The Impact of Unilateral Divorce on Female Human Capital Investment

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Abstract

This paper examines how unilateral divorce laws affect the decision of females to invest in human capital. The change from mutual consent to unilateral divorce redefined property rights within marriages, leading to intra-household reallocation that reduced the incentives for women to invest in human capital. Using survey data to exploit the variation across states and over time of the adoption of unilateral divorce laws, we find that females in adopting states are less likely to report having a bachelor degree or higher, and that this effect is especially strong in the long-run for married white women who live in states with equal or equitable division of property.

1 Introduction

The institution of the family has experienced markedly extensive changes in the United States over the past 50 years, as the Center for Disease Control and Prevention reports both marriage and divorce rates (per 1000 people) have steadily declined since 1982 (CDC 2016). One of the most important institutional changes occurred during the 1970s and 1980s, when many US states adopted unilateral divorce laws allowing a spouse to obtain a divorce without the consent of the other spouse. Prior to the adoption of unilateral divorce, spouses could only obtain a divorce by mutual agreement or on fault grounds.

This "divorce revolution" has received considerable attention in the literature for several decades. The direct effect of the reform on divorce rates has been debated at length (Peters 1986; Allen 1992; Peters 1992; Friedberg 1998). There is a growing consensus, however, that divorce rates rose sharply following the adoption of unilateral divorce laws, but that this rise was reversed within about a decade (Wolfers 2006). The relevant theoretical issue at stake in the empirical debates surrounding the divorce law's effect on divorce rates is the applicability of the Coase theorem to marital relations. If the Coase theorem applies, since property rights are well defined under mutual consent and unilateral divorce, in both cases couples should bargain to reach the efficient outcome. Hence, a reassignment of property rights would not affect divorce rates. In any case, a reassignment of property rights can cause important distributional changes within a marriage, which may alter the bargaining power within a marriage and the incentives to invest in marriage-specific capital. For these reasons the divorce law changes can have an indirect effect on a variety of outcomes, such as female labor force participation

(Peters 1986; Gray 1998; Stevenson 2008; Voena 2015), investment in marriage-specific capital (Stevenson 2007), marriage rates (Rasul 2006), children's welfare (Gruber 2004), domestic violence (Stevenson and Wolfers 2006), and crime (Caceres-Delpiano and Giolito 2012).

Although much has been done regarding the direct and indirect effects of unilateral divorce on a variety of outcomes, little has been said about how these divorce laws affect human capital investment decisions. The purpose of this paper is to examine what effect unilateral divorce has on the human capital investment decisions of women.

In Section 2 we present a simple model of human capital investment which suggests that the effect of unilateral divorce laws on the likelihood that a woman enters the labor force is particularly important for our analysis. This is not surprising given the incentives provided by the returns to education in the labor market. However, mixed results have emerged from studies of the labor market impacts of unilateral divorce laws. Peters (1986) suggests that unilateral divorce led to a two percentage point rise in female labor force participation. Gray (1998) argues that unilateral divorce had no independent effect on women's decision to work in the market, but instead that the effects are different depending on the underlying property division laws upon divorce. Stevenson (2008) shows that Gray's results are not robust to alternative specifications and controls, and instead argues that unilateral divorce led to an increase in female labor force participation, regardless of the underlying property division laws. Most recently, Voena (2015) provides a dynamic model of household decision-making and empirical evidence that the introduction of unilateral divorce in states that imposed an equal division of property is actually associated with lower female employment. An argument supporting Peters and Stevenson might be that unilateral divorce makes divorce easier and a more credible threat

point in marital bargaining, hence the distributional changes that result from a reassignment of property rights increase the value of options outside of marriage. Alternatively in support of Voena, in a dynamic setting, marriage and divorce laws set the parameters for intertemporal contracting between partners and are therefore likely to influence the incentives to make investments that are beneficial in marriage but less so if divorced. Thus, limited commitment due to unilateral divorce results in intra-household reallocation in favor of wives, especially in states with equal, or at least equitable, division of property.

