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Karina Doorley
Trinity College Dublin and IZA

Elena Stancanelli
Paris School of Economics, CNRS and IZA

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IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Marital Status and Retirement: An Empirical Study for France*

We argue that retirement from work may affect marital status according to the predictions of quite standard economic models of marriage and divorce. Retirement may make singles less marriageable as well as impacting negatively marriage stability for married people. We exploit retirement laws in France to instrument the effect of retirement on individual marriage status, using Census data. While we cannot claim causality, we find that retirement correlates negatively with the marriage probability of men, and the more so for men with less than high school education.

JEL Classification: J12, J14, J22
Keywords: ageing, retirement, divorce

Corresponding author:
Elena Stancanelli
Paris School of Economics
Maison des Sciences Economiques
106-112 Boulevard de l'Hopital
75013 Paris
France
E-mail: elena.stancanelli@univ-paris1.fr

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Introduction

The economic literature on the consequences of retirement is sizable. Although the marriage market has been the subject of numerous studies by economists since the pioneering work of Gary Becker, the relationship between retirement and marriage rates has been largely ignored in the literature to date. Recent media attention has been given in the US and the UK to the rise of the "silver splitters" as the number of people over 60 years of age getting divorced has risen by three quarters in just 20 years.[1] Similar phenomena may be observed in other countries such as France. In this paper, we argue that retirement may affect individual marriage chances negatively, according to the predictions of quite standard economic models.

Although, increases in divorces and remarriages at older ages have been studied thoroughly (Stevenson and Wolfers, 2007), the fact that retirement may affect marriage rates has not yet been considered in the vast economic literature on marriage and divorce. Retirement from work likely involves changes in spouses' bargaining power, household time allocation, health outcomes, and gender identity, all of which have been well documented to affect marriage and divorce (Grossbard-Shechtman, 1993; Akerlof & Krant, 2000; Bonsang et al, 2012). The scant economic literature in this area focused on how wives' financial independence through pension rights may increase the risk of marital dissolution in the United States (Ono & Stafford, 2001) and how spousal social security rules in the United States may incentivise marriage durations or delay divorce (Dillender, 2014).[2]

Since marriage (separation) and the timing of retirement may be endogenously determined,[3] we exploit the legal retirement age in France to instrument retirement in a model of the individual probability of being married (or divorced). Using data drawn from the French Census, we show that the probability of retirement increases significantly and discontinuously at the legal retirement age of 60. In the case of France, like many other European countries, partial retirement is extremely rare and individual retirement is associated with a large drop of working hours to zero (Stancanelli, 2017), which results in an immediate and large change in

[1] "'Til retirement us do part: 'silver splitter' divorces up by three quarters in generation", The Telegraph, 06 August 2013

[2] A study by Moen et al (2001) from the psychology literature explores the link between retirement and marriage quality, finding that retirement decreases marriage quality. However, no link to marital stability is drawn.

[3] A study by Bargain et al (2012) shows that access to divorce may change female labour supply decisions.

the household allocation of time (Stancanelli and Van Soest, 2012). We use the age-60 threshold as an instrument for retirement. We thus assume that turning 60 does not directly affect marital status, other than through its effect on retirement. We argue that this is plausible as there are no other public policies that activate at age 60 in France. We find that retirement correlates negatively with the probability of men being married. This effect is larger for men with less than high school education, which includes the majority of the French population in the cohort we consider. We find no robust effect of retirement on the marriage probability of women.

Contrary to the US, in France, male divorce rates actually increase in the level of education so that those without a high school diploma have a lower probability of divorce at all ages than those with a college degree. The fact that the marriage probability of this group correlates the most with retirement may fit a picture of changes in bargaining power and time allocation at retirement, negative effects of retirement on health outcomes, or gender identity "collapsing" at retirement. Indeed, individuals with lower education levels are typically more exposed to health shocks at retirement (Bloemen et al., 2013), less involved in domestic work at all ages (Stancanelli et al, 2012) and more attached to gender stereotypes (Akerlof and Kranton, 2000), which become blurred at retirement.

We find no correlation of female retirement and female marital rates. This is not surprising as if retirement makes marriages more fragile, as we argue here, this will happen when the husband, who is usually older than the wife, retires and he retires first. Moreover, all of the potential mechanisms we consider apply mainly to men. Indeed, the literature on the adverse effects of retirement on health and mortality have focused on men while the literature on changes in housework at retirement indicates that such increases are larger for men (Aguiar and Hurst, 2005; Stancanelli and Van Soest, 2012).

The case of France appears especially interesting to study, as legal retirement age law provides a neat instrument for retirement. In addition to this, most workers in France only rely on public pensions (Bovenberg, 2011), which means that pension income is easy to anticipate by the worker and their spouse, as there is generally no complementary employer or other private pension. There are no spousal pension benefits either and health insurance coverage is universal and public (at all ages). Divorce law in France takes into account the future drop in income at retirement for individuals close to retirement age, and thus, there is no financial incentive to postpone divorce to retirement.

One concern with our research design is that, because age can be anticipated, divorce could be timed around the time of (husband's) retirement as more time is available at retirement to file for divorce. However, we find no empirical evidence of such anticipation effects although we cannot completely rule them out. Also, there is evidence that women are the ones who often initiate divorce (Brining and Douglas, 2000) while our results indicate that it is husband's retirement that precipitates divorce. Also, we find no empirical evidence of such anticipation effects.

This paper is structured as follows. The economic mechanisms are discussed in Section 2. The institutional background follows in Section 3. The data and empirical model are described in Section 4. Results are commented upon in Section 5 and robustness checks in Section 6. The last section draws conclusions.

1 THE EFFECT OF RETIREMENT ON MARRIAGE AND DIVORCE

Pioneering economic models of marriage and marital instability were developed by Becker and Landes (1977) and Becker (1981). These hinge on the assumption that the marriage match between two given spouses produces some positive marriage surplus (such as extra consumption or love) that is enjoyed by the two spouses.[4] Essentially, individuals marry if the expected returns from marrying their future spouse exceed the expected returns of remaining single and they may later separate if the value of being married to their current spouse falls short of the value of separating from their current spouse. Therefore, models of marriage and divorce are inherently dynamic, considering the expected value of marriage and its realization over two time periods (Peters, 1986) or employing a matching framework with a fixed number of marriageable types (Bruze et al, 2015).

Each spouse's expected value of marriage (versus that of being single) depends on the utility derived from (private and public) consumption, (the output of) household production and leisure, subject to a time and a budget constraint (Friedberg and Stern, 2003). There are several ways in which retirement may affect marriage and divorce.

Traditional gender roles are challenged by retirement as male gender identity is strongly associated with market work (Akerlof and Krant, 2000). Recent work shows that male retirees

[4] An extensive treaty of the economics of marriage is also provided by Grossbard (1993) and Friedberg and Stern (2003).

dramatically increase the time spent doing household work (Aguiar and Hurst, 2005; Stancanelli and Van Soest, 2012). Retirement also negatively affects individual well-being (Bonsang, and Klein, 2012; Clark and Fawaz , 2009), health status and cognitive functioning (Bonsang et al, 2012). These changes may induce spouses to renegotiate the household allocation of time and the quantity of household production, changing the value of marriage. Last but not least, retirement may present individuals with new opportunities (outside options), for example through time reallocation to hobbies, that may increase the expected value of being single relative to the expected value of the current marriage.

These changes in task allocation, gender identity health, cognition, well-being and outside options are unlikely to be perfectly anticipated prior to retirement. They represent margins which may affect the value functions for marriage and separation, changing the expected value of marriage compared to the value of separation, prompting marital dissolution upon retirement.

