90	-0.036	50.10	50.60	-0.01
Shanghai	14.90	6.40	0.28	14.90	14.30	0.018
Liaoning	9.60	8.00	0.056	9.60	9.30	0.01
Henan	8.10	13.00	-0.159	8.10	8.10	0.001
Gansu	2.60	12.30	-0.377	2.60	2.50	0.006
Guangdong	14.60	8.40	0.198	14.60	15.20	-0.015

Alternative Missing Data Strategy Using Multiple Imputation Deletion Approach

Here I report alternative results using data generated by multiple imputation methods with chained equations. These include Table S3, logit models predicting odds ratio of cohabitation, and Table S4, cox models predicting hazard ratios of marital disruption. All these models are consistent with the results that I have presented in the main text.

Table S3. *Logit Models Predicting Odds Ratio of Cohabitation Using Multiple Imputed Data*

	Model 1		Model 2	
	Early-Reform (1980-1994)		Late-Reform (1995-2010)	
	OR	SE	OR	SE
<i>Family Background:</i>				
Education (ref: primary school)				
Middle School	0.85	0.10	1.12	0.09
High School	0.73 ⁺	0.12	1.48***	0.16
College	0.48**	0.13	1.02	0.13
Father's Education (ref: primary school)				
Middle School	1.15	0.18	1.05	0.08
High School	1.27	0.29	0.91	0.10
College	1.82 ⁺	0.56	0.90	0.17
Father's Party Membership (ref: non-CCP)				
CCP Member	0.84	0.13	0.96	0.09
<i>Institutional Constraints:</i>				
CCP Member (ref: non-CCP)	0.83	0.18	0.82	0.12
Migration Experience (ref: always rural)				
Always Urban	1.29	0.20	1.14	0.11
From Rural to Urban	1.93***	0.26	1.48***	0.14
Free Mate Selection (ref: arranged)	2.30***	0.24	3.15***	0.20
<i>Socio-Demographic Features:</i>				
Age	0.92***	0.01	0.92***	0.01
Logged Annual Income	1.05**	0.02	1.04***	0.01
Minorities (ref: <i>Han</i> ethnicity)	0.82	0.18	0.84	0.09
Female (ref: male)	0.80*	0.08	0.89 ⁺	0.06
Religion Affiliated (ref: no)	1.47	0.59	1.29	0.39
No Sibling (ref: > 1)	0.47*	0.14	0.74**	0.07
<i>Regional Variance:</i>				
Provincial Marketization Index	1.35	0.07	1.35***	0.05
Sampling Region (ref: small provinces)				
Shanghai	0.78	0.16	0.98	0.14
Liaoning	0.83	0.14	1.16	0.13
Henan	0.49**	0.10	0.55***	0.06
Gansu	0.38**	0.12	0.43***	0.08
Guangdong	0.89	0.15	0.87	0.10
Constant	0.29*	0.16	0.30***	0.09
N	10699		7618	

⁺ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table S4. Cox Models Predicting Hazard Ratio of Marital Disruption Using Imputed Data