Using survey data to exploit the variation across states and over time of the adoption of unilateral divorce, we find that females living in a unilateral divorce state are about 1 percentage point less likely to report being college graduates. Our results also suggest that this effect is stronger for married white women in states with equal or equitable distribution of property upon divorce. Our findings are most in line with those of Voena (2015), since her findings suggest that in states with equal distribution of property, unilateral divorce is associated with lower female employment. A wife with a sufficiently low share of marital resources benefits from an equal or equitable division of property upon divorce, and therefore may be less likely to enter the labor force and invest in human capital.

This paper proceeds as follows. Section 2 contains a simple dynamic model of human capital investment, Section 3 presents our empirical strategies and main results, and section 4 concludes.

2 Model

Mincer (1974) designates schooling as a principal element of human capital. As such, in this section we present a simple infinite period dynamic model of human capital investment based on the decision to invest in schooling. In the first period, an individual decides whether to invest in schooling at a cost of c, or work for wage ω_0. In subsequent periods, the individual works with probability p earning an expected wage $\omega_0 p$ if she did not invest in schooling, and $\omega_1 = \omega_0(1+\gamma)p$ if she did invest in schooling, where γ denotes the returns to schooling. Taking $r > 0$ as the interest rate, an individual's discounted present value of investing in schooling is[1]

$$\begin{aligned} DPV_{school} &= -c + \frac{\omega_1}{1+r} + \frac{\omega_1}{(1+r)^2} + \cdots \\ &= -c + \omega_1 \left[\sum_{t=0}^{\infty} \left(\frac{1}{1+r} \right)^t - 1 \right] \\ &\vdots \\ &= -c + \frac{\omega_1}{r} \\ &= -c + \frac{\omega_0(1+\gamma)p}{r} \end{aligned}$$

[1] Proofs of the following calculations can be found in the appendix

and an individual's discounted present value of not investing in schooling is

$$\begin{aligned} DPV_{no\ school} &= \omega_0 + \frac{\omega_0 p}{1+r} + \frac{\omega_0 p}{(1+r)^2} + \cdots \\ &= \omega_0 + \omega_0 p \left[\sum_{t=0}^{\infty} \left(\frac{1}{1+r} \right)^t - 1 \right] \\ &\vdots \\ &= \omega_0 \left(\frac{r+p}{r} \right). \end{aligned}$$

Hence, an individual is indifferent between investing in schooling and not investing in schooling if their discounted present value of investing in schooling is equal to their discounted present value of not investing in schooling:

$$-c + \frac{\omega_0(1+\gamma)p}{r} = \omega_0 \left(\frac{r+p}{r} \right).$$

The threshold level of returns to schooling then, is

$$\gamma^* = \frac{r(c+\omega_0)}{\omega_0 p}.$$

This implies that an individual's decision to invest in schooling depends on her returns to schooling relative to the threshold level of returns to schooling. If $\gamma = \gamma^*$, the individual is indifferent between investing in schooling and not. If $\gamma > \gamma^*$, the individual will invest in schooling. And if $\gamma < \gamma^*$, the individual will not invest in schooling. It is immediately apparent that the threshold level of returns to schooling is decreasing in the probability that

an individual works:

$$\frac{\partial \gamma^*}{\partial p} = -\frac{r(c+\omega_0)}{\omega_0 p^2} < 0$$

This leads to the following testable prediction: The unilateral divorce law decreased the probability that females worked in the labor market, this increased the threshold level of returns to schooling, and therefore less women attended college.

3 Empirical Strategy and Results

3.1 Data

The majority of the states that adopted unilateral divorce did so in the early to mid 1970s. We use the US Census from 1970 and 1980 and the annual March Current Population Survey (CPS) from 1964 to 1999 because they both contain information on educational attainment and other important demographic characteristics. The US Census reports highest grade attained but does not report the highest degree obtained. The CPS reports the same for the 1964 to 1991 surveys but switches to highest degree obtained for the 1992 to 1999 surveys. We restrict our samples to females between the ages of 18 and 35 because schooling and marriage decisions are most likely to occur during these years. Similar to Goldin et. al. (2006), we define our primary dependent variable "*grad*" equal to one if the respondent in state s reports having completed at least 4 years of college or at least a bachelor degree in year t. Descriptive statistics of this variable and other key demographic variables are found in Table 1. A drawback of the Census is that it was only given every decade. The ideal data for our analysis would be annual data that contain representative samples of women in each state of the United States.

