SCENES FROM A MARRIAGE: DIVORCE AND FINANCIAL BEHAVIOR

EMMA ZETTERDAHL*

ABSTRACT

In this paper, the impact of divorce on individual financial behavior is empirically examined. Evidence that divorcing individuals increase their saving rates before the divorce is presented. This may be seen as a response of the increase in background risk. After the divorce, negative divorce effects on individual saving rates and risky shares are established, which may lead to disparities in wealth accumulation possibilities between married and divorced. Women are, on average, shown to not adjust their precautionary savings to the same extent as men before the divorce. I also provide tentative evidence that women reduce their financial risk-taking more than men after a divorce. This could potentially be a result of inequalities in financial positions or an adjustment towards individual preferences.

JEL Classification: D01, D14, J12, J16, G02, G11

Keywords: asset allocation, divorce, financial risk taking, saving behavior, risky share

*Department of Economics, Umeå School of Business and Economics, Umeå University, SE-901 87 Umeå, Sweden. E-mail: emma.zetterdahl@econ.umu.se; phone: +46(0)90-786 65 47. A special thanks to Wallander, Browald, and Tom Hedelius Foundation for the financial support and the Swedish Investment Fund Association for providing data. I thank Jörgen Hellström, Thomas Aronsson, Niklas Hanes, Gauthier Lanot, David Granlund, André Gyllenram, Elon Strömbäck, and seminar participants at Umeå University for their useful comments. I am also grateful for comments from Scott Adams, Markku Kaustia, and an anonymous referee. All remaining errors and omissions are my own.

1. INTRODUCTION

Economic theory traditionally views divorce as a shock increasing individual background risk, which raises uncertainty about future income (Carroll, 1997; Cocco, 2005; Cooco et al., 2005; Love, 2010). If two spouses decide to divorce, economies of scale associated with marriage are lost, and the uncertainty about the future and the possibility of a second marriage are likely to affect the individual's financial risk taking and wealth accumulation (Schmidt and Sevak, 2006). In addition, divorce may be a costly event requiring lawyer payments and liquidation of real estate assets, which may then alter the composition of wealth. Moreover, assets need to be divided, potentially increasing or decreasing personal wealth depending on initial levels. In this paper, I therefore focus on empirically studying the effect of divorce on financial behavior. Economic theory predicts that in order to self-insure against the increase in background risk, given that individuals want to smooth consumption over the life-cycle, individuals will increase their precautionary savings. Furthermore, the uncertainty may also affect divorcing individuals' demand for risky assets.

Recent literature suggests that an understanding of the effects of divorce on individual financial behavior is of great interest, especially from a behavioral perspective (e.g. Love, 2010; Bertocchi et al., 2011; González and Özcan, 2013). The empirical literature related to the topic is however limited, even though the likely changes in background risk, household resources, and financial risk-taking following a divorce may lead to substantial changes in the spouses' financial positions.[1] For that reason, I analyze the effect of divorce on individual financial risk-taking and saving behavior in a dynamic setting, where I study individuals before, during, and after a divorce. The large register-based data set on Swedish residents utilized enables me to decompose individual financial and real asset holdings and to study the divorce effect over time.[2]

Earlier studies are generally inconclusive, and further analysis of the divorce effect on the individual saving rate and the proportion invested in risky assets (both directly through stocks and indirectly through risky mutual funds) is needed to understand how financial decision-making is affected by life-changing events, such as divorce.

[1] Changes in family structures are not exogenous events, but constitute a central source of risk and can therefore be viewed as a source of background risk. The standard unitary model cannot be applied to examine divorce or marriage decisions because the individual utilities of the husband and wife cannot be recovered from the welfare function that generates savings, consumption, and other behavior within marriage (Lundberg and Pollak, 1996). Thus, divorce is in often modeled in cooperative life-cycle allocation models as a shock increasing individual background risk (Carroll, 1997; Cocco, 2005; Cooco et al., 2005; Love, 2010).

[2] Data on individuals' stockholdings and mutual fund holdings are collected both from tax records by Statistics Sweden, as well as from the Nordic Central Securities Depository Group (NCSD).

Additionally, the contributions of the study are especially relevant since we today see increasing divorce rates. In fact, today roughly 50 percent of all marriages in Sweden end in divorce (Agell and Brattström, 2011).[3] Financial behavior may therefore have macroeconomic consequences and lead to inequalities in wealth accumulation between married and divorced individuals.

Empirical studies have frequently taken advantage of the variation across U.S. states in the introduction of unilateral divorce legislation, which permits people to get a divorce without the consent of their spouse. Also, González and Özcan (2013) view changes in divorce legalization in Ireland as an exogenous shock to the risk of divorce, and they find evidence based on survey data that the legalization of divorce, i.e. the increase in the probability of marital dissolution, led to a significant increase in the propensity to save by married individuals. Wolfers (2006) does not, however, find any long-lasting effect of unilateral divorce legislation on divorce rates. Moreover, Devereux and Smith (1994) find that more risk sharing opportunities, provided by marriage, may translate into less saving, since there are other ways of handling uncertainty. If the probability of divorce increases, this may then lead to increasing saving rates. On the other hand, Mazzocco (2007) shows in his theoretical model that if marital instability increases, it will consequently make saving while married more risky. After the divorce, the rise in uncertainty and costs may directly affect wealth accumulation and saving rates negatively (e.g. Cubeddu and Rios-Rull, 2003). The higher economic uncertainty could also make the individual more averse to financial risk and consequently, actively reduce the share of risky assets (e.g. Viceira, 2001; Haliassos and Michaelides, 2003). Nonetheless, no clear empirical evidence, to the author's knowledge, exists in earlier literature.

An important aspect to consider is that divorce may affect men and women differently. Earlier studies generally demonstrate that women are not participating in the stock market to the same extent as men (Haliassos and Bertaut, 1995; Halko et al., 2012), and women have repeatedly been shown to display a higher degree of risk aversion (Barber and Odean, 2001; Lusardi and Mitchell, 2008). Economic gains due to marriage have been shown to vary across genders, for example in Brinig and Allen (2000) and Bertocchi et al. (2011). Love (2010) predicts in his theoretical model that women should respond to divorce by choosing a safer portfolio allocation, i.e. a less risky one, while men should do the opposite. Possible gender differences in the divorce effect on financial risk taking and

[3] Similar numbers, but slightly lower, can be observed in the US.

saving behavior has, to the author's knowledge, not been studied empirically before. If differences exist, it could result in various disparities between genders, for example in wealth levels, making the topic an important one to study further.

Earlier studies have shown that divorce has a short-term negative impact on economic well-being, but less is known about how divorce may influence long-term economic outcomes. In this paper, I analyze the possible long-term effects by studying individuals over time. Empirical studies on the topic typically examine the financial behavior in a static framework (e.g. Guiso et al., 2008; Van Rooij et al., 2011). This simplification has to a large extent been motivated by convenience and lack of data. The panel data set analyzed in the present paper provides a dynamic setting, and individuals can be studied yearly for a relatively long time period (1999-2007). In addition, earlier studies are generally comparing two groups of individuals at each point in time: those who are married, and those who are single. Systematic differences may however exist between those groups since some singles have never been married and some are divorced. This divides them into two types of individuals, each with different selection mechanisms, which could be confounding the analysis. In this paper, this potential bias is considered by studying dynamic changes. The same individual is studied yearly, from three years before and three years after the divorce. Estimation of intra-household behavior models is complex since personal characteristics that affect marriage dissolution are likely to be related to characteristics determining behavior in financial markets, given that the sorting of individuals into divorcing couples is nonrandom.[4] The possible selection bias that may arise from selection into divorcing households is for this reason adjusted for by Propensity Score Matching (PSM), based on the probability of being part of a marriage that ends in a divorce during the observed time period (Rosenbaum and Rubin, 1983). The potential divorce effect on financial behavior is then empirically examined in a Difference-In-Difference (DID) framework combined with PSM by comparing individuals who are experiencing a divorce with a representative control group of married individuals.[5]

In essence, I find evidence supporting the theoretical argument that the increase in background risk associated with divorce increases saving rates on average. The increase in saving rate the year before the divorce is finalized is significantly higher for the group

[4] It is likely that individuals belonging to a certain marital status share similar characteristics, such as educational attainment, values, and attitudes.
[5] Following Heckman et al. (1998) and Hirano et al. (2003).

of divorced individuals compared to the control group of married individuals. In addition, I present evidence that divorce affects the individual saving rate in a negative way after the divorce, which is most likely driven by wealth effects caused by asset division or high expenses. Results show that the risky share is, on average, reduced after a divorce, which likely is partly driven by a lower demand for risky assets following the increase in background risk.

Certain gender differences in the divorce effect on financial behavior are also determined. Women are, on average, shown to adjust their precautionary savings less before a divorce relative to men. I also provide evidence that women are reducing their financial risk-taking after a divorce more than men. This could be a result of inequalities in financial positions or an adjustment towards individual preferences. Various robustness checks have been performed and results have been shown to hold.

The remainder of the paper is organized as follows: Section 2 explains the empirical methodology to estimate the divorce effect on the divorced, Section 3 presents the data, Section 4 provides the empirical results, and Section 5 concludes.

2. EMPIRICAL METHODOLOGY

Estimation of intra-household behavior models is a daunting task since personal characteristics which affect selection into divorcing couples are likely to be related to characteristics determining behavior in financial markets (such as educational attainment, age, and income) given that the sorting of individuals into those households is nonrandom. The possible selection bias from endogenous matching is therefore taken into account by Propensity Score Matching (PSM). The effect of divorce on the divorced, i.e. average treatment effects on the treated (ATT), is in the second step analyzed in a dynamic setting where the financial behavior of a divorcing individual is compared with "identical", i.e. based on observable covariates, individuals that stay married in a PSM-Difference-in-Difference approach (Rosenbaum and Rubin 1983; Heckman et al., 1997; 1998). Hence, it is not a comparison of sample means, but rather a comparison of each divorced individual with close matches of married individuals very similar to her. The DID-estimator then measures the difference in yearly changes of divorced and married individuals' saving rates as well as risky shares.

