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The effect of equal division of property regime on subjective health, psychological well-being and investments in health capital

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Abstract

This thesis analyses the effects of different marital property regimes on health, well-being and health related behavior. In particular, it provides an empirical assessment of the effects of a change from a separate property regime towards a more equal distribution of matrimonial assets on subjective health, psychological well-being and investments in health capital, using the variance occurring after a decision by the English House of Lords in 2000. I use a Difference-in-Difference approach, taking advantage of the panel structure of the British Household Panel Survey. Results show that neither wives nor husbands experience higher self-assessed health status or psychological well-being after the reform. The results are mixed with regards to wives' investment choices in health, where the empirical analysis suggests that wives substitute leisure time devoted to training activities for health services including physiotherapy and psychotherapy. However, the results are not robust over different model specifications.

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/Jens Wikström

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1 Introduction

"Health is not everything in life, but without health, life is nothing"

Zweifel, Breyer, and Kifmann (2009) argue that this well-known proverb captures the important dual property of health; health is a highly valued asset for individual welfare and also a prerequisite for other activities; to be productive in the labor market and to be able to enjoy the good things in life. Health economists have opened the "black box" of how health and various socioeconomic indicators are related, commonly embarking from the seminal theoretical work presented by Grossman (1972). Frequently discussed determinants of health are income, education, work situation, gender and civil status. However, another important factor in the accumulation of health capital and well-being, not directly discussed in Grossman's model, is the relationship between family members.

With this Master of Science thesis I investigate if and how a shift in spousal bargaining power, proxied by a change in the division of assets at divorce, affects the spouses' health capital, psychological well-being and investments in health capital. The main focus is on wives' outcomes because the implementation of more equal marriage regimes are often motivated by concerns for the wife's welfare in case of divorce.

Literature suggests that marriage confers benefits to both men and women in the form of increased earnings, better health, higher well-being and a longer life (Averett, Argys, & Sorkin, 2013; Manzoli, Villari, Pirone, & Boccia, 2007). This relationship is explained by caring preferences and the economy of scale of being married, which alleviate the budget constraint allowing for larger investments in health and well-being. However, marriage can also impose negative effects on health through the bargaining situation arising from sharing resources, i.e. through the spouses not being able to allocate the amount of the household's resources needed to hold the preferred health capital, because of imbalances in the power structure within the marriage (Bolin, Jacobson, & Lindgren, 2002). Bargaining power can also affect psychological well-being through the concept of allostatic load, repeated and prolonged stress on the physiological systems, driven by exposure to daily adverse life circumstances (Kawachi, Subramanian, & Almeida-Filho, 2002), such as the opportunities to make decisions within the marriage. Allostatatic load may also affect the depreciation of health capital, making it more costly to maintain any level of health capital.

There are many factors affecting the spouses' intra-marriage bargaining power. One important outside factor is marriage legislation (Chiappori, Fortin, & Lacroix, 2002). Many western countries have in the last decades introduced unilateral divorce laws and equal property division regimes in case of divorce. This allows spouses to exit the marriage without the consent of the partner and enforces equal division of marital property, which means that

the assets acquired during marriage are divided equally in case of divorce. These changes towards more liberal marriage regimes are motivated and implemented in good faith to address fairness concerns for those divorcing. The concerns are foremost with regards to the financially weaker spouse, often the women, to recognize the role of women in the formation of household wealth through home production, traditionally performed by the wife.

The effects of changes in marriage laws have been extensively studied with a focus on how unilateral divorce and equal property division affect labor supply and marriage specific specialization. The literature suggests that more liberal marriage laws and equal division of property influence within-family allocation of labor supply (Gray, 1998; Chiappori et al., 2002; Kapan et al., 2008; Voena, 2015), home production and childcare (Piazzalunga, 2016), household violence (Stevenson & Wolfers, 2006; Brassiolo, 2016) and financial and physical assets accumulation (Voena, 2015). However, there is a gap in the literature with regards to empirically investigating the effect of such reforms on overall health status and well-being.

This thesis contributes to the literature in three ways. First, it is a step in filling the gap in the empirical literature with regards to how intra-household bargaining power affect spouse's health capital and well-being. An individual's welfare cannot be measured only by the amount of labor supply, leisure time or saving; it also depends on overall life-satisfaction, including self-perceived health status and psychological well-being. Imbalances in the power structure of a marriage can both affect the distribution of resources needed to invest in health capital and create allostatic load and it is important to understand how changes in family laws affect all aspects of life-satisfaction. To my knowledge this is the first time this relationship is empirically investigated.

Second, previous research has to a large extent neglected to investigate how non-labor market time is allocated after major changes in marriage regimes, or the leisure-time indicators used have been too general and do not shed light on what people do in their spare time. In this thesis I consider how health-enhancing activities, which crowd out other leisure activities and consumption, are affected by changes in the spouses' bargaining positions.

Third, I consider the implementation of a new property division practice under a divorce regime that is based on fault grounds or mutual consent. A large share of the literature has focused on how a change to a unilateral regime affects various outcomes. In this thesis, the focus is on the effects of a change in property regime when the divorce regime is unchanged.

To investigate how a shift in spousal bargaining power affects spouses' psychological well-being and health capital formation I exploit the variation occurring as a result of a new legal practice in England constituted by the House of Lords appeal court in 2000 in the White vs. White case. The appeal verdict introduced a more equitable division of assets between divorcing spouses in England, replacing a regime where divorce settlements where awarded on

the basis of future needs and reasonable requirements, accounting for the spouses' financial contribution to the marriage. This legislative change unexpectedly entitled the financially weaker spouse to a higher share of total assets in case of divorce. The theory predicts that this alteration redistributed bargaining power within the household, proving a quasi-natural experiment suitable for analyzing the effect of intra-household bargaining power on health and well-being indicators.

The analysis is based on a Difference-in-Difference approach using England as a treatment group and Scotland as a control group. There are many similarities between England and Scotland but Scotland is in a different legal jurisdiction and is therefore not affected by the change in divorce property regime introduced in England in 2000, making it a good counter factual for the Difference-in-Difference method. I use the British Household Panel Survey for the analyses, which allow me to control for potential problems with endogeniety.

My results show that property division laws have no direct effect on accumulated health capital or psychological well-being. However, the introduction of more equitable division of assets show mixed results with regards to the effect on investments in health capital through leisure time devoted to training and the usage of health services.

The rest of this thesis is organized as follows: Section 2 provides a short literature review and section 3 describes the theoretical framework and predictions. In Section 4 I go through the institutional background and the changes in the marital property regime in England. The empirical strategy and data are illustrated in section 5 and 6, respectively. In section 7 I present the results. Section 8 provides a discussion of the results and the conclusion.

2 Literature review

There is no shortage of empirical literature with regards to intra-family resource allocation, labor supply and consumption. However, to my knowledge no published empirical paper has looked explicitly at the impact of bargaining powers on health and health investments. In this section I start by looking at papers that examine bargaining powers and consumption choices and then the literature connecting marriage laws to bargaining powers. Next I consider papers relating bargaining powers and marriage to health related outcomes.

Previous empiric work has tested and discarded Becker's (1981) unitary model in favor of dynamic collective models (Thomas, 1990; Schultz, 1990; Bourguignon, Browning, Chiappori, & Lechene, 1993; Lise & Seitz, 2011; Friedberg & Webb, 2006). The empirical strategies in these papers are quite similar: the authors use regressors conceivably connected to bargaining powers to investigate expenditure outcomes. Commonly used proxies for bargaining powers are inequality in wealth indicators, such as earning, wage and non-labor income, to

estimate differences in expenditure on consumption goods such as clothing (Phipps & Burton, 1998; Ward-Batts, 2008; Bourguignon et al., 1993), food (Lundberg, Startz, & Stillman, 2003; Duflo, 2003) and child outcomes in terms of education and health (Schultz, 1990; Thomas, 1990; Duflo, 2003). The main challenge, and critique, of this strain of empirical literature is to identify exogenous variations in bargaining power that are not correlated with the individual's preferences that can be used to estimate causal effects on economic outcomes.

To address the endogeniety problem another strain of literature, more closely related to my thesis, use marriage law changes as quasi-natural experiments to assess the effect of changes in spouses' bargaining power (Gray, 1998; Chiappori et al., 2002; Voena, 2015; Stevenson & Wolfers, 2006; Kapan et al., 2008; Piazzalunga, 2016). The basic argument is that changes in marriage laws affect the spouses' bargaining powers through the probability of divorce, either by changing the divorce procedure or by affecting the expected cost (or gain) of divorce through the allocation of the households assets in the event of separation. There are two commonly discussed mechanisms through which a change in divorce law regime may affect married life. The first is through the effect on divorce rate due to easier divorce procedures. This direct mechanism traces the effects of easier access to divorce to higher divorce rates. The second mechanism, which is the main focus of this thesis, is when the legislation changes the within-family bargaining power and thereby the behavior between spouses. If the divorce regime affects the bargaining position of the partners in a way that changes intra-family distribution of marital rents it is possible to observe changes in the partners' relations, e.g. through choices regarding allocation of time between labor and leisure and private consumption.

Chiappori et al. (2002) introduce the notion of distributional factors, defined as exogenous variables that affect individuals' decision power without influencing preferences or the budget constraint. This is crucial to successfully identify a causal relationship between bargaining powers and any economic outcome. Marriage laws constitute a distributional factor under the assumption that regulations influencing the divorce process, division of marital wealth, alimony payment and support orders play an important role in the spouses welfare levels in case of separation, which influence the spouse's bargaining power within the marriage through the probability of divorce, without changing the spouse's preferences.Chiappori et al. (2002) show that distributional factors, such as divorce laws and sex ratio, favorable to women, affect household labor supply behavior in U.S. families by reducing the wife's supply of market labor and also by inducing larger transfers from the husband to the wife. Stevenson and Wolfers (2006) also use U.S. data to show that the introduction of more liberal marriage regimes reduces marriage-specific investments, such as the investments in

the spouse's education, household specialization and the number of children in the household, no matter the underlying property regime. Gray (1998) shows that the adoption of more equal property regimes in the U.S increases the wife's labor supply and the women after the reform substitute home production with market labor.

In a more recent paper Voena (2015) evaluates how the interaction between implementation of unilateral divorce and equal property regime affect savings and labor supply in the U.S. She finds that in states with equal division, households reported higher net savings and, contrarily to Gray, that wives are less likely to work after the introduction of unilateral legislation. By analyzing additional time use surveys she also finds that the decrease in the labor supply of women was associated with an increase in the amount of leisure time they enjoyed. The effect was only visible in states where equal property division laws applied. Voena (2015) argues that the changes in the division of assets only affect the within marriage allocation if spouses can divorce unilaterally and not when divorce requires the consent of both spouses. The argument is that equal division of property regime alters the allocation of resources in divorce compared to the present intra-household allocation, where the financially weaker spouse gains more assets in divorce. However, this would only change the within marriage allocation if unilateral divorce regime is allowed because this makes the threat of divorce credible. Kapan et al. (2008) and Piazzalunga (2016) use U.K. data to analyze if the introduction of more equal property regimes changes household behavior. Their results do not support Voena's argument and indicate that the introduction of a more equal property regime, even when there is a required separation period for unilateral divorce reduces female labor supply and also increases domestic care chores for wives, while there is no effect for husbands (Piazzalunga, 2016).

Despite the large volume of literature regarding bargaining powers little attention is directed towards empirically testing the effect on the spouses' health capital and well-being, which is the main focus of this thesis. One strain of literature have associated marriage with premiums, e.g. the marriage-wage premium (Gupta, Smith, & Stratton, 2007; Light, 2004) and marriage-health premium (Averett et al., 2013; Duncan, Wilkerson, & England, 2006; Manzoli et al., 2007). Controlling for age, education and other demographic and socioeconomic variables the literature indicates that married individuals enjoy higher self-assessed health and longevity. This relationship is explained by caring preferences between spouses and the economy of scale of being married, which alleviate the budget constraint allowing for larger investments in health and well-being. However, this literature has neglected to investigate if different marriage regimes affect these premiums.