Table 1: Descriptive Statistics

Variable	N	Mean	Standard Deviation	Min	Median	Max
US Census (1970 & 1980):						
grad†:						
Full Sample	2,183,498	0.13	0.34	0	0	1
Married Females	1,234,033	0.14	0.35	0	0	1
Unmarried Females	949,465	0.12	0.33	0	0	1
Black Females	275,075	0.07	0.26	0	0	1
White Females	1,846,283	0.14	0.35	0	0	1
Age:	2,183,498	25.95	5.11	18	26	35
Wage:	2,183,498	4,236.40	5,283.94	0	2,205	75,000
Number of Children:	2,183,498	1.05	1.29	0	1	9
Number of Children Under 5:	2,183,498	0.43	0.69	0	1	8
Black:	2,183,498	0.13	0.33	0	0	1
White:	2,183,498	0.85	0.36	0	1	1
Current Population Survey (1964 - 1999):						
grad†:						
Full Sample	670,576	0.15	0.36	0	0	1
Married Females	371,161	0.16	0.37	0	0	1
Unmarried Females	234,383	0.15	0.36	0	0	1
Black Females	74,909	0.09	0.28	0	0	1
White Females	571,486	0.16	0.36	0	0	1
Age:	670,576	26.46	5.17	18	26	35
Wage:	670,576	6,601.74	9,958.36	0	2,800	454,816
Number of Children:	670,576	1.00	1.26	0	0	9
Number of Children Under 5:	670,576	0.43	0.69	0	0	7
Black:	670,576	0.11	0.32	0	0	1
White:	670,576	0.85	0.35	0	1	1

Note: Samples consist of females between the ages of 18 and 35.
† *grad* is a binary variable equal to 1 if the individual has completed at least 4 years of college (or at least has a bachelor degree in the 1992 to 1999 Current Population Surveys).

Although the CPS provides such data for recent years, the CPS grouped several states together during the 1970s, reducing the number of state-years available for analysis. In particular,

several states are grouped together between 1968 and 1972 and others are grouped together between 1973 and 1976. We use all available state-years in our regressions using CPS data.

3.2 Empirical Specifications

We use a "differences-in-differences" approach by using the variation resulting from the differences in the timing of the adoption of unilateral divorce laws across the adopting states and the fact that other states did not pass this reform to estimate the effects of these laws on educational attainment. Our first specification is a linear probability model:

$$y_{ist} = \alpha_s + \beta_t + \delta X_{ist} + \psi Z_{st} + \gamma U_{st} + \varepsilon_{ist} \tag{1}$$

Where α_s and β_t represent state and year fixed effects, respectively; X_{ist} is a vector of individual demographic controls including age, marital status, non-labor income, total number of children, number of children under the age of 5, and race; Z_{st} is a vector of state-level demographic and policy controls including age composition variables indicating the share of states populations aged 26 to 40, 41 to 55, 56 to 65, and over 65, the share of the states population that is black, the natural log of state personal income per-capita, the state's property division laws (Gray 1998), and the state's law regarding abortion access (Donohue and Levitt 2001); and the variable of interest U_{st} is a dummy variable that takes a value of one for a state s that had already adopted unilateral divorce at year t.

