

Marrying for Money: Evidence from the First Wave of Married Women's Property Laws in the U.S..*

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Abstract

Marriage can substitute for formal business contracts, especially in environments that lack a well established system of contract or corporate law. In such settings, marriage can facilitate the efficient organization of labor and capital. In this paper, we explore the pooling of capital as an explicit motive for marriage. We measure the impact of a class of married women's property acts introduced in the American South during the 1840s on assortative matching in the marriage market. These laws did not grant married women autonomy over their separate estate; they merely shielded their property from seizure by their husbands' creditors. This had the dual effect of mitigating downside risk while restricting a husband's ability to borrow against his wife's property; it also preserved the bulk of the wife's assets as inheritance for the couple's children. Using a newly compiled database of linked marriage and census records, we show that these laws were associated with an overall increase in assortative mating, suggesting that the ability to pool capital importantly contributed to the gains from marriage. At the same time, there is considerable heterogeneity in the effect in different regions of the joint men's and women's wealth distribution. We provide an interpretation for these results.

*Preliminary and incomplete.

1 Introduction

Marriage is, in part, an economic decision. By marrying, a couple can achieve economic outcomes that are difficult to attain relying on market transactions alone. Analogous to the Theory of the Firm, a marital contract can improve efficiency through the enforcement of implicit contracts and by discouraging opportunistic behavior. The existing literature, starting with the seminal work of Becker (1981), has emphasized the improvements in household production that are achieved through marriage, focusing on married couples' ability to exploit increasing returns through division of labor.¹ In this paper, we take a different perspective and consider the role of marriage in the pooling of financial resources for business purposes. In particular, through marriage, couples can pool assets to increase the amount of pledgeable collateral, improving access to credit. At the same time, by strategically allocating ownership of marital property between spouses, households can acquire additional protection from outside creditors, effectively substituting for limited liability. Even though marriage can serve as a safeguard against opportunistic behavior, there is still scope for moral hazard, as one partner can misappropriate funds. This is especially problematic if divorce is a costly option or if property rights upon separation are not well defined.

The idea that marriage has traditionally served as a substitute for more formal business contracts is not new, especially in historical contexts and developing countries that lack a rich system of contract or corporate law. However, most of the existing literature has emphasized how marriage can facilitate the efficient organization of labor. The role of capital is not well studied, and the main purpose of this paper is to fill this gap in the literature.² It is not straightforward to empirically disentangle the different economic roles of marriage and isolate the role of capital. In this paper, we take the following approach. We locate an institutional change that affects how capital can be used within marriage and that affects the gains of marriage in a clear and predictable way. We then measure its effect on partner choice. If the pooling of capital is indeed important, we expect

¹See Weiss (1997) for an overview.

²Historian Stephanie Coontz (2005) documents the evolution of marriage from a primarily economic to a primarily emotional institution, noting that, "for much of history, marriage was not primarily about the individual needs and desires of a man and woman and the children they produced. Marriage had as much to do with getting good in-laws and increasing one's family labor force as it did with finding a lifetime companion and raising a beloved child" (p. 6). Fafchamps and Quisumbing (2005a, 2005b) and Rosenzweig and Wolpin (1985), among others, look at developing countries. There is also a literature on the role of family networks in accessing credit; for a recent example, see Lee and Persson (2016).

assortative mating on familial wealth to change in a particular way.

We are especially interested in understanding how a couple’s ability to access the credit market affects the gains from marriage. To this end, we exploit a unique institutional development in the American South during the 1840s – the introduction of a specific class of married women’s property laws – that affected the allocation of marital property and married couples’ interactions with credit markets. Prior to the introduction of these laws, a woman’s property became her husband’s property upon marriage. These laws altered this default, but in a very limited way. They did not give a married woman the right to determine how her property was used, but, instead, shielded her assets from seizure by her husband’s creditors. In addition, a husband could not dispose of his wife’s assets, unless his own income and wealth were insufficient to provide for the family. As such, the married women’s property laws both functioned as a form of bankruptcy protection and a vehicle to reduce moral hazard on the part of the husband. Importantly, if a couple’s ability to access credit is an important source of the gains from marriage, then these laws will have a clearly predictable effect on the the relative value of certain types of marriages, which is heterogeneous in different areas of the joint men’s and women’s wealth distribution (details follow).³

We study changes in marriage choice by looking at the tendency for people from similar socioeconomic backgrounds to marry each other. The effect of married women’s property laws on assortative mating depends on whether or not spousal capital becomes more or less “complementary” after the passage of a law. If spousal wealth becomes more complementary, then the relative gains from rich men marrying rich women will increase, and assortative mating should become more prevalent (Becker 1981). We model the way property laws affected a couple’s interaction with the credit market, and how this in turn affected the relative complementarity of spousal assets. In the absence of a property law, husbands’ and wives’ capital are perfect substitutes. If a wife’s property

³We also note that, because these laws predated modern divorce laws and did not allocate economic power to women, they altered the way in which marital property could be pooled without having a first order effect on the relative bargaining power of spouses. There is a literature on the way in which bargaining power within the household affects spouses’ household labor input. For instance, Chiappori et al (2002) explore the impact of divorce laws on the division of labor between spouses, citing changes in bargaining power as the driving mechanism. Geddes and Lueck (2002) discuss the adoption of U.S. state statutes allowing women to own and control property. They argue that the adoption of these laws can be explained in part by increasing returns to women’s work: if women invest more effort in production when they hold property rights within the family, this may explain why male dominated legislatures were willing to pass such legislation. Doepke and Tertilt (2009) propose a model in which assigning property rights and increased bargaining power to married women increases investment in children’s human capital. While we expect the effect on bargaining power to be minimal, we emphasize that a model in which property laws affect bargaining power is unlikely to generate the type of heterogenous effect on the marriage market that we document here.

is protected, spousal assets become more complementary: only the husband’s capital can be used to access credit, but only the wife’s capital can be consumed in the event of default. On the other hand, by affecting borrowing behavior, the property laws also affect the level of consumption a couple can enjoy. If utility becomes less concave in consumption as consumption increases (as in most conventional utility functions for risk averse agents), then husband’s and wife’s wealth becomes less “substitutable” if the consumption a couple is able to achieve increases. In related work, Koudijs and Salisbury (2016) show that the increased protection against creditors only benefitted couples with relatively rich husbands who had sufficient collateral available to begin with; these couples were able to increase borrowing, which led to increased consumption. Couples with relatively rich women had a serious lack of pledgeable assets after the legal change and became credit constrained, leading to decreased consumption. This implies heterogeneity in the impact on the marriage market, with assortative mating becoming more common among couples with richer husbands and poorer wives, and less common among couples with richer wives and poorer husbands. We show that, while several alternative models deliver an increase in assortative mating overall, they do not predict this type of heterogeneity.

This result illustrates how useful the property laws we analyze are for establishing the link between a couple’s interaction with the credit market and the gains from marriage. Unlike married women’s property laws passed elsewhere in the U.S. and later in the 19th century, these laws did not allow married women to borrow money, so the portion of marital assets that are excluded from interaction with the credit market is clearly identifiable. We argue that the effect of a law on assortative mating depends on the ratio of protected to unprotected assets. Thus, if we know that women’s assets are protected and men’s assets are unprotected, this gives us a clear prediction about what heterogeneity in the marriage market should look like. We get no such clarity from laws allowing married women to borrow independently of their husbands.

Using a new database of marriage records in the U.S. South from 1840 to 1851, we document striking changes in marriage patterns after the passing of the laws that are consistent with this simple framework. Using the 1840 census, we determine each partner’s socio-economic background. We define “marriage markets” to be state-years, and we use a statistic based on Choo and Siow (2006) to measure the systematic gains from assortative versus non-assortative matches. We investigate how this changed after the introduction of a married women’s property act. Because different

states passed laws at different times, we can include both state and year of marriage fixed effects in our regressions. We show that married women’s property laws were associated with an overall increase in assortative mating on wealth. However, this masks heterogeneity in different parts of the joint distribution of men’s and women’s wealth. In particular, we show that laws tended to increase the gains from assortative matching among couples with relatively richer husbands; however, they tended to decrease the gains from assortative matching among couples with relatively richer wives. This is entirely consistent with the theoretical effect of these laws, described above.

These results indicate that, in the absence of a modern system of contract and business law, the institution of marriage has an important economic role in alleviating problems associated with credit constraints and limited debtor protection. Our findings indicate that changing laws governing marital property can materially affect marriage choices. This has interesting implications about the development of marriage patterns and assortative mating over time. As the U.S. economy has developed, and access to outside finance and limited liability has improved, some of the economic motives for marriage have disappeared. We hypothesize that this has fundamentally changed the way in which people have formed partnerships over time.

Our paper relates more generally to the literature on assortative matching in marriage markets. There is evidence of a recent decline in marriage rates accompanied by an increase in assortative matching on economic status (Choo and Siow 2006; Greenwood et al 2014). This has sparked new interest in understanding the way economic institutions interact with marriage markets. Assortative matching can be explained by different economic mechanisms. First of all, they can be the result of random matching with search frictions. These models may generate assortative matching if people with similar characteristics are more likely to encounter one another in the marriage market (Adachi 2003). Second, non-random matching models posit that people have preferences for certain traits in the marriage market. Assortative matching will occur in a frictionless setting with stable matches if certain traits are universally preferred by both men and women – in this case, highly ranked men will pair with highly ranked women, and lower ranked men will pair with lower ranked women.⁴ Alternatively, if people prefer mates with similar characteristics to themselves, assortative matching will also tend to occur when matches are stable.⁵

⁴See Chen et al (2013) and Olivetti et al (2015) for examples of such models.

⁵Gale and Shapely (1962); Weiss (1997).

The fact that different marriage matching models have similar predictions for assortative matching make it difficult to differentiate between these models. Hirtsch et al. (2010) show that assortative matching emerges in online dating – a relatively frictionless setting – and argue that this indicates that people have explicit preferences for similar mates in the dating market. Our paper takes a different approach: we show that changes in marital property regimes generate changes in assortative matching on economic status. Since these property regimes had no effect on marriage matching institutions, this only makes sense if spousal economic assets enter directly into a person’s utility function.

Finally, this paper adds to the literature on married women’s property laws in the United States. This is a topic that has received much attention from economists and economic historians; however, due to data limitations, it has been difficult to introduce pre-marriage characteristics into any empirical analysis of these laws. In particular, it is difficult to observe pre- and post-marriage socioeconomic characteristics of both halves of a couple, and to know whether a couple was married before or after the passage of a married women’s property law. Most examinations of the consequences of these laws have focused on their effect on women’s economic activity or wealth holding, typically looking at state-level changes in these outcomes following the passage of a property law. Kahn (1996) explores the effect of married women’s property laws on women’s patenting, examining changes in the rate of patenting among women at the state level. Inwood and Van Sligtenhorst (2004) look at changes in women’s property holding that occurred after the passage of a married women’s property law in Ontario, Canada. Geddes et al (2012) analyze the effect of property laws on children’s school attendance at the state level. Hamilton (1999) analyzes choices of property regimes by married couples in 19th century Quebec, who could opt for separate or community of property through prenuptial contracts. Koudijs and Salisbury (2016) analyze the impact these property laws had on family investment decisions.

The rest of this paper is structured as follows. Section 2 provides more historical background. Section 3 develops a simple model to describe the impact of married women’s property laws on assortative mating. Section 4 discusses the newly constructed dataset that we use in this paper, and section 5 describes the empirical strategy. Section 6 presents empirical results on the assortativeness of matching. Section 7 discusses alternative mechanisms that may drive our results, and section 5 concludes.

2 Historical Background

Prior to the introduction of married women's property acts, married women's property was governed by American common law, which dictated that virtually all property owned by a woman before marriage or acquired after marriage belonged to her husband. The exception was real estate. Although the fruits derived from real estate belonged to the husband (who could use this revenue as collateral for a loan), the property itself was inalienable and was held in trust by the husband for his wife. It was supposed to pass on to their children or otherwise would revert back to the wife's family (Warbasse 1987, p.9). In most of the states we consider in our empirical analysis prenuptial agreements were problematic to enforce and therefore rare (Salmon 1986, p. xv). The key difficulty lay in the dual legal system in the U.S. at the time. The dominant legal framework was American common law. Under this system prenuptial agreements were not valid. To 'fix' some of the inequities of common law, a separate body of equity law had evolved. This branch of the law did support prenups, but it was less well established and was administered in separate chancery courts. This created two problems. First, as many southern states did not structurally report equity cases, chancery judges often knew little of the equity jurisprudence. Second, there were few courts that solely administered equity law. Usually, a judge mixed equity and common law cases. As a result, decisions were rife with inconsistencies (Warbasse 1987, p. 165-6).

Warbasse (1987) suggests that the problems associated with equity law and prenuptial agreements spurred the passing of state statutes modifying the common law to better protect women's assets within a marriage. These laws were introduced at different times in different states.⁶ The acts can be broadly separated into four categories: debt relief, or acts that shielded women's property from seizure by husbands' creditors but did not allow women to control their separate property; property laws, or laws that allowed women to independently own and dispose of real and personal property; earnings laws, which allowed women to control their own labour earnings; and sole trader laws, which allowed women to engage in contracts and business without their husbands' consent.

We focus on the first class of married women's property acts ("debt relief"), which were enacted in most southern states during the 1840s. Interestingly, the states that did not pass these law

⁶Information on married women's property acts is compiled from a number of sources, including Kahn (1996), Geddes and Lueck (2002), Warbasse (1987), Kelly (1882), Wells (1878), Chused (1983) and Salmon (1982).

changes had the most well developed equity law systems, such as Virginia and Georgia (Warbasse 1987, p. 167). The timing of the passing of these laws coincided with a major recession, following the Panic of 1837, which precipitated a large decline in cotton prices. This depressed land and slave prices in the southern states, where the economy and financial system was based largely around plantation agriculture (McGrane 1924). Historians argue that these laws were passed in response to the economic hardship created by this recession, and the observation that men's losses were also being borne by their wives (Kahn 1996). At the time all loans were full recourse. If a husband's assets were not sufficient to cover a mortgage, for example, creditors could lay claim on all other possessions a couple might have had, including a wife's assets. For example, an article in the 1843 Tennessee Observer states that "the reverses of the last few years have shown so much devastation of married women's property by the misfortunes of their husbands, that some new modification of the law seems the dictate of justice as well as prudence." The Georgia Journal argued in the same year that there is no good reason "why property bequeathed to a daughter should go to pay debts of which she knew nothing, had no agency in creating, and the payment of which, with her means, would reduce her and her children to beggary. This has been done in hundreds of instances, and should no longer be tolerated by the laws of the land" (quoted in Warbasse 1987, p. 176-177). This seems to have been a widespread sentiment, and even states that did not succeed in passing a married women's property act during the 1840s proposed them to the state legislation. For example, Georgia failed to pass an act in 1843 by a margin of 18 out of 173 votes. Tennessee did not pass an act until 1850, even though the issue had clearly been raised prior to this.