More related to my thesis, Bourguignon et al. (1993) examine the relationship between within-family income inequality of spouses and expenditure on health care using French data.

They do not find that intra-household income inequality affects health expenditure (however, they report strong affects on other types of consumption, such as clothing and restaurant visits). Using income inequalities as a proxy for bargaining powers may, as discussed before, induce endogeniety and the results may suffer from omitted variable bias. Lundborg, Nystedt, and Lindgren (2007) examine the correlation between Body Mass Index (BMI) and divorce risk and present statistically significant lower BMI in countries with high divorce rates for both wives and husbands using cross sectional, individual level, data for European countries. The effect is absent in unmarried individuals of both genders. The authors argue that the risk for divorce might impose precautionary behavior where the spouses invest in their health capital to improve their competitiveness in the marriage market.

Also highly related to health and well-being, Stevenson and Wolfers (2006) and Brassiolo (2016) present evidence that lowering the cost of divorce reduces domestic violence in the U.S. and Spain, respectively. Both examine the introduction of easier divorce legislation and argue that more equal marriage regimes influence the spouses' bargaining position, by making (the threat of) divorce more available, and influence the spouse's behavior within the marriage.

With this thesis I contribute to both the literature on bargaining power and the literature on determinants of health by examining the link between intra-household bargaining power and health outcomes.

3 Theoretical Framework

3.1 Intra-household Bargaining models

For a long time economic theory described the family as a single economic unit. It was assumed that the household members pooled their resources and optimized consumption with regards to a household preference where individual differences are abstracted away (or assumed to be equal). This common preference can be motivated either by love (or altruism, such that both spouses care equally about their own and their partners satisfaction), egalitarian family values or by the parties seeking to maximize a social welfare function, agreed upon in a complete marriage contract. Therefore a change in the distribution of income or the divorce property regime should not influence expenditure outcomes, because only total household income determines optimal consumption choices (Pollak, 2005). However, a family consists of diverse individuals with different preferences and as discussed by Arrow (1950) aggregating individuals' preferences into a single social, or family, preference is a difficult social choice problem. The idea of this unitary family has been empirically challenged, and

discarded, by a number of authors (Thomas, 1990; Schultz, 1990; Bourguignon et al., 1993; Lise & Seitz, 2011) .

Economic theory has evolved over the years and new models allowing intra-household bargaining between family members have grown more popular. These marriage models describe the family as a group of individuals with different preferences and individual resources where the intra-household allocation of the household's combined resources depends on each partner's bargaining power. This is because bargaining powers effectively determine whose preference is more prominent in the decision making process (Pollak, 2005). McElroy and Horney (1981) and Manser and Brown (1980) pioneered this idea of a cooperative family by analyzing labor supply. These models assumed that household members are Nash-bargainers and the Nash equilibrium depends on the outside option of each spouse. The outside option is defined as the reservation utility of not being in the relationship and thus the threat point of separation corresponds to each individual's bargaining power. Chiappori (1988) suggests another Nash bargain intra-household allocation model based on a pre-decided sharing rule that, in a repeated game, will end up in a Pareto-efficient outcome. An additional set of bargaining models are the separate sphere models, which have an interior threat point. That is, the equilibrium distribution is maintained by the threat of reversion to a non-cooperative equilibrium (Lundberg & Pollak, 1993).

A common feature of the cooperative bargaining models is the assumption that all bargains are enforceable contracts and therefore do not place any restrictions on the agreements that family members can make (Pollak, 2005). In non-cooperative bargaining models personal interests motivate individuals within the household rather than the desire to work in a cooperative way. In both types of bargaining models divorce occurs when cooperation breaks down and the spouses cannot reach a feasible Nash equilibrium with regards to their respective utility, that is, the outside utility is larger than the utility from staying married.

With regards to health capital and investments in health capital, theoretical work by Jacobson (2000) and Bolin, Jacobson, and Lindgren (2001; 2002) expands the classic demand for health model pioneered by Grossman (1972) by introducing a family into the model. In the standard simplified Grossman model the single individual maximizes utility over time by optimizing the health capital stock. In the models developed by Jacobson (2000) and Bolin et al (2001; 2002) the family is regarded as a producer of health in which the spouses bargain or act strategically about allocation of resources. The fundamental insight gained from these theoretical models is that the outside opportunities affect the allocation of health capital and consumption within the family. This is because the spouses have to bargain over a new Nash-equilibrium after a change in the credible threat point of divorce, during which the family will reallocate time and other resources to increase the utility of the spouse

benefiting from the improved outside option. If a change in bargaining powers is large and the bargaining procedure fails the marriage will be dissolved, because the spouses believe they are better off outside the marriage.

3.2 Theoretical predictions of bargaining powers and health

In this subsection, I rely on Chiappori's (1988) models mentioned above to derive the theoretical predictions of the relationship between bargaining power and health.

I start by considering a standard household model composed by two spouses with distinct quasi-concave egoistic utility functions, which depend on leisure and own consumption: $U_i = (L_i, C_i, x_i)$ for the spouses $i = 1, 2$. L_i is non-productive leisure time, C_i is consumption and x_i is a vector of individual's characteristics which may affect preferences. The price for consumption is normalized to 1. The family members' consumption choices are limited by the household's budget constraint, which is determined by labor income, $h_i w_i$, and household non-labor income, y. In the basic setting each spouse decides how much time to allocate to the labor market, h_i, so that $L_i = 1 - h_i$. For simplicity, total time is normalized to 1 and $0 \leq h_i \leq 1$. Following the collective modeling approach it is assumed that the outcome is Pareto efficient, with a pre-decided sharing rule, denoted μ. That is, the household maximizes the collective utility function such that:

$$\begin{aligned} \max_{h_i, C_i,} \quad & \mu U_1(1 - h_1, C_1, x_1) + (1 - \mu) U_2(1 - h_2, C_2, x_2) \\ \text{subject to} \quad & h_1 w_1 + h_2 w_2 + y = C_1 + C_2 \end{aligned} \tag{1}$$

The model so far does not consider the main focus of the thesis, which is health capital and health related behavior. Including health capital into the model induces theoretical problems. Health capital is a composited good produced by time devoted to health improving activities (such as going to the gym, walking or swimming regularly) and resources allocated to market inputs (such as medical care, health services, healthy foods and the like). Grossman (1972) describes health capital as "*a durable capital stock that produces an output of healthy time*". In Grossman's model health capital enters the individual utility function directly as a positive stock factor and as an investment good used to improve earnings by reducing sick time and improving efficiency. Bolin et al. extend the model into a family setting where the spouses can act as Nash bargainers (Bolin et al., 2001) or strategically (Bolin et al., 2002). Bolin et al.'s models show that the family will invest in health capital until the marginal utility of health capital equals the net cost of investment for the household. Even though the individual's outcome in these models is ambiguous the authors argue that a change in bargaining powers will, *ceteris paribus*, likely increase the health capital of the spouse with

an improved bargaining position.

Grossman discusses health capital in terms of a capital stock factor and an investment in a dynamic setting and in Bolin et al.'s extensions the spouses have caring preferences and can invest in each others health to optimize utility over the time of the marriage. Moreover, Bolin et al. also consider the presence of children in the models. For simplicity I do not include children in the theoretical model. I follow the suggestion that health capital is both a utility improving stock factor and an investment to increase productivity. However, I assume that health capital is produced only by the individual by using the household's resources[1].

I assume that the health capital stock is produced by $H_i = H_i(t_{Hi}, z_i)$, where t_{Hi} and z_i are productive time in the health production and marketable health inputs and services, respectively. $H_i = H_i(t_{Hi}, z_i)$ is strictly increasing in both time and marketable inputs. I assume that health is a normal good and follows the traditional law of diminishing marginal returns, $\frac{\partial U_i}{\partial H_i} > 0$ and $\frac{\partial^2 U_i}{\partial H_i^2} < 0$. Both the health production inputs, t_{Hi} and z_i, crowd out leisure time and other consumption, which affect the individual's utility function and the family's budget constraint. Starting with the utility functions, the individual can choose to allocate time to increase health by forgo leisure or labor work, so that $L_i = 1 - h_i - t_{Hi}$. Moreover, health capital is also produced using costly marketable inputs (priced π), crowding out other consumption. Incorporating health into the standard family model laid out in (1) yields[2]:

$$\begin{aligned} \max_{h_i, z_i, t_{Hi}, C_i} & \mu U_1(1 - h_1 - t_{H1}, C_1, H_1(t_{H1}, z_1), x_1) \\ & + (1 - \mu) U_2(1 - h_2 - t_{H2}, C_2, H_2(t_{H2}, z_2), x_2) \end{aligned} \tag{2}$$

$$\text{subject to} \quad h_1(H_1)w_1 + h_2(H_2)w_2 + y = C_1 + C_2 + \pi(z_1 + z_2)$$

Notice that h_i, time in the labor market, is now a function of the health capital stock. The argument is that good health reduces sick-time, improving the individual's production capabilities[3]. Hence, the household's allocation problem is how to distribute labor supply, monetary investments in health, time allocated to investments in health and other consumption within the household.

Central for the within-family allocation is the Pareto weight, denoted μ. In bargaining

[1]The data and empirical strategy do not allow me to investigate between spouses investments or investments in children and it is therefore unnecessary for the objective of this thesis to complicate the theoretical model by introducing caring preferences and the presence of children.

[2]For simplicity I assume that time invested in the health production negatively affect utility by reducing non-productive leisure time. Marketable health inputs only affect utility through the health production function, but enters the right hand side of the budget constraint by crowding out other consumption

[3]I have not considered sick-time in the model but it is reasonable to assume sick-time would enter the model through the time constraint, reducing leisure time

theory the outside option determines the threat point of divorce, which is crucial for final outcome on the Pareto frontier. Any factor affecting the outside option can enter the Pareto weight. Following the model proposed by Chiappori et al. (2002) the Pareto weight can be written as a function of factors that determines the outside option, $\mu(w_1, w_2, y, R)$, where w_i and y are wage and non-labor income as described above and R stands for distributional factors. A change in a distributional factor is expected to cause a virtual redistribution of household assets towards the spouse favored by the change. The distributional factor only enters the collective utility function through the Pareto weight function, assuming that it does not affect the individual's preferences or household budget constraint. This in an important assumption for the the empirical approach discussed in Section 5.

In the context of this thesis R represents the property division regime before and after the White vs White case. The regime changes the divisions of total assets between the wife and the husband by improving the wife's outside option relative to the husbands by exogenously putting more assets under her control in case of divorce. Assuming that the wife is the financially weaker spouse she will be entitled to a larger share of the household wealth than before, even though it is held in the name of her husband[4]. This leads to a higher Pareto weight for the wife within the marriage because her outside option has improved.

Without assigning functional forms to the spouse's individual utility functions the maximization problem has no closed form solution and it is beyond the scope of this thesis to derive the first order optimality conditions. However, the theoretical framework is still informative to identify testable implications of a shift in bargaining powers and to interpret empirical findings.

What are the implications of a change in property regime on health capital, well-being and health related behavior?

The new legislative practice affects the household outcomes only through its effect on the resource allocation mechanism, μ. Assuming that the new legislative practice improves the wife's bargaining position, her weight in the decision-making process will increase, which translates into a higher share of the families resources being allocated to her. To the extent that the spouses' health capital stock are responsive to income, the income effect will lead to an increase in the health capital stock held by the wife. The predictions are more ambiguous for husbands. The reduction in household resources controlled by the husband should decrease the health capital stock held by husbands (through the income effect). However, since labor income is assumed to be affected by health capital, the husband may want to improve his health capital, in order to increase earnings to compensate for the income effect

[4]This is a reasonable assumption considering the share of total income and labor income made by wives compared to husbands. See Appendix A.1.

of the law change. The total effect for men is therefore ambiguous.

Hypothesis 1: The income effect resulting from the reallocation of family resources will increase the health capital stock held by wives, who are favored by the change in marriage property regime. The effect is ambiguous with regards to men.

