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# Is marriage protecting your health in recession times?

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## Is marriage protecting your health in recession times?

**Abstract:** This paper aims to contribute to the literature on the protective effects of marriage on individuals' health by examining whether this advantage is still valid in recession times. A two stage empirical strategy is followed based on individual-level cross-section data for Spain. Using propensity score matching techniques we firstly estimate the causal impact of divorce and legal separation (marital dissolution) on mental health and binge drinking in two different points in time: before and during the economic crisis. Secondly, we examine whether there exists an incremental or detrimental effect on these health outcomes implied by the economic recession using difference-in-difference (DiD) regression methods, upon conditioning on a proxy of innate health status. The results confirm that divorce and separation cause a large and significant deterioration of mental health and a raise in heavy drinking both before the economic recession and after (during) the crisis. Strikingly, we find that this detrimental effect on psychological health is actually lowered because of the recession, although this amelioration on mental health is observed for male individuals. However, heavy drinking does not seem to worsen more with divorce/separation during the economic downturn. These findings, which appear robust to the sensitivity analysis, would then suggest that the marriage institution, contrary to what is generally believed, would not be protecting mental health status, mainly in male individuals, under a period of economic crisis. We speculate that divorce/separation may act as an escape mechanism to confront the usual financial constraints and other stress-related issues which are strengthened during a prolonged period of recession.

JEL Codes: I10, I12, J12.

Keywords: Mental health, Marriage, Recession.

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## 1. Introduction

The beneficial (detrimental) effects of marriage (marital loss) on physical and mental health, life expectancy or happiness have been well documented in the literature. Like education and income, marriage is seen as a protective factor or a health advantage affecting positively individuals' well-being. Several mechanisms have been suggested for the marriage-health connection. Some authors point-out the positive partner's influence –especially in men– on the adoption of better health-related choices, so that life (health) is more efficiently produced (Fuchs, 1968; Umberson, 1987). Other authors argue the emotional support and help received by the spouse reducing stress and stress-related illnesses (Simon, 2012). While for others the marriage institution may result in higher incomes, enhances wealth accumulation through more savings, economies of scale or complementarities in production of household goods (Becker, 1974; Lupton and Smith, 1999).<sup>1</sup> This in turn improves health by increasing access to health care, medicines or lowering stress. In all, we cannot neglect that this marital status relationship may reflect a causality that begins with good health status and results in being selected as a partner (selection effect) eroding part of above benefits (Wood et al, 2009).

This paper seeks to analyse these issues within the turbulent recent past of the Spanish economy. Like other European countries (Greece, Italy, Ireland or Portugal) Spain was adversely affected by a huge global economic crisis that began in 2008. Since this year there have been a fall in the GDP leading to a deep recession as a combination of a collapse in the property market, banking crisis, EU recession and public spending cuts. This meant a mass destruction of jobs – between 2007 and 2013 the labour market shed 3.44 million jobs- a sharp rise in the unemployment rate -from 8.5% in 2006 to a peak of 26% in 2013- and significant losses of family incomes with a general impoverishment of the country.<sup>2</sup> Large government budget deficits and a rapid increase of government debt –from 42% of GDP in 2007 up to 92% in 2012 and 118% in 2014- were seen as a consequence of the recession and the banking crisis (OECD, 2015). This is well in contrast with the decade preceding the crisis, where Spain's economy was among the fastest growing in Europe with average annual GDP growth rates above 5%.

As a consequence, the Spanish public healthcare sector suffered substantial budget cuts amounting to roughly 10,000 M. euros (13.6%) between 2009 and 2013, a 0.8 percentage points decrease of the GDP in these years (IGAE, 2013). Among other interventions, this implied on the part of the different regional health departments a reduction of hospital activity, beds and stays, cuts in medical staff wages, externalizations of services and closure of medical consultations. This deterioration has also meant an increase in waiting lists, more co-payments and a decrease in patients' satisfaction regarding primary and secondary care services and waiting lists (Jiménez-Martín and Viola, 2014).<sup>3</sup>

The potential health consequences of the crisis and austerity measures have been documented in the literature. Gili et al. (2012) showed that the recession has substantially raised the frequency of diagnosed mental disorders (mood, anxiety, somatoform) and alcohol abuse among primary care patients between 2006 and 2010 in Spain, with a significant association with family unemployment, mortgage payment difficulties and evictions. Navarro-Mateu et al. (2015) also reported higher prevalence of mental disorders in the adult population in a southern region of Spain during the economic crisis. Bartoll et al. (2013) based on cross-sectional data gathered

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<sup>1</sup> See Waite (1995) for an interesting discussion of these issues.

<sup>2</sup> In 2014 long-term unemployment represented more than 50% of total unemployment. Household disposable income decreased annually by 3.5% in 2010, 1.3% in 2011, 5.3% in 2012 and 1.5% in 2013 (OECD, 2015).

<sup>3</sup> From 2009 until 2013 the number of patients on Spanish NHS surgery waiting lists has increased by 56%, and the mean waiting time rose from 63 days in 2009 to 101 days in 2013 (Ministry of Health, 2014).

from the Spanish National Health Survey (years 2006-07 and 2011-12) also evidenced a deterioration in mental health among men during the recession in Spain, linked to low socioeconomic status. Finally, Jiménez-Martín and Viola (2014) documents negative trends in some short-term adult population health indicators (chronic conditions, diabetes-related and mental disorders hospitalizations or obesity rate) associated with the crisis and the austerity measures, although with no effects on long-term or fundamental health indicators like life expectancy or years in good health.

