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Loss of Marital Gains from the Division of Labor and Divorce: Evidence from a Pension Reform in Japan

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Loss of Marital Gains from the Division of Labor and Divorce: Evidence from a Pension Reform in Japan*

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Abstract

We examine the impact of Japan's pension reform on divorce. In typical Japanese couples, spouses enjoy marital gains from the division of labor, not only during their younger years but also into old age, with the primary earner generating income through pension benefits and the dependent spouse contributing through household work. The reform allowed dependent spouses to claim half of the primary earner's pension contributions during the marriage upon divorce. Thus, dependent spouses could secure these gains without maintaining marital relationships. Using the reform as a natural experiment, we test the hypothesis that the reduction in marital gains increased the likelihood of divorce. Our analysis reveals that among couples experiencing the largest reduction in these gains, divorce incidents rose by 10 to 20% in a few years after the reform. This finding highlights the importance of marital gains from the division of labor in shaping divorce decisions.

Keywords: Divorce, Marital gains, Pension reform, Marital property division.

JEL classification: D13; H31; J12; K36.

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1 Introduction

In recent decades, marriage rates in Japan have steadily declined, raising questions about the underlying causes. One explanation is a reduction in the economic gains from marriage, particularly those derived from its role as a cooperative economic unit (Becker, 1991; Browning *et al.*, 2014).[1] Among these, the division of labor has been significantly affected by social and economic changes. As women have become more educated and increased their participation in the labor market, the traditional economic gains of the division of labor within marriage may have diminished. Understanding the causal relationship between the gains and marriage or divorce decision is challenging, as conducting randomized controlled trials to assign changes in marital gains is both impractical and unethical, requiring researchers to rely on alternative observational approaches.

The Japanese public pension reform in April 2007 provides an ideal setting for a natural experiment to study the marriage gains from the division of labor. The typical couples most strongly affected by this reform were those in which primary earners (typically husbands) specialized in market labor, while dependent spouses (typically wives) specialized in unpaid care and household work (hereafter jointly referred to as "household work"). Primary earners working as salaried employees contributed to the pension system and later received part of their labor compensation as pension benefits. Therefore, even after retirement, those couples continued to enjoy the gains from the division of labor, with primary earners providing financial resources through pension benefits and dependent spouses contributing through household work.

However, the 2007 pension reform disrupted this post-retirement division of labor by allowing dependent spouses to claim 50% of the pension benefits associated with the contributions made by the primary earner during the marriage upon divorce. This

[1]The economic gains from marriage include the division of labor, the sharing of household public goods, risk sharing between spouses, etc. For a detailed discussion, see, for example, Korenman and Neumark (1992), and Chichilnisky (2008) for the division of labor, Lazear and Michael (1988) and Browning *et al.* (2013) for the sharing of public good, and Kotlikoff and Spivak (1981), Rosenzweig and Stark (1989), and Hess (2004) for risk sharing between spouses.

reform provided financial security in old age for dependent spouses—a gain that had previously been attainable only through marriage—even after divorce. As a result, divorce became a more viable option for these spouses. The extent of the reform's impact varied based on the primary earner's income level and the length of the marriage, as these factors determined the amount of pension contributions subject to division upon divorce. Based on this variation, we hypothesize that couples more strongly affected by the reform were more likely to experience increased divorce.

To the best of our knowledge, this is the first study to empirically demonstrate, using a natural experiment, that a loss of marital gains from the division of labor increases the likelihood of divorce. Focusing on Japan as the subject of our analysis offers several advantages in estimating the impact of the loss of marital gains from the division of labor on divorce. First, gender role norms have been deeply ingrained in Japan, and the division of labor remained particularly prevalent among middle-aged to older couples at the time of the pension reform.[2] Second, we take advantage of three key features of Japanese public pension system: (i) mandatory enrollment, (ii) public pensions as the main (and often sole) source of income after primary earner's retirement, and (iii) lifetime annuities. The first feature eliminates concerns about endogeneity regarding whether couples enroll in the public pension system—that is, whether they are affected by the 2007 pension reform—as this decision is not left to couples' discretion. The second and third features suggest that the reform could significantly influence divorce decisions of dependent spouses, as they are often unable to earn sufficient income after divorce and thus rely heavily on public pensions to support themselves in old age. Finally, in Japan, divorce requires mutual consent from both spouses, which gives dependent spouses—who stand to benefit from divorcing after April 2007—significant control over the timing of divorce. Even if a primary earner wanted to expedite divorce before March 2007 to avoid having to transfer up

[2]While the prevalence of traditional gender roles has declined in many countries, such norms remain persistent in Japan, where women still shoulder the majority of childcare, informal caregiving, and household responsibilities (IMF, 2024).

to half of their pension contributions to their spouse, they would not be able to do so without the dependent spouse's consent. This makes it easier to observe an increase in divorces driven by the pension reform.

Amilon (2015) is the only study estimating the impact of a reform in marital property division on divorce decisions. The study examines the effect of a reform in Denmark that shifted pension savings from being treated as community property to private property upon divorce. Importantly, like the Japanese pension reform of 2007, the Danish reform did not change the total amount of pension savings accumulated during marriage but allowed for a different allocation between spouses upon divorce. Since husbands' pension savings were on average 30% higher than wives', the reform substantially reduced the pension savings of divorced women. She finds a significant increase in divorce rates following the reform and attributes this to the possibility that husbands were better off financially if they divorced.

Our analysis offers several advantages over Amilon (2015), differing in the following four key respects: (1) the size of pension transfers was substantially larger than in Amilon (2015), with dependent spouses receiving approximately 9.6 million yen (80,000 USD) on average (see Section 2.3 for further details)[3]; (2) focusing on Japan, where the division of labor between spouses was more pronounced than in Denmark, provides a valuable opportunity to observe how the reduction in marital gains stemming from the division of labor influences divorce decisions[4]; (3) the Japanese pension reform caused large variations in its impact across couples, depending on factors such as marriage length, whether the primary earner was employed by a large or small to medium-sized firm (used as a proxy for the amount of pension contributions subject to division, which reflects differences in earnings level), and whether the primary earner was covered by

[3]Based on the figures reported in Amilon (2015), our calculations show that the amount of pension savings transferred between spouses as a result of the Danish reform is equivalent to only about 5%—at most 23%—of the amount transferred under the Japanese pension reform.

[4]In Amilon (2015), husbands decided to divorce after the reform because the gains from retaining their accumulated assets upon divorce exceeded the gains from continuing the marriage. However, it remains unclear which aspects of marital gains—such as specialization, shared household resources, or risk sharing—they were willing to forgo.

the pension scheme affected by the reform (e.g., firm employees vs. farmers or the self-employed); and (4) to remove the effect of delayed divorce aimed at avoiding the negative impact on minor children—which could lead to an underestimation of the effect of pension division on divorce—we also conduct an analysis using a sample of couples without minor children.

In addition to examining the impact of marital property division rules as analyzed in Amilon (2015), several studies have investigated the effects of unilateral divorce laws (UDLs) on divorce rates and household behavior. Specifically, research has shown that the introduction of UDLs led to an increase in divorce rates (Wolfers, 2006; González and Viitanen, 2009) and triggered changes in household decisions (Angelini *et al.*, 2019; González and Özcan, 2013; Pericoli and Ventura, 2012; Roff, 2017; Stevenson, 2007; Voena, 2015). Of these, González and Özcan (2013), Pericoli and Ventura (2012), and Angelini *et al.* (2019) found that household savings increased after the implementation of UDLs. According to Angelini *et al.* (2019), this increase in savings may have been driven by a rise in wives' labor supply, which likely reduced their time spent on household work and diminished the gains from the division of labor. Alternatively, the rise in divorce rates could also be attributed to the increase in wives' income and asset holdings, an effect known as the "independence effect," initially proposed by Becker (1974), making it challenging to pin down the exact mechanism driving divorce decisions. In this context, the Japanese pension reform serves as a valuable case for disentangling these potential causes by isolating the effect of diminished gains from the division of labor. This is because, in contrast to UDL reforms that often coincided with shifts in wives' economic behavior, the Japanese reform affected a group—wives typically around 60 years old—for whom labor supply and savings behavior remained largely unchanged. As such, the observed increase in divorces can be more confidently attributed to the loss of marital gains, rather than confounding factors like the independence effect.

Other empirical studies examine the impact of income shocks on divorce decisions. These shocks influence divorce through two distinct mechanisms: the *income* effect,

driven by changes in the couple's total income, and the *allocation* effect, driven by changes in how income is distributed between spouses. These mechanisms are explored in the context of lottery winnings (Boertien, 2012; Bulman *et al.*, 2022; Cesarini *et al.*, 2023; Golosov *et al.*, 2024; Hankins and Hoekstra, 2011), public transfers (Berniell *et al.*, 2020; Bitler *et al.*, 2004; Bobonis, 2011; Hoffman and Duncan, 1995; Tjøtta and Vaage, 2008) and natural disasters (Deryugina *et al.*, 2018; Kureishi *et al.*, 2025). When it is the spouse—not oneself—who experiences an increase in household income (e.g., through lottery winnings) and then public goods for the household (such as a car and automated household appliances) are purchased, the income effect could lead to higher utility during the marriage for both spouses, potentially reducing the likelihood of divorce. In the pension reform analyzed in this paper, however, no income effect occurs as far as spouses continue their marital relationship, allowing for the identification of the allocation effect, i.e., the effect of reallocating gains from the division of labor upon divorce.

We analyze the effects of the pension reform on divorce both empirically and theoretically. First, our theoretical model demonstrates that, for households where the husband is the primary earner and the wife is a homemaker, wives who receive a larger amount of pension contributions from their husbands upon divorce would achieve higher utility by divorcing than by remaining married after the 2007 pension reform.

Next, using the pension reform as a natural experiment, we empirically test this theoretical finding with a Difference-in-Differences (DID) framework. For couples with the longest marriage length (25 to 29 years) in our sample, we find that divorce incidents—calculated by dividing the number of divorces by the number of couples remaining married—increased by approximately 10% in FY2007, the year when the pension division rule upon divorce took effect, compared to couples with a marriage length of less than 5 years. This elevated level of divorce incidents persisted in the subsequent years and even increased further, reaching approximately 20% two to three years after the reform. Significant increases in divorce incidents are also observed among couples with marriage lengths of 20 to 24 years and 15 to 19 years, although

the magnitude of the increase was smaller than that for couples with marriage length of 25 to 29 years. Furthermore, couples with a primary earner employed by a large firm were more likely to get divorced after the reform than those with a primary earner employed by small to medium-sized firms. In contrast, no significant increase in divorce incidents is observed among couples with a farming- or self-employed primary earner, whose pension contributions were not subject to division upon divorce.

These findings are consistent with our hypothesis that the pension reform had a greater impact on couples in which wives received larger pension transfers. Specifically, this applies to couples with longer marriage lengths and high-income primary earners (e.g., those employed by large firms). The results suggest that the 2007 pension reform significantly reduced the marriage gains from the division of labor for dependent spouses, thereby incentivizing them to pursue divorce. Furthermore, the observed increase in divorces indicates that one of the reform's objectives—alleviating financial concerns for divorced women in their old age—has been achieved to some extent.

The observed increase in divorce incidents estimated in this study is not attributable to couples who intentionally postponed their divorces from immediately before to after the reform. Although the reform took effect in April 2007, its announcement was made in June 2004, creating incentives for dependent spouses to postpone divorce until April 2007 to benefit from the new rule. While our analysis reveals some evidence of this postponement behavior, the resulting increase in divorces driven by such behavior is marginal. Therefore, our findings suggest that the observed results are primarily due to an actual increase in divorce incidents rather than a postponement in their timing.

This study contributes to four key areas of the literature. First, it enhances understanding of the factors behind declining marriage rates by highlighting one aspect of marital gains. Second, it examines how changes in marital property division impact divorce decisions. Unlike previous studies that focus on the effects of such changes on spousal bargaining power and its influence on leisure, expenditures, and the provision of household public goods (Dong, 2022; Huang *et al.*, 2023; Sakamoto, 2008; Toriyabe, 2021; Wang, 2014), this study centers on their impact on divorce decisions. Third, it

contributes to understanding whether and how economic incentives influence marital decisions. While prior studies on this topic exist for the United States (Dillender, 2016; Heim, 2003; Nixon, 1997; Peters, 1993) and Scandinavian countries (Amilon, 2015; Tjøtta and Vaage, 2008), research on other countries is limited (Berniell *et al.*, 2020; Bobonis, 2011).[5] Finally, in addition to these empirical contributions, this study also contributes to theoretical research by developing a model that incorporates the gains from the division of labor and divorce decisions.

The remainder of this paper is organized as follows. Section 2 provides the institutional background, including an overview of the Japanese public pension system and the pension division upon divorce before and after the 2007 reform. Section 3 develops a theoretical model to explain how the pension reform influenced divorce decisions. Section 4 describes the data used in our analysis, while Section 5 outlines the empirical methodologies. Section 6 presents the estimation results. Finally, Section 7 concludes.

2 Institutional background

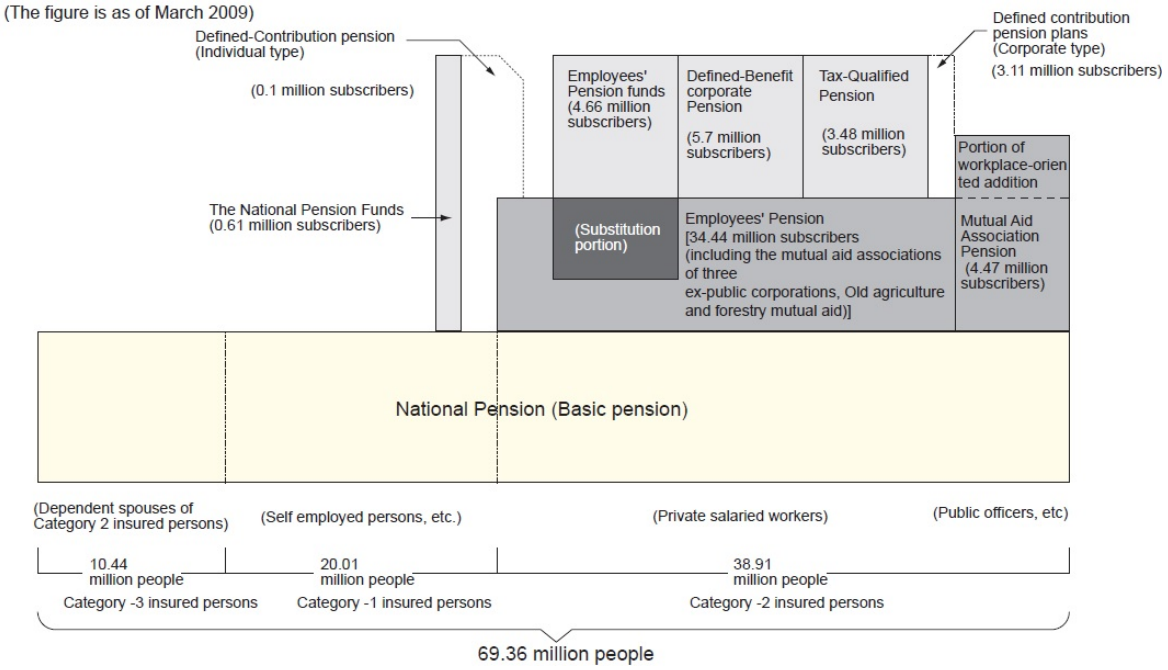
2.1 Japanese pension system

First, this section explains the basic structure of the Japanese public pension system. It consists of two tiers: the National Pension (Tier 1), which is common to all insured persons, and the Employees' Pension (Tier 2), which is available only to Category-2 insured persons. The cream-colored and dark gray areas in Figure 1 represent Tier 1 and Tier 2, respectively. In addition to the public pension system, there is a private pension (Tier 3), for which contributions are paid separately, and it provides additional benefits on top of the public pension (represented by the light gray area in Figure 1).

Public pension insured persons are classified into three categories: Category-1,

[5]Understanding how individuals respond to economic incentives for divorce and marriage is critical for preventing policy reforms that may lead to unintended consequences. For example, Japan's 2007 pension reform may have distorted the decisions of high-income earners—who are significantly affected by the new pension division rule upon divorce—regarding whether and when to marry.

Figure 1: Japanese public pension system



Notes: The source is the Ministry of Health, Labour and Welfare (MHLW) of Japan, *Pension Security in Japan*, available at `https://www.mhlw.go.jp/english/wp/wp-hw4/dl/pension_security/2011072501.pdf`.

Category-2, and Category-3 insured persons. Category-2 insured persons are salaried employees under the age of 70, including national and local government employees as well as private school teachers. They receive benefits from both the National Pension and the Employees' Pension. Category-3 insured persons are dependent spouses of Category-2 insured persons who are between 20 and 59 years old. Category-1 insured persons include all those who do not fall into Category-2 or Category-3, such as farmers, self-employed individuals, students, employees not covered by the Employees' Pension, and the unemployed.

Next, we also elaborate on the three features of the Japanese public pension system mentioned in Section 1: (i) mandatory enrollment, (ii) public pensions as the main (and often sole) source of income after primary earner's retirement, and (iii) lifetime annuities. For (i), all individuals aged 20 to 59 who are registered residents of Japan,

regardless of nationality, are legally required to pay contributions to the Japanese public pension system. For (ii), not all individuals in Japan participate in private pensions (Tier 3), and even when they do, the pension amounts are typically not large. According to Figure 1, as of 2009, the total number of Tier 3 participants was less than half of the number of Category-2 insured persons. For (iii), because Japan's public pension system operates on a pay-as-you-go scheme, pension amounts, at least partially indexed for inflation, are generally provided for life.

2.2 Pension division upon divorce

This section briefly describes the treatment of pensions in marital property division before and after the pension reform enacted in April 2007.

Before the pension reform

Before the pension reform, public pension benefits were rarely considered in the property division upon divorce. As a result, divorced women, particularly full-time homemakers during their marriage, often received only a small amount of benefits (i.e., the National Pension in Figure 1) in old age. When divorces occurred after the primary earner had started receiving pension benefits, a portion of those benefits could sometimes be included in the property division.[6] However, even in such cases, the dependent spouse could lose access to the pension if the primary earner passed away. Since the primary earner was typically male and likely to have a shorter lifespan, this posed a significant risk for the dependent spouse. Furthermore, there was always the possibility that the primary earner might fail to make agreed-upon monthly payments. To make matters worse, if the primary earner had no assets other than their pension,

[6] According to Nakamura (2003), a book written by one of the most knowledgeable lawyers on marital property division, judicial precedents allowed the portion of the primary earner's pension already being received to be included in the property division, even though there was no explicit provision in the Civil Code. However, because this was not recognized as a legal right of the dependent spouse, it is believed that few dependent spouses actually received a share of the primary earner's pension.

legal provisions prohibiting the garnishment of pensions made enforcing such payments impossible. Additionally, litigation costs for including pensions in the property division were often prohibitive for full-time homemakers, making it financially unfeasible to pursue such claims. The situation was even worse for divorces occurring before the primary earner began receiving pension benefits. It was uncommon to include pensions in the property division due to the difficulty of accurately determining the value of future pension benefits at the time of divorce.

To address these issues and enable dependent spouses to divorce without undue concern over financial security in old age, a new rule was created to include the primary earner's pension benefits as part of the marital property division. The law regarding the new pension division rule was passed in June 2004 and took effect in April 2007, applying the rule to all couples who divorced after its implementation.

After the pension reform

The new pension division rule applies to the Employees' Pensions (Tier 2) of Category-2 insured persons. For couples divorced after April 2007, dependent spouses became legally entitled to receive up to 50% of the primary earner's Employees' Pension benefits associated with their contributions made during the marriage. However, this rule does not automatically grant dependent spouses a 50% share of the couple's total pension benefits linked to their marriage period. Nevertheless, during our sample period, 92–95% of divorced couples who utilized this rule opted for an equal division, meaning that former wives received 50% of the pension benefits (see Subsection 2.3 for details). Importantly, this applies not only to pension contributions paid after April 2007 but also to those paid during the marriage before that date.

The proportion of pension benefits transferred from the primary earner to the dependent spouse depends on the labor earnings of each spouse during their marriage. If the dependent spouse was a full-time homemaker with no labor earnings, they receive half of the Employees' Pension contributions made by the primary earner. When both

spouses are Category-2 insured persons, the proportion of pension benefits transferred depends on the ratio of their labor earnings during the marriage. For example, if the husband earned 90 million yen and the wife earned 10 million yen, their combined earnings would be 100 million yen. In this case, before the pension reform, the wife typically received only 10% (=10 million yen/100 million yen) of the total pension benefits associated with their marriage period. However, after the reform, she became entitled to receive 50%.

This reform allowed the government to transfer pension benefits directly to the dependent spouse without involving the primary earner, thereby significantly reducing the dependent spouse's burden of negotiating pension division. Strictly speaking, the primary earner's consent is required to divide the pension benefits upon divorce even after the pension reform. However, the primary earner typically agrees to the pension division, because, if they do not agree, it will almost certainly end up with a court case and they will have to divide the pension.