Indicators of health status and any changes in behavior with regards to investments in health may only be visible after a long period. Therefore, I also look at the spouses' choices with regards to time allocation and marketable inputs that may affect health in the empirical analysis. Any predictions with regards to time and money allocation is ambiguous and depend on preference, efficiency of the input factors and the relative price between time and the marketable component in the health production function. However, following the reasoning behind *Hypothesis 1* the wife is expected to increase her investments in health to accumulate more health capital, and therefore I expect to see an increase in either the time devoted to health improving activities and/or an increase in consumption of health improving marketable inputs.

Hypothesis 2: The wife will allocate more resources to her investments in health capital when her bargaining increases. It is ambiguous if the surge in investment will increase through time devoted to health improving activities or through the consumption of marketable health inputs, or both. The effect on the husband's investment is ambiguous.

For the empirical model I use a reduced form Difference-in-Difference model where I proxy the health capital stock with self-assessed status and psychological well-being. I investigate behavior changes with regards to investments in the health capital stock using information on how often the individual attend training activities (proxy for time devoted to health investments) and information on the usage of health services such as physiotherapy and physiotherapy (proxy for markable inputs).

4 Institutional background

A marriage can be viewed as a conjugal contract imposing two sets of conditions regulating the eventuality of its dissolution. The first condition determines how, when and where divorce can take place and the second concerns how the marital assets are divided in case of divorce. In the Western World there have been a gradual shift towards more neutral marriage regimes with unilateral divorce legislations, where either partner can choose to leave the marriage at any time, and equal sharing property division, where the marital assets are split equally in case of separation (González & Viitanen, 2009). These changes have been primarily driven

by a search for equality, especially with regards to financial disadvantage faced by women after divorce.

To evaluate the impact of a change in property regime on the accumulation of health capital I will use the variation occurring after the House of Lords appeal courts ruling in the White vs White case in October 2000, which set a new "yardstick of equality" precedent in England with regards to division of assets in case of divorce. The legal precedent set by the House of Lords did, however, not affect the grounds for divorce.

4.1 Marriage laws in England

4.1.1 Grounds for divorce

In England the basis of divorce is governed by English Common Law. The law states that divorce is only legally acceptable in case of "irretrievable breakdown", which includes adultery, unreasonable behavior, desertion, two years' separation with consent and five years' separation without consent of the partner. Hence, marriage represent a serious, binding, commitment where a married man or woman cannot divorce without a time constraint unless it can be proven that the partner has committed wrongdoing like abuse or infidelity. The long separation periods impose a high cost of divorce and may affect how credibly the spouses can threaten to dissolve the marriage. The fault and consent based divorce regime in England differs from the more common unilateral regimes in many other European countries and U.S states, which allows one party to obtain divorce without the consent of the other, without long court demanded separation periods.

4.1.2 Property division laws

Property division regimes can be broadly classified into three main systems (Voena, 2015):

1. Title-based regimes, in which assets are allocated according to the title of ownership.

2. Community property regimes, in which marital assets and debts are divided equally between the spouses, under the presumption that they are jointly owned.

3. Equitable distribution regimes, in which courts have discretion in dividing marital assets in order to achieve equity. This process may result in equal division or in a division that favors either the spouse who contributed the most to the purchase of the asset or the one in higher financial need.

Section 25 of the Matrimonial Causes Act (1973) set the grounds for reallocation of assets between divorcing spouses in England, which impose a equitable distribution regime.

Settlements are decided by the court, who must take various factors into consideration when deciding on how assets should be divided between the divorcing spouses. Before the White vs White case the courts exercised discretion in this respect and divided assets taking into account future needs, reasonable requirements and the contribution each spouse had made to the accumulation of family wealth. This, so called, "needs-based" approach often meant that the financially strong spouses, usually husbands, kept most of the household assets while the less well-to-do partners, usually wives, received only a small share of the assets.

4.1.3 The White vs. White case and verdict

The Whites were married for 33 years and together they ran two successful farming businesses. The marriage broke down in 1994 and on the basis of "need assessment" and "reasonable requirements" the former Mrs White was awarded £800 000 of the marriage's combined assets of £4.5 millions. On appeal, the House of Lords awarded Mrs White a lump sum of £1.5 millions to better reflect her contribution to the business and to the family. With this verdict the House of Lords stated that there should be no discrimination between spouses and no bias against a homemaker in divorce. That is, the "yardstick of equality" was not to introduce a presumption of equality in all cases, but to ensure the absence of discrimination, for instance, between a wage earner and a child-carer, thereby recognizing the non-financial contribution of the parent caring for children.

The House of Lords ruling in the White vs. White case introduced the expectation of more equitable division of physical and financial assets in case of divorce. This is a significant change from the previous practice of limiting the spouses share to his or her assessed need and reasonable requirements given his or her contribution to the accumulation of the household wealth. Such arrangements generally left the financially weaker claimant with only a small proportion of the total assets. The legal precedent set by the House of Lords does not directly affect how easy spouses can divorce, it may however lower the inter-temporal cost of divorce for the financially weaker spouse by increasing the claim on the family's assets, and thereby changed the threat-point of divorce , the point at which someone can credibly threaten to leave the marriage. This could serve as a powerful motivator for the high earning spouse to share resources more equally.

4.2 Marriage laws in Scotland

My control group in the empirical model is constituted by individuals living in Scotland. England and Scotland are both members of the United Kingdom and face similar economic conditions, but the two countries belong to separate legal jurisdictions, making Scotland a

good counter factual for the Difference-in-Difference analysis.

Scotland practice a community property regime, which means that assets acquired during the marriage, excluding those that each spouse bring into the marriage, as well as inheritance and gifts, are split equally, without restrictions, in case of divorce. The present property regime was introduce in 1985 and have been in place since.

The divorce procedure in Scotland is governed by the Divorce Act of 1976, which allows divorce on the same basis as in England (discussed above) and up until the Family Law Act of 2006, Scotland also required 5 years of separation for unilateral divorce. With the amended Family law of 2006 the required time of separation was reduced to 2 years for unilateral divorce to be valid. Because the passing of the new law may affect the behavior of married individuals in Scotland I consider data only until 2005.[5]

5 Empirical Strategy

5.1 A Difference-in-Difference approach

The House of Lords' ruling in the White vs. White case provides a quasi-natural experiment, which allows evaluation of the redistribution effect of a shift in bargaining powers by comparing outcomes in England and Scotland. Identification of the treatment effect can be achieved by observing both the treated population (England) and the untreated population (Scotland) before and after the reform, since the change in marriage regime only affect individuals living in England after the verdict. However, just comparing changes in outcomes before and after the White vs. White verdict is problematic since there may have been other economic changes affecting individuals choices over time. Moreover, a simple difference between the average outcome in England and Scotland after the verdict also causes a problem because there might be fundamental differences in the behavior between the two regions to begin with. To overcome these problems a Difference-in-Difference approach is employed to estimate differences between England and Scotland before and after the reform.

Two major advantages of the Difference-in-Difference approach are that it allows for level differences between the treatment and control group and it does not necessarily relay of panel data, compared to e.g. fixed and random effect models. However, for the Difference-in-Difference approach to be feasible an additional set of assumptions, besides the standard Gauss Markow assumptions, have to be fulfilled. These assumptions will be discussed further in Section 5.3.

The baseline empirical evaluation will be in a repeated cross-sections framework with the

[5]For a more in-depth description of marriage laws in Scotland and England see Piazzalunga (2016).

following reduced form model specification:

$$y_{ict} = \delta post_t * treat_{ct} + \sum_r \gamma_r + \sum_t \lambda_t + \mathbf{X_{ist}}\beta + \epsilon_{it} \tag{3}$$

y_{ist} represents the self-assessed health, well-being and investment in health capital indicators (defined and described in section 6.2) for individual i in country c at time t. When y_{ist} is a binary variable I use a linear probability model for the main specification[6].

The main explanatory variable of interest is the time-country interaction term $post * treat_{ct}$. The *post* variable is equal to 0 in the period before the reform (1995-1999) and 1 in the period after the reform (2001-2005). The *treat* variable is equal to 0 for individuals living in Scotland and 1 for the individuals living in England. The interaction term, $post * treat_{ct}$, takes the value 1 if the individual is living in England after the reform and 0 otherwise. The cut off is selected based on the House of Lords verdict in October 2000. The time-country interaction coefficient, δ, is interpreted as the average change in the outcome variable attributable to the verdict.

To avoid problems with endogeniety and to control for any systematic differences between the treatment and control groups I include a standard set of control variables commonly used in health economic literature in the empirical model. The vector of control variables, $\mathbf{X_{ict}}$, includes age, age squared, the number of preschool aged children, number of school aged children, dummy variables for level of education, a dummy for race (1 equals white, 0 otherwise), a dummy for employment (1 equals if in paid employment, 0 otherwise), log-form household labor income and log-form household non-labor income[7]. Since all individuals in the sample are married I also control for age, age square and level of education for the spouse. Socio-demographic factors such as age, number of children, labor and non-labor income, education and current job situation have been empirically documented to correlate with health status (Zweifel et al., 2009) , subjective well-being (Alem, 2013) and demand for

[6]When the outcome is binary, only taking the values 0 or 1, I use a linear probability model:

$$P(y_{ict} = 1|\mathbf{Z}) = \delta post_t * treat_{ct} + \sum_r \gamma_r + \sum_t \lambda_t + \mathbf{X_{ist}}\beta + \epsilon_{it}$$

where $\mathbf{Z}$ is the vector of determinants. There are three major drawbacks with the linear probability model: the estimated change in probability is always constant, the error term is by definition heteroscedastic and the OLS estimator does not bound the predicted probability in the unit interval. On the plus side the coefficient estimate have a direct marginal interpretation and can work well around the means of the independent variables, when the average partial effect is of primary interest. In section 7.3 I test the robustness of the linear probability model by running a logic model specification, allowing a non-linear relationship between the covariate and the outcomes.

[7]Both log-form labor income and non-labor income are calculated by $logincome = log(income + 1)$ to avoid missing values for individuals stating 0 income.

health care (Riphahn, Wambach, & Million, 2003; Zweifel et al., 2009). Summary statistics of the dependent variables and the control variables included in the analysis are presented in Tables A.2 and A.3 in the Appendix A.2.

Regional fixed effects ,γ_r, and year fixed effects, λ_t, are included to capture time-invariant regional characteristics (and any time-invariant systematic difference between England and Scotland i.e. with regards to health care system) and the trends or shocks common to the entire sample.

The empirical model error, ϵ_{ist} is assumed to be at an individual level and to be normally distributed, $(\epsilon_{ict}|\mathbf{X}_{ict} \sim N(0, \sigma^2)$. This is an unreasonable assumption for the linear probability model and to address the problem all regressions are estimated with heteroscedastic robust standard errors. I will discuss inference and the assumption about individual error more in the next section.

5.2 Inference with the Difference-in-Difference method

The parameters of equation (3) are estimated using Ordinary Least Squares (OLS). The Difference-in-Difference approach yields potential problems with regards to calculating accurate standard errors of the OLS parameters, a fundamental component of getting consistent statistical inference. The issue is that the default standard errors may overestimate the precision of the parameters due to heteroscedasticity, within cluster variation and serial correlation in the error. Failure to control for heteroscedasticity, cross-sectional and serial dependencies can lead to misleadingly small standard errors and, consequently, rejection of the null hypothesis too often (also referred to as type I error) (Angrist & Pischke, 2008).

The first problem occurs because the units of observation are more detailed than the level of variation. The observations are at an individual level while the level of variation in the determinant of interest is at the country-year level, between England/Scotland and before/after the reform, which suggests clustering the standard errors at country-year level. With country-year standard errors individuals in the same country in the same year may be correlated, while model errors for individuals in different regions and years are assumed to be uncorrelated (Angrist & Pischke, 2008; Cameron & Miller, 2015). However, when the number of clusters at the cluster-year level are small, as in this case with only two countries, model errors may be negatively correlated and cluster robust standard errors at the country-year level may produce wrongfully smaller standard error compared with default standard errors (Cameron & Miller, 2015).