The timing of the impact is informative about the channel and individuals affected by the adoption of the laws (Wolfers 2006). The CPS permits the use of a dynamic specification, which allows the impact to vary by time since the reform was introduced in order to differentiate

short-run from long-run impacts of the reform:

$$y_{ist} = \alpha_s + \beta_t + \delta X_{ist} + \psi Z_{st} + \sum_c \gamma^c U_{st}^c + \varepsilon_{ist} \tag{2}$$

Where the variables of interest U_{st}^c represents a series of dummy variables that take a value of one for those states that have adopted the unilateral reform after c years where
$c \in \{-3 \text{ to } -1, 0, 1 \text{ to } 3, 4 \text{ to } 6, 7 \text{ to } 9, 10+\}$[2].

3.3 US Census Results

The US Census only allows us to implement our first specification, the results of which are found in Table 2. Our findings are in line with the prediction from the model. The first column reports results based on the full sample of females between the ages of 18 and 35, indicating that on average, females living in a unilateral divorce state are about 1 percentage point less likely to report being college graduates. To examine how the results differ depending on marital status and race, we split the sample accordingly. Columns 2 through 6 report results for the restricted samples. White women who are married appear to be those primarily driving the results from the full sample. We calculated the proportion of female graduates by state and year to see if there was an effect of the law reform at an aggregate state-level. The last column reports these results and shows suggestive evidence in support of the linear probability model.

[2]A negative c represents the number of years prior to a the law change.

Table 2: US Census Results (1970 and 1980 Samples)

	Dependent variable: grad[†]					
Variable	All Females	Married Females	Unmarried Females	Black Females	White Females	Grad Rate at State-Year Level
Unilateral[††]	−0.0088* (0.0044)	−0.0103** (0.0043)	−0.0067 (0.0053)	−0.0064** (0.0034)	−0.0105** (0.0050)	−0.0060 (0.0085)
Individual Demographic Controls	✓	✓	✓	✓	✓	
State-Level Demographic Controls	✓	✓	✓	✓	✓	✓
State-Level Policy Controls	✓	✓	✓	✓	✓	✓
State Fixed Effects	✓	✓	✓	✓	✓	
Year Fixed Effects	✓	✓	✓	✓	✓	
Sample Size	2,161,587	1,220,244	941,343	273,890	1,826,003	93

Note: Columns one through five are linear probability models with Grad as the dependent variable, and Unilateral as the regressor of interest. Columns 2 through 5 restrict the sample to married females, unmarried females, black females, and white females respectively. Individual demographic controls include age, marital status (when the sample is not restricted by marital status), non-labor income, total number of children, number of children under the age of 5, and race (when the sample is not restricted by race). State-level demographic controls include age composition variables indicating the share of states populations aged 26 - 40, 41 - 55, 56 - 65, and over 65, the share of the states population that is black, and the natural log of state personal income per-capita. State-level policy controls include the state's property division laws and the state's law regarding abortion access. Column six takes as the dependent variable the mean of the Grad variable at the state-year level. Standard errors, in parenthesis, are clustered by state.

† *grad* is a binary variable equal to 1 if the individual has completed at least 4 years of college.

†† Unilateral is a binary variable equal to 1 if the state has already adopted unilateral divorce at year t (in the case of the US Census, this takes the value of 1 if the year is 1980 and the state adopted the law between 1970 and 1980).

* Significant at the 10% level.