Apart from the pension division rule introduced in April 2007, a distinct division rule known as the Category-3 pension division also took effect in April 2008. This division rule allows Category-3 insured persons to receive half of the pension entitlement associated with the Employees' Pension contributions paid by their spouse (i.e., the Category-2 insured person) during marriage without requiring the spouse's consent. Since this rule only applies to the contributions paid after April 2008, we believe its impact on divorce decisions is negligible compared to the 2007 pension reform. In fact, the share of divorces that relied solely on the Category-3 pension division (i.e., divorces not using the division rule introduced in 2007) accounted for only 0.25% in FY2008, 1.03% in FY2009, and 2.10% in FY2010 of the total number of divorced couples dividing their pension following either rule.

2.3 Awareness and utilization of the pension division rule

This section discusses the awareness of the new pension division rule introduced in April 2007, the proportion of divorced couples who divided their pension property following the rule, and how pension benefits were divided between spouses of these couples.

Awareness of the 2007 pension division rule

The Japanese Panel Survey of Consumers (JPSC), conducted by the Panel Data Research Center (PDRC) at Keio University, included a question in its October 2007 survey on whether respondents were aware of the pension division rule upon divorce. All respondents of this survey were women, and they were asked to select from four options: "1. Know very well," "2. Know," "3. Slightly know," and "4. Do not know at all." Among 1,211 married women who answered this question, 52.2% chose either option 1 or 2. Thus, more than half of married women knew the pension division rule upon divorce shortly after its introduction.

Women considering divorce (e.g., those dissatisfied with their marital relationship) or those likely to gain more from the pension division rule (e.g., women in longer marriages) may have been more interested in the rule. To explore this, Appendix Figure A1 shows the proportion of respondents aware of the new rule, categorized by marital satisfaction and length of marriage, as separately assessed in the same survey. The results indicate that awareness of the pension division rule was higher among women with lower marital satisfaction. Specifically, nearly 60% of women with the lowest satisfaction levels were aware of the rule. Although awareness does not increase steadily with the length of marriage, it peaks among respondents married for 20 years or more. This trend likely reflects the fact that dependent spouses in longer marriages stand to benefit more, as the amount of Employees' Pension contributions eligible for division increases with marital duration. These findings suggest that many women were aware of the pension division rule, making it unsurprising if divorces leveraging

the rule increased following its introduction.

Proportion of divorced couples utilizing the pension division rule

The Overview of Social Insurance Services for the period from FY2007 to FY2010, published by the Social Insurance Agency, provides data on the number of divorced couples who divided their pension contributions under the new division rule by the length of marriage. To calculate the proportion of such couples, we divide the number of these couples by the number of divorces, sorted by marriage length, in the Vital Statistics. For the denominator, we use the number of divorces where the primary earner was a worker employed by a firm (i.e., a Category-2 insured person) at the time of divorce.[7]

Appendix Figure A2 reveals two key findings regarding the proportion of divorced couples dividing their pension. First, the longer the marriage length, the more likely divorced couples were to utilize pension division. This reflects the greater benefits of pension division for dependent spouses in longer marriages, as noted in the interpretation of Appendix Figure A1. Second, the proportion was higher in FY2008 and later compared to FY2007. This aligns with the increase in the number of cases using the rule, from 8,634 in FY2007 to 18,282 in FY2010. These results suggest that awareness of the rule and understanding of its benefits for dependent spouses gradually increased after FY2007.

How pension benefits were divided between spouses

Finally, we examine how pensions were divided between spouses upon divorce. First, we consider the direction of transfers: whether pension benefits were transferred from husbands to wives or vice versa. According to the Overview of Cases on Pension

[7]Even among couples where the primary earner was retired at the time of divorce, some may have been eligible to use the pension division rule if the primary earner was a Category-2 insured person before retirement. However, it is impossible to determine from the Vital Statistics whether the primary earner was a Category-2 insured person before retirement. Thus, this is not accounted for in the calculation, which could result in overestimating the proportion of utilizing the pension division rule.

Division upon Divorces by the Family Bureau of the Supreme Court General Secretariat, during the period from April to December 2007, 97.7% of divorces using the pension division rule filed in Family Courts involved benefits being transferred from husbands to wives. Specifically, of the 3,003 divorces where Family Courts determined the proportion of pension benefits the dependent spouse was entitled to receive from the other, 2,933 cases (97.7%) involved transfers from husbands to wives, while only 70 cases (2.3%) involved the reverse.

Next, Appendix Table A1, based on the Overview of Social Insurance Services, shows how the total pension benefits of divorced couples were divided between spouses. Across all years, 92% or more of couples divided their pension benefits equally. In addition, in approximately 97% of divorced couples, the dependent spouse received more than 40% of the couple's total pension benefits. Combined with the fact that most transfers were from husbands to wives, this suggests that, in most divorced couples following the pension division rule, the division of labor between spouses was well established, with the husband serving as the primary earner and the wife as a full-time homemaker.

Finally, we examine the monetary value of pension benefits transferred from the primary earner to the dependent spouse. According to the Overview of Social Insurance Services of FY2007, approximately 40,000 yen (333 USD at the 2007 exchange rate of 120 yen to the dollar) per month was transferred from the primary earner to the dependent spouse among couples where both spouses had already reached the eligible age for receiving pensions and divided their pensions following the division rule in FY2007. As a result, the dependent spouse's monthly pension amount nearly doubled, increasing from approximately 42,000 yen to 82,000 yen. Over a 20-year period starting at age 65, this monthly increase of 40,000 yen would amount to a total of 9.6 million yen (80,000 USD). This significant transfer of pension entitlements likely alleviated financial insecurity in old age for dependent spouses, making it easier for them to proceed with divorce.

3 Theoretical analysis

3.1 Scope of the analysis

In the theoretical analysis, we focus on couples where the primary earner is approaching, but has not yet reached, retirement age for the following two reasons. First, the empirical analysis in this paper identifies couples strongly affected by the introduction of the pension division rule (treatment group) based on whether the primary earner was employed by a (large) firm at the time of divorce. From the dependent spouse's perspective, divorcing after the primary earner's retirement would maximize the benefits from the pension division, as the primary earner's pension contributions would have reached their peak. However, even if the primary earner has not yet retired, the benefits of utilizing the division rule for the dependent spouse remain sufficiently high. Second, as explained in Section 2, couples with longer marriage lengths are more affected by the pension division rule. Thus, it is appropriate to focus on middle-aged and older couples as the primary subjects for analyzing the impact of the rule on divorce decisions, rather than younger couples.

Japanese couples with a primary earner close to retirement around 2007 were characterized by the following two traits: (i) the husband was typically the primary earner, and the wife was a full-time homemaker (or, even if employed, worked part-time), and (ii) the husband generally had greater bargaining power than the wife. Regarding (i), while women's labor force participation in Japan has been increasing over the long term, it was still uncommon for wives in middle-aged and older couples around 2007 to continue working as full-time employees until retirement age. This is supported by the 2005 Population Census of Japan conducted by the Ministry of Internal Affairs and Communications, which shows that among couples where the husband was aged 55–59 and classified in the census as "primarily working," 64% had wives whose labor force status was either "engaged in household work in addition to work" or "not in the labor force." Regarding (ii), as a consequence of (i), it is reasonable to assume that

husbands had higher incomes and, consequently, stronger bargaining power relative to their wives.

In our model below, prior to the husband's retirement, a typical Japanese couple maximizes their utilities under the division of labor in which the husband participates in the external labor market while the wife performs household work. Our model further shows that, for such couples, without pension division, the division of labor would likely persist after the husband's retirement, with the husband receiving pension income and the wife continuing household work. Finally, the model indicates that once the pension division rule is enforced, the benefits for the wife of opting for divorce may outweigh those of maintaining the marital relationship.

3.2 Model

Our model is a single-period model that integrates the few years before the husband's retirement and the subsequent 20 to 30 years until the end of his life into a single period. This simplification is justified for the following reasons. First, in 2007, the average life expectancy for Japanese women was 86 years, while for men it was 80 years. This suggests that for couples in which the husband is nearing retirement age, the post-retirement period is substantially longer than the limited years preceding it. Second, as explained in Section 3.1, the main subjects of the theoretical analysis are middle-aged and older couples, for whom the distinction between the period of human capital investment and its returns—relevant for younger couples—is not necessary. Third, in the model, both spouses are allowed to work part-time while receiving pensions; however, pensions are assumed to be the primary source of income during old age. Thus, the household income remains relatively stable over time. Given these considerations, it is reasonable to treat the period from several years prior to retirement until the end of life as a single period.[8]

[8]The qualitative effects of pension division remain unchanged even if we adopt a two-period model for slightly younger couples (i.e., those with shorter marriages) and explicitly distinguish between the husband's pre-retirement and post-retirement periods. That is, generally, the larger the pensionable

We also assume unilateral divorce in our model, even though Japanese law requires divorce by mutual consent. While legally, divorce in Japan requires the mutual agreement of both spouses, this does not imply that one spouse can indefinitely prevent divorce by refusing to consent. In practice, if one spouse insists on divorce, the other will eventually need to accept it, as divorce can be granted in court after a separation period of 3 to 5 years. Moreover, under the pension reform, pension contributions made by the husband during the separation period are also subject to division upon divorce. Given this, if divorce is inevitable, it is often in the husband's best interest to consent to divorce immediately rather than prolong the separation. Thus, assuming unilateral divorce simplifies the model without significantly departing from the realities of the divorce decision-making process of a Japanese couple.

Our model builds on the framework developed by Becker (1973) and Becker (1974), which assumes that either spouse will choose to divorce if their utility within the marriage falls below their expected utility after divorce. Based on this framework, Amilon (2015) provides a diagrammatic analysis to examine how government policies can lead couples to divorce. In contrast, this paper analytically examines the effects of pension division. We numerically show a case in which a couple prefers to remain married before the pension division reform, while the wife opts for divorce after the reform.

Each spouse decides whether to remain married or divorce by comparing their utilities under the two scenarios. A spouse's utility depends on private good consumption, leisure, and the consumption of household public goods. Under marriage, the couple maximizes a weighted average of their utilities, with the weights being each spouse's bargaining power. This decision-making process achieves an efficient allocation and falls within the realm of collective models such as Browning and Chiappori (1998) and Chiappori (1992).

Throughout this section, we denote the husband and wife by m and f in sub-

earnings subject to division at the time of divorce, the greater the likelihood of divorce after the pension reform.

scripts and single and marital (couple) states by s and c in superscripts, respectively. The pension benefits that spouse i receives after divorce, denoted by z_i, satisfies the followings:

$$z_m(\alpha) = b_m - \alpha(b_m - b_f), \qquad z_f(\alpha) = b_f + \alpha(b_m - b_f), \tag{1}$$

where b_i is the amount of pension benefits associated with the contributions made by spouse i during the marital period. The second term represents a transfer of pension benefits based on the marital period; α represents the percentage of the difference in pension benefits, based on payments made during the marital period, that the wife receives. Focusing on actual Japanese pension benefits for people nearing retirement in 2007, we assume that

$$b_m > b_f.$$

This is because the amount of b_i depends on the length of the employment period during marriage, and a typical Japanese couple around the age of 60 in 2007 followed a division of labor system in which the husband worked outside the home while the wife remained a housewife.[9] The Japanese pension system is characterized as follows:

$$\begin{aligned} \alpha &= 0 : \text{Before the pension reform (No pension division rule)}, \\ \alpha &= 0.5 : \text{After the pension reform (New pension division rule applied)}. \end{aligned}$$

From (1), we see that $z_i|_{\alpha=0} = b_i$, and $z_i|_{\alpha=0.5} = (b_m + b_f)/2$. The pension benefits, calculated from the total contributions made by both spouses during the marital period, are divided equally between them.

As discussed in Section 2.2, a very small portion of the husband's pension benefits might be allocated to the wife as part of the property division at the time of divorce.

[9]The pension contributions made by spouse i before marriage are not subject to pension division. Couples around the age of 60 in 2007 typically married at a relatively young age and had long marriages. Since the Japanese salary system was seniority-based, salaries during marriage were usually higher than those before marriage. Taking these facts into account, b_m is much larger than the pension benefits accrued before marriage. Therefore, pension reforms based on payments made during the marital period strongly affect couples' behavior. Thus, this paper does not consider pension benefits associated with contributions made before marriage.

Thus, we allow α to take a small positive value, such as $\alpha = 0.1$, even before April 2007.

The utility functional forms are identical for both the husband and the wife, as well as for the single and marital (couple) periods. It is given by:

$$u_i^k = \varphi_i\left(x_i^k\right) + \phi_i(1 - q_i^k - l_i^k) + e_i^k, \quad i = m, f \text{ and } k = s, c, \tag{2}$$

where x_i^k represents the consumption of a private good, l_i^k denotes labor supply in an external market, and e_i^k represents the consumption of household products. The time endowment is normalized to one for simplicity. We assume that φ_i and ϕ_i are strictly concave.

Divorced singles

The household production function of divorced single person is given by

$$e_i^s = \kappa_i(q_i^s; n_i), \quad i = m, f, \tag{3}$$

where q_i^s is the contribution to a household public good, and n_i is the parameter indicating the productivity of spouse i. κ_i is assumed to be strictly concave.

The budget constraint is

$$x_i^s = z_i + w_i l_i^s, \quad i = m, f, \tag{4}$$

where w_i is wage rate. Maximizing (2) subject to (3) and (4) yields $x_i^{s*}(z_i(\alpha), w_i, n_i)$, $l_i^{s*}(z_i(\alpha), w_i, n_i)$, and $q_i^{s*}(z_i(\alpha), w_i, n_i)$. See Theoretical Appendix for details. From these, we obtain the utility of the divorced single person as $u_i^{s*}(z_i(\alpha), w_i, n_i) = u_i^s(x_i^{s*}(\cdot), l_i^{s*}(\cdot), q_i^{s*}(\cdot))$. Thus, u_i^{s*} depends on the pension benefit division ratio α.

Married couple

The household production function of couple is given by

$$e_i^c \equiv \frac{\kappa_m(q_m^c; n_m) + \kappa_f(q_f^c; n_f)}{\theta}, \quad i = m, f. \tag{5}$$

The household public good is simply defined as the summation of the household products of the spouses, while it is discounted by θ, which satisfies $1 \leq \theta$, due to congestion, diseconomies, and other factors arising from an increase in family members.

This paper considers the collective decision for marital allocation. The couple's utility, u^c, is given by $u^c = \gamma_m u_m^c + \gamma_f u_f^c$, where γ_i is the bargaining power of spouse i and satisfies $\gamma_m + \gamma_f = 1$. The bargaining power is assumed to be constant. We hold the weights γ_i fixed for two plausible reasons. First, the weights could be determined at the marriage stage. Second, traditional Japanese social norms solidify the husband's strong bargaining power within the family. Of course, the pension division may have affected bargaining power, but our numerical analysis confirms that wives prefer divorce due to the pension division, even if bargaining power changes somewhat. Using (5), the couple's utility becomes

$$\begin{aligned} u^c \;=\; & \gamma_m \cdot \left(\varphi_m\left(x_m^c\right) + \phi_m(1 - q_m^c - l_m^c) + \pi_m \left(\frac{\kappa_h(q_h^c; n_h) + \kappa_f(q_f^c; n_f)}{\theta} \right) \right) \\ & + \gamma_f \cdot \left(\varphi_f\left(x_f^c\right) + \phi_f(1 - q_f^c - l_f^c) + \pi_f \left(\frac{\kappa_h(q_h^c; n_h) + \kappa_f(q_f^c; n_f)}{\theta} \right) \right). \end{aligned} \tag{6}$$

The budget constraint of the couple is

$$x_m^c + x_f^c = z + w_m l_m^c + w_f l_f^c, \tag{7}$$

where $z \equiv z_m + z_f = b_m + b_f$. It should be noted that the couple's budget, as given by (7), is independent of the pension benefit division ratio α,because z is independent of α. Hence, the utility of each spouse at marriage is also independent of α. Maximizing (6) subject to (5) and (7) yields $x_i^{c*}(z, w_m, w_f, n_m, n_f, \gamma_m, \gamma_f, \theta)$,

$l_i^{c*}(z, w_m, w_f, n_m, n_f, \gamma_m, \gamma_f, \theta)$, and $q_i^{c*}(z, w_m, w_f, n_m, n_f, \gamma_m, \gamma_f, \theta)$. The allocation of each spouse depends on the partner's parameters, while these allocations are independent of the pension benefit division parameter α due to the unified budget of the couple based on collective decision-making. Substituting these into (6) yields $u_i^{c*}(z, w_m, w_f, n_m, n_f, \gamma_m, \gamma_f, \theta) = u_i^c(x_i^{c*}(\cdot), l_i^{c*}(\cdot), q_m^{c*}(\cdot), q_f^{c*}(\cdot))$, which also is independent of α, unlike the utility of a single person.

Welfare comparison

For simplicity, we assume that marriage dissolution is not costly.[10] Therefore, if the Japanese pension reform, enacted in April 2007, were to encourage a wife to divorce, the following must hold:

$$u_f^{s*}\big|_{\alpha=0} < u_f^{c*} < u_f^{s*}\big|_{\alpha=0.5}. \tag{8}$$

The first inequality shows that in the absence of pension division, i.e., before the Japanese pension reform, the wife wants to continue the marriage. The second inequality shows that after the pension division reform, the wife prefers to divorce.

We consider the case where the husband satisfies the following condition:

$$u_m^{s*}|_{\alpha=0.5} < u_m^{s*}|_{\alpha=0} < u_m^{c*}. \tag{9}$$

The first inequality is always satisfied. From (1), we have: $z_m|_{\alpha=0} - z_m|_{\alpha=0.5} = (b_m - b_f)/2 > 0$, where the inequality follows from the assumption that $b_m > b_f$. Therefore, it holds $u_m^{s*}|_{\alpha=0.5} < u_m^{s*}|_{\alpha=0}$. The second inequality shows that even in the absence of pension benefit division, the husband wants to continue the marriage. This implies that the benefits of household public goods are relatively large for the husband. Behind this mechanism, the wife is a major contributor to household production in exchange for income (consumption).

[10] Although divorce costs include legal fees and the time and effort required to find a new residence, the model analysis ignores these costs because they are relatively small when considering the 20–30 years after a divorce as one period.

Numerical analysis

This section numerically examines the effects of the Japanese pension division reform, which was enacted in April 2007. To focus on the effects of the pension benefit reform, we consider the following subutility functions:

$$\varphi_i\left(x_i^k\right) = \frac{t_i \cdot (x_i^k)^\rho}{\rho}, \quad 0 < \rho < 1 \text{ and } t \text{ is constant}, \tag{10}$$

$$\phi_i(1 - q_i^k - l_i^k) = \frac{g_i \cdot (1 - q_i^k - l_i^k)^\delta}{\delta}, \quad 0 < \delta < 1 \text{and } g \text{ is constant}, \tag{11}$$

The functional form of κ_i simply takes the form:

$$\kappa_i(q_i^k; n_i) = \frac{v_i \cdot (n_i q_i^k)^\sigma}{\sigma}, \quad 0 < \sigma < 1 \text{ and } v \text{ is constant}. \tag{12}$$

The parameters take the following values: $b_m = 0.5$, $b_f = 0.05$, $v_m = v_f = 1.55$, $t_m = t_f = 2.0$, $g_m = g_f = 0.5$, $\theta = 1.5$, $w_m = 0.52$, $w_f = 0.42$, $n_m = 0.05$, $n_f = 0.3$, $\gamma_m = 0.55$, and $\gamma_f = 0.45$.

The difference between w_m and w_f is not as large in comparison to the difference between n_m and n_f. In Japan, previous careers are less significant for reemployment after retirement, and even in cases of re-contracted employment with the same company, the previous salary level is usually substantially reduced. In contrast, the wife's high ability to perform household chores, accumulated during marriage, does not suddenly decrease after the husband's retirement. We assume that the husband's bargaining power is larger than that of the wife, which aligns with Japanese cultural norms in the 50s and 60s in 2007, where the husband's bargaining power would typically be higher."

In the specified case, we manipulate α from 0, reflecting the Japanese pension system before April 2007, to 0.5, reflecting the system after April 2007. The utility of the wife is depicted in Figure 2a and that of the husband in Figure 2b, where the red line shows utility as a single and the blue line shows utility in marriage. The numerical results satisfy the conditions (8) and (9). Both the wife and husband

prefer to stay married when $\alpha = 0$, i.e., before the Japanese pension reform. In this numerical analysis, the wife's labor supply in the external market is close to zero, indicating she is a housewife during marriage, as shown in Appendix Figure B1.[11] Our numerical results under $\alpha = 0$ suggest that the benefits of marriage arise from gender specialization, where the husband plays the breadwinner role and the wife handles household production, with the spouses exchanging their contributions. When $\alpha = 0.5$, i.e., after the Japanese pension division reform is applied, Figures 2a and 2b show that the wife prefers divorce while the husband wants the marriage to continue. An increase in the wife's pension benefits reduces her incentive to exchange household production for income. The advantage of supplying more intrahousehold production becomes smaller for the wife, and the disadvantages of marriage grow.[12] This result aligns qualitatively with the argument made by Becker (1991).