Given the large number of background characteristics at hand, the PSM method is well suited and an omitted variable bias is not likely to cause problems. McKenzie et al. (2010) compare different non-experimental approaches and find that the PSM-DID

estimator outperforms the OLS estimator in terms of bias reduction when studying income gains. An advantage with the approach is that the DID-estimator differences out the unobserved time-invariant heterogeneity that may affect outcome, for example ability or overconfidence. However, selection problems may still be caused by systematical differences between the groups in unobserved time-variant heterogeneity. Non-parametric Mantel and Haenszel (1959) tests confirm that results are robust against hidden bias.

The first step is to estimate the propensity scores. A pooled panel logistic model is applied to estimate the probability that the individual belongs to a household that is dissolved through a legal divorce during the observed time period (1999-2007). The covariates at the individual level are observed before the household is dissolved (*t-1*). The risk that the individual covariates are influenced by the divorce (or the anticipation of divorce) is then reduced. Thus, divorces between 2000 and 2007 are studied. The exact timing of the divorce cannot be retrieved, but the change in marital status from one year to another is known. The following model is estimated to retrieve propensity scores:

$$D_{i,t}=\mathbf{1}(Y_{i,t}>0).$$

The 1(.) function is an indicator function that equals one if the $Y_{i,t}$ function takes a value greater than zero. The $Y_{i,t}$ function is defined as

$$Y_{i,t}=\alpha+\gamma X_{i,\,t-1}+\omega\Lambda_{i,c}+\mu T_t+\varepsilon_{i,\,t-1},$$

where $X_{i,\,t-1}$ = multidimensional vector of pre-divorce individual characteristics, $\Lambda_{i,c}$ = community characteristics, and T_t = time fixed effects (for variable definitions, see Appendix A, Table A1). The error term is defined as $\varepsilon_{i,\,t-1}$. Formally the estimated propensity score is defined as $\hat{p}(X_{i,\,t-1},\Lambda_{i,c},T_{t-1})$.[6]

The data set contains substantially more control than treated units (6.14%), i.e. $N_T< N_C$, where N_T is the number of treated units and N_C the number of control units. Therefore, instead of choosing only one nearest neighbor, I increase the number of neighbors to use more of the information available in the control set. In the paper, I present matching results for Nearest-Neighbor Matching (with replacement, using four neighbors). Nearest-Neighbor Matching varying the number of neighbors is also performed as a robustness

[6] Only significant covariates are included except if they are important for balancing the matched sample (e.g. Heckman et al., 1997; Dehejia and Wahba 2002; Caliendo and Kopeinig, 2008). Also, a common support restriction is imposed, i.e. extreme values of propensity scores are excluded.

check as well as Kernel matching, and results are shown to hold.[7] The second step after the propensity score estimation is to retrieve ATTs:

$$ATT_{DID}=E\left[S_{i,t,t-1}(1)-S_{i,t,t-1}(0)|D_{i,t}=1\right]=E\left(S_{i,t,t-1}(1)|D_{i,t}=1\right)-E\left(S_{i,t,\,t-1}(0)|D_{i,t}=1\right),$$

where $S_{i,t,t-1}(1)$ is the outcome variable of main interest, i.e. the change in the saving rate and risky share for the divorced (treatment) group between period *t-1* and *t*, and $S_{i,t,t-1}(0)$ is the hypothetical outcome in the divorced group in case of no divorce. Both outcomes cannot be observed, but only:

$$E\left(S_{i,t,t-1}(1)\middle|D_{i,t}=1\right) \text{ and } E\left(S_{i,t,t-1}(0)\middle|D_{i,t}=0\right).$$

The counterfactual outcome $E\left(S_{i,t,t-1}(0)\middle|D_{i,t}=1\right)$ cannot be observed and has to be constructed. For Nearest-Neighbor Matching, this counterfactual outcome is approximated by comparing non-divorced who are close matches on observable characteristics. The estimator is defined:

$$S_{i,t,t-1}(1)-S_{i,t,t-1}(0)=\left(S_{i,t}(1)-S_{i,t-1}(1)\right)-\left(S_{i,t}(0)-S_{i,t-1}(0)\right).$$

DID is then combined with PSM:

$$ATT_{DID,\,PSM}=E\left[E\left\{S_{i,t,t-1}(1)|D_{i,t}=1,p(.)\right\}-E\left\{S_{i,t,t-1}(0)|D_{i,t}=0,p(.)\right\}|D_{i,t}=1\right],$$

where the outer expectation is over the distribution of $p(.)|D_{i,t}=1$. The effect of divorce on the change in saving rate and risky share for the divorced can be identified yearly, from three years before to three years after the divorce. By estimating ATTs at several time points, it is possible to study the timing of possible altered financial behavior. Also, the limit of three years before and after divorce gives a sufficient amount of observations, and pre-divorce characteristics can be obtained.

3. DATA AND VARIABLE MEASUREMENTS

3.1 *Data*

I use data pertaining to all Swedish residents born in 1963 and 1973, observed between the years 1999 and 2007. These two cohorts are selected since a large proportion of the individuals do have a partner, and they are less likely to have been divorced earlier

[7] By using Kernel matching all the information in the control set is used, and one advantage of using that method is therefore the low variance achieved. However, the common support restriction is of crucial importance when implementing the method to lower the probability of bad matches. See Smith and Todd (2005) for a more detailed discussion of the trade-off between variance and bias, and the benefits of matching with replacement.

compared to older cohorts. At the same time, I cover the peak ages for divorce in Sweden (35-45 years old).[8] The analysis of the divorce effect on financial behavior is therefore not likely to be contaminated by effects of earlier divorces. Data on individuals' stockholdings and mutual fund holdings are collected from official tax records by Statistics Sweden. Data on individuals' other wealth (bank holdings, real estate, and investments in debt securities) and taxable incomes are also drawn from the Swedish tax authorities, and are reported on an annual basis from December 1999 to December 2007, and individual characteristics for the same period have been collected from Statistics Sweden.[9] I also use equivalent data belonging to individuals' spouses. Daily stock prices (closing prices) are collected from Thomson Datastream, and NAV-rates for mutual fund holdings are gathered from the Swedish Investment Fund Association. The data provides a unique opportunity to explore asset allocation over time. As the effect of divorce on individual investment behavior is being examined, all selected individuals have at some time during the observed time been married. Here, the treatment group is divorced individuals, and the control group consists of individuals that are lawfully married. A divorcing individual is defined as a lawfully married individual going through a legal divorce. The marital status is observed at the end of each time period, i.e. year. If a person remarries during the first three years after a divorce, the individual is excluded from the sample to avoid capturing a potential remarriage effect.[10]

The selected sample consists of 655,258 observations, based on 117,964 individuals, where the older cohort represents 52.3% of the observations. I can also observe cohabiting partners with common children. They are however excluded from the main analysis since a legal divorce between a lawfully married couple and a separation between cohabiting individuals are likely to be two very different events when it comes to the division of assets.[11] I conduct a separate analysis on cohabitants in the robustness part, Section 4.4, to verify that the separation effect is in line with the main estimated divorce effects.

The average divorce rate of married individuals is 6.14%, and the distribution over years is fairly even, but slightly higher in the last observational years. Official divorce statistics from Statistics Sweden display a similar pattern. During the observational years, the marriage rate is 0.4%, and a divorce, on average, occurs after the spouses have been

[8] Data on age and divorce rates is retrieved from Statistics Sweden.
[9] Individual characteristics are collected from the LISA database, Statistics Sweden.
[10] Only about 1,000 observations are dropped when imposing that restriction.
[11] Cohabiting couples with no common children are, in my data set, defined as singles.

married for 12.3 years.[12] Private property, inheritance, gifts, as well as assets that are categorized as private property through a prenuptial agreement are excluded.[13] In Sweden, about 12% of all marriages have a prenuptial agreement (Agell and Brattström, 2011). The former spouses are encouraged to divide their assets privately but they can also apply to a district court for the appointment of a marital property administrator. Decisions regarding marital property and how assets should be divided are then determined by the administrator.

3.2 *Outcome Variables*

The saving rate and share of risky assets (risky share) are the main outcome variables of interest. Information is retrieved from wealth register data of asset values collected from tax records by Statistics Sweden. The saving rate is measured as the proportion of disposable income that is saved from one year to another, and is determined by the ratio between the individual's savings and disposable income: $\text{Saving rate}_{i,t} = \frac{\text{savings}_{i,t-1,t}}{\text{disposable income}_{i,t-1}}$. Savings are here defined as changes in net total wealth (financial wealth, real estate wealth, and liabilities) from *t-1* to *t*. Financial wealth is the value of holdings in cash, stocks, mutual funds, directly held bonds, capital insurance products, and derivatives, excluding illiquid assets and defined contribution retirement accounts. Real estate wealth includes residential real estate wealth (value of primary and secondary residences), as well as commercial real estate wealth (value of rental, industrial, and agricultural property). Liabilities are the sum of total debt, including student loans. Disposable income includes net earnings, transfers[14], capital income, pensions, and deductions.[15] Changes in individual saving rates are acquired in the second step (PSM-DID estimation) by taking yearly differences.

The measure of the risky share is, in line with earlier studies, argued to serve as a proxy for measuring the change in relative risk of the individual's wealth allocation (e.g. Guiso et al., 1996; Heaton and Lucas, 2000; Calvet et al. 2009a and b; Bertocchi et al., 2011; Calvet and Sodini, 2014). Earlier studies focus on liquid assets when constructing the share of risky assets (e.g. Brunnermeier and Nagel, 2008; Malmendier and Nagel,

[13] Whether spouses have a prenuptial agreement or not cannot not be observed in the data.
[14] Household transfers are divided equally between spouses when calculating the individual disposable income.
[15] Negative values for the disposable income are possible due to negative capital incomes but rare, and are in that case set to one (as is disposable income summing to zero). Moreover, assets are given in current market value.