	Model 3		Model 4		Model 5	
	Early-Reform (1980-1994)		Late-Reform (1995-2010)		Post-Reform (1980-2010)	
	<i>HR</i>	<i>SE</i>	<i>HR</i>	<i>SE</i>	<i>HR</i>	<i>SE</i>
Cohabitation	2.46 ^{***}	0.43	1.09	0.20	2.49 ^{***}	0.43
<i>Family Background:</i>						
Education (ref: primary school)						
Middle School	1.07	0.15	0.94	0.17	1.04	0.12
High School	1.36 ⁺	0.23	1.00	0.24	1.23	0.17
College	1.93 ^{**}	0.44	0.68	0.20	1.19	0.22
Father's Education (ref: primary school)						
Middle School	1.35 [*]	0.22	1.25	0.21	1.30 [*]	0.15
High School	1.50 [*]	0.30	1.00	0.26	1.24	0.20
College	0.96	0.32	1.48	0.53	1.14	0.27
Father's Party Membership (ref: non-CCP)						
CCP Member	1.02	0.15	0.71	0.16	0.91	0.11
<i>Institutional Constraints:</i>						
CCP Member (ref: non-CCP)	0.35 ^{***}	0.09	0.87	0.26	0.51 ^{***}	0.10
Migration Experience (ref: always rural)						
Always Urban	3.44 ^{***}	0.52	2.28 ^{***}	0.46	2.96 ^{***}	0.35
From Rural to Urban	2.22 ^{***}	0.37	1.27	0.28	1.77 ^{***}	0.24
Free Mate Selection (ref: arranged)	1.04	0.13	1.04	0.16	1.03	0.10
<i>Socio-Demographic Features:</i>						
Age	0.97 ^{**}	0.01	1.00	0.01	0.98 [*]	0.01
Logged Annual Income	1.00	0.02	1.00	0.02	1.00	0.01
Minorities (ref: <i>Han</i> ethnicity)	1.89 ^{**}	0.34	0.92	0.22	1.43 [*]	0.20
Female (ref: male)	0.72 ^{**}	0.08	0.77 ⁺	0.11	0.72 ^{***}	0.06
Religion Affiliated (ref: no)	1.38	0.50	1.96	1.00	1.55	0.46
No Sibling (ref: > 1)	0.93	0.22	0.83	0.20	0.81	0.14
<i>Regional Variance:</i>						
Provincial Marketization Index	0.94	0.07	1.02	0.09	0.97	0.05
Sampling Region (ref: small provinces)						
Shanghai	1.50	0.43	0.91	0.34	1.32	0.29
Liaoning	1.78 ^{***}	0.29	2.03 ^{***}	0.40	1.87 ^{***}	0.24
Henan	0.85	0.18	0.67	0.18	0.77	0.13
Gansu	1.16	0.27	0.99	0.31	1.09	0.20
Guangdong	0.44 [*]	0.16	0.65	0.22	0.56 [*]	0.14
Marriage Cohort (ref: early-reform)						
Late-Reform					1.58 ^{**}	0.22
<i>Interaction Term Test:</i>						
Cohabitors # Late-Reform					0.42 ^{***}	0.10
<i>N</i>	10699		7618		18317	

⁺ $p < 0.1$, ^{*} $p < 0.05$, ^{**} $p < 0.01$, ^{***} $p < 0.001$.

Predicted Divorce Hazards for Two Marriage Cohorts

Figure S2 and S3 report predicted divorce hazards for both early- and late- reform marriage cohorts. In general, Figure 2 shows that the divorce hazard in post-reform China was still very small but it increased from the early-reform period to the late-reform period. For the early-reform marriage cohort, there was a sizeable difference between cohabitators and noncohabitators, whereas this difference disappeared for late-reform marriage cohorts. Figure S3 shows that the cohabitation effect varied across different gender groups. In this article, I do not discuss gender difference in the cohabitation effect and leave this limitation to future research.

FIGURE S2. PREDICTED DIVORCE HAZARDS FOR TWO MARRIAGE COHORT BY COHABITATION

FIGURE S3. PREDICTED DIVORCE HAZARDS FOR TWO MARRIAGE COHORT BY COHABITATION AND GENDER

Sensitivity Check for Different Early-Reform and Late-Reform Marriage Cohorts

Many studies on post-reform China often focus on the 30-year's range during the period from 1978 to 2008. As discussed in the main text, the large-scale and significant economic reform started in rural areas in 1978, and it expanded to the urban economy in 1992. Some scholars therefore used 1992 as the significant year to distinguish the early- and late- reform period. But in the main text, I focused on the period during 1980-1994 and 1995-2010. After the mid-1990s, China completed the second demographic transition (Xie, 2011). Therefore, it was more appropriate to use the year of 1995 to differentiate the early- and late- reform period in this specific research, in terms of cohabitation as one important aspect of the second demographic transition. Here I provide all relevant statistics for the early-reform (1978-1992) and late-reform

(1993-2008) marriage cohort (Table S5-S8). All the results are consistent with the results that I have presented in the main text.