As stated above, the objective of this paper is to examine whether the protective effects of marriage are still valid in recession times. A two stage empirical strategy is followed. Firstly by means of estimating treatment effects through propensity score matching techniques we analyse the causal impact of divorce and legal separation (marital dissolution) on two sensible health outcomes of the adult population, mental health and binge drinking, in two different points in time: before and during the economic crisis. Secondly, we examine whether there exists an incremental or detrimental effect on these health outcomes implied by the economic recession using difference-in-difference (DiD) regression methods, upon conditioning on a proxy of innate health status. This will allow us to verify whether divorce and legal separation (alternatively marriage) are still an enhancing (protecting) factor under adverse macroeconomic conditions. This analysis is based on cross-sectional individual level data for Spain.

Our results confirm that divorce and separation cause a large and significant deterioration in mental health and a raise in heavy drinking both before the economic recession and after (during) the crisis, upon controlling for a proxy of innate physical health status. Strikingly, we find that this detrimental effect on psychological health is actually lowered because of the recession and this amelioration on mental health is only observed for the subsample of male individuals. Heavy drinking does not seem to worsen more with divorce/separation during the economic downturn. These results are robust to some sensitivity analysis and different specifications. The findings reported in this paper would then suggest that the marriage institution, contrary to what is generally believed, would not be protecting mental health status, mainly in male individuals, under a period of economic crisis. At the contrary, marital dissolution through divorce/separation (although proven to be a stressful even) would be enhancing mental well-being. We speculate that it may act as an escape mechanism to confront the usual financial constraints and other stress-related issues which are strengthened during a prolonged period of recession.

The paper is organized as follows. Section 2 presents the main related literature and findings around this topic. Section 3 describes the data and statistical methods employed in the empirical analysis. The results are presented in Section 4. Finally, Section 5 concludes discussing the main findings of the paper.

## **2. Related Literature**

This paper must be placed within the ample literature examining the socioeconomic determinants of health status (c.f., Marmot and Wilson, 2005; Lleras-Muney 2005; Smith 2007) and, particularly, within the research that highlights the beneficial effects of marriage for individuals' well-being. One of the first studies reporting evidence of the association between the conjugal condition and health is that of the British epidemiologist William Farr, who in 1858 showed that married people lived longer and enjoyed healthier lives (Parker-Pope, 2010). More recent evidence shows that married people are less likely to get pneumonia, develop certain cancers or suffer heart attacks and more likely to engage in preventive medical care –cholesterol checks, prostate or breast examinations (Guner et al., 2014). Similarly, marital disruption appears to

increase stress and erode self-perceived well-being, reduce the probability of surviving, raise cigarette and alcohol consumption (among men) or sleep problems (among women), and adopt more risk-taking behaviours.<sup>4</sup>

A positive link between marriage and mental well-being has also been reported in the literature. Apart from the first cross-section studies, the literature was enriched by new research using longitudinal data and adjusting for the selection problem. For instance, Horwitz et al. (1996) using longitudinal data of young adults over a 7-year period, from some New Jersey counties, documented lower levels of depression (for men) and fewer alcohol problems (for women) among those who got and remained married along this period, after controlling for premarital psychological status. Marks and Lambert (1998), employing a two wave panel of the US National Survey of Families and Households, examined the longitudinal effects of continuity and transitions in several marital statuses on multiple dimensions of psychological well-being. They found that those continually married showed significant higher levels of mental health, although in some dimensions -for example, autonomy, personal growth- the single fared better than the married. Multivariate analyses revealed a complex pattern of effects depending on the marital relationship and the outcome examined. Simon (2002), using the same panel dataset and controlling for selection issues, showed that married people evidenced less depression symptoms and alcohol abuse than the unmarried. In addition, marital gain (loss) had beneficial (harmful) consequences for men's and women's mental health (Waite, 1995). Johnson and Wu (2002) provide evidence of a higher level of psychological distress of divorced compared to married people. That the benefits from marriage do not originate solely from living with someone is evidenced by research showing that cohabitation provides few or no mental benefits (Kim and McKenry, 2002).

The quality of marriage is of crucial importance for the existence of the health advantage effect. Troubled or conflict relationships, in addition of being detrimental for physical health<sup>5</sup>, affect mental health (Ross, 1995; Parker-Pope, 2010). Horwitz et al. (1996) found that married individuals with good relationships with their spouses had less depression and fewer drinking problems, supporting the idea that is not marriage per se but only good marriages what enhances mental health. It is also worthy to note that the positive effects of marriage on health are shown to be cumulative (Guner et al., 2014).

In parallel to the protective effects of marriage the literature also documents the existence of a selection bias or reverse causality effect into marriage as healthier (taller) people may be more likely than those who are less healthy to get and stay married (Lillard and Panis, 1996; Murray, 2000; Simon, 2002). In principle, they may be considered more desirable partners in terms of attributes such as physical attractiveness, earnings potential, mental health, life-styles or self-sufficiency.<sup>6</sup> More evidence of the combination of the two effects is reported by Guner et al. (2014) showing that the advantage effect of marriage is more prevalent at older ages, while the selection into marriage occurs at younger ages.

The studies by Urbanos and López-Valcarcel (2014) and Pascual and Rodríguez (2013a) are highly related to our investigation in terms of the empirical approach employed. Both papers using matching and difference in difference methods and cross-section data documented a statistically significant negative impact of unemployment and long-term unemployment on both

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<sup>4</sup> See Wilson and Oswald (2005) and Wood et al. (2009) for excellent reviews of the health benefits of marriage.

<sup>5</sup> Unhappily married couples have higher risk of heart disease than those in a happy marriage, being the highest risk for married women aged 70-80 years-old (Lui and Waite, 2014).