On the other hand, in most countries, including France, pension offices have the obligation to inform people of pre-retirement age about their future pension income rights. Often, the employer's human resources department also provides them with such information. In this way, individuals know well in advance what their income will be upon retirement. Therefore, as argued in more depth in the next section, changes in income are likely to be well anticipated and are unlikely to change the expected value of marriage at retirement in an abrupt manner.

1.1 RETIREMENT IN FRANCE

As far as retirement goes, 60 is the legal age at which most workers in France can retire with "maximum" pension benefits.[5] Age 60 is also the 'effective' retirement age according to recent OECD estimates (OECD, 2014). This likely reflects the fact that pension benefits do not increase any further with employment after age 60 when individuals have sufficient years of social-security contributions. Particular sectoral agreements enable some workers to retire before 60, with "early" retirement often being at age 55, but these apply to only a minority of workers. By age 65, the law also requires most workers to retire if they have not yet done so.[6]

[5] In 2010, this legal retirement age threshold was raised from 60 to 62, but with effect only in 2018.
[6] The 2010 reform also raised this age 65 threshold with effect from 2018.

We can therefore think of the French retirement system as a two legal retirement-age system, with a first threshold at 60 and a second at 65, although in practice the vast majority of workers retire long before 65. There is no detectable jump into retirement at age 65 for men, as there is at age 60 (Stancanelli, 2017).

According to recent estimates, about 79 per cent of French retirees claim only a public (first pillar) pension, while 6 per cent also receive an occupational (employer-provided) pension and 18 per cent also have a private pension. The corresponding American figures are, respectively, 45, 13 and 42 per cent (Bovenberg, 2011). Periods of unemployment, sickness and maternity leave are all fully insured with 100 per cent coverage of pension rights. [7]

Retirement is often associated with a drop in household income, which is well anticipated. The rules concerning pension income are quite simple in France, as the pension payments are a specific well-known z fraction of the best n last years of earnings, with z and n varying by sector of employment, duration of the pension contribution period (or employment seniority) and year of birth. Pension benefits are typically more generous for public sector workers, who can receive up to 75% of their average earnings in the last 10 (or, more recently, 20) years of work than for private sector employees, whose pension benefits are about 50% of past earnings. Since the drop in income can be anticipated and individuals can save towards their retirement, theory predicts that this margin should have little effect on marital stability (Becker and Landes, 1977).

Retirement is an "absorbing" state: working hours drop to zero at retirement for the vast majority of workers (Stancanelli, 2017). There are no spousal (or dependent spouse) pension benefits. Only survivor pension benefits are available to widowed individuals upon the death of their retired spouse and these benefits are not lost upon separation or divorce, as long as individuals were married for at least four years (under the public pension plan) and did not remarry (for the private pension plans). Therefore, we do not have to worry about spouses' social security in our empirical set up. However, we need to pay attention to the fact that the retirement decision may not be independent of the quality of marital life, as individuals who anticipate separating may have stronger labour market attachment and, therefore, postpone

[7] Because breaks in employment not insured by pension contributions are often chosen by the individual, using the actual contribution period to identify eligibility for retirement (instead of the individual's birthday) did not appeal to us. Furthermore, this measure is not available in the Census data which we use.

retirement. Alternatively, their marital life may affect their productivity at work and employers may want to encourage them to retire as early as possible. Therefore, we exploit the discontinuity in individual retirement at the legal retirement age to instrument retirement in a model of the marriage probability.

1.2 DIVORCE LAW IN FRANCE

Consensual divorce laws date back to 1975 in France and divorce rates soared thereafter.[8] Figure 1 (based on administrative data on divorcees collected by the French Ministry of Justice) illustrates large increases in the proportion of French older divorcees (as a proportion of the married population) over the last few decades, particularly older male divorcees,[9] and similar patterns have been shown to hold in the US (Brown & Lin, 2012) and the UK (Office for National Statistics, 2013). French administrative data on marriage break up rates by the duration of the marriage reveal that, by the end of the nineties, as many marriages broke up after 30-34 years of duration as after the first five years of marriage (Figure 2). Because individuals marry on average in their late twenties/early thirties and retire in their sixties, this suggests that retirement years may have become critical for marriage stability.

[8] A recent reform (2004) further eased divorce procedures in France.

[9] There are notable spikes in divorce rates both after the introduction of consensual divorce (1975) and a recent reform (2004) that eased further divorce procedures in France. For each older age group, there are many more divorces for men than for women, which is explained by the fact that men marry (and divorce) on average younger women.

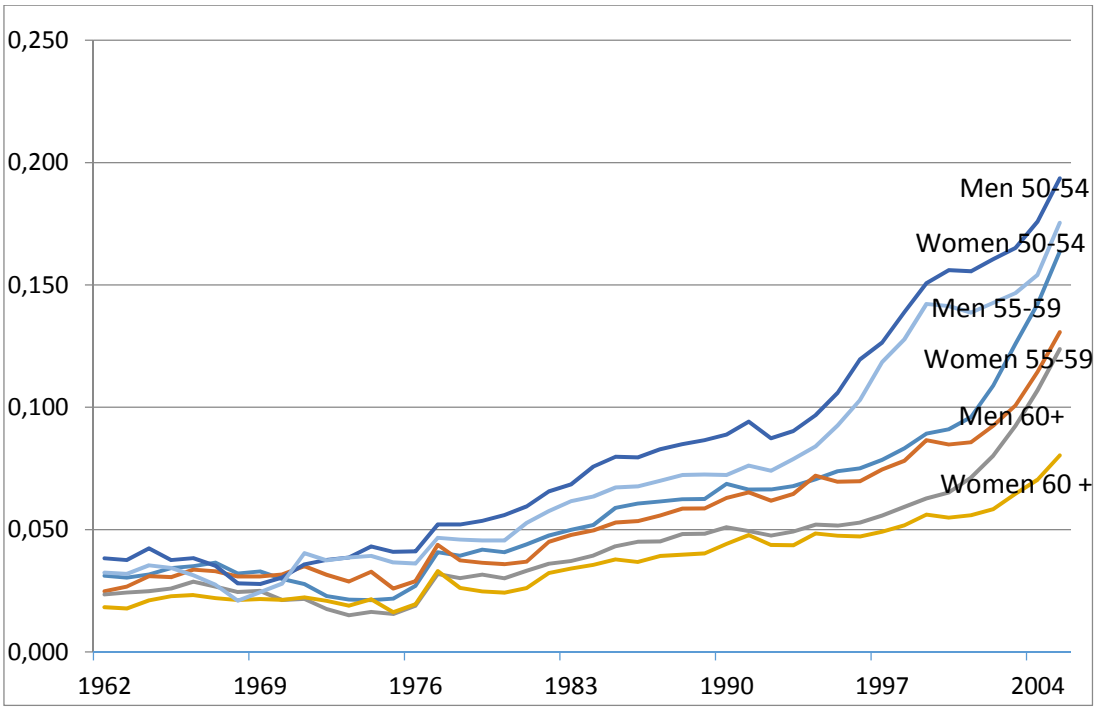

Figure 1 Divorced French persons by year of the divorce and age of the divorcee (as a proportion of the married population by gender in the same year). Source. French Ministry of Justice.