The second problem is with regards to the time component in the panel dataset, where the errors in different time periods for a given individual may be correlated, while model

errors for different individuals are assumed to be uncorrelated. This is because the regressors of interest, $post * treat_{ct}$, is serially correlated since the binary variable will equal a string of zeros before and a string of ones after the verdict. Bertrand, Duflo, and Mullainathan (2004) argue that the potential of serially correlated errors may produce misleadingly small standard errors and it might be better to cluster standard errors at country level and not country-year level since England in 1998 potentially is serially correlated with England in 1997.

I regressed specification (3) using different levels of clusters: individual-level, primary sampling unit (PSU)-level, region-level and country-level as well as the same levels interacted with year. The results, not presented here, show that standard errors are smallest with country-year level clusters and largest with PSU-level clusters. The common practice is to be conservative with regards to standard error and I will use heteroscadastic and cluster robust standard errors at the PSU-level for the main specification[8]. Cameron and Miller (2015) argue that PSU is the minimum level of clustering when using complex survey data, such as the BHPS, however, there may be situations where a higher level of clustering is preferred, if the number of clusters are large enough. Clustering at the PSU-level should also partially correct for the risk of serial correlation. In section 7.3 I will present a robustness check where the time series information in the empirical model is ignored by averaging the data before and after the White vs. White verdict and run equation (3) on averaged outcome variables in a panel of length 2. Bertrand et al. (2004) show in their paper that such an approach is a feasible robustness check.[9]

5.3 Identification Assumptions

In order to make statistical interference and use the OLS estimator to calculate the parameter estimates I have to make assumptions about the error term, the explanatory variables and the functional form of the parameters. The standard set of assumptions are referred to as the Gauss Markov Assumptions, under which the parameter estimates are BLUE, best linear unbiased estimates[10] (Verbeek, 2008).

Beside the standard Gauss Markov assumptions the identification of policy effects through the Difference-in-Difference approach is based on additional underlying assumptions. I will briefly discuss the assumptions with respect to how they apply to this thesis below.

[8]The primary sampling unit, PSU, is the first stage of sampling in the BHPS, based on 250 postcode sectors, which on average contain 2,500 delivery points (equivalent to addresses).

[9]More advanced clustering approaches are available, taking into account spatial dependence between clusters, but that is beyond the scope of this thesis.

[10]A review of the Gauss Markov Assumptions is found in Appendix A.3

Parallel trend assumption

The Parallel trend assumption states that conditional on $(\gamma_c, \sigma_r, \lambda_t, \mathbf{X}_{ist})$ individuals in England and Scotland experience similar trends in the outcome variables in absence of the reform.

The parallel trend assumption can be partially validated by comparing the trends in the outcome variable of the treated and untreated groups. One common approach is to visually inspect the average trend in the outcome variable for the two groups, however, this does not necessarily provide the evidence needed to assess parallel trends. Visual representation of the trends are found in the Appendix A.4. Just eyeballing the trends before the verdict yields inconclusive evidence of a parallel trend. Therefore I also perform a more formal test of the parallel trend assumption, using the following dynamic model specification for both continuous and binary outcomes:

$$y_{ict} = \sum_{t=1995}^{2005} \delta post * treat_{ct} + \sum_{r} \gamma_r + \sum_{t} \lambda_t + \epsilon_{it} \tag{4}$$

where year-dummy variables are interacted with the country dummy for all years before and after the reform. The regression estimates for the wives sample using specification (4) are reported in Table 1. Notice that the last before-period interaction term is dropped to avoid multicollinearity (treat*1999 in column 1, 2 and 4 and treat*1998 for column 3) and thus all the other interaction coefficients are expressed relative to the omitted period, which serves as the baseline.

The before-period interaction terms can be used to assess the parallel trend assumption. The parameter estimates before the verdict (1995 to 1998) are not by themselves statistically significant, nor jointly significant with p-value between 0.7420 and 0.9595[11], indicating that I can not reject the null hypothesis of similar trends, supporting the assumption of common trends. I also test if the parallel trend assumption holds when including the full set of control variables. The results, not presented here, show higher p-values. Furthermore, the null results before the intervention also support the assumption of exogeneity of the policy and no anticipation discussed below.

Exogeneity of the intervention

The exogeneity of the intervention assumption states that conditional on $(\gamma_c, \sigma_r, \lambda_t, \mathbf{X}_{ist})$, the policy is exogenous to political incentives and not an intervention to increase (or decrease)

[11] the corresponding p-values for husbands are between 0.22 and 0.72, the regression results are presented in Appendix A.4 Table A.4

Table 1: Test of parallel trend for married women's main outcomes

	(1) Health status	(2) Well-being	(3) Sport or fitness class	(4) Health service
treat*1995	0.0355	0.408		-0.0258
	(0.0721)	(0.718)		(0.0519)
treat*1996	-0.00314	0.294	0.0508	-0.00670
	(0.0608)	(0.815)	(0.0702)	(0.0371)
treat*1997	0.00353	0.552		-0.00668
	(0.0448)	(0.637)		(0.0330)
treat*1998	0.00169	0.184		-0.0199
	(0.0483)	(0.673)		(0.0364)
treat*2001	-0.0329	-0.0851		0.0477
	(0.0604)	(0.671)		(0.0315)
treat*2002	-0.0193	-0.0451	-0.0243	0.0433
	(0.0555)	(0.681)	(0.0707)	(0.0311)
treat*2003	0.0567	0.837		0.0551*
	(0.0605)	(0.772)		(0.0312)
treat*2004	0.0690	-0.214	0.00422	0.0448
	(0.0722)	(0.667)	(0.0883)	(0.0447)
treat*2005	0.0285	1.020		-0.00687
	(0.0879)	(0.857)		(0.0437)
Controls				
Time FE	Yes	Yes	Yes	Yes
F-test				
(1) treat*1995	= 0	= 0	-	= 0
(2) treat*1996	= 0	= 0	= 0	= 0
(3) treat*1997	= 0	= 0	-	= 0
(4) treat*1998	= 0	= 0	-	= 0
Prob > F	0.9595	0.7420	0.8733	0.9532
N	5998	5998	2433	5998
R^2	0.064	0.043	0.050	0.026

Heteroscadastic and cluster robust Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

the outcome variable. If this in not the case, the estimated effects of the reform may be endogenous.

The change in property division practice was implemented in good faith to address fairness concerns for those divorcing, especially with regards to financial disadvantage faced by the homeworker after divorce, and not as a political intervention to address issues concerning health status, psychological well-being and/or time allocation decisions within the family.

Stable sample composition

The assumption of stable sample composition states that conditional on $(\gamma_c, \sigma_r, \lambda_t, \mathbf{X}_{ist})$, the composition of the treatment and control groups is stable before and after the policy.

To ensure stable groups the sample only include individuals who are married to the same partner throughout the examined periods and who are not in enrolled in training or in schooling and who do not move between England and Scotland and the assumption should thereby be valid for the purpose of the outcomes i include in the analysis.

No anticipation

No anticipation means that the individuals were unable to anticipate the outcome in the White vs. White case and thereby adjust their behavior beforehand.

The White vs. White appeal verdict came in October 2000. The BHPS survey was conducted in September throughout November the same year and therefore some people may have known about the verdict when taking the survey. To address this potential problem I drop the 2000 wave.

No other policies

Lastly, for the Difference-in-Difference estimator to correctly identify the effect of a specific policy there should not be any other policy changes or major reforms during the same period which could affect the outcomes.

There were a number of policies implemented in both England and Scotland in the 10 year period I examine. The reform of main concern for my study was introduced in Scotland in 2002, making formal personal care free of charge for individuals over 65 years of age. The reform was not introduced in the rest of the United Kingdom and may affect health capital investments for individuals residing in Scotland. Ohinata and Picchio (2015) investigate the consequences of the policy, and find that it decreases household savings for individuals over 40 years of age. To address this concern I perform a robustness check where specification (3)

is estimated using a shorter time period, 1997 to 2002. The results do not change significantly when using the shorted time period.

6 Data

6.1 The BHPS

The data used in the analysis comes from the British Household Panel Survey (BHPS). The BHPS is an annual survey of adults, including individuals over 16 years of age. The first wave was sampled in 1991 with roughly 5500 households and 9500 individuals representative for the United Kingdom. The BHPS includes 18 waves of repeated annual data and is one of the longest panel data sets available. The last wave was conducted in 2008. The survey collects detailed information on individual and household demographics, income and labor, but has a limited focus on consumption. I have chosen to only include the original, UK representative, sample of the BHPS to avoid oversampling problems due to the various extensions and re-sampling.

6.2 Sample selection

The main sample consists of legally married women who are between the ages of 20 and 50, living in England (treatment group) and Scotland (control group) and who are not currently enrolled in any schooling or training program. The age restriction is implemented to avoid possible confounding effects coming from pension choices. Results for the main specification will also be provided for husbands for comparison.

Depending on the outcome variable the main sample includes waves between 1995 and 2005 (not all variables are included in all waves). I do not include all waves of the BHPS because the Difference-in-Difference approach is sensitive to other policy changes and economic shocks and therefore a short time period is preferable. The *before treatment period* is 1995 to 1999 and the *after treatment period* is 2001 to 2005. The verdict was made public in October 2000 and I have excluded the year 2000 from the analysis because it is ambiguous if individual behavior were affected by the White vs. White case in this year.

The main sample includes individuals who were married in 2000 and married to the same partner throughout the before and after treatment years to exclude any confounding effects arising from a different selection into marriage. One benefit of the restriction is that all individuals in the sample have been married for at least five years before the reform and they have adapted to their marital life-course when it comes to social roles and exercise behavior. Moreover, the restriction allows evaluation of marriages where the partners after the verdict

reach a new Pareto efficient outcome by excluding individuals where the cooperation breaks down and result in divorce.

One drawback of the strict sample selection is the small sample size. The female sample include 5682 individuals in the treatment group and 635 individuals in the control group (and even fewer for some outcome variables which are only present in some of the waves of the BHPS). The corresponding numbers for males are 4768 and 507, respectively. The small sample size lowers the statistical power of the analysis and increases the probability of committing a type II error, not rejecting the false null hypothesis. Hence, a larger samples would yield more reliable results, especially if the estimated effect is small and the population variance is large. However, the different-in-different approach assumes consistent treatment and control groups and the restrictions are thereby motivated.

6.3 Definition of outcome variables

The main outcome variables of interest are self-assessed health and psychological well-being, which are included as proxies for health capital. Since both these outcomes are crude measures of over-all health status and life-situation I also include two sets of indicators that may capture the underlying behavior with regards to investments in health capital and well-being. The first set includes leisure activities associated with sporting and training. The second set includes marketable health and well-being improving services.

Self-assessed health as a measure of health capital

The individual's health is in a sense unobserved since there is no true objective measure of health in the BHPS, e.g. a medical professionals health assessment about the individual. The literature has given great attention to modeling unobserved health, or health capital, but no universal measurement have been uniformly accepted as the golden standard[12].

The most commonly used proxy for health state, which is present in the BHPS, is self-assessed health (Jones, 2009). Self-assessed health is included in the BHPS as a five-scale answer to the question "Please think back over the last 12 months about how your health has been. Compared to people of your own age, would you say that your health has on the whole been...?" where the score card ranges between 1 =excellent and 5=very poor[13]. Self-reported measures are arguably not exact measures and a third-party reported health status, e.g. from a medical professional, would make it easier to compare individuals health (Jones, 2009). However, such data is hard to access due to confidentiality restrictions. Jones

[12]See Appendix A.4 for a review of health economics literature on health measures

[13]In the 1999 wave the wording of the self-assessed health question changed to "In general, would you say your health is: excellent, very good, good, fair, poor".

(2009) and Zweifel (2009) argues that objective health measures are more reliable because different individuals have different reference points when it comes to health and what is good health for one person might be different for another. Yet Zweifel (2009) argues that subjective measures can be very informative, especially with regards to demand for health care and beliefs of medical conditions. Moreover, Van Doorslaer and Gerdtham (2003) show that self-assessed health status is correlated with mortality but not socioeconomic status, suggesting it is a good measure of health condition.

