A quantitative review of *Marriage Markets: How Inequality is Remaking the American Family* by Carbone and Cahn.

Kirsten Cornelson and Aloysius Siow*
University of Toronto

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Abstract

Carbone and Cahn argue that growing earnings inequality and the increased educational attainment of women, relative to men, have led to declining marriage rates for less educated women and an increase in positive assortative matching since the 1970's. These trends have negatively affected the welfare of children, as they increase the proportion of poor, single-female headed households. Using data on marriage markets defined by state, race and time, and the Choo Siow marriage matching function, this review provides a quantitative assessment of these claims. We show that changes in earnings inequality had a qualitatively consistent, but modest quantitative impact on marriage rates and positive assortative matching. Neither changes in the wage distributions nor educational attainments can explain the large decline in marriage rates over this period.

1 Introduction

In the book under review, two professors of family law, June Carbone and Naomi Cahn, argue that the increase in earnings inequality and the widespread availability of the birth control pill to single women in the United States since the seventies have led to the disintegration of American families and concurrent decline in marriage rates. Following Goldin and Katz (2001), they argue that the availability of the pill enabled single women to pursue higher education and a career without having to forgo premarital sex. This led to an increase in female educational attainment, with more women than men attending and graduating from college by the nineties. Female college graduates' focus on their careers differentiated them from high school graduates as potential spouses and made them attractive to increasingly scarce male college graduates. College women

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used their increased market power to secure stable marriages with high levels of child investment. At the bottom of the earnings distribution, male high school dropouts were increasingly detached from the labor market, rendering them unmarriageable from the perspective of potential mates, primarily female high school dropouts. However, these women did not stop having children and the fraction of single parent headed households, and the fraction of single parent headed households, which tend to have low income, grew. So, more positive assortative matching (PAM) by educational attainment at the top with dual spousal earnings, and a disproportionate retreat from marriage at the bottom of the educational distribution led to increased family earnings inequality. The problem is exacerbated by the decline in manufacturing which shifted a significant mass of men from middle class to working class.

The book first presents stylized facts, gathered from various articles which use different data sources, consistent with the above arguments. The authors sketch some vignettes on individual and family behavior to accompany the stylized facts. They also summarize evidence on the ill effects of poverty on children's outcomes. Finally, the book provides policy suggestions which aim at lowering earnings inequality and creating a better social safety net. Because they are not economists, the authors did not show whether the mechanisms that they focus on are quantitatively significant in predicting the changes in observed marital outcomes.

Due to current interest in both the recent decline in marriage and rise of wage inequality, the book has received a great deal of popular attention.[1] What remains missing is a quantitative assessment of their hypotheses. Economists, such as Burtless (1999), Fernández, et. al. (2005),Greenwood, et. al. (2014), Eika, et. al. (2014) have quantitatively studied how changes in marital matching, production of marital output, decline in marriage rates, and increase in earnings inequality affect the distribution of family income. Carbone and Cahn's argument, however, requires an evaluation of the converse relationship: how much does the distribution of individual income affect marriage patterns?

The rest of this review provides an answer to this question. We first show that the main facts in the book are supported using a consistent data source, recent US censuses. Next, we sketch a simple empirical framework based on Choo and Siow (2006) which can provide a quantitative decomposition of how the increase in earnings inequality and changes in the schooling distributions by gender affected marital outcomes. Finally, we apply this framework to the data from the US censuses to answer three questions:

1. How much did changes in the schooling distributions by gender affect marital outcomes?

2. What is the contribution of increases in earnings inequalities to changes in marital outcomes?

3. Has there been a significant increase in PAM by educational attainment?

[1] E.g. *New York Times*(July 27, 2014), *Wall Street Journal* (June 20, 2014)and *Economist* (Dec 8, 2014),

The above cited economic studies have all used aggregate data over time in their analysis, which is also the implicit perspective of the book as well. That is, at any point in time, they treat the entire nation as one marriage market. It is difficult to disentangle the effects of shifts in population supplies, changes in wage distributions and changes in preferences for marital matches on marital behavior with aggregate time series data. In our quantitative review, we will treat each state and racial group, black and white, at a point in time as a separate marriage market.[2] Changes in population supplies, earnings inequality and marital matching across these state by race by time cells provide sufficient variation for us to estimate our simple model.

Figure 1 previews our empirical strategy and results. The figure shows marriage rates at the state by race level, plotted against the wage ratio of college to less than high school-educated men in that state by race cell, in 1970 and 2012. The increase in earnings inequality can be seen from a rightward shift of the mass of points from 1970 (around a mean of about 1.5) to 2012 (where the mean is around 2) There remains significant overlap in earnings inequality between the two periods. In 1970, there is a negative relationship between male wage inequality and marriage; this relationship disappears in 2012. Even in 1970, the magnitude of the relationship is small in comparison to the large declines in the marriage rates that occurred over this time period. Due to the significant overlap in wage inequality across states in the two periods, the increases in male wage inequality over the two periods are unlikely to explain the declines in the marriage rates.