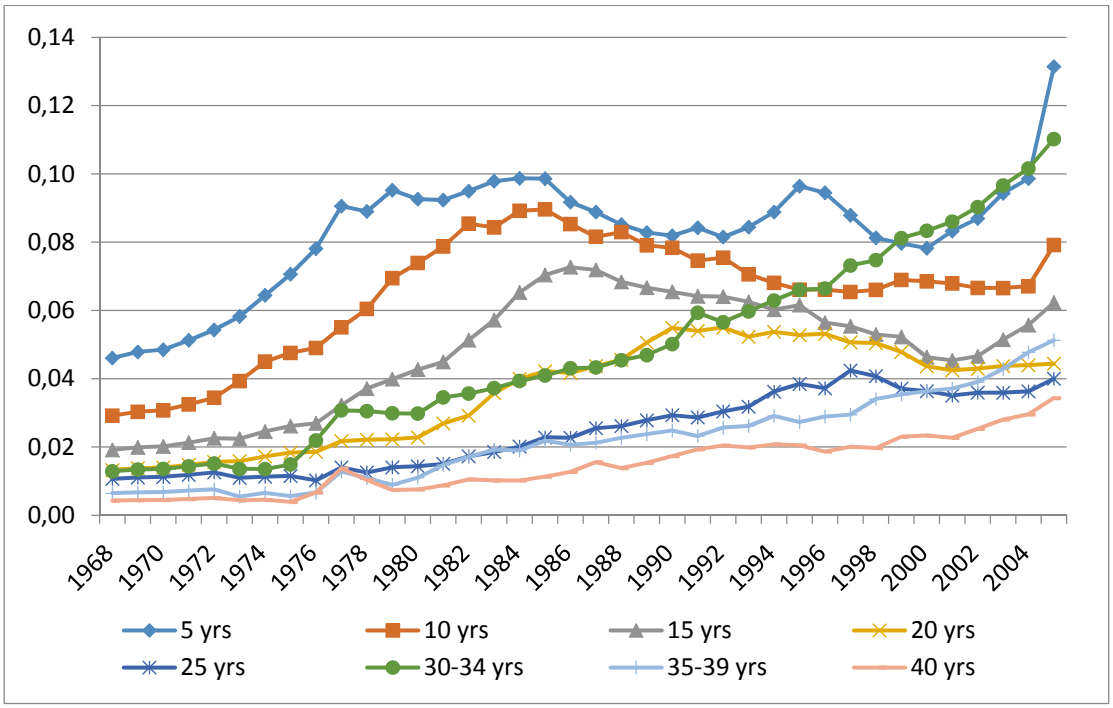

Figure 2 Divorced French persons by year of the divorce and duration of the marriage (as a percentage of the married population in the same year). Source. French Ministry of Justice.

2 DATA AND METHOD

We use the French Census Data for year 1999, whose coverage was universal Samples of 1/20 or 1/4 of the population are publicly available to researchers from the French National Institute of Statistics and Economic Studies (INSEE). To be able to create cells large enough for robust analysis, we opt for the 1/4 of the population data, which corresponds to around 14.5 million people. The Census provides data on age (in days), employment, type of contract, work duration, marital status and household type. In principle, more recent years of Census data could be used. Census data collection became annual starting in 2004. However, the new format of the survey results in samples of just 1/20 of the population each year. Thus, to rely on a sample as large as possible (as only a small percentage of the population of any age separates in any given year), we carry out our main analysis on the 1999 Census. The Census is cross-sectional in nature so that we cannot follow individuals over time. Furthermore, we cannot link individuals to their spouses. Sample selection is as follows: we retain those aged between 50 and 70 who declare themselves to be currently working or to have formerly been workers.[10] We also exclude those who declare themselves to be of a nationality other than French in case retirement provokes return migration.

2.1 OUTCOMES

We define three alternative outcome variables: marries, divorced and living alone. The variables "married" and "divorced" are extracted from the question on marital status in the Census questionnaire. The individual self-declares himself as single; married (or remarried); widowed or divorced. The variable "married" is set to 1 for all those who chose married and 0 for those who chose single or divorced. The variable "divorced" is set to 1 for those who declare to be divorced and 0 for those who declare to be married or single. The variable "living alone" is defined as follows. In the Census questionnaire, the individual is asked about their living arrangements and chooses among: child of a couple; child of a single parent; member of a couple (with or without children); single parent; living away from home (in a shared residence) and living alone. Those who select one of the latter three options are classed as "living alone".

[10] That is to say, *actif ayant un emploi* or *ancien actif*.

2.2 SUMMARY STATISTICS

Summary statistics for our selected sample from the 1999 Census data are shown in Table 1 for men and women aged 50-70. The average age of men and women is 59 and 59.5 respectively. Around 46% of men are employed, with the vast majority (94%) of these working full-time. 44% of women work but only 71% of these are working full-time. 54% of men are retired while the same figure for women is 56%. There are large gender differences in the probability of being married for the subsample of 50-70 year olds. 81% of men are married while just 66% of women are married. Many more women live without a partner than men (33% compared to 19%) where living alone is defined as living without a partner (single, separated, widowed and divorced are included in this group). Just 8% of men are divorced while 11% of women are divorced. Almost half of the sample of 50-70 year olds observed in 1999 are high school "dropouts", meaning that they do not have a diploma higher than elementary school. Another two-fifths have a high school diploma as their highest qualification while 15% of men and 12% of women have a third level qualification.

Table 1 Summary statistics for 50-70 year olds from 1999 French Census Data

	Men	**Women**
Age	59.0	59.5
Employed	0.46	0.44
Full-time	0.94	0.72
Part-time	0.06	0.28
Retired	0.54	0.56
Married	0.81	0.66
Living alone	0.19	0.33
Divorced	0.08	0.11
Widowed	0.03	0.14
Highschool dropout	0.41	0.48
Highschool	0.44	0.39
College	0.15	0.12
N	*1,361,943*	*1,183,043*

Sample (from 1999 French Census) is aged 50-70 and self-declared to be currently working or to be a former worker. Living alone is defined as not living with a partner. Highschool dropouts have no highschool diploma. Highschool refers to those with a highschool qualification. College refers to those with third level qualifications.

2.3 EMPIRICAL MODEL

The legal retirement age in France is 60. This means that a large proportion of the population will retire at exactly 60 but not everyone. We are, therefore, in the case of a "fuzzy"

Regression Discontinuity design (FRD) which Hahn et al (2001) have shown is comparable to an Instrumental Variables (IV) set-up. However, as age 60 has been the retirement age in France for a long time and individual can anticipate this, though we test for anticipation effects and we find none, we still opt for discussing our results in terms of statistical correlations. Following Lee and Lemieux (2010), in the case of an FRD design, we can write the probability of retirement as

$$P(R = 1|X = x) = \gamma + \vartheta T + g(x - c)$$

where R is a dichotomous variable indicating retirement, X represents the running variable, age, $T = 1|X \geq c|$ indicates whether the running variable exceeds the threshold, c, which is 60 years of age. This design can be described by the two-equation system:

$$M = \alpha + \tau R + f(X - c) + \varepsilon$$

$$R = \gamma + \delta T + g(X - c) + v$$

M is a dichotomous variable indicating marriage. The statistical correlation between marriage and retirement is, τ, which is estimated by instrumenting the dummy, R, with T (passing the age threshold for retirement eligibility).

An exclusion restriction is also required. Reaching the retirement age cannot impact marriage probability discontinuously except through its impact on the treatment probability (retirement). As there is no other large policy which kicks in at age 60, apart from retirement, we expect this to be the case. However, as discussed in more detail in Section 2, retirement has been shown to affect many other outcomes (income, health, time allocation, well-being) so that the statistical correlation of retirement and the probability of being married that we estimate may be interpreted as a composite correlation t of all of these factors which our data and set-up does not allow us to distinguish between.

We will estimate this system as a linear probability model, both by polynomial regressions estimated by Generalized Method of Moments (GMM) with robust standard errors and by local linear regressions using a variety of bandwidths and a rectangular kernal. A battery of

robustness tests as well as an investigation into potential anticipation effects will also be conducted.