The first such law was passed in Mississippi in 1839, which merely sheltered a woman's slaves from seizure by her husband's creditors; an additional law was passed there in 1846, securing the income earned from her real and personal property to her separate estate. Alabama, Florida, Kentucky, North Carolina, and Tennessee all passed similar property laws during the 1840s. Virginia and Georgia did not pass laws during the period, and Louisiana and Texas were community property states which kept property owned before marriage separate prior to the 1840s. Arkansas passed a weak version of a property law in 1846, which was generally considered nothing more than a strengthening of the equity tradition, which governs premarital contracts (Warbasse 1987). Table 1 contains a list of important legislative dates for each state that we use in our analysis. In all cases, the statutes did not grant women the right to control their separate property; it was kept in a trust

administered by their husbands. As Kahn (1996) writes, “control remained with the husband, and courts interpreted the legislation narrowly to ensure that ownership did not signify independence from the family” (p. 361).

While the married women’s property acts passed in the South during the 1840s did not grant women economic independence, they did place real constraints on the way in which this property was used. As said, wives’ assets were protected from from husbands’ creditors. At the same time, a wife could not contract debt in her own name. Under common law a married women (or ‘feme covert’) was legally unable to sign contracts; common law assumed that a family was a single legal entity, led by the husband. The early married women’s property acts did not (yet) change this feature of American common law. This put a wife’s assets in a special position: neither husband nor wife could use them as collateral to obtain credit. In some states an exception was made to furnish the household with ‘common law necessities,’ which included food and shelter. In general, husbands and wives were allowed to jointly sell wife’s assets. However, this did not mean that the ownership changed or that proceeds could be consumed. The proceeds from the sale had to be reinvested as part of the wife’s separate estate. For example, an Alabama decision from 1857 maintains that, even if a wife’s property can be sold by a husband and wife jointly, the proceeds “are to be reinvested in ‘the purchase of other property’ not sold for money” (31 Ala. 39). The statute was interpreted to protect a wife’s property “not only against third persons, but against the husband himself.” This principle seems to have been broadly upheld in court.

A secondary motive for passing the married women’s property acts was the legislatures’ concerns with the “character” of certain men. In 1846 the Alabama legislature commented that the passing of a law would not only protect a women against a husband’s insolvency, but also against his “intemperance or improvidence.” In 1839, a newspaper from Vicksburg, Mississippi argued, somewhat less eloquently, that “the property of ladies should be guarded against the squandering habits of a drunken and gambling husband. The ladies are virtuous and prudent creatures – they never gamble, they never drink, and there is no good reason why the strong arm of legislation should not be extended to the protection of the property they bring into the marriage bargain” (quoted in Warbasse 1987, p. 150 and 170).

Of course, the extent to which these laws had any meaningful impact depends on the degree to which women held property during this period. As women’s labor force participation was very low,

women's property would have to come from family. The historical evidence suggests that women frequently received real estate and personal wealth from their family. The first channel was dowry. Though there is a serious lack in research on dowry in the Antebellum South, historical anecdotes suggest that dowry was a frequent phenomenon. Thomas Jefferson's wife, for example, received a dowry of 132 slaves and many thousands of acres of land (Gikandi 2011). Auslander (2011) gives numerous examples from Antebellum Greenwood county, Georgia of the transfer of slave property in the form of dowry. The second channel was inheritance. After the American Revolution the United States had done away with the British standard of primogeniture. In 1792 most US states (including the South) had passed so-called intestacy laws that guaranteed that in the absence of a will, sons and daughters would receive equal shares in the inheritance from their parents (Salmon et al. 1987, p. 64-65; 83). There is very little evidence on the exact shares stipulated in actual wills, but anecdotal evidence suggests that women could receive sizable inheritances, often in the form of slaves (Warbasse 1987, p. 143-144; Brown 2006).⁷

3 Theory

We model the way in which the legal status of married women's property affects the utility both men and women derive from marriage. We focus on the impact on the *relative* value of marriages of different types, which has implications about the degree of assortative mating on economic status. We are especially interested in how married women's property laws affected a couple's interaction with the credit market. By sheltering a wife's assets from seizure by her husband's creditors, the law offers a household downside protection if the husband defaults on his debts; however, these laws also prohibit a couple from borrowing against a wife's assets, which limits a household's access to credit.

Intuitively, the impact on assortative mating hinges on whether these laws make husband's and wife's wealth more or less substitutable. We proceed by showing that, by changing the way a couple is able to access credit, the laws have a heterogeneous effect on assortative mating in different regions of the joint men's and women's wealth distribution. When men are wealthy relative to women, the laws tend to make men's and women's wealth more complementary through

⁷The tendency to will real estate to men seems to have been a national phenomenon in the first half of the 19th c.: see Salmon et al. (1987, p. 111) on the case of Bucks county in Pennsylvania.

this channel; when women are wealthy relative to men, the laws tend to make men's and women's wealth less complementary.

3.1 Utility from Marriage

Men and women with wealth w_M and w_F , respectively, experience gains from marriage which can be divided into three components: (i) a systematic component that derives from the consumption of goods and services within marriage ($U_M(w_M, w_F) + U_F(w_M, w_F)$); (ii) a systematic component that does not derive from consumption but is correlated with assets ($\psi(w_M, w_F)$); and (iii) an idiosyncratic component (ϕ). Thus, the value of a marriage between a man with wealth w_M and a woman with wealth w_F who have idiosyncratic gains from marriage equal to ϕ is:

$$V(w_M, w_F, \phi) = U_M(w_M, w_F) + U_F(w_M, w_F) + \psi(w_M, w_F) + \phi$$

Choo and Siow (2006) show that, if idiosyncratic match quality obeys an extreme value distribution, the total systematic value from marriages between men of type i and women of type j is directly proportional to the number of i, j marriages relative to the number of single men of type i and single women of type j . Thus, the prevalence of certain marriages depends directly on their systematic value.

In what follows, we model systematic utility $U(w_M, w_F) \equiv U_M(w_M, w_F) + U_F(w_M, w_F)$, which accrues from the couple's ability to invest and then consume premarital assets.

3.1.1 Statistic for Measuring Effect on Matching

Consider a marriage market with two types of men (w_M^H, w_M^L) and two types of women (w_F^H, w_F^L). Assortative mating in the marriage market will become more valuable – and thus more prevalent – if the following expression increases:

$$\Delta U \equiv U_{HH} + U_{LL} - U_{HL} - U_{LH}$$

Here, $U_{HH} \equiv U(w_M^H, w_F^H)$, and so on. Define U_{ij} ($i, j \in \{L, H\}$) to be systematic marital utility before the passage of a property law, and \tilde{U}_{ij} to be systematic marital utility after the passage of

a property law.

Proposition 1 *Suppose the following inequality holds for all $x \in [w_M^L, w_M^H]$ and $y \in [w_F^L, w_F^H]$:*

$$\frac{\partial^2 \tilde{U}(x, y)}{\partial x \partial y} > \frac{\partial^2 U(x, y)}{\partial x \partial y}$$

Then, the following also holds:

$$\tilde{U}_{HH} + \tilde{U}_{LL} - \tilde{U}_{LH} - \tilde{U}_{LL} > U_{HH} + U_{LL} - U_{LH} - U_{HL}$$

Conversely, if the following holds for all $x \in [w_M^L, w_M^H]$ and $y \in [w_F^L, w_F^H]$:

$$\frac{\partial^2 \tilde{U}(x, y)}{\partial x \partial y} < \frac{\partial^2 U(x, y)}{\partial x \partial y}$$

Then, the following also holds:

$$\tilde{U}_{HH} + \tilde{U}_{LL} - \tilde{U}_{LH} - \tilde{U}_{LL} < U_{HH} + U_{LL} - U_{LH} - U_{HL}$$

Proof. Follows Becker (1981). See appendix for details. ■

In words, this means that the gains from assortative mating will increase when $\partial^2 U / \partial w_M \partial w_F$ increases, and these gains will decrease when $\partial^2 U / \partial w_M \partial w_F$ decreases. So, in what remains, we will characterize what happens to $\partial^2 U / \partial w_M \partial w_F$ after the passage of a law.

3.1.2 A Model of Credit and Matching

Married women's property laws affect the marriage market by altering a married couple's interaction with the credit market. Here, we model the effect of property laws on matching through this channel.

3.1.3 Setup

When a couple is married, the husband and wife invest their assets in a risky project with a positive expected return. Project returns are then realized, and the couple consumes the return. With probability 1/2, the project succeeds and yields a return of $\bar{R} > 1$; otherwise, the project fails and yields a return of $\underline{R} < 1$. We define $r \equiv \frac{\bar{R} + \underline{R}}{2} > 1$, and $\Delta r \equiv \bar{R} - \underline{R}$. Households can borrow

to scale up investment in the project. A portion of the return equal to $\underline{R}I$ can always be seized by the creditor, where I is the total amount invested; however, the household can abscond with the remainder. If the project has failed, there is nothing for the household to abscond with. But if the project has succeeded, the household can abscond with ΔrI . We assume that there is a penalty associated with absconding, so households who abscond with ΔrI can only consume $\beta\Delta rI$, where $\beta < 1$. Thus, in order for a loan contract to be incentive compatible, the household must be better off repaying its loan if the project succeeds than it would be if it absconded with the surplus. We impose the following restrictions on parameters:

$$\frac{2(r-1)}{\Delta r} < \beta < 1$$

$$\overline{RR} - r > 0$$

The first restriction ensures that the incentive compatibility constraint is binding; the second ensures that returns are not so risky that the household forgoes investment in the risky project and instead chooses to hold assets in cash. We assume that both the husband and the wife consume the proceeds of the household's investment.⁸

3.1.4 No Separate Property for Women

Husbands gain full ownership of w_F upon marriage, and they choose a loan size l to maximize their own utility:

$$\max_l U(l) = \frac{1}{2} \log c^G + \frac{1}{2} \log c^B$$

Here, c^G is consumption of the married couple if the project succeeds, and c^B is consumption of the couple if the project fails. Assuming that l is risk free – which will certainly be the case, as a risky loan would leave the couple with zero consumption if the project fails – these terms have the following definitions:

$$c^G = \overline{R}(w_M + w_F + l) - l$$

$$c^B = \underline{R}(w_M + w_F + l) - l$$

⁸Our key results are invariant to dividing marital output between spouses as opposed to allowing them both to consume all of it.

Proposition 2 *A household consisting of a husband with wealth w_M and a wife with wealth w_F will choose the following loan size:*

$$l^* = \frac{\overline{R}\underline{R} - r}{(\overline{R} - 1)(1 - \underline{R})}(w_M + w_F)$$

Proof. See appendix. ■

Lemma 3 *Given the household's optimal choice of loan size, consumption in each state will be equal to:*

$$c^G = \frac{\Delta r}{2(1 - \underline{R})}(w_M + w_F)$$

$$c^B = \frac{\Delta r}{2(\overline{R} - 1)}(w_M + w_F)$$

Proof. See appendix. ■

3.1.5 Separate Property for Women

After a married women's property law is enacted, the household can no longer use w_F as collateral, and w_F cannot be seized in repayment of the households debts. Now, because w_F cannot be seized by creditors, the household may choose to contract a risky loan, such that $(1 - \underline{R})l > \underline{R}w_M$. If it does this, it will pay the creditor $\underline{R}(w_M + l)$ if the project fails, and ρl if the project succeeds, where $\rho > 1$. This loan contract will need to satisfy the incentive compatibility constraint:

$$\overline{R}(w_M + l) - \rho l \geq \beta \Delta r (w_M + l)$$

In addition, the lender requires a return equal to the risk free rate, which we set equal to 1 for simplicity:

$$\underline{R}(w_M + l) + \rho l = 2l$$

Whether or not the husband chooses to contract a risky loan will depend on the size of w_F . Namely, if w_F is sufficiently small that the husband would prefer to consume *more* than $\underline{R}w_F$ if the project fails, he will opt for a risk-free loan, solving the same problem, and thus borrowing the

same amount, as before the passage of a property law.⁹ If w_F is sufficiently large, the husband will choose to contract a risky loan: he will solve the above maximization problem, but consumption in each state is defined differently:

$$c^G = \bar{R}(w_M + w_F + l) - \rho l$$

$$c^B = \underline{R}w_F$$

Proposition 4 *There exists a cutoff, Ω_0 , such that we obtain the following solutions for consumption in each state:*

1. $w_M/w_F \leq \Omega_0$.

$$c^G = \frac{\bar{R}}{\lambda}(w_M + \lambda w_F)$$

$$c^B = \underline{R}w_F$$

where $\lambda \equiv \frac{\bar{R}(2-2r+\beta\Delta r)}{2\beta\Delta r} < 1/2$.

2. $w_M/w_F > \Omega_0$.

$$c^G = \frac{\Delta r}{2(1-\underline{R})}(w_M + w_F)$$

$$c^B = \frac{\Delta r}{2(\bar{R}-\underline{1})}(w_M + w_F)$$

Proof. See appendix. ■

3.1.6 Effect on Assortative Mating

We are interested in what happens to total systematic utility after the passage of a property law.

Recall that total utility is:

$$V(w_M, w_F, \phi) = \log c^G + \log c^B + \psi(w_M, w_F) + \phi$$

⁹This must be feasible, since consuming more than $\underline{R}w_F$ in the bad state implies borrowing against *less* than w_M , which is allowable under the new property regime.