<sup>6</sup> Lillard and Panis (1996) even find a negative or *adverse* selection into marriage suggesting that unhealthy men are actually more likely to (re)marry and to do it early.

self-assessed and mental health which worsened with the economic crisis.<sup>7</sup> Much closer to our analysis is the paper by Pascual and Rodriguez (2013b) who found, using individual-level data for Catalonia for the period 2010-2012 and matching techniques, that non-married individuals had worst mental health wellbeing.

### 3. Data & Empirical Methods

#### 3.1 Data description

We used microdata from the 2006-07 and 2011-12 editions of the Spanish National Health Survey (SNHS). The first survey collects information before the start of the crisis and the second survey reports data during the crisis. The SNHS is a biannual and nationwide cross-section survey collecting information on a wide array of self-assessed health status, primary and specialised healthcare utilization, consumption of medicines, lifestyles, preventive practices and socio-economic characteristics of individuals.<sup>8</sup> Both surveys contain separate adult and child samples in addition to a household questionnaire. This study is based on the adult sample matched with information gathered from the household sample.

Since our goal is to analyse the relationship between (marriage) divorce and separation and health, we restricted the sample only to married, divorced and legally separated adult individuals. As it will be clarified shortly, we decided to restrict the sample even further to individuals aged 20+. In this case, we have N= 18,303 (N= 12,326) adults for the 2006-2007 (2011-2012) dataset.<sup>9</sup>

#### 3.2 Treatment Effects: Matching Methods

We estimate the causal or treatment effect of divorce and legal separation (marriage) on mental health and binge drinking through the use of the propensity score matching method (Rosenbaum and Rubin, 1983) separately for the period 2006-2007 and 2011-2012.<sup>10</sup> The interest lies in estimating the ATET (Average Treatment Effect on the Treated) effect, particularly the average treatment effect of divorce/separation (marriage) on the health status of the divorced and legally separated (married) individuals. Let  $Y_{1i}$  denote the health outcome of individual  $i$  if he were to receive the treatment (divorce/separation) and let  $Y_{0i}$  denote the health outcome of individual  $i$  if not. Denote the treatment variable (divorce/separation) by a dummy variable,  $D_i$ .<sup>11</sup> The ATET is then defined as the expected difference:

$$E[Y_{1i} - Y_{0i}|D_i = 1] = E[Y_{1i}|D_i = 1] - E[Y_{0i}|D_i = 1] \quad (1)$$

where the first term of the right-hand side of equation (1) is the average health outcome of divorced/separated individuals (an observable characteristic), whereas the second term or counterfactual expresses the average health outcome of divorced/separated people had they not

<sup>7</sup> While Urbanos and López-Valcarcel (2014) used data for Spain (Spanish National health Survey), Pascual and Rodríguez (2013) used data for Catalonia (Catalan Health Survey).

<sup>8</sup> The SNHS follows a stratified multi-stage sampling procedure in which the primary strata are the Autonomous Communities and the sub-strata are then defined according to population size in particular areas. Within the sub-strata, municipalities and sections (primary and secondary sampling units respectively) are selected using a proportional random sampling scheme. Finally, individuals are randomly selected from the sections.

<sup>9</sup> The original 2006-07 dataset comprises 29,478 adults, whereas the 2011-12 dataset contains 21,007 adults, from all Spanish regions.

<sup>10</sup> See Stuart (2010) for an interesting discussion on matching methods and guidance on their use.

<sup>11</sup> Actually, the observed outcome of  $i$  is:  $Y_i = D_i Y_{1i} + (1 - D_i) Y_{0i}$ , where  $D_i \in [0,1]$ . Reordering we have:  $Y_i = Y_{0i} + (Y_{1i} - Y_{0i}) D_i$ . Note that the parenthesis is the causal effect on  $Y$ .

being divorced/separated. This latter term cannot be observed, as no individual is simultaneously observed in both states, though we can generate a control or comparison group to provide a consistent estimate of it.

Treatment effects are estimated in this paper by matching individuals, divorced/separated people and controls with similar distribution of observable characteristics ( $X$ ), using the propensity score, i.e., the conditional probability of treatment (divorce/separation) given a vector of observed covariates  $X$ :  $e_i(X_i) = P(D_i = 1|X_i)$ . Propensity scores will be estimated using a logit regression model and have the advantage of summarising all the covariates into one scalar. A key assumption to determine which covariates to include in the matching process is the “strongly ignorable treatment assignment” (Rosenbaum and Rubin, 1983) which implies that health outcomes are conditionally independent of treatment assignment ( $D$ ) given the covariates:  $Y_{i0}, Y_{i1} \perp D_i | X_i$ . In consequence, treatment assignment is also conditionally independent given the propensity scores. If valid, there are no unobserved differences between treatment and control groups conditional on the observed covariates (no omitted variable bias). To satisfy this assumption is important to include in the matching procedure all variables known to be related to both treatment assignment and the health outcomes (Stuart, 2010).<sup>12</sup> All this justifies matching based on the propensity score values rather than on the full set of covariates. Thus when treatment assignment is ignorable, the difference in means in the health outcomes between treated and control individuals, with a particular propensity score value, is an unbiased estimate of the treatment effect at that propensity score value.

For robustness purposes, we use different matching methods and estimators to estimate the ATET effect: k-nearest neighbours matching, kernel matching and radius matching.