Table S5. Cohabitation Rate before First Marriage by Marriage Cohort and Education

	Marriage Cohort	
	Early-Reform (1978-1992)	Late-Reform (1993-2008)
Total Sample	4.16%	20.24%
Education Level		
Primary School	4.23%	14.98%
Middle School	3.79%	20.70%
High School	4.47%	30.54%
College	5.00%	21.84%
Observations	10340	7807

Note: all descriptive results were weighted to be nationally representative.

Table S6. *Logit Models Predicting Odds Ratio of Cohabitation among Two Marriage Cohorts*

	Model 1		Model 2	
	Early-Reform (1978-1992)		Late-Reform (1993-2008)	
	OR	SE	OR	SE
<i>Family Background:</i>				
Education (ref: primary school)				
Middle School	0.84	0.11	1.16	0.10
High School	0.66*	0.12	1.51***	0.18
College	0.42**	0.13	1.04	0.15
Father's Education (ref: primary school)				
Middle School	1.17	0.23	0.97	0.08
High School	1.37	0.33	0.84	0.10
College	1.83	0.67	0.78	0.17
Unknown	1.10	0.20	1.14	0.15
Father's Party Membership (ref: non-CCP)				
CCP Member	0.74	0.13	0.98	0.10
Unknown	1.07	0.19	1.23*	0.12
<i>Institutional Constraints:</i>				
CCP Member (ref: non-CCP)	0.84	0.18	0.77	0.12
Migration Experience (ref: always rural)				
Always Urban	1.39	0.28	1.11	0.13
From Rural to Urban	1.70**	0.30	1.57***	0.17
Free Mate Selection (ref: arranged)	1.90***	0.28	3.34***	0.27
<i>Socio-Demographic Features:</i>				
Age	0.92***	0.01	0.92***	0.01
Logged Annual Income	1.06***	0.02	1.04***	0.01
Minorities (ref: <i>Han</i> ethnicity)	1.07	0.26	0.82	0.11
Female (ref: male)	0.79**	0.07	0.85**	0.04
Religion Affiliated (ref: no)	1.33	0.66	1.38	0.43
No Sibling (ref: > 1)	0.47*	0.15	0.76*	0.09
<i>Regional Variance:</i>				
Provincial Marketization Index	1.37***	0.09	1.36***	0.06
Sampling Region (ref: small provinces)				
Shanghai	0.75	0.19	1.06	0.21
Liaoning	0.92	0.20	1.13	0.15
Henan	0.43**	0.12	0.64**	0.09
Gansu	0.34*	0.15	0.46**	0.11
Guangdong	0.85	0.19	0.90	0.14
Constant	0.21*	0.14	0.27***	0.10
<i>N</i>	10340		7807	
<i>Log Lik.</i>	-1564		-3156	

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

Table S7. Cox Models Predicting Hazard Ratio of Marital Disruption before Matching