Proposition 5 $\frac{\partial^2 V}{\partial w_M \partial w_F}$ is equal to:

1. Before the passage of a property law:

$$\frac{\partial^2 V}{\partial w_M \partial w_F} = \frac{-2}{(w_M + w_F)^2} + \frac{\partial^2 \psi}{\partial w_M \partial w_F}$$

2. After the passage of property law, $w_M/w_F \leq \Omega_0$:

$$\frac{\partial^2 V}{\partial w_M \partial w_F} = \frac{-\lambda}{(w_M + \lambda w_F)^2} + \frac{\partial^2 \psi}{\partial w_M \partial w_F}$$

3. After the passage of a property law, $w_M/w_F > \Omega_0$:

$$\frac{\partial^2 V}{\partial w_M \partial w_F} = \frac{-2}{(w_M + w_F)^2} + \frac{\partial^2 \psi}{\partial w_M \partial w_F}$$

Proof. See appendix. ■

This may be positive overall if w_M and w_F are complementary inputs into the ψ function, which captures marital utility that does not derive from consumption (but is correlated with premarital assets). This may happen if people with similar wealth levels are more compatible, due to (for example) similar tastes or culture. Thus, although husband's and wife's wealth are substitutes in consumption, they may be complementary overall and so we may expect to see positive assortative mating on wealth.

Again, consider a marriage market with two types of men (w_M^H, w_M^L) and two types of women (w_F^H, w_F^L). We are interested in whether $\frac{\partial^2 V}{\partial w_M \partial w_F}$ increases or decreases after the passage of a property law at all values of w_M and w_F in this marriage market; this will tell us whether assortative mating in this market has become more or less valuable. Specifically, we want to know under which circumstances $\frac{\partial^2 V^{AFTER}}{\partial w_M \partial w_F} - \frac{\partial^2 V^{BEFORE}}{\partial w_M \partial w_F} > 0$ for all w_M, w_F in this market.

Lemma 6 *There exists a $\Omega_1(\lambda, \pi)$ such that assortative mating will weakly increase when $w_M/w_F \geq \Omega_1$ and it will strictly decrease when $w_M/w_F < \Omega_1$.*

Proof. See appendix. ■

Practically, consider four sub-marriage markets consisting of men of two wealth types – w_M^H and w_M^L – and women of two wealth types – w_F^H and w_F^L . If these wealth levels are such that w_M/w_F

is large in all combinations of w_M and w_F , we should expect the gains from assortative mating to increase in this sub-marriage market. However, if w_M/w_F is small in all combinations, we should expect the gains from assortative mating to decrease in this sub-marriage market. We do not have a clear prediction about how the change in the gains from assortative mating should vary across marriage markets in which w_M/w_F is large in some combinations but small in others.

To understand what drives this heterogeneity, consider the way in which a married women’s property law affects borrowing.¹⁰ The law has two competing effects: by offering downside protection in the case of default, the law increases a household’s demand for credit; however, by limiting the assets a creditor can seize in repayment of a loan, the law decreases the supply of credit. Koudijs and Salisbury (2016) show that the former effect dominates when a smaller portion of total household assets is protected (or when w_M/w_F is large), while the latter effect dominates when a larger portion of total assets is protected (or when w_M/w_F is small).

The impact of a property law on borrowing is important, because it affects the way in which consumption in each state responds to w_M and w_F , which affects the complementarity of w_M and w_F . Couples enjoy consumption in both states. Before the passage of a property law, c^G and c^B depend on w_M and w_F in the same way: w_M and w_F are perfectly substitutable. After the passage of a law, c^B depends only on w_F , while c^G depends on both w_M and w_F , which tends to make w_F and w_M more complementary. The *heterogeneity* in the effect of the law on assortative mating arises from its impact on the substitutability of w_M and w_F in determining the utility the couple derives from c^G .

Intuitively, $\partial^2 \log c^G / \partial w_M \partial w_F$ reflects the way in which the marginal utility (derived from c^G) of w_M varies with w_F . In general, an increase in w_F decreases the responsiveness of $\log c^G$ to w_M because the marginal utility of consumption is declining. This is more pronounced when c^G is smaller; to see this, notice that as $c^G \rightarrow \infty$, $\log c^G$ approaches zero concavity.¹¹ When w_M/w_F is large, the law results in an increase in c^G , as it results in an increase in borrowing (and changes in c^G work through changes in borrowing), which tends to diminish the substitutability of w_M and w_F . On the other hand, when w_M/w_F is small, the law results in a decrease in c^G , which tends

¹⁰See Koudijs and Salisbury (2016) for a detailed investigation into the effect of these laws on total household investment.

¹¹Another way to think about this is the following. For those with low levels of wealth, there are large aggregate utility gains from “diversifying” w_M and w_F , to smooth consumption across couples. For those with high levels of wealth, these gains are smaller.

to increases the substitutability of w_M and w_F . For small enough values of w_M/w_F , this increase in substitutability overtakes the increase in complementarity driven by the post-law segregation of w_M in c^G and w_F in c^B .

4 Data and Measurement

We link data across two sources: county records of marriages contracted in the South between 1840 and 1851 from familysearch.org; and the complete count 1840 census from ancestry.com. We begin by extracting information from approximately 300,000 marriage records from southern states dated between 1840 and 1851 from the genealogical website familysearch.org. These electronic records contain the full name of both the bride and the groom, the date of marriage, and the county of marriage. We are able to find marriage records from nine states: Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Tennessee, and Virginia. Table 2 contains information about the number of marriage records from each state, as well as the coverage of these records. As can be seen from columns (2) and (3) of this table, our marriage record data cover a majority of counties in most states.

The second data source is the complete count 1840 census. We use this to measure the pre-marriage socioeconomic status of husbands and wives. The only socioeconomic information available in the 1840 census is slaveholdings. Specifically, each 1840 census record is taken at the household level, and contains information on the name of the household head as well as the number of free and enslaved persons residing in the household. So, we calculate log 1840 household slave wealth as:

$$w_{1840} = \log 377S + 1$$

Here, S is the number of slaves in the household. We multiply this by the average slave price in 1840, which is \$377, measured in current dollars (Historical Statistics 2006).

Because we do not have detailed demographic (or even first name) information on household members, it is difficult to link our couples to their precise 1840 households. Instead, we compute a measure of “familial assets” by averaging log slave wealth by state and surname, and we link this to our matched sample by state of marriage and surname (using the maiden name from marriage records for women). So, the pre-marital wealth of person i with surname j who was married in

state s will be:

$$\hat{w}_{i,j,s} = \frac{1}{K_{j,s}} \sum_{k=1}^{K_{j,s}} w_{k,j,s}$$

Here, $K_{j,s}$ is the number of households in state s headed by someone with the surname j . We match the spelling of surnames exactly, and individuals whose precise surnames can be found in the 1840 census comprise our core sample. However, if no exact match can be found, we search the 1840 census for surnames that approximately match surnames in our marriage records. We define an approximate match as one that scores above a certain threshold in a test of alphabetic string similarity.¹² Overall, we are able to obtain an estimate of pre-marital wealth for 80% of our marriage records, 90% of which are matched exactly.

Table 3 contains further information about our measure of premarital wealth. In panel A, we present summary statistics about log (household-level) slave wealth from the 1840 census ($\log w_{1840}$) for all slave states. Overall, approximately one third of all households enumerated in the South owned at least one slave in 1840. The average log value of slave wealth fluctuated across states, but the distribution looks broadly similar, particularly among states which ultimately make it into our sample.

In panel B of table 3, we summarize the measure of log slave wealth that we have matched to our marriage records ($\widehat{\log w}_{i,j,s}$). We do not have marriage record data from Delaware, Maryland, or South Carolina, so these states are omitted from this panel. Average log slave wealth looks similar in both panels. However, because wealth in panel B is computed as an average by surname and state, the distribution of this measure is more compressed. Standard deviations are smaller, maximum values are lower, and the fraction of individuals with slave wealth equal to zero is smaller. This can also be seen in figure 1, which plots the distribution of log slave wealth by surname frequency. Panel A plots the distribution of log slave wealth at the individual level. It is clear that, at the individual household level, the distribution of log slave wealth does not differ dramatically by name frequency. Panel B plots the distribution of mean log slave wealth by name frequency; not surprisingly, the distribution looks very different, with more common names obeying a significantly more compressed distribution than unique names.¹³

¹²We use the Jaro-Winkler algorithm, which is frequently used in the creation of matched samples (Ruggles et al 2010).

¹³We plot the distribution of groom's wealth in panel B of this figure; however, the distribution of bride's wealth looks identical.

Given the difference in the distribution of actual wealth and our measure of wealth, it is worth mentioning some of the properties of our measure of wealth. We are working under the assumption of zero linkage error. So, if we observe person i with surname j from state s , we assume that this person’s family is one of the $K_{j,s}$ households used to compute $\hat{w}_{i,j,s}$.¹⁴ However, we do allow for error in the measurement of “true” log wealth (w^*), so that measured wealth (w) is given by:

$$w = w^* + \epsilon$$

First, notice that our wealth measure is “unbiased” in the sense that it does not differ systematically from w_i^* :

$$E[w_i^* - \hat{w}_{i,j,k}] = E[w^*|J = j, S = s] - E[w^*|J = j, S = s] = 0$$

We also derive the expected squared deviation of w_i^* from $\hat{w}_{i,j,k}$, which captures the variance of our wealth measure, and is a function of $K_{j,s}$ and other unknown parameters. Suppose that ϵ is IID with mean 0 and variance σ_ϵ^2 , and that $E[w^{*2}|J = j, S = s] = \sigma_{j,s}^2$. Further, suppose that $E[w_i^* w_k^* | J = j, S = s] = \rho_{j,s}$ for any i, k . Then, it can be shown that:

$$E[w_i^* - \hat{w}_{i,j,k}]^2 = \frac{\sigma_\epsilon^2}{K_{j,s}} + \frac{K_{j,s} - 1}{K_{j,s}} (\sigma_{j,s}^2 - \rho_{j,s})$$

Intuitively, this is increasing in the variance of the measurement error term and increasing in the dispersion of w^* within surname-state groups. Given that these are unknown parameters, it is difficult for us to address this empirically. However, notice also that the overall variance of measurement error also depends on $K_{j,s}$. In particular, as $K_{j,s}$ increases, measurement error generated by ϵ becomes less important, but measurement error generated by dispersion within surname-state groups becomes more important. This is because, as $K_{j,s}$ increases, $\hat{w}_{i,j,s}$ starts to converge to the median w (as can be see in figure 1). This tends to cause the expected squared deviation of w from $\hat{w}_{i,j,s}$ to start to grow. In our individual level analysis, we include binned fixed effects for name frequency, to deal with the possibility that there are level differences in $\hat{w}_{j,s}$ which are correlated with $K_{i,s}$. We also run specifications in which we overweight uncommon names.

¹⁴We are working on incorporating the possibility of linkage error into our characterization of this wealth measure.

5 Empirical Approach

5.1 Empirical Approach: Theory

To analyze the impacts of property laws on the marriage market, we follow Choo and Siow (2006), who propose a simple statistic for measuring the systematic gains from a marriage between a man and woman of two types. They define μ_{ij} to be the number of marriages between men of type i and women of type j ; μ_{i0} to be the number of unmarried men of type i ; and μ_{0j} to be the number of unmarried women of type j . In addition, they define α_{ij} to be the systematic gross return to a type i man from marrying a type j woman, relative to being unmarried; similarly, γ_{ij} is defined as the systematic gross return to a type j woman from marrying a type i man, relative to being unmarried. They show that, under conventional distributional assumptions about idiosyncratic returns to marriage, the following holds:

$$\ln \left(\frac{\mu_{ij}}{\sqrt{\mu_{i0}\mu_{0j}}} \right) = \frac{\alpha_{ij} + \gamma_{ij}}{2}$$

So, the systematic gains to a marriage between a man of type i and a woman of type j can be measured with information on the number of matches between these two types and the number of individuals of these types who remain unmarried.

We use a variant of this statistic, which is motivated by the nature of our data.¹⁵ In particular, we cannot observe μ_{i0} or μ_{0j} ; we can only observe marriages that actually occur in a particular state and year. This does not allow us to measure the value of type i, j marriages. However, it does allow us to compute the relative value of marriages of different types, which allows us to characterize the effect of married women’s property laws on assortative matching.

We will consider “types” to be defined by premarital wealth, and we will index men and women in descending order of wealth. So, $i < j$ means that $w_i > w_j$. Consider four “types:” $i, k, j,$ and l . There will be four sub-marriage markets consisting of men of types i and k and women of types j and l . Suppose that $i < k$ and $j < l$. We can say there is a tendency towards assortative matching in this sub-marriage market if matches between (i, j) and (k, l) systematically yield more value than matches between (i, l) and (k, j) . Or, if marriages among like types systematically more

¹⁵This variant of the Choo-Siow statistic is also used in Siow (2015).

valuable than marriages among unlike types. With this in mind, we define the following:

$$\Omega_{ijkl} = \frac{\mu_{ij}\mu_{kl}}{\mu_{il}\mu_{kj}}$$

Then, $\omega_{ijkl} - \ln \Omega_{ijkl}$ will be equal to:

$$\omega_{ijkl} = \frac{1}{2} \left((\alpha_{ij} + \alpha_{kl} - \alpha_{il} - \alpha_{kj}) + (\gamma_{ij} + \gamma_{kl} - \gamma_{il} - \gamma_{kj}) \right)$$

Notice that all μ_{i0} and μ_{0j} terms are differenced out, so we can compute this statistic with the data we have available. The policy change will tend to increase assortative matching in this sub-marriage market when it increases ω_{ijkl} . This is likely to happen if the policy makes spousal wealth more “complementary.”

5.2 Empirical Approach: Details

We estimate the average impact of married women’s property acts on ω , as defined above. To accomplish this, we split our marriage records into state-year “marriage markets.” So, all marriages occurring in, say, Alabama in 1840 are from the same marriage market. We then divide each marriage market into “bins” based on the husband’s and wife’s premarital wealth: we assign men and women to one of B wealth quantiles, which differ by state to reflect to fact that different states have different wealth distributions.¹⁶ So, for each marriage market, we define a $B \times B$ matrix, where men’s wealth quantiles are rows and women’s wealth quantiles are columns. Entry (i, j) is the number of marriages between men in wealth quantile i and women in wealth quantile j .

Each observation is a group of four sub-marriage markets, consisting of men of two types (i and k) and women of two types (j and l). An example of one observation is illustrated in figure 2 ($B = 10, i = 3, k = 7, j = 3, l = 7$). In each marriage market, there are $\sum_{b=1}^{B-1} b$ possible combinations of i and k , and $\sum_{b=1}^{B-1} b$ possible combinations of j and l , which means that there are $\left(\sum_{b=1}^{B-1} b\right)^2$ observations per marriage market. With 12 years and 9 states, we have 108 marriage markets in total, which means that we have $108 \times \left(\sum_{b=1}^{B-1} b\right)^2$ observations in total. For example,

¹⁶In our preferred specification, we rank couples by the arithmetic mean of 1840 slave wealth by surname and state. More formally, if $W = 377 \times S$, then we rank individuals with surname j from state s according to $\hat{W}_{i,j,s} = \frac{1}{K_{j,s}} \sum_{k=1}^{K_{j,s}} W_{k,j,s}$. We estimate our core specification using even numbers of bins, ranging from $B = 4$ to $B = 20$.

if $B = 10$, we would have 2,025 sub-marriage markets in each larger marriage market, which would give us $108 \times 2,025 = 218,700$ observations in total.