2011; Calvet and Sodini, 2014) following Merton (1969). Thus, the risky share is here defined as the proportion of the liquid financial portfolio (the sum of bank account balances, money market funds, risky mutual funds, and directly held stocks) invested in risky assets (risky mutual funds and directly held stocks).[16] More explicitly, the risky share is defined as $\text{Risky share}_{i,t} = \frac{\text{risky financial assets}_{i,t}}{(\text{cash} + \text{risky financial assets})_{i,t}}$. Secondly, the individual changes in the risky share, conditional on that the individual is participating in the risky financial market, $\Delta\text{Risky share}_{i,t,t-1}$ is then calculated for the PSM-DID estimator. Summary statistics for the outcome variables are presented in Table 1.

TABLE 1: SUMMARY STATISTICS, OUTCOME VARIABLES (UNMATCHED)
Summary statistics for the relevant outcome variables divided over divorced and married individuals are displayed. N(divorced)= 14,325, N(married)= 640,933. Significance levels: ***p<0.01 **p<0.05 *p<0.10

	Divorced	**Married**	
Variable	Mean (SD)	Mean (SD)	Difference (t-statistic)
Saving rate	0.0567 (0.1538)	0.0694 (0.1639)	-1.26*** (-25.08)
Risky share	0.4964 (0.4954)	0.3966 (0.4821)	0.0998*** (67.50)
Risky financial market participation	0.2551 (0.4359)	0.3918 (0.4882)	-0.137*** (-93.36)

Notice that general participation rates in risky financial markets are relatively high in Sweden compared to U.S. and the rest of Europe (e.g. Guiso et al., 2003). Moreover, financial market participation has repeatedly been shown to be generally lower for women than men (e.g. Haliassos and Bertaut, 1995; Barber and Odean, 2001; Halko et al., 2012). This is also the case here (33.1% versus 41.5%). Those born 1963 generally participate in the financial market to a larger extent than those born 1973 (38% versus 34.5%). Overall, the participation rate for the full sample is 36.9%.

The average yearly differences in the saving rate between those who get divorced and those who stay married are displayed in Figure A1 in Appendix A. A relatively small difference between the groups is visible and the divorced display a lower saving rate on average. Interestingly, the opposite holds for the years immediately before the divorce where the divorcing individuals' saving rates are generally larger. The summary statistics in Table 1 show that individuals who stay married over the whole observed time period have, on average, a significantly higher saving rate compared to divorcing individuals

[16] following Calvet and Sodini (2014).

(6.94% vs 5.67%). The average household saving rate in Sweden during the observed time period is higher, 11%. Household saving rates were 11.7% across the EU, while saving rates in the US were lower (5.1%), even though incomes were lower in the EU and institutional factors such as social security schemes were stronger (Leetmaa et al., 2009).

Moreover, married individuals, in general, participate in the risky financial market to a larger extent. Reasons behind this may be that they are able to carry out risk sharing within the marriage, they have a more stable economic situation, and they are wealthier.[17] In that sense, married individuals are less risk-averse because participating is principally a risky decision. In contrast, divorcing individuals hold a larger risky share, 49.6% compared to 39.2% (see Table 1; Figure A2 and A3 in Appendix A).

3.3 *Explanatory Variables*

The rich data enables me to add a large number of control variables in the propensity score estimation. Descriptive statistics of the variables and t-tests are presented in Table A2 in Appendix A (variable definitions in Table A1).

The average net wealth (financial, real estate wealth, and liabilities) for the total Swedish population is 874,157 Swedish kronor (SEK) and thus, it is considerably larger than the sample average.[18] A possible explanation for these discrepancies between the sample and the whole Swedish population is the relatively young age of the sample. I also include a dummy variable for whether the individual has a negative net wealth or not, which then is viewed as a proxy for potential financial stress, which may affect the decision to divorce. In fact, there is a 10.6% significant observed difference in the proportion of individuals displaying a negative net wealth between divorced and married. Investments in housing have been shown to play an important role in cross-sectional variations of wealth composition. For example, Cocco (2005) as well as Vestman (2013) find evidence that house price risk crowds out stockholdings, resulting in limited financial wealth for the young and poor. I therefore condition on real estate wealth in the propensity score estimation.

To control for household income I include the partner's disposable income as well as the individual's disposable income. The yearly average disposable income is 147,557 SEK for the divorced and 154,689 SEK for the married.[19] A t-test establishes a significant difference in average net wealth between divorced individuals and non-divorced (104,192

[17] They, being wealthier, could also of course be a consequence of successful investments in earlier periods.
[18] Statistics come from Wealth Statistics and Household economy (HEK) from Statistics Sweden (SCB).
[19] Overall, the yearly average disposable income is lower in my sample compared to the total Swedish population, which is 231,000 SEK. This is most likely due to the cohorts' relatively young age.

SEK compared to 151,297 SEK).[20] Time-fixed effects have been added to control for contemporaneous influence and potential time trends.

Divorced individuals have, on average, a lower educational level and disposable income. The divorced group displays an average age of 33.5, while the control group has an average age of 35.7. The divorced group consists of 2.4% more women than in the control group. Also, 18.4% of the divorced individuals are immigrants (20.2% in the control group). [21] Moreover, descriptive statistics show that the divorced have significantly fewer children in each age category.

In a theoretical bargaining framework, the divorce threat point is also likely to depend on environmental factors.[22] Conditions in the remarriage market are one example of these factors. Social norms concerning divorce in the community may also be considered an environmental parameter. A large body of empirical research suggests that community effects on family-related outcomes exist. For example, McDermott et al. (2013) find evidence that divorce can spread between friends, siblings, and coworkers.[23] Whether the community effects are a result of social interaction or that community members are sharing similar characteristics is of less importance in this particular context. The average duration of marriage in the municipality may affect changes in individual marital status either through social interaction effects or due to sorting into communities and is therefore included as well as municipality population density.[24]

Relative measures of spouses' incomes or education are often used in empirical work to control for relative bargaining power within households (e.g. Lundberg and Ward-Batts, 2000; Elder and Rudolph, 2003; Euwals et al., 2004). Elder and Rudolph (2003) find that bargaining power is positively correlated with financial knowledge, educational level, and wage, irrespective of gender. These measures serve as proxies since direct measures of how decisions are made in a household are generally hard to obtain. Inequalities in bargaining power may affect the general marital stability. Moreover, Bertrand (2015) indicates an aversion to deviate from the traditional norm that if the

[20] The average SEK/US dollar exchange rate during the years 1999 to 2007 is 0.1232 SEK per USD.
[21] To be categorized as immigrant, the individual and/or at least one of the individual's parents has to be born outside of Sweden.
[22] McElroy (1990) uses the term extra-household environmental parameters for environmental factors.
[23] Community effects are labeled differently in the fairly vast existing literature, for example peer effects, neighborhood effects, network effects, herding, mimicking, conformity, and observational learning.
[24] The data is collected from Statistics Sweden. The average age of entering a marriage in the municipality where the individual resides is also collected from Statistics Sweden, but the variable is displaying a low variance, and hence, the age of entering a marriage is quite homogenous over municipalities and is therefore assumed to be constant over individuals. In addition, age is included as a covariate and the sample is relatively homogenous since only two cohorts are studied.

woman earns more, there is a higher likelihood of divorce. In this study, I include a dummy for whether the female spouse earns more than the male spouse in the household in the propensity score model. I also include absolute differences in educational attainment and age. In addition, a variable indicating if partners have shared the parental leave (if any) equally is used as a control variable for equality in the household.[25]

4. EMPRICAL ANALYSIS

In this section the empirical findings are presented. The results are reported in terms of marginal effects for the propensity score pooled logit model (calculated at the mean of the other regressors) along with point estimates for the average divorce effects on the divorced (ATTs).

4.1 *Propensity Score Estimation*

The propensity score estimation results are given in Table 2. The binary dependent variable takes on the value of one if the individual is divorced in time *t*, and zero if married.

The propensity score estimation results give an indication of the differences in characteristics of the divorced and married. For example, studies have shown that educational attainment is associated with greater marital stability (Heaton, 2002), and that low income, financial instability, or economic problems are associated with lower levels of marital quality (Rauer et al., 2008). The propensity score estimation indicates the higher the level of education the individual has, the less likely the individual is to get a divorce. One explanation for this result may be that the greater economic problems in lower educated households are resulting in lower marital satisfaction. However, I find evidence for an increase in the probability of divorce followed by an increase in disposable income. An interpretation is that a higher income would result in a higher "threat point" making divorce a less risky decision financially.

[25] An equal share of parental leave between partners is defined as if the relative share of parental leave between 0.85-1.15.

TABLE 2: PROPENSITY SCORE ESTIMATION

Results for the propensity score estimation (pooled logistic model) are displayed here. Dependent variable: *Divorced (*1=individual divorce in time t, 0=still married). Explanatory variables are lagged one year. Cluster robust standard errors at the individual level. Significance levels: *******p<0.01 ******p<0.05 *****p<0.10.

Variable	Marginal Effect (S.E.)
Educational attainment	-0.002***
	(0.0002)
Log disposable income	0.004***
	(0.0003)
Female	0.008***
	(0.0005)
Age	-0.001***
	(0.0001)
Immigrant	-0.009***
	(0.001)
Log net wealth (positive)	-0.002***
	(0.0004)
Negative net wealth	0.001***
	(0.0006)
Real estate wealth (dummy)	-0.0018***
	(0.0001)
Children 0-3 yrs old	0.007***
	(0.0005)
Children 4-6 yrs old	-0.002***
	(0.0003)
Children 7-10 yrs old	-0.004***
	(0.0003)
Children >10 yrs old	-0.004***
	(0.0004)
Partner's log disposable income	0.001***
	(0.0001)
Female spouse earns more than the male spouse	0.028***
	(0.001)
Age difference (the male's age-the female's age)	0.0001***
	(0.00001)
Difference in educational attainment	0.003***
(the male's educational level –the female's educational level)	(0.0002)
Equal relative share of parental leave	-0.014***
	(0.0016)
Log population per square meter in community c	-0.001***
	(0.0002)
Average duration of marriage in time of divorce in community c	-0.001***
	(0.0002)
Time fixed effects	Y
Memo	N= 655,258; Pseudo R^2=0.297

Negative net wealth results are in line with expectations as people with a negative net wealth display a higher propensity for divorce. Moreover, the likelihood of divorce is decreasing with net wealth as well as with age. An explanation for the lower probability of divorce with increasing age is the composition of the sample since individuals are observed between the ages 27 and 46, and the peak ages for divorce in Sweden are observed (35-45 years old).[26] Immigrants are less likely to get divorced, possibly because of differences in marriage norms. Results also show that having children is, in general, reducing the probability of divorce. An exception is however observed for children between the ages 0-3, where a positive effect on divorce is estimated for the number of children in those ages. Those years can be stressful and could then potentially lead to marital instability.