However, there are a number of empirical problems associated with using subjective ordered categorical health measures, especially with panel data. On one-hand, problems including non-linear relationship and individual specific cut off points between categories, measurement errors and reference bias can create interpretation issues. On the other hand, existing identification methods cannot accommodate the difference-in-difference approach or fixed effects models, when the dependent variable is categorical due to the incidental parameters problem (Verbeek, 2008). A possibility is to assume no correlation between the time-invariant part of the error term and the explanatory variables and use a random effects model. However, the orthogonality assumption is difficult to justify with respect to health but crucial for the unbiased estimates when using random effects (Verbeek, 2008; Jones, 2009).

To address these issues I have recoded the subjective health measure to a binary variable where 1 equals good or excellent self-reported health and 0 equals fair, poor or very poor health status. Thus, parametric identification is possible using common estimation techniques and the interpretation of the parameter is the change in linear probability of considering oneself in good or excellent health.

Psychological well-being

As discussed above the subjective health status indicator has limitations and can be an imprecise indicator when evaluating the impact of policies on health capital. As a complement to the self-assessed health measures I will include the broader measurement of subjective well-being to also capture other health related qualities of life, e.g. mental health.

The BHPS includes two measures of well-being: the Likert scale and the Caseness scale. Both measures use data on the GHQ-12[14] measure of psychological well-being to create scales of well-being. I will focus on the former because the distribution is more normally distributed and allows larger variation due to the longer scale. The Likert approach converts

[14]The General Health Questionnaire, GHQ-12, measures self-assessed, general psychological health using 12 standardized questions. The full set of variables used for the in the questioner are described in the Appendix A.4.1

valid answers to the BHPS's twelve standardized questions about well-being to a single scale by re-recoding so that the scale for individual variables runs from 0 to 3, instead of 1 to 4, and then summing the variables, giving a scale running from 0 (high well-being) to 36 (low well-being). For the purpose of easier interpretation of the regression results the Likert scale is inverted so that high score points equal high well-being and low scores equals low well-being.

There are different views regarding whether the Likert scale is an ordinal scale or an interval scale (Jamieson et al., 2004). On one side the questions are arbitrarily chosen in the survey, and not based on any objective numerical scale and the answers are responses to categorical questions. This together with the undefined length between each value support an ordinal interpretation of the scale. On the other hand the Likert scale is usually fairly symmetrical and studies have suggested that when the categorical variable have many categories, such as the 36 point Likert score, it may be treated as a continuous variables (Bentler & Chou, 1987). Moreover, Ferrer-i Carbonell and Frijters (2004) show that when the dependent variable is based on general life satisfaction it is more important to control for unobserved time-invariant heterogeneity than correctly specifying the functional form and conclude that assuming ordinality of the answers with regards general satisfaction questions is relatively unimportant. I will consider the Likert scale as an interval scale in order to use the variable as a continuous outcome. Among others, Gardner and Oswald (2007) use the BHPS and the Likert scale in the same manner to evaluate how economic shocks, measured by lottery winnings, affect psychological health.

Investment in health capital and well-being improving activities

It is important to consider that measures of health capital differ from what have been commonly studied before in the bargaining power context. Previous research commonly focus on an individual's choices as the outcome, e.g. how much time is allocated to labor for participation or how much money is allocated to private and household consumption. Health capital is an output of investments, described in my model as the result of productive time in health production and consumption of marketable inputs.

Measuring investments in health capital is difficult because health capital is a composite good, which includes both time and marketable inputs. The BHPS does not include any monetary measurements for health service consumption, only expenditures on overall leisure activities and time allocated to leisure activities and discrete measurements of usage of health care and health services. To evaluate behavioral changes in investments in health capital I focus on two types of health improving activities: physical activities that can be viewed as training and the costly usage of health services that are not directly life-saving

or normally prescribed by a medical doctor. These activities can be viewed as a trade-off between investments in health capital and non-productive leisure time and between health investments and other consumption[15].

The survey questions I use for activities associated with training answers the question: "how frequently you play sports or go walking or swimming?" and " how frequently you attend leisure activity groups such as evening classes, keep fit, yoga etc.?". The respondent may answer the questions on a 5 scale score card choosing between "At least once a week", "At least once a month", "Several times a year", "Once a year or less" or "Never/almost never". In order to use the variables as a measure of health investment I have recoded the variable to a binary response where 1 equals at least once a week and 0 equals less than once a week. I have also combined the information from the two questions into a single binary variable where 1 equals if the individual does any of the activities at least once a week and 0 otherwise.

The usage of health service indicators are created by the respondent answering the question: "Have you yourself made use of any of these services since September 1st last year?" where the respondent can choose from a variety of health and welfare services. I focus on whether or not the respondent have consulted a psychotherapist or physiotherapist in the last year because these services are usually not prescribed by a medical doctor, making them voluntary investments in health and well-being.

6.4 Descriptive changes in the outcome variables

Tables 2 and 3 report the average changes in the main dependent variables in England and Scotland before and after the White vs. White case for wives and husbands, respectively[16].

The simple non-parametric Difference-in-Difference estimator, calculated using the mean values before and after the White vs. White verdict by comparing England to Scotland, indicates no large changes in wives self-assessed health or psychological well-being after the reform. The weakly sport or fitness class indicator is negative, suggesting a decrease in the share of wives who participate in regular training activities. The indicator for usage of health services is positive suggesting an increase in the share of wifes in England using health consultation. All indicators for husbands are small but positive, suggesting an increase in overall health and investments in health after the reform.

[15]The perception of a trade-off is valid under the the assumption that activities such as sports, swimming, fitness classes and the like are not utility improving activities by them selfs, but only through their effect on health capital and well-being.

[16]A more detailed summery of the outcome variables are reported in Tables A.2 and A.3 in Appendix A.2.

Table 2: Descriptive statistics - Difference-in-Difference - Wives

		Before	After	Difference
Self-assessed health status	England	0.782	0.747	-0.035
	Scotland	0.840	0.793	-0.047
	Difference	-0.058	-0.046	**0.012**
Well-being	England	11.59	11.81	0.22
	Scotland	10.70	10.92	0.22
	Difference	0.89	0.89	**0.00**
Sport or fitness class	England	0.575	0.610	0.035
	Scotland	0.609	0.680	0.071
	Difference	-0.034	-0.070	**-0.039**
Health services	England	0.046	0.068	0.022
	Scotland	0.086	0.058	-0.028
	Difference	-0.040	0.010	**0.050**

Non-parametric Difference-in-Difference in bold

Table 3: Descriptive statistics - Difference-in-Difference - Husbands

		Before	After	Difference
Self-assessed health status	England	0.818	0.770	-0.048
	Scotland	0.840	0.772	-0.068
	Difference	-0.022	-0.002	**0.020**
Well-being	England	10.31	10.79	0.48
	Scotland	10.26	10.51	0.25
	Difference	0.05	0.28	**0.23**
Sport or fitness class	England	0.539	0.580	0.041
	Scotland	0.589	0.583	-0.006
	Difference	-0.05	-0.003	**0.047**
Health services	England	0.029	0.039	0.010
	Scotland	0.039	0.032	-0.007
	Difference	-0.010	0.007	**0.017**

Non-parametric Difference-in-Difference in bold

7 Results

In this section I present and briefly discuss the results from the repeated cross-sectional models followed by various robustness tests. The coefficient of interest is the time-country interaction terms, denoted $treat * post$, which captures the effect of the change in legislative practice after the White vs. White verdict. All outcomes are coded such that a positive sign before the estimate indicates an increase and a negative sign indicates a decrease.

7.1 Main specification

Baseline result for wives

Column 1 and 2 in Table 4 report the main results: the estimated effects of the shift in bargaining power on self-assessed health status and psychological well-being for wives. The $post * treat$ coefficient is positive, but small, for both outcomes suggesting an on average increase in both indicators after the introduction of more equal division of assets in case of divorce for wives in England. The estimated change in probability that a wife states good or excellent health status after the verdict is 0.5 percentage points, which is economically insignificant since 77 % of the wives in England and 82 % in Scotland state good or excellent health. The estimated improvement in mental well-being after the verdict is approximately 0.05 Likert score points. This can be compared to the the average in the Scotland, which is 11.70. This means that the average change in Likert score points is only 0.43 % of the average in the control group. Moreover, the estimated effects are not statistically significant at any of the conventional significance levels. The economic interpretation is that the more equal division of assets have no, or a very small, effect on health capital accumulation and well-being for wives. The results indicate that the improved bargaining situation for women does not change the within-household distribution of health capital.

Both the self-assessed health status and well-being indicators are crude measurements of over-all health situations and do not necessarily capture the underlying behavioral changes with regards to resource allocation and investments in health capital. The next set of reduced form estimations includes, as dependent variables, choices with regards to health improving activities.

In Table 4, column 3 and 4, the dependent variables are binary outcomes informative about whether or not the individual does sporting activities or attend fitness classes at least once a week or have used a physiotherapist or psychotherapist in the last year, respectively. The results are mixed. After the verdict the probability of an English wife regularly attending training activities decreases by 6 percentage points while the probability of having used any

Table 4: Effects of the White vs White case on married women's outcomes - Main specification

	(1) Health status	(2) Well-being	(3) Sport or fitness class	(4) Health service
$post * treat_{ct}$	0.00524	0.0535	-0.0606**	0.0404***
	(0.0196)	(0.250)	(0.0235)	(0.00983)
Controls				
Individual	Yes	Yes	Yes	Yes
Spouse	Yes	Yes	Yes	Yes
Household	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Regional FE	Yes	Yes	Yes	Yes
Individual FE	No	No	No	No
N	5998	5998	2433	5998
R^2	0.064	0.043	0.050	0.026

Heteroscadastic and cluster robust Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Individual controls include: age, age squared, a dummy for employed, a dummy for race and dummies for level of education. Spouse controls include: age, age square and dummies for different level of education of the spouse. Household controls include: number of children at pre-school and school age and log-form household labor and non-labor income.

of the two health services in the last year increase by 4 percentage points. The estimated effect of the verdict on both outcomes are statistically significant.

The results indicate a possible behavioral change for the wife with regards to how she invests in health capital after the improved economic situation in case of divorce. The economic interpretation is that the changes in the distribution of bargaining powers between the two spouses allows the wife to reallocate more resources towards her own health and well-being. Assuming that health services, such as physiotherapist and psychotherapist, are more efficient investments in health compared with leisure time devoted to training one possible explanation to the mixed results is that with a stronger bargaining position wives trade sporting and fitness activities for markable health services, perhaps because they now can reallocate financial assets towards improving their own health capital in a more efficient way. However, the additional usage of health services has not statistically affected the probability of stating good or excellent health status or increased the broader defined psychological well-being.

Disaggregating leisure time and health services devoted to health improvements

Next, I disaggregate the variables capturing investments in health and regress the indicators yielding information on leisure time devoted to health improving activities and health services separately in order to investigate where the effect comes from. When separating the indicators I find a negative and partially statistically significant effect on the probability of the wife doing sports, swim or walk at least once a week. At the same time there is a partially significant positive increase in the probability of having consulted a physiotherapist in the last year. The estimated effect of the White vs White verdict on the probabilities of attending fitness classes once a week or having visited a psychotherapist in the last year are both positive, however too imprecisely estimated to statistically reject the null hypothesis of no effect (the estimated coefficients are reported in Table 5).

Baseline result for husbands

Table 6 report results for the husbands. Overall the results are similar to those of the wives regarding health capital accumulation; the estimated effect of the new law practice on the health indicators are small and imprecisely estimated. What is interesting is that the estimated effect on well-being is negative, suggesting a possible decrease in husbands psychological well-being after the verdict and that there is no effect with regards to health improving activities or usage of health services. None of the results are statistically significant.