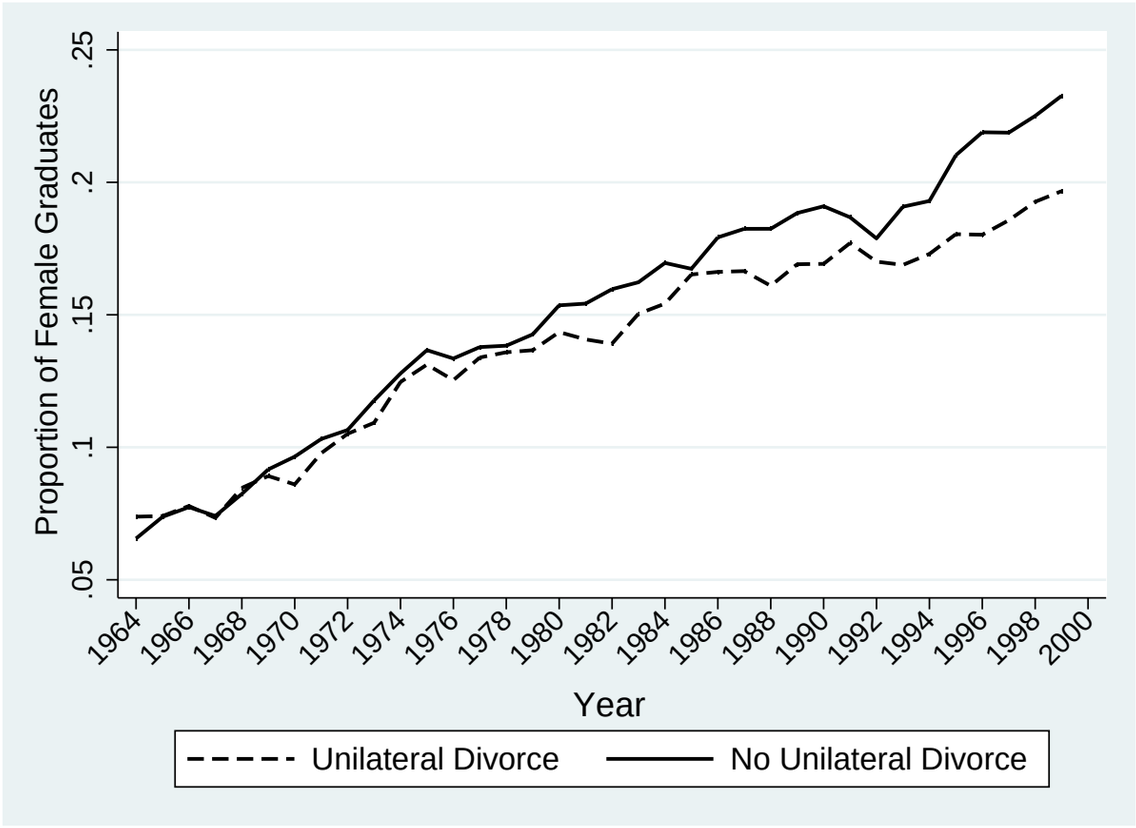
** Significant at the 5% level.

*** Significant at the 1% level.

3.4 Current Population Survey Results

Figure 1 shows the aggregate proportion of female graduates in adopting and non-adopting states over time using annual data from the March CPS from 1964 to 1999. The two groups of states are fairly similar up to about 1980, at which point they begin to diverge with the

Figure 1: Proportion of Female Graduates Over Time in Unilateral and Non-Unilateral States



Source: Data are from the Current Population Survey 1964 - 1999

adopting states growing more slowly than the non-adopting states, lending support to the results from the Census data. The results of our first specification using CPS data are found in Table 3. The effect appears to be slightly stronger but nearly identical to the results from the Census data. The dynamic specification results are found in table 4. These results indicate that the effect of unilateral divorce on female human capital investment is a long-term effect. This specification suggests that after ten or more years following unilateral divorce reform, the likelihood of graduation decreases by about two percentage points for females living in adopting states.

Table 3: Current Population Survey Results (yearly from 1964 to 1999)

	Dependent variable: grad[†]					
Variable	All Females	Married Females	Unmarried Females	Black Females	White Females	Grad Rate at State-Year Level
Unilateral[††]	−0.0111*	−0.0134*	−0.0109	0.0008	−0.0121*	−0.0051
	(0.0062)	(0.0080)	(0.0077)	(0.0059)	(0.0070)	(0.0090)
Individual Demographic Controls	✓	✓	✓	✓	✓	
State-Level Demographic Controls	✓	✓	✓	✓	✓	✓
State-Level Policy Controls	✓	✓	✓	✓	✓	✓
State Fixed Effects	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Sample Size	670,576	371,161	234,383	74,909	571,486	1,524

Note: Columns one through five are linear probability models with Grad as the dependent variable, and Unilateral as the regressor of interest. Columns 2 through 5 restrict the sample to married females, unmarried females, black females, and white females respectively. Individual demographic controls include age, marital status (when the sample is not restricted by marital status), non-labor income, total number of children, number of children under the age of 5, and race (when the sample is not restricted by race). State-level demographic controls include age composition variables indicating the share of states populations aged 26 - 40, 41 - 55, 56 - 65, and over 65, the share of the states population that is black, and the natural log of state personal income per-capita. State-level policy controls include the state's property division laws and the state's law regarding abortion access. Column six takes as the dependent variable the mean of the Grad variable at the state-year level. Standard errors, in parenthesis, are clustered by state.