We estimate the following:

$$\omega_{ijkl,s,t} = \alpha + \beta LAW_{s,t} + \delta t + \chi s + \phi_i + \phi_j + \phi_k + \phi_l + u_{ijkl,s,t} \quad (1)$$

This estimates an average effect of a property law on the systematic value of assortative versus non-assortative matches in all sub-marriage markets. Notice that, because each observation is a combination of four sub-marriage markets, very small and very large marriage markets will receive equal weight. This is not ideal: to deal with this, we weight regressions by the total number of marriages associated with each observation. We cluster by four variables: state-year-bin i , state-year-bin j , state-year-bin k , state-year-bin l .

This approach is especially useful for uncovering heterogeneity in the effect of married women’s property laws in different regions of the marriage market. This is because we can estimate equation (1) on subsets of the entire market. Recall that, if property laws affect the gains from assortative mating through their impact on a couple’s access to credit, we should expect to see more assortative mating in marriage markets with wealthier men and poorer women; however, we should expect to see less assortative mating in marriage markets with poorer men and wealthier women. We can test for this type of heterogeneity by estimating equation (1) in exactly these types of marriage markets. In particular, we divide the marriage market into quadrants, and we estimate equation (1) four times, using only observations from a particular quadrant at a time.

6 Results

6.1 Individual Level Results

Before estimating the model described in section (5), we explore whether, on average, husbands’ and wives’ wealth became more or less correlated after the passage of a married women’s property act. In figures 3 and 4, we illustrate this graphically. In figure 3, we calculate the correlation between husband’s and wife’s log wealth in each state and year, and we plot these correlation coefficients, marking state-years in which a property law had been passed differently from state-

years in which a property law had not been passed. While this is not true in all cases, in many states that passed a property law, husbands' and wives' premarital wealth became somewhat more positively correlated after the passage of a law. Importantly, there does not seem to be much of an underlying trend in the correlation between husbands' and wives' wealth in any state; so, we are not concerned that apparent effects of property laws on the marriage market are simply picking up a different pre-existing trend in assortative mating in states that passed property laws. In figure 4, we illustrate the change in the correlation between husband's and wife's wealth in each state after the passage of a property law.¹⁷ In every state except Alabama, there is at least a small increase the correlation between husbands' and wives' wealth.

To test whether this is significant or not, we use two simple approaches. First, we estimate the following at the state-year level:

$$\hat{\rho}_{s,t} = \alpha + \beta LAW_{s,t} + \delta_t + \chi_s + u_{s,t}$$

Here, $\hat{\rho}_{s,t}$ is the estimated correlation between husband's and wife's log wealth in state s in year t , $LAW_{s,t}$ is an indicator equal to one if state s had passed a property law by year t , δ_t is a year fixed effect, and χ_s is a state fixed effect. Second, we estimate the following:

$$\begin{aligned} \hat{w}_{M_{i,s,t}} = \alpha + \beta_1 LAW_{s,t} + \beta_2 \hat{w}_{F_{i,s,t}} + \gamma(LAW_{s,t} \times \hat{w}_{F_{i,s,t}}) + \delta_t + \chi_s + \\ + \tau_t \hat{w}_{F_{i,s,t}} + \psi_s \hat{w}_{F_{i,s,t}} + u_{i,s,t} \end{aligned}$$

Here, $\hat{w}_{M_{i,s,t}}$ is the log wealth of the husband in couple i , married in state s in year t : $\hat{w}_{F_{i,s,t}}$ is the log wealth of the wife in this couple. Other variables are defined similarly. The terms $\tau_t \hat{w}_{F_{i,s,t}}$ and $\psi_s \hat{w}_{F_{i,s,t}}$ are interactions between wife's log wealth and year fixed effects and state fixed effects, respectively. These interactions allow the correlation between husband's and wife's log wealth to differ by state and year. The main coefficient of interest here is γ : if $\gamma > 0$, this means that property laws are associated with an increase in the assortative mating.

These results are presented in table 4, with state-year level results in panel A and individual-level results in panel B. Individual-level results are clustered at the state-year level. We estimate

¹⁷These are done using the `binscatter` command in Stata.

several alternative specifications. In column (1), we estimate our baseline specification. In column (2), we add a state-specific linear time trend (plus an interaction with bride’s log wealth in panel B). In column (3), we include non-exact matches to the 1840 census. In column (4), we add name frequency fixed effects (or calculate correlations between residual log husband’s and wife’s wealth, net of name frequency fixed effects). In column (5), we weight our regressions (or calculate a weighted correlation between husband’s and wife’s wealth) to address the fact that error in the measurement of a person’s pre-marital wealth is correlated with the commonness of that person’s surname. Specifically, we compute the following weight for men from state s with surname j and women from state t with surname k :

$$\lambda_{j,s,k,t} = \left(\frac{1}{K_{j,s}} + \left(\frac{K_{j,s} - 1}{K_{j,s}} \right) \hat{\sigma}_{j,s}^2 \right)^{-1/2} \left(\frac{1}{K_{k,t}} + \left(\frac{K_{k,t} - 1}{K_{k,t}} \right) \hat{\sigma}_{k,t}^2 \right)^{-1/2}$$

Here, $K_{j,s}$ is the number of households in state s with surname j , and $\hat{\sigma}_{j,s}^2$ is the sample variance of w among households in state s with surname j . This is an attempt at weighting by the inverse of the geometric mean of the variance of measurement error associated with the husband’s and wife’s wealth.¹⁸

In all cases, we find that the passage of a property law is associated with a significant increase in assortative mating. Our weighted results suggest that the error inherent in our measure of premarital wealth attenuates our estimates slightly, but this is not terribly severe.

6.2 Main Results

In figure 5, we plot our estimates of β from equation (1), with 95% confidence bands, dividing men and women into different numbers of bins. We estimate equation (1) using a number of bins ranging from 4 to 20. In the left panel, we use our baseline specification (in which we only use people with exact surname links to the 1840 census); in the right panel, we include fuzzy links to the 1840 census. Recall that β captures the impact of $LAW_{s,t}$ on ω , or the relative gains to assortative mating in each sub-marriage market. This is everywhere positive and significant.

The overall increase in assortative matching masks large differences in the effect of the law in

¹⁸We do not know σ_ϵ^2 and have arbitrarily set this equal to 1. We tried an alternative scheme, in which we simply weighted by $\left(\frac{1}{K_{j,s}} \right)^{-1/2} \left(\frac{1}{K_{k,t}} \right)^{-1/2}$ and got similar results.

different portions of the wealth distribution. We are able to capture this with the model described in section (5). We estimate our model for the entire distribution of bride’s and groom’s wealth; we also do this for sub-sections of these distributions, which are illustrated graphically in figure 6. We find significant changes in particular segments of the distribution, which are illustrated in figure 7. There seems to have been an increase in assortative matching among pairs in which the man is richer than the woman; conversely, there seems to have been a decline in assortative matching among pairs in which the woman is richer than the man. Among couples in which both men and women have above (or below) average wealth, there is no significant change in assortative mating. This is true in the baseline, and in the version in which we include fuzzy links to the 1840 census.

In figures 8 and 9, we estimate specifications from figures 5 and 7 using alternative definitions of “marriage market.” Instead of defining a marriage market as a state-year, we define it as a partial state-year. Specifically, we partition states into quarters, and into halves along an east-west boundary and along a north-south boundary. The results are robust to redefining marriage markets in this way. All of this suggests that the credit market effects of married women’s property laws did affect the marriage market.

7 Alternative Mechanisms

We argue that the heterogeneous effects on the marriage market that we uncover are most consistent with a model in which married women’s property laws affect the marriage market by affecting the way a couple can access credit. Here, we discuss other potential channels which may be important, and we argue that, while some generate an increase in assortative mating overall, they are unlikely to yield the particular heterogeneity we find.

7.1 Moral Hazard

Property laws affect the distribution of marital property upon separation. While divorce was extremely uncommon during this period, separation was more common (Cvrcek 2009). In the absence of a married women’s property law, women were legally entitled to nothing if they were abandoned by their husbands, though they could in principle seek an equitable settlement to remedy

this injustice.¹⁹ Married women’s property laws typically awarded women unfettered access to their separate property in the event of desertion by their husbands.

We model this effect as reallocating marital property in the event that the marriage dissolves. With probability π , the couple experiences a severe negative shock to ϕ , which causes the couple to separate with certainty. If this occurs, the husband and wife will individually consume a share of marital property which is determined by the property regime under which the couple operates. If either the husband or the wife is left with nothing upon separation, he or she can obtain a “settlement” which is equal to a fraction ω of other half of the couple’s property.

We abstract from any interaction with the credit market here. So, if the couple stays together, they both consume $w_M + w_F$. Before a law is passed, if the couple separates, the husband will consume $(1 - \omega)(w_M + w_F)$ and the wife will consume $\omega(w_M + w_F)$. After a law is passed, if the couple separates, the husband will consume w_M and the wife will consume w_F . Thus, total marital utility before a law is passed is equal to

$$V(w_M, w_F, \phi) = 2(1 - \pi) \log(w_M + w_F) + \pi \log\left((1 - \omega)(w_M + w_F)\right) + \pi \log\left(\omega(w_M + w_F)\right) + \psi(w_M, w_F) + \phi$$

And, after a law is passed, total marital utility is equal to

$$V(w_M, w_F, \phi) = 2(1 - \pi) \log(w_M + w_F) + \pi \log w_M + \pi \log w_F + \psi(w_M, w_F) + \phi$$

Proposition 7 *After the passage of a property law, assortative mating will always strictly increase.*

Proof. See appendix. ■

The reason is intuitive. Total marital utility depends on the consumption of both husbands and wives if the couple separates. In the absence of a property law, post-separation consumption of both halves of the couple depends on w_M and w_F . With a property law, post-separation consumption of the wife depends only on w_F , while post-separation consumption of the husband depends only on w_M . Thus, w_M and w_F are inherently less substitutable if a property law is in place. This tends

¹⁹When the precise application of the common law led to outcomes deemed “unfair,” these could be “remedied” by a court of equity, or chancery court (Warbasse 1987). Alternatively, married women who had been abandoned may have sought some form of compensation from their husbands using extralegal means, like enforcement by family or friends. In any case, we assume there is some mechanism to ensure that married women who are abandoned do not have zero consumption; otherwise no one would marry.

to encourage assortative mating through this channel.

7.2 Bargaining Power

We have emphasized that the property laws we study in this paper devolved minimal economic power to married women. As such, their effect on intra-household bargaining should be minimal. Nonetheless, it is possible that women experienced an increase in bargaining power under these property laws. How would this affect the marriage market? We consider this question using a simple model based on Doepke and Tertilt (2009). Proofs are forthcoming in the appendix.

7.2.1 Household production decision

In this model, the decision-making unit is a couple, who has one child. Each half of the couple is endowed with a level of human capital, H_i , where $i \in \{M, F\}$. The couple produces output, which it consumes, according to the following production function:

$$c_0 = A(tH_F)^\alpha (H_M)^{1-\alpha}$$

Each person is endowed with 1 unit of time, which the husband is assumed to spend exclusively on production. The wife splits her time between producing output and educating the child; t represents time spent on production, and e represents time spent on the child's education. It must be that $t + e = 1$. Parents transmit human capital to their child according to the following function:

$$H' = e^\theta H_F^\beta H_M^{1-\beta}$$

Assume the child does not marry and produces output for his or her consumption (c_1) alone:

$$c_1 = AH' = Ae^\theta H_F^\beta H_M^{1-\beta}$$

Husbands and wives have different preferences over c_0 and c_1 . Specifically:

$$U_i = (1 - \gamma_i) \log c_0 + \gamma_i \log c_1 + \nu_i \quad i \in \{M, F\}$$

We assume that $\gamma_F > \gamma_M$, or women place greater weight on their children's consumption than men. The term ν_i represents all other elements of marital utility – including a direct effect of wealth – which, for the purposes of this model, are assumed not to change after the passage of a property law. The couple chooses e to maximize a weighted average of U_M and U_F , where the weight depends on bargaining power; this amounts to maximizing the following:

$$U^* = (1 - \gamma) \log c_0 + \gamma \log c_1$$

where γ is a weighted average of γ_M and γ_F (Doepke and Tertilt 2009).

7.2.2 Marriage market

Critically, we assume that a husband and wife cannot commit to future investments in children's education at the time of marriage. However, knowing their relative bargaining position, they can anticipate what these investments will look like. So, the couple is able to forecast its total utility after having a child, and intra-couple utility transfers are made immediately to clear the marriage market. Thus, as in other transferable utility models, a stable set of marriage matches will be those that generate the greatest total utility. The couple's total utility as a function of γ is:

$$U = U_M(\gamma) + U_F(\gamma)$$

This is to emphasize that, while the decision about how much to invest in the child's human capital is made by weighting the husband's and wife's utilities according to relative bargaining power, the calculation of overall marital utility weights the husband and wife equally.

7.2.3 Effect of laws

We are interested in how a change in bargaining power will affect assortative mating on wealth. Notice that wealth only directly enters the utility function through ν , which we assume not to change after the introduction of a property law. However, we assume that allocation of wealth within the household determines bargaining power in a way that changes after a law is passed. In particular, we assume (for simplicity) that men hold all the bargaining power before a law is

passed, so $\gamma = \gamma_M$. However, after a law is passed, women acquire a bargaining weight equal to their share of total family wealth: $\gamma = (1 - \omega)\gamma_M + \omega\gamma_F$, where $\omega = \frac{w_F}{w_M + w_F}$. This will result in increased assortative mating if the following holds:

$$\frac{\partial^2}{\partial w_M \partial w_F} \left((2 - \gamma_M - \gamma_F) \log(c_0^*(\gamma)) + (\gamma_M + \gamma_F) \log(c_1^*(\gamma)) \right) > 0$$

(A more detailed and formal exposition is forthcoming.) In the appendix (also forthcoming), we show that this is generally the case.