Figure 3 depicts the difference in the wife's utility as a single under $\alpha = 0.5$ and wife's utility at marriage, $u_f^{s*}\big|_{\alpha=0.5} - u_f^{c*}$, along with the pension benefits associated with the contributions paid by the husband during marriage, b_m.[13] As b_m increases, the wife's incentive to seek a divorce rises. This is because long hours spent on household work lead to substantial welfare loss, whereas the time burden is significantly reduced when she is single, as confirmed in Appendix Figure B2. Since b_m tends to be larger for couples with longer marriages or when the husband is employed by a large firm, we expect that such couples were more strongly affected by the pension reform. This will be empirically tested in the next section.

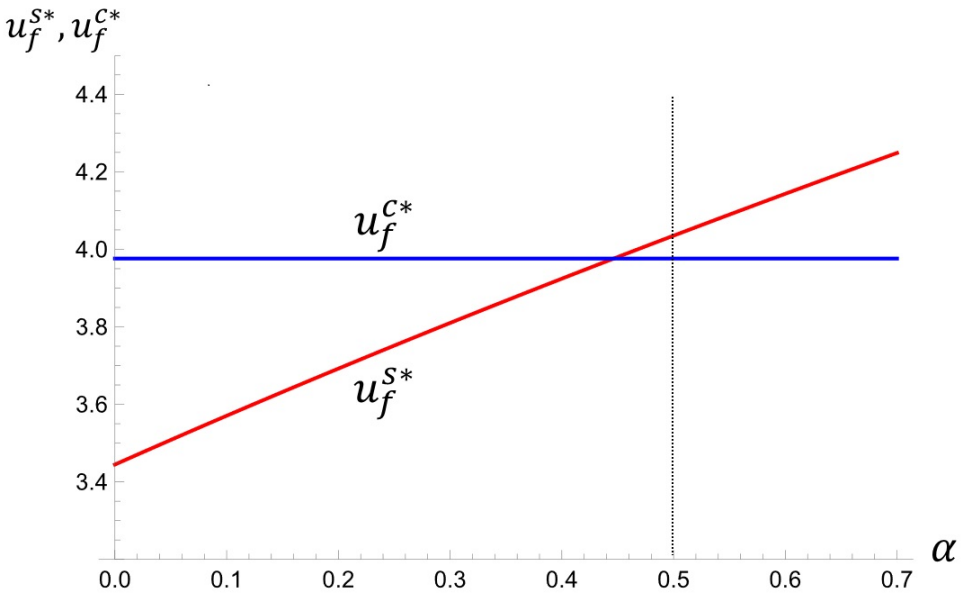
[11] We have confirmed that the labor supplies of both the husband and wife in the external market are non-negative for $\alpha \in [0, 0.5]$, whether in marriage or after divorce.

[12] While pension division may increase the wife's bargaining power, we confirm that even if her bargaining power increases somewhat, her utility under pension division is still higher when single.

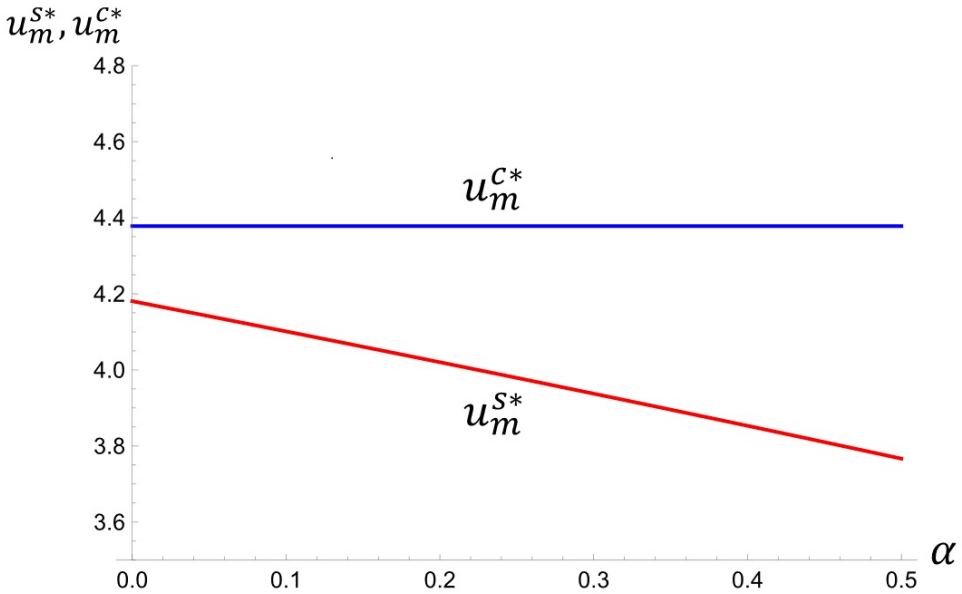
[13] To highlight the effects of b_m, we have changed the values of γ_h (γ_w) to 0.53 (0.47).

Figure 2: Impact of the pension division upon divorce on utility

(a) Wife's utility

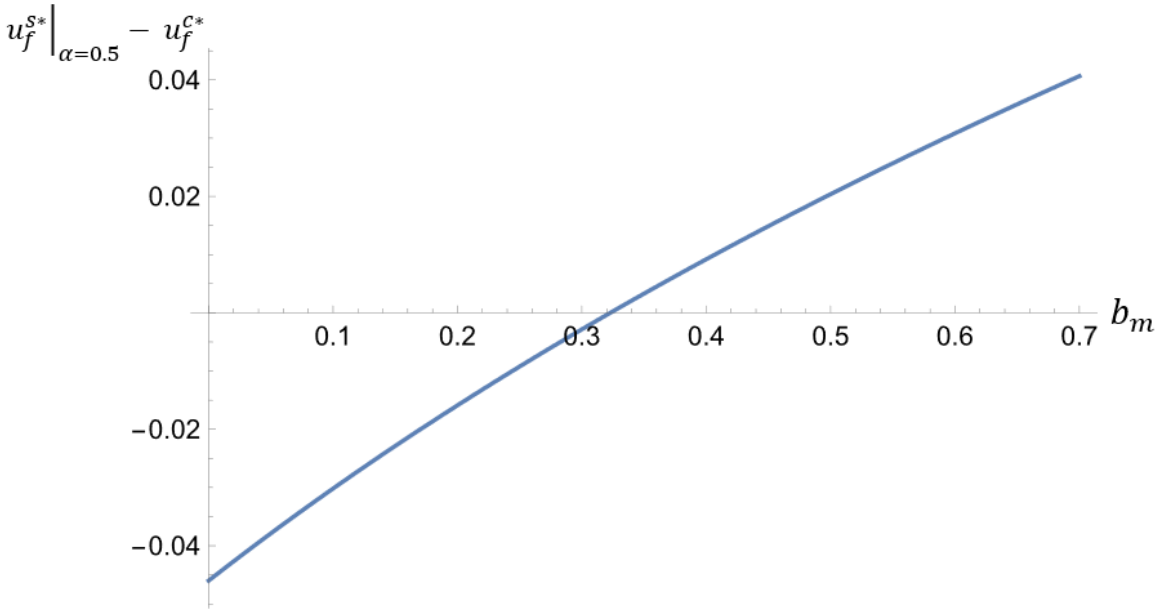


(b) Husband's utility



Notes: The utility level is measured on the vertical axis and the pension division ratio (α) on the horizontal axis. Figure 2a and 2b depict the utility level of wife and husband. The red line indicates the utility level when single and the blue line indicates the utility level when married. With equal pension division ($\alpha = 0.5$), the wife has a higher utility level when she is single. On the other hand, the husband always has a higher utility level when married.

Figure 3: Difference in wife's utility between single and married states and husband's pension benefits



Notes: The vertical axis represents the difference between the wife's utility level under pension division ($\alpha = 0.5$) and her utility level at marriage, and the horizontal axis represents the magnitude of the pension benefit (b_m) evaluated from the husband's marital cost. If the value of the vertical axis is positive, the wife chooses to divorce; if it is negative, she chooses to stay in the marriage. The larger the pension benefit, the more strongly the pension division encourages the wife to divorce.

4 Data description

4.1 Vital Statistics on Divorces

This study utilizes microdata from the Vital Statistics on Divorces compiled by the Ministry of Health, Labour and Welfare. This is an administrative dataset that includes the complete record of all divorces in Japan since January 1973. Importantly, it includes the information on the month and year when each divorce was finalized (i.e., the date when the divorce registration was submitted), allowing us to calculate the monthly number of divorces over the study period.

The dataset also provides detailed information about the occupation of the primary earner of divorced couples and the length of marriage. These variables are critical for distinguishing couples who were likely to be more significantly affected by the 2007

pension reform from those less affected. First, the occupation of the primary earner categorizes couples into the following seven groups: (1) Farmers (including part-time farmers), (2) Self-employed, (3) Working for small to medium-sized firms (fewer than 100 employees), (4) Working for large firms (including executives in company organizations and government workers), (5) Others (couples not classified above, including temporary or short-term contracts), (6) Unemployed (where no household member is employed) and (7) N.A. Second, the length of marriage is derived from information about the start of couple's cohabitation and their divorce registration. While the dataset does not provide the exact month and year when the marriage registration was submitted, it does record the month and year when the couple started living together. We use this information as a proxy for the marriage date. The length of marriage is then calculated as the period between the start of cohabitation and the month of divorce registration.

This paper uses the following criteria to limit divorces to be analyzed below. First, to exclude couples less likely to be affected by the Japanese pension reform, the sample is restricted to divorces where at least one spouse holds Japanese nationality.[14] Couples excluded based on this criterion account for less than 2% of divorces in any given year, ensuring minimal loss of generality. Second, our analysis focuses on the period from fiscal year (FY) 2002 to 2010, though the Vital Statistics dataset spans from January 1973 onward. The following two factors influenced this decision: (1) The Great East Japan Earthquake in March 2011 and (2) Long-term trends in later-life divorces among older, long-married couples (*Jukunen Rikon* in Japanese). First, the earthquake had a substantial impact on divorce decision (Kureishi *et al.*, 2025), leading to a 6.2% reduction in divorce cases between 2010 and 2011. This sharp decline stands in contrast to the relatively minor effect of the 2008 global financial crisis, which caused only small fluctuations of about 1% in divorce cases.

[14]While foreign residents in Japan are also required to enroll in the public pension system, if both spouses are non-Japanese nationals, they may have only temporarily resided in Japan and thus have shorter enrollment periods. As a result, the extent to which Japan's pension division upon divorce influences their divorce decisions may be limited.

Second, since later-life divorces have been increasing for reasons unrelated to the pension reform, we focus on the four years after the reform in order to identify its effects, separately from other increasing trends. The percentage of divorces among couples who have been married for 20 years or more has risen from 18.5% (=49,015/264,246) in 2000 to 23.1% (=44,697/193,253) in 2020. One potential reason for this increase is that, due to the increase in life expectancy, the period after a husband retires is becoming longer, and during this time, an increasing number of couples are finding that their relationship is not going well (or are anticipating that it will not be). Enhanced remarriage opportunities through online matchmaking platforms and reduced stigma of later-life divorce have also contributed to this trend.

Focusing on the FY2002–FY2010 period thus avoids confounding effects from these disruptions, ensuring that the analysis captures the impacts of the 2007 pension reform within a stable socio-economic context. This timeframe also encompasses the global financial crisis, but its effects on divorces were modest compared to those of the earthquake as explained above, making it less likely to bias our results.

4.2 Definition of adjusted divorce incidents

We use "adjusted divorce incidents" calculated for different lengths of marriage as a divorce measure. The calculation of this measure draws on microdata from both divorce and marriage records in the Vital Statistics, both available since January 1973. For couples with length of marriage l at month m in year y, the adjusted divorce incidents are calculated by dividing the number of divorces at month m of a year by the number of couples continuing their marital relationship until the end of the previous month $m-1$. It should be noted that deaths of married individuals would also affect the number of couples; however, since the number of couples who have been widowed is not available, this is not considered in the calculation of the divorce measure.

We calculate the adjusted divorce incidents for each occupation category of the

primary earner in divorced couples. In this calculation, while the numerator of this measure is the number of divorces broken down by the occupation of the primary earner, the denominator is the total number of couples continuing their marriage. Therefore, this divorce measure should not be interpreted as representing the probability of divorce for couples in a particular occupation, but rather as the number of divorces adjusted for differences in the number of remaining couples by length of marriage. Nevertheless, compared to previous studies using crude divorce rates, our calculation is more accurate because it can take into account demographic (cohort-level) differences in the number of marriages in a particular year.

The number of couples continuing their marriage can only be calculated for couples who married after January 1973, because marriage records in the Vital Statistics are only available from that point onward. Therefore, to calculate the divorce measure for couples with a specific marriage length, the corresponding length of time must have passed since January 1973. Consequently, it is impossible to calculate our divorce measure for couples with very long marriage lengths. For instance, the divorce measure for couples with a marriage length of 40 years in April 2002 cannot be calculated because no couples had been married for 40 years since January 1973 at that time. Accordingly, this study mainly focuses on couples who divorced within 359 months (less than 30 years) of marriage.[15] Furthermore, the number of couples with a marriage length up to 359 months can only be counted from FY2002 onward. This is why the sample period in this study begins in FY2002.

4.3 Descriptive statistics and trends

Table 1 presents descriptive statistics for the divorce data used in our analysis from 2002 to 2010. The number of divorces declined steadily from 2002 to 2008 and then remained relatively flat. Given the upward trend in the number of divorces until 2002

[15] As a robustness check, we estimate the model using the natural log of the number of divorces as the dependent variable in Section 6.6, instead of the natural log of the adjusted divorce incidents, focusing on couples who divorced after 360 months (30 years) of marriage. The qualitative results remain largely unchanged regardless of which divorce measure is used.

(though not shown in Table 1), reflecting the economic downturn referred to as the "Lost Decade" following the collapse of the Japan's bubble economy in the late 1980s, the subsequent decline is likely attributable to the economic expansion, which lasted from February 2002 to March 2009. The mean ages of husbands and wives at the time of divorce remained stable until 2006 but rose discontinuously in 2007, when the new pension division rule commenced. Similarly, the average length of marriage prior to divorce rose after 2007, consistent with the hypothesis that older and longer-married couples were more likely to be affected by the new pension division rule. Turning to the occupation of the primary earner, the share of farmers and self-employed has slightly decreased, reflecting the long-term decline in the number of people engaged in these occupations. In contrast, the share of workers employed by firms has remained relatively stable, regardless of firm size.

Next, we explain the time trends in the adjusted divorce incidents. Figure 4 depicts trends of the monthly divorce measure for couples whose primary earner's occupation before divorce was employment in small to medium-sized firms or large ones (referred to as "couples with a firm-employed primary earner" thereafter) from FY2002 to FY2010 (i.e., April 2002 to March 2011). This analysis is repeated for six marriage length categories, each spanning five years, as shown in Figure 4.[16]

In the figures, the dashed line represents the divorce measure trends, which exhibit strong seasonality, with a spike in the measure in March.[17] To prevent this seasonality from obscuring broader trends, we add a bold solid line representing a locally weighted scatterplot smoothing (LOWESS) separately for the periods before and after the pension reform (i.e., before March 2007 and from April 2007 onward),

[16] Appendix Table A2 presents the proportion of divorced couples in each of these six categories of marriage length. Since divorces tend to be more common among couples with shorter marriage lengths, couples married for less than 15 years constitute approximately three-quarters of all divorces in each year. The other categories, representing couples married for 15 years or longer, account for about 4% to 11% of divorces.

[17] March marks the end of the fiscal year for many Japanese firms and the school year for children. Additionally, as Japan does not officially allow married couples to retain separate surnames, a surname change due to marriage or divorce may motivate couples to finalize their marriages in March to avoid such changes during the fiscal or school year.

Table 1: Descriptive statistics

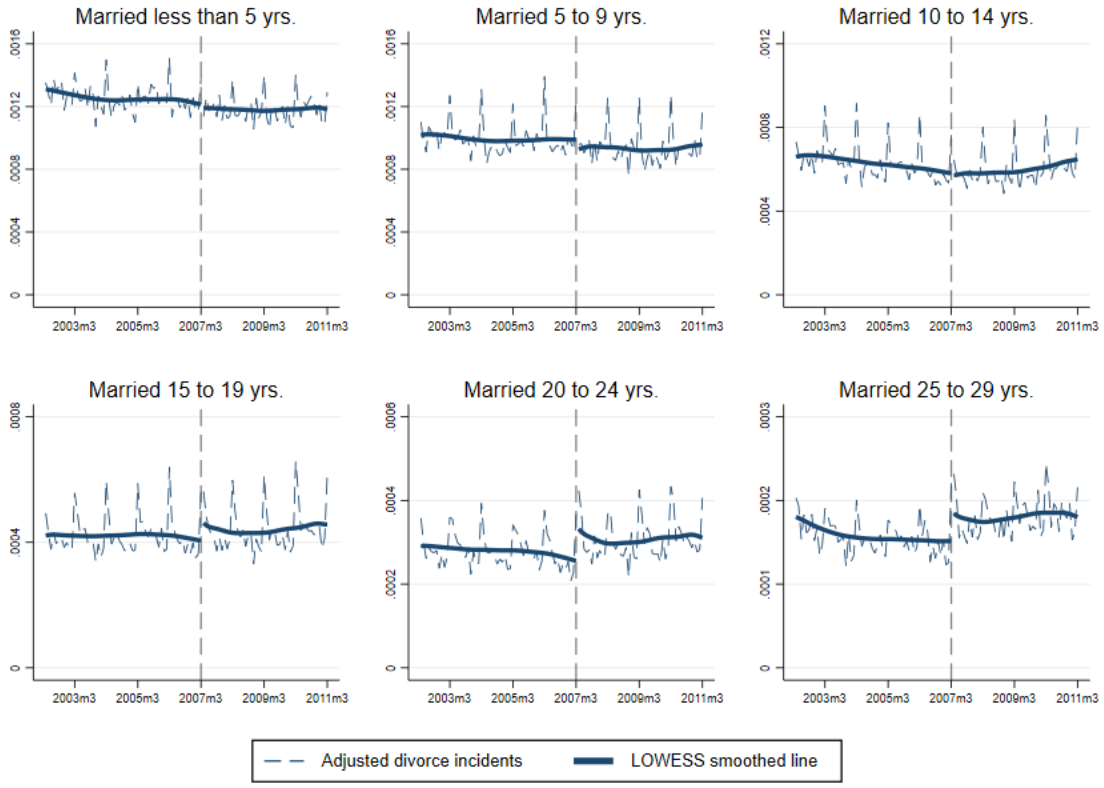
CY	N	Age		Length of marriage	Occupation of the primary earner of divorced couples					
		Husband	Wife		Farmers or self-employed	Working for small to medium-sized firms	Working for a large firm	Not in labor force	Others	N.A.
2002	289,836	39.54	36.72	135.7	0.175	0.355	0.234	0.053	0.110	0.074
		(11.38)	(10.7)	(117)	(-)	(-)	(-)	(-)	(-)	(-)
2003	283,854	39.77	36.95	136.9	0.173	0.351	0.231	0.054	0.109	0.083
		(11.46)	(10.74)	(117.8)	(-)	(-)	(-)	(-)	(-)	(-)
2004	270,804	39.82	37.01	136	0.168	0.350	0.234	0.053	0.107	0.089
		(11.47)	(10.75)	(117.9)	(-)	(-)	(-)	(-)	(-)	(-)
2005	261,917	39.96	37.13	135.9	0.166	0.362	0.247	0.054	0.101	0.070
		(11.5)	(10.75)	(117.9)	(-)	(-)	(-)	(-)	(-)	(-)
2006	257,475	39.99	37.11	133.8	0.161	0.357	0.243	0.050	0.099	0.090
		(11.5)	(10.69)	(117.2)	(-)	(-)	(-)	(-)	(-)	(-)
2007	254,832	40.54	37.58	138.5	0.155	0.352	0.250	0.047	0.096	0.100
		(11.69)	(10.91)	(121.3)	(-)	(-)	(-)	(-)	(-)	(-)
2008	251,136	40.73	37.75	138.5	0.152	0.349	0.252	0.046	0.093	0.109
		(11.71)	(10.91)	(120.6)	(-)	(-)	(-)	(-)	(-)	(-)
2009	253,354	41.08	38.1	140.4	0.150	0.344	0.248	0.054	0.094	0.111
		(11.83)	(11.06)	(122.3)	(-)	(-)	(-)	(-)	(-)	(-)
2010	251,379	41.28	38.3	141.8	0.153	0.357	0.260	0.060	0.096	0.075
		(11.84)	(11.05)	(122.5)	(-)	(-)	(-)	(-)	(-)	(-)

Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). The table reports the mean value for each variable, with standard deviations shown in parentheses. "CY" and "N" represent calendar year and the number of observations, respectively. The unit for "Length of marriage" is months. Each variable representing the "Occupation of the primary earner of divorced couples" is a dummy variable that takes the value of 1 if the occupation of the primary earner matches the respective category.

respectively. According to these figures, couples with longer marriage lengths (specifically those married for 15 years or more) show a discontinuous jump in the divorce measure between March 2007 and April 2007. In contrast, for couples with shorter marriage lengths (less than 15 years), the LOWESS lines connect smoothly throughout the study period. These patterns align with our hypothesis. Furthermore, for the period before March 2007, all figures show either a flat or slightly downward trend, with no significant differences in trends across marriage lengths. While formal parallel trend tests are conducted using regression models explained in Section 5, visual inspection suggests no substantial differences in trends by marriage length.