The overall decline in marriage rate for women in our sample between 1970 and 2012 was 38 percentage points. Our empirical model shows that changes in wages between 1970 and 2012 were responsible for a 1 percentage point drop in the marriage rate of women with less than a high shcool diploma and an increase of 1.5 percentage point in the marriage rate of college graduates in 2012. So, the impact of changes in wages on marriage rates are qualitatively consistent with the book's argument. However, the large shifts in relative and absolute marriage rates remain mostly unexplained after shifts in population supplies and wages are taken into account.

Our estimates furthermore suggest increasing wage inequality has a negative effect on PAM. It appears, then, that increasing earnings inequality explains only a small part of the dramatic shifts in marriage behavior that have occurred over the past four decades. Changes in marital production, along the lines of Greenwood, et. al. (2012); Lundberg and Pollak (2007); and Stevenson and Wolfers (2007) may be salient.

2 The facts

There are three key facts that motivate Carbone and Cahn's analysis. First, there has been a reversal in the marriage behavior of young women across the

[2]Treating the black and white marriage markets as separate is standard because there are little interacial marriages.

educational distribution. Table 1 shows marriage rates by education level for a sample of young women, from the 1970 Census and the 2012 American Community Surveys.[3 4] In 1970, college-educated women and women who dropped out of high school were both less likely to be married than their high-school educated counterparts. By 2012, the pattern had changed: marriage rates are now increasing in educational attainment. This is the result of a very large decline in marriage rates for less-educated women, and a somewhat smaller decline for college-educated women.

Second, they show that the educational attainment of women has overtaken that of men. We replicate this finding in Table 2. In our framework, this increase of female college graduates relative to male college graduates should have lowered the marriage rate of female college graduates relative to non-college graduates in 2012. This point is not addressed in the book. In fact, marriage rates declined more for less-educated women, the opposite of this prediction. Our empirical framework has to accommodate this counterfactual observation.

Third, there has been a large increase in wage inequality over this time period. The authors use the term wage inequality to refer to two distinct trends. The first is the increase in wage inequality among men. Figure 2 shows the distribution of annual wages for full-time, full-year male workers aged approximately 27-31, in 1970 and 2012. There has been a clear increase in inequality, with more weight at both tails. The second trend is the change in relative wages between men and women. The authors show that since 1990, the male-female wage gap has increased for college graduates, but decreased for other groups. Looking over the longer term, however, this pattern does not hold. Table 3 shows that the female-male wage ratio has increased for all groups from 1970-2012.

The authors argue that trends in wage inequality explain the shift in relative marriage rates across education groups. They also link wage inequality to an increase in PAM by educational attainment, especially among the college educated. Economists (e.g. Fernández, et. al. (2005); Greenwood et. al. 2014), have also concluded that there has been an increase in the correlation between spouses' education levels over this time period. This trend holds in our dataset as well, with the correlation between husbands' and wives education increasing significantly over time. Note, however, that this measure treats the number of marriages as exogenous, even though population supplies by educational attainment and marriage rates have significantly changed over the period.

Finally, as noted by Carbone and Cahn, marriage and earning trends have led to an increase in across household earnings inequality, with particularly negative consequences for children. We agree with this result and will not evaluate it.

The facts presented in Carbone and Cahn are therefore broadly supported by Census data. An explicit model of marriage matching allows us to take

[3]For ease of comparison with later results, we use our empirical sample in the construction of all tables. The construction of this sample is described in the empirical section.

[4]The three educational categories we use are: less than high school, high school graduates and those with some college (for brevity, we often refer to this group as "high school graduates"), and those with four or more years of college.

account of shifts in the wage structure, population supplies and preferences in a coherent manner, to assess the relative importance of these factors in explaining marriage behavior.

3 An empirical framework

Consider a marriage market s at time t. s is distinguished by location (state) and race (black versus white). There are I, $i = 1, .., I$, types of men by increasing educational attainment and J, $j = 1, .., J$, types of women by increasing educational attainment. Let M^{st} be the population vector of men where a typical element is m_i^{st}, the supply of type i men. F^{st} is the population vector of women where a typical element is f_j^{st}, the supply of type j women. Each individual can choose a type of spouse of the opposite sex to marry or not marry. An unmarried individual chooses a partner of type 0.