The intuition behind this result is straightforward. If the couple was able to commit ex ante to a level of investment in its child's human capital, it would choose the amount that maximizes *total* marital utility, then intra-couple utility transfers would be made to satisfy individual parties. Before the passage of a property law, investment in the child's human capital is always too low (as men have all the bargaining power). After the passage of a property law, investment in education is still too low among couples in which men hold most of the family wealth, and too high among couples in which women hold most of the family wealth. However, couples in which men and women have equal wealth (and thus equal bargaining power) invest the efficient amount in their child's human capital. As such, these couples experience the largest increase in total marital utility after the passage of a property law. If couples of similar means experience the largest utility gains, they are more likely to be formed. This means that assortative mating should become more common after a property law is enacted.

While this model predicts an increase in assortative mating, it does not predict a decline in assortative mating among couples with relatively rich wives and relatively poor husbands. The above logic holds everywhere in the wealth distribution: in any marriage market, the couples who are most evenly matched (in terms of wealth) will experience the largest utility gains. So, the model predicts an increase in assortative mating everywhere.

7.3 Changing transfers to daughters

It is possible that married women's property laws induced parents to transfer more assets to their married daughters, since they were protected from misappropriation by their daughters' husbands. For reason discussed in section 3.1, an increase in transfers to daughters tends to increases as-

sortative mating, and a decrease in transfers to daughters tends to reduce assortative mating.²⁰ So, to generate the heterogeneity we observe, parents would have to increase transfers to couples with rich men and poor women; and, they would have to decrease transfers to couples with rich women and poor men. This seems unlikely if the credit mechanism is not at play. The potential for misappropriation by the husband seems largest among rich women married to poor men, and smallest among rich men married to poor women.

7.4 Endogenous laws

Married women's property laws were passed during a large recession. It is possible that the states that passed property laws were the hardest hit by the recession, and that the passage of the laws coincided with the greatest economic turmoil in these states. If this is the case, then 1840 family wealth may be a poor measure of family wealth at the time of marriage in these states, particularly among couples married after the passage of a property law. However, this would tend to *lower* the apparent rate of assortative mating, not raise it. In addition, there is no reason for endogenous laws to generate the heterogeneous effects on the marriage market that we document in this paper.

8 Conclusion

This paper offers evidence that pooling property is an important motive for marriage by analyzing the impact of married women's property laws on marriage decisions. We focus on laws passed in the American South during the 1840s, which re-directed wives' property toward saving and investment, and limited husbands' ability to borrow against their wives' property. As such, they altered the way in which married couples could pool property and access the credit market without affecting the productivity of marriage matches. Using a newly compiled database of linked marriage and census records, we show that these laws had a heterogeneous effect on the marriage market in different areas of the wealth distribution. Among couples with relatively rich husbands, assortative mating became more prevalent, while the opposite occurred among couples with relatively rich wives. We argue that this patterns can be explained by the fact that property laws affected a couple's ability to access credit, and that the ability to access credit as a couple was an important component of

²⁰This is straightforward to show analytically, and a proof is available from the authors on request.

the gains from marriage.

References

- [1] Abramitzky, Ran, Leah Platt Boustan, and Katherine Eriksson (2012). “Europe’s Tired, Poor, Huddled Masses: Self-Selection and Economic Outcomes in the Age of Mass Migration.” *American Economic Review*. 102(5): 1832-1856.
- [2] Adachi, Hiroyuki (2003). “A Search Model of Two-Sided Matching under Nontransferable Utility.” *Journal of Economic Theory*. 113(2): 182-198.
- [3] Atack, Jeremay and Fred Bateman (1992). “Matchmaker, Matchmaker, Make Me a Match: A General Personal Computer-Based Matching Program for Historical Research.” *Historical Methods*. 25(2):53-65.
- [4] Botticini, Maristella and Aloysius Siow (2003). “Why Dowries?” *American Economic Review*. 93: 1385-98.
- [5] Chused, Richard (1983). “Married Women’s Property Law: 1800-1850.” *Georgetown Law Journal*. 71(2): 1359-1425.
- [6] Chen, Natalie, Paola Conconi and Carlo Perroni (2013). “Multi-trait Matching and Gender Differentials in Intergenerational Mobility.” *Economics Letters*. 120: 292-296.
- [7] Chiappori, Pierre-Andre, Bernard Fortin and Guy Lacroix (2002). “Marriage Market, Divorce Legislation, and Household Labor Supply.” *Journal of Political Economy*. Vol. 110.
- [8] Choo, Eugene and Aloysius Siow (2006). “Who Marries Whom and Why.” *Journal of Political Economy*. 114(1): 175-201.
- [9] Doepke, Matthias and Michele Tertilt (2009). “Women’s Liberation: What’s in it for Men?” *Quarterly Journal of Economics*. 124(4): 1541-1591.
- [10] Duflo, Esther (2003). “Grandmothers and Granddaughters: Old Age Pensions and Intra-household Allocation in South Africa.” *World Bank Economic Review*. 17(1): 1-25.
- [11] Fafchamps, Marcel and Agnes Quisumbing (2005a). “Assets at Marriage in Rural Ethiopia.” *Journal of Development Economics*, 77(1), pp. 1-25.
- [12] Fafchamps, Marcel and Agnes Quisumbing (2005b). “Marriage, Bequest, and Assortative Matching in Rural Ethiopia.” *Economic Development and Cultural Change*, 53(2), pp. 347-380.
- [13] Fernandez, Raquel (2014). “Women’s Rights and Development.” *Journal of Economic Growth*. 19: 37-80.
- [14] Ferrie, Joseph P. (1996). “A New Sample of Americans Linked from the 1850 Public Use Micro Sample of the Federal Census of Population to the 1860 Federal Census Manuscript Schedules.” *Historical Methods*. 29: 141- 156.

- [15] Gale, David and Lloyd S. Shapely (1962). "College Admissions and the Stability of Marriage." *American Mathematical Monthly*. 69(1): 9-15.
- [16] Geddes, Rick, Dean Lueck, and Sharon Tennyson (2012). "Human Capital Acquisition and the Expansion of Women's Economic Rights." *Journal of Law and Economics*. 55(4): 839-867.
- [17] Geddes, Rick and Dean Lueck (2002). "The Gains from Self-Ownership and the Expansion of Women's Rights." *American Economic Review*. 92(4): 1079-1092.
- [18] Hamilton, Gillian (1999). "Property Rights and Transaction Costs in Marriage: Evidence from Prenuptial Contracts." *Journal of Economic History*. 59(1): 68-103.
- [19] Hirtcsh, Gunter J., Ali Hortacsu, and Dan Ariely (2010). "Matching and Sorting in Online Dating." *American Economic Review*. 100(1): 130-163.
- [20] Inwood, Kris and Sarah Van Sligtenhorst (2004). "The Social Consequences of Legal Reform: Women and Property in a Canadian Community." *Continuity and Change*. 19(1): 165-197.
- [21] Kahn, B. Zorina (1996). "Married Women's Property Laws and Female Commercial Activity." *Journal of Economic History*. 56(2): 356-388.
- [22] Kelly, John F. (1882). *A Treatise on the Law of Contracts of Married Women*. Jersey City: D. Linn & Co.
- [23] Koudijs, Peter and Laura Salisbury (2016). "Bankruptcy and Investment: Evidence from Changes in Marital Property Laws in the U.S. South, 1840-1850." NBER Working Paper no. 21952.
- [24] McGrane, Reginald C. (1924). *The Panic of 1937: Some Financial Problems of the Jacksonian Era*. Chicago.
- [25] Olivetti, Claudia, Daniele Paserman, and Laura Salisbury (2016) "Three-Generation Mobility in the United States: The role of Paternal and Maternal Grandparents." NBER Working Paper no. 22094.
- [26] Ruggles, Steven, J. Trent Alexander, Katie Genadek, Ronald Goeken, Matthew B. Schroeder, and Matthew Sobek. (2010) *Integrated Public Use Microdata Series: Version 5.0* [Machine-readable database]. Minneapolis: University of Minnesota.
- [27] Salmon, Marylynn (1982). "Women and Property in South Carolina: The Evidence from Marriage Settlements, 1730-1830." *William and Mary Quarterly*. 39(4): 655-85.
- [28] Warbasse, Elizabeth (1987). *The Changing Legal Rights of Married Women. 1800-1861*. New York: Garland.
- [29] Weiss, Yoram (1997). "The Formation and Dissolution of Families: Why Marry? Who Marries Whom? And What Happens Upon Divorce?" *Handbook of Population and Family Economics*. 1: 81-123.
- [30] Wells, John C. (1878). *A Treatise on the Separate Property of Married Women*. Cincinnati: R. Clarke & Co.

