RESEARCH PAPER

Revisiting the Relationship Between Marriage and Wellbeing: Does Marriage Quality Matter?

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Abstract This paper revisits the marriage and wellbeing relationship using variables reflecting marriage quality and data from the US, the UK and Germany. People in self-assessed poor marriages are fairly miserable and much less happy than unmarried people, even in the first year of marriages. However, people in self-assessed good marriages are even happier than the literature suggests. Women show greater range of responses to marriage quality than men. The effect of employment status and subjective health on happiness and the marriage effects on interpersonal trust and mental health change dramatically when marriage quality is controlled for. A strong link from happiness to marriage does not exist. However, happier people are more likely to stay single instead of being unhappily married, but less likely to stay single compared to being very happily married and happiness cannot predict staying single versus being pretty happily married.

1 Introduction

The relationship between marriage and happiness has been studied widely in a range of social science disciplines and there is a comfortable consensus that marriage has a positive

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and enduring influence on well-being.[1] Typically empirical studies of the issue report estimations of models using person-level data with measures of self-reported happiness or life satisfaction[2] as the dependent variable. This is considered to be a function of being married or unmarried (only as a dummy variable) and a host of other independent variables. In these studies, the coefficient for the married category is always positive and statistically significant while the size of the coefficient for the married category varies across studies.[3]

Economic theory for this finding is provided in Becker (1973) who applies the theory of preferences for marriage since marriage is practically always voluntary by the persons marrying. The obvious explanation for marriages between men and women lies in the desire to raise children and the physical and emotional attraction between sexes. Moreover, persons in love can reduce the cost of frequent contact and of resource between each other by sharing the same household. Economies of scale may also be secured by joining households. According to Becker (1973), marrying persons can be assumed to expect to raise their utility level above what it would be were they to remain single. The gain from marriage compared to remaining single for a man and a woman is related to the "compatibility" or "complementarity" of their time, goods, and other inputs used in household production. The gain from marriage also depends on traits, such as beauty, intelligence, and education that affect non-market productivity as well as market opportunities while increase in the value of traits that have a positive effect on non-market productivity (market productivity held constant) would generally increase the gain from marriage.

Stutzer and Frey (2006) examine the causal relationship between marriage and subjective well-being in a longitudinal dataset spanning 17 years, the goal being to separate selection effects from the role of marriage per se and report that happier singles are more likely to become married. However, even correcting for this selection, there are apparently remaining large positive effects from marriage. The authors also (Stutzer and Frey (2006)) find huge differences in how spouses feel in their lives as newly-married couples (in terms of overall life satisfaction) but do not exploit the information on the self-rated quality of the relationships. But if being married makes people happy, why is divorce so prevalent? According to Becker (1973), the benefits of marriage depend on how much spouse's expectations prior to marriage are met during marriage. However, previous estimation approaches treat people who are married (or single, or divorced, or widowed) as either being in this state or not being in this state without controlling for different levels of marriage quality. Our motivation is to test this proposition, with the following contributions.

First, we are able to examine the role of marriage quality in explaining the relationship between marriage and wellbeing using person-level data from the US, the UK and Germany. In other words, we test the proposition that self-reported measures of people's satisfaction with their marriages (or partner, or family) affect their general level of happiness, and perhaps in an important enough way to undermine the consensus concerning the marriage-happiness connection. We do not have exogenous shifters of marriage so

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[1] For example, from sociology and demography see Waite (1995) and Waite and Lehrer (2003), and from economics, Frey and Stutzer (2002) and Layard (2005). See also Graham (2009) for a summary of findings on marriage and happiness.

[2] In the paper we use the terms "happiness" and "life satisfaction" interchangeably. One data set which we know of, the European Social Survey, has measures of both variables; we computed the correlation coefficient between them and found it to be 0.72 (author's calculations).

[3] See Table 1 for the previous findings on the married dummy using different estimation methods and datasets.

Table 1 Literature review on the happiness-marriage relationship

Author	Country of data	Year	Method	Happiness scale	Coefficient/ marginal effect	Regression method
Blanchflower and Oswald	UK	1975–1998	Married dummy	1–4	0.41	OLS
Alesina et al.	US	1981–1996	Married dummy	1–3	0.31	Ordered logit
Alesina et al.	12 European countries	1975–1992	Married dummy	1–3	0.29	Ordered logit
Clark et al.	Australia	2001	Married dummy	0–10	0.31 (men)	Ordered logit
Clark et al.	Australia	2001	Married dummy	0–10	0.20 (women)	Ordered logit
Stutzer and Frey	Germany	1984–2001	Married dummy	0–10	0.30	OLS
Dockery	Australia	1997–2002	Married dummy	1–4	0.74	Random effects logit
Graham et al.	Russia	1995	Married dummy	1–5	0.15	Ordered logit
Ferrer-i-Carbonell and Frijters	Germany	1984–2001	Married dummy	0–10	0.07	FE OLS

We present a summary of the findings in the literature. The coefficients are given for OLS and marginal effects for other specifications

terms like "matters" should not be understood in a causal sense but only as a predictive correlation while we provide discussions and robustness estimations on this issue in Sect. 5.

In the previous literature examining the marriage-happiness relationship using a married dummy, several variables are included in the models as controls such as log household income, house ownership, employment status, sex, age, age squared, years of education, log household size, self-reported health, the number of children, religion, and region of residence. Exclusion of marriage quality as a control in these estimations could create omitted variables bias if marriage quality is also correlated the independent variables included in the model. Therefore, as a second contribution, we examine whether or not controlling for marriage quality changes the relationship between other independent variables and happiness.

On the other hand, there is a great deal of social science research aimed at explaining variations in individual levels of physical and emotional health, of which the happiness literature is a (substantial) subset. Other indicators of well-being include measures of self-reported health, feelings about suicide, mental and emotional health and levels of interpersonal trust. The literature has established a positive and significant relationship between being married and good health for both men and women.[4] Kiecolt-Glaser and Newton (2001) find that marriage has indirect positive influences on health outcomes through diminution of depression and lifestyle health risks, and direct positive influences on cardiovascular, endocrine, immune, neuro-sensory, and other physiological mechanisms. In addition, married people live longer than unmarried people, a result that Guven and Soloumidies (forthcoming) attribute partly to the influence of marriage on increased happiness. Finally, Grundy and Sloggett (2003) show that social support due to being married has an important and positive effect on psychological and self-rated health. In line with these studies, as a third contribution, we examine the influence of marriage and marriage quality interaction on several non-happiness wellbeing outcomes.