Next, Figure 5 is a scatterplot showing the relationship between the annual change rate in the adjusted divorce incidents and marriage length (ranging from 0 to 359

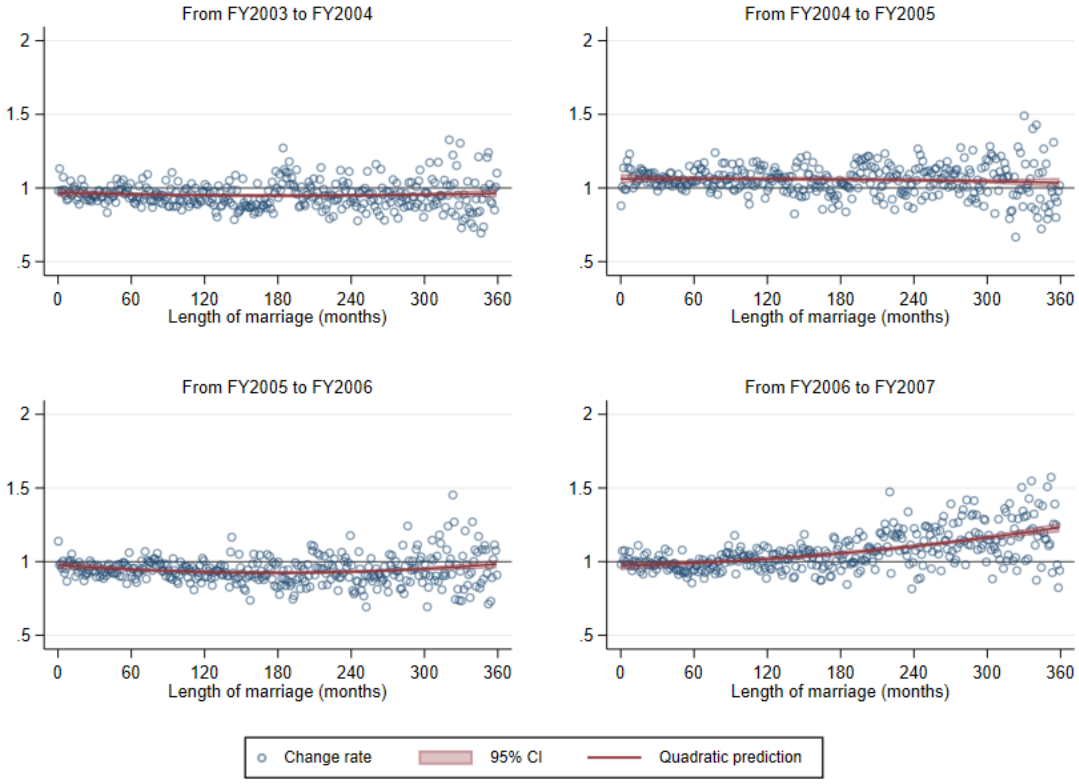
Figure 4: Monthly trends in adjusted divorce incidents (FY2002 to FY2010)



Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). The dashed line represents the monthly trends in adjusted divorce incidents from FY2002 to FY2010, while the bold solid line represents a locally weighted scatterplot smoothing (LOWESS) applied separately to the periods before and after the pension reform. This figure focuses on couples where the primary earner is employed by a firm.

months) for couples with a firm-employed primary earner. According to Figure 5, for the two-year periods not encompassing the implementation of the new pension division rule—fiscal years 2003 to 2004, 2004 to 2005, and 2005 to 2006—the change in the divorce measure shows little variation by marriage length. The quadratic prediction lines for these periods are nearly straight, though their levels shift up or down depending on the year. These vertical shifts reflect differences in the average divorce incidents across years. In contrast, the change in the divorce measure from FY2006 to FY2007 is larger for couples with longer marriage lengths. Specifically, no noticeable

Figure 5: Annual change rates in adjusted divorce incidents



Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). This figure illustrates the annual change rates in adjusted divorce incidents (vertical axis), categorized by the length of marriage measured in months (horizontal axis). The red curve represents a quadratic prediction of the relationship, along with its 95% confidence interval indicated by the shaded light red area. This figure focuses on couples where the primary earner is employed by a firm.

changes are observed for couples married up to approximately 120 months. However, beyond 120 months, the change in divorce incidents gradually increases and continues this trend up to 359 months. This pattern is also consistent with our hypothesis.

Finally, we consider firm size as another proxy for the total amount of pension contributions subject to the property division upon divorce. In Japan, there has been a tendency for larger firms (in terms of the number of employees) to offer higher salaries. Therefore, we classify couples with a firm-employed primary earner into those employed by small to medium-sized firms and those employed by large firms,

and create Figures 4 and 5 for each group. As shown in Appendix Figures A4, the results indicate that the latter group, which tended to have higher salaries, exhibits a clearer discontinuity in divorce incidents before and after the pension reform.[18] Furthermore, Appendix Figures A5a and A5b show a stronger positive correlation between the annual changes in divorce incidents from FY2006 to FY2007 and marriage length compared to the changes observed in other two-year periods. This positive correlation is particularly more pronounced among couples where the primary earner was employed by large firms, compared to those employed by small to medium-sized firms. From Section 5 onward, we use a regression framework to confirm whether the trends observed in the figures so far hold after controlling for other factors.

5 Methodologies

In this paper, we estimate the impact of the pension reform on divorce by comparing changes in adjusted divorce incidents before and after FY2007, when the new pension division rule was introduced. The estimation is conducted using a Difference-in-Differences (DID) approach, comparing couples more likely to be affected by the reform (treatment group) with those less likely to be affected (control group). As described in Section 4.1, we classify couples into these groups based on two factors: the occupation of the primary earner and the length of the marriage. The treatment group consists of couples with a firm-employed primary earner and longer marriage durations, while the control group includes couples with shorter marriage durations. Specifically, couples married for less than five years are considered to be minimally affected by the reform and are designated as the control group. The impact of the reform is thus estimated as the difference in changes in adjusted divorce incidents between the shortest-marriage-duration couples (i.e., those married for less than five

[18]The adjusted divorce incidents for couples whose primary earner was employed by small to medium-sized firms are higher than those for couples whose primary earner was employed by large firms. This is due to the larger number of divorced couples in the former group and does not imply that couples in the former group were more likely to divorce.

years) and couples with longer marriage durations.

To implement this estimation strategy, we categorize the couples into several groups (hereafter referred to as "cells") based on the length of their marriage. Each cell represents a specific marriage duration category, and the adjusted divorce incidents within each cell serve as the observation values in our dataset. The Vital Statistics data provide the marriage length of divorced couples in months. However, dividing the marriage length into overly fine categories would result in too few divorces per cell, potentially leaving some cells empty and leading to unstable estimates. To ensure the reliability of our results, we divide marriage length into 30 categories, each spanning 12 months. As described in Section 4.1, the sample period covers FY2002 to FY2010. Consequently, the sample size used in our DID estimations is 3,240 (= 9 years $\times$ 12 months $\times$ 30 marriage length categories). Descriptive statistics for the adjusted divorce incidents, calculated at the cell level, are presented in Appendix Table A3.

For the couples analyzed in the DID estimation, we assume—consistent with the theoretical analysis presented in Section 3—that a couple with a firm-employed primary earner consists of a husband working for a firm and a wife who is a full-time homemaker (or a low-income part-time worker). For such couples, the 2007 pension reform may have led the wife to divorce, as she would benefit from receiving half of the Employees' Pension contributions upon divorce paid by the husband. Unfortunately, however, the Vital Statistics on Divorces do not include income information for either spouse, making it impossible to directly verify this assumption. To address this, we use another dataset, the Japan Panel Survey of Consumers (JPSC), which is a panel survey conducted since 1993 that targets women as respondents and provides income data for both the respondents and their husbands (if married). In the JPSC data, we identify couples with a firm-employed primary earner—as defined in the Vital Statistics—as those where at least one spouse is employed by a company and self-employment income constitutes less than 50% of their total labor income. For these couples, we calculate the husband's share of the total household labor income, focusing on the period before the pension reform (i.e., prior to 2006). This approach

allows us to assess whether such couples align with the assumption in our theoretical and empirical analyses—that the husband is a full-time salaried worker, while the wife is a full-time homemaker or a part-time worker.

The results, presented in Appendix Figure A3, show that the husband's income share is concentrated at 0.5 or higher, with a significant clustering near 1. The mean share is 0.858, and the median is 0.974, indicating that, prior to 2007, husbands generally earned substantially more than their wives. This suggests that couples fitting our theoretical model—where the husband is the primary earner and the wife contributes little or no income—are indeed prevalent in the data, supporting the validity of our assumptions.

To estimate the impact of the pension reform on divorce decisions, we use the following equation.

$$\ln(D_{yml}) = \beta_0 + \sum_{\substack{y=2002 \\ y\neq 2003}}^{2010} \sum_{\substack{l=2 \\ l\neq 1}}^{6} \beta_{1yl} \times Year(y) \times Length(l) + \mu_{ym} + \nu_l + \varepsilon_{yml} \qquad (13)$$

where the dependent variable is the natural log of adjusted divorce incidents at month m in year y for couples with marriage length l. $Year(y)$ is a dummy for fiscal year y. $Length(l)$ is a dummy variable that takes 1 if the marriage length falls into a category l.

The parameter of interest is β_{1yl}, which represents the change in the divorce incidents compared to the reference year, FY2003 (the year prior to the pension reform announcement in FY2004).[19] The 30 categories of marriage length were grouped into six broader categories for the estimation: less than 5 years, 5–9 years, 10–14 years, 15–19 years, 20–24 years, and 25–29 years. The category of less than 5 years serves as the reference, and the coefficients are estimated for the other categories.

To control for the seasonality in the adjusted divorce incidents observed in Figure

[19]The choice of the reference year may affect the estimation results. If the postponement behavior, as will be discussed in Section 6.4, led to fewer divorces between 2004 and 2006 and more in 2007, selecting 2004, 2005, or 2006 as the reference year could result in an overestimation of the reform's effects.

4, we include year-month fixed effects (μ_{ym}). To control for the tendency, shown in the descriptive statistics in Table 1, that couples with shorter marriage lengths tend to divorce more frequently, we include marriage-length fixed effects (μ_l). The error term is denoted as ε_{yml}. Our standard errors are cluster-robust, clustered at the level of month and year of divorce, to account for potential common shocks that might affect divorce decisions across different marriage lengths.

When identifying the couples with a firm-employed primary earner, the primary earner who was not employed by a firm (and thus not contributing to the Employees' Pension Insurance) before moving into firm employment could be mistakenly included in the treatment group. This potential misclassification would likely bias the estimated effects of the pension reform downward, and thus the estimates should be interpreted as a lower bound. However, at least in Japan prior to 2007, the so-called "Japanese employment system" were prevalent, whereby individuals (particularly men) who joined a firm after graduating from school typically remained employed at the same firm (or its affiliates) until retirement. Given this context, the potential bias from such transitions into firm employment is expected to be minimal, if it exists at all.

In addition to the estimation focusing on couples with a firm-employed primary earner, the same estimation is applied to couples where the primary source of household income was from farming or self-employment (referred to as "couples with a farming- or self-employed primary earner" thereafter). Farmers and self-employed individuals are enrolled in different pension systems from firm-employed individuals and do not contribute to the Employees' Pension Insurance. Therefore, even with the 2007 pension reform, the pension benefits received by non-working spouses upon divorce would not increase for such couples. As a result, for couples with a farming- or self-employed primary earner, we conduct a falsification test to verify whether there is no significant increase in divorce incidents following the pension reform.

In Eq. (13), we estimate the difference in the rate of change in the adjusted divorce incidents across couples with different marriage lengths. However, if there are marriage-length-specific trends in divorce rates, independent of the pension reform, the

identification of the reform's effect may be compromised. Specifically, at any given point in time, couples with longer marriage lengths are more likely to belong to older generations (born earlier), while those with shorter marriage lengths tend to belong to younger generations (born later). Thus, these marriage-length-specific trends may reflect generational differences rather than the impact of the reform. To address this issue, we also conduct a triple differences analysis, using couples with a farming- or self-employed primary earner—who were unaffected by the pension reform—as a control group. This approach relies on the assumption that, in the absence of the reform, the trends in the divorce incidents would have been similar between couples with firm-employed primary earners and those with farming- or self-employed primary earners across different marriage lengths. The estimation equation is as follows:

$$\begin{aligned}\ln(D_{ymlo}) = \beta_0 + & \sum_{\substack{y=2002 \\ y\neq 2003}}^{2010} \sum_{\substack{l=2 \\ l\neq 1}}^{6} \beta_{1ylo} \times Year(y) \times Length(l) \times Firm(o) \\ & + \sum_{\substack{y=2002 \\ y\neq 2003}}^{2010} \sum_{\substack{l=2 \\ l\neq 1}}^{6} \beta_{2yl} \times Year(y) \times Length(l) \\ & + \sum_{\substack{y=2002 \\ y\neq 2003}}^{2010} \beta_{3yo} \times Year(y) \times Firm(o) \\ & + \sum_{\substack{l=2 \\ l\neq 1}}^{6} \beta_{4lo} \times Length(l) \times Firm(o) \\ & + \mu_{ym} + \nu_l + \theta_o + \varepsilon_{ymlo}\end{aligned} \tag{14}$$

where the dependent variable is the natural log of adjusted divorce incidents at month m in year y for the occupation category o of the primary earner of a divorced couple with marriage length l. $Firm(o)$ is a dummy variable that equals 1 if the primary earner is employed by a firm, and 0 otherwise (i.e., if the primary earner is engaged in farming or self-employment). θ_o represents the fixed effects for the occupation of the primary earner. The definitions of the other variables are consistent with those in

Eq. (13). The sample size for this estimation is 6,480 (= 9 years × 12 months × 30 categories of marriage length × 2 categories of the primary earner's occupation).

It is important to note that if there are trends specific to couples with a farming- or self-employed primary earner that are unrelated to the pension reform, even the triple differences analysis may fail to fully isolate the effect of the reform. To assess the severity of this potential issue, we examine whether there are any pre-existing trends unique to farming- or self-employed couples prior to the reform.

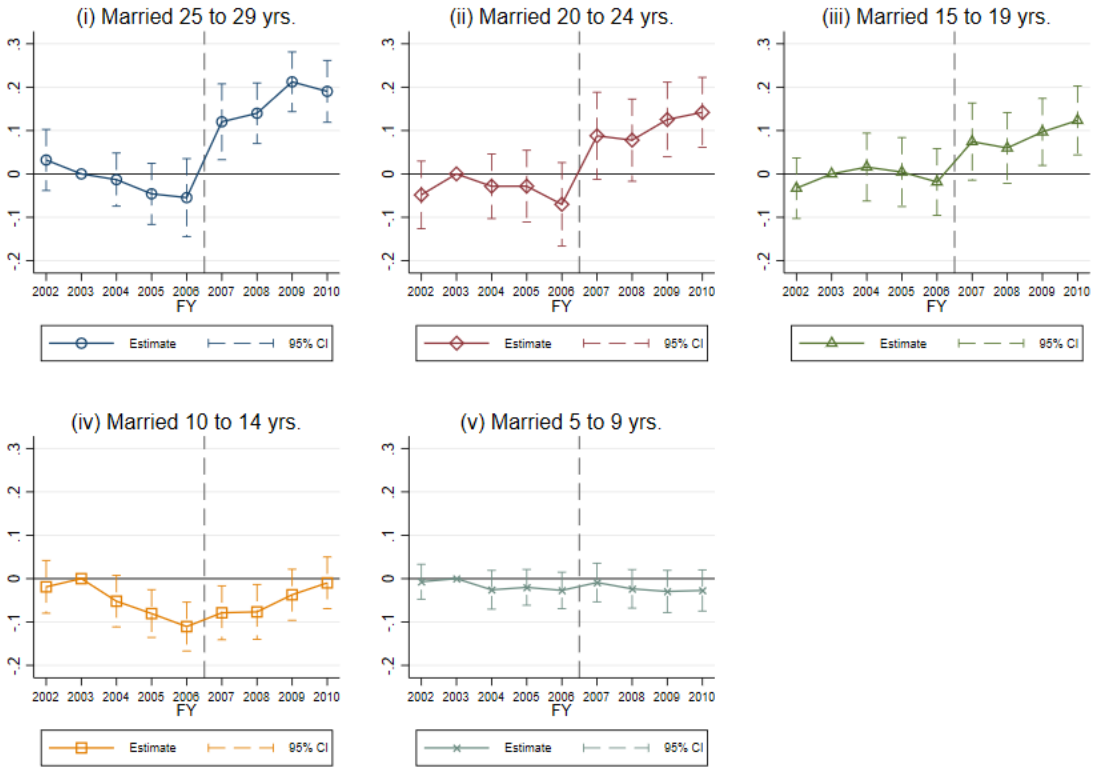
6 Results

6.1 The effect of the pension reform on the adjusted divorce incidents

Figure 6 shows the changes in the adjusted divorce incidents before and after the implementation of the new pension division rule for couples with a firm-employed primary earner, as represented by the estimate of β_{1yl} in Eq. (13). Figures 6(i) through (iii) show a noticeable increase in the divorce measure in FY2007. The largest increase is observed among couples with the longest marriage length, with divorce incidents rising statistically significantly by approximately 10% in the first year after the reform and by 20% in the subsequent two to three years. Figures 6(ii) and (iii) also indicate an increase in divorces of around 10%. The point estimates in Figure 6(ii), which focuses on couples with relatively longer marriage lengths, are slightly higher than those in Figure 6(iii), consistent with our hypothesis.

In contrast, couples with shorter marriage lengths show no significant increase in divorces following the pension reform. Figure 6(iv), which focuses on couples with marriage lengths of 10 to 14 years, displays a declining trend in divorces starting from FY2004. Although this decline tapers off after FY2007, there is no evidence of an increase in divorces compared to FY2003 (the reference year). Similarly, Figure 6(v), which targets couples with marriage lengths of 5 to 9 years, shows coefficients that

Figure 6: Impact of the pension reform on adjusted divorce incidents



Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). This figure presents the estimates of β_{1yl} in Eq. (13) for couples where the primary earner is employed by a firm, represented by markers in each subfigure. The horizontal axis corresponds to each fiscal year (y) from FY2002 to FY2010, categorized by five different marriage lengths (l). Each coefficient estimate represents the difference in changes in adjusted divorce incidents between couples with marriage lengths of less than 5 years and those with longer marriage lengths from the reference year FY2003 to other fiscal years. The number of observations used in the estimation is 3,240. The dashed line indicates the 95% confidence intervals for the estimates. We cluster at the year-month (i.e., the date of divorce) level.

are not statistically significant in any year, aligning with the expectation that the pension reform had minimal impact on divorces among couples with shorter marriage durations.

Moreover, except for Figure 6(iv), the coefficients for the pre-reform period are not statistically significant, indicating no deviation from the parallel trend assumption relative to couples with marriage lengths under 5 years. These findings suggest that the increases in divorces observed in FY2007 in Figures 6(i) to (iii) are likely attributable to the pension reform.

Next, we examine the estimation results by dividing the couples of a firm-employed primary earner into two groups based on whether the primary earner worked for a large firm or a small to medium-sized firm. Comparing Figures 7a and 7b, which respectively focus on couples whose primary earner was a large firm employee and a small-to-medium-firm employee, we observe that the increase in divorce incidents following the pension reform is larger for the former than the latter, conditional on having the same marriage length. This difference likely reflects the larger amount of pension contributions subject to division upon divorce, resulting from the higher income levels of large firm employees.

Additionally, the trend observed here aligns with previous findings in Figure 6: the longer the marriage length, the greater the increase in divorces after the pension reform.[20] The most significant impact is seen among couples whose primary earner was employed by a large firm and the marriage length was 25-29 years, with divorces increasing by approximately 20% following the reform. These results are consistent with the hypothesis derived from the theoretical model presented in Section 3. In contrast, for couples with marriage lengths of 10 to 14 years, Figures 7a and 7b show a significant decline in divorces during the period prior to the pension reform. This may indicate that the divorce trend for this group differs from that of couples with

[20]In particular, Figure 7b shows that the estimated coefficients gradually increase from FY2007 to FY2010, a pattern that mirrors the rise in the number of divorces utilizing the new pension division rule—from 8,634 cases in FY2007 to 18,282 cases in FY2010, according to the Overview of Social Insurance Services published by the Social Insurance Agency.

shorter marriage lengths, i.e., those under 5 years.