### 3.3 Difference in Difference Estimation

Given that we have data on treated and control groups both before and during the economic crisis, we use Difference in Difference (DiD) methods to estimate the incremental effect of the recession on the health effect of divorce/separation (marriage). In particular we are aimed at estimating by OLS the following equation (see Meyer, 1995),

$$Y_{it}^g = \alpha + \theta t + \delta D^g + \gamma D_t^g + X_{it}^{g'} \beta_t + \varepsilon_{it}^g, \quad (i = 1, \dots, N; t = 0, 1) \quad (2)$$

where  $g$  is the group type (1 for the treated; 0 the untreated),  $t = 0$  means years 2006-2007 (before the crisis) and  $t = 1$  years 2011-2012 (during the crisis);  $D^g$  is a dummy variable for being in the treatment (divorced/separated) group ( $D^g = 1$  if  $g$  equals 1 and 0 otherwise);  $D_t^g$  is a dummy variable of being divorced/separated during (after) the crisis ( $D_t^g = 1$  if both  $g$  and  $t$  equal 1 and 0 otherwise);  $X$  is a vector of controls related to health and marriage and  $\varepsilon$  is the (zero mean and constant variance) error term. Interestingly, in this regression model, estimated from the pooled data, note that parameter  $\delta$  yields an estimate of the impact of divorce/separation on health outcomes in the base year or before the economic crisis; coefficient  $\theta$  captures a time trend effect on both treated and untreated groups, whereas parameter  $\gamma$  is the causal effect of divorce/separation on the health status of married people during (after) the recession.

In the estimation equation (2) we (partially) control for selection into marital status through the use of adult height, our proxy of initial (physical) health status. As height reaches a peak around approximately age 18-20 and then remains constant until late old-age, this measure

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<sup>12</sup> Another useful assumption is the overlap (support) condition that states:  $0 < P(D_i = 1|X_i) < 1$ , which ensures that for each treated individual there is another matched untreated individual with similar  $X$ .

can be fairly thought as a premarital health status for our sample of individuals aged 20+. Actually, there is evidence showing that height is a good marker of past wellbeing, net nutrition and good health status. In consequence, shorter individuals are more likely to have chronic conditions in later life and die earlier. Notice that the inclusion of height also means a control for current health, which is highly correlated with happiness and then with mental health. The (often) omission of this control for physical health (positively correlated with marriage) is a serious drawback, producing an overstatement of the benefits of marriage (Wilson and Oswald, 2005).

### *Health Outcomes and Controls*

Following the literature on marriage and health the two health outcomes examined in this paper are adult mental health and heavy drinking, which are anyway very sensible to economic downturns. On the one hand, we measure mental health from the answers given to a 12-item set of questions provided by GHQ-12 questionnaire, a well-known screening instrument to detect mental disorders.<sup>13</sup> Based on a 4-point Likert-type scale scoring, these questions admit two types of answers and four potential responses (coded from 0 to 3).<sup>14</sup> Responses 0,1 are additionally recoded to 0 (“no problem”) and responses 2,3 are recoded to 1 (“with problems”) and summed for the whole set of questions defining the Golberg index. Mental health risk is then defined as a dummy variable with value 1 if the individual has a score equal or greater than 3, indicating the presence of 3 or more mental health problems.<sup>15</sup> On the other hand, and after recognizing the complexities in defining heavy drinking, we opted here to define it as the daily consumption of 3+ drinks (units) of any alcoholic beverage for both genders.

The set of controls ( $X$  vector) used in both the matching and DiD analyses, which are highly related to the decision of being married and the two health outcomes, are shown in Table 1. We considered as demographic controls the respondent’s gender, age and age square, the latter intended to capture a non-linear relationship. The influence of education attainment is measured by three dummies (low and primary education, secondary education and university education), where the reference category is the lowest education level. Given that individual’s labour market status affects the decision and timing of marriage (Ahn and Mira, 2001), we also included two labour market covariates aimed to account for some form of household and/or economic stability: long-term unemployment (unemployed for 1 or more years) and long-term labour contract (civil servant or infinite duration labour contract).<sup>16</sup> Finally, the regressions were adjusted for the presence of children in the household and urban size. This latter control may act as a proxy for the availability of social contact opportunities affecting the probability of (re)marriage and also mental wellbeing. Note that in both analyses we incorporated self-reported individual’s height, acting as a proxy for innate physical health status, in order to overcome a problem of selection bias; and sedentary behaviour as an independent determinant of physical health.

There are two potential controls -widely documented as key factors of the health advantage effect- which may be considered for the estimation of the matching logit model for propensity of marriage: indicators of marriage quality and satisfactory personal relationships

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<sup>13</sup> With a Cronbach’s alpha of 0.76, Sánchez-López and Dresch (2008) find that the GHQ-12 shows adequate reliability and validity to assess the overall psychological wellbeing and to detect (non-psychotic) psychiatric problems in the Spanish adult population.

<sup>14</sup> Type 1 answers are: more than usual; equal than usual; less than usual; much less than usual. Whereas type 2 answers are: no, absolutely; no more than usual; something more than usual; much more than usual.

<sup>15</sup> This measure of mental health risk was also used by Bartoll et al. (2013); Urbanos and López-Valcárcel (2014) and Pascual and Rodríguez (2013).

<sup>16</sup> We also account for household net income in an alternative specification, measured in monthly and logarithm terms, although unfortunately this control has many missing observations in our database.



among non-married individuals. Unfortunately the data set used in this paper does not allow us to construct these covariates (see Horwitz et al., 1996).<sup>17</sup>

## 4. Results

### 4.1 Descriptive statistics

Table 1 reports the mean and standard deviation of the whole set of variables of the regressions for the sample of married, divorced and legally separated individuals aged 20+. The data show that the number of divorced and legally separated individuals increased over the course of the economic recession in Spain from 6.7% in 2006-07 to 7.84% in 2011-12. However, the data confirm a slightly improvement in mental wellbeing, since those who report 3+ mental health problems decreased from 21.47% in 2006-07 to 20.42% in 2011-12; and a hard drop in heavy drinking (from 5% in 2006-07 to 2.47% in 2011-12). It is worth noting that the distribution of the covariates in the two time periods are roughly similar with the exception of both low and secondary education, which experienced a radical change in these years, and presence of children in the household. Of course, consistent with the huge economic crisis suffered in this time period, the data evidence a sharp increase of the long-term unemployment rate from 2.39% in 2006-07 to 7.13% in 2011-12 for our sample of individuals.