Tables and Figures

Figure 1: Distribution of Individual and Grouped Slave Wealth Measure

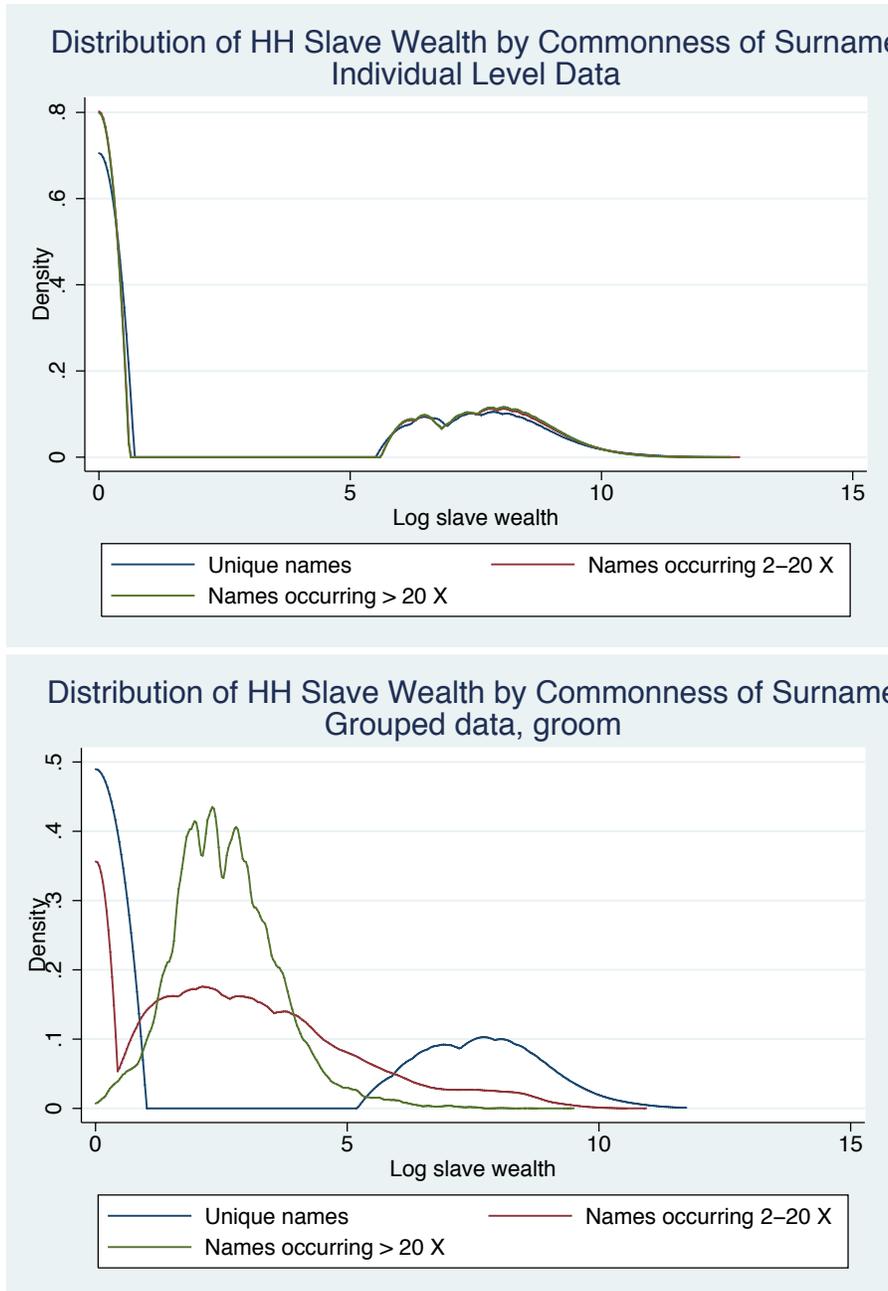


Figure 2: Assortative Matching Data: Illustration

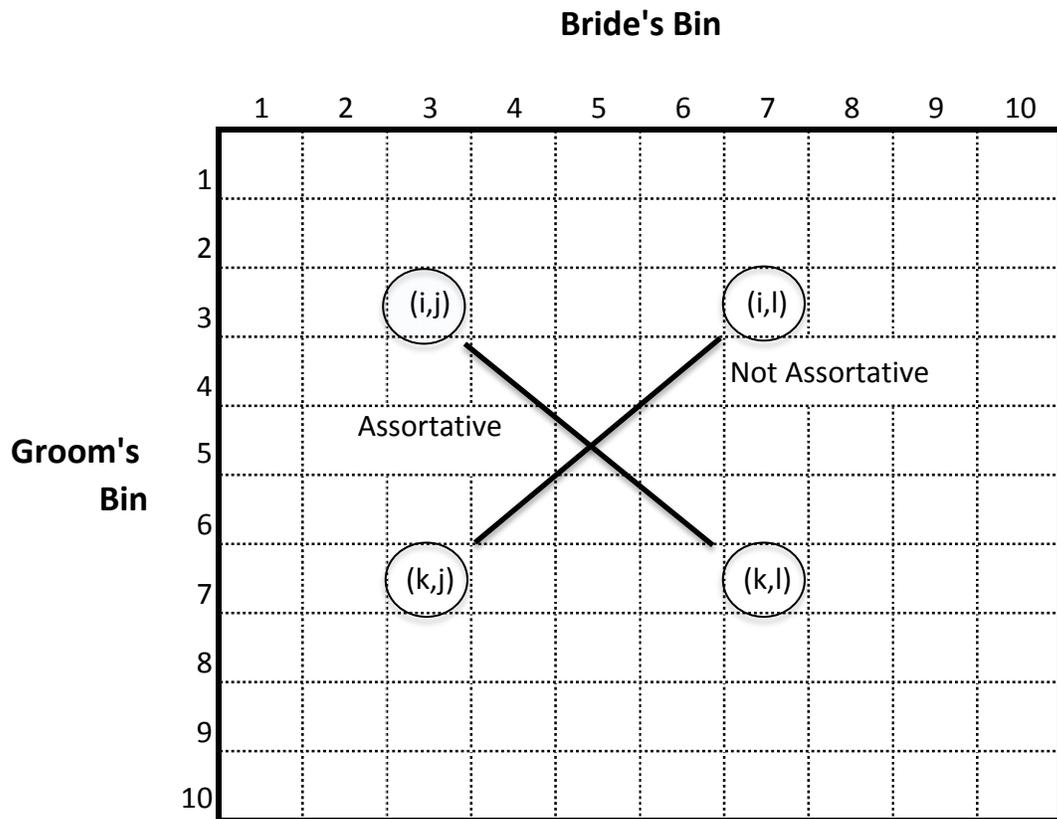


Figure 3: Correlation between Spouses' Wealth
Before and After Legal Change

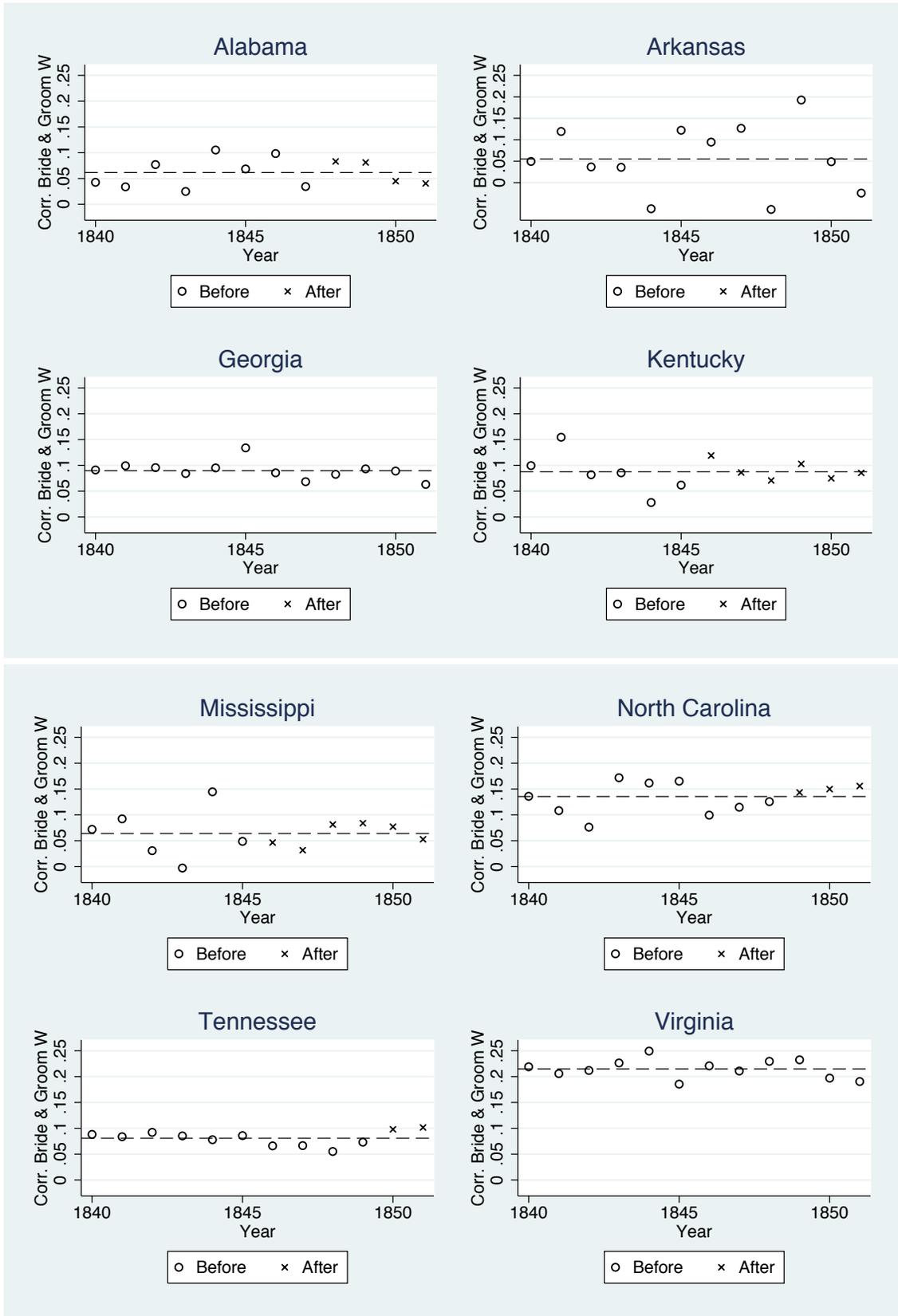


Figure 4: Correlation between Spouses' Wealth
Before and After Legal Change

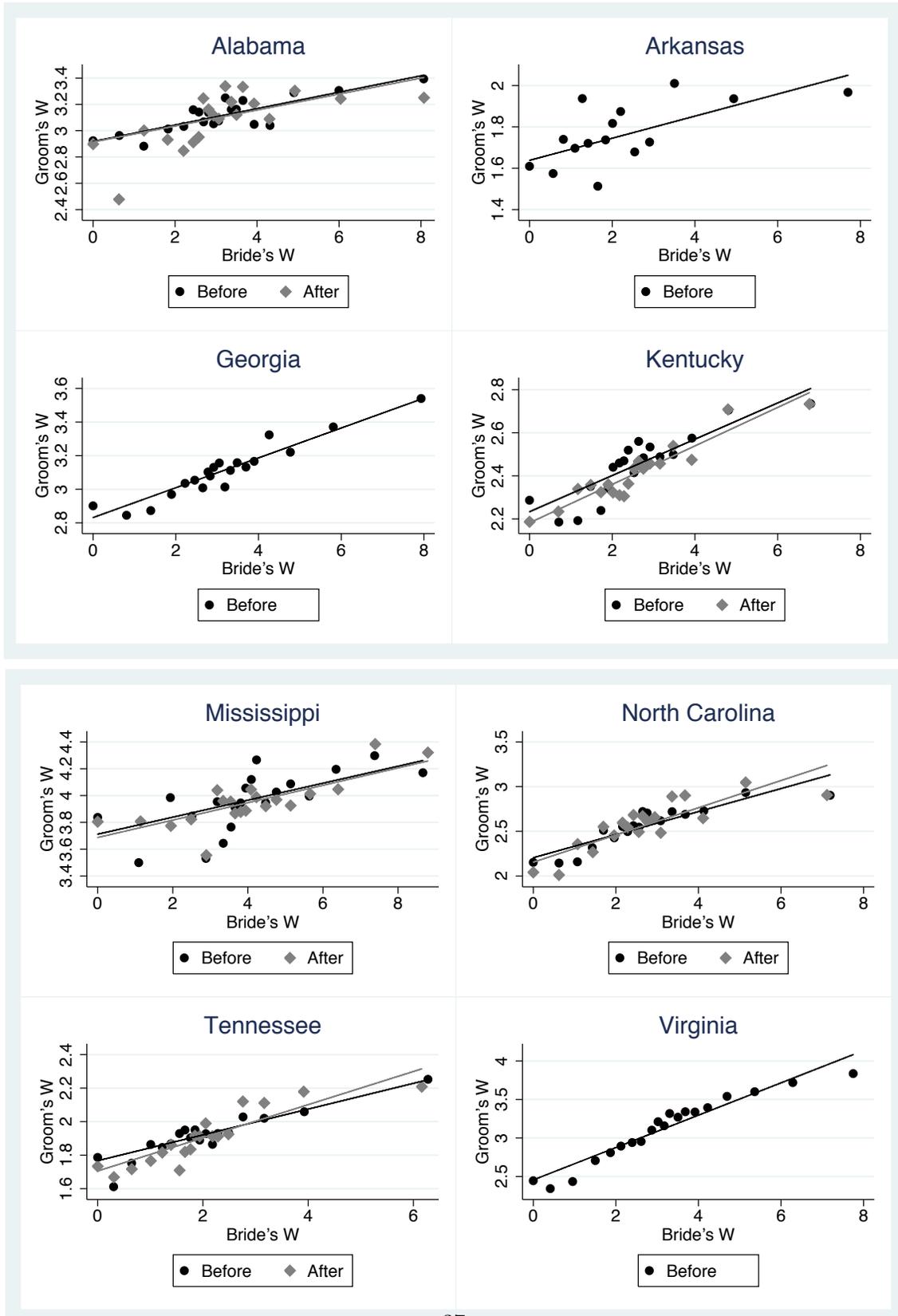


Figure 5: Overall Impact on Assortative Mating

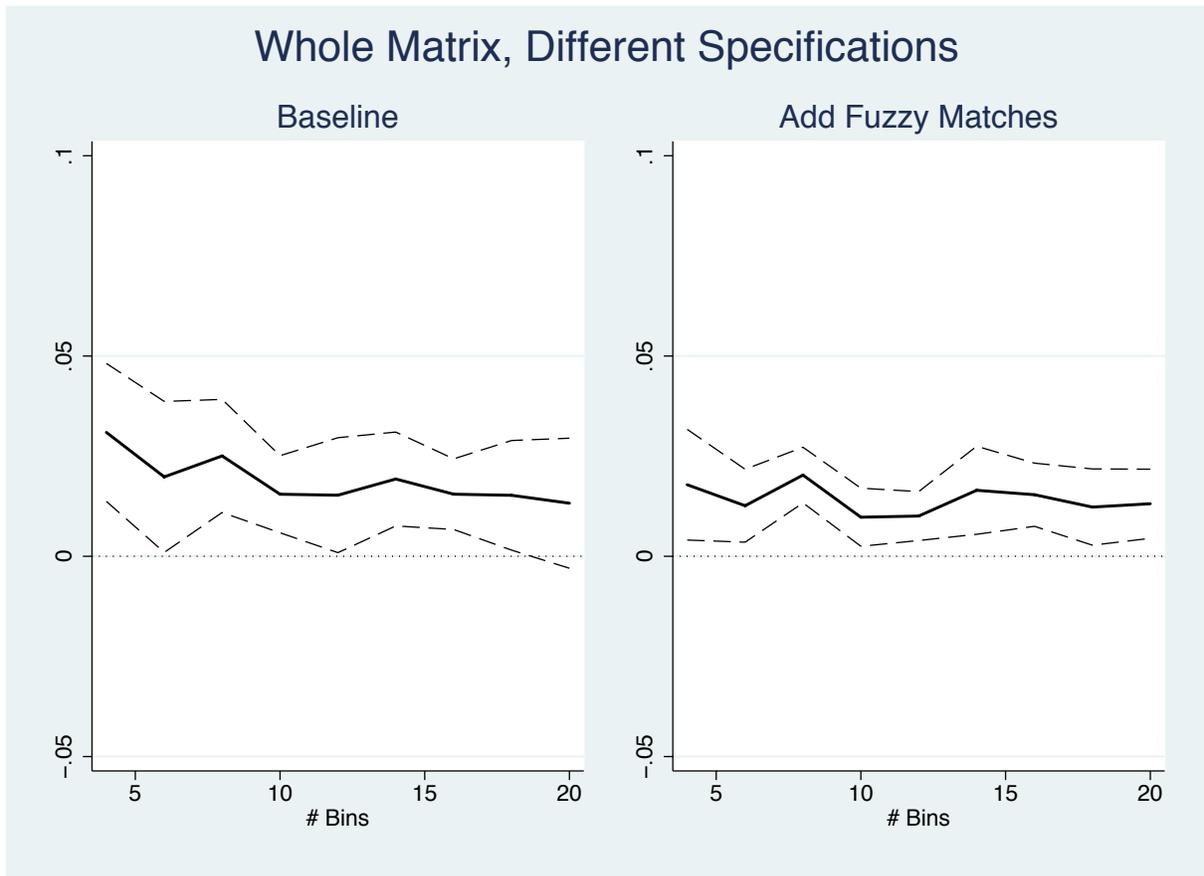


Figure 6: Assortative Matching Results: Area Definitions

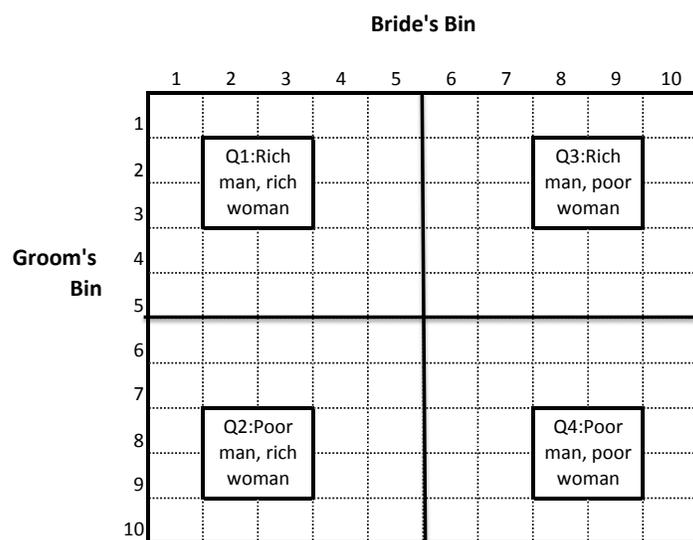
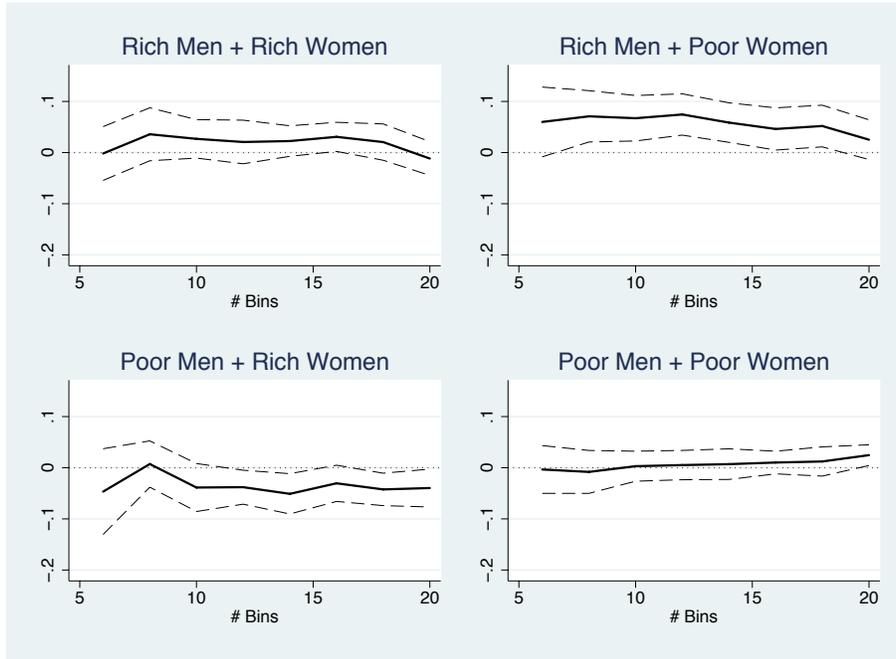
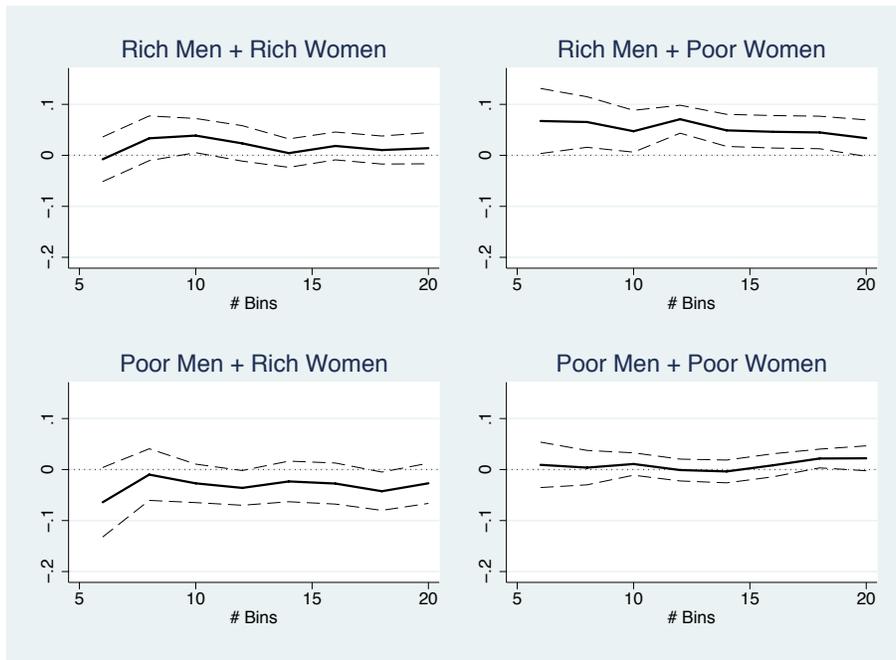