It is not possible to control for how long the individuals have been involved in the current relationship. However, the age of the children could potentially capture the effect that the likelihood of divorce increases significantly after three years of marriage. Becker et al. (1977) suggest that the presence of young children increases marital stability, although serious selection problems may bias results here. Children per se may not be the glue that keeps marriages stable. Instead, the presence of children may be an indication of stable family conditions.

If the woman earns more than her male spouse, they are more likely to get divorced according to the results. In addition, results indicate that large relative differences in educational attainment and age increase the probability of divorce. If parental leave is divided equally between spouses, divorce is shown to be less likely. Spouses sharing parental leave equally could be a result of economic reasons or bargaining power. In sum, results indicate the importance of inequalities between spouses for marital instability.

Results show that the likelihood of divorce increases with population density, then indicating that divorce is more likely in urban areas, where the remarriage market is potentially larger. Also, the longer the average duration of marriage in one's community is, the less likely one is to get a divorce. This could be a consequence of sorting, but the variable may also capture social norms concerning divorce.[27] A community is here defined as a municipality. The areas are smaller than the Metropolitan Statistical Areas (MSAs) which are often applied in similar studies on US data (e.g. Brown et al, 2008).

[26] Data is retrieved from Statistics Sweden.
[27] Manski (1993) among others has shown that there is a clear identification problem with measuring effects of social interactions due to endogeneity.

However, peer groups are likely to be smaller in size.[28] The estimated community effects should therefore be interpreted with caution. Even so, they most likely serve as good proxies for marriage market conditions and other community factors.

A common support restriction is imposed and the overlap of the propensity score distributions is extensive (Figure A4 in Appendix A). The success of the matching procedure is tested and in particular, whether the matching procedure is able to balance the distribution of relevant variables in both groups.[29] For example, Rosenbaum and Rubin (1985) propose a balance indicator, the Standardized Bias (SB), which should fall below the limit (Table A3, Appendix A).[30] The low pseudo-R^2 after matching also indicates that there are no remaining systematic differences in the distribution of covariates between the groups.

4.2 *Evidence on the Divorce Effect on the Divorced*

The average divorce effects on the divorced (ATTs) for the saving rate are presented in Table 3 and the risky share in Table 4.[31] All ATTs are significant at the 1% level.

4.2.1 *Divorce Effect on Saving Behavior*

PSM-DID results for the change in the saving rate is presented in Table 3. The results show that one year before the divorce, divorcing individuals increase their saving rates 9.16 percentage points more than the control group. Since the average saving rate for the divorce group is 5.67 percent, this is a remarkable effect of high economic significance. However, no significant divorce effect on the divorced can be established for the same year as the divorce. This can then be taken as evidence that divorce leads to higher precautionary savings, as predicted (cf. Love, 2010; González and Özcan, 2013).

[28] For example, family members have been shown to influence individual financial decisions (Li, 2014; Hellström et al., 2013).
[29] One troubling aspect is that different balancing tests sometimes yield different answers. Thus, results from different tests are presented, and the balancing properties are satisfied.
[30] Following Rosenbaum and Rubin (1985), the standardized percent bias is the percent difference of the sample means in the treated and non-treated sub-samples (within common support) as a percentage of the square root of the average of the sample variances in the treated and non-treated groups. A SB below 3-5% after matching is often seen as sufficient (Lechner, 1999; Caliendo and Kopeinig, 2008).
[31] Robustness checks are performed varying the number of neighbors and implementing Kernel Matching but results are not presented here since the general conclusions hold.

TABLE 3: DIVORCE EFFECT ON THE SAVING RATE

The propensity score matching difference-in-difference (PSM-DID) results for the changes in saving rate are presented here. Outcome variable: Change in yearly saving rate. Standard errors are adjusted robust standard errors (Abadie and Imbens, 2012).

Sample	Divorced	Married	ATT	S.E.	# observations
t-3	0.0402	0.0301	0.0102	0.0150	6,258 (divorced) 595,154 (married)
t-2	0.0222	0.0381	-0.0159	0.0129	10,633 (divorced) 615,645(married)
t-1	0.1262	0.0346	0.0916***	0.0132	12,756 (divorced) 613,223(married)
t	0.0414	0.0575	-0.0161	0.0154	14,801 (divorced) 625,979(married)
t+1	-0.1216	0.0747	-0.1964***	0.0170	14,037 (divorced) 625,219(married)
t+2	-0.0055	0.0842	-0.0897***	0.0171	11,927 (divorced) 624,648(married)
t+3	0.0256	0.0841	-0.0585***	0.0176	9,781 (divorced) 624,387(married)

Results show that one year after the divorce, a negative divorce effect on the divorced in the change in saving rate is established. Divorced individuals have a 19.64 percentage point lower change in the saving rate one year after the divorce compared to matched married individuals. A divorce is generally costly, and this decline in the saving rate could be a result of high divorce expenses. The large effect is possibly also a result of changes in real estate wealth and division of assets. This is further considered in the robustness part of the paper (Section 4.4). In addition, the uncertainty may directly affect wealth accumulation and may explain why the saving rates are negatively affected after the divorce (Cubeddu and Rios-Rull, 2003). Concerns about wealth accumulation in a longer time perspective may then arise. Divorced individuals may not be able to buffer against future economic shocks like health problems, another divorce, or retirement, since they have not accumulated a sufficient amount of wealth. However, the immediate effect is the most pronounced, and it gradually decreases the years following the divorce. Nonetheless, the effects are still fairly high and of economic significance two and three years after the divorce (8.97 and 5.85 percentage points, respectively).

4.2.2 *Divorce Effect on the Risky Share*

The PSM-DID results for the risky share, conditional on risky asset market participation, are presented in Table 4.

TABLE 4: DIVORCE EFFECT ON THE RISKY SHARE

The propensity score matching difference-in-difference (PSM-DID) results for the risky share are presented here. Results are conditioned on that the individuals have holdings in risky assets. Outcome variable: Change in risky share. Standard errors are adjusted robust standard errors (Abadie and Imbens, 2012).

Sample	Divorced	Married	ATT	S.E.	# observations
t-3	0.0285	0.0296	-0.0011	0.0066	2,103 (divorced) 210,017 (married)
t-2	0.1244	0.0335	0.0909***	0.0081	2,996 (divorced) 232,126 (married)
t-1	0.05992	0.0395	0.0204***	0.0081	3,492 (divorced) 231,550 (married)
t	0.01974	0.0568	-0.0370***	0.0082	3,700 (divorced) 235,042 (married)
t+1	0.04036	0.0599	-0.0196***	0.0084	3,393 (divorced) 234,909 (married)
t+2	0.02420	0.0621	-0.0379***	0.0087	2,782 (divorced) 234,799 (married)
t+3	-0.00382	0.0600	-0.0638***	0.0096	2,161 (divorced) 234,732 (married)

Results show that the divorce effect on the divorced (ATTs) is positive at two years and one year before the divorce for the risky share. When divorcing individuals are still married, they are hence increasing their risk taking more than the control group. This could potentially be a result of the fact that the saving rates are generally increasing in the years before a divorce, and that they then choose to invest those savings in risky assets. At the time of divorce (*t*), the empirical analysis reveals a negative divorce effect on the change in risky share for the divorced. The matching results show an ATT of -3.7 percentage points, then indicating that divorcing individuals demand less risky assets.

Results also reveal a negative divorce effect on the divorced for all the years after the divorce, and the effect is gradually increasing in magnitude. One year after the divorce, the ATT is 1.96 percentage points, two years following the divorce it is 3.79 percentage points, and after the third year, it reaches 6.38 percentage points. This may then be taken as evidence that the divorce effect on the divorced for the risky share is persistent and of economic significance. After a divorce, individuals' risky asset shares are generally negatively affected. Divorce involves an increased uncertainty about the future, and the possibility of risk sharing between spouses is lost. Individuals may experience financial stress and the economic future is more uncertain. Individuals become more risk averse and the observed financial risk is actively reduced. Results support the hypothesis that an

individual changes his/her financial risk taking behavior after the event of a divorce, i.e. he/she becomes more risk averse in the financial domain, which then corresponds to findings in Viceira (2001) and Haliassos and Michaelides (2003). Alternative explanations of the effect may however exist, such as investor behavior changes among divorcing individuals. It could be that divorcing individuals have so much on their minds and that they consequently become more passive in their investment strategy and are not actively adjusting their portfolio, which could affect returns. This may affect their portfolio value negatively. Irrespective of what the dominating driving explanation of this effect is, results indicate that individuals' risky shares are negatively affected by a divorce.

Furthermore, since wealth decreases, wealth is then low compared to the habit which individuals strive to maintain, and according to habit formation models on household portfolio allocation decisions, individuals will then become more risk averse and invest less in risky assets (e.g. Lupton, 2002; Calvet and Sodini, 2014). The composition of assets can however be altered by the fact that individuals need to liquidate assets to pay for the divorce costs. These two potential explanations for the estimated divorce effects are further approached in the robustness part of the paper (Section 4.4).

4.3 *Gender Differences*

Divorce may affect women and men differently. Earlier studies have shown that women have a lower stock market participation rate compared to men (Haliassos and Bertaut, 1995, Halko et al., 2012, Van Rooij et al., 2011). The risky financial market participation rate is also here lower for women (33.1% compared to 41.5% for men).