In our basic specifications, we estimate Ordinary Least Squares (OLS) models using three large surveys, the US General Social Survey (GSS), the British Household Panel Study (BHPS) and the German Socio-Economic Panel (GSOEP), which all include information on self-reported happiness and indicators for marriage quality. We find that the coefficient on the married dummy is significant and of the order of 0.251, 0.205 and 0.136 (or about 8.37, 6.84 and 4.54 %) for the US, the UK, and Germany. However, through the use of categorical approaches with respect to marriage quality, we find very large differences in the happiness effects of being married, with the range for these countries being, respectively: −0.476 to +0.437, −0.547 to +0.292, and −0.268 to +0.343 (or about −15.87 to + 4.57, −18.24 to +9.74 and −8.94 to +11.44 %). We test the idea that marriage quality effects on happiness differ between women and men, the result being that women's reported levels of happiness are more conditioned by the quality of their marriage than is the case for the men.

When marriage quality is controlled for, coefficients (in terms of both the size and the significance) on household income, being a renter, being unemployed, education, household size, having one child instead of no children and age do not change much in a happiness regression. However, the coefficient on not being in the labor force decreases considerably while the coefficient on self-reported good health increases very significantly. In addition, the effect of having more than one child (compared to having no children) decreases while the female happiness premium increases slightly. Controlling for marriage quality also changes the relationship between marriage and other wellbeing outcomes. For example, people in high quality marriages report higher levels of health and interpersonal

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[4] See Ross et al. (1990) for a review.

trust while people in poor quality marriages report lower levels of health and interpersonal trust (all compared to being unmarried). In addition, suicide is significantly less likely to be justified among people in high quality marriages.

2 Data

We use three large surveys, the US GSS, the BHPS and the GSOEP which all include self-reported measures of happiness/life satisfaction and marriage quality. Admittedly, the focus of this paper is not on the comparison of Germany, the UK and the US. Rather, we use these datasets because the BHPS and the GSOEP are two of the main panel surveys that have been used in the happiness literature, so that results obtained with both sources will have more generality and the US GSS provides data from much earlier years starting in 1970s. Conducting the same analysis on three datasets separately is one way to include a self-contained "replication check" on the validity of the results. Using several datasets also allows exploiting complementary pieces of information. For instance, the BHPS has information on satisfaction with partner, whereas US GSS has information about happiness with marriage and GSOEP has information on happiness with family.

2.1 US General Social Survey

The US GSS is carried out annually for most years 1972–1994, and biennially beginning in 1994. The dependent variable used in our analysis is the response to the question, "Taken all together, how would you say things are these days—would you say that you are very happy, pretty happy, or not too happy?" The response is recoded as a categorical variable taking the values 1, 2 and 3 which in order refer to "not too happy," "pretty happy," and "very happy."[5] There were insufficient observations in any single year so we pooled the data and this produced 23,045 observations.[6] The measure of marriage quality is taken to be respondents' answers to the following question: "Taking things all together, how would you describe your marriage—would you say that your marriage is very happy, pretty happy, or not too happy?". The response is recoded as a categorical variable taking the values 1, 2, and 3 which respectively refer to "not too happy," "pretty happy," and "very happy." In a robustness test we used family satisfaction as another measure of marriage quality which is the response to the question: "From each area of life I am going to name, tell me the number that shows how much satisfaction you get from that area: your family, with responses measured as: a very great deal (7); a great deal (6); quite a bit (5); a fair amount (4); some (3); a little (2); none (1).

2.2 British Household Panel Survey

The BHPS began in 1991 and follows the same individuals over a period of years interviewing every adult member of sampled households. It contains sufficient cases for meaningful analysis of certain groups such as the elderly or lone parent families.[7] The first round consists of 5,500 households and 10,300 individuals drawn from 250 areas of Great

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[5] We have omitted observations with the responses "Don't know", "No answer" and "Not applicable", of which there were less than 10 %.

[6] This is an acceptable procedure given that there are no repeated observations.

[7] For further information on BHPS, see http://www.esds.ac.uk/longitudinal/access/bhps/L33196.asp.

Britain. Additional samples of 1,500 households in each of Scotland and Wales were added to the main sample in 1999, and a sample of 2,000 households in Northern Ireland was added in 2001, making the panel suitable for UK-wide research. The BHPS has information on an individual's life satisfaction together with the individual's satisfaction with his/her partner (if partnered), both of which are measured on a scale from 1 to 7 for the period 1996–2007. To be consistent with the US data, we recoded the life satisfaction variable in the BHPS into three categories as follows: (1–3) not too happy; (4, 5) pretty happy; (6, 7) very happy. We measure marriage quality with the use of the respondent's satisfaction with his/her partner, which is measured from 1 to 7. Again, to be consistent with the US data, we have recoded this variable into three categories as follows: (1–3) not too happily married; (4, 5) pretty happily married; (6, 7) very happily married.

2.3 German Socio-economic Panel

The GSOEP is a wide-ranging representative longitudinal annual collection of data on private households conducted since 1984.[8] The survey includes information on living conditions, place of residence, values, willingness to take risks, socio-economic factors, the changes currently being undergone in various areas of individuals' life, and with respect to the relationships and dependencies among these areas. Life satisfaction is measured as a categorical variable taking values 0–10 (where 0 is totally unhappy and 10 is totally happy) and is available for every year in the survey. To be consistent with the US and the recoded UK data, we recoded life satisfaction as a three category variable: (0–6) not too happy; (7, 8) pretty happy; (9, 10) very happy. In our estimations for Germany, we used 18,054 observations from the 25th round of the data which was conducted in 2007. The measure of marriage quality is respondents' "satisfaction with family" which takes values from 0 to 10, a variable which exists only for the years 2006 and 2007. Again to be consistent with the US and recoded UK data, we recoded this variable as a three category variable: (0–6) not too happily married; (7, 8) pretty happily married; (9, 10) very happily married.