Figure 7: Impact on Assortative Mating by Quadrant



(a) Baseline



(b) Include Fuzzy Matches

Figure 8: Overall Impact on Assortative Mating: Alternative Definitions of Marriage Markets

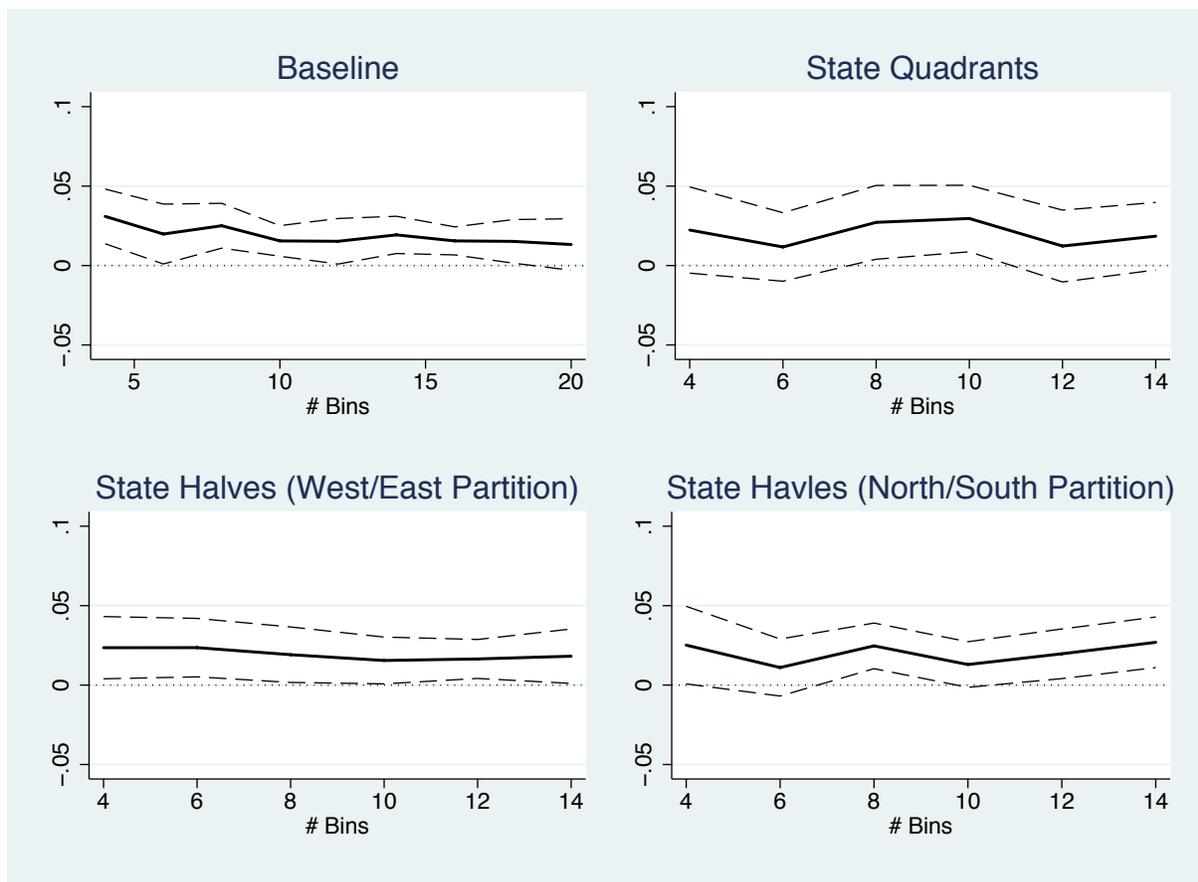
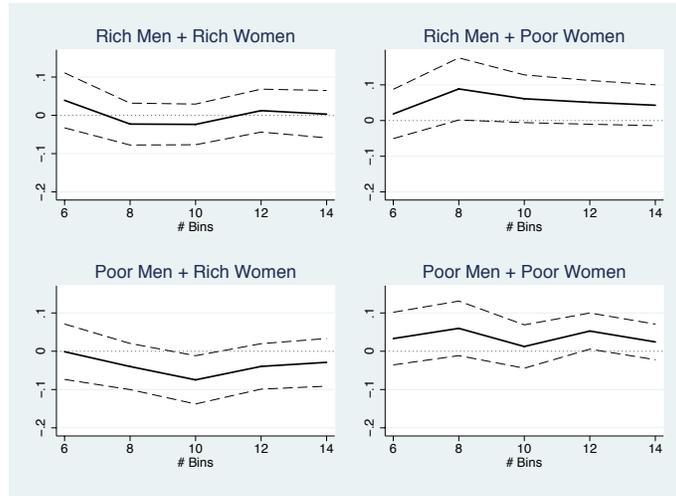
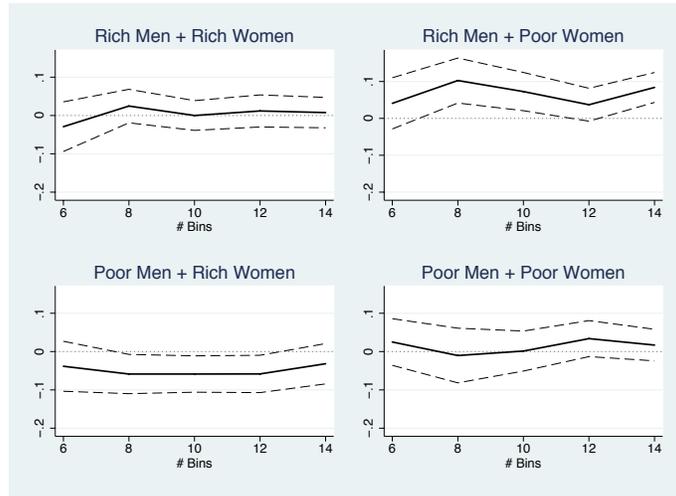


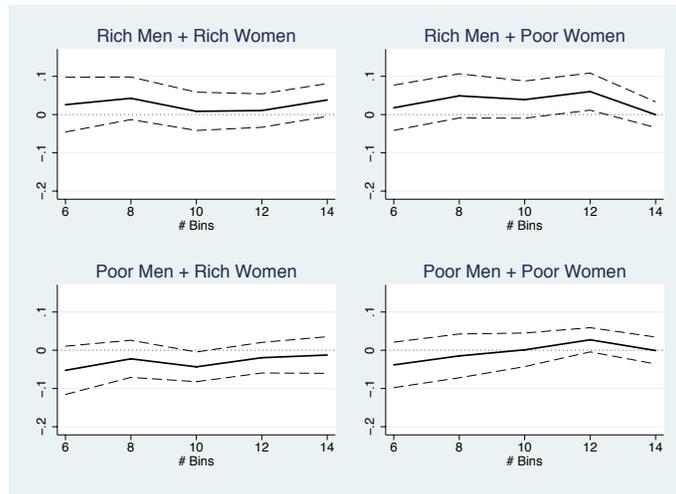
Figure 9: Impact on Assortative Mating by Quadrant



(a) State Quadrants



(b) State Halves (West/East Partition)



(c) State Halves (North/South Partition)

Table 1: Dates of Key Married Women’s Property Legislation in the 1840s

State	Date Main Law Change	Protection Wife’s Assets	Ability to Sell Wife’s Assets
Alabama	Mar 1, 1848	All property owned at time of marriage, or acquired afterwards	Wife cannot sell
Arkansas	–		
Florida	Mar 6, 1845	All property owned at time of marriage, or acquired afterwards	Husband and wife can jointly sell real estate
Georgia	–		
Kentucky	Feb 23, 1846	Real estate and slaves owned at time of marriage, or acquired afterwards	Husband and wife can jointly sell real estate
Louisiana	–		
Mississippi	Feb 28, 1846	Real estate owned at time of marriage and all other property required for the maintenance of the plantation (incl. slaves)	Husband and wife can jointly sell real estate; wife can sell individually if required for maintenance
North Carolina	Jan 29, 1849	Husband’s interest in the wife’s real estate (i.e. profits or rents) not liable for his debts	Wife’s real estate cannot be sold by husband without her written consent
Tennessee	Jan 10, 1850	Husband’s interest in the wife’s real estate (i.e. profits or rents) not liable for his debts	Husband cannot sell his interest in his wife’s real estate
Texas	–		
Virginia	–		

Notes: We omit Maryland and South Carolina from this Table as we do not have a sufficient number of marriage records to include these states in our analysis. Due to their French and Spanish heritage, Louisiana and Texas had community property systems in place that, by default, allowed men and women to have separate estates. Sources: Kahn (1996), Geddes and Lueck (2002), Warbasse (1987), Kelly (1882), Wells (1878), Chused (1983) and Salmon (1982).

Table 2: Coverage of Marriage Record Data

State	# Marriage records	% Counties with marriage record data	% Population living in counties with marriage record data
Alabama	27,934	0.67	0.75
Arkansas	7,186	0.49	0.56
Georgia	32,756	0.74	0.78
Kentucky	50,507	0.64	0.71
Louisiana	5,277	0.19	0.37
Mississippi	12,838	0.47	0.65
North Carolina	27,564	0.73	0.76
Tennessee	95,371	0.65	0.72
Virginia	31,292	0.48	0.54

Table 3: Summary Statistics: Log Slave Wealth in 1840

<i>Panel A. Household data from 1840 Census</i>						
State	Mean	Standard deviation	Maximum	% W=0	# Households	
South	2.71	3.75	12.74	0.65	738,527	
Alabama	3.15	3.95	12.08	0.60	56,079	
Arkansas	1.64	3.15	11.31	0.78	12,696	
Delaware	0.60	1.97	9.58	0.91	10,369	
Georgia	3.15	3.91	12.57	0.60	69,592	
Kentucky	2.40	3.54	11.16	0.68	100,346	
Louisiana	3.54	3.99	12.21	0.55	29,930	
Maryland	1.97	3.33	11.63	0.74	57,831	
Mississippi	3.98	4.08	12.34	0.50	30,948	
North Carolina	2.56	3.69	12.74	0.67	87,491	
South Carolina	3.81	4.09	12.59	0.53	46,655	
Tennessee	1.92	3.33	11.99	0.75	106,554	
Virginia	2.99	3.84	12.71	0.62	130,036	

<i>Panel B. Data from Marriage Records</i>						
State	Mean	Standard deviation	Maximum	% W=0	# Marriage recs	% Marriage recs linked to 1840
South	2.62	1.90	11.74	0.14	264,568	0.79
Alabama	3.22	2.00	11.41	0.12	25,216	0.80
Arkansas	1.77	2.06	10.22	0.34	5,537	0.58
Georgia	3.21	1.87	11.34	0.09	30,649	0.86
Kentucky	2.47	1.71	10.31	0.14	45,339	0.81
Louisiana	3.35	2.57	10.91	0.22	3,699	0.48
Mississippi	4.10	2.24	11.55	0.10	11,328	0.77
North Carolina	2.59	1.82	11.74	0.13	25,941	0.85
Tennessee	1.98	1.57	10.95	0.16	87,342	0.84
Virginia	3.17	1.97	11.46	0.10	29,517	0.88

Table 4: Effect of Married Women's Property Laws on Assortative Mating

	(1)	(2)	(3)	(4)	(5)
<i>Panel A. State-Year-Level Regressions</i>					
Dependent Variable	Correlation between Bride's and Grooms's Log Slave Wealth				
Post Law	0.028*** (0.009)	0.040*** (0.012)	0.018** (0.008)	0.028*** (0.009)	0.042** (0.020)
Observations	108	108	108	108	108
R-squared	0.816	0.830	0.842	0.795	0.765
State & Year FE's	Y	Y	Y	Y	Y
State-specific linear time trend	N	Y	N	N	N
Include fuzzy matches	N	N	Y	N	N
Name frequency FEs	N	N	N	Y	N
Overweight uncommon names	N	N	N	N	Y
<i>Panel B. Individual-Level Regressions</i>					
Dependent variable	Groom's Log Slave Wealth				
Bride's Log Wealth X Post Law	0.031*** (0.007)	0.034*** (0.007)	0.021*** (0.006)	0.031*** (0.007)	0.043** (0.016)
Observations	210,057	210,057	247,920	210,057	210,057
R-squared	0.125	0.125	0.113	0.100	0.120
State & Year FE's	Y	Y	Y	Y	Y
State-specific linear time trend	N	Y	N	N	N
Include fuzzy matches	N	N	Y	N	N
Name frequency FEs	N	N	N	Y	N
Overweight uncommon names	N	N	N	N	Y

A Proofs

Proof. of Proposition 1.