Women have generally been shown to take on lower levels of risk and invest more conservatively in comparison to men, conditional on participation (Schubert et al., 1999; Dwyer et al., 2002; Lusardi and Mitchell, 2008). Marital status seems to play a role and married women have been shown to take a higher level of financial risk than single women (Sundén and Surette, 1998). Moreover, Friedberg and Webb (2006) find that households tend to invest more heavily in stocks as the husband's bargaining power increases. Marriage and the interaction with their spouse may then be argued to affect the individual's portfolio share of risky assets, and it may not correctly reflect the individual risk aversion, but rather the household's. Given that women are more risk averse than men, I should observe women decreasing their risky asset shares more than men when they divorce. The fact that women generally display a higher degree of risk aversion

could furthermore lead to different reactions to the background risk that divorce produces between genders.

To bring clarity to potential gender differences in the effect of divorce on financial risk taking, I estimate a pooled regression for each sample (t-3, t-2, …, t+3), where the dependent variable is the individual divorced-married treatment effect in the change in saving rate and change in risky share. A dummy indicating the individual's gender (female, value: 1, or male, value: 0) is added as an explanatory variable, and is thus, the main variable of interest to interpret. Results are presented in Table 5.

TABLE 5: GENDER DIFFERENCES IN THE DIVORCE EFFECT ON THE DIVORCED
In the table, pooled panel regression results are presented, using each individual "matched pair" difference in the change in saving rate (Model 1) and the change in risky share (Model 2) as dependent variables, conditioned on a dummy variable for gender (1=female, 0=male) in each regression. Cluster robust standard errors at the individual level. Significance levels: ***p<0.01 **p<0.05 *p<0.10.

	(1) Change in saving rate		(2) Change in risky share	
Sample	Female	S.E.	Female	S.E.
t-3	-0.0406	0.0376	0.0006	0.0178
t-2	-0.0646	0.0420	0.0067	0.0139
t-1	-0.1469***	0.0410	-0.0103	0.0139
t	-0.0955**	0.0424	0.0015	0.0145
t+1	-0.0069	0.0410	-0.0105	0.0143
t+2	0.0188	0.0421	-0.0024	0.0145
t+3	-0.0126	0.0447	-0.0322**	0.0164

At three years and two years before the divorce, no statistically significant difference between genders is present for either the saving rate or the risky share. One year before the divorce, however, divorcing women, in general, display lower positive effects on their saving rates compared to divorcing men. This may reflect the fact that, in the year before divorce, men suddenly realize that a divorce is about to happen (Clark et al., 2008), while women have adjusted their saving rates for a longer time period before. Another reason could be that women do not have the same possibilities as men to increase their precautionary savings due to generally lower incomes. If you are a divorcing female, the increase in the saving rate will be 14.69 percentage points lower than if you would have been a divorcing male (significant at the 1% level). This effect is large and could lead to women suffering more financially after a divorce relative to men. The year of the divorce, females also, on average, display a 9.55 percentage point lower effect in the change in

saving rate (significant at the 5% level), which may then indicate that they are not adjusting their precautionary saving to the same extent as men.
After the divorce there is no statistically significant difference in adjustments of savings rates between genders. Even though a divorce leads to a negative financial shock, results indicate that there may not be any significant gender differences in wealth accumulation for divorced individuals the years following a divorce.

The effect of gender on the change in risky share during a divorce is also analyzed. Before the divorce, both men and women display positive and significant ATTs. After the divorce, individuals generally decrease their risky shares. A significant gender difference in the divorce effect on the risky share is not present until three years after the divorce. After three years, women decrease their risky shares 3.22 percentage points more than men on average (significant at the 5% level). This could then be seen as evidence that women reduce their financial risk-taking after a divorce to a larger extent than what men do. Given that women, on average, display a higher risk aversion than men, this negative gender effect could be due to the fact that married individuals do not hold the preferred portfolio share of risky assets reflecting their true risk aversion level. This may be a result of the marriage itself and the interaction with their spouse. The effect after the divorce would then be an adjustment towards their true preferences outside of the marriage. However, the more pronounced negative effect on divorcing women could also be an effect originating from changes in financial positions, and women may be more financially vulnerable after a divorce in comparison to men. If such an effect exists, one could however expect to observe it immediately after the divorce.

4.4 *Robustness of Results*

To test the robustness of the results, a number of possible issues have been addressed. First, one issue that has been considered is the possibility of remaining unobserved heterogeneity. Inference about treatment effects may be altered by unobserved factors and I therefore want to determine how strongly an unmeasured variable must influence the selection process in order to undermine the implications of the matching analysis. Following Aakvik (2001) I apply the non-parametric Mantel and Haenszel (1959) test, which compares the successful number of persons in the treatment group to the expected number of successes given that the treatment effect is zero. The unconfoundedness assumption is not tested by the bounding approach, since this would amount to testing that there are no (unobserved) variables that influence the selection

into treatment. Instead, the Rosenbaum bounds given by the Mantel and Haenszel (1959) test provide evidence to which degree any significant results hinge on this non-testable assumption (Rosenbaum, 2002). The tests indicate robust results to unobserved factors.

Second, the risky share is argued to capture changes in financial risk-taking. However, the composition of assets can be altered as a result of the fact that individuals need to liquidate real assets to pay for the costly event of a divorce. The risky shares can therefore be changed because the individual needs to liquidate resources or because the increase in background risk increases risk aversion. These two effects are therefore expected to negatively affect individual financial risk taking, but no separation of the two effects can be done in the main analysis. As a robustness check, I analyze a dummy variable indicating whether the divorcing individual moves out or sells his/her original home, or if the individual stays in the original home after the divorce. Thus, this variable is constructed by looking at changes in households and individual holdings in residential real estate wealth (primary residences, not secondary). If the individual does not own any primary residence directly after the divorce, this is interpreted as the individual having moved out or that the spouses have sold the residence.[32] To study the effect of changes in housing arrangements on the asset mix, I then estimate a pooled regression for each sample (t-2, t-1, …) to study the heterogeneity in individual divorced-married treatment effect in change in saving rate and change in risky share, between those who move out/sell versus those who stay in the original home. Each individual "matched pair" difference in the change in saving rate and risky share from the matching analyses then constitutes the dependent variables, and a dummy variable indicating whether the individual moves out or not (1=move out/sell, 0=stay) is added as an explanatory variable in each regression. Those that move out/sell their primary residences exhibit larger changes in their saving rates and risky shares directly before and after the divorce compared to people that keep the house/condo (see Table A4 in Appendix A). However, there are no statistically significant differences several years before or after the divorce.

In addition, a separate analysis for individuals not holding any real assets during the observed time period is estimated in order to determine whether the effects on financial behavior are partly driven by individual changes in risk preferences, and not only a

[32] It is not possible in the data to observe the partner's wealth after the divorce and thus, I cannot observe whether the spouses sell the house/condo or if the individual "sells" his/her share to the partner.

consequence of the fact that individuals need to liquidate assets to pay for various expenses associated with the divorce. The sample is largely reduced since only 18.5% of the individuals never own real assets, and results have to be interpreted with some caution. The ATTs are consistent in sign with the main analysis (see Table A5 in Appendix A). The magnitudes shall however not directly be compared since real assets are here excluded. Before the divorce, results show a significant positive divorce effect on the saving rate. After the divorce, divorcing individuals decrease their risky shares more than the control group.

Third, another potential issue is that a legal divorce implies that the common assets should be divided equally, and this could potentially lead to incorrect conclusions about the changes in risk aversion. The results could be a consequence of the division of assets instead of changes in background risk. Therefore I take advantage of my rich data set. I can observe cohabiting partners with common children (they are excluded from the main analysis). Cohabiting couples with no common children are defined as singles. A legal divorce between a lawfully married couple and a separation of a cohabiting couple are likely to be two very different events when it comes to the asset division. It is therefore of interest to see if the effect of separation is in line, or different, from the estimated effects in the main analysis. Thus, I conduct a separate analysis for cohabiting individuals with common children. The general conclusions are shown to hold. A positive effect on the saving rate is established the same years as the separation. The negative ATTs the years after are generally lower in magnitude, possibly since a separation is less costly and fewer assets need to be divided, and hence, the effect on wealth is not as large.

Fourth, I find strong effects already two years prior to divorce for the risky share (not for the saving rate). This may be seen as an indication that divorcing individuals are systematically different from the control group. To be convinced that they are not, I have selected a subsample of individuals, those divorcing in 2007, and conducted the main analysis on them. I select the group since I can study them for a longer time period before the divorce (7 years). Results show no significant differences in financial behavior up to two years before the divorce, and this then indicates that the two groups are not systematically different after conditioning on propensity scores and performing the matching.

5. CONCLUSION

The focus of my study, divorce, constitutes a source for background risk. Substantial changes in individuals' financial positions are likely due to, for example, changes in household resources and risk preferences which could affect both saving rates and individuals' willingness and possibility to invest in risky assets. In this paper, divorce and its potential effects on financial risk behavior are empirically examined in a Propensity-Score-Matching Difference-In-Difference (PSM-DID) framework by comparing individuals who are experiencing a marital dissolution to a representative control group of married individuals.

The evidence of a change in financial behavior during a divorce could be of economic significance since it may affect wealth accumulation in a longer time perspective. A better understanding of factors influencing individual investment behavior, based in the life-cycle framework, clearly benefits the work of finding policy designs to decrease wealth inequalities. If the individual wants to buffer against the event of a divorce, one could expect an increase in precautionary savings. In fact, I do find evidence for a larger increase in saving rates immediately before the divorce for the divorce group than for the representative control group of married individuals. Results also show a significant negative effect on the change of saving rate one year after. A consequence of this may be that divorced individuals are not able to buffer against future economic shocks like health problems, another divorce, or retirement since they have not been able to accumulate a sufficient level of wealth. The immediate effect is hence the most pronounced, but the analysis also raises a concern that divorce may lead to differences in life-cycle savings and wealth inequalities in the long run, since the divorce effect on the saving rate is present two and three years after the divorce. Divorcing individuals are also shown to take on less financial risk by decreasing their risky shares. A possible explanation is that the divorcing individuals' financial positions are negatively affected, but also that they are hedging against the increased background risk that divorce produces.