Table 5: Effects of the White vs White case on married women's leisure time and health services devoted to health improvements - Main specification

	(5) Sport	(6) Fitness class	(7) Psychotherapist	(8) Physiotherapist
$post * treat_{ct}$	-0.0955**	0.0306	0.0182	0.0213***
	(0.0385)	(0.0439)	(0.0116)	(0.00626)
Controls				
Individual	Yes	Yes	Yes	Yes
Spouse	Yes	Yes	Yes	Yes
Household	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Regional FE	Yes	Yes	Yes	Yes
Individual FE	No	No	No	No
N	2433	2432	5998	5998
R^2	0.050	0.037	0.025	0.019

Heteroscadastic and cluster robust Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Individual controls include: age, age squared, a dummy for employed, a dummy for race and dummies for level of education. Spouse controls include: age, age square and dummies for different level of education of the spouse. Household controls include: number of children at pre-school and school age and log-form household labor and non-labor income.

Table 6: Effects of the White vs White case on married men's outcomes - main specification

	(1) Health status	(2) Well-being	(3) Sport or fitness class	(4) Sport	(5) Fitness class	(6) Any Health service	(7) Psychotherapist	(8) Physiotherapist
$post * treat_{ct}$t	0.00961	-0.425	0.0386	0.0402	0.0393	0.0172	0.00449	0.00926
	(0.0329)	(0.517)	(0.0653)	(0.0644)	(0.0330)	(0.0134)	(0.0123)	(0.00575)
Controls								
Demographic	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Spouse	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	No	No	No	No	No	No	No	No
N	5196	5196	2124	2125	2123	5196	5196	5196
R^2	0.101	0.054	0.051	0.052	0.041	0.049	0.028	0.061

Heteroscadastic and cluster robust Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, ***$p < 0.01$

See table 4 for information on included control variables

7.2 Limitations of the main specification

The main results suffers from some limitations. A first possible critique of the results is that the models fit the data poorly, suggesting that the model specification is not good. To evaluate the precision of the probability models (column 1, 3 and 4 in Table 4) I have checked for the number of correct predictions for the wives results using the estimated parameters to predict the outcome-variables. This test show that the the model performs fairly well with regards to self-assessed health status and medical services, making correct predictions between 78% and 95% of the times, respectively. However, for the sporting activities the model performs poorly and only predict the outcome correctly for 28% of the sample.

Next, the $post * treat$ coefficients are to a large extent imprecisely estimated and this could be the reason why some of the effects captured are not significant, but it can also be that there is no effect at all. The statistical significance are sensitive to different level of clustering and when using the less conservative country-year clustered standard errors, as discussed in section 5.2, the estimated precision increases, however, the effect on well-being and self assessed health status are still statistically insignificant. There are no major changes when using the country-year standard errors for men.

Furthermore, the restrictive sample selection creates a small sample size, especially with regards to the questions about leisure activities, which are only covered in four of the waves included in the main sample. The small sample size affect the statistical power of the empirical results, which decreases the probability of truthfully rejecting the null hypothesis. Moreover, the indicators of health status, well-being and investments in health capital are imprecise measurements and prone to measurement error, and may be very volatile over time with potentially large variations within the binary coded variables, which makes consistent parametric identification hard.

There is also the issue of potential endogenous covariates. Indeed, unobserved individual characteristics may be positively or negatively correlated with the health status and well-being indicators, thus creating spurious correlation between the covariate matrix and the error terms of the reduced-form equations. In the robustness section I will address this issues by using within estimation, and thus controlling for individual heterogeneiety.

7.3 Robustness Checks

In this section, the robustness of the main results for wives are analyzed by changing the identification strategy to a fixed effects specification, ignoring the time series information and restricting the sample to only include the years 1997 to 2002. All robustness checks use the more conservative standard errors calculated using heteroscedastic and cluster robust

standard errors at PSU-level.

Individual fixed effects

One potential problem with specification (3) is omitted variable bias due to unobserved heterogeneity. To address this issue I take advantage of the panel structure of the BHPS dataset by including individual fixed effects which allow me to control for potential unobservable characteristics that are different between individuals but fixed over time. I use the following model specifications for both continuous and binary outcomes:

$$y_{ict} = \delta post * treat_{ct} + \sum_{r} \gamma_r + \sum_{t} \lambda_t + \mathbf{X_{ict}}\beta + \omega_{ic} + \varepsilon_{ict} \tag{5}$$

The vector of control variables, $\mathbf{X_{ist}}$, country fixed effects ,γ_c and year fixed effects, λ_t, are defined as in section 5.1 (with the exception of variables which do not change over time, which are dropped to avoid multicollinearity). With the individual fixed effect model the error term is split into two components, the first captures time invariant individual heterogeneity, the second is a time varying idiosyncratic component.

The within estimates (reported in Table 7) confirm some of the results from the pooled cross-sectional specification. The estimated effect of the White vs. White case on the wives outcomes are not statistically different from zero for self-assessed health status (however the sign is now negative), well-being or time devoted to health improving leisure time devoted to training. Column 4 report the results for usage of health services and the estimated effect of the White vs. White verdict is slightly larger and still statistically different from zero.

Logit specification

The health status indicator and the indicators of investments in health are coded as binary outcomes and in the main specification estimated using a linear probability model. There are three major drawbacks with using the linear probability models. First, the estimated change in probability is always constant, which means that the marginal effect is constant for all levels of the explanatory variables. Second, the error term is by definition heteroscedastic. The first and second issues are not of great concern for the interpretation of the country-time interaction term in specification (3) since the only level change is between 0 and 1 and I have applied heteroscadastic and cluster robust standard errors, addressing the concern with heteroscedasticity[17]. The third issue is that the OLS estimator does not bound the

[17]In fact, the type of heteroscedasticity is know in the linear probability model to be $p(1-p)$, suggesting that the most efficient estimate, under the assumptions of consistency in estimating the coefficient, is archived by using weighted least square to account for the form of the heteroscedasticity. However, because the

Table 7: Robustness checks of the effects of the White vs White case on married women's outcomes

	(1) Health status	(2) Well-being	(3) Sport or fitness class	(4) Health service
Individual fixed effects				
$post * treat_{ct}$	-0.00768	0.121	-0.0397	0.0527***
	(0.0425)	(0.520)	(0.0600)	(0.0196)
Controls				
Individual	Yes	Yes	Yes	Yes
Spouse	Yes	Yes	Yes	Yes
Household	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Regional FE	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes
N	5998	5998	2433	5998
R^2	0.021	0.012	0.024	0.021
Ignoring time series information				
$post * treat_{ct}$	0.00979	0.204	-0.0749	0.0383*
	(0.0448)	(0.518)	(0.0594)	(0.0210)
Controls				
Individual	Yes	Yes	Yes	Yes
Spouse	Yes	Yes	Yes	Yes
Household	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Regional FE	Yes	Yes	Yes	Yes
Individual FE	No	No	No	No
N	1220	1220	1217	1220
R^2	0.102	0.082	0.067	0.059
Shorter time period 1997 to 2002				
$post * treat_{ct}$	-0.0299	0.221	-0.0586	0.0389*
	(0.0445)	(0.667)	(0.0676)	(0.0223)
Controls				
Controls				
Individual	Yes	Yes	Yes	Yes
Spouse	Yes	Yes	Yes	Yes
Household	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Regional FE	Yes	Yes	Yes	Yes
Individual FE	No	No	No	No
N	3101	3101	1234	3101
R^2	0.080	0.050	0.065	0.029

Heteroscadastic and cluster robust Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

See table 4 for information on included control variables

predicted probability in the unit interval, allowing predicted probabilities outside the 0 to 1 range of meaningful probabilities.

Table 8: Effects of the White vs White case on married women's outcomes - Logit specification

	(1) Health status	(2) Well-being	(3) Sport or fitness class	(4) Health service
$post * treat_{ct}$	0.0908	N/A	-0.272***	0.737***
	(0.137)		(0.102)	(0.184)
Controls				
Individual	Yes		Yes	Yes
Spouse	Yes		Yes	Yes
Household	Yes		Yes	Yes
Time FE	Yes		Yes	Yes
Regional FE	Yes		Yes	Yes
Individual FE	No		No	No
N	5998		2433	5998
pseudo R^2	0.0570		0.0375	0.0583

Heteroscadastic and cluster robust Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Individual controls include: age, age squared, a dummy for employed, a dummy for race and dummies for level of education. Spouse controls include: age, age square and dummies for different level of education of the spouse. Household controls include: number of children at pre-school and school age and log-form household labor and non-labor income.

To investigate if a non-linear model significantly changes the results I follow Karaca-Mandic, Norton, and Dowd's (2012) suggestion and use a logistic Difference-in-Difference model to estimate the model parameters[18]:

$$P(p_{ict} = 1|\mathbf{Z}) = \Phi(\delta post * treat_{ct} + \sum_r \gamma_r + \sum_t \lambda_t + \mathbf{X_{ict}}\beta + \epsilon_{it}) \tag{6}$$

Φ is the logistic cumulative density function. The vector of control variables, $\mathbf{X_{ist}}$, regional fixed effects ,γ_r and year fixed effects, λ_t, are defined as in section 6.1. The results from the

OLS estimations technique does not impose a range restriction, allowing predictions outside the range of meaningful probabilities, making weighted least squares difficult to implement.

[18]I prefer the Logit regression model to the Probit regression model because of the log odds interpretation and the flatter tails of the logistic cumulative density function. Using a probit model do not significantly change the results.

logit regression in Table 8 are log odds and can not be directly compared with the results from the linear model. Instead the average marginal effect of a change in the interaction term has to be calculated (Table 9).

Table 9: Marginal effect of the logit regression

	(1) Health status	(2) Well-being	(3) Sport or fitness class	(4) Health service
$\frac{\partial P(p_{ict}=1\|\mathbf{Z})}{\partial post*treat_{ct}}$	0.0150	N/A	-0.0623***	0.0379***
	(0.0227)		(0.0232)	(0.00935)
N	5998		2433	5998

Heteroscadastic and cluster robust Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Comparing the average marginal effects for the logit regression in Table 9 with the constant marginal effects from the linear probability model in Table 4 show similar results, both in size and sign, but the coefficients from logit estimation are more precisely estimated. The proportion of correct predictions are about the same in both specifications (78 % and 96 % for health status and health services, respectively, and 30% for sporting or fitness class).

Ignoring time series information

In section 5.2 I discuss the potential problem of serial correlation due the panel structure of the dataset and as a robustness check I simply average the data before and after the verdict and run specification (3) on this averaged outcome variable in a panel of length 2. When ignoring the time series information the only significant effect captured is on the variable combining the information regarding usage of either a psychotherapist or a physiotherapist. The estimated effect is slightly smaller and partially significant. It is worth noticing that the number of observations drop to 1220 in this specification and as discussed before this can affect the statistical power and does not necessarily mean that there is no effect. The size and sign of the estimated effect is similar for most of the outcomes (regression coefficients are reported in Table 7).

Shorter time period

In 2002 there was a health care reform in Scotland, making formal personal care free of charge for individuals over 65 years of age after rigorous need-based assessment conducted by the local authorities. The reform was not introduced in the rest of the United Kingdom and may affect health care investments for individuals residing in Scotland. Ohinata and

Picchio (2015) explore the reform to investigate household saving behavior and find that the introduction of the reform decreases saving for individuals above 40 years of age. The main sample in my thesis include individuals between 20 and 50 years of age and to make sure that the reform in Scotland do not significantly affect the estimated effects of the White vs White case I restrict the number of years in the analysis to only include 1997 to 2002 (Table 7). Reducing the number of periods included in the analysis do not significantly affect the results.

8 Discussion and Conclusion

The purpose of this thesis is to investigate if and how intra-household bargaining power affects wives' health capital, psychological well-being and behavior with regards to health improving activities. In order to isolate a causal relationship I perform a Difference-in-Difference analysis exploiting the variation induced by the House of Lords' ruling in the White vs. White case as a quasi-natural experiment. Marriage laws constitute distributional factors that affect the opportunities of spouses outside marriage and can therefore influence the intra-household balance of power and ultimately the final allocation of resources, even when the marriage does not dissolve. The White vs. White case introduced the 'yardstick of equality' for divorcing couples in England, replacing the 'need-based approach' which was practice before. I use married individuals in Scotland as the counter factual, since Scotland is similar to England in many ways but was not effected by the new law practice. Using the British Household Panel Survey, I am also able to control for endogeniety and unobserved individual heterogeneity.