3 RESULTS

3.1 GRAPHICAL ANALYSIS

Before looking at the results from the model described in the previous section, we show some graphical results. The definition of our outcome variables is described in detail in Section 4. The main outcome variable that we use is *married.* This is a self-declared status. We also show results from two alternative dependent variables in the Appendix. *Divorced* is also a self-declared status and *living alone* is defined as living without a spouse i.e. the individual reports that they do not live in a couple. The sample we retain for our analysis is that of workers and retirees aged between 50 and 70.

We plot in Figure 3 the raw probability among our sample of being in employment in France in order to illustrate the downward jump in employment levels at age 60. The 95% confidence intervals are constructed using the sampling variance of employment levels by age and a fractional polynomial line is fitted to these cell means.

At age 50, almost all of the subsample of workers and retirees are in work. This figure steadily decreases with age with around 40% of men and 50% of women still in employment at age 59. A large drop in employment rates (to around 20% for both men and women) is observed between age 59 and 60 and this proportion continues to decrease until it is close to zero at age 65. Therefore, reaching the legal retirement age induces over half of the working population to retire at exactly age 60.

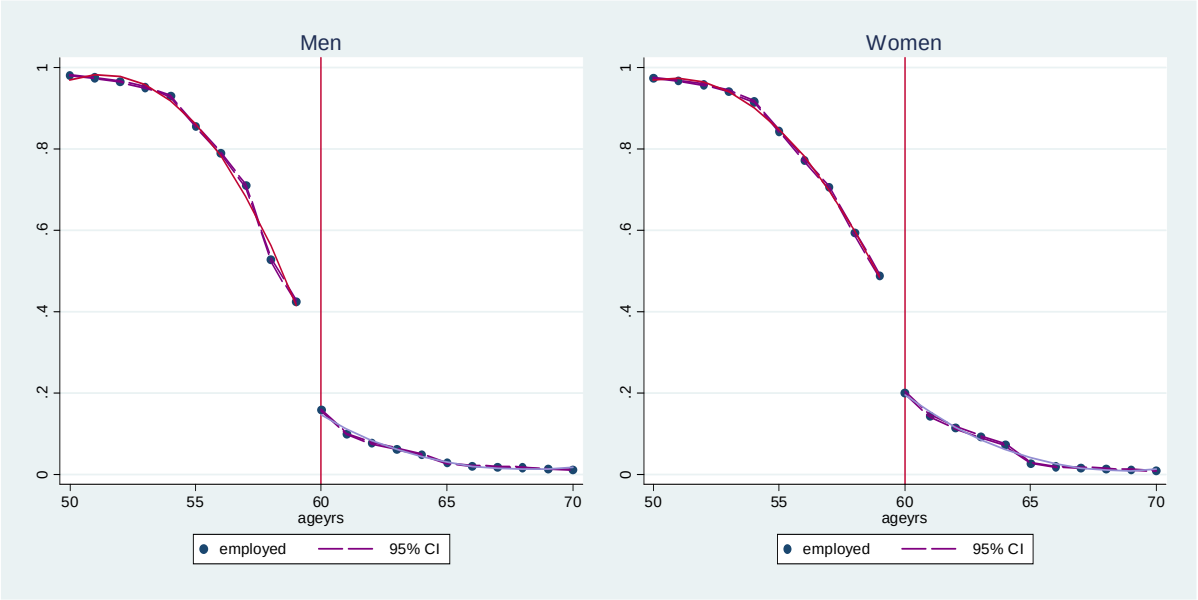

Figure 3 The probability of being employed by age using Census 1999

Next, we plot in Figure 4 the raw probability of being married by age, along with the 95% level confidence bounds, using our selection of working or retired individuals from the 1999 Census. The left hand side graph shows results for men. Marital probability is increasing for men between age 50 and 55, at which point it becomes somewhat flatter. A clear decrease in the probability of being married is apparent for men at age 60, the legal retirement age. Importantly, this drop is unusually large compared to other bumps in the curve away from that threshold and is of a magnitude of about 1 ppt. The right hand side graph shows the same plot for women. The marriage probability of women is decreasing slowly from age 50 to 60 and continues decreasing at a faster rate after age 60. In contrast to men, there does not seem to be a sharp change in the probability of women being married at age 60.

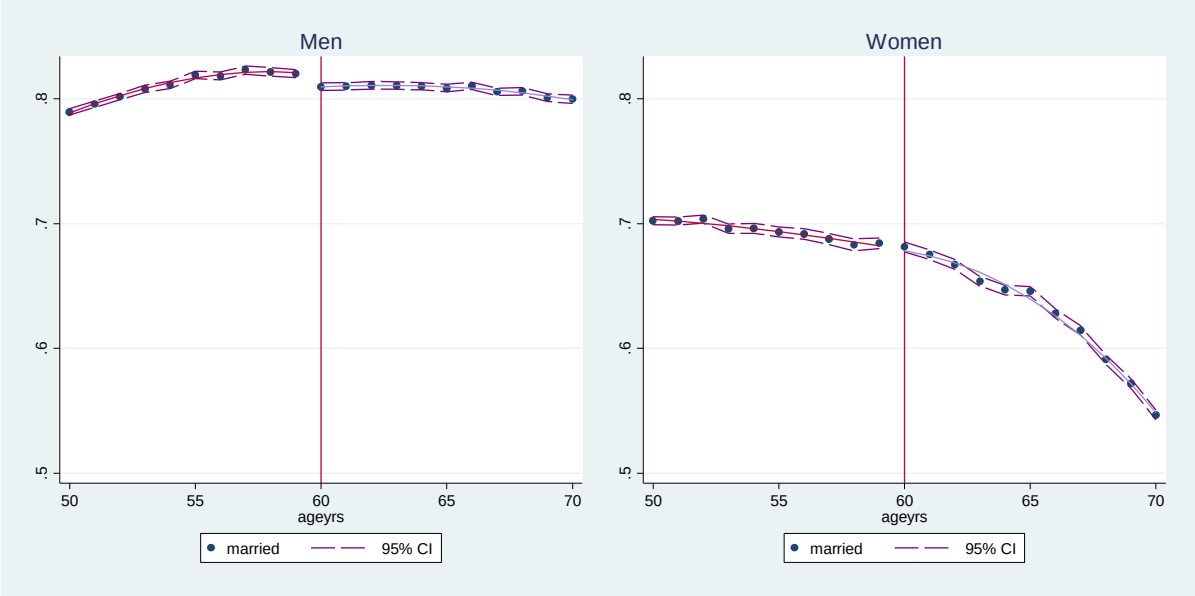

Figure 4 Probability of being married by age (measured in years) using Census 1999 data.

Figure 5 shows the same plot with age measured in quarters rather than in years. This figure displays more noise due to the fact that the age cells are smaller so we allow different scales on the male and female y-axis to allow the discontinuity to be clearly seen. The decrease in marriage probability for men at age 60 is confirmed and the drop is still unusually large compared to other bumps in the curve away from the discontinuity.