Gender differences in the divorce effect on financial behavior are also established. Women are, on average, shown to not adjust their precautionary savings to the same extent as men before the divorce. I also provide evidence that women are reducing their financial risk-taking more than men after a divorce. This may be due to inequalities in financial positions or an adjustment towards individual preferences. Moreover, results are also interesting since lower financial risk taking usually entails a lower expected return, which may then affect wealth accumulation possibilities. The evidence that the divorce

effect differs between genders is hence of importance for policy makers and future legislators of divorce laws in their continuing work to counteract the economic disparity effects divorce typically gives rise.

REFERENCES

Aakvik, A. (2001). "Bounding a matching estimator: the case of a Norwegian training program." *Oxford Bulletin of Economics and Statistics* 63.1: 115-143.

Abadie, A, and Imbens, G. W. (2012). *Matching on the estimated propensity score*. No. w15301. National Bureau of Economic Research.

Agell, A, and Brattström, M. (2011). *Äktenskap Samboende Partnerskap*. 5 ed. Lustus Förlag.

Barber, B. M., and Odean, T. (2001). "Boys will be boys: Gender, overconfidence, and common stock investment." *The Quarterly Journal of Economics* 116.1: 261-292.

Becker, G. S., Landes. E. M. and Michael. R. T. (1977). "An economic analysis of marital instability." *The Journal of Political Economy* 85.6: 1141.

Bertocchi, G., Brunetti, M., and Torricelli, C. (2011). "Marriage and other risky assets: A portfolio approach." *Journal of Banking and Finance* 35.11: 2902-2915.

Bertrand, M., Kamenica, E., and Pan, J. (2015). "Gender identity and relative income within households." *The Quarterly Journal of Economics*, forthcoming.

Brinig, M. F., and Allen, D. W. (2000). "'These boots are made for walking': why most divorce filers are women." *American Law and Economics Review* 2.1: 126-169.

Brown, J. R., Ivković, Z., Smith, P. A., and Weisbenner, S. (2008). "Neighbors matter: Causal community effects and stock market participation." *The Journal of Finance* 63.3: 1509-1531.

Brunnermeier, M. K. and Nagel, S. (2008). "Do Wealth Fluctuations Generate Time-Varying Risk Aversion? Micro-evidence on Individuals." *American Economic Review* 98.3: 713-36.

Caliendo, M. and Kopeinig, S. (2008). "Some practical guidance for the implementation of propensity score matching." *Journal of Economic Surveys* 22.1: 31-72.

Calvet, L. E., Campbell, J. Y, and Sodini P. (2009a). "Measuring the Financial Sophistication of Households." *American Economic Review* 99: 393-398.

Calvet, L. E., Campbell, J. Y, and Sodini P. (2009b). "Fight or flight? Portfolio rebalancing by individual investors." *The Quarterly Journal of Economics* 124.1: 301-348.

Calvet, L.E. and Sodini, P. (2014). Twin Picks: Disentangling the Determinants of Risk-Taking in Household Portfolios. *The Journal of Finance* 69, 867-906.

Carroll, C. D. (1997). "Buffer-stock saving and the life cycle/permanent income hypothesis." *The Quarterly Journal of Economics* 112.1: 1-55.

Cocco, J. F. (2005). "Portfolio choice in the presence of housing." *Review of Financial Studies* 18.2: 535-567.

Cocco, J. F., Gomes, F. J., and Maenhout. P. J. (2005). "Consumption and portfolio choice over the life cycle." *Review of Financial Studies* 18.2: 491-533.

Cubeddu, L. M., and Ríos-Rull, J. V. (2003). "Families as shocks." *Journal of the European Economic Association* 1.2-3: 671-682.

Dehejia, R. H., and Wahba, S. (2002). "Propensity score-matching methods for nonexperimental causal studies." *Review of Economics and Statistics* 84.1: 151-161.

Devereux, M. B., and Smith, G. W. (1994). "International risk sharing and economic growth." *International Economic Review* 35.3: 535-550.

Dwyer, P. D., Gilkeson, J. H., and List, J. A. (2002). "Gender differences in revealed risk taking: evidence from mutual fund investors." *Economics Letters* 76.2: 151-158.

Elder, H. W., and Rudolph, P. M. (2003). "Who makes the financial decisions in the households of older Americans?." *Financial Services Review* 12.4: 293-308.

Euwals, R., Eymann, A., and Börsch-Supan, A. (2004). "Who determines household savings for old age? Evidence from Dutch panel data." *Journal of Economic Psychology* 25.2: 195-211.

Friedberg, L. and Webb, A. (2006) *Determinants and Consequences of Bargaining Power in Households*. No. wp2006-13. Center for Retirement Research.

González, L. and Özcan. B. (2013). "The risk of divorce and household saving behavior." *Journal of Human Resources*, 48.2: 404-434.

Guiso, L., Jappelli, T., and Terlizzese, D. (1996). "Income risk, borrowing constraints, and portfolio choice." *The American Economic Review* 86.1: 158-172.

Guiso, L., Haliassos, M., and Jappelli, T. (2003). "Household stockholding in Europe: where do we stand and where do we go?." *Economic Policy* 18.36: 123-170.

Guiso, L., Sapienza, P., and Zingales, L. (2008). "Trusting the stock market." *The Journal of Finance* 63.6: 2557-2600.

Haliassos, M. and Bertaut, C. C. (1995). "Why Do So Few Hold Stocks?."*Economic Journal* 105.432: 1110-29.

Haliassos, M. and Michaelides, A. (2003). "Portfolio Choice and Liquidity Constraints." *International Economic Review* 44.1: 143-177.

Halko, M. L., Kaustia, M., and Alanko, E. (2012). "The gender effect in risky asset holdings." *Journal of Economic Behavior & Organization* 83.1: 66-81.

Heaton, J. and Lucas, D. (2000). "Portfolio choice in the presence of background risk." *The Economic Journal* 110.460: 1-26.

Heaton, T. B. (2002). "Factors contributing to increasing marital stability in the United States." *Journal of Family Issues* 23.3: 392-409.

Heckman, J. J., Ichimura, H., and Todd, P. E. (1997). "Matching as an econometric evaluation estimator: Evidence from evaluating a job training programme." *The Review of Economic Studies* 64.4: 605-654.

Heckman, J. J., Ichimura, H., and Todd, P. E. (1998). "Characterizing Selection Bias Using Experimental Data." *Econometrica* 66.5: 1017-1098.

Hellström, J., Zetterdahl, E., and Hanes, N. (2013). ”Loved Ones Matter: Family Effects and Stock Market Participation.” Umea Economic Studies 865.

Hirano, K., Imbens, G. W., and Ridder, G. (2003). "Efficient estimation of average treatment effects using the estimated propensity score." *Econometrica* 71.4: 1161-1189.

Lechner, M. (1999). "Earnings and Employment Effects of Continuous Gff-the-Job Training in East Germany After Unification." *Journal of Business & Economic Statistics* 17.1: 74-90.

Leetmaa, P., Rennie, H., and Thiry, B. (2009). "Household saving rate higher in the EU than in the USA despite lower income." *Statistics in Focus* 29.

Li, G. (2014). "Information Sharing and Stock Market Participation: Evidence from Extended Families," *Review of Economics and Statistics,* 96.1: 151-160.

Love, D. A. (2010). "The effects of marital status and children on savings and portfolio choice." *Review of Financial Studies* 23.1: 385-432.

Lundberg, S. and Pollak, R. A. (1996). "Bargaining and distribution in marriage." *The Journal of Economic Perspectives* 10.4: 139-158.

Lundberg, S. and Ward-Batts, J. (2000). “Saving for Retirement: Household Bargaining and Household Net Worth.” Claremont McKenna College Robert Day School of Economics and Finance Research Paper 2004-03.

Lupton, J. P. (2002). ”Household Portfolio Choice and the Habit Liability: Evidence from Panel Data.” University of Michigan, Working Paper.

Lusardi, A. and Mitchell, O. S. (2008). *Planning and financial literacy: How do women fare?*. No. w13750. National Bureau of Economic Research.

Malmendier, U. and Nagel, S. (2011). "Depression Babies: Do Macroeconomic Experiences Affect Risk Taking?." *The Quarterly Journal of Economics* 126.1: 373-416.

Mantel, N. and Haenszel, W. (1959). "Statistical aspects of the analysis of data from retrospective studies of disease.” *Journal of the National Cancer Institute* 22:719-748.

Manski, C. F. (1993). "Identification of endogenous social effects: The reflection problem." *The Review of Economic Studies* 60.3: 531-542.

Mazzocco, M. (2007). "Household intertemporal behaviour: A collective characterization and a test of commitment." *The Review of Economic Studies* 74.3: 857-895.

Merton, R. C. (1969). "Lifetime portfolio selection under uncertainty: The continuous-time case." *Review of Economics and Statistics* 51.3: 247-257.

McDermott, R., Fowler J. H., and Christakis, N. A. (2009). "Breaking up is hard to do, unless everyone else is doing it too: social network effects on divorce in a longitudinal sample followed for 32 years." *Social Forces*, 92.2: 491–519.

McElroy, M. B. (1990). "The Empirical Content of Nash-Bargained Household Behavior." *Journal of Human Resources* 25.4: 559-583.

McKenzie, D., Stillman, S., and Gibson, J. (2010). "How important is selection? experimental vs. non-experimental measures of the income gains from migration." *Journal of the European Economic Association* 8.4: 913-945.

Rauer, A. J., et al. (2008). "Relationship risks in context: A cumulative risk approach to understanding relationship satisfaction." *Journal of Marriage and Family* 70.5: 1122-1135.

Rosenbaum, P. R., and Rubin, D. B. (1983). "The central role of the propensity score in observational studies for causal effects." *Biometrika* 70.1: 41-55.

Rosenbaum, P. R., and Rubin, D. B. (1985). "Constructing a control group using multivariate matched sampling methods that incorporate the propensity score."*The American Statistician* 39.1: 33-38.

Rosenbaum, P. R. 2002. *Observational studies*. Springer New York.

Schmidt, L. and Sevak, P. (2006). "Gender, marriage, and asset accumulation in the United States." *Feminist Economics* 12.1-2: 139-166.