My first hypothesis is that the 'yardstick of equality' will increase the health capital held by the wives. Summarizing the results, the empiric analysis indicates that the change in legal practice in England has no direct effect on wives' (or husbands') self-assessed health status or psychological well-being. The estimated coefficients are not statistically significant in any of the model specifications. Comparing my results to previous research, which suggests that the reform in England has an effect on e.g. labor supply (Kapan et al., 2008) and time allocated to home production (Piazzalunga, 2016), my results suggest that there is no individual level adjustments with regards to health capital after the verdict. One possible explanation, not considered in my theoretical model with egoistic utility functions, is that both spouses gain utility from the health capital and well-being of their partner, both as an investment to increase productivity and marital rents but also as a valued asset on its own to better enjoy e.g. joint leisure time. This would suggest that spouses do not bargain over the "health good" in the same manner as they bargain over other consumption, because the

partner's health is also a highly valued asset that improves the utility of the marriage.

An alternative explanation to the null results with regards to health status and well-being is that more equitable property regimes by themselves do not affect the spouse's bargaining power and distribution of resources. This interpretation is in line with Voena's (2015) argument that even if the property regime alters the allocation of asset in case of divorce compared with the present intra-household allocation, it is only a channel affecting the within marriage decisions if unilateral divorce is an option. This would suggest that any effect of the property division regime change in England is attenuated by the long period of separation required for unilateral divorce. It is not enough that the property regime is expected to lower the cost of divorce to change the threat-point at which dissolving the marriage is credible, divorce must also be easily available. This explanation stands in contrast with the suggestions presented by Kapan et al. (2008) and Piazzalunga (2016) but is important to consider in the context of England, where the change in legal practices only change the expectation of more equitable division of marital assets.

A caveat in the analysis is that I can only include 5 years after the law change in the empirical model and since the English divorce regime requires 5 years of separation before unilateral divorce is allowed any effect may be delayed and may only become visible in later years. Moreover, it is important to consider that measures of health capital differ from what have been studied before in the context of bargaining powers. Previous research commonly focus on individual's choices as the outcome, e.g. how much time is allocated to labor force participation or how much money is allocated to consumption. In my theoretical model health capital is instead an output of investments made in the health production. Health capital is assumed to be an output of productive time in health production and consumption of marketable inputs. Therefore, another possible reason for the null results is that the time frame of the analysis is too short for any reallocation of time and money to health investments to have a visible effect on health capital.

My second hypothesis is that wives will increase the investments in health, either by time devoted to training or through consumption of marketable inputs. To investigate the choices made by wives and husbands with regards to investments in health I look at time devoted to training activities and usage of health services. The results in the empirical analysis are inconclusive. There seems to be a negative effect of the White vs. White verdict on leisure time devoted to training, but the effect is only partially significant in the main model and not robust over the different specifications. At the same time there is a increase in the usage of health services, which is robust. The results for husbands are not statistically significant in any of the specifications. These results suggest a potential behavioral change, where wives, due to their improved bargaining situation, can invest more effectively in health

capital and well-being through the more costly health services instead of training activities. This interpretation is viable if the wives after the new property regime gain access to more economic resources, affecting their individual budget constraint, and have a higher preference for health service investments. Assuming that health services are more efficient investments in health this would increase over-all utility since it would free up more time for other leisure activities (which is utility improving), even if the net effect of substituting sporting activities for health services do not improve the overall accumulation of health capital. However, the results are not robust and future research should look at more detailed data on changes in usage of leisure time and health improving services to better understand any potential effects.

It is important to point out that the empirical results suffers from some limitations. The parameters are imprecisely estimated, and this could be the reason why the effects captured are not significant, but it can also be that there is no effect at all. Furthermore, the sample selection creates a small sample size, especially with regards to the questions about leisure activities, which are only covered in four of the waves included in the main sample. The small sample size affects the statistical power, which affects the probability of truthfully rejecting the null hypothesis. Also, the indicators of health status, well-being and investments in health capital are imprecisely measured with potentially large variations within the binary coded variables and more detailed data may provide more consistent estimates.

It is difficult to suggest any policy recommendation based on the results of the empirical analysis. The implementation of community property is motivated and implemented to protect the financially weaker spouse. Previous literature has questioned if such implementations actually are protecting because they may reinforce traditional division of labor and home production. With this thesis I look at another dimension of possible effects by investigating the incentives created by such reforms on health and well-being. Considering the null results on well-being and health status it seems that equitable division of marital property is a fair protective tool to ensure the welfare of the financially disadvantaged spouse.

Further research is needed. An interesting question, not examined here, is if the interaction of change to a unilateral regime and a more equitable division of property has an effect on well-being and health investments. Another interesting question is how property regime changes and unilateral divorce laws affect spouses incentives to invest in each other's health capital as well as other factors of the human capital. It would also be interesting to look at potential heterogeneous effects between different socioeconomic groups. Moreover, my sample only contains households who do not divorce as a consequence of the new legal practice and it would be interesting to see how marriage property regimes affect husbands and wifes after divorce.

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A Appendix

A.1 Income differences between men and women in the sample

One strong assumption in the theoretical framework is with regards the wife being the financially weaker spouse. Table A.1 show the yearly labor income and total income for females and males in the sample used for the analysis. There is a large difference in income between the genders in favor of the male, indicating that the assumption is reasonable.

Table A.1: Descriptive statistics - Income difference between Wives and Husbands

	Female		Male	
	Mean	Sta. dev.	Mean	Sta. dev
Labor income	8679.9	9327.1	22620.3	16771.4
Share of household labor income	0.269	0.234	0.702	0.244
Total yearly income	10579.1	9483.3	23920.3	18012.1
Share of household total yearly income	0.305	0.202	0.666	0.209

Source BHPS

A.2 Descriptive statistics

Table A.2 and A.3 report descriptive statistics for the variables included in the empirical analysis for wives and husbands, respectively. Looking at the main outcome variables we can see that the share of husbands and wives in England who state good or excellent health is lower compared with Scotland. At the same time the average psychological well-being is higher for both husbands and wives living in England. There is a larger share of wives in Scotland who regularly participative in sporting activities and fitness classes as well as have used a psychotherapist or physiotherapist during the last year compared to English wives. The difference is very small with regards to husbands.

Table A.2: Descriptive statistics - Wives

	England			Scotland		
	Mean	Sta. dev.	Obs	Mean	Sta. dev.	Obs
Dependent variables						
Health status (1= good or excellent)	0.765	0.424	5682	0.817	0.387	635
Likert scale	11.70	5.364	5682	10.80	4.835	635
Sport or fitness class (1= once a week)	0.592	0.492	2305	0.643	0.480	258
Sport (1=once a week)	0.534	0.499	2305	0.585	0.494	258
Fitness class (1=once a week)	0.232	0.422	2304	0.279	0.449	258
Psychotherapist or physiotherapist (1= used in the last year)	0.0567	0.231	5682	0.0724	0.259	635
Physiotherapist (1= used in the last year)	0.0375	0.190	5682	0.0520	0.222	635
Psychotherapist (1= used in the last year)	0.0204	0.141	5682	0.0205	0.142	635
Individual characteristics						
Age	37.68	5.968	5682	35.94	6.513	635
Race (1 = white)	0.932	0.252	5682	0.935	0.246	635
No qualification (yes=1)	0.0901	0.286	5682	0.0157	0.125	635
Vocational or Training (yes=1)	0.108	0.311	5682	0.0157	0.125	635
GCSE or equiv (yes=1)	0.241	0.427	5682	0.150	0.357	635
A levels (yes=1)	0.413	0.492	5682	0.617	0.486	635
University or above (yes=1)	0.144	0.351	5682	0.202	0.401	635
Employed (yes=1)	0.766	0.423	5682	0.844	0.363	635
Household characteristics						
Number of pre-school age kids (age 0-4)	0.160	0.382	5682	0.197	0.413	635
Number of school-age kids (age 5-15)	0.357	0.618	5682	0.255	0.543	635
Household labor income	32301.6	19576.1	5682	32610.3	19866.4	635
Household non-labor income	3448.7	5649.7	5682	4043.8	12334.1	635
Spouse characteristics						
Age	40.13	7.094	5682	38.13	6.927	635
No qualification (yes=1)	0.0901	0.286	5682	0.0157	0.125	635
Vocational or Training (yes=1)	0.0855	0.280	5682	0.0488	0.216	635
GCSE or equiv (yes=1)	0.133	0.340	5682	0.165	0.372	635
A levels (yes=1)	0.467	0.499	5682	0.454	0.498	635
University or above (yes=1)	0.173	0.378	5682	0.230	0.421	635

Source BHPS, see section 6.2 for sample selection

Table A.3: Descriptive statistics - Husbands

	England			Scotland		
	Mean	Sta. dev.	Obs	Mean	Sta. dev.	Obs
Health status (1= good or excellent)	0.794	0.404	4768	0.807	0.395	507
Likert scale	10.54	4.929	4768	10.39	4.916	507
Sport or fitness class (1= once a week)	0.559	0.497	1944	0.586	0.494	210
Sport (1=once a week)	0.536	0.499	1945	0.552	0.498	210
Fitness class (1=once a week)	0.132	0.339	1943	0.129	0.336	210
Psychotherapist or physiotherapist (1= used in the last year)	0.0338	0.181	4768	0.0355	0.185	507
Physiotherapist (1= used in the last year)	0.0199	0.140	4768	0.0316	0.175	507
Psychotherapist (1= used in the last year)	0.0141	0.118	4768	0.00986	0.0989	507
Individual characteristics						
Age	38.63	5.868	4768	36.60	5.736	507
Race (1 = white)	0.917	0.276	4768	0.951	0.217	507
No qualification (yes=1)	0.0929	0.290	4768	0.0533	0.225	507
Vocational or Training (yes=1)	0.0852	0.279	4768	0.0237	0.152	507
GCSE or equiv (yes=1)	0.152	0.359	4768	0.179	0.384	507
A levels (yes=1)	0.477	0.500	4768	0.479	0.500	507
University or above (yes=1)	0.185	0.388	4768	0.264	0.441	507
Employed (yes=1)	0.942	0.234	4768	0.945	0.229	507
Household characteristics						
Number of pre-school age kids (age 0-4)	0.178	0.400	4768	0.211	0.427	507
Number of school-age kids (age 5-15)	0.340	0.609	4768	0.241	0.542	507
Household labor income	32238.8	19780.4	4768	33775.6	20432.5	507
Household non-labor income	3362.9	5456.6	4768	4085.9	13256.9	507
Spouse characteristics						
Age	37.03	6.323	4768	34.74	6.092	507
No qualification (yes=1)	0.0929	0.290	4768	0.0533	0.225	507
Vocational or Training (yes=1)	0.115	0.319	4768	0	0	507
GCSE or equiv (yes=1)	0.239	0.427	4768	0.140	0.347	507
A levels (yes=1)	0.410	0.492	4768	0.607	0.489	507
University or above (yes=1)	0.149	0.356	4768	0.217	0.413	507

Source BHPS, see section 6.2 for sample selection

A.3 The Gauss Markov assumptions

With a linear regression model the first assumption states that the model is linear with regards to parameters. While the equation must be linear in the parameters, it is still possible to transform the predictor variables in ways that produce curvature, e.g. by including age and age squared. The second assumption is more pragmatic and state that the matrix of covariates must be full rank to allow model identification. Full rank implies that the rows and columns are linearly independent. This assumption is referred to as no perfect multicollinearity and I check the assumption by looking at a correlation table for the included variables. The third assumption says that the expected value of the error term is zero, which means that, on average, the regression line is correct. The forth assumption states that the variance of the error term is the same for all levels of the independent variable. This is also discussed as homoscedasticity and if the assumptions fails the coefficient's standard errors are wrong. This is a particular concern with regards to the linear probability model and I will use heteroscedastic robust standard error to correct for this. This assumption also ensures no autocorrelation, e.g. in the case of time series. Assumption five states that the dataset is a random sample of one underlying population, which is necessary to make predictions about the population. Assumption 1-5 makes the parameters BLUE, the best linear unbiased estimators, indicating that the parameters are unbiased, consistent and efficient. To set up the stochastic part of the econometric model and make statistical inference a sixth assumption is necessary; the disturbance is IID, independent and identical with a normal distribution error term. This assumption says that the population error is independent of the explanatory variables and normally distributed (Verbeek, 2008).