6.2 Falsification test

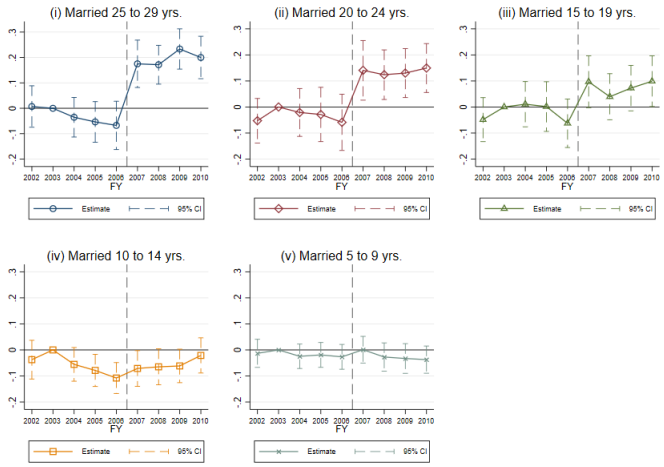
If the increase in divorce incidents observed in Figures 6 and 7 after FY2007 is not due to trends specific to couples with long marriage lengths but instead due to the impact of the pension reform, there should be no corresponding increase in divorces among couples with a farming- or self-employed primary earner, who are unaffected by the reform. To test this, we apply the same analysis previously conducted for couples with a firm-employed primary earner to those with a farming- or self-employed primary earner as a falsification test.

Before explaining the results of the falsification test, we first apply the descriptive analysis conducted in Section 4.3 for couples with a firm-employed primary earner to those with a farming- or self-employed primary earner. First, Appendix Figure A6 examines the trends in monthly divorce incidents from FY2002 to FY2010. Except for couples with marriage lengths of 25 to 29 years, there is little evidence of a rise in divorce incidents after April 2007, even among couples with long marriage lengths. Next, Appendix Figure A7 presents the annual change rate in divorce incidents for couples with a farming- or self-employed primary earner. It shows that, except for a slight increase among couples with marriage lengths of 20 years or more from FY2006 to FY2007, the annual change rate in divorce incidents remains almost flat. The observed increase in divorce incidents for couples with marriage lengths of 20 years or more from FY2006 to FY2007, as well as the increase in divorces among couples with marriage lengths of 25 to 29 years observed in Appendix Figure A6, could potentially be explained by primary earners who retired from salaried jobs and subsequently transitioned to farming or self-employment.

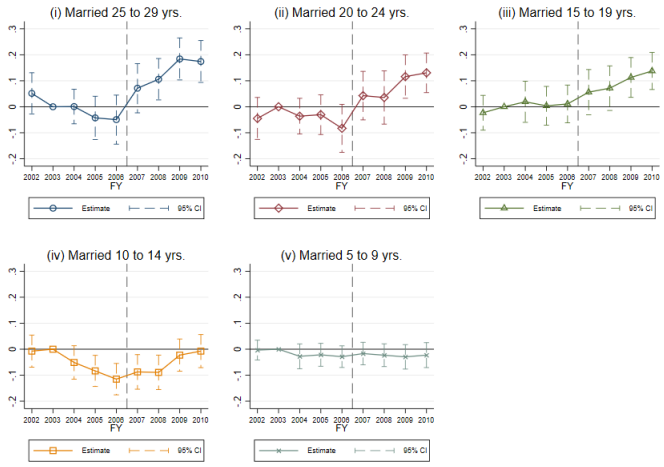
Finally, we estimate Eq. (13) for couples with a farming- or self-employed primary earner. As shown in Appendix Figure A8, there is no indication of an increase in divorce incidents after FY2007 for couples in any marriage length category. This

Figure 7: Impact of the pension reform on adjusted divorce incidents by firm size of the primary earner

(a) Large firm employee



(b) Small to medium-sized firm employee



Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). This figure presents the estimates of β_{1yl} in Eq. (13) for divorced couples whose primary earner's occupation was a large firms' employee (Figure 7a) and a small to medium-sized firms' employee (Figure 7b), represented by markers in each subfigure. The horizontal axis corresponds to each fiscal year (y) from FY2002 to FY2010, categorized by five different marriage lengths (l). Each coefficient estimate represents the difference in changes in adjusted divorce incidents between couples with marriage lengths of less than 5 years and those with longer marriage lengths from the reference year FY2003 to other fiscal years. The number of observations used in each estimation is 3,240. The dashed line indicates the 95% confidence intervals for the estimates. We cluster at the year-month (i.e., the date of divorce) level.

suggests that the increase in adjusted divorce incidents observed in Figures 6 and 7 among couples with a firm-employed primary earner was driven by the effects of the pension reform.

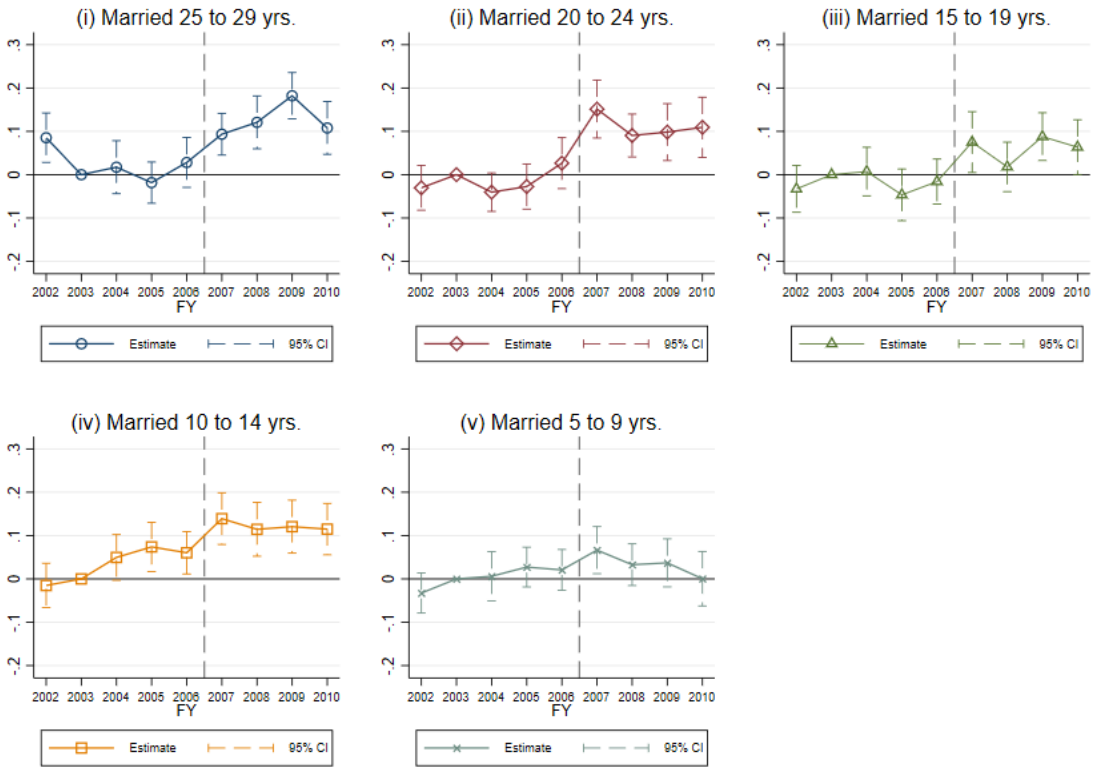
It is also worth noting that for the two categories with the longest marriage lengths, there is a slight decrease in divorces in FY2006, and for couples with marriage lengths of 10 to 14 years, divorces declined after FY2004. These trends are consistent with the patterns observed for couples with a firm-employed primary earner and may reflect trends specific to marriage length.

6.3 Triple differences analysis

To address the possibility of bias due to marriage-length-specific trends in divorce incidents, we estimate Eq. (14) under the assumption that there are no differences in the pre-trends of adjusted divorce incidents between couples with a firm-employed primary earner and those with a farming- or self-employed primary earner. The results are presented in Figure 8. In the estimations targeting the three longest categories of marriage lengths, shown in Figures 8(i) to (iii), the finding that divorce incidents increased after FY2007 remains unchanged. Additionally, the declining trend in divorces observed before the introduction of the pension reform in Figures 6 and 7 is no longer evident in any of the graphs. Moreover, the coefficients for the pre-reform period (i.e., before FY2007) are generally not statistically significant, except for couples with a marriage length of 10 to 14 years. This suggests that there are no pre-existing trends unique to farming- or self-employed couples, meaning that the key identifying assumption of the triple differences analysis is not violated.

For couples with a marriage length of 10 to 14 years, as shown in Figure 8(iv), the coefficients for the period after FY2007 are estimated to be significantly positive. However, unlike the results for longer marriage lengths, a few coefficients for the pre-reform period are also significantly positive, raising concerns that the observed post-reform increases may not be entirely attributable to the pension reform. The figure

Figure 8: Impact of the pension reform on adjusted divorce incidents: Triple differences analysis



Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). This figure presents the estimates of β_{1ylo} in Eq. (14) for divorced couples where the primary earner is employed by a firm, represented by markers in each subfigure. The horizontal axis corresponds to each fiscal year (y) from FY2002 to FY2010, categorized by five different marriage lengths (l). Each coefficient estimate represents the difference in changes in adjusted divorce incidents between couples with a farming- or self-employed primary earner and those with a firm-employed primary earner. Specifically, the estimates reflect triple differences: the changes from FY2003 (the reference year) to other fiscal years, comparing marriage lengths (less than 5 years vs. longer) between occupational categories of the primary earner. The number of observations used in the estimation is 6,480. The dashed line indicates the 95% confidence intervals for the estimates. We cluster at the year-month (i.e., the date of divorce) level.

indicates a discontinuous increase in divorce incidents between FY2006 and FY2007, followed by a sustained level through subsequent years. Therefore, the differences in the coefficients between FY2006 and the post-reform years—0.079 (for FY2007), 0.054 (for FY2008), 0.060 (for FY2009), and 0.055 (for FY2010)—may be interpreted as the effects of the pension reform. An F-test rejects the null hypothesis that the differences in coefficients between FY2006 and each of the subsequent years are equal to zero at conventional significance levels.

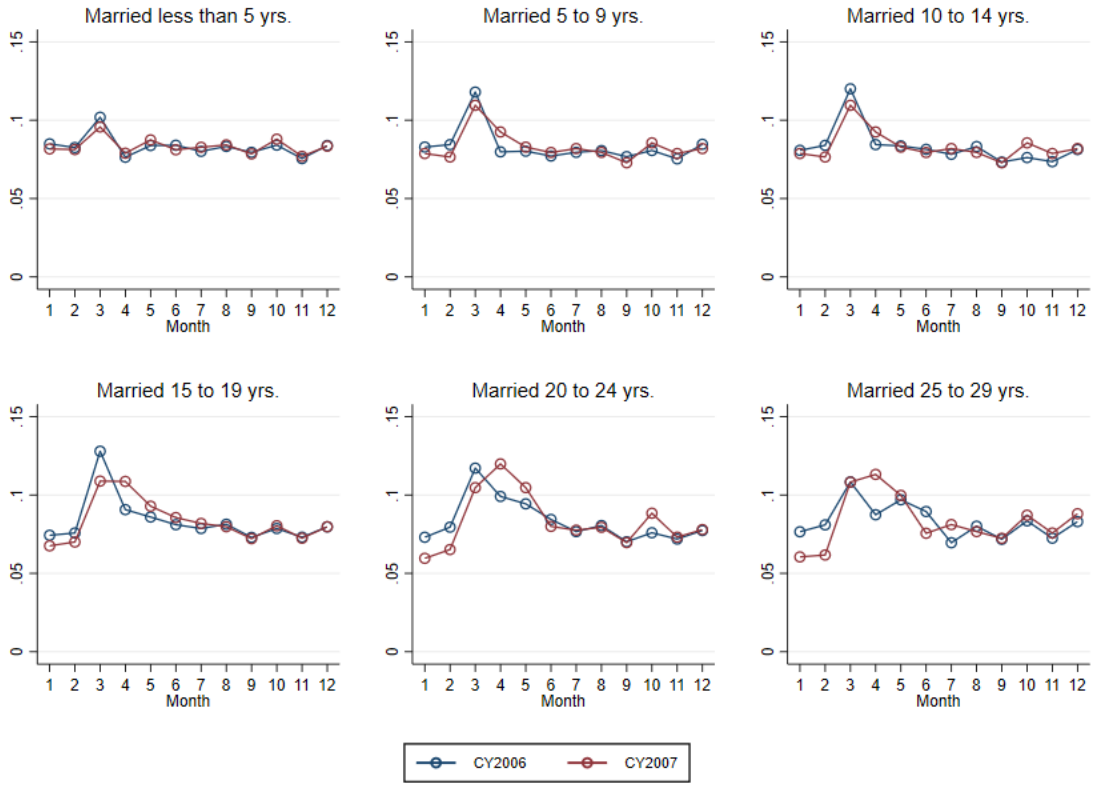
6.4 Postponement behavior

The pension division rule may not only permanently increase the level of divorce incidents after its implementation but may also have the effect of postponing divorces. This behavior may arise because the dependent spouse benefits more from divorcing after the reform than before, due to the pension benefit transfers they receive from the primary earner under the new pension division rule.[21]

The postponement of divorces reduces the number of divorce incidents before the pension reform and increases them after it. If such an effect is prominent in shifting the timing of divorces from just before to just after the pension reform, then our estimates for fiscal year 2007 may be correspondingly higher than those for other years. First, to assess whether such behavior actually occurred, we compare the share of divorces by month for couples with a firm-employed primary earner between the 2006 and 2007 calendar years. According to Figure 9, the share from January to March 2007 is lower than that in 2006 among couples with a marriage length of 15 years or more, while the

[21]It is important to note that the primary earner in a couple would be disadvantaged by the postponement of divorce and would likely oppose it if they fully understood its consequences. Whether a postponement or an attempt to expedite divorce occurs depends on the couple's ability to gather and process information about the reform, as well as their respective bargaining power. However, in cases where both spouses fully understand the pension reform, the dependent spouse can refuse to consent to an expedited divorce. Since divorce in Japan requires mutual consent, an expedited divorce is nearly impossible when both spouses fully understand the pension reform. In light of these dynamics, this paper focuses primarily on the lasting increase in divorce incidents. The theoretical model presented in Section 3 elucidates the mechanisms underlying this persistent rise in divorce following the reform.

Figure 9: Proportion of divorces by month



Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). This figure shows the monthly proportion of divorces among couples where the primary earner is employed by a firm by marriage lengths. The navy and red lines represent the proportions for the calendar years 2006 and 2007, respectively.

share in April 2007 is higher than that in 2006. This pattern suggests the possibility of postponement behavior. In contrast, no significant changes are observed in the monthly share of divorces for couples with shorter marriage lengths.[22]

Second, to remove the potential increase in divorces due to the postponement

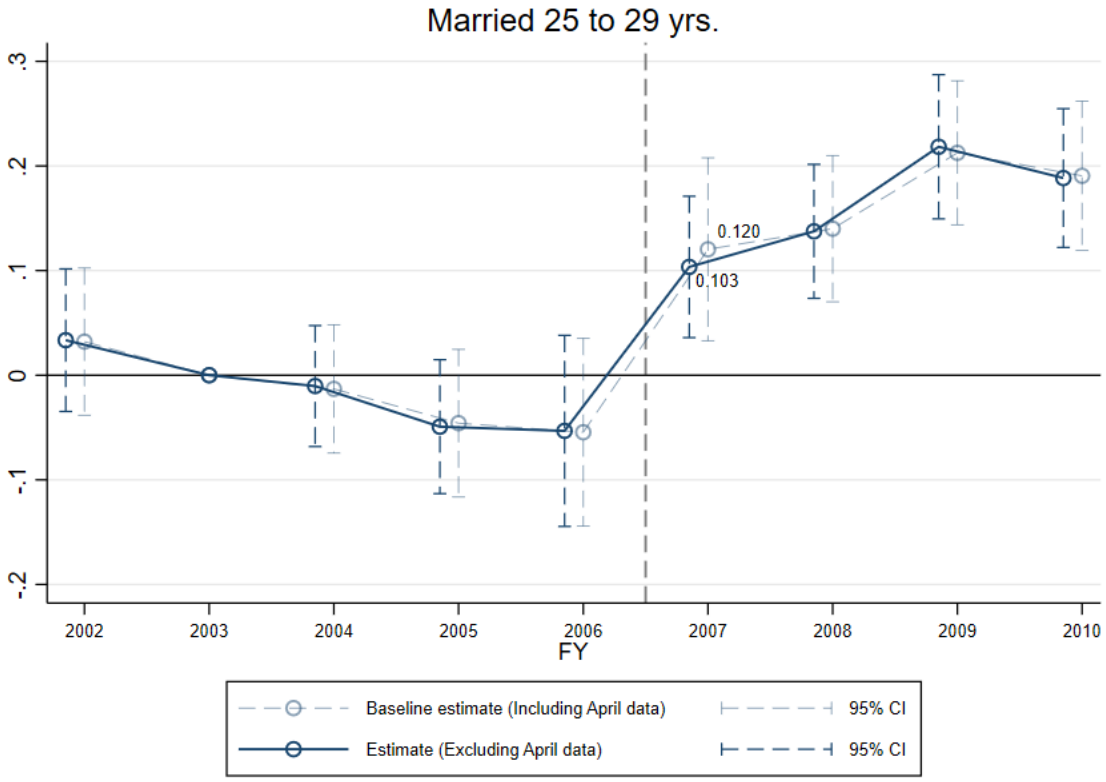
[22]For couples with marriage lengths of 5–10 years and 10–14 years, there is also a slight tendency for the share of divorces in April 2007 to be higher than that in April 2006. Since homemakers in couples with shorter marriage lengths also still have some benefits from the pension transfers upon divorce, it is plausible that homemakers who were planning to divorce even without the pension reform had some incentive to postpone. However, for these shorter-marriage couples, the impact of the pension reform was likely insufficient to prompt homemakers who would not have otherwise divorced to make that decision. Thus, it can be interpreted that only postponement behavior occurred, without any notable permanent increase in divorce incidents for these couples.

behavior, we estimate Eq. (13) excluding April data for all years. The estimation results for the longest marriage length category are presented in Figure 10. As expected, the coefficients for FY2007 are estimated to be smaller when April data are excluded. Specifically, for couples with a marriage length of 25 to 29 years, the coefficient for FY2007 decreases by 16.5%, from 0.120 to 0.103. Similarly, the coefficients for couples with marriage lengths of 20 to 24 years and 15 to 19 years decrease by 21.6% and 23.0%, respectively (see Appendix Figure A9). For couples in these marriage length categories, the coefficients for years other than FY2007 exhibit minimal changes. Therefore, while the increase in divorces due to postponement behavior is indeed reflected in the coefficient, β_{1yl} in Eq. (13), its contribution is at most around 20%. Furthermore, this 20% represents an upper bound, as an increase in divorces in April 2007 was not solely attributable to postponement behavior but also included those initiated by dependent spouses who would not have been able to divorce without the new pension division rule—an increase primarily driven by the loss of marital gains from the division of labor, which is the main focus of this study. Thus, the actual impact of postponement behavior is likely even smaller. This suggests that the primary driver of the overall increase in divorces after FY2007 was the loss of marital gains from the division of labor rather than a shift in timing.

6.5 Heterogeneity analysis

This section examines whether the introduction of the new pension division rule had heterogeneous effects on divorce decisions depending on household characteristics. These characteristics include the presence of minor children, the couple's place of residence at the time of divorce (i.e., urban vs. rural), and the employment status of the husband and wife.

Figure 10: Impact of the pension reform on adjusted divorce incidents: Excluding April data



Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). This figure presents the estimates of β_{1yl} for couples with marriage length of 25 to 29 years in Eq. (13) estimated without including April data for all years, represented by markers in each subfigure. The horizontal axis corresponds to each fiscal year (y) from FY2002 to FY2010, categorized by five different marriage lengths (l). This figure focuses on couples where the primary earner is employed by a firm. Each coefficient estimate represents the difference in changes in adjusted divorce incidents between couples with marriage lengths of less than 5 years and those with longer marriage lengths from the reference year FY2003 to other fiscal years. The number of observations used in the estimation is 3,240. The dashed line indicates the 95% confidence intervals for the estimates. We cluster at the year-month (i.e., the date of divorce) level.