2.4 Descriptive Statistics

Figure 1 shows the distribution of the measures of happiness for the US, the UK and Germany by marital status. In all three countries married people are more likely to report themselves as being in the happiest category than unmarried people. Also in all three countries, married people are less likely to be in the least happy category. These distributions can be converted into means and we find respectively for the three countries that the average measures of happiness for married and unmarried people are: 2.33 and 2.04; 2.30 and 2.13; and 1.85 and 1.81. The simple t-statistics on a test of differences are respectively 47.9, 14.1 and 4.1, meaning that (without controls) married people are happier than unmarried people in all three countries. Table 2 presents summary statistics of the variables used in the paper, and some features of the data respectively for the US, the UK and Germany as follows: The samples are around 45, 47, and 49 years old while 63, 76 and 46 % of people own their own dwelling. 62, 56 and 61 % of the sample are employed while males make up 44, 46 and 48 % of the samples. Average years of schooling are 13, 12 and 12 while the unemployment rates are, at 3.0, 2.6 and 4.8 %. The proportions of
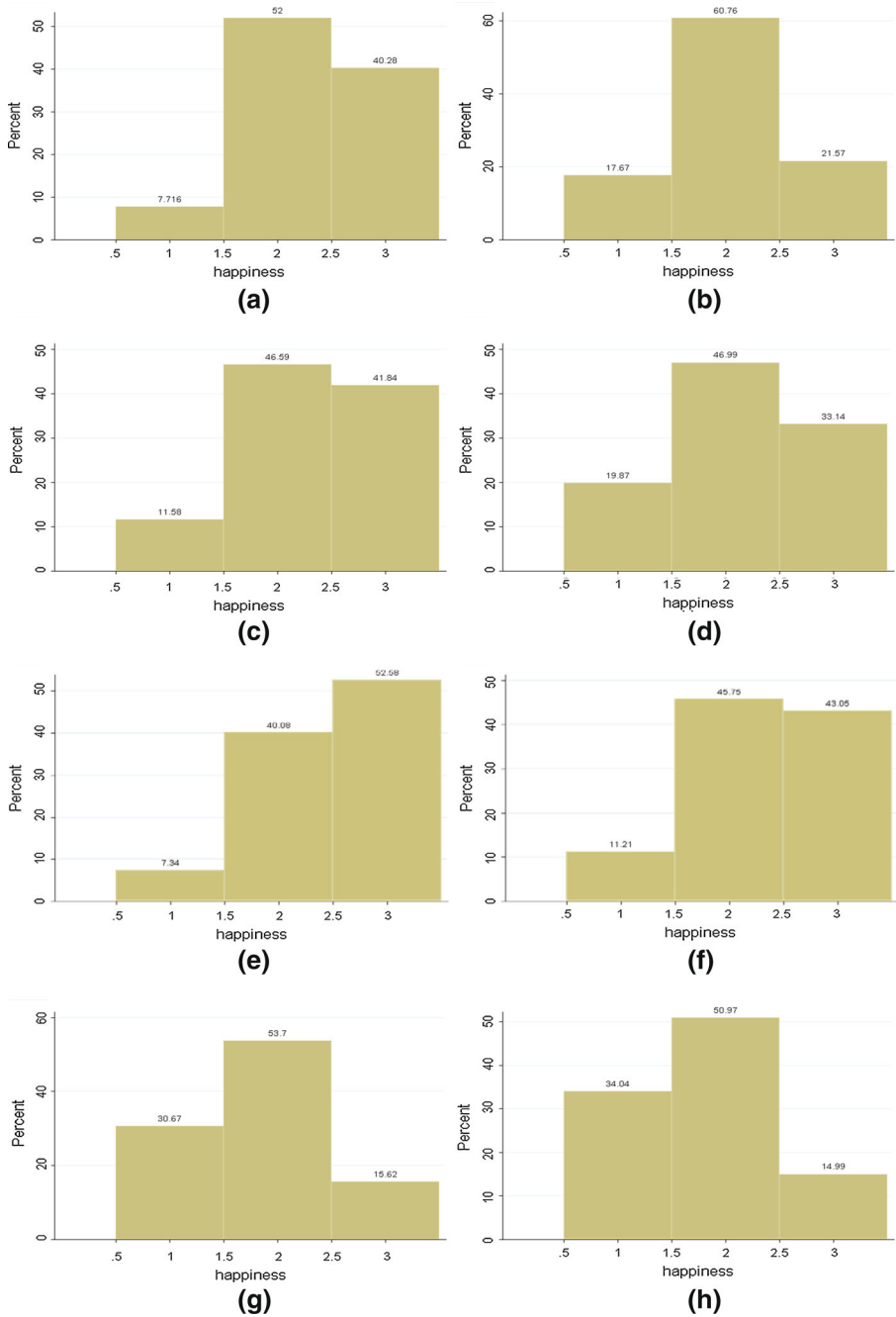

Fig. 1 Distribution of happiness by marital status, **a** US GSS/married, **b** US GSS/unmarried, **c** HILDA/married, **d** HILDA/unmarried, **e** BHPS/married, **f** BHPS/unmarried, **g** GSOEP/married, **h** GSOEP/unmarried

Table 2 Variables' means, proportions, and standard deviations

Variable	US GSS		BHPS		GSOEP	
	Mean	SD	Mean	SD	Mean	SD
Original happiness	2.2	0.63	5.3	1.25	7.0	1.78
Recoded happiness	2.2	0.63	2.4	0.64	1.9	0.67
ln household income	9.9	0.98	4.7	1.12	7.9	0.59
Age	45.2	17.52	46.5	16.92	48.9	17.50
Percent own dwelling	62.8	0.04	75.9	0.04	45.6	0.07
Percent rent dwelling	35.0	0.03	24.1	0.03	54.4	0.07
Percent other dwelling	2.2	0.01				
Percent employed	61.9	0.02	57.5	0.02	60.9	0.02
Percent unemployed	3.0	0.01	2.6	0.01	4.8	0.01
Percent not in the labor force	35.1	0.02	39.9	0.02	34.4	0.03
Percent male	43.9	0.02	45.6	0.02	47.6	0.02
Percent female	56.1	0.02	54.4	0.02	52.4	0.02
Years of education	12.6	3.2	12.2	2.8	12.2	2.7
Percent no children	27.3	0.03	67.0	0.03	70.9	0.03
Percent 1 child	16.0	0.02	15.4	0.02	15.1	0.02
Percent > 1 children	56.7	0.02	17.5	0.02	14.0	0.02
ln household size	0.9	0.57	0.9	0.53	0.9	0.49
Percent married	55.5	0.02	64.0	0.02	60.0	0.02
Percent unmarried	45.5	0.02	36.0	0.02	40.0	0.02
Self-reported health	3.0	0.85	3.8	0.94	3.4	0.95
Happiness with marriage	2.6	0.54				
Recoded satisfaction with partner			2.8	0.46		
Recoded satisfaction with family					2.2	0.75