[†] *grad* is a binary variable equal to 1 if the individual has completed at least 4 years of college (or has at least a bachelor degree in the 1992 to 1999 Surveys).

[††] Unilateral is a binary variable equal to 1 if the state has already adopted unilateral divorce at year t.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

If unilateral divorce results in limited commitments within marriages, the results are expected to differ based on states' underlying property division laws. In particular, a wife with a sufficiently low share of marital resources benefits from an equal or equitable division of property upon divorce, especially if she can obtain a divorce without the consent of the other party. Our results in Table 5 suggest that this is the case. We split the sample by grouping

Table 4: Dynamic Specification Results

	Dependent variable: grad†	
Variable	All Females	Grad Rate at State-Year Level
1 - 3 years prior to change	−0.0018	−0.0066
	(0.0048)	(0.0068)
Year of change	0.0010	0.0069
	(0.0061)	(0.0086)
1 - 3 years later	−0.0084	−0.0060
	(0.0054)	(0.0107)
4 - 6 years later	−0.0024	0.0056
	(0.0058)	(0.0094)
7 - 9 years later	−0.0087	−0.0033
	(0.0059)	(0.0100)
10 years or more later	−0.0190**	−0.0142
	(0.0077)	(0.0125)
Individual Demographic Controls	✓	
State-Level Demographic Controls	✓	✓
State-Level Policy Controls	✓	✓
State Fixed Effects	✓	✓
Year Fixed Effects	✓	✓
Sample Size	670,576	1,524

Note: Individual demographic controls include age, marital status, non-labor income, total number of children, number of children under the age of 5, and race. State-level demographic controls include age composition variables indicating the share of states populations aged 26 - 40, 41 - 55, 56 - 65, and over 65, the share of the states population that is black, and the natural log of state personal income per-capita. State-level policy controls include the state's property division laws and the state's law regarding abortion access. Standard errors, in parenthesis, are clustered by state.

† *grad* is a binary variable equal to 1 if the individual has completed at least 4 years of college (or has at least a bachelor degree in the 1992 to 1999 Surveys).

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

states according to their property division laws to check for heterogeneity of responses. Based on the results, the effect of unilateral divorce laws on female college graduation is statistically significant and most strong in states that have equitable and equal (community property) division of property upon divorce. Our results are most in line with Voena (2015), who argues

Table 5: Results Based on Different Property Division Laws

	Dependent variable: grad[†]		
Variable	Equitable Distribution	Common Law	Community Property
Unilateral[††]	−0.0209*	0.0080	−0.0117**
	(0.0114)	(0.0073)	(0.0048)
Individual Demographic Controls	✓	✓	✓
State-Level Demographic Controls	✓	✓	✓
State-Level Policy Controls	✓	✓	✓
State Fixed Effects	✓	✓	✓
Year Fixed Effects	✓	✓	✓
Sample Size	239,345	270,035	161,196

Note: The results are based on linear probability models with Grad as the dependent variable, and Unilateral as the regressor of interest. Each column represents a subsample of states based on their underlying property division laws. Individual demographic controls include age, marital status, non-labor income, total number of children, number of children under the age of 5, and race. State-level demographic controls include age composition variables indicating the share of states populations aged 26 - 40, 41 - 55, 56 - 65, and over 65, the share of the states population that is black, and the natural log of state personal income per-capita. The state-level policy control is for state's laws regarding abortion access. Standard errors, in parenthesis, are clustered by state.