Minor children and urban–rural classification

First, the upper and lower panels of Table 2 present the results of the DID and triple differences analyses, respectively, conducted separately based on whether minor children were present and whether the couple resided in an urban or rural area. To address potential sensitivity in the estimation results due to the choice of the reference year, as observed in Figures 6 and 7, and to reduce the number of figures, we estimate modified versions of Eqs. (13) and (14), replacing the variable $Year(y)$ with a dummy variable, $Post$, which takes a value of 1 for fiscal year 2007 and later.

We begin by examining the estimation results based on the presence of minor children. Columns (2) and (3) of Table 2 report the estimated coefficients on the interaction terms for couples with and without minor children at the time of divorce, respectively.[23] In both DID and triple differences estimations, the effect of the pension reform on divorces is estimated to be larger for couples without minor children.[24] This result suggests that in the absence of minor children, couples may face fewer constraints in deciding to divorce, such as delaying it until their children reach adulthood.

Notably, regardless of whether minor children are present, longer-marriage-length couples exhibit a stronger increase in divorces after the pension reform, particularly in the DID estimates. This finding implies that the greater increase in divorces observed for longer-marriage-length couples in Figures 6 and 7 is not merely because they are less likely to have minor children and therefore face fewer constraints on divorce timing. Instead, it suggests that the stronger effect of the pension reform among longer-marriage-length couples is attributable to the fact that primary earners in these couples had paid more pension contributions prior to the reform, making the impact

[23]The number of observations for the triple differences estimation among couples with minor children is 6,479, which is one fewer than in other estimations. This is because splitting the sample resulted in a single cell where the number of divorces was zero.

[24]In the DID estimation, the coefficients for shorter-marriage-length couples with minor children are significantly negative. This likely reflects the declining trend in divorces observed among couples with 10–14 years of marriage in Figures 6 and 7, which began before the pension reform. The fact that the interaction term coefficient is also significantly negative for couples with 5–9 years of marriage may indicate a similar declining trend for this group.

Table 2: Heterogeneity analysis of divorced couples by minor children status and urban–rural classification

Dependent variable: Natural log of the adjusted divorce incidents	**DID**			
	With children	Without children	Urban	Rural
	Coef.	Coef.	Coef.	Coef.
Length 25-29×*Post*	0.140***	0.194***	0.181***	0.184***
	(0.032)	(0.018)	(0.022)	(0.020)
Length 20-24×*Post*	0.097***	0.240***	0.158***	0.127***
	(0.028)	(0.019)	(0.023)	(0.024)
Length 15-19×*Post*	0.062***	0.200***	0.099***	0.089***
	(0.022)	(0.024)	(0.022)	(0.021)
Length 10-14×*Post*	-0.044**	0.110***	-0.014	0.018
	(0.018)	(0.012)	(0.017)	(0.017)
Length 5-9×*Post*	-0.046***	0.051***	-0.023*	0.011
	(0.015)	(0.011)	(0.014)	(0.012)
Number of obs.	3,240	3,240	3,240	3,240
Within R-sq.	0.0647	0.0939	0.1307	0.0908
Dependent variable: Natural log of the adjusted divorce incidents	**Triple differences**			
	With children	Without children	Urban	Rural
	Coef.	Coef.	Coef.	Coef.
Length 25-29×*Post* × *Firm*	0.079**	0.136***	0.118***	0.091***
	(0.038)	(0.021)	(0.025)	(0.023)
Length 20-24×*Post* × *Firm*	0.097***	0.178***	0.123***	0.133***
	(0.022)	(0.026)	(0.023)	(0.020)
Length 15-19×*Post* × *Firm*	0.057***	0.092**	0.070***	0.087***
	(0.018)	(0.035)	(0.020)	(0.022)
Length 10-14×*Post* × *Firm*	0.058***	0.134***	0.092***	0.088***
	(0.020)	(0.024)	(0.021)	(0.017)
Length 5-9×*Post* × *Firm*	0.026	0.003	0.022	0.042***
	(0.016)	(0.019)	(0.019)	(0.014)
Number of obs.	6,479	6,480	6,480	6,480
Within R-sq.	0.5077	0.4388	0.5341	0.5658

Notes: Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). The table reports the estimates of β_{1yl} from Eq. (13) in the upper panel and those of β_{1ylo} from Eq. (14) in the lower panel—after replacing the variable $Year(y)$ with a dummy variable *Post* that equals 1 for fiscal year 2007 and later—for couples where the primary earner is employed by a firm, categorized by minor children status and urban–rural classification (urban: Tokyo, Kanagawa, Chiba, Saitama, Aichi, Kyoto, Osaka, Hyogo, and Fukuoka; rural: all other prefectures). Both estimations control for year-month and marriage-length fixed effects; in the lower panel, we further control for fixed effects for the occupation of the primary earner, in addition to them. Cluster-robust standard errors are reported in parentheses, with clustering at the year-month (i.e., the date of divorce) level.

of the new pension division rule more significant for them.

Next, we examine whether the effect of the pension reform varies based on the couple's place of residence at the time of divorce (i.e., urban or rural). To categorize Japan's 47 prefectures, we classify Tokyo, Kanagawa, Chiba, Saitama, Aichi, Kyoto, Osaka, Hyogo, and Fukuoka as urban, and all other prefectures as rural. Since a higher proportion of primary earners in urban areas are employed by large firms, the impact of the pension reform is expected to be larger in urban areas. However, as shown in columns (4) and (5) of Table 2, contrary to this expectation, the estimation results reveal little difference between urban and rural areas. One possible explanation is that the higher cost of living in urban areas makes it more difficult for dependent spouses to fully resolve financial insecurity in old age, even when utilizing the new pension division rule.

Employment status of each spouse

Next, we examine whether the effect of the pension reform varies based on the employment status of the husband and wife. The upper and lower panels of Table 3 present the results of the DID and triple differences analyses, respectively, conducted separately for couples in which only the husband was employed (column (2)) and those in which both spouses were employed (column (3)). Since information on the employment status of both spouses at the time of divorce is available only for couples who divorced in fiscal years when the Population Census was conducted (which occurs every five years in Japan), the estimations in this table use data exclusively from fiscal years 2005 and 2010. Accordingly, the number of observations is 720 (= 2 years $\times$ 12 months $\times$ 30 marriage length categories) for the DID analysis, and for the triple differences analysis, it is doubled to 1,440 due to the inclusion of two categories of the primary earner's occupation. Aside from this data restriction, the estimations in Table 3 follow the same approach as those in Table 2.

Before analyzing the heterogeneity by employment status, column (1) of Table 3

presents the estimation results for Eq. (13) and Eq. (14) using the two years of data without splitting the sample. This allows for a direct comparison with earlier findings based on the full sample period. Regardless of the estimation method, the results exhibit a similar pattern to those in the previous analyses—namely, that divorces increased after the pension reform, particularly among couples with longer marriage durations.

When the sample is divided by employment status, the increase in divorces following the pension reform is found to be larger among couples in which both spouses were employed compared to those in which only the husband was employed. Given that the pension benefits received by the wife from her husband are insufficient to cover her living expenses after divorce, and that even when both spouses work, the husband typically earns significantly more than the wife (as shown in Figure A3), these results can be interpreted as follows.[25] First, although working wives may be in non-regular employment or earn relatively low incomes, they are still more likely than non-working wives to have accumulated personal assets, allowing them to pursue divorce when combined with the pension benefits they receive from their husbands upon divorce. Second, wives who were employed before divorce can continue working afterward to supplement the pension benefits they receive, making divorce a more viable option.

6.6 Robustness checks

In this section, we confirm the robustness of the results by conducting estimations using the number of divorces rather than the adjusted divorce incidents as the dependent variable and by changing the clustering level for standard errors. Annual changes in the number of divorces are influenced by demographic shifts, which complicates the identification of the effects of the pension reform. On the other hand, this approach

[25]Since the Vital Statistics do not provide information on individual incomes, it is not possible to identify couples in which both spouses earn roughly the same income. If estimations were conducted specifically for such couples—where both spouses work and earn similar incomes—one would expect no significant increase in divorces following the pension reform.

Table 3: Heterogeneity analysis of divorced couples by pre-divorce employment status of husband and wife

Dependent variable: Natural log of the adjusted divorce incidents	**DID**		
	All	H: Work W: Not work	H: Work W: Work
	Coef.	Coef.	Coef.
Length 25-29×*Post*	0.238***	0.121**	0.244***
	(0.034)	(0.047)	(0.042)
Length 20-24×*Post*	0.171***	0.116*	0.152***
	(0.042)	(0.060)	(0.045)
Length 15-19×*Post*	0.119**	0.065	0.096*
	(0.043)	(0.044)	(0.048)
Length 10-14×*Post*	0.070**	-0.0002	0.075**
	(0.031)	(0.040)	(0.030)
Length 5-9×*Post*	-0.007	-0.030	-0.012
	(0.027)	(0.037)	(0.024)
Number of obs.	720	720	720
Within R-sq.	0.2454	0.0415	0.1800
Dependent variable: Natural log of the adjusted divorce incidents	**Triple differences**		
	All	H: Work W: Not work	H: Work W: Work
	Coef.	Coef.	Coef.
Length 25-29×*Post*	0.127***	0.069	0.181***
	(0.030)	(0.058)	(0.036)
Length 20-24×*Post*	0.138***	0.113	0.182***
	(0.036)	(0.074)	(0.046)
Length 15-19×*Post*	0.111***	0.131**	0.120***
	(0.033)	(0.062)	(0.036)
Length 10-14×*Post*	0.040	-0.029	0.083**
	(0.030)	(0.044)	(0.032)
Length 5-9×*Post*	-0.026	-0.003	-0.006
	(0.027)	(0.040)	(0.037)
Number of obs.	1,440	1,440	1,440
Within R-sq.	0.7003	0.3916	0.6835

Notes: Significance levels: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). The table reports the estimates of β_{1yl} from Eq. (13) in the upper panel and those of β_{1ylo} from Eq. (14) in the lower panel, using the data from FY2005 and FY2010. The estimations are conducted after replacing the variable $Year(y)$ with a dummy variable *Post* that equals 1 for fiscal year 2010, for couples where the primary earner is employed by a firm, categorized by pre-divorce employment status of husband and wife. "H" stands for "Husband," and "W" stands for "Wife." Both estimations control for year-month and marriage-length fixed effects; in the lower panel, we further control for fixed effects for the occupation of the primary earner, in addition to them. Cluster-robust standard errors are reported in parentheses, with clustering at the year-month (i.e., the date of divorce) level.

allows us to include couples with a marriage length of 30 years or more, for whom the adjusted divorce incidents can only be calculated for a subset of the sample period. Since the proportion of couples who divided their pension contributions under the new pension division rule after 2007 is higher among those with longer marriage lengths, as confirmed earlier in Appendix Figure A2, we expect to observe a larger effect of the pension reform for these couples.

First, we estimate Eq. (13)—after replacing the variable $Year(y)$ with a dummy variable *Post* that equals 1 for fiscal year 2007 and later—with the dependent variable as the natural log of the number of divorces.[26] The results are presented in column (1) of Appendix Table A4. The number of divorces significantly increased after FY2007 except for couples with a marriage length of 30 to 34 years and 5 to 9 years. Similarly, the estimation results obtained after applying the same modification to Eq. (14) are shown in column (2) of the same table. These results indicate that, after FY2007, the number of divorces increased more substantially among couples with longer marriage durations. In particular, divorces among couples with a marriage length of 30 years or more increased by approximately 14%. The statistically significant rise in divorces among couples with a marriage length of 30–34 years may be attributable to the removal of marriage-length-specific divorce trends via the triple differences estimation.

Second, we also estimate Eqs. (13) and (14) with clustering not only by the date of divorce but also by marriage length. This approach accounts for correlations in divorces among couples with the same marriage length at a given time, as well as potential serial correlation. The significance levels of the coefficients remain largely unchanged (results not shown to conserve space).

[26]The sample size for the DID estimation is 4,320 (= 9 years × 12 months × 40 categories of marriage length). Likewise, the sample size for the triple differences estimation, which will be explained in the following sentences, is 8,640 (= 9 years × 12 months × 40 categories of marriage length × 2 categories of the primary earner's occupation).

6.7 Discussion

This section examines the limited evidence of postponement behavior and the observed increase in divorce incidents immediately following the introduction of the new pension division rule. First, postponement of divorces is an action taken by couples who would have divorced even without the pension reform, so it is unsurprising that the additional influence of the reform on their decision-making is minimal. Those who would divorce regardless of the pension reform are dependent spouses for whom financial insecurity in old age was not a significant barrier to divorce. More specifically, these individuals include those who can rely on financial support from their parents, expect *inter vivos* gifts or inheritances, or are compelled to divorce due to urgent issues such as domestic violence. Consequently, these individuals are less likely to perceive substantial pecuniary benefits from the pension reform.

Next, some may find it surprising that divorce incidents increased immediately following the introduction of the new pension division rule in Japan, where divorce requires mutual consent from both spouses. If a wife requests divorce but the husband does not immediately agree, it might be expected that the increase in divorces would take more time to materialize. In general, there are two common reasons why husbands do not immediately consent to a divorce: (1) concerns about the negative impact of divorce on young children, and (2) the loss of household work provided by their wife. However, for couples with long marriage lengths, the share of those with young children is very low, making the first reason irrelevant. As for the second reason, even if the husband resists divorce, once the wife has initiated the request, the couple often enters a period of separation, during which the husband can no longer benefit from his wife's household work. Furthermore, as noted in Section 3.2, since it is common for courts to grant a wife's divorce petition after a separation period of 3 to 5 years, immediately agreeing to a divorce may be advantageous for the husband. It allows him to avoid having pension contributions made during the separation period become subject to pension division and eliminates the need to pay living expenses to the wife during

separation. Therefore, many husbands may choose to consent to divorce relatively quickly.

In fact, according to the Vital Statistics on Divorces, 47.9% of couples with a firm-employed primary earner and a marriage length of 20 years or more who divorced between FY2007 and FY2010 had no separation period (i.e., the month of the divorce registration is the same as the month separation began). Another 25.1% of couples in this group had a separation period of one year or less. These findings align with the idea that husbands agree to divorce requests from their wives shortly, supporting the view that an increase in divorces immediately following the pension reform (especially in FY2007) is plausible.

7 Conclusion

This paper utilizes the Japanese pension reform as a natural experiment to investigate whether a loss of marital gains from the division of labor increases the likelihood of divorce. For couples in which one spouse is the primary earner, providing all of the household's labor income, and the other spouse is a full-time homemaker, the reform allows for the transfer of up to 50% of the primary earner's pension benefits to the dependent spouse upon divorce. If this reform reduces the dependent spouse's economic insecurity in old age, they may no longer need to remain married solely to benefit from the division of labor—that is, to exchange household work for the primary earner's pension income. This shift enables spouses who may have otherwise stayed in the marriage for financial reasons to pursue divorce without sacrificing their post-retirement financial security. Theoretical analysis suggests that the reform can create an incentive for dependent spouses to divorce, particularly those whose primary earners paid more pension contributions (resulting in larger pension benefits subject to division).

Our empirical analysis supports this theoretical hypothesis. Couples in which the primary earner was employed by a large firm (which generally corresponds to higher

income levels) and the marriage had lasted longer were more likely to divorce after the reform. For instance, among couples where the primary earner worked for a large firm and the marriage lasted 25 to 29 years, divorce incidents increased by approximately 10% in the first year following the reform and by 20% over the subsequent two to three years. This increase reflects not merely a shift in the timing of divorces around the reform date but an actual rise in the overall number of divorces—indicating that dependent spouses who might not have otherwise pursued divorce did so due to the reform. Furthermore, these results remain robust across different estimation methods (whether DID or triple differences) and outcome variables (whether adjusted divorce incidents or the raw number of divorces).

These findings suggest that the division of labor between spouses is one of the marital gains and that its loss increases the likelihood of divorce. This may explain, at least partly, the long-term decline in marriage rates in Japan, as traditional gender roles—where men earn income through market labor and women focus on household work—are gradually shifting. At the same time, the substitution of household production, such as cooking, cleaning, and laundry, with market goods and services may further reduce the attractiveness of marriage by diminishing the gains from the division of labor.

Finally, we discuss the policy implications of our findings. First, prior to the pension reform, many dependent spouses were unable to pursue divorce due to financial insecurity. The pension reform contributed to an increase in divorces by enhancing the financial security of dependent spouses after divorce, thereby improving their welfare. Second, the pension reform introduced an imbalance that disproportionately disadvantages the primary earner in a couple. While the reform allows dependent spouses to claim 50% of the primary earner's pension contributions upon divorce, it does not account for the household work skills developed solely by the dependent spouse. The division of labor in a marriage generates mutual benefits: the primary earner's income is supported by the dependent spouse's household contributions, and the dependent spouse's skills are developed through the financial stability provided by the primary

earner. Since it is impractical to divide household work skills directly, allocating less than 50% of the primary earner's pension contributions to the dependent spouse might better reflect the interdependence between spouses and ensure a more equitable distribution—particularly in cases where the dependent spouse divorces at an older age.[27]

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[27] If a wife divorces at a younger age, even if she works to support herself until pension benefits begin, she may find it difficult to secure a full-time position due to a lack of labor market skills, having previously devoted herself to household responsibilities. Therefore, in such cases, it may be justifiable to allocate a larger share of her husband's pension benefits to her as compensation for having sacrificed a full-time career to focus on household work.

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Empirical Appendix

Table A1: Distribution of the proportion of pension benefits that dependent spouses were entitled to receive from the primary earner

	%<10	10≤%<20	20≤%<30	30≤%<40	40≤%<50	50%
FY2007	0.1	0.2	0.9	2.4	4.6	91.9
FY2008	0.1	0.1	0.7	2.0	3.3	93.8
FY2009	0.0	0.2	0.7	2.0	3.1	94.0
FY2010	0.0	0.1	0.6	1.7	3.0	94.5

Notes: The data source is the Overview of Social Insurance Services (Social Insurance Agency). The table shows the distribution of the proportion of pension benefits that dependent spouses were entitled to receive from the primary earner upon divorce. The percentage of divorced couples in each proportion category, shown for the fiscal years from 2007 to 2010, is presented.

Table A2: Proportion of divorced couples by length of marriage

FY	Less than 5 yrs.	5 to 9 yrs.	10 to 14 yrs.	15 to 19 yrs.	20 to 24 yrs.	25 to 29 yrs.	30 yrs. or more	N.A.
2002	0.317	0.226	0.138	0.092	0.070	0.053	0.057	0.048
2003	0.313	0.225	0.141	0.092	0.072	0.050	0.060	0.048
2004	0.317	0.222	0.139	0.093	0.071	0.047	0.060	0.052
2005	0.316	0.225	0.137	0.095	0.071	0.045	0.061	0.050
2006	0.317	0.231	0.138	0.092	0.067	0.043	0.059	0.053
2007	0.309	0.226	0.135	0.095	0.069	0.047	0.065	0.054
2008	0.305	0.222	0.137	0.098	0.068	0.047	0.062	0.060
2009	0.305	0.215	0.136	0.099	0.069	0.048	0.065	0.062
2010	0.301	0.214	0.141	0.103	0.070	0.048	0.066	0.058

Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). The table reports the proportion of divorced couples by length of marriage for calendar years from 2002 to 2010.