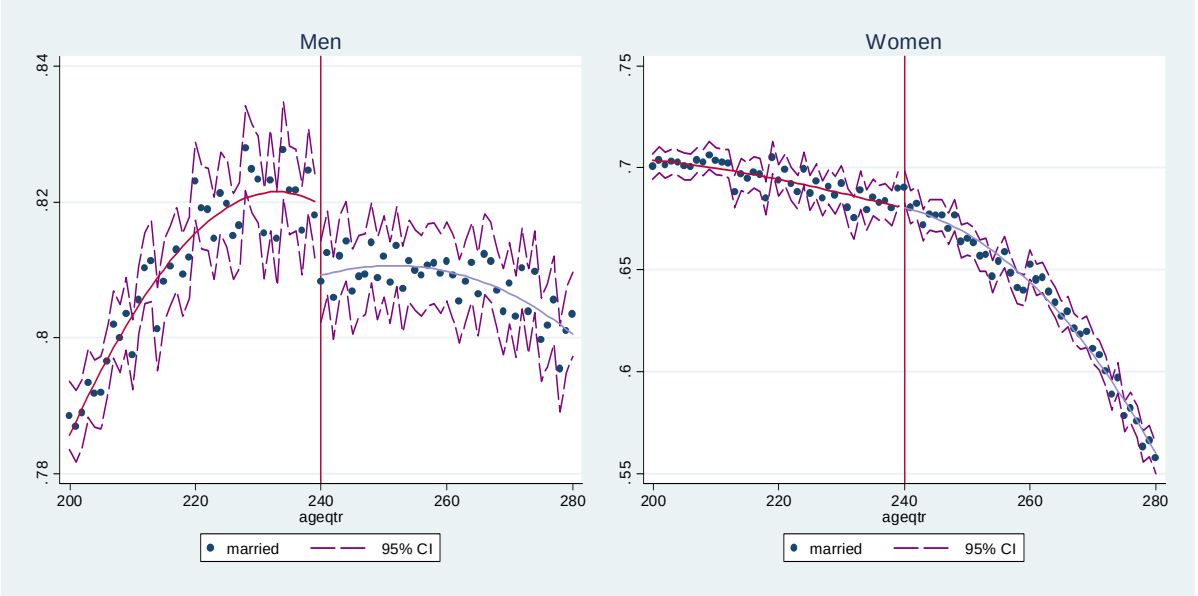

Figure 5 Probability of being married by age (measured in quarters) using Census 1999 data.

3.2 Model Results

In this section, we build on the graphical results from the previous section and present the results of a reduced form econometric model of marriage, described in Section 5. The dependent variable is self-declared marital status. The statistical correlation we are after is that between the probability of retirement and the probability of being married. In each specification, the first it is instrumented with a dummy variable which takes the value of 1 if the individual has reached the legal retirement age (60) and 0 otherwise. Additional explanatory variables in both the first stage (the retirement model) and the second stage (the marriage model) are limited to a polynomial in age (measured in quarters). . This model (equivalent to a fuzzy design RD model) is first estimated parametrically by GMM and then non-parametrically using local linear regression with a range of bandwidths and a rectangular kernal. Table 2 shows the results. Column (1) shows the results of a fuzzy design RD model, estimated by GMM using a quadratic polynomial in age. Column (2) shows the results of a fuzzy design RD model, estimated by GMM using a cubic polynomial in age. Column (3) shows GMM results using a cubic spline in age i.e. different slopes are allowed on each side of the discontinuity. Columns (4) – (6) show non-parametric estimates of the first stage and the treatment effect using local linear regression and a number of bandwidths, equivalent to 2, 3 and 4 years. Column (7) also shows local linear regression estimates using the optimal bandwidth as defined by Imbens & Kalyanaraman (2012).

We notice that the first stage estimate of the effect of being aged 60 on retirement is always statistically significant for both men and women. Turning 60 increases the probability of being retired by 16-41 percentage points (depending on the specification) for men and by 13-40 percentage points (ppt, hereafter) for women.

Turning next to the second stage equation, results show that retirement correlates negatively with the probability of being married and this correlation corresponds to a reduction of n 4-7 ppt for men in the marriage probability. The size of this statistical correlation is relatively stable and statistically significant across empirical specifications. There is no robust finding for women which is consistent with the fact that no change in female marital status was observed at age 60 in Figures 4 or 5. More generally, this finding is consistent with the fact that if retirement affects marital stability, on average, the husband is the oldest spouse in the couple (Bloemen and Stancanelli, 2014) and the first to retire.

Table 2 The statistical correlation between retirement and marriage

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
			GMM						Local linear regression					
	Quadratic		Cubic		Cubic Spline		BW = 8		BW = 12		BW = 16		BW = 1.5	
A. Census 1999														
Men														
Retirement	-0.04	***	-0.05	***	-0.06	***	-0.06	***	-0.07	***	-0.06	***	-0.06	**
	0.00		0.01		0.02		0.02		0.02		0.02		0.03	
First stage	0.41	***	0.24	***	0.16	***	0.17	***	0.16	***	0.16	***	0.26	***
	0.00		0.00		0.00		0.00		0.00		0.00		0.00	
N	*1,361,943*		*1,361,943*		*1,361,943*		*1,361,943*		*1,361,943*		*1,361,943*		*1,361,943*	
Women														
Retirement	0.04	***	0.01		0.03		0.00		0.00		0.01		0.00	
	0.00		0.01		0.02		0.03		0.02		0.02		0.08	
First stage	0.40	***	0.26	***	0.21	***	0.18	***	0.19	***	0.21	***	0.13	***
	0.00		0.00		0.00		0.00		0.00		0.00		0.00	
N	*1,183,043*		*1,183,043*		*1,183,043*		*1,183,043*		*1,183,043*		*1,183,043*		*1,183,043*	

The dependent variable is self-reported marriage. Age is measured in quarters. Retirement is instrumented with reaching the legal retirement age (60) and a polynomial of age is included in columns (1)-(3). The local linear are non-parametrically estimated.

3.3 VARYING THE SAMPLE SIZE

To check the robustness of our results to the sample selection used in the previous section, we re-run the analysis for narrower age-groups. In a first instance, we select 55-65 years olds and in a second instance, we select those aged 57-63. We present, in Table 3, the results from the most flexible specifications.

The statistical correlation between retirement and marriage probability for men is of a similar magnitude when we use these smaller samples. The size of this ranges from -6 to -8 ppt with all coefficients but one being statistically significant. Results for women are also unchanged. We observe no correlation of female retirement with marriage probabilities.

Table 3 The statistical correlation of retirement and marriage for 55-65 year olds and 57-63 year olds

	Cubic		Cubic Spline		Local linear regression	
	Age 55-65	Age 57-63	Age 55-65	Age 57-63	Age 55-65 BW = 8	Age 57-63 BW = 8
Men						
Retirement	-0.07 ***	-0.08 ***	-0.07 **	-0.07	-0.06 ***	-0.06 ***
	(0.02)	(0.02)	(0.03)	(0.04)	(0.02)	(0.02)
First stage	0.17 ***	0.16 ***	0.14 ***	0.13 ***	0.17 ***	0.17 ***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
N	*614,236*	*360,948*	*614,236*	*360,948*	*614,236*	*360,948*
Women						
Retirement	0.02	0.00	0.00	0.06	0.00	0.00
	(0.02)	(0.02)	(0.03)	(0.05)	(0.03)	(0.03)
First stage	0.22 ***	0.19 ***	0.16 ***	0.14 ***	0.18 ***	0.18 ***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
N	*509,393*	*295,467*	*509,393*	*295,467*	*509,393*	*295,467*

The dependent variable is self-reported marriage. Age is measured in quarters. Retirement is instrumented with reaching the legal retirement age (60) and a polynomial of age is included in columns (1)-(4). The local linear specifications are non-parametrically estimated with a bandwidth of 8 quarters. Robust standard errors are used.

3.4 MEASURES OF MARITAL STABILITY

The results detailed previously used self-declared marriage as the primary outcome variable. In this section, we discuss the results from two alternative outcome variables: *divorce* and *living alone*. *Divorce* is self-declared in the same way as marriage. *Living alone* is a variable which we construct to indicate whether or not an individual lives with a partner (see Section 3.1). As dissolving a marriage can take some time to complete from a legal standpoint, we expect this variable to pick up the effect of retirement on living arrangements, which may change in anticipation of divorce.