This table shows the summary statistics of the variables. Means are reported for the continuous variables and proportions (for instance, 61.9 equals to the number of people who are employed divided by the sum of people who are employed, unemployed, and not in the labor force.) are reported for categorical variables. Original happiness takes values 0–10 for GSOEP and 1–7 for BHPS. Recoded happiness takes values 1–3 for GSOEP and BHPS which is recoded from the original form as follows: GSOEP-(0–6) not too happy; (7, 8) pretty happy; (9, 10) very happy and BHPS-(1–3) not too happy; (4, 5) pretty happy; (6, 7) very happy. For the US GSS, original happiness and recoded happiness is the same and is on a scale 1–3 where: (1) not too happy; (2) pretty happy; (3) very happy. Unmarried includes separated, divorced, widowed, and single people. The numbers are for all the waves of the US GSS from 1974 to 2004, for the wave (2007) of BHPS and for the 25th wave (2007) of GSOEP. Satisfaction with partner (BHPS) and satisfaction with family (GSOEP) is recoded from the original form as follows: BHPS-(1–3) not too happily married; (4, 5) pretty happily married; (6, 7) very happily married. GSOEP-(0–6) not too happily married; (7, 8) pretty happily married; (9, 10) very happily married. For the GSS, happiness with marriage is on a scale 1–3 where: (1) not too happily married; (2) pretty happily married; (3) very happily married. Number of children is defined as the total children (regardless of residence) in the US GSS but it is defined as the total number of children living in the household for the GSOEP and the BHPS

people in each sample who are married[9] are 56, 64 and 60 %. These findings reveal that major characteristics of the three datasets are fairly similar.

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[9] We define married as a person living with a partner. We separate the effects for legally married and cohabitation samples in the empirical analysis.

3 Empirical Method

Our goal is to determine the extent to which conventional empirical approaches calculate the marriage effects on happiness and how much these effects change including the role of marriage quality.[10] Ferrer-i-Carbonell and Frijters (2003) show that using ordinal or cardinal approaches in the estimation of happiness equations results in no differences in practice, and this permits us to employ the simpler approach of OLS compared to ordered probit. Second, the same authors find that while using fixed effects has important consequences for the interpretation of happiness determinants, the strength of the marriage effect is not compromised by controlling for individual time-invariant factors. Therefore, we do not control for fixed effects in our main estimations but we present fixed effects results in the robustness section. The method adopted can be clarified formally through reference to the following. Equation (1) illustrates the usual method, where the dependent variable is the measure of happiness, β_m is the coefficient for marriage dummy. β_j^S are coefficients for other T control variables (x_j summed to T) in the marriage dummy model.

$$Happiness = \beta_0 + \beta_m X_m + \sum_{j=1}^{T} \beta_j X_j + \epsilon \tag{1}$$

Our more flexible functional form is given by Eq. (2), in which γ_i^S are the coefficient for each level of marriage quality, assumed here to number three (to correspond to the empirical analysis, 1 = not happily married, 2 = pretty happily married, and 3 = happily married).

$$Happiness = \beta_0 + \gamma_1 X_1 + \gamma_2 X_2 + \gamma_3 X_3 + \sum_{j=1}^{T} \beta_j^* X_j + \epsilon \tag{2}$$

In the situation in which the marriage variables are uncorrelated with other control variables the marriage dummy coefficient from Eq. (1) is given by:

$$\beta_m = \bar{\gamma} = \sum_{i=1}^{3} \omega_i \gamma_i$$

where the weight ω_i is the proportion of the sample for each level of marriage quality.[11] Allowing for some degree of correlation among the regressors, then the married dummy can be approximated by:

$$\beta_m \approx \bar{\gamma} = \sum_{i=1}^{3} \omega_i \gamma_i$$

We are concerned mainly with comparisons of the results of estimations in Eq. (1) (with the usual set of right-hand side variables) with the results of various estimations in Eq. (2). In the main part of the analysis we seek to determine the role of marriage quality on happiness, with the clear prediction that $\gamma_1 < \gamma_2 < \gamma_3$. This part of the exercise allows us to illustrate a new range of marriage effects, and this leads to more disaggregated analysis concerning the effects of different variables on happiness and other differences between people.

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[10] One of the indicators used for marriage quality in this paper is satisfaction with marriage which is found to predict divorce (Frijters 2000).

[11] For example, for the BHPS, the weight assigned to the first level of marriage quality is $\omega_1 = 0.032$, the proportion of the sample which reports being "not happily married".

4 Empirical Results

Table 3 presents the results for the baseline specifications where the dependent variable is happiness on a scale 1–3. All regressions include religion dummies, region dummies, and, for the US, year dummies (if applicable). The main results respectively for the US, the UK and Germany are as follows. The coefficient on the married dummy is significant and of the order of 0.251, 0.205 and 0.136. These results suggest that being married adds around 10 % on average to happiness in the US and the UK, and about 7.5 % to happiness in Germany. The positive relationship between household income and happiness is highly significant, with the results for US and the UK being close and the relationship is stronger

Table 3 Baseline regressions

Dependent variable: self-reported happiness

OLS

	US GSS	BHPS	GSOEP
Married	0.251 (31.5)	0.205 (14.7)	0.136 (10.7)
Unmarried (omitted)			
ln household income	0.049 (8.4)	0.023 (2.7)	0.182 (17.4)
Own dwelling (omitted)			
Rent dwelling	−0.016 (1.7)	−0.089 (6.6)	−0.044 (4.5)
Employed (omitted)			
Unemployed	−0.178 (7.1)	−0.182 (5.2)	−0.156 (7.3)
Not in the labor force	0.028 (3.6)	0.036 (2.5)	0.048 (3.8)
Male (omitted)			
Female	0.041 (5.7)	0.016 (1.6)	0.024 (2.7)
Age	−0.006 (4.3)	−0.022 (12.0)	−0.018 (10.4)
Age square/100	0.009 (6.5)	0.023 (13.1)	0.018 (11.1)
Years of education	0.006 (7.6)	0.002 (0.7)	0.013 (6.9)
ln household size	−0.001 (0.4)	−0.051 (2.9)	−0.156 (9.6)
Self-reported health	0.182 (147.8)	0.239 (40.1)	0.279 (55.2)
No children (omitted)			
One child	−0.080 (7.3)	−0.023 (1.4)	0.044 (3.0)
More than one child	−0.072 (9.2)	−0.033 (1.8)	0.079 (4.7)
Religion dummies	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes
Year dummies	Yes	No	No
Adjusted R-squared	0.128	0.154	0.241
Number of observations	43,317	12,956	18,054