As expected, Table 2 shows that divorced and legally separated individuals experience much worse mental wellbeing and higher heavy drinking of alcohol in both time periods, compared to the married group. Notice that the magnitude of the gap in both outcomes is substantial. Interestingly, despite the impact of the crisis the two health outcomes improved over these years. The improvement in heavy drinking is consistent with other evidence showing that the decrease in alcohol use occurring during bad times is concentrated among heavy drinkers (Ruhm and Black, 2003). Alcohol consumption seems to cut, among recent job losers, when the economy deteriorates. However, the improvement reported in mental health (notably among divorced and legally separated) is clearly in contrast with some results indicating its procyclical nature, whereas physical wellbeing is not (Ruhm 2000, 2003).<sup>18</sup>

### 4.2 Matching and DiD estimates

The results of the matching estimations for mental health and heavy drinking are presented in Tables 3 and 4, respectively.<sup>19</sup> Both tables show the ATET effect or causal impact of being divorced and legally separated on the two health outcomes for 2006-07 and 2011-12. As can be seen, we use firstly the  $k$ -nearest neighbour matching method ( $k=1-4$ ) based on the common support and ties options, standard errors are computed as in Abadie and Imbens (2006) and a caliper distance of 0.05 is employed. Alternatively, we use the kernel matching method based on a normal distribution and the radius method with a radius of 0.05. In both cases, the common support option is considered. Columns (1) and (6) in both tables report the average health outcome for the divorced/separated individuals (treated group); columns (2) and (7) show the counterfactual or the estimated average health outcome of divorced/separated people had they been married (control or untreated group), whereas columns (3) and (8) report the ATET

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<sup>17</sup> Even if we had such information, notice that it would be endogenous with mental health and binge drinking, so unidirectional causality would be guaranteed.

<sup>18</sup> Urbanos-Garrido and López-Valcarcel (2014) showed similar evidence for their subgroups of employed, unemployed and never worked and mid-term unemployed Spanish individuals.

<sup>19</sup> These estimations are performed using the `Psmatch2` Stata command (version 4.0.11) by Leuven and Sianesi (2003). These results are highly similar to those obtained when using the Stata command `nnmatch` (Abadie et al., 2004).

coefficient. The logit estimations for the propensity score are displayed in Table A of the Appendix.<sup>20</sup>

Regarding mental health Table 3 shows that the estimated ATET coefficient is positive and highly statistically significant for both time periods examined and robust to the alternative matching approaches used. That is, our results indicate that being divorced/separated cause a deterioration in mental health before the economic recession and also during the crisis. Upon controlling for the set of  $X$  regressors, being divorced/separated increases the probability of reporting mental health risk by approximately 12 percentage points (years 2006-07) and by roughly 8-9 percentage points for the period 2011-12. A similar picture emerges from the estimates for heavy drinking. The ATET or causal impacts reported in columns (3) and (8) in Table 4 are also positive and statistically significant, suggesting that the marital loss of divorce/separation increases the probability of heavy alcohol abuse between 2.5-3 percentage points before the economic recession and between 1.7-2.1 percentage points during the crisis. Although not shown, the same conclusions are obtained (ATET coefficients hardly differ) when the control for innate health (self-reported height) is excluded from the estimation or an alternative specification including household income is considered. These specifications, however, leaves more observations out of the common support option.<sup>21</sup>

The results of the DiD regressions based on the estimation of equation (2) are reported in Tables 5-6. In both tables parameter  $\delta$  measures the effect of divorce/separation on the health outcome in the base year or before the crisis, parameter  $\theta$  reports the effect of the crisis on the health outcomes of the two subgroups and our parameter of interest,  $\gamma$ , shows the change in the effect of divorce/separation on each health outcome during (after) the crisis compared to the baseline year. Note that these estimations account for the complete set of controls including individual's height, a proxy for innate physical health status, and sedentary behaviour.

As shown in Table 5, divorce/separation has a large, positive and highly significant effect on mental health risk before the economic recession for both the entire sample and by gender, confirming previous results of worse mental wellbeing among divorced/separated individuals compared to the married group. However, the interaction term  $\gamma$  is negative and statistically significant evidencing that the detrimental effect of divorce/separation on psychological health is decreased because of the recession. Interestingly, this amelioration on mental health associated to divorce and separation during (after) the crisis is only observed for the subsample of male individuals. Meanwhile, Table 6 confirms that heavy drinking is significantly higher among divorced/separated individuals before the adverse times and there is even an improvement in this unhealthy behaviour after the crisis. Notwithstanding, the results show that heavy drinking does not seem to worsen more with divorce/separation during the economic downturn than before the start of the crisis.<sup>22</sup>

#### *4.3 Robustness checks*

To check the consistency of these DiD findings we performed some sensitivity analysis. Firstly, we used another treatment group (singles), that is, a subpopulation we hypothesised was

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<sup>20</sup> We report just for the sample before the crisis (years 2006-07) a positive and significant coefficient of the health proxy indicating the presence of a selection effect.

<sup>21</sup> Regarding the covariates balance, the k-nearest neighbour and radius matching estimations of Tables 3 and 4 produced low values of the mean and median standardised percentage bias and values of the Rubin's B and Rubin's R tests within the recommended intervals for both periods of time. Notwithstanding, the kernel matching method showed just for the Rubin's B test and the sample 2006-07 values outside the range with a 30% of concern (Rubin, 2001).