Table A3: Descriptive statistics by the primary earner's occupation of divorced couples

FY	N	Farmers or self-employed			
		Mean	S.D.	Min.	Max.
2002	360	0.000183	0.000071	0.000043	0.000344
2003	360	0.000177	0.000068	0.000054	0.000324
2004	360	0.000162	0.000061	0.000043	0.000309
2005	360	0.000161	0.000061	0.000045	0.000310
2006	360	0.000151	0.000059	0.000036	0.000294
2007	360	0.000149	0.000057	0.000041	0.000294
2008	360	0.000143	0.000055	0.000039	0.000295
2009	360	0.000142	0.000053	0.000033	0.000310
2010	360	0.000144	0.000052	0.000042	0.000258
FY	**N**	**Working for small to medium-sized firms**			
		Mean	S.D.	Min.	Max.
2002	360	0.000388	0.000266	0.000057	0.001049
2003	360	0.000378	0.000257	0.000043	0.001034
2004	360	0.000358	0.000243	0.000053	0.000929
2005	360	0.000376	0.000258	0.000053	0.001046
2006	360	0.000354	0.000244	0.000044	0.000913
2007	360	0.000355	0.000234	0.000035	0.000916
2008	360	0.000349	0.000230	0.000044	0.000964
2009	360	0.000346	0.000220	0.000060	0.000985
2010	360	0.000356	0.000222	0.000056	0.000896
FY	**N**	**Working for large firms**			
		Mean	S.D.	Min.	Max.
2002	360	0.000257	0.000166	0.000037	0.000614
2003	360	0.000253	0.000162	0.000030	0.000709
2004	360	0.000243	0.000156	0.000034	0.000654
2005	360	0.000260	0.000168	0.000036	0.000720
2006	360	0.000243	0.000160	0.000030	0.000683
2007	360	0.000255	0.000152	0.000042	0.000666
2008	360	0.000252	0.000151	0.000039	0.000696
2009	360	0.000251	0.000149	0.000047	0.000673
2010	360	0.000263	0.000152	0.000042	0.000662

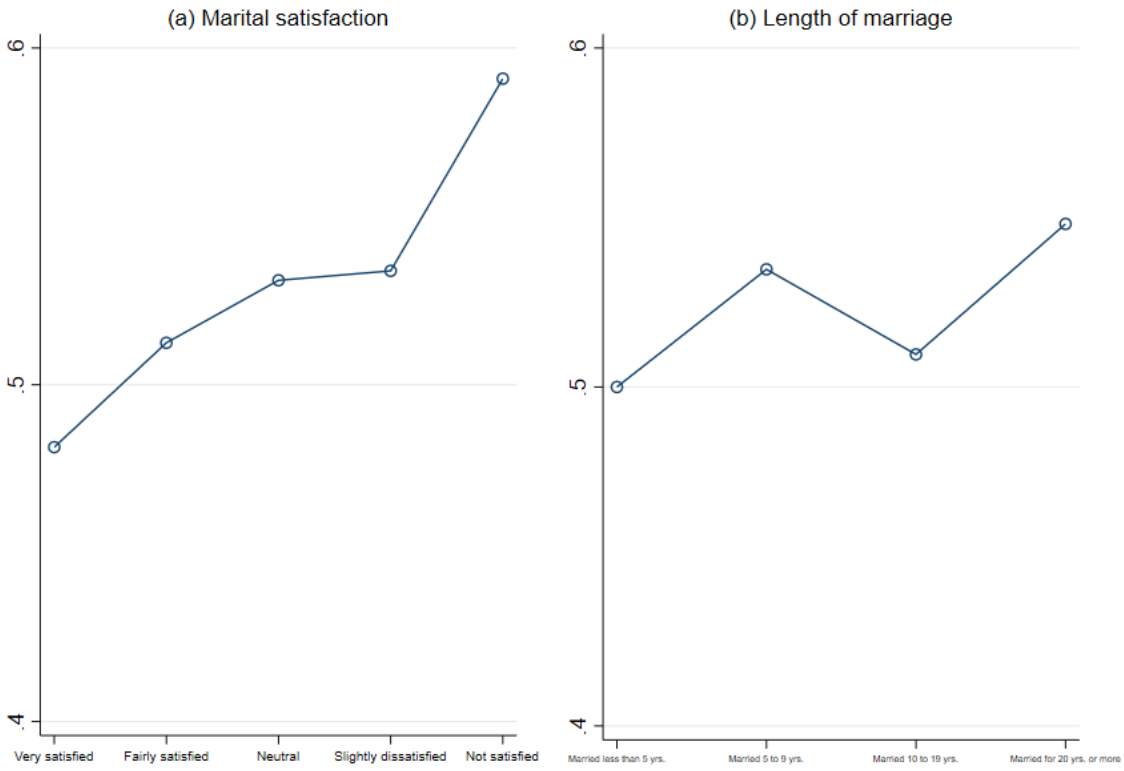
Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). The table reports the mean value, standard deviation (S.D.), minimum value (Min.), and maximum value (Max.) of the adjusted divorce incidents for each fiscal year. "FY" and "N" represent fiscal year and the number of observations, respectively.

Table A4: DID and triple differences estimates based on the number of divorces

Dependent variable: Natural log of the number of divorces	(1) **DID**	(2) **Triple differences**
	Coef.	Coef.
Length 35-39×*Post*	0.400***	-
	(0.027)	
Length 30-34×*Post*	0.005	-
	(0.021)	
Length 25-29×*Post*	0.095***	-
	(0.021)	
Length 20-24×*Post*	0.082***	-
	(0.022)	
Length 15-19×*Post*	0.140***	-
	(0.021)	
Length 10-14×*Post*	0.072***	-
	(0.016)	
Length 5-9×*Post*	0.018	-
	(0.012)	
Length 35-39×*Post* × *Firm*	-	0.139***
		(0.030)
Length 30-34×*Post* × *Firm*	-	0.141***
		(0.025)
Length 25-29×*Post* × *Firm*	-	0.105***
		(0.015)
Length 20-24×*Post* × *Firm*	-	0.127***
		(0.016)
Length 15-19×*Post* × *Firm*	-	0.079***
		(0.015)
Length 10-14×*Post* × *Firm*	-	0.089***
		(0.014)
Length 5-9×*Post* × *Firm*	-	0.030**
		(0.022)
Number of obs.	4,320	8,640
Within R-sq.	0.1928	0.6880

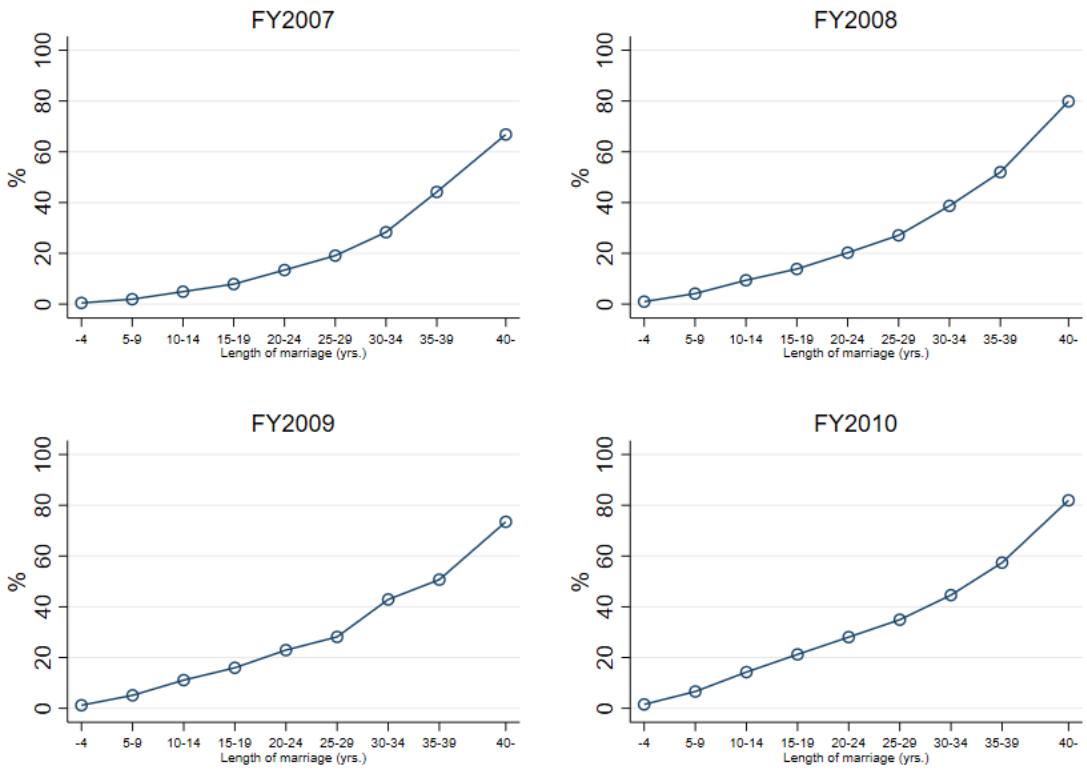
Notes: Significance levels: *** $p<0.01$, ** $p<0.05$. The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). The table reports the estimates of β_{1yl} from Eq. (13) in column (1) and those of β_{1ylo} from Eq. (14)—after replacing the variable $Year(y)$ with a dummy variable *Post* that equals 1 for fiscal year 2007 and later—for couples where the primary earner is employed by a firm. Both estimations control for year-month and marriage-length fixed effects; in column (2), we further control for fixed effects for the occupation of the primary earner, in addition to them. Cluster-robust standard errors are reported in parentheses, with clustering at the year-month (i.e., the date of divorce) level.

Figure A1: Proportion of JPSC respondents that know the pension division rule upon divorce



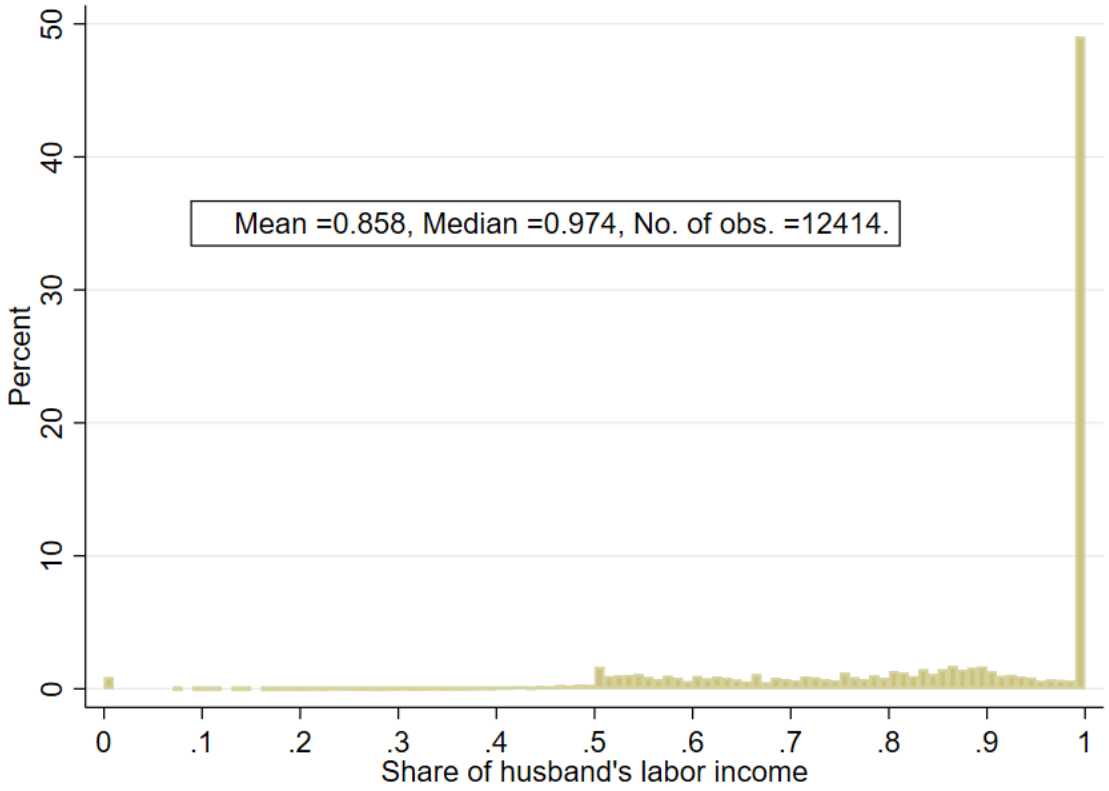
Notes: The data source is the Japanese Panel Survey of Consumers (JPSC), conducted by the Panel Data Research Center at Keio University. This figure shows the proportion of JPSC respondents who were aware the pension division rule upon divorce in October 2007. Respondents were considered aware if they either "1. Know very well" or "2. Know" from the following four options regarding their knowledge of the rule: "1. Know very well," "2. Know," "3. Slightly know," and "4. Do not know at all." The figures (a) and (b) show this proportion by their marital satisfaction and length of marriage, respectively.

Figure A2: Proportion of divorced couples who divided their pension contributions under the new pension division rule



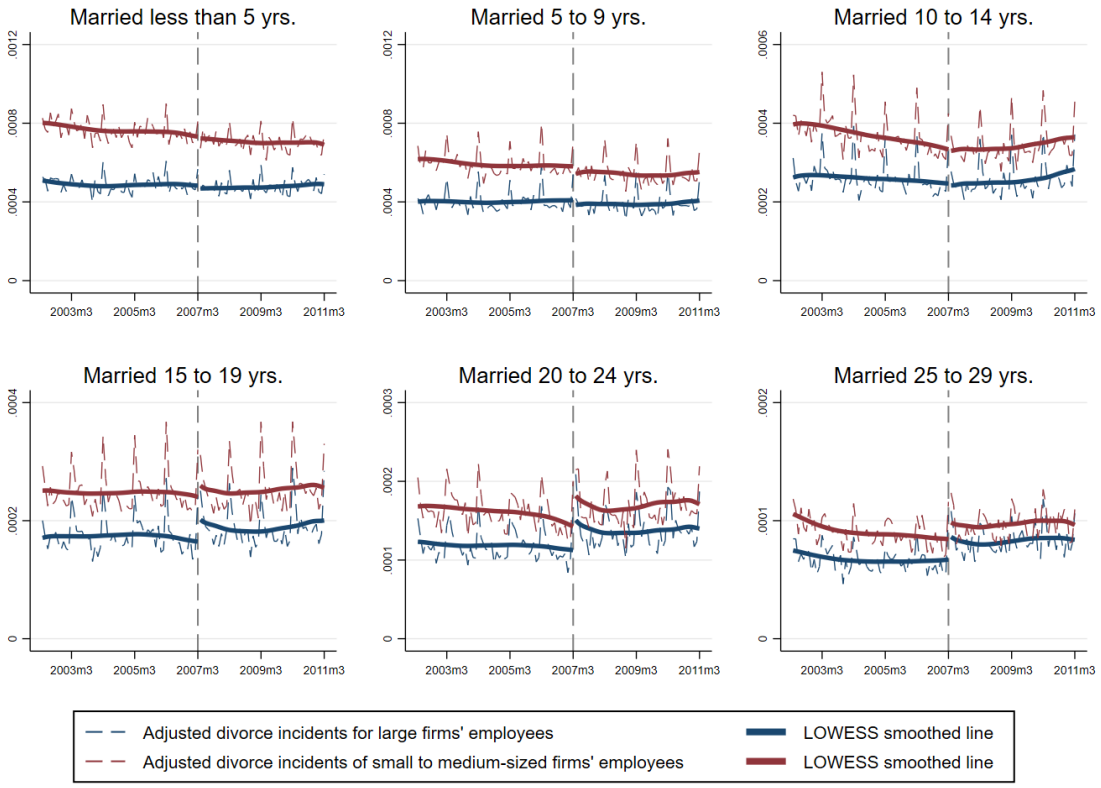
Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare) and the Overview of Social Insurance Services (Social Insurance Agency). This figure shows the proportion of divorced couples who divided their pension contributions under the new pension division rule by fiscal year. The proportion is presented by marriage length categories, shown on the horizontal axis of each figure in 5-year intervals (with those married for 40 years or more grouped together).

Figure A3: Distribution of husband's labor income share among the JPSC couples



Notes: The data source is the Japanese Panel Survey of Consumers (JPSC), conducted by the Panel Data Research Center at Keio University. This figure illustrates the distribution of the husband's labor income share among JPSC couples. The sample for constructing this figure is restricted to couples where at least one spouse is an employee, and self-employment income accounts for no more than 50% of their total labor income. For these couples, the husband's labor income share is calculated as the ratio of the husband's labor income to the couple's total labor income, focusing on the period before the pension reform (i.e., prior to 2006).

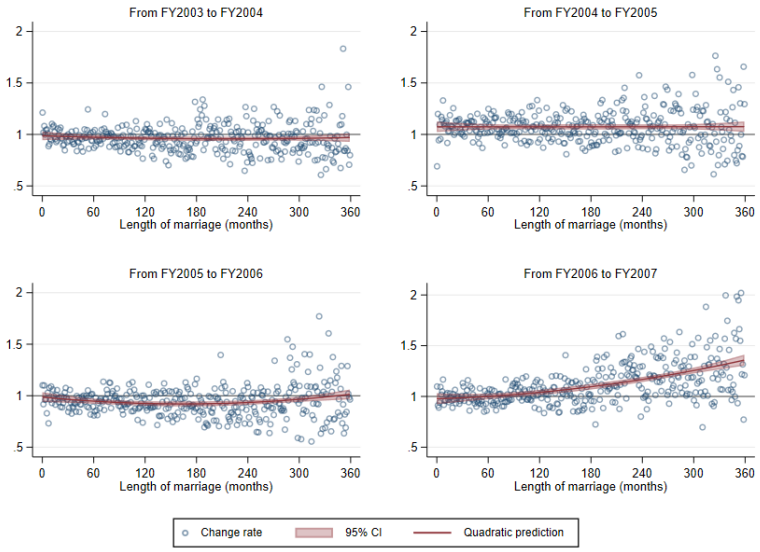
Figure A4: Monthly trends in adjusted divorce incidents by firm size of the primary earner



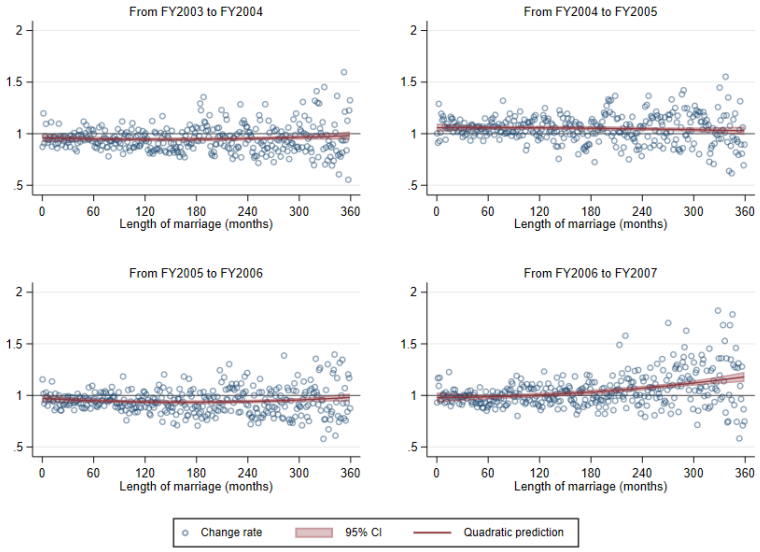
Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). The dashed line depicts the monthly trends in adjusted divorce incidents from FY2002 to FY2010, while the bold solid line represents locally weighted scatterplot smoothing (LOWESS), applied separately to the periods before and after the pension reform. The navy and red lines show the monthly trends in adjusted divorce incidents for couples where the primary earner is employed by a large firm and a small to medium-sized firm, respectively.