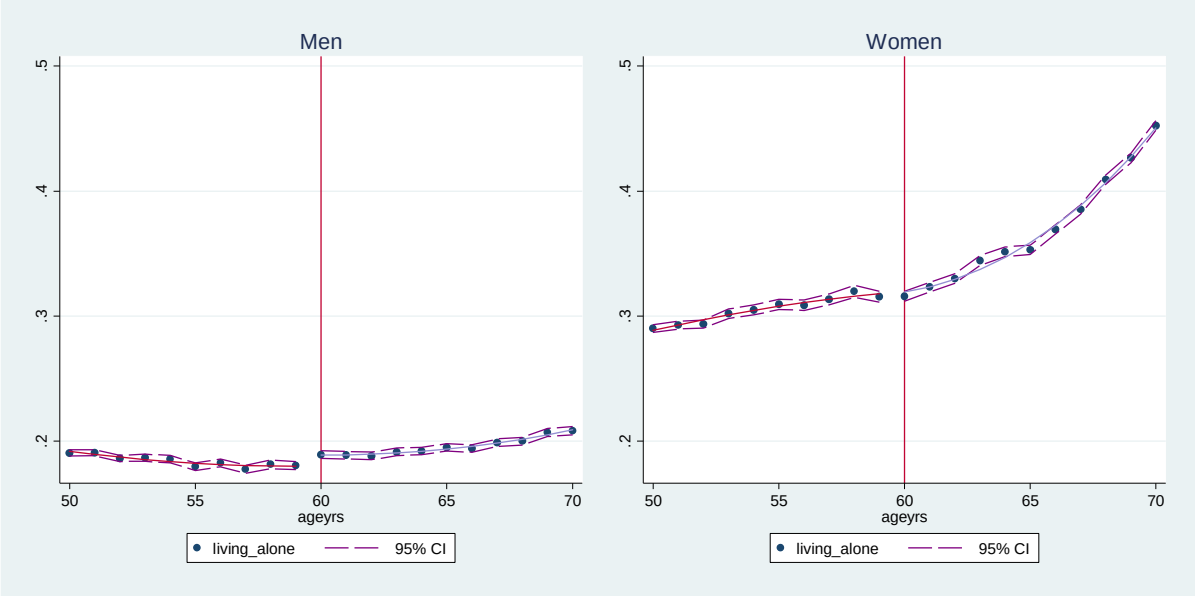

Figure 6 The probability of living without a partner by age using Census 1999

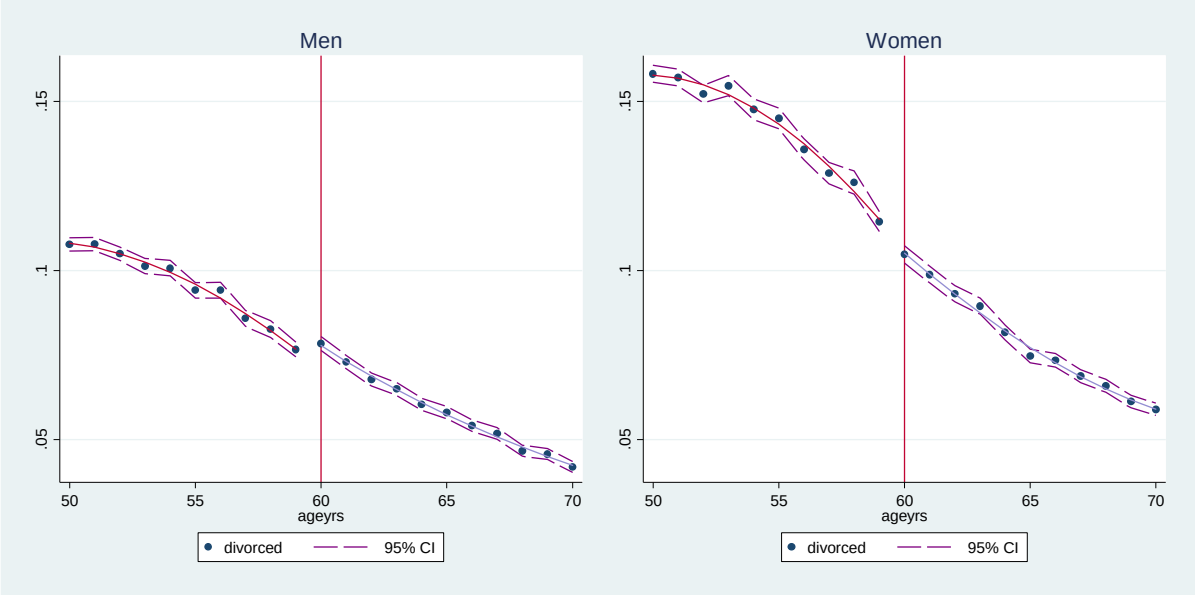

Figure 7 The probability of being divorced by age using Census 1999

Figures 6 and 7 show graphical evidence of the discontinuity of both living alone and being divorced at the legal retirement age. For men, the probability of living alone jumps by around 1 ppt at age 60 (similar to the decrease in the probability of being married) and the probability of being divorced jumps by around 0.5 ppt. For women, we observe no evidence of a discontinuity in the probability of living alone or of being divorced at the legal retirement age.

Results from the same models described in Section 6 are shown in the Appendix for the two alternative outcome variables. Table 5 shows results for the same models using *divorce* as the

dependent variable. The statistical correlation between retirement and divorce is positive in all specifications ranging from 2 to 4 ppt. This is a slightly smaller magnitude than the correlation of retirement and the marriage probability (-4 to -7 ppt). This is unsurprising as divorce is a lengthier process than separation so we expect that self-declared divorce rates change slower than self-declared marriage rates once separation occurs.

Table 6, which displays the results for the outcome variable *living alone* shows that the likelihood of living without a partner correlates positively (corresponding to an increases by between 2 and 5 ppt) for men who retire. For women, the results are a little noisier. Some specifications show a negative correlation between retirement and the likelihood of women living alone but these are not robust across specifications.

3.5 HETEROGENEOUS EFFECTS

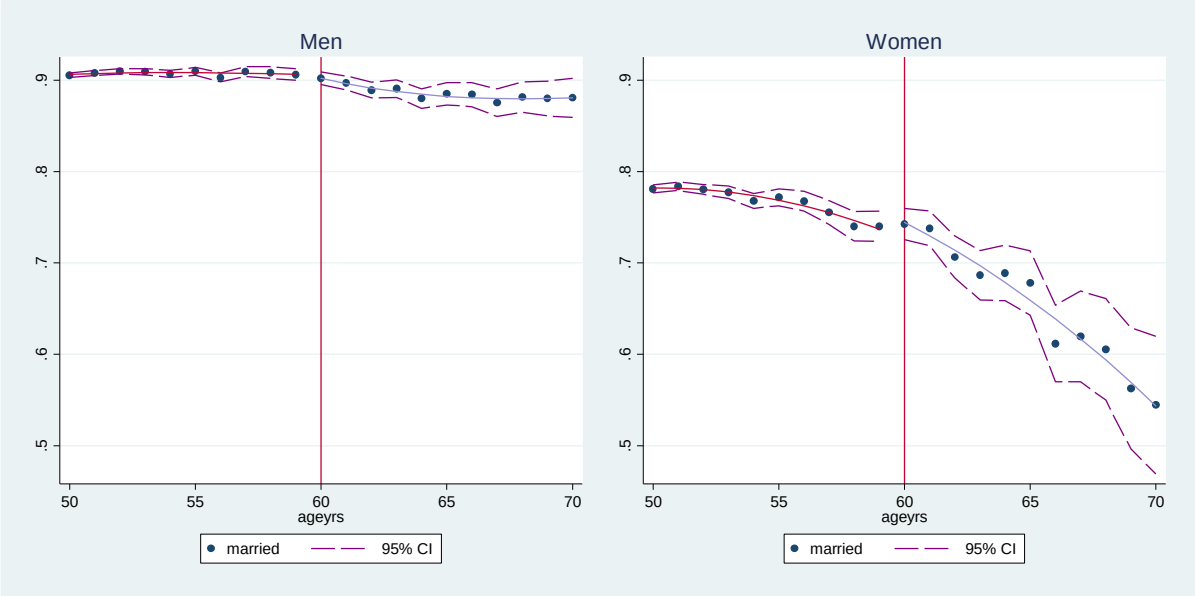

Figure 8 The probability of being married for 50-70 year olds who live with their children using Census 1999

Many economic studies have concluded that children significantly affect marital stability in many different ways (see Vuri (2001) for a review of the literature). The presence of children in the family home may change the effect of retirement on martial stability. Therefore, we plot in Figure 8 the probability of being married for men and women observed in the 1999 Census who still have children living in their home. This graph can be compared to Figure 4 which depicts the same picture for those with and without children living at home. Figure 8 shows that individuals who have children living at home are more likely to be married at all ages.