<sup>22</sup> The same results are obtained when self-reported height is excluded from the estimation.

not affected by the economic crisis. We found that the interaction term for both health outcomes was not statistically different to zero at 95% confidence level, suggesting that our original DiD estimates are likely to be unbiased. Secondly, we used a different comparison group (married and singles) and, as expected, we obtained very similar DiD coefficients. Thirdly, in addition to the above set of controls used in both the matching and DiD analyses, we included a proxy of social support network, which is known to have important anti-depressive effects and also affect alcohol consumption.<sup>23</sup> Interestingly, this new set of DiD coefficients were similar to the baseline estimates although relatively of lower magnitude. Notice that our preference for the initial estimates is due to the fact that this specification may be subjected to a reverse causality problem given the strong association between social support and divorce and separation in the matching estimations.

## 5. Conclusion

There is plenty of empirical evidence showing the protective effects of marriage on health and mental wellbeing even after accounting for reverse causality. Different theoretical explanations have been discussed supporting these findings. This paper seeks to contribute to this literature examining whether this advantage is still valid or present in recession times using cross-section data for Spain. To this end we follow a two stage empirical strategy. Firstly, we use propensity score matching techniques to estimate the causal impact of divorce and legal separation on two sensible health outcomes: mental health and binge drinking both before and after (during) the economic crisis. Secondly, we examine whether there exists an incremental or detrimental effect on these health outcomes implied by the economic recession using difference-in-difference (DiD) regression methods, upon conditioning on a proxy of innate health status.

The results from the matching estimation indicate that divorce and separation cause a large and significant deterioration of mental health and a significant raise in heavy alcohol drinking in our sample of adults both before the economic recession and after (during) the crisis. That is, upon controlling for the set of  $X$  regressors, being divorced/separated increases the probability of reporting mental health risk by approximately 12 percentage points (years 2006-07) and by roughly 9 percentage points for the period 2011-12. Similarly, the ATET coefficients show that divorce/separation increases the probability of heavy alcohol abuse between 2-2.5 percentage points before the economic recession and between 1.6-2 percentage points during the crisis. These findings appear to be consistent to alternative matching approaches. Moreover, the DiD estimates, after accounting for a complete set of controls including height, show that the detrimental effects on psychological health are actually lowered because of the recession, although this amelioration is observed only in male individuals. On the other hand, heavy drinking does not seem to worsen more with divorce/separation during the economic downturn. These results are robust to some sensitivity tests and different specifications.

In other words, the findings reported in this paper, at least from our sample of data, would suggest that the marriage institution, contrary to what is generally believed, would not be protecting mental health status, mainly in male individuals, under a period of economic crisis. At the contrary, marital dissolution through divorce/separation (although proven to be a stressful even) would be enhancing mental well-being. We speculate that it may act as an escape mechanism to confront the usual financial constraints and other stress-related issues which are

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<sup>23</sup> Specifically, we calculated the 11-item Duke social support index (DSSI) aimed at measuring subjective functional social support. It is computed using a Likert scale from answers ranging from “As much as I would like” (score of 5) to “Much less than I would like (score of 1). These scores are then summed (maximum of 55) and then divided by 11 to get an average score. The greater is this index the greater is the perceived social support. This index has been validated and adapted to the Spanish population (Bellón et al., 1996).

strengthened during a prolonged period of recession. Of course, these findings are not against the claim that marriage could be effective in protecting financial and/or property assets of spouses under hard times. Actually empirical evidence tend to document a pro-cyclical evolution of the divorce rate.<sup>24</sup>

A common criticism refers to the fact that economic recessions, accompanied with high unemployment and lower incomes, reduce access to the healthcare system and consequently medications and treatments accentuating the negatives effects on physical and mental wellbeing. However, this situation is unlikely for Spain that maintained its universal healthcare coverage during this period.

However, these results must be taken with some caution due to a number of limitations of the study. First, DiD methods attribute any differences in trends between the treatment and control groups, that occur at the same time as the intervention, to that intervention. That is, if there are other factors that affect the difference in trends between the two groups, then the estimation will be biased! Second, the ignorable treatment assignment is a strong assumption becoming invalid if there are unobservable factors affecting both marriage and the error term of the health equation. Third, the lack of longitudinal data does not allow us to really control for the reverse causality problem through a measure of innate or previous health status as it is usually done in the literature. We are also unable to control for premarital psychological wellbeing. This explains our decision of using (self-reported) height as a proxy of initial health status to control for the selection issue. Fourth, unfortunately we also lack information on marriage quality or marital conflict which is reported to have large beneficial effects on mental health; or information on marital duration as an additional control. This means we cannot distinguish in our sample whether the significant effect of marriage is partly driven by a transitory effect by those newly married who feel initially happier. According to Johnson and Wu (2002) this is a potential reason why married individuals might incorrectly appear to have better mental health. Actually, findings by Marks and Lambert (1998) suggest that newlywed individuals are making a significant contribution to an inflation of the mean for psychological well-being among the married in most cross-section papers.

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<sup>24</sup> For instance, González-Val and Marcén (2016) using country level data of 29 European countries spanning from 1991-2012, evidence that unemployment rate negatively affects the divorce rate, even after controlling for socio-economic covariates and country and time unobserved effects.