	Model 3		Model 4		Model 5	
	Early-Reform (1978-1992)		Late-Reform (1993-2008)		Post-Reform (1978-2008)	
	<i>HR</i>	<i>SE</i>	<i>HR</i>	<i>SE</i>	<i>HR</i>	<i>SE</i>
Cohabitation	2.46^{***}	0.49	1.16	0.22	2.45^{***}	0.47
<i>Family Background:</i>						
Education (ref: primary school)						
Middle School	1.09	0.16	1.09	0.18	1.11	0.12
High School	1.40	0.24	1.21	0.27	1.34 [*]	0.18
College	1.92 ^{**}	0.47	0.86	0.25	1.22	0.23
Father's Education (ref: primary school)						
Middle School	1.52 [*]	0.25	1.13	0.20	1.28 [*]	0.16
High School	1.62 [*]	0.35	1.00	0.24	1.24	0.20
College	1.18	0.41	1.21	0.41	1.14	0.28
Unknown	1.03	0.21	1.76 [*]	0.40	1.25	0.19
Father's Party Membership (ref: non-CCP)						
CCP Member	1.09	0.16	0.68 [*]	0.13	0.91	0.10
Unknown	1.32	0.25	0.86	0.16	1.10	0.14
<i>Institutional Constraints:</i>						
CCP Member (ref: non-CCP)	0.40 ^{***}	0.10	0.72	0.20	0.53 ^{***}	0.10
Migration Experience (ref: always rural)						
Always Urban	3.37 ^{***}	0.53	2.37 ^{***}	0.45	2.90 ^{***}	0.35
From Rural to Urban	2.18 ^{***}	0.38	1.50	0.31	1.82 ^{***}	0.25
Free Mate Selection (ref: arranged)	1.07	0.15	1.01	0.15	1.03	0.11
<i>Socio-Demographic Features:</i>						
Age	0.96 ^{***}	0.01	0.98	0.01	0.96 ^{***}	0.01
Logged Annual Income	1.00	0.02	1.01	0.02	1.00	0.01
Minorities (ref: <i>Han</i> ethnicity)	1.88 ^{***}	0.35	0.90	0.22	1.38 [*]	0.20
Female (ref: male)	0.69 ^{**}	0.08	0.75 [*]	0.10	0.71 ^{***}	0.06
Religion Affiliated (ref: no)	1.34	0.49	1.74	0.89	1.50	0.44
No Sibling (ref: > 1)	0.80	0.21	0.82	0.20	0.76	0.13
<i>Regional Variance:</i>						
Provincial Marketization Index	0.96	0.08	1.03	0.10	0.99	0.06
Sampling Region (ref: small provinces)						
Shanghai	1.36	0.42	0.88	0.35	1.20	0.29
Liaoning	1.71 ^{**}	0.31	2.02 ^{**}	0.43	1.82 ^{***}	0.25
Henan	0.84	0.20	0.66	0.17	0.75	0.13
Gansu	1.21	0.31	1.02	0.31	1.13	0.23
Guangdong	0.36 [*]	0.15	0.58	0.20	0.49 ^{**}	0.13
Marriage Cohort (ref: early-reform)						
Late-Reform					1.25	0.19
Interaction Term Test:						
Cohabitor # Late-Reform					0.46 ^{**}	0.12
<i>N</i>	10340		7807		18147	
<i>Log Lik.</i>	-3003		-2166		-5523	

* $p < .05$, ** $p < .01$, *** $p < .001$

Table S8. Cox Models Predicting Hazard Ratio of Marital Disruption after Matching

	Model 6		Model 7	
	Early-Reform (1978-1992)		Late-Reform (1993-2008)	
	<i>HR</i>	<i>SE</i>	<i>HR</i>	<i>SE</i>
Cohabitation	2.40^{***}	0.47	1.39	0.26
<i>Family Background:</i>				
Education (ref: primary school)				
Middle School	1.34	0.28	0.87	0.20
High School	2.19 [*]	0.83	0.77	0.32
College	5.33 [*]	3.68	1.04	0.36
Father's Education (ref: primary school)				
Middle School	1.32	0.28	1.05	0.20
High School	1.22	0.39	1.10	0.35
College	0.57	0.33	1.38	0.69
Unknown	1.05	0.23	1.52	0.42
Father's Party Membership (ref: non-CCP)				
CCP Member	1.48	0.41	0.72	0.15
Unknown	1.17	0.23	0.67	0.18
<i>Institutional Constraints:</i>				
CCP Member (ref: non-CCP)	0.46 ^{**}	0.14	0.76	0.30
Migration Experience (ref: always rural)				
Always Urban	2.45 ^{**}	0.72	2.14 ^{**}	0.51
From Rural to Urban	1.22	0.52	0.93	0.42
Free Mate Selection (ref: arranged)	0.54	0.27	0.24	0.24
<i>Socio-Demographic Features:</i>				
Age	1.05	0.07	1.08	0.08
Logged Annual Income	0.93	0.05	0.96	0.04
Minorities (ref: <i>Han</i> ethnicity)	1.92 ^{***}	0.38	1.45	0.41
Female (ref: male)	0.93	0.20	0.82	0.16
Religion Affiliated (ref: no)	0.90	0.41	0.97	0.60
No Sibling (ref: > 1)	1.60	1.02	1.29	0.42
<i>Regional Variance:</i>				
Provincial Marketization Index	0.66	0.17	0.74	0.20
Sampling Region (ref: small provinces)				
Shanghai	2.03	0.79	0.71	0.32
Liaoning	1.89 ^{***}	0.36	1.96 ^{**}	0.50
Henan	2.20	1.55	1.17	0.54
Gansu	3.31	3.03	2.80	2.11
Guangdong	0.52	0.23	0.71	0.27
<i>N</i>	10340		7807	
<i>Log Lik.</i>	-1122		-485	