Further, we note that there is no effect of the discontinuity at age 60 on the probability of being married for individuals living with their children, indicating that the presence of children may "dampen" the shock to the utility of marriage which retirement can result in.

As living alone after retirement may have different implications for poverty depending on lifetime earnings we next look at the difference in the statistical correlation found between retirement and marriage probapility for different education groups which are likely to have different profiles of lifetime earnings. We define three education groups. The group "dropouts" has no highschool qualification. The group "highschool" has at least some form of highschool qualification (at least a "*Brevet*"). The group "college" has some form of postsecondary education. Results for a selection of specifications using the 1999 Census data are displayed in Table 4.

Results for men indicate that much of the pattern observed in the whole population comes from the group of high school dropouts. Retirement correlates negatively with the marriage probability of male high school dropouts (corresponding to a drop of around 8-11ppt). The corresponding figure for those with some high school qualification is 1-3 ppt but this is statistically significant in only one parametric specification (cubic polynomial in age). There is no statistical correlation between retirement and the marriage probability of college educated males. Given that high school dropouts have a lower divorce probability at all ages than college educated men (6.5 per cent versus 9 per cent at age 59), it is interesting to note that their marriage stability should be more affected by retirement.

Results for women indicate that, if retirement does affect their marriage probability, it does so only for college educated women. However, this finding is not robust across specifications.

Table 4 The statistical correlation between retirement and the marriage probabilities of different education groups

	GMM						Local linear regression		
	Cubic Dropouts	Cubic Highschool	Cubic College	Cubic Spline Dropouts	Cubic Spline Highschool	Cubic Spline College	Dropout BW = 8	Highschool BW = 8	College BW = 8
Men									
Retirement	-0.08 ***	-0.03 ***	-0.02	-0.11 ***	-0.02	-0.04	-0.09 **	-0.01	-0.11
	(0.01)	(0.01)	(0.02)	(0.03)	(0.03)	(0.05)	(0.03)	(0.03)	(0.07)
First stage	0.27 ***	0.22 ***	0.22 ***	0.17 ***	0.15 ***	0.13 ***	0.17 ***	0.17 ***	0.13 ***
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
N	*563,263*	*597,421*	*201,259*	*563,263*	*597,421*	*201,259*	*563,263*	*597,421*	*201,259*
Women									
Retirement	0.00	0.03 *	-0.09 **	0.02	0.05	-0.04	-0.11	0.03	-0.04
	(0.01)	(0.02)	(0.04)	(0.02)	(0.03)	(0.07)	(0.07)	(0.05)	(0.10)
First stage	0.31 ***	0.20 ***	0.21 ***	0.24 ***	0.17 ***	0.17 ***	0.13 ***	0.17 ***	0.15 ***
	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
N	*573,440*	*465,587*	*144,016*	*573,440*	*465,587*	*144,016*	*573,440*	*465,587*	*144,016*

The dependent variable is self-reported marriage. Age is measured in quarters. Retirement is instrumented with reaching the legal retirement age (60) and a polynomial of age is included in columns (1)-(4). The local linear specifications are estimated non-parametrically.

4 Further Analysis

4.1 Anticipation Effects

Anticipation effects are a concern in any RD study which uses age as the running variable because age is perfectly anticipated and individuals may, therefore, adjust their behaviour prior to reaching the age threshold which is used for policy analysis. Therefore, we present and discuss our results in terms of statistical correlations.

In our study, anticipation effects could make the interpretation of the retirement effect difficult if, for example, individuals who are already in unstable marriages before they turn 60 "wait" until they are retired to separate.

There are a couple of ways in which we can check if this kind of anticipation effect might be driving our results. Firstly, since there is evidence that women are most often the ones that initiate separation or divorce (Brining and Douglas, 2000) and that, in most couples, the wife is on average younger than the husband (the average age difference between spouses in our sample being about two and a half years), if divorce were timed when either the woman or, even, both spouses have the time available to file for divorce, than one would expect to find a

larger increase in separation rates when the wife retires than when the husband retires. From our estimations, we note that this is not the case. Marital instability seems to arise only in response to male retirement, when the wife is unlikely to have reached the retirement age.

We can also look at the pre-age 60 trends for a number of groups whose marital stability we consider to be more or less affected by the legal retirement age. For example, it is plausible that full-time workers who retire may experience a larger shock to their marriage utility than part-time workers, as a larger amount of time suddenly becomes available for reallocation to leisure or home production to the full-time than to the part-time workers, or because health shocks associated with retirement may be smaller for part-time than for full-time workers. Part-time workers also have more time at their disposal before retirement to deal with the administrative burden of marital dissolution. The marriages of individuals who are inactive prior to the legal retirement age should be least affected by reaching the retirement age. Without suitable panel data, we cannot compare the marriage probabilities of these groups before and after the age threshold. However, by comparing the pre-60 marriage trends for these three groups of people, we can check if there seems to be an anticipation effect for full-time workers compared to part-time workers or the inactive. If this were the case, we would observe a marriage probability which increases at a faster rate (or decreases at a slower rate) for full-time workers who approach the age of 60 compared to part-time or inactive people who approach the age of 60.

Results are displayed in Figure 9. In the right and left hand graph, the black line shows the marriage probability for inactive individuals, the gray line shows the trend for part-time workers and the purple line shows the trend for full-time workers. For men, we find that the probability of being married is highest for full-time workers, followed by part-time workers and the inactive. This is true for all ages between 50-60. While the age-trends for part-time workers and the inactive are quite similar, the trend for full-time workers is flatter, the opposite of what we would expect if full-time workers were delaying their marriage dissolution until age 60. For women, we find that the inactive have the highest marriage rates, followed by full-time and then part-time workers. However, for each of these groups, the age trend is similarly flat, showing no evidence of anticipation effects for full-time or part-time workers.