Figure A5: Annual change rates in adjusted divorce incidents by firm size of the primary earner

(a) Large firm employees

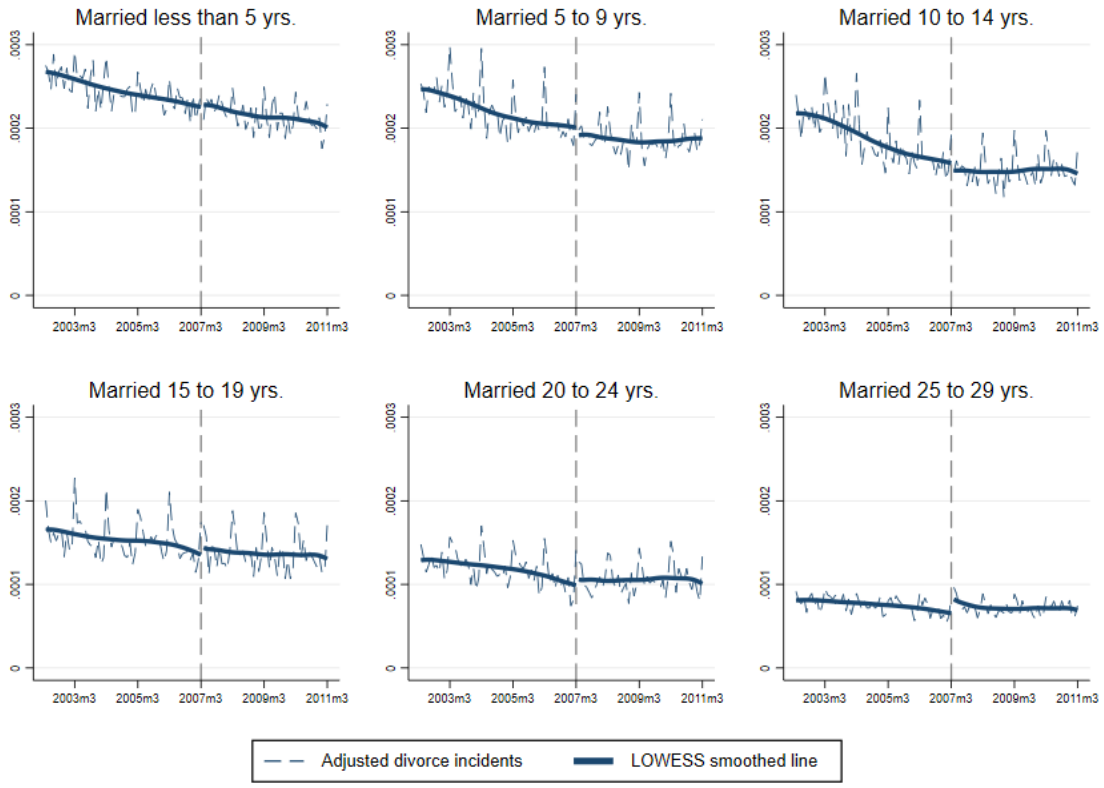


(b) Small to medium-sized firm employees



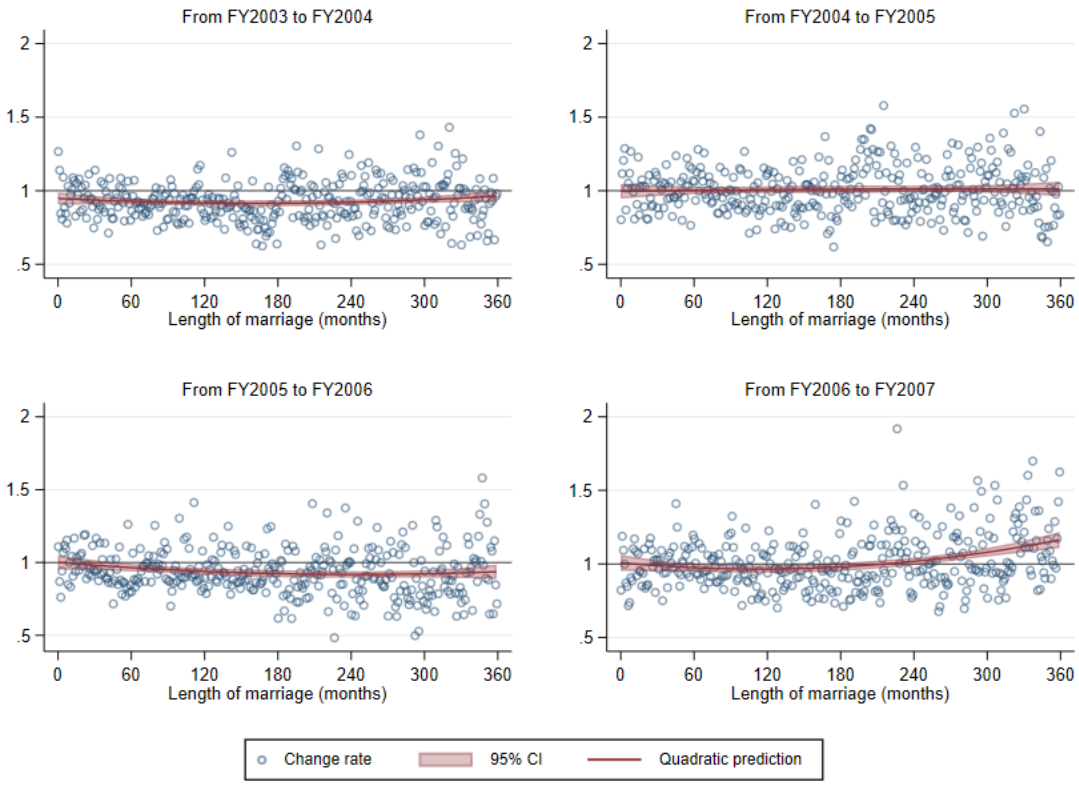
Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). This figure illustrates the annual change rates in adjusted divorce incidents (vertical axis) for couples where the primary earner is employed by a large firm (A5a) and a small to medium-sized firm (A5b), categorized by the length of marriage measured in months (horizontal axis). The red curve represents a quadratic prediction of the relationship, along with its 95% confidence interval indicated by the shaded light red area.

Figure A6: Monthly trends in adjusted divorce incidents of couples with a farming- or self-employed primary earner



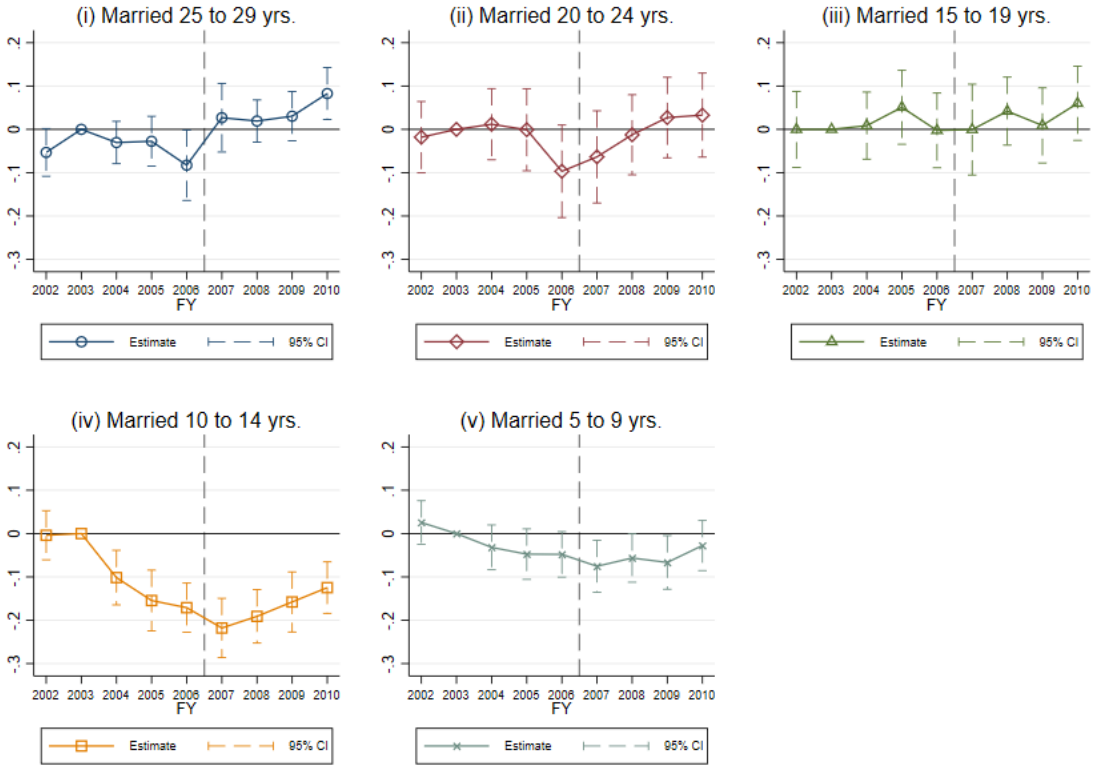
Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). The dashed line represents the monthly trends in adjusted divorce incidents from FY2002 to FY2010, while the bold solid line represents a locally weighted scatterplot smoothing (LOWESS) applied separately to the periods before and after the pension reform. This figure focuses on couples with a farming- or self-employed primary earner.

Figure A7: Annual change rates in adjusted divorce incidents of couples with a farming- or self-employed primary earner



Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). This figure illustrates the annual change rates in adjusted divorce incidents (vertical axis) for couples with a farming- or self-employed primary earner, categorized by the length of marriage measured in months (horizontal axis). The red curve represents a quadratic prediction of the relationship, along with its 95% confidence interval indicated by the shaded light red area.

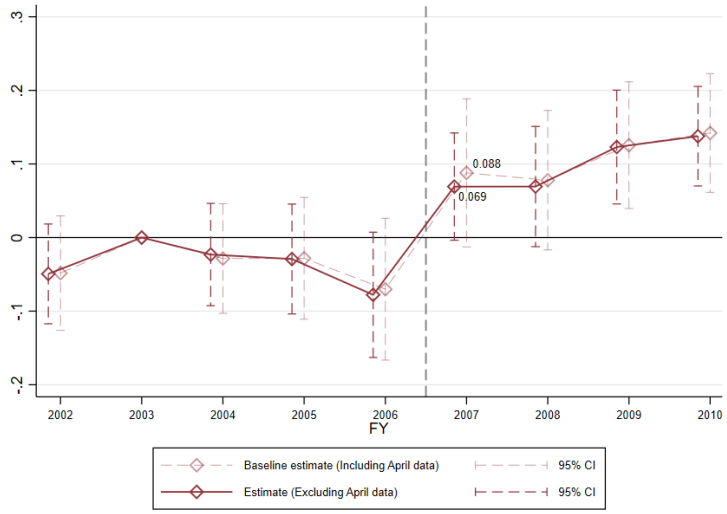
Figure A8: Impact of the pension reform on adjusted divorce incidents of couples with a farming- or self-employed primary earner



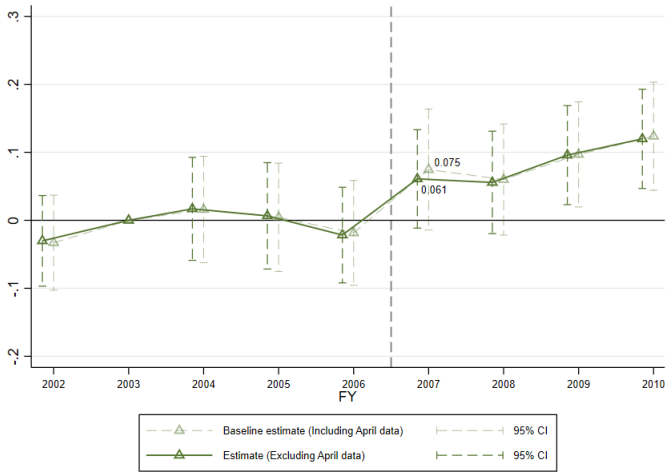
Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). This figure presents the estimates of β_{1yl} in Eq. (13) for couples with a farming- or self-employed primary earner, represented by markers in each subfigure. The horizontal axis corresponds to each fiscal year (y) from FY2002 to FY2010, categorized by five different marriage lengths (l). Each coefficient estimate represents the difference in changes in adjusted divorce incidents between divorced couples with marriage lengths of less than 5 years and those with longer marriage lengths from the reference year FY2003 to other fiscal years. The number of observations used in the estimation is 3,240. The dashed line indicates the 95% confidence intervals for the estimates. We cluster at the year-month (i.e., the date of divorce) level.

Figure A9: Impact of the pension reform on adjusted divorce incidents: Excluding April data (for Married 20 to 24 yrs. and Married 15 to 19 yrs.)

(a) Married 20 to 24 yrs



(b) Married 15 to 19 yrs.



Notes: The data source is the Vital Statistics on Divorces (Ministry of Health, Labour and Welfare). This figure presents the estimates of β_{1yl} for couples with marriage length of 20 to 24 years (A9a) and 15 to 19 years (A9b) in Eq. (13) estimated without including April data for all years, represented by markers in each subfigure. The horizontal axis corresponds to each fiscal year (y) from FY2002 to FY2010, categorized by five different marriage lengths (l). This figure focuses on couples where the primary earner is employed by a firm. Each coefficient estimate represents the difference in changes in adjusted divorce incidents between couples with marriage lengths of less than 5 years and those with longer marriage lengths from the reference year FY2003 to other fiscal years. The number of observations used in the estimation is 3,240. The dashed line indicates the 95% confidence intervals for the estimates. We cluster at the year-month (i.e., the date of divorce) level.

Theoretical Appendix

Utility maximization of the single

The single person maximizes (2) subject to (4). Hereafter, the prime "′" denotes the first-order derivative. By denoting the Lagrange multiplier on (4) by λ_i^s, the FOCs of the resulting Lagrangian with respect to x_i^s, l_i^s, and q_i^s are given by

$$x_i^s : 0 = \varphi_i'(x_i^s) - \lambda_i^s, \quad i = m, f, \tag{15}$$

$$l_i^s : 0 = \phi_i'(1 - q_i^s - l_i^s) - w_i\lambda_i^s, \quad i = m, f, \tag{16}$$

$$q_i^s : 0 = \pi_i'(\kappa_i(q_i^s; n_i))\kappa_i'(q_i^s; n_i) - \phi_i'(1 - q_i^s - l_i^s), \quad i = m, f. \tag{17}$$

We denote the allocations satisfying (4), (5) and (15)–(17) as

$$x_i^{s*}(z_i(\alpha), w_i, n_i), \quad l_i^{s*}(z_i(\alpha), w_i, n_i), \quad q_i^{s*}(z_i(\alpha), w_i, n_i), \quad i = m, f, \tag{18}$$

which yields utility of the divorced single person as $u_i^{s*}(z_i(\alpha), w_i, n_i) = u_i^s(x_i^{s*}(\cdot), l_i^{s*}(\cdot), q_i^{s*}(\cdot))$.

Utility maximization of the couple

The couple maximizes (6) subject to (7). By denoting the Lagrange multiplier on (7) by λ^c, the FOCs of the resulting Lagrangian with respect to x_i^c, l_i^c, and q_i^c are given by

$$x_i^c : 0 = \gamma_i\varphi_i'(x_i^c) - \lambda^c, \quad i = m, f, \tag{19}$$

$$l_i^c : 0 = \gamma_i\phi_i'(1 - q_i^c - l_i^c) - w_i\lambda^c, \quad i = m, f, \tag{20}$$

$$\begin{aligned} q_i^c : 0 = \gamma_i \left(-\phi_i'(1 - q_i^c - l_i^c) + \pi_i' \left(\frac{\kappa_h(q_h^c; n_h) + \kappa_f(q_f^c; n_f)}{\theta} \right) \frac{\kappa_i'(q_i^c; n_i)}{\theta} \right) \\ + \gamma_j\pi_j' \left(\frac{\kappa_h(q_h^c; n_h) + \kappa_f(q_f^c; n_f)}{\theta} \right) \frac{\kappa_i'(q_i^c; n_i)}{\theta}, \quad i = m, f. \end{aligned} \tag{21}$$

From (7)–(21), we obtain the equilibrium allocations at marriage:

$$x_i^{c*}(z, w_m, w_f, n_m, n_f, \gamma_m, \gamma_f, \theta), \quad l_i^{c*}(z, w_m, w_f, n_m, n_f, \gamma_m, \gamma_f, \theta), \tag{22}$$
$$q_i^{c*}(z, w_m, w_f, n_m, n_f, \gamma_m, \gamma_f, \theta), \quad i = m, f.$$

Allocations of a spouse depends on its partner's parameters while those are independent on the pension benefit division parameter α because of the unified budget of the couple based on the collective decision making. Substituting (22) into (5) yields $u_i^{c*}(z, w_m, w_f, n_m, n_f, \gamma_m, \gamma_f, \theta) = u_i^c(x_i^{c*}(\cdot), l_i^{c*}(\cdot), q_m^{c*}(\cdot), q_f^{c*}(\cdot))$, which also is independent of α, unlike utility of single.

Numerical analysis

Under $\rho = \delta = \sigma \equiv 0.5$ in (10)–(12), the FOCs at single (15)–(17) are reduced to

$$t_i^2 \cdot (x_i^s)^{-1} = (\lambda_i^s)^2, \quad i = m, f, \tag{23}$$

$$g_i^2 \cdot (1 - q_i^s - l_i^s)^{-1} = w_i^2 \cdot (\lambda_i^s)^2, \quad i = m, f, \tag{24}$$

$$v_i^2 n_i \cdot (q_i^s)^{-1} = g^2 \cdot (1 - q_i^s - l_i^s)^{-1}, \quad i = m, f. \tag{25}$$

From (4) and (23)–(25), we have

$$x_i^s = \frac{(z_i + w_i)\, w_i^2 t_i^2}{(g_i^2 + w_i t_i^2 + v_i^2 n_i)\, w_i}, \quad i = m, f, \tag{26}$$

$$q_i^s = \frac{(w_i + z_i)\, v_i^2 n_i}{(g_i^2 + w_i t_i^2 + v_i^2 n_i)\, w_i}, \quad i = m, f, \tag{27}$$

$$l_i^s = \frac{w_i^2 t_i^2 - (v_i^2 n_i + g_i^2)\, z_i}{(g_i^2 + w_i t_i^2 + v_i^2 n_i)\, w_i}, \ i = m, f. \tag{28}$$

Under $\rho = \delta = \sigma \equiv 0.5$ in (10)–(12), the FOCs at marriage (19)–(21) are reduced to

$$\gamma_i^2 t_i^2 \cdot (x_i^c)^{-1} = (\lambda^c)^2, \quad i = m, f, \tag{29}$$

$$\gamma_i^2 g_i^2 \cdot (1 - q_i^c - l_i^c)^{-1} = (w_i)^2 (\lambda^c)^2, \quad i = m, f, \tag{30}$$

$$\left(\frac{v_i}{\theta}\right)^2 n_i \cdot (q_i^c)^{-1} = (\gamma_i)^2 g_i^2 \cdot (1 - q_i^c - l_i^c)^{-1}, \quad i = m, f. \tag{31}$$

(7) and (29)–(31) yield

$$x_i^c = \frac{\gamma_i^2 (w_h + w_f + z) w_f w_h t_i^2}{\left(\frac{v_h^2}{\theta^2} n_h + \gamma_h^2 g_h^2\right) w_f + \left(\frac{v_f^2}{\theta^2} n_f + \gamma_f^2 g_f^2\right) w_h + \left(\gamma_h^2 t_h^2 + \gamma_f^2 t_f^2\right) w_h w_f}, \quad i = m, f, \tag{32}$$

$$q_i^c = \frac{\frac{v_i^2}{\theta^2} n_i (w_h + w_f + z) w_j}{\left[\left(\frac{v_h^2}{\theta^2} n_h + \gamma_h^2 g_h^2\right) w_f + \left(\frac{v_f^2}{\theta^2} n_f + \gamma_f^2 g_f^2\right) w_h + \left(\gamma_h^2 t_h^2 + \gamma_f^2 t_f^2\right) w_h w_f\right] w_i}, \tag{33}$$

$$i, j = m, f \text{ and } i \neq j,$$

$$l_i^c = 1 - \frac{\left(\frac{v_i^2}{\theta^2} n_i + \gamma_i^2 g_i^2\right) (w_h + w_f + z) w_j}{\left[\left(\frac{v_h^2}{\theta^2} n_h + \gamma_h^2 g_h^2\right) w_f + \left(\frac{v_f^2}{\theta^2} n_f + \gamma_f^2 g_f^2\right) w_h + \left(\gamma_h^2 t_h^2 + \gamma_f^2 t_f^2\right) w_h w_f\right] w_i}, \tag{34}$$

$$i, j = m, f \text{ and } i \neq j.$$

Substituting (26)–(28) into (2) yields the utility function at single, and substituting (32)–(34) into (5) yields the utility function at marriage. Under the parameter's values provided in Section 3.2, Figures 2a and 2b depict the relation of utility of the wife and husband and the pension division ratio α.

The amount of labor supply and that of contribution on the household production

We present the amount of labor supply and contribution to household production, based on the parameter values in Section 3.2. In Figure B1, the vertical axis rep-

resents the amount of labor supply, and the horizontal axis represents the pension division ratio. In Figure B2, the vertical axis represents the contribution to household production, while the horizontal axis represents the pension division ratio. Figure B1 shows that the wife's labor supply at marriage is at a very low level, while her contribution to household production is at a high level. This is due to the assumption that the wife's productivity in household production is much higher than the husband's. Labor supplies and contributions are all positive for $\alpha \in [0, 0.5]$.

Figure B1: Labor supply

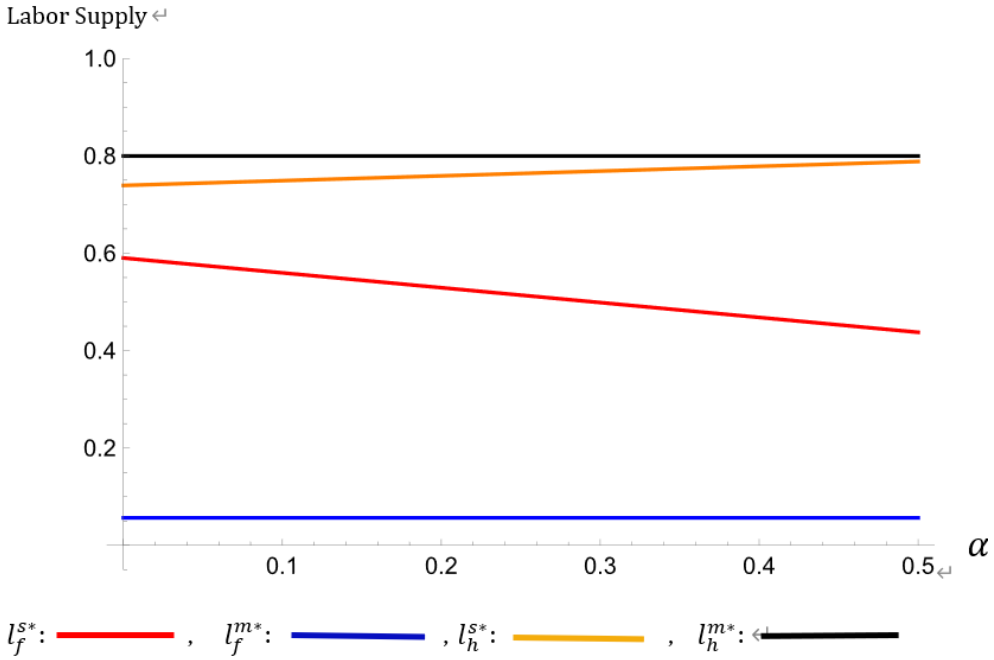


Figure B2: Contribution on household production