† *grad* is a binary variable equal to 1 if the individual has completed at least 4 years of college (or has at least a bachelor degree in the 1992 to 1999 Surveys).

†† Unilateral is a binary variable equal to 1 if the state has already adopted unilateral divorce at year t.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

that unilateral divorce laws decrease the probability that a women will enter the labor force, especially in states with equal division of property laws. If this is the case, this decreased probability of working would increase the threshold level of returns to schooling, and less women would be expected to invest in human capital.

4 Conclusion

This paper examined the impact of unilateral divorce laws on female human capital investment decisions. Marriage and divorce laws set the parameters for intertemporal contracting between partners and are therefore likely to influence the incentives to invest in marriage-specific capital. The ease of divorce under unilateral laws results in a potential commitment issue which decreases the likelihood that spouses will support each other in investments that are beneficial in marriage but less so if divorced. The costly human capital investment is a superb example of such an investment. Under unilateral divorce, a wife with a sufficiently low share of marital resources benefits from an equal or equitable division of property upon divorce, and hence would be less likely to invest in human capital.

Using US Census and Current Population Survey data to exploit the variation across states and over time of the adoption of unilateral divorce laws, we find that there is a long-run negative effect of unilateral divorce on the human capital investment decisions of women. In the long run, women in states that adopted unilateral divorce are less likely to graduate with a bachelor degree or higher, particularly white married women who live in states with equal or equitable property division laws.

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Appendix

Calculations of the discounted present values of investing in school and not investing in school and of the threshold level of returns to schooling:

$$\begin{aligned}
DPV_{school} &= -c + \frac{\omega_1}{1+r} + \frac{\omega_1}{(1+r)^2} + \cdots \\
&= -c + \omega_1 \left[\sum_{t=0}^{\infty} \left(\frac{1}{1+r} \right)^t - 1 \right] \\
&= -c + \omega_1 \left[\frac{1}{1 - \frac{1}{1+r}} - 1 \right] \\
&= -c + \omega_1 \left[\frac{1+r}{r} - 1 \right] \\
&= -c + \frac{\omega_1}{r} \\
&= -c + \frac{\omega_0 (1+\gamma) p}{r}
\end{aligned}$$

$$\begin{aligned}
DPV_{no\ school} &= \omega_0 + \frac{\omega_0 p}{1+r} + \frac{\omega_0 p}{(1+r)^2} + \cdots \\
&= \omega_0 + \omega_0 p \left[\sum_{t=0}^{\infty} \left(\frac{1}{1+r} \right)^t - 1 \right] \\
&= \omega_0 + \omega_0 p \left[\frac{1}{1 - \frac{1}{1+r}} - 1 \right] \\
&= \omega_0 + \omega_0 p \left[\frac{1+r}{r} - 1 \right] \\
&= \omega_0 + \frac{\omega_0 p}{r} \\
&= \omega_0 \left(1 + \frac{p}{r} \right) \\
&= \omega_0 \left(\frac{r+p}{r} \right)
\end{aligned}$$

An individual is indifferent between investing in school and not investing in school if

$$-c + \frac{\omega_0(1+\gamma)p}{r} = \omega_0 \left(\frac{r+p}{r}\right)$$

$$\begin{aligned}
\implies \quad & \frac{\omega_0(1+\gamma)p}{r} = c + \omega_0 \left(\frac{r+p}{r}\right) \\
\implies \quad & \omega_0(1+\gamma)p = rc + \omega_0 (r+p) \\
\implies \quad & 1 + \gamma = \frac{rc}{\omega_0 p} + \frac{r+p}{p} \\
\implies \quad & \gamma = \frac{rc}{\omega_0 p} + \frac{r+p}{p} - 1 \\
\implies \quad & \gamma = \frac{rc + \omega_0 r + \omega_0 p - \omega_0 p}{\omega_0 p} \\
\implies \quad & \gamma^* = \frac{r(c+\omega_0)}{\omega_0 p}
\end{aligned}$$