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TABLE 1. Variable definitions and sample descriptive

Variable	Description	Mean (St. dev.)	
		Sample 2006-07 (N=18,303)	Sample 2011-12 (N=12,326)
Mental health risk	1 if reporting 3 or more mental health problems in the Golberg index	0.2147 (0.410)	0.2042 (0.403)
Heavy drink.	1 if reporting the daily consumption of 3+ drinks (units) of any alcoholic beverage	0.0500 (0.218)	0.0247 (0.155)
Div.-Separ.	1 if divorced or legally separated	0.0670 (0.250)	0.0784 (0.269)
Female	1 if female	0.5166 (0.500)	0.5003 (0.500)
Age	Age in years	50.62 (14.87)	51.85 (14.72)
Age square	Square of age in years	2782.92 (1603.83)	2904.80 (1622.21)
Low educ.	1 if primary or less than primary education (reference category)	0.4728 (0.499)	0.2285 (0.420)
Second. educ.	1 if compulsory and non-compulsory secondary education, pre-university education or specific labour training	0.3654 (0.482)	0.6160 (0.486)
Univ. educ.	1 if university education	0.1618 (0.368)	0.1554 (0.362)
Long-term unempl.	1 if reporting one or more years unemployed	0.0239 (0.152)	0.0713 (0.257)
Long-term contract	1 if reporting to be a civil servant or have an indefinite duration contract	0.3108 (0.463)	0.3047 (0.460)
Log income	Logarithm of monthly household net income (in €)	7.270 (0.616)	7.244 (0.603)
Presence of children	1 if there are children living in the household	0.3919 (0.488)	0.6185 (0.486)
Town_1	1 if living in a town up to 10,000 inh.	0.2263 (0.418)	0.2152 (0.411)
Town_2	1 if living in a town between 10,001 and 500,000 inh. (reference category)	0.6021 (0.489)	0.6372 (0.481)
Town_3	1 if living in a town with 500,001+ inh.	0.1717 (0.377)	0.1476 (0.355)
Sedentarism	1 if seated most of the time of the day in the main activity (job, at home, education centre...)	0.3000 (0.458)	0.3406 (0.474)
Height	Self-reported height (in cm.)	166.31 (9.160)	166.97 (9.129)

Note: Information based on the Spanish National Health Survey, editions 2006-07 & 2011-12. Sample of married, divorced and legally separated individuals aged 20+. Means are calculated using sampling weights.



TABLE 2. Health outcomes by marital status before and during (after) the crisis

		Mean (St. dev.)	
		Years 2006-07	Years 2011-12
Mental health risk	Divorced-Separated	0.3252 (0.469)	0.2945 (0.456)
	Married	0.2093 (0.407)	0.2019 (0.401)
Heavy Drinking	Divorced-Separated	0.0638 (0.245)	0.0407 (0.198)
	Married	0.0412 (0.199)	0.0245 (0.155)

Note: Means are calculated without sampling weights.

TABLE 3. Causal impact of Divorce/Separation on Mental Health risk: Matching estimations (Years 2006-2007 & 2011-2012)

	Year 2006-2007					Year 2011-2012				
	Div/Sep E[Y <sub>1</sub>   D=1] [1]	Married E[Y <sub>0</sub>   D=1] [2]	ATET Impact [3]	S.E. [4]	T-statistic [5]	Div/Sep E[Y <sub>1</sub>   D=1] [6]	Married E[Y <sub>0</sub>   D=1] [7]	ATET Impact [8]	S.E. [9]	T-statistic [10]
Single Nearest Neighb. Match. <sup>a</sup>	0.3226	0.1985	0.1241	0.0163	7.60	0.2860	0.1995	0.0866	0.0178	4.87
2- Nearest Neighb. Match. <sup>a,b</sup>	0.3226	0.1970	0.1255	0.0152	8.26	0.2860	0.2034	0.0826	0.0160	5.17
3- Nearest Neighb. Match. <sup>a,b</sup>	0.3226	0.2012	0.1214	0.0145	8.36	0.2860	0.2063	0.0797	0.0152	5.25
4- Nearest Neighb. Match. <sup>a,b</sup>	0.3226	0.2007	0.1218	0.0142	8.55	0.2860	0.2067	0.0794	0.0148	5.35
Kernel Matching <sup>c</sup>	0.3226	0.2006	0.1219	0.0128	9.49	0.2860	0.2008	0.0852	0.0132	6.42
Radius Matching <sup>d</sup>	0.3226	0.2017	0.1209	0.0129	9.36	0.2860	0.2032	0.0829	0.0134	6.17

Notes: Estimations based on the Stata command Psmatch2. <sup>a</sup> Common support and ties options are used. Standard errors computed as in Abadie & Imbens (2006); <sup>b</sup> A caliper distance of 0.05 is used; <sup>c</sup> Normal distribution is assumed and the common support option is used; <sup>d</sup> Based on a radius of 0.05, common support is used. Controls: female, age, age square, secondary educ., university educ., long-term unemployment, long-term labour contract, presence of children, small and large urban size and height.

TABLE 4. Causal impact of Divorce/Separation on Heavy Drinking: Matching estimations (Years 2006-2007 & 2011-2012)