* $p < .05$, ** $p < .01$, *** $p < .001$

Imputation-Based Sensitivity Analysis for Unobserved Factors Influencing the Cohabitation Effect

Matching on the propensity score, though efficiently balancing observed covariates, is not able to control unobserved biases. Thus I also conducted sensitivity analysis to examine whether unobserved features significantly influenced the cohabitation effect. I adopted Lu et al. (2012)'s sensitivity analysis method for Cox models, which was to run an imputation-based sensitivity analysis by treating U as an unobserved covariate, imputing U based on a hypothetical model for each case, and including U as a covariate in the final Cox models (Lu et al. 2012). I used the following equation to generate the unobserved covariate U :

$$\text{logit}(P(U=1)) = \beta_1 T + \beta_2 Y \cdot C.$$

T (1 or 0) denotes one's cohabiting experience with the spouse prior to first marriage, Y indicates one's survival time of first marriage (to simplify, if the survival outcome is either less than or equal to average survival time of first marriage, $Y=1$; 0, otherwise), and censoring variable C shows whether first marriage ends in divorce and assumes that C and U are independent. β_1 denotes the log odds ratio of U being in the cohabitation group ($T = 1$) rather than in the non-cohabitation group ($T = 0$). β_2 is used to assess the relationship between U and the timing of marital disruption, which is also the log odds ratio of U being in the shorter marriage survival group ($Y=1$) rather than in the other ($Y=0$). Thus, I could use β_1 and β_2 together to evaluate potential deviation from the strong ignorable assignment assumption.

Intuitively, if the odds ratio combination ($\exp(\beta_1)$, $\exp(\beta_2)$) is set to be (5, 5), this indicates that the unobserved covariate U is strongly associated with both cohabitation (five times as likely

in odds) and shorter survival time of first marriage (five times as likely in odds). After we put this unobserved U into final models and if the cohabitation effect is not statistically significant, this means that the original significant relationship between cohabitation and marital disruption is actually due to the unobserved factor U (Lu et al., 2012).

For simplicity, I only conducted sensitivity analysis for the early-reform marriage cohort. As shown in Table 3, the hazard ratio for cohabitation is 2.37 ($p < .001$). I performed 20 imputations for each odds ratio combination, allowing both $\exp(\beta_1)$ and $\exp(\beta_2)$ to vary from 1 to 15. To be more cautious, I applied commonly used .01 as the p value for the qualitative change of the research conclusion, which means that the cohabitation effect was not significant for the early-reform marriage cohort at the 1% significance level.

I calculated odds ratios between all observed covariates and shorter marriage survival time/cohabitation as Lu et al. (2012) suggested. The highest odds ratio between all observed covariates and shorter marriage survival time is 3.44 and the highest odds ratio between all observed covariates and cohabitation is 2.26. Figure S4 shows that in order to qualitatively change the research conclusion, both odds ratios must be very high, say (6, 6). This suggests that the unobserved covariate must have a strong association both with shorter marriage survival time and cohabitation (higher than any observed odds ratio in the data). As a result, this article's conclusion is robust.

Note: For the interpretation of this figure, please see the discussion in sensitivity analysis (see also Lu et al., 2012). Intuitively, in order to change the significance of the cohabitation effect at the 1% level, both odds ratios must be very high, say larger than (6, 6). But this unobserved covariate is very rare in reality. The largest odds ratio combination calculated from CFPS 2010 data is (3.44, 2.26) for early-reform marriage cohort (1980-1994). Thus, the conclusion in this article is robust.

FIGURE S4. SENSITIVITY ANALYSIS: CONTOUR PLOT FOR THE QUALITATIVE CHANGE OF THE COHABITATION EFFECT IN CHINA.