Schubert, R. (1999). "Financial decision-making: are women really more risk-averse?." *American Economic Review* 89.2: 381-385.

Smith, J. and Todd, P. E. (2005). "Does matching overcome LaLonde's critique of nonexperimental estimators?." *Journal of Econometrics* 125.1: 305-353.

Sundén, A. E. and Surette, B. J. (1998). "Gender differences in the allocation of assets in retirement savings plans." *American Economic Review* 88.2: 207-11.

Van Rooij, M., Lusardi, A., and Alessie R. (2011). "Financial literacy and stock market participation." *Journal of Financial Economics* 101.2: 449-472.

Vestman, R. (2013). "*Limited* Stock Market Participation Among Renters and Home Owners" (No. 549). Society for Economic Dynamics.

Viceira, L. M. (2001). "Optimal Portfolio Choice for Long-Horizon Investors with Nontradable Labor Income." *The Journal of Finance* 56.2: 433-470.

Wolfers, J. (2006). "Did unilateral divorce laws raise divorce rates? A reconciliation and new results." *American Economic Review* 96.5: 1802-1820.

APPENDIX A

TABLE A1: VARABLE DEFINITIONS

Variable	Definition
Financial variables	
Saving rate	The yearly change in the value of total wealth (financial and real estate wealth) divided by disposable income
Cash	Bank account balances and money market funds
Risky mutual fund	A mutual fund other than a money market fund
Risky financial assets	Risky mutual funds and directly held stocks
Risky share	Proportions of risky assets in the portfolio of cash and risky financial assets
Risky financial market participation	1=participate in risky financial market (holdings in risky mutual funds and/or directly hold stocks), 0=otherwise
Financial wealth	Value of holdings in cash, risky financial assets, capital insurance products, derivatives, and directly held bonds, excluding illiquid assets and defined contribution retirement accounts.
Residential and commercial real estate wealth	Market value of primary and secondary residences (residential), as well as the value of rental, industrial, and agricultural property (commercial)
Control variables	
Educational attainment	Educational attainment, (level 1-7). 1=less than 9 years of schooling, 2=high school, 3=Senior high school (11^{th} grade), 4=Senior high school (12^{th} grade), 5=College/University (less than 3 years), 6=University, Graduate school (3 years or more), 7=PhD education
Log disposable income	Logged yearly disposable income, in hundreds of SEK
Female	Gender, 1=female, 0=male
Age	Age of individual *i.*
Immigrant	1=individual and/or at least one of the parents are born outside of Sweden, 0=otherwise
Log net wealth (positive)	Log net wealth (if net wealth is >0). Includes financial wealth and residential and commercial real estate wealth, as well as liabilities.
Negative net wealth	1=individual has a negative net wealth in time *t (i.e.* liabilities including study loans exceed financial and real estate wealth), 0=otherwise
Real estate wealth	1=household has real estate wealth, 0=otherwise
Children, age 0-3	Nr of children, age 0-3
Children, age 4-6	Nr of children, age 4-6
Children, age 7-10	Nr of children, age 7-10
Children, >10	Nr of children, age 11 or older
Partner's log disposable income	Logged yearly disposable income of the partner, in hundreds of SEK
Female spouse earns more than the male spouse	1=female spouse has the highest disposable income in the household (yearly), 0= male spouse has the highest disposable income in the household (yearly)
Age difference (the male's age-the female's age	Age difference between partners in time *t*, the male's age-the female's age
Difference in educational attainment	Difference in educational attainment between partners in time *t*, the male's educational level-the female's educational level
Equal relative share of parental leave	1=relative share of parental leave proportion between partners (individual's proportion/partners proportion) is 0.85-1.15, 0=difference in relative share is less than<0.85 or >1.15.
Log population per square meter in community c	Community, log population per square meter in community *c* (municipality) where the individual resides.
Average duration of marriage in time of divorce in community c	Average duration of marriage in time of divorce in community c (municipality), given in years

TABLE A2: SUMMARY STATISTICS, EXPLANATORY VARIABLES (UNMATCHED)

N(Divorced)= 14,325, N(Non-Divorced)= 640,933. All variables are observed one year before (t-1) the individual is observed as divorced or not. [+]Given in hundreds of SEK. Significance levels: ***p<0.01 **p<0.05 *p<0.10.

	Divorced	Married	
Variable	Mean (SD)	Mean (SD)	Difference (t-statistic)
Educational attainment	4.046 (1.382)	4.079 (1.402)	-0.032*** (-4.69)
Disposable income[+]	1475.9 (2.389)	1547.9 (2.273)	-70.99*** (-11.60)
Female	0.515 (0.500)	0.539 (0.498)	-0.024*** (-10.37)
Age	33.483 (5.655)	35.748 (5.117)	-2.264*** (-89.50)
Immigrant	0.184 (0.387)	0.202 (0.402)	-0.019*** (-9.84)
Log net wealth (positive)	11.554 (3.283)	11.927 (2.938)	-0.373*** (-19.22)
Negative net wealth indicator	0.506 (0.500)	0.400 (0.500)	0.106*** (44.01)
Real estate wealth (dummy)	0.5239 (0.4994)	0.7409 (0.4381)	-0.217*** (-157.90)
Children, 0-3 yrs	0.224 (0.491)	0.359 (0.590)	-0.135*** (-47.21)
Children, 4-6 yrs	0.152 (0.400)	0.279 (0.506)	-0.127*** (-51.71)
Children, 7-10 yrs	0.203 (0.481)	0.410 (0.629)	-0.206*** (-67.93)
Children, >10 yrs	0.324 (0.708)	0.616 (0.915)	-0.292*** (-66.07)
Partner's disposable income	146,386 (2.234)	151,751 (3.327)	-5,365*** (-4.18)
Female spouse earns more than the male spouse	0.761 (0.427)	0.285 (0.451)	0.476*** (223.51)
Age difference (the male's -the female's age)	0.254 (4.362)	0.990 (7.488)	-0.737*** (-20.56)
Difference in educational attainment(the male's – female's)	-0.116 (0.846)	-0.308 (1.454)	0.193*** (27.72)
Equal relative share of parental leave	0.010 (0.095)	0.021 (0.144)	-0.012*** (-18.05)
Log population per square meter in community c	5.074 (1.900)	4.866 (1.815)	0.208*** (23.24)
Average duration of marriage in community c (years)	12.335 (1.642)	12.537 (1.669)	-0.202*** (-25.62)

TABLE A3: BALANCING TESTS

Variable	Sample	%Standardized bias	T-test statistic	p<|t|
Educational attainment	Unmatched	-2.3	-1.33	0.182
	Matched	-1.3	-1.37	0.171
Log disposable income	Unmatched	-5.5	-14.04	0.000
	Matched	0.8	1.33	0.185
Female	Unmatched	-4.9	-17.36	0.000
	Matched	2.3	0.40	0.691
Age	Unmatched	-42.0	-108.66	0.000
	Matched	-0.9	1.05	0.294
Immigrant	Unmatched	-4.7	-23.44	0.000
	Matched	-1.6	-0.58	0.564
Log net wealth (positive)	Unmatched	-20.8	-43.46	0.000
	Matched	-0.8	-0.99	0.322
Real estate wealth (dummy)	Unmatched	-18.8	-53.19	0.000
	Matched	-0.3	-0.45	0.103
Negative net wealth	Unmatched	21.4	46.65	0.000
	Matched	1.0	0.84	0.403
Children 0-3 yrs old	Unmatched	-24.9	-54.58	0.000
	Matched	-1.6	-1.73	0.084
Children 4-6 yrs old	Unmatched	-27.8	-62.65	0.000
	Matched	-0.5	1.89	0.059
Children 7-10 yrs old	Unmatched	-36.9	-80.76	0.000
	Matched	-0.3	0.95	0.345
Children >10 yrs old	Unmatched	-35.7	-73.65	0.000
	Matched	-0.0	0.31	0.756
Partner's log disposable income	Unmatched	-13.0	-2.65	0.008
	Matched	-2.8	1.22	0.223
Female spouse earns more than the male spouse	Unmatched	108.4	256.90	0.000
	Matched	-1.7	0.07	0.942
Age difference (the male's age-the female's age)	Unmatched	-12.0	-22.51	0.000
	Matched	-0.1	-1.53	0.126
Difference in educational attainment	Unmatched	16.2	30.53	0.000
	Matched	-0.6	-1.02	0.308
Equal relative share of parental leave	Unmatched	-9.9	-21.60	0.000
	Matched	0.3	-0.69	0.488
Log population per square meter in community c	Unmatched	11.2	30.36	0.000
	Matched	-2.3	-0.58	0.562
Average duration of marriage in time of divorce within community c	Unmatched	-12.2	-33.28	0.000
	Matched	0.7	1.09	0.276

Sample	Pseudo R^2	LR chi2	p>chi2	Mean Bias	Median bias
Unmatched	0.150	12765.01	0.000	21.6	16.8
Matched	0.001	24.19	0.393	1.1	1.2

TABLE A4: DIFFERENCES IN HOUSING ARRANGMENTS AFTER A DIVORCE

In the table pooled panel regression results are presented, using each individual "matched pair" difference in the change in saving rate and risky share as dependent variable, respectively, conditioned on a dummy variable for whether the individual moves out of their original home/sell it (value: 1) or if the individual stay in their original home after the divorce (value:0). In Model 1 the dependent variable is the Change in saving rate and in Model 2 the Change in risky share. N(move out/sell)=16,480; N(stay in original home)=107,150. Cluster robust standard errors at the individual level. Significance levels: *******p<0.01 ******p<0.05 *****p<0.10. N(move out/sell)=17,126 N(stay in original home)=106,504 (out of divorced individuals).

	(1) Change in saving rate		(2) Change in risky share	
Sample	Move out/sell	S.E.	Move out/sell	S.E.
t-3	0.0539	0.0561	-0.0250	0.0241
t-2	-0.0997	0.0581	-0.0049	0.0211
t-1	0.0626	0.0434	-0.0560***	0.0174
t	-0.5850***	0.0423	0.1573***	0.0219
t+1	0.4637***	0.0424	-0.0164	0.0189
t+2	-0.0393	0.0505	0.01852	0.0226
t+3	0.0539	0.0561	-0.0250	0.0241

Table A5: INDIVIDUALS WITH NO REAL ESTATE WEALTH, PSM-DID RESULTS

Sub-sample of individuals not owning any real assets (18.5 percent of main sample) during the years 1999-2007. Outcome variables are given in percent. Standard errors are adjusted robust standard errors (following Abadie and Imbens, 2012).