	Year 2006-2007					Year 2011-2012				
	Div/Lsep E[Y <sub>1</sub>   D=1] [1]	Married E[Y <sub>0</sub>   D=1] [2]	ATET Impact [3]	S.E. [4]	T-statistic [5]	Div/Lsep E[Y <sub>1</sub>   D=1] [6]	Married E[Y <sub>0</sub>   D=1] [7]	ATET Impact [8]	S.E. [9]	T-statistic [10]
Single Nearest Neighb. Match. <sup>a</sup>	0.0654	0.0410	0.0243	0.0084	2.91	0.0420	0.0208	0.0213	0.0068	3.14
2- Nearest Neighb. Match. <sup>a,b</sup>	0.0654	0.0414	0.0240	0.0076	3.14	0.0420	0.0219	0.0202	0.0065	3.09
3- Nearest Neighb. Match. <sup>a,b</sup>	0.0654	0.0398	0.0256	0.0073	3.49	0.0420	0.0219	0.0202	0.0063	3.20
4- Nearest Neighb. Match. <sup>a,b</sup>	0.0654	0.0374	0.0280	0.0071	3.94	0.0420	0.0239	0.0181	0.0063	2.89
Kernel Matching <sup>c</sup>	0.0654	0.0422	0.0232	0.0066	3.49	0.0420	0.0251	0.0170	0.0058	2.92
Radius Matching <sup>d</sup>	0.0654	0.0411	0.0242	0.0067	3.63	0.0420	0.0250	0.0170	0.0059	2.90

Notes: Estimations based on the Stata command Psmatch2. <sup>a</sup> Common support and ties options are used. Standard errors computed as in Abadie & Imbens (2006); <sup>b</sup> A caliper distance of 0.05 is used; <sup>c</sup> Normal distribution is assumed and the common support option is used; <sup>d</sup> Based on a radius of 0.05, common support is used. Controls: female, age, age square, secondary educ., university educ., long-term unemployment, long-term labour contract, presence of children, small and large urban size and height.

TABLE 5. DiD estimates for Mental Health Risk

Dependent Variable: Mental Health Risk				
Sample	Effect	Coefficients	R-squared	N
Entire	( $\delta$ ) Effect of Div/Sep in the base year 2006-07	0.1185 (0.0127)***	0.037	27738
	( $\theta$ ) Time Effect	- 0.0005 (0.0054)		
	( $\gamma$ ) Change in the effect of Div/Sep on MHR after the crisis	- 0.0399 (0.0180)**		
Male	( $\delta$ ) Effect of Div/Sep in the base year 2006-07	0.1265 (0.0200)***	0.031	12341
	( $\theta$ ) Time Effect	0.0096 (0.0072)		
	( $\gamma$ ) Change in the effect of Div/L-Sep on MHR after the crisis	- 0.0729 (0.0270)***		
Female	( $\delta$ ) Effect of Div/Sep in the base year 2006-07	0.1131 (0.0164)***	0.026	15397
	( $\theta$ ) Time Effect	- 0.0117 (0.0080)		
	( $\gamma$ ) Change in the effect of Div/Sep on MHR after the crisis	- 0.0146 (0.0241)		

Note: Robust standard errors in parenthesis. \* p-value<0.1; \*\* p-value<0.05; \*\*\* p-value<0.01. Controls: female, age, age square, secondary educ., university educ., long-term unemployment, long-term labour contract, presence of children, small and large urban size, sedentarism and height.

TABLE 6. DiD estimates for Heavy Drinking

Dependent Variable: Heavy Drinking				
Sample	Effect	Coefficients	R-squared	N
Entire	( $\delta$ ) Effect of Div/Sep in the base year 2006-07	0.0242 (0.0065)***	0.039	28438
	( $\lambda$ ) Time Effect	- 0.0246 (0.0025)***		
	( $\gamma$ ) Change in the effect of Div/Sep on HD after the crisis	- 0.0043 (0.0085)		
Male	( $\delta$ ) Effect of Div/Sep in the base year 2006-07	0.0593 (0.0161)***	0.023	12671
	( $\lambda$ ) Time Effect	- 0.0467 (0.0049)***		
	( $\gamma$ ) Change in the effect of Div/Sep on HD after the crisis	- 0.0209 (0.0203)		
Female	( $\delta$ ) Effect of Div/Sep in the base year 2006-07	0.0022 (0.0040)	0.003	15767
	( $\lambda$ ) Time Effect	- 0.0051 (0.0017)***		
	( $\gamma$ ) Change in the effect of Div/Sep on HD after the crisis	- 0.0028 (0.0050)		

Note: Robust standard errors in parenthesis. \* p-value<0.1; \*\* p-value<0.05; \*\*\* p-value<0.01. Controls: female, age, age square, secondary educ., university educ., long-term unemployment, long-term labour contract, presence of children, small and large urban size, sedentarism and height.

Appendix

Table A. Logit estimations of the Probability of Divorce/Separation in 2006-07 and 2011-12

Prob. Div/Sep	Years 2006-07 Coefficient	z	Years 2011-12 Coefficient	z
Female	0.2670 (0.0794)	3.36	0.3706 (0.0842)	4.40
Age	0.1413 (0.0171)	8.24	0.2215 (0.0215)	10.31
Age square	-0.0015 (0.0002)	-9.01	-0.0023 (0.0002)	-10.71
Second. educ.	0.3473 (0.068)	5.11	0.0998 (0.0876)	1.14
Univ. educ.	0.1080 (0.0905)	1.19	-0.0509 (0.1155)	-0.44
Long-term unempl.	0.8482 (0.1376)	6.16	0.6620 (0.1055)	6.28
Long-term contract	0.1718 (0.0673)	2.55	0.2566 (0.0731)	3.51
Presence of children	-0.8208 (0.0701)	-11.71	-1.0008 (0.0668)	-14.99
Town_1	-0.3724 (0.0713)	-5.22	-0.3551 (0.0808)	-4.39
Town_3	0.1087 (0.0831)	1.31	0.2106 (0.090)	2.33
Height	0.0091 (0.0043)	2.12	0.0009 (0.0047)	0.20
Cons	-6.8443 (0.8886)	-7.70	-7.0590 (0.9981)	-7.07
N	16823		11636	
Wald Chi2	375.39		447.79	
Pseudo R2	0.0447		0.0664	

Note: Robust standard errors in parenthesis