The dependent variable is on a scale from 1 to 3. Original happiness takes values 0–10 for GSOEP and 1–7 for BHPS. Recoded happiness takes values 1–3 for GSOEP and BHPS which is recoded from the original form as follows: GSOEP-(0–6) not too happy; (7, 8) pretty happy; (9, 10) very happy and BHPS-(1–3) not too happy; (4, 5) pretty happy; (6, 7) very happy. For the GSS, happiness is on a scale 1–3 where: (1) not too happy; (2) pretty happy; (3) very happy. Not married includes separated, divorced, widowed, and single people. We present coefficients in all regressions together with the t statistics in parenthesis. The first column is estimated for all the waves of the GSS from 1974 to 2004. The second column is estimated only for the wave (2007) of BHPS. The third column is estimated only for the 25th wave (2007) of GSOEP

in Germany. Renters are less happier than owners, but the effect of home ownership is quite small while unemployed people are less happier than the employed, with the effect being between 7 and 10 % and relatively large in the UK. Being female is associated with higher happiness of the order of 0.04, 0.02 and 0.02, or around 10–15 % at the mean and the U-shaped age effect on happiness is found for all three countries. Education contributes positively to happiness and the relationship between health and happiness is significant in all three countries, being highest in Germany and lowest in the US.

The important general result from the estimation of Eq. (2) concerns the familiarity of findings in the context of the literature; for example, the happiness associations with household income, unemployment, gender and age are typically what is found in studies of this type. This provides us with some confidence that we will be able to generalize the findings to different populations and periods of time. Estimations of Eq. (2) are reported in Table 4, in which the typical baseline approach to happiness estimation is augmented through the replacement of the marriage dummy with the marriage quality disaggregation. The results of the exercise are summarized in Table 5, which allows a direct comparison of the results of estimation of Eqs. (1) and (2) in terms of the marriage/happiness relationship. The comparison of the coefficients from estimations of Eqs. (1) and (2) offers a very instructive reading. The results are as follows. For all three countries, people who report themselves to be "not too happily married" are significantly less happy than unmarried people. The (un)happiness effect of a poor quality marriage is quite large compared to being unmarried, with the coefficients for the US, the UK and Germany respectively being −0.48, −0.55 and −0.27, which in percentage terms (calculated at the mean) are around 22, 27 and 14 %.

The happiness of those who report themselves to be "happily married" is very high, with the coefficients for the US, the UK and Germany being 0.44, 0.30 and 0.34. In percentage terms (calculated at the mean) these effects suggest that those in high quality marriages are around 20, 19 and 18 % happier than the unmarried. While on average there is clearly a positive happiness effect from marriage, there is a very large range of marriage effects which are determined by the quality of the partnership. In the US, the UK and Germany those with the happiest marriages are roughly 42, 28 and 32 % more happy than those with the unhappiest marriages. The relative size of these effects can be illustrated graphically in many different ways. To highlight the dimensions of the differences we chose to use simulations of the happiness-marriage quality relationship for the British panel in each round from 1996 to 2007 in Fig. 2. The findings illustrated from the figures which are shown empirically in Table 5 are the following. There are quite similar differences between the marriage groups in these countries. The range of marriage effects on happiness is very large and being unmarried is clearly associated with important happiness benefits if the counter-factual is being in a poor quality partnership. The findings offer a strong justification for the basic motivation of the paper. There is no doubt that the literature's consensus of a significantly positive marriage effect for happiness is at best an important simplification and people in poor marriages are fairly miserable relative to the unmarried people.

In order to encourage further work along these lines rather than to provide a comprehensive analysis for all the samples, Table 6 illustrates the sensitivity of the major coefficients to changes in marriage specifications only with respect to the US data. There are no important changes in the measured effects on happiness of changes in household income, being a renter, being unemployed, education, household size, having one child instead of no children and age. The happiness effect of not being in the labor force decreases considerably when marriage quality is controlled for, from 0.028 to 0.017 while the happiness effect of self-reported good health increases very significantly, from 0.182 to 0.648. The

Table 4 The role of marriage quality

Dependent variable: self-reported happiness

OLS

	US GSS	BHPS	GSOEP
Not too happily married	−0.476 (16.3)	−0.547 (14.7)	−0.268 (15.8)
Pretty happily married	−0.041 (2.6)	−0.177 (8.4)	0.037 (2.8)
Happily married	0.437 (41.2)	0.292 (21.3)	0.343 (26.0)
Not married (omitted)			
ln household income	0.045 (7.6)	0.021 (2.5)	0.187 (18.0)
Rent dwelling	−0.017 (1.9)	−0.070 (5.4)	−0.051 (5.5)
Unemployed	−0.176 (6.7)	−0.162 (4.9)	−0.159 (7.8)
Not in the labor force	0.017 (2.3)	0.036 (2.6)	0.030 (2.5)
Female	0.052 (7.6)	0.032 (3.1)	0.030 (3.5)
Age	−0.004 (3.8)	−0.019 (11.4)	−0.017 (10.6)
Age square/100	0.007 (5.8)	0.002 (12.7)	0.002 (12.7)
Years of education	0.004 (5.8)	0.003 (1.2)	0.011 (16.1)
ln household size	0.012 (1.8)	−0.024 (1.4)	−0.163 (10.3)
Self-reported health	0.648 (50.8)	0.223 (38.7)	0.241 (49.9)
No children (omitted)			
One child	−0.067 (6.0)	−0.017 (1.0)	0.046 (3.3)
More than one child	−0.058 (6.6)	−0.024 (1.3)	0.088 (5.5)
Religion dummies	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes
Year dummies	Yes	No	No
Adjusted R-squared	0.213	0.224	0.318
Number of observations	43,317	12,956	18,054