Becker (1981, p. 130) shows that, given a function $f(x, y)$, $\partial^2 f/\partial x\partial y > 0$ implies that $f(x_2, y_2) + f(x_1, y_1) > f(x_1, y_2) + f(x_2, y_1)$, where $x_2 > x_1$ and $y_2 > y_1$. Similarly, $\partial^2 f/\partial x\partial y < 0$ implies that $f(x_2, y_2) + f(x_1, y_1) < f(x_1, y_2) + f(x_2, y_1)$. For reference, the proof is as follows.

Suppose $\partial^2 f/\partial x\partial y > 0$. Consider the following function:

$$\partial Q(x_1, x_2, y)/\partial y \equiv (\partial f/\partial y)(x_2, y) - (\partial f/\partial y)(x_1, y)$$

If $x_2 = x_1$, then $\partial Q/\partial y = 0$. Because $\partial Q/\partial y$ increases in x_2 by assumption, it follows that $\partial Q/\partial y > 0$ when $x_2 > x_1$. As the function $Q \equiv f(x_2, y) - f(x_1, y)$ is increasing in y , it follows that:

$$f(x_2, y_2) - f(x_1, y_2) > f(x_2, y_1) - f(x_1, y_1)$$

as $y_2 > y_1$. Rearranging the above inequality, we get

$$f(x_2, y_2) + f(x_1, y_1) > f(x_1, y_2) + f(x_2, y_1)$$

An identical proof shows that $\partial^2 f/\partial x\partial y < 0 \Rightarrow f(x_2, y_2) + f(x_1, y_1) < f(x_1, y_2) + f(x_2, y_1)$.

Now, define $f(x, y) \equiv \tilde{U}(x, y) - U(x, y)$, so that $f(w_M^H, w_F^H) \equiv \tilde{U}_{HH} - U_{HH}$, and so on. Notice that

$$\frac{\partial^2 f(x, y)}{\partial x\partial y} = \frac{\partial^2 \tilde{U}(x, y)}{\partial x\partial y} - \frac{\partial^2 U(x, y)}{\partial x\partial y}$$

So:

$$\frac{\partial^2 f(x, y)}{\partial x\partial y} > 0 \Leftrightarrow \frac{\partial^2 \tilde{U}(x, y)}{\partial x\partial y} > \frac{\partial^2 U(x, y)}{\partial x\partial y}$$

and

$$\frac{\partial^2 f(x, y)}{\partial x\partial y} < 0 \Leftrightarrow \frac{\partial^2 \tilde{U}(x, y)}{\partial x\partial y} < \frac{\partial^2 U(x, y)}{\partial x\partial y}$$

Then, by Becker (1981):

$$\begin{aligned} \frac{\partial^2 \tilde{U}(x, y)}{\partial x\partial y} > \frac{\partial^2 U(x, y)}{\partial x\partial y} &\Rightarrow (\tilde{U}_{HH} - U_{HH}) + (\tilde{U}_{LL} - U_{LL}) > (\tilde{U}_{LH} - U_{LH}) + (\tilde{U}_{HL} - U_{HL}) \\ &\Rightarrow \tilde{U}_{HH} + \tilde{U}_{LL} - \tilde{U}_{LH} - \tilde{U}_{LL} > U_{HH} + U_{LL} - U_{LH} - U_{HL} \end{aligned}$$

By a similar proof,

$$\begin{aligned} \frac{\partial^2 \tilde{U}(x, y)}{\partial x\partial y} < \frac{\partial^2 U(x, y)}{\partial x\partial y} &\Rightarrow (\tilde{U}_{HH} - U_{HH}) + (\tilde{U}_{LL} - U_{LL}) < (\tilde{U}_{LH} - U_{LH}) + (\tilde{U}_{HL} - U_{HL}) \\ &\Rightarrow \tilde{U}_{HH} + \tilde{U}_{LL} - \tilde{U}_{LH} - \tilde{U}_{LL} < U_{HH} + U_{LL} - U_{LH} - U_{HL} \end{aligned}$$

■

Proof. of Proposition 2.

Because the household is risk averse, it will always choose a risk-free loan, which is always incentive compatible. Thus, the husband will choose l^* that solves the following maximization

problem:

$$\max_l \frac{1}{2} \log \left(\bar{R}(w_M + w_F + l) - l \right) + \frac{1}{2} \log \left(\underline{R}(w_M + w_F + l) - l \right)$$

The first order condition simplifies to:

$$\begin{aligned} & \frac{1}{2} \left(\frac{\bar{R} - 1}{\bar{R}(w_M + w_F + l) - l} - \frac{1 - \underline{R}}{\underline{R}(w_M + w_F + l) - l} \right) = 0 \\ \Rightarrow l^* &= \frac{\bar{R}\underline{R} - r}{(\bar{R} - 1)(1 - \underline{R})} (w_M + w_F) \end{aligned}$$

The denominator is positive, from the assumption that $\bar{R} > 1$ and $\underline{R} < 1$. And, the numerator is positive so long as $\bar{R}\underline{R} - r > 0$, which we assume. If $\bar{R}\underline{R} - r < 0$, the project is too risky for the household to want to invest, and the household chooses instead to hold all its assets in cash. We abstract away from this possibility here.

■

Proof. of Lemma 3.

Solutions for c^i , where $i \in \{G, B\}$, follow straightforwardly from substituting the above solution for l^* into the definitions of c^i .

■

Proof. of Proposition 4.

Case 1: Risky Loan

We first solve for the case in which the household contracts a risky loan. If we impose the lender's zero profit condition and take the derivative of U_M with respect to l , we get the following:

$$\frac{\partial U_M}{\partial l} = \frac{(2r - 2)}{2c^G} > 0$$

If the husband's utility is always increasing in l , he will want to borrow an infinite amount, and the incentive compatibility constraint will hold with equality. Combining the IC and the lender's zero profit condition, we obtain the following:

$$\begin{aligned} \bar{R}(w_M + l) - \beta\Delta r(w_M + l) &= \rho l = 2l - \underline{R}(w_M + l) \\ \Rightarrow l &= \frac{2r - \beta\Delta r}{2 - 2r + \beta\Delta r} w_M \end{aligned}$$

We then obtain the following solution for c^G :

$$c^G = \bar{R}(w_M + w_F + l) - 2l + \underline{R}(w_M + l) = \frac{2\beta\Delta r}{2 - 2r + \beta\Delta r} w_M + \bar{R}w_F$$

We define the following parameter:

$$\lambda \equiv \frac{\bar{R}(2 - 2r + \beta\Delta r)}{2\beta\Delta r}$$

Notice that $\lambda < 1/2$:

$$\begin{aligned}\lambda &\equiv \frac{\bar{R}(2 - 2r + \beta\Delta r)}{2\beta\Delta r} = \frac{\bar{R}(-2(r - 1))}{2\beta\Delta r} + \frac{\bar{R}}{2} < \frac{\bar{R}(-2(r - 1))}{2\Delta r} + \frac{\bar{R}}{2} \\ &= \frac{\bar{R}(\Delta r - 2r + 2)}{2\Delta r} = \frac{\bar{R}(2 - 2\underline{R})}{2\Delta r} = \frac{\bar{R} - \bar{R}\underline{R}}{\Delta r} \\ &< \frac{\bar{R} - r}{\Delta r} = \frac{1/2(\Delta r)}{\Delta r} = \frac{1}{2}\end{aligned}$$

This follows from our two restrictions on β and r . Then, we can rewrite c^G as follows:

$$c^G = \frac{\bar{R}}{\lambda}(w_M + \lambda w_F)$$

Because the loan is risky, $c^B = \underline{R}w_F$, or the return on the investment of w_F .

Case 2: Risk-free Loan

We now solve for the case in which the husband contracts a risk-free loan. In this case, the husband solves the following maximization problem, subject to the constraint that $(1 - \underline{R})l < \underline{R}w_M$:

$$\max_l \frac{1}{2} \log \left(\bar{R}(w_M + w_F + l) - l \right) + \frac{1}{2} \log \left(\underline{R}(w_M + w_F + l) - l \right)$$

As in the case with no separate property for women, the solution to this (unconstrained) problem is:

$$l^* = \frac{\bar{R}\underline{R} - r}{(\bar{R} - 1)(1 - \underline{R})}(w_M + w_F)$$

If the constraint that $(1 - \underline{R})l < \underline{R}w_M$ is binding, it will hold with equality and c^B will be equal to $\underline{R}w_F$. In this case, c^B is identical with a risky or risk-free loan; thus, the husband will choose the risky loan in which c^G is higher. Note that the $(1 - \underline{R})l < \underline{R}w_M$ constraint is binding when $(1 - \underline{R})l^* = \underline{R}w_M$:

$$\begin{aligned}(1 - \underline{R})\frac{\bar{R}\underline{R} - r}{(\bar{R} - 1)(1 - \underline{R})}(w_M + w_F) &= \underline{R}w_M \\ \Rightarrow (\bar{R}\underline{R} - r)(w_F + w_M) &= (\bar{R}\underline{R} - \underline{R})w_M \\ \Rightarrow \frac{w_M}{w_F} &= \frac{2(\bar{R}\underline{R} - r)}{\Delta r}\end{aligned}$$

At the same time, we know that, as $w_F \rightarrow 0$, the husband will certainly prefer a risk-free loan, as c^B with a risky loan approaches $-\infty$. So, we know that there exists some cutoff Ω_0 , where $\Omega_0 > \frac{2(\bar{R}\underline{R} - r)}{\Delta r}$, such that the husband will choose a risky loan if $w_M/w_F \leq \Omega_0$ and he will choose a risk-free loan if $w_F/w_F > \Omega_0$.

■

Proof. of Proposition 6.

Before the passage of a property law, $\partial V/\partial w_M$ is:

$$\frac{\partial V}{\partial w_M} = \frac{2}{w_M + w_F} + \frac{\partial \psi(w_M, w_F)}{\partial w_M}$$

So,

$$\frac{\partial^2 V}{\partial w_M \partial w_F} = \frac{-2}{(w_M + w_F)^2} + \frac{\partial^2 \psi}{\partial w_M \partial w_F}$$

After the passage of a property law, the effect on assortative mating depends on whether the couple contracts a risky loan or not. If $w_M/w_F \leq \Omega_0$, so the couple contracts a risky loan, we get the following expression for $\partial V/\partial w_M$:

$$\frac{\partial V}{\partial w_M} = \frac{1}{w_M + \lambda w_F} + \frac{\partial \psi(w_M, w_F)}{\partial w_M}$$

So,

$$\frac{\partial^2 V}{\partial w_M \partial w_F} = \frac{-\lambda}{(w_M + \lambda w_F)^2} + \frac{\partial^2 \psi}{\partial w_M \partial w_F}$$

If $w_M/w_F < \Omega_0$, c^G and c^B are identical to the pre-law case, we we obtain the same solution for our assortative mating parameter:

$$\frac{\partial^2 V}{\partial w_M \partial w_F} = \frac{-2}{(w_M + w_F)^2} + \frac{\partial^2 \psi}{\partial w_M \partial w_F}$$

■

Proof. of Lemma 6.

If $w_M/w_F > \Omega_0$, there is no change in assortative mating, as $\partial^2 V/\partial w_M \partial w_F$ does not change. If $w_M/w_F \leq \Omega_0$, the change is $\partial^2 V/\partial w_M \partial w_F$ is equal to:

$$-\frac{\lambda}{(w_M + \lambda w_F)^2} + \frac{2}{(w_M + w_F)^2}$$

Under which circumstances will this change be positive?

$$\begin{aligned} & \frac{-\lambda}{(w_M + \lambda w_F)^2} + \frac{2}{(w_M + w_F)^2} > 0 \\ \Rightarrow & \frac{\lambda}{(w_M + \lambda w_F)^2} < \frac{2}{(w_M + w_F)^2} > 0 \\ \Rightarrow & \lambda(w_M + w_F)^2 < 2(w_M + \lambda w_F)^2 \\ \Rightarrow & \lambda^{1/2}(w_M + w_F) < 2^{1/2}(w_M + \lambda w_F) \\ \Rightarrow & w_F \lambda^{1/2} \left(1 - (2\lambda)^{1/2}\right) < w_M \left(2^{1/2} - \lambda^{1/2}\right) \end{aligned}$$

The right hand side of this inequality is always greater than zero, as $2 > \lambda$. The left hand side is also positive, as $\lambda < 1/2$ (see proof of proposition 4). So, the impact of the law on assortative mating will be heterogeneous. Specifically, the degree of assortative mating will increase if the following holds:

$$\frac{w_M}{w_F} > \frac{\lambda^{1/2} \left(1 - (2\lambda)^{1/2}\right)}{2^{1/2} - \lambda^{1/2}}$$

However, the degree of assortative mating will decrease if the inequality is reversed.

If $\frac{\lambda^{1/2} \left(1 - (2\lambda)^{1/2}\right)}{2^{1/2} - \lambda^{1/2}} > \Omega_0$, then $\Omega_1 = \Omega_0$. Otherwise, $\Omega_1 = \frac{\lambda^{1/2} \left(1 - (2\lambda)^{1/2}\right)}{2^{1/2} - \lambda^{1/2}}$. In either case assortative mating strictly decreases when $w_M/w_F \leq \Omega_1$ and weakly increases when $w_M/w_F > \Omega_1$.

■

Proof. of Proposition 7.

Given the expression for total marital utility before a law is passed, it is straightforward to show that:

$$\frac{\partial^2 V}{\partial w_M \partial w_F} = \frac{-2}{(w_M + w_F)^2} + \frac{\partial^2 \psi}{\partial w_M \partial w_F}$$

After a law is passed:

$$\frac{\partial^2 V}{\partial w_M \partial w_F} = \frac{-2(1 - \pi)}{(w_M + w_F)^2} + \frac{\partial^2 \psi}{\partial w_M \partial w_F}$$

Thus, $\partial^2 V / \partial w_M \partial w_F$ is greater after the law is passed if $-2(1 - \pi) > -2$, which is clearly true (as $\pi < 1$).

■