A.4 Parallel trend

The parallel trend assumption is crucial for correctly identifying the effect of policy changes with the difference-in-difference method. The assumption states that absent of the reform the treatment group and the counter factual should show similar trends. A common approach to investigate the if the assumption holds is by visually inspecting the trends in the pre-treatment period. Eyeballing the trends in figure A.1 to A.8 do not provide conclusive evidence of parallel trends. The strong parallel trend assumption can be partially relaxed by controlling for regional specific trends. This allows treatment and control regions to follow different trends in a limited but potentially revealing way. When evaluating the parallel trends with the full empirical model it provides evidence of parallel trend with regards to the outcome variables included in the analysis.

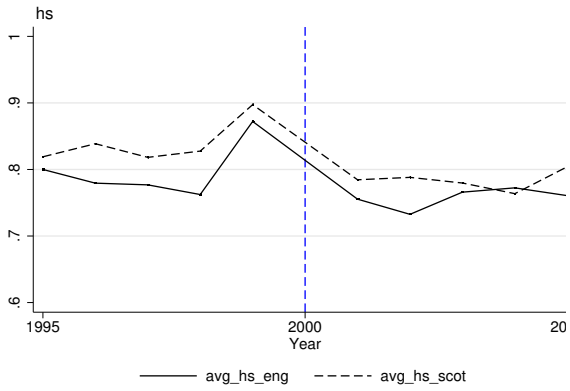

Figure A.1: Binary health status

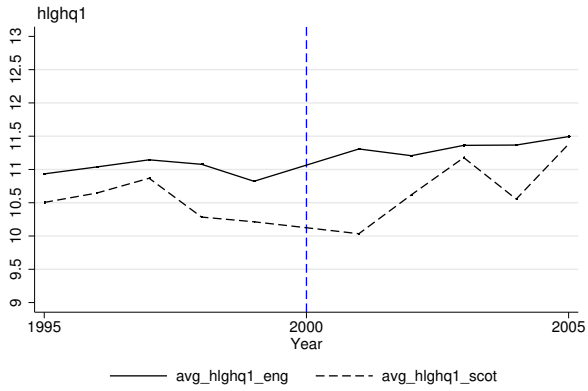

Figure A.2: Likert scale well-being

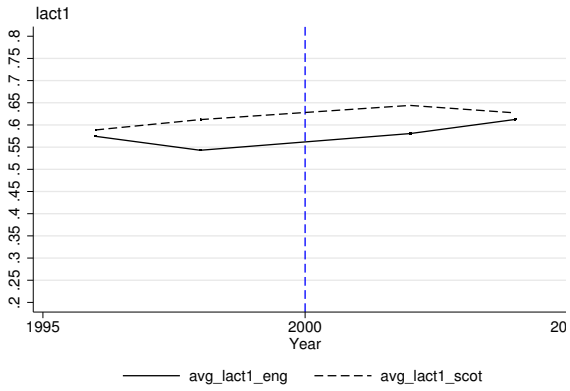

Figure A.3: Do sports or fitness class

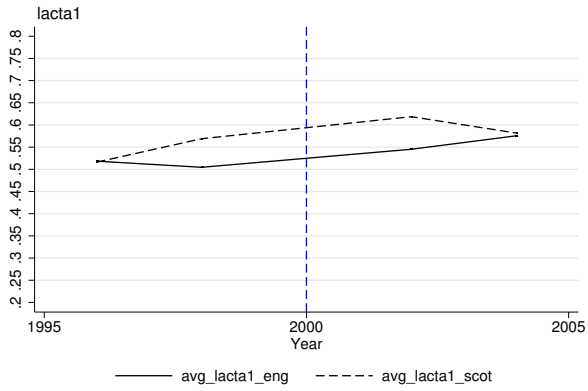

Figure A.4: Swim/Walk/Sport once a week

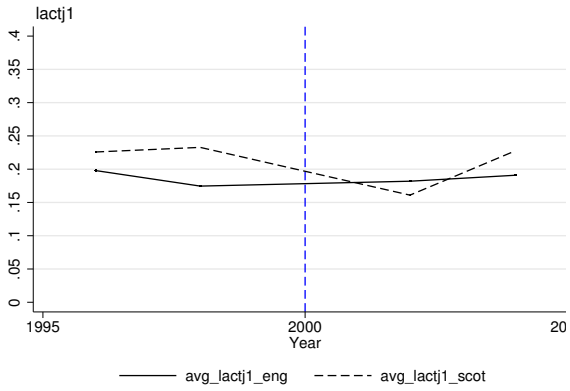

Figure A.5: Evening class to keep fit

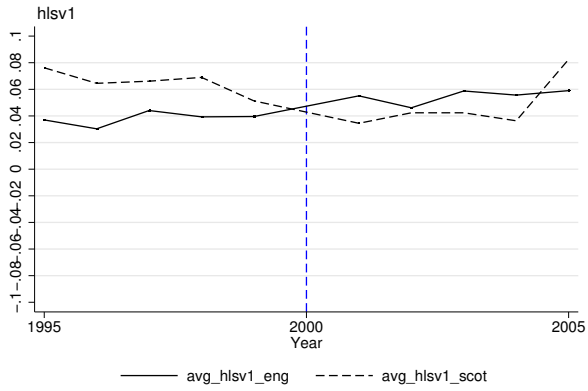

Figure A.6: Psychotherapy or physiotherapy

Table A.4: Test of parallel trend for married male's main outcomes

	(1) Health status	(2) Well-being	(3) Sport or fitness class	(4) Health service
treat21995	-0.0351	-0.145		-0.0287
	(0.0671)	(0.912)		(0.0373)
treat21996	-0.0749	0.0853	0.0596	-0.0432
	(0.0625)	(0.799)	(0.0560)	(0.0438)
treat21997	-0.0446	0.0118		-0.0158
	(0.0596)	(0.595)		(0.0331)
treat21998	-0.0943	- 0.657		-0.0171
	(0.0627)	(0.671)		(0.0337)
treat22001	0.0316	.1.422**		0.0126
	(0.0625)	(0.592)		(0.0289)
treat22002	-0.0473	0.0776	0.0422	-0.0197
	(0.0678)	(0.736)	(0.0887)	(0.0331)
treat22003	-0.0475	- 0.108		-0.00630
	(0.0599)	(0.672)		(0.0342)
treat22004	-0.0119	-0.222	0.114	0.0124
	(0.0612)	(0.610)	(0.0908)	(0.0299)
treat22005	-0.0785	-0.170		-0.0185
	(0.0556)	(0.711)		(0.0388)
Controls				
Time FE	Yes	Yes	Yes	Yes
F-test				
(1) treat*1995	= 0	= 0	-	= 0
(2) treat*1996	= 0	= 0	= 0	= 0
(3) treat*1997	= 0	= 0	-	= 0
(4) treat*1998	= 0	= 0	-	= 0
Prob > F	0.2873	0.6685	0.2105	0.4909
N	5275	5275	2154	5275
R^2	0.008	0.003	0.003	0.002

Heteroscadastic and cluster robust Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

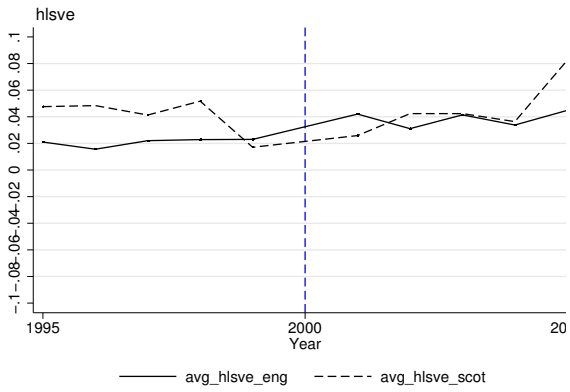

Figure A.7: Psychotherapy

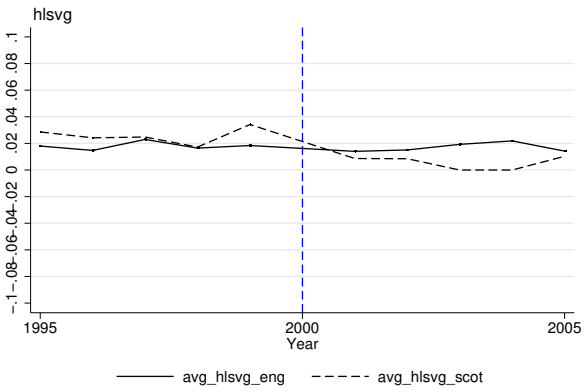

Figure A.8: Physiotherapy

A.5 Health measures and the Likert scale

An overview of the health economic literature yields a couple of common approaches: a single observed health measure, e.g. self-assessed health or limitations in daily activity (Grossman, 1972; Manning et al., 1982; Wagstaff, 1993; Gould & Jones, 1996; Jones, 2007; Zweifel, 2009); anthropometric measures based on weight, BMI and the like (Jones, 2007; Steckel, 2008); latent variable approaches such as multiple-indicators-multiple-causes models where health is measured as a system of equations (Wagstaff, 1986; Ersblad et al., 2002; Tekwe et al., 2014); principal components analysis (Zhang et al., 2006) and multiple correspondence analysis (Greenacre, 2002; Kohn, 2012) to create a health index using health related indicators. The BHPS do not include medical measures, such as blood pressure, BMI, weight and the like which limits the possibility to use health measurements that relies on this information, i.e. anthropometric measurements and indices derived with principal components analysis. The only measure available in the BHPS are self-assessed health status and well-being.

A.5.1 Likert scale

The Likert scale is created using the data from the BHPS's General Health Questionnaire, GHQ-12. The GHQ-12 includes 12 standardized question about general psychological health and well-being, summarized in Table A.5. The questions are answered on 4 point score card, where 1 indicates good psychological health or well-being and 4 indicates poor psychological health or well-being. The Likert approach first convert the answers to run between 0 to 3 instead of 1 to 4 and then creates a single scale by summing the variables, giving a scale running from 0 (high well-being) to 36 (low well-being). For the purpose of the analysis I have re-recorded the variable so that a higher Likert score correspond to better psychological well-being.

Table A.5: GHQ-12 variables used to create the Likert scale

	Wives				Husbands			
	England		Scotland		England		Scotland	
	Mean	Sta. dev.	Mean	Sta. dev.	Mean	sd	Mean	Sta. dev.
ghqa: concentration	2.169	0.548	2.124	0.483	2.090	0.495	2.069	0.471
ghqb: loss of sleep	1.969	0.757	1.892	0.720	1.804	0.736	1.762	0.730
ghqc: playing a useful role	1.962	0.525	1.929	0.475	1.946	0.526	1.957	0.516
ghqd: capable of making decisions	1.999	0.491	1.985	0.442	1.932	0.482	1.919	0.478
ghqe: constantly under strain	2.232	0.719	2.178	0.681	2.172	0.719	2.132	0.727
ghqf: problem overcoming difficulties	1.894	0.689	1.774	0.654	1.785	0.675	1.782	0.650
ghqg: enjoy day-to-day activities	2.128	0.553	2.109	0.508	2.114	0.538	2.088	0.500
ghqh: ability to face problems	2.058	0.491	2.010	0.383	1.998	0.433	2.012	0.435
ghqi: unhappy or depressed	1.995	0.805	1.822	0.757	1.843	0.774	1.819	0.763
ghqj: losing confidence	1.780	0.739	1.675	0.706	1.535	0.693	1.525	0.692
ghqk: believe in self-worth	1.479	0.679	1.360	0.613	1.331	0.607	1.301	0.616
ghql: general happiness	2.036	0.598	2	0.536	2.009	0.564	2.014	0.577
subjective wellbeing (ghq) 1: likert	11.70	5.378	10.85	4.802	10.56	4.939	10.39	4.912
N	5682		635		4768		507	

Source BHPS, see section 6.2 for sample selection