The dependent variable is on a scale from 1 to 3. Original happiness takes values 0–10 for GSOEP and 1–7 for BHPS. Recoded happiness takes values 1–3 for GSOEP and BHPS which is recoded from the original form as follows: GSOEP- (0–6) not too happy; (7, 8) pretty happy; (9, 10) very happy and BHPS-(1–3) not too happy; (4, 5) pretty happy; (6, 7) very happy. For the GSS, happiness is on a scale 1–3 where: (1) not too happy; (2) pretty happy; (3) very happy. Not married includes separated, divorced, widowed, and single people. We present coefficients in all regressions together with the *t* statistics in parenthesis. The first column is estimated for all the waves of the GSS from 1974 to 2004. The second column is estimated only for the wave (2007) of BHPS. The third column is estimated only for the 25th wave (2007) of GSOEP. Unmarried includes separated, divorced, widowed, and single people. Satisfaction with partner (BHPS) and satisfaction with family (GSOEP) is recoded from the original form as follows: BHPS-(1–3) not too happily married; (4, 5) pretty happily married; (6, 7) very happily married. GSOEP-(0–6) not too happily married; (7, 8) pretty happily married; (9, 10) very happily married. For the GSS, happiness with marriage is on a scale 1–3 where: (1) not too happily married; (2) pretty happily married; (3) very happily married

happiness effect of having more than one child, compared to having no children, decreases from −0.072 to −0.058 and female happiness premium increases from 0.041 to 0.052.[12]

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[12] Section 4.1 illustrates that the gender effect is unlikely to be completely accurately measured with this specification given that there are quite clearly differences between females and males with respect to the impact of marriage quality on happiness.

Table 5 How much does our specification change the relationship between marriage and happiness?

Country	Baseline specification	Including marriage quality specification			
	$\beta_{married}$	γ_1	γ_2	γ_3	$\bar{\gamma}$
US GSS	0.251	−0.476	0.041	0.437	0.250
		(0.030)	(0.333)	(0.637)	
BHPS	0.205	−0.547	−0.177	0.292	0.200
		(0.032)	(0.140)	(0.829)	
GSOEP	0.136	−0.268	0.037	0.343	0.117
		(0.162)	(0.425)	(0.423)	

Values in the brackets are weights for each group. Baseline specification is the same as in Table 3. Interaction with marriage quality specification is the same as in Table 4. The dependent variable is on a scale from 1 to 3. All regressions include the same controls as the baseline regressions as in Table 3

Fig. 2 Interaction effects (BHPS)
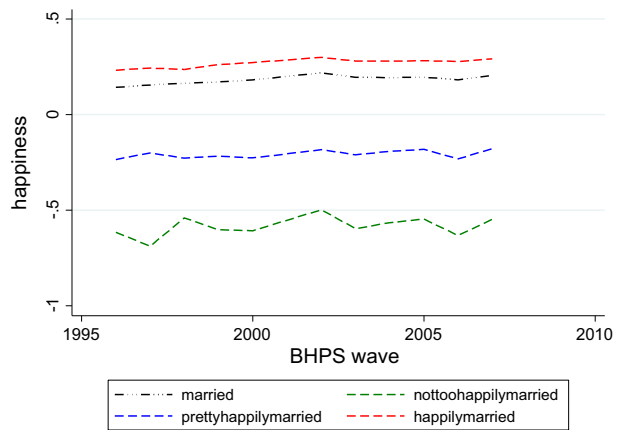
Table 6 Does our specification change the relationship between happiness and other controls?

Variables	Baseline specification		Including marriage quality specification	
	Coefficient	t	Coefficient	t
ln household income	No change			
Rent dwelling	No change			
Unemployed	No change			
Not in the labor force	0.028	3.6	0.017	2.3
Years of education	No change			
ln household size	No change			
Self-reported health	0.182	147.80	0.648	50.8
One child	No change			
More than one child	−0.072	9.2	−0.058	6.6
Female	0.041	5.70	0.052	7.6
Age	No change			

We give a summary of the results for the control variables. If the coefficients on a variables does not statistically differ across specifications, we name it as no change. Otherwise we present the coefficients only for the US for simplicity

4.1 Gender Differences and Non-happiness Well-Being Outcomes

So far we have focused on our basic concern and have used a restriction typically employed in happiness estimations, which is to constrain relationships to be identical between genders. Table 7 reports male and female coefficient sizes for the marriage quality effects on happiness from models which allow flexibility between the genders in terms of happiness effects with respect to all three countries. Both men and women who report themselves to be "not too happily married" are significantly less happy than unmarried while "happily married" men and women are significantly happier than unmarried and in all cases these effects are much higher than the average marriage effects from the baseline model. The (un)happiness effects for females as a result of being in marriages which they report to be "not too happily married" are much greater than is the case for males, of the

Table 7 Gender differences

Dependent variable: self-reported happiness				
	Baseline specification	Including marriage quality specification		
	Married dummy	Not too happily married	Pretty happily married	Happily married
US GSS				
Male	0.259 (22.1)	−0.439 (11.8)	−0.038 (2.8)	0.429 (35.9)
Female	0.241 (10.0)	−0.549 (8.8)	−0.073 (6.1)	0.463 (44.8)
BHPS				
Male	0.172 (7.8)	−0.623 (10.5)	−0.193 (5.9)	0.238 (11.1)
Female	0.220 (11.9)	−0.507 (10.6)	−0.178 (6.5)	0.324 (17.9)
GSOEP				
Male	0.082 (4.9)	−0.221 (8.8)	0.047 (2.3)	0.359 (17.8)
Female	0.085 (5.2)	−0.279 (19.2)	0.042 (2.3)	0.341 (18.9)

Each row corresponds to a different regression with the corresponding gender sample and country. Baseline specification is the same as in Table 3 for gender subsamples. Interaction with marriage quality specification is the same as in Table 4 for gender subsamples. The dependent variable is on a scale from 1 to 3. We present coefficients in all regressions together with the *t* statistics in parenthesis. All regressions include the same controls as the baseline regressions as in Table 3
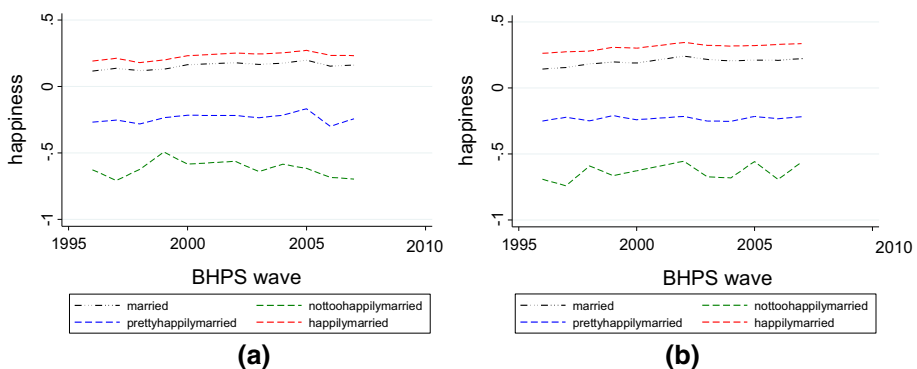