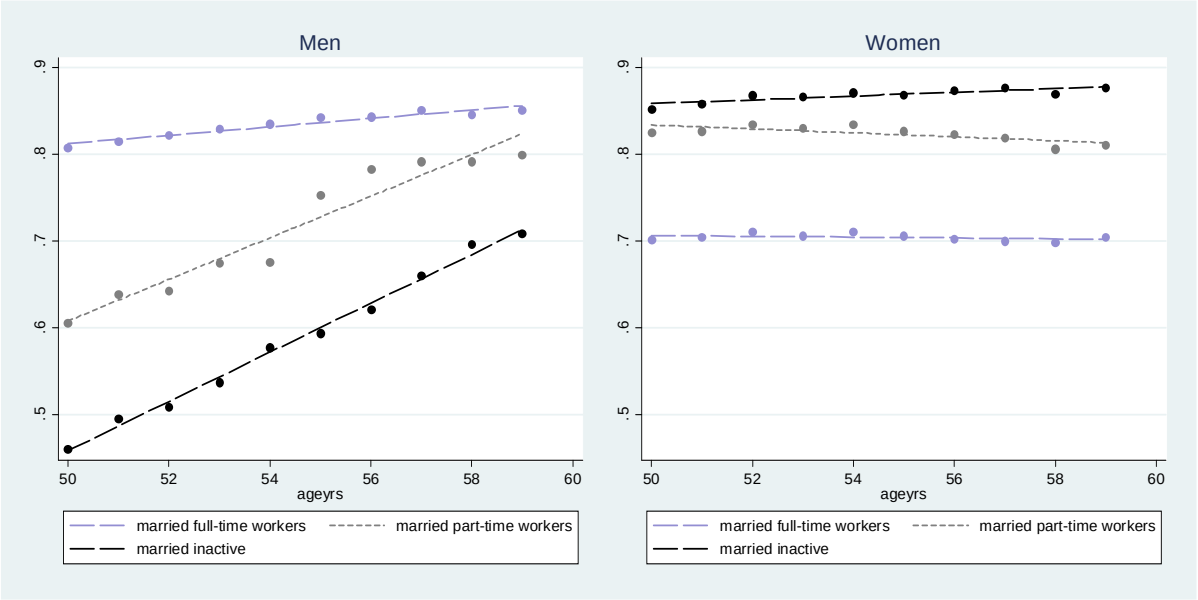

Figure 9 The probability of being married for 50-60 year olds who work full-time, work part-time or are inactive

These arguments do not definitively preclude the possibility that the effect which we measure is (partly) a delay in marriage dissolution until retirement. However, given these arguments, it is likely that at least some of the effect which we identify captures a pure increase in marital dissolution, rather than just a change in the timing of marital dissolution.

5 Concluding Discussion

The economic literature on the consequences of retirement is sizable. Leaving employment increases opportunities for leisure and may reduce stress, leading to a longer lifespan. However, leaving employment can also reducing mental and physical activity, social interaction and encourage more unhealthy behaviour, such that delaying retirement may actually extend the lifespan. Retirement has been found to affect health and well-being both positively and negatively, depending on occupation type and whether or not the retirement was voluntary. Retirement has also been found to dramatically increase the amount of house work performed by retired men but not to greatly affect the amount performed by retired women, as women are often the main providers of unpaid work in the household, regardless of their employment situation.

This paper studies the effect of retirement on individual marriage status, an issue which has received scarce attention in the economic literature. We argue that retirement may affect the value of marriage for a number of reasons. Retirees immediately need to reallocate a huge amount of time and this cannot be done ahead of retirement. In addition, retirement may result in shocks to well-being, health, cognition and outside options. The combination of these unanticipated shocks may result in a change in the expected value of marriage following retirement.

Because the individual decision to retire from work may not be independently determined from marriage stability, we exploit the legal retirement age in France to instrument the effect of retirement on marriage stability. Nevertheless, as individual may anticipate turning 60, we interpret our results in terms of statistical correlations. Using data drawn from the French Census, we show that the probability of retirement increases significantly and discontinuously at the legal retirement age of 60. Using this threshold as an instrument for retirement in a fuzzy RD design, we find that retirement correlates negatively with the probability of men being married. These results are robust to a number of empirical specifications, to a number of measures of marital stability and to robustness checks including narrowing the age window examined. We find no evidence of anticipation effects although we cannot completely rule these out. The statistical correlation found is larger, in absolute value, for low educated men. We find no significant correlation between retirement and the the marriage probability of women. Our results are somewhat in line with the small literature on the effect of unemployment on divorce, which indicates that men becoming unemployed significantly increases their probably of divorce while the same is not true for women becoming unemployed (Doiron & Mendolia, 2011; Banzhaf, 2018).

Being single at the end of the life cycle is economically undesirable. Single or divorced individuals present more physical and mental health problems than married individuals and at least part of this difference is attributable to the stress associated with loneliness and marital dissolution. Marital breakdown may lead to increased elderly poverty and reliance on social transfers as single (or newly separated) individuals do not benefit from the economies of scale which sharing a household provide and have less resilience to output shocks. There is also an increased risk of a lone elderly person becoming a burden on hospitals and hospices later in life if there is no spouse to care for them. The group for which we find the largest association between retirement and marital stability, low educated men with no children living at home, may be most vulnerable to these economically undesirable effects.

For these reasons, among others, policies which ease transitions to retirement could be considered in order to reduce the shock which retirement has on the value of marriage. Such policies, which could include more flexible working hours in the years prior to and after the legal retirement age and the deployment of social security or welfare agencies to advise workers on how to plan their time use after retirement, could decrease the effect of retirement on marital instability.

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10. APPENDIX

Table 5 The statistical correlation between retirement and the probability of divorce

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
			GMM						Local linear regression					
	Quadratic		Cubic		Cubic Spline		BW = 8		BW = 12		BW = 16		BW = 1.5	
A. Census 1999														
Men														
Retirement	0.02	***	0.02	***	0.04	***	0.04	***	0.04	***	0.04	***	0.03	
	0.01		0.01		0.01		0.02		0.01		0.01		0.02	
First stage	0.24	***	0.24	***	0.16	***	0.17	***	0.16	***	0.16	***	0.15	***
	0.00		0.00		0.00		0.00		0.00		0.00		0.01	
N=	*1,361,943*		*1,361,943*		*1,361,943*		*1,361,943*		*1,361,943*		*1,361,943*		*1,361,943*	
Women														
Retirement	-0.04	***	-0.02	***	-0.02		-0.01		-0.01		-0.02		-0.04	*
	0.00		0.01		0.01		0.02		0.01		0.01		0.02	
First stage	0.40	***	0.26	***	0.21	***	0.18	***	0.19	***	0.21	***	0.17	***
	0.00		0.00		0.00		0.00		0.00		0.00		0.01	
N=	*1,183,043*		*1,183,043*		*1,183,043*		*1,183,043*		*1,183,043*		*1,183,043*		*1,183,043*	

The dependent variable
is self-reported "divorced". Age is measured in quarters. Retirement is instrumented with
reaching the legal retirement age (60) and a polynomial of age is included in columns (1)-(3). The local linear specifications are estimated non-parametrically .

Robust standard errors are used.

Table 6 The statistical correlation between retirement and the probability of living without a partner

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
			GMM						Local linear regression					
	Quadratic		Cubic		Cubic Spline		BW = 8		BW = 12		BW = 16		BW = 1.5	
A. Census 1999														
Men														
Retirement	0.02	***	0.04	***	0.04	**	0.04	*	0.05	***	0.05	***	0.05	
	0.00		0.01		0.02		0.02		0.02		0.02		0.03	
First stage	0.41	***	0.24	***	0.16	***	0.17	***	0.16	***	0.16	***	0.15	***
	0.00		0.00		0.00		0.00		0.00		0.00		0.01	
N=	*1,361,943*		*1,361,943*		*1,361,943*		*1,361,943*		*1,361,943*		*1,361,943*		*1,361,943*	
Women														
Retirement	-0.05	***	-0.02	**	-0.03	*	0.00		-0.01		-0.02		-0.01	
	0.00		0.01		0.02		0.03		0.02		0.02		0.03	
First stage	0.40	***	0.26	***	0.20	***	0.18	***	0.19	***	0.21	***	0.17	***
	0.00		0.00		0.00		0.00		0.00		0.00		0.01	
N=	*1,183,043*		*1,183,043*		*1,183,043*		*1,183,043*		*1,183,043*		*1,183,043*		*1,183,043*	

The dependent variable is self-reported "living alone" meaning not living with a partner. Age is measured in months. Retirement is instrumented with reaching the legal retirement age (60) and a polynomial of age is included in columns (1)-(3). The local linear Specifications are estimated non-parametrically.
Robust standard errors are used.