Change in saving rate

Sample	Divorced	Married	ATT	S.E.	# observations
t-3	-0.0090	0.0039	-0.0129	0.0096	1,652 (divorced) 90,939 (married)
t-2	0.0027	0.0077	-0.0050	0.0164	2,213 (divorced) 106,008(married)
t-1	0.0122	0.0070	0.0045	0.0132	2,826 (divorced) 105,237 (married)
t	0.0336	-0.0080	0.0415 ***	0.0109	3,478 (divorced) 104,461 (married)
t+1	-0.0172	-0.0153	-0.0019	0.0137	4,191 (divorced) 107,939 (married)
t+2	-0.0047	-0.0034	-0.0012	0.0112	4,205 (divorced) 107,684 (married)
t+3	0.0227	-0.0142	0.0370 ***	0.0130	3,627 (divorced) 107,506 (married)

Change in risky share

Sample	Divorced	Married	ATT	S.E.	# observations
t-3	0.0525	0.0302	0.0223	0.0197	201 (divorced) 18,899 (married)
t-2	0.0542	0.0266	0.0276	0.0192	254 (divorced) 20,666 (married)
t-1	0.0450	0.00563	0.0393***	0.0161	323 (divorced) 20,577 (married)
t	0.0308	0.0129	0.0179	0.0143	388 (divorced) 20,495 (married)
t+1	-0.0062	0.0139	-0.0201	0.0185	424 (divorced) 20,883(married)
t+2	-0.0256	0.0115	-0.0371**	0.0179	392(divorced) 20,865(married)
t+3	0.00143	0.00206	-0.000630	0.0179	329(divorced) 20,859(married)

FIGURE A1: SAVING RATE OVER YEARS (in percent, unmatched)

Each figure shows a comparison of saving rates (yearly averages in percent) between married individuals (solid line) and those who divorce a specific year (dashed line). The dotted vertical line indicates which year the individuals get divorced.

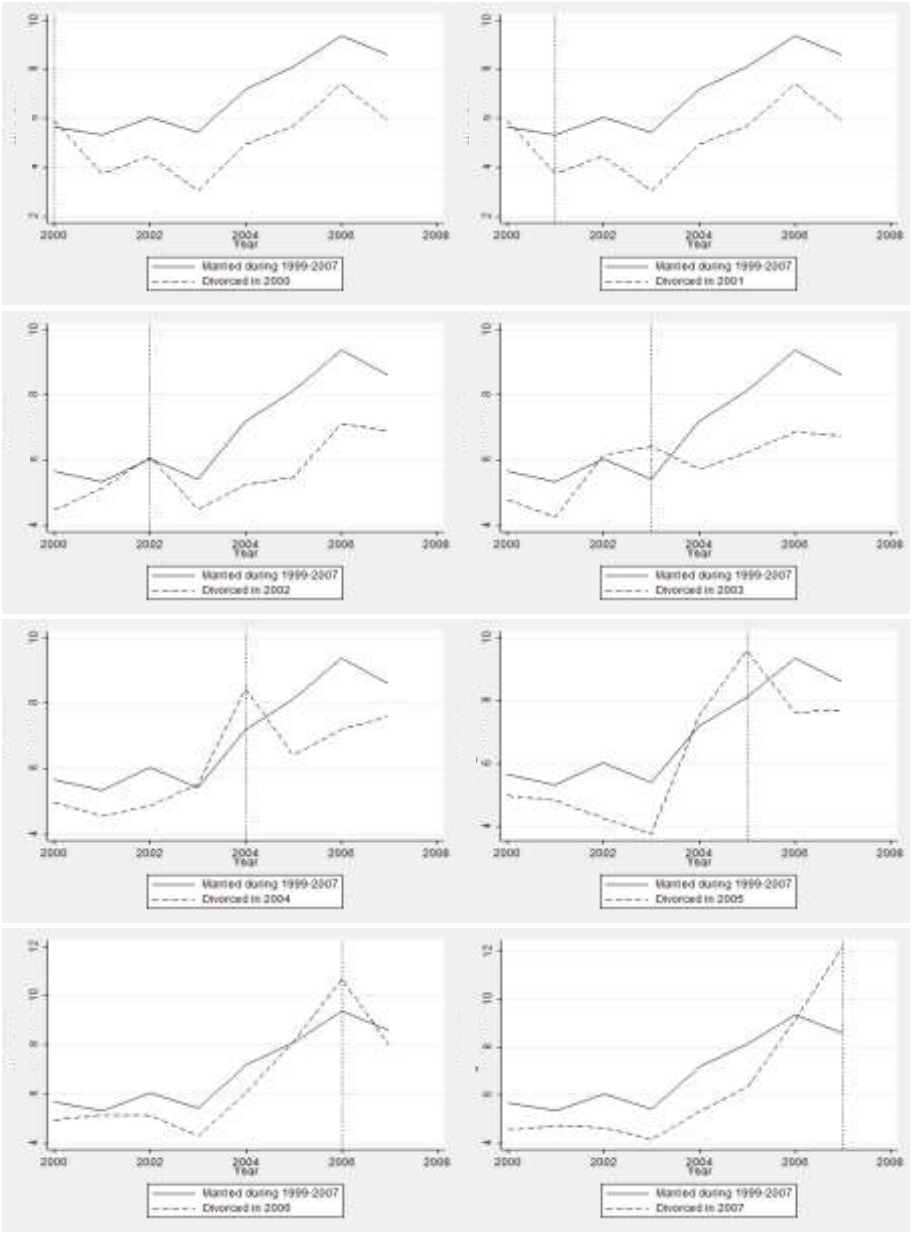

FIGURE A2: RISKY SHARE OVER YEARS (in percent, unmatched)

Each figure shows a comparison of risky shares (yearly averages in percent) between married individuals (solid line) and those who divorce a specific year (dashed line). The dotted vertical line indicates which year the individuals get divorced.

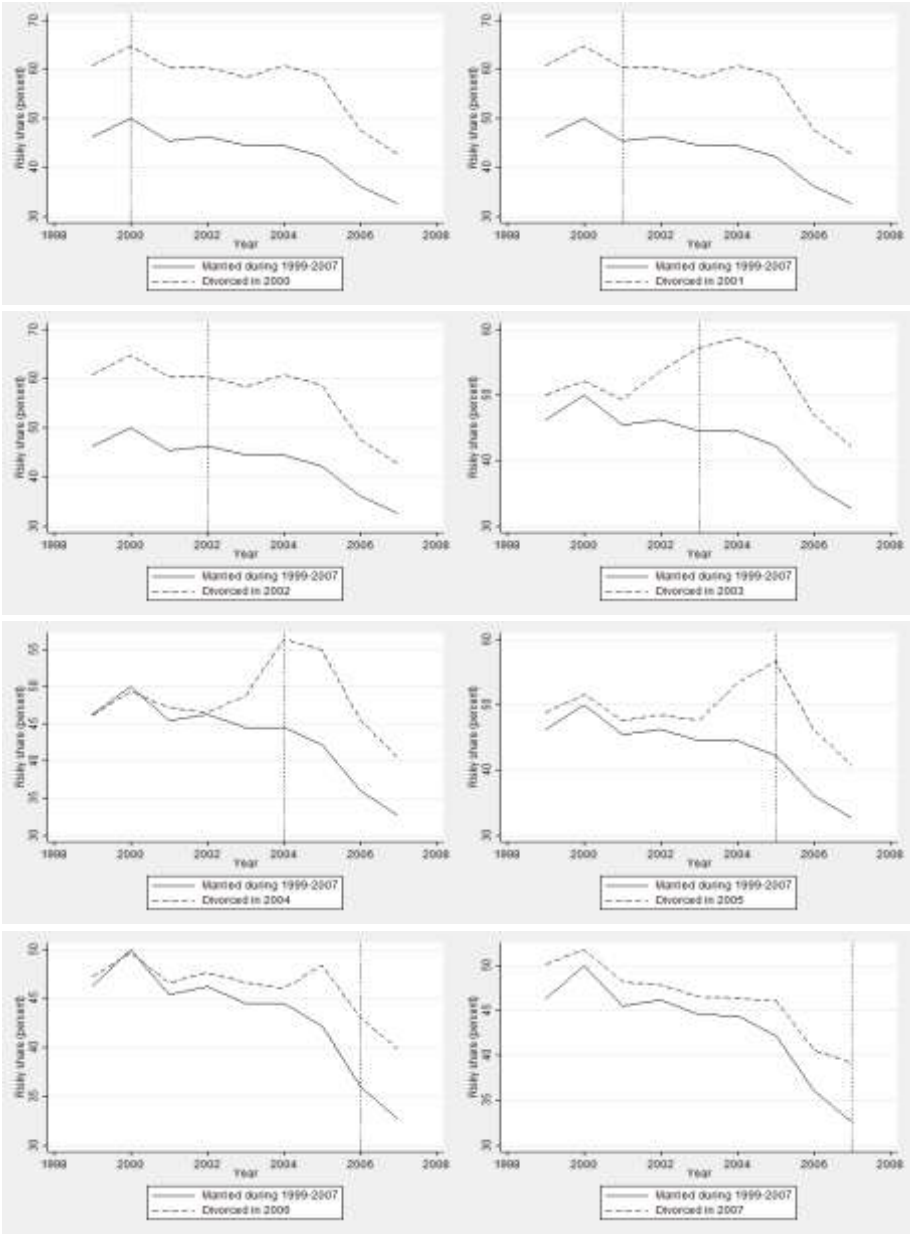

FIGURE A3: PROPENSITY SCORE DENSITY DISTRIBUTION, OVER DIVORCED AND NON-DIVORCED

The figure shows the propensity score distributions between divorced (dashed line) and married (solid line) individuals.