Fig. 3 Interaction effects by gender in BHPS, **a** BHPS/men, **b** BHPS/women

order of 25 %[13] and the happiness effects for males and females as a result of being in marriages in which they report to be "happily married" are quite similar. A broad conclusion is that the effects of marriage quality are not substantially different between men and women, and that the findings concerning the effects of marriage quality on happiness are not compromised through the use of a more constrained approach by gender. The one notable difference is that women are apparently much more responsive in terms of (un)happiness effects from poor marriages which is illustrated in Fig. 3.[14]

Table 8 examines the role of marriage quality in explaining non-happiness well-being outcomes. Some of the important findings are as follows, all compared to being unmarried. In all three countries people in high quality marriages report higher levels of health and interpersonal trust while people in poor quality marriages report lower levels of health and interpersonal trust. In the US, different reasons for suicide—such as bankruptcy—are significantly less likely to be justified in the minds of people in high quality marriages. In the UK, high quality marriages were much less likely to be associated with poor measures of health outcomes except migraine and in Germany, people in low quality marriages are much more likely to have a high number of doctor visits. Again, we find that interpretation of the influence of marriage is importantly distorted when marriage quality is not accounted for. That is, the range of outcomes within marriage is a critical aspect to our understanding of the alleged benefits to partnership, a point that we believe should be taken up in much more detail with respect to many health and related outcomes.

5 Robustness

It can be argued for different reasons that the usual methods that we have also employed are subject to major concerns, with respect to unobserved heterogeneity (omitted variables bias) and reverse causality (selection). With respect to unobserved heterogeneity, a valid argument might be that people who report that they are unhappy with their marriage might also be those that are unhappy with everything, including their lives in general. To provide some insight into this possibility we considered several specifications as follows. We directly control for satisfaction with various aspects of life (satisfaction with health, income, job, house, social life, amount of leisure time, use of leisure time) in the regressions.[15] In another specification, to control for happiness with other aspects of life, we regress total happiness only on satisfaction with all aspects of life (omitting satisfaction with partner) and derive the residuals from this regression, then use the residuals as a dependent variable and again find similar results. Finally, we take advantage of the panel aspects of the data and include lagged happiness as an independent variable and use fixed and random effects or first differencing. Lack of perfect collinearity among lagged happiness and other independent variables allows us to control for it in the regression as is shown in the appendix. If unobserved effects are captured by the lagged happiness term,

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[13] This approximation is the result of comparisons between the absolute sizes of the coefficients on the lowest category of marriage quality between males and females for each country.

[14] The evidence from the demographic literature, that marital separation is more likely to be initiated by women, sits comfortably with this result. In addition, Guven et al. (2012) find that separations are mostly initiated by women who were actually less happier than their partners.

[15] Multi-collinearity will not be an issue here since we show that the correlations among these satisfaction variables are always low.

Table 8 Non-happiness well-being outcomes and marriage quality

	Baseline specification Married dummy	Including marriage quality specification		
		Not too happily married	Pretty happily married	Happily married
US GSS				
(1) Subjective health	0.065 (6.2)	−0.217 (6.2)	−0.067 (5.0)	0.144 (12.6)
(2) Trust	0.006 (0.5)	−0.139 (3.1)	−0.028 (1.6)	0.023 (1.6)
Suicide justified if				
(3) Incurable disease	−0.029 (3.4)	0.013 (0.4)	0.009 (0.9)	−0.051 (5.5)
(4) Bankrupt	−0.010 (2.5)	0.023 (1.9)	−0.007 (1.4)	−0.013 (3.1)
(5) Dishonored family	−0.011 (2.9)	0.024 (2.0)	−0.009 (1.8)	−0.014 (3.2)
(6) tired of living	−0.021 (3.7)	0.040 (2.2)	−0.013 (1.9)	−0.030 (4.9)
BHPS				
(7) Subjective health	0.002 (0.1)	−0.271 (4.8)	−0.178 (5.6)	0.040 (1.9)
(8) Trust	−0.006 (0.3)	−0.187 (3.1)	−0.107 (3.1)	0.002 (0.8)
(9) High blood pressure	−0.002 (0.2)	0.036 (1.6)	0.030 (2.3)	−0.005 (0.6)
(10) Cancer	0.002 (1.3)	0.011 (2.0)	0.001 (0.4)	0.002 (1.3)
(11) Diabetes	−0.011 (2.6)	0.005 (0.5)	−0.004 (0.7)	−0.011 (2.7)
(12) Epilepsy	−0.002 (1.3)	−0.001 (0.3)	−0.001 (0.5)	−0.002 (1.7)
(13) Migraine	0.013 (2.4)	0.010 (0.9)	0.021 (2.2)	0.012 (2.1)
(14) Alcohol and drugs	−0.001 (1.2)	0.002 (1.5)	−0.001 (0.7)	−0.002 (2.4)
(15) Cigarettes per day	−1.338 (3.7)	0.167 (0.2)	−1.235 (2.1)	−1.535 (4.0)
(16) Concentration	0.003 (0.2)	−0.209 (6.0)	−0.062 (3.2)	0.021 (1.6)
(17) Loss of sleep	−0.046 (2.7)	0.344 (7.1)	0.123 (4.5)	−0.086 (4.9)
(18) Depressed	−0.101 (5.4)	0.554 (10.7)	0.172 (5.9)	−0.164 (8.6)
GSOEP				
(19) Subjective health	0.003 (0.1)	−0.326 (12.9)	−0.067 (3.3)	0.163 (8.1)
(20) Annual doctor visits	0.189 (0.6)	2.214 (5.0)	0.302 (0.9)	0.131 (0.4)
(21) Trust	0.040 (2.7)	−0.088 (4.1)	−0.032 (2.1)	0.009 (0.5)

Each row corresponds to a different regression with the corresponding outcome variables. Baseline specification is the same as in Table 3 for different dependent variables and interaction with marriage quality specification is the same as in Table 4 for different dependent variables. (3)–(6), (8), (9)–(14) are estimated with probit and marginal effects are presented while OLS is used in all other specifications and we present coefficients together with the *t* statistics in parenthesis. All regressions include the same controls as the baseline regressions as in Table 3. All dependent variables are defined in the appendix

we expect the coefficients on interaction variables to change however we find that the inclusion of this variable makes no difference. An important observation is that controlling for satisfaction with different aspects of life is a useful approach to take into account heterogeneity, because inclusion of lagged happiness and estimation with fixed effects and random effects make practically no change neither to the size nor to the significance on the interaction variables. Finally, we use measures of marriage quality reported by the spouse and found similar results. However, the coefficients are much lower but still significant with these specifications. We believe this to be quite an instructive test since spouse's report of the marriage quality could be thought less dependent of the respondent's own characteristics.

With respect to reverse causality, we tested the following strategies, the first being to use an instrument; however it is difficult to believe that there is a variable which influences happiness not directly but only through marriage quality. A different way we have sought to deal with this issue is to estimate a model using the sample of married couples who are in their first year of marriage, together with unmarried people.[16] The results do not change in this specification. A second approach in this general area involved employing 1, 5, and 11 years lagged values of marriage quality in some specifications to test if the coefficients on the interaction dummies are still significant and of similar sizes to the original specifications, which we found to be the case. To test reverse causation,[17] we also explore whether happy single people in 1996 in Germany and the UK were more likely to be married later at some point in life, and find no selection effects (i.e. there is not an important selection effect from happiness to the probability of becoming married). In addition, we carried out fixed effects estimation for the sample of people in the year before marriage and in the year of marriage, which allows us to compare the same people's happiness before and after marriage. Also in theory, randomly matching couples will be good to study the impact of marriage quality on happiness. But because researchers are unable to do this, we try to address the issue by using a random sample of data and using immigrant sample in which arranged marriages are more common. As well we carried out many sensitivity checks, using more objective wellbeing outcomes such as alternative dependent variables, including measures of blood pressure, number of doctor visits and cigarettes consumed. Again, the results are robust to these specifications which suggest that marriage quality is a fundamental determinant of well-being.

Table 9 tests the role of marriage quality in explaining selection in to marriage by using a multinomial logit regression for the sample of people who were single in 1996. In this estimation our dependent variable is a categorical variable with four possible states: unmarried in 2007; unhappily married in 2007; pretty happily married in 2007; and very happily married in 2007. By making the independent variable of interest happiness in 1996, we find that happier people are more likely to stay single instead of being unhappily married, but less likely to stay single compared to being very happily married. Also, for Germany and the UK, happiness is insignificant in explaining the decision to remain single versus being pretty happily married. Again, this suggests a small role for reverse causality.

A range of different sensitivity tests were also undertaken with the data as follows. We use of the original 10 point happiness scale for Germany and 7 point scale for the UK. Using all available rounds with year dummies for the UK (1996–2007) and Germany (2006–2007) results in the same conclusions, with even higher levels of statistical significance. Disaggregating measures of marriage quality from three to seven categories for the UK and to ten categories for Germany and using another seven scale marriage quality measure for the US provide very similar findings to the main exercise. For the UK and the US, the use of other indices constructed on the basis of answers to questions indicating satisfaction with other aspects of marriage or family life, spouse's satisfaction with partner, and satisfaction measured on difference scales deliver similar findings. Person fixed effects modeling with the use of all rounds in the BHPS and the GSOEP resulted in the same broad conclusions. Our broad results hold also for the legally married sample as well as for the cohabitation sample in the UK and Germany.

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[16] We have around 2,035 observations where we observe couples in their first year of marriage in BHPS

[17] That is, happier people are more likely to get married, rather than that marriage increases life satisfaction.

Table 9 Selection into marriage based on marriage quality

Dependent variable: interaction in 2007	
Independent variable: happiness in 1996 (1–3)	
BHPS	N/R2-1599/0.231
Unmarried/unhappily married	−0.530 (1.6)
Unmarried/pretty happily married	−0.009 (0.5)
Unmarried/very happily married	0.232 (2.2)
GSOEP	
Unmarried/unhappily married	−0.158 (1.2)
Unmarried/pretty happily married	0.174 (1.7)
Unmarried/very happily married	0.396 (3.6)

Multinomial Logit regression using the sample of unmarried people in 1996. Interaction variable in 2007 takes four values 0–3 where 0 is unmarried. We present coefficients in all regressions together with the t statistics in parenthesis. All regressions include the same controls as the baseline regressions as in Table 3

6 Conclusion

This paper revisits the literature on marriage and wellbeing with the use of variables reflecting marriage quality and data from the US, the UK and Germany. For all three countries, we find that in a happiness equation the coefficient on the married dummy is significant and of the order of 0.251, 0.205 and 0.136. However, controlling for marriage quality we find that the marriage coefficient for these countries ranges as follows: −0.476 to +0.437, −0.547 to +0.292, and −0.268 to +0.343. In percentage terms these sizes are −15.87 to +14.57, −18.24 to +9.74 and −8.94 to +11.44 %. In addition, while women still tend to be happier, women respond much more strongly in happiness terms to poor marriages then men. When marriage quality is controlled for, the role of employment status and subjective health are influenced by our innovation, although the relationships with respect to age, education and household income appear to be robust. The relationship between marriage and other self-reported measures of well-being, such as health and trust changes by the inclusion of marriage quality. Finally, it is apparent that our results do not show a strong link from happiness to marriage in the sense that for singles, happiness at the beginning of a survey is not significantly related to being married at some point later in life. However, happier people are more likely to stay single instead of being unhappily married, but less likely to stay single compared to being very happily married and happiness is insignificant in explaining staying unmarried versus pretty happily married. The findings of the paper could have important policy implications and opens up interesting venues for future research. For example, is there any empty room for policy making (such as law structures) to increase the quality of marriage? For instance, as found in this paper, being in an unhappily marriage significantly decreases the happiness of people. Does this mean that we should make divorce easier? Or is it possible that divorce might make people more unhappier?

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