Let π^{st} be $I \times J$ matrix whose typical element is π_{ij}^{st}. A marriage matching function (MMF) is a $I \times J$ matrix valued function $\mu(M^{st}, F^{st}, \pi^{st})$ whose typical element is μ_{ij}^{st}, the number of (i, j) marriages in society (s, t). Given a behavioral MMF and an estimate of π^{st}, we can evaluate how the marriage distribution μ^{st} will respond to changes in the educational attainment distributions, M^{st} and F^{st}. A behavioral MMF should indicate how changes in earnings inequality affect π^{st} and therefore also the marriage distribution. For this review, we will use the Choo Siow (2006; hereafter CS) behavioral MMF[5]:

$$\ln\left[\frac{\mu_{ij}^{st}}{\sqrt{\mu_{i0}^{st}\mu_{0j}^{st}}}\right] = \pi_{ij}^{st} \;\forall\; (i, j) \tag{1}$$

where $\mu_{0j}^{st} = f_j^{st} - \sum_k \mu_{kj}^{st}$ and $\mu_{i0}^{st} = m_i^{st} - \sum_k \mu_{ik}^{st}$ are the numbers of unmarried women and men respectively. The left hand side of equation 1 is the log ratio of the number of (i, j) marriages relative to the geometric average of the numbers of type i unmarried men and type j unmarried women in society (s, t). As (i, j) marriages becomes more desirable, we expect to see more of those marriages relative to the unmarrieds and vice versa.

CS says that the left hand side of equation 1 is equal to π_{ij}^{st}, the total gains to (i, j) marriages, which for two randomly chosen i and j individuals, is proportional to the expected marital output if they married less the expected sum of individual outputs if they remain unmarried.

We assume that the mean wages, w_i^{st} and w_j^{st}, of type i men and type j women respectively affect marital output as well as outputs of remaining unmarried.

Since wages affect π_{ij}^{st}, changes in wages in this society will affect the marriage distribution, μ^{st}. The book hypothesizes that an increase in earnings inequality will increase PAM in marriage. We will provide a non-parametric test of this hypothesis.

[5] CS; Chiappori and Salanié (2014); Mourifié and Siow (2014) discuss properties of this class of MMFs.

The left hand side of equation 1 is observable and so we can estimate π_{ij}^{st}. In fact, we can find π^{st} to fit any marriage distribution μ^{st}. Given $(M^{st}, F^{st}, \pi^{st})$, the marriage distribution μ exists and is unique. So when the parameterization of the CS MMF is saturated, π^{st} is an alternative description of the marriage distribution, albeit one with a behavioral interpretation.

As population supplies, M^{st} and F^{st}, change, the numbers of unmarrieds will change which will lead μ to change according to the set of equations (1). Thus the CS MMF accommodates changes in population supplies which is what is needed here.

In order to quantify the effects of increased earnings inequality on marital behavior, we have to parameterize how wages affect the total gains to marriage:

$$\pi_{ij}^{st} = \beta^t + \beta^s + \beta_{ij}^t + \beta_m \ln w_i^{st} + \beta_f \ln w_j^{st} + \beta_{mf} \ln w_i^{st} \ln w_j^{st} + u_{ij}^{st} \; \forall \, (i,j) \quad (2)$$

Given our parameterization, β_m and β_f are the effects of wages on total gains. β_{mf} measures the interaction in spousal wages on marital output. Similarly β_{ij}^t measures the $(i,j;t)$ match interaction on marital output which is unrelated to spousal wages. For example, if college educated couples change their fertility and child rearing practice over time in ways unrelated to their wages, it will show up as changes in β_{ij}^t. Changes in labor force participation rates of married women, holding wages constant, also will show up as changes in β_{ij}^t. Changes in labor for labor force participation rates of married women due changes in their wage are incorporated in β_f and β_{mf}.

Assume that u_{ij}^{st} is idiosyncratic and independent of the other variables on the RHS of equation (2). Since π_{ij}^{st} is observable by the LHS of equation 1, the parameters on equation (2) can be estimated by OLS with panel data by (i,j,s,t).

In order to study PAM in marriage, we follow Siow (forthcoming) and use equation (1) to derive the local log odds $l(i,j,s,t)$:

$$l(i,j,s,t) = \ln \left[\frac{\mu_{ij}^{st} \mu_{i+1,j+1}^{st}}{\mu_{i+1,j}^{st} \mu_{i,j+1}^{st}} \right] = \pi_{ij}^{st} + \pi_{i+1,j+1}^{st} - \pi_{i+1,j}^{st} - \pi_{i,j+1}^{st} \quad (3)$$

$l(i,j,s,t)$ is a measure of local PAM matching in μ^{st}. If it is positive, then (i,j) individuals are more likely to match with a spousal types closer to themselves than otherwise. Statisticians say that μ^{st} satisfies PAM if all the local log odds $l(i,j,s,t)$ of μ^{st} are strictly positive or totally positive of order 2.

The RHS of equation (3) only depends on parameters of the MMF and not on population supplies. In other words, under CS, $l(i,j,s,t)$ is invariant to changes in population supplies. $l(i,j,s,t)$, a measure of PAM, changes only if marital outputs change. $l(i,j,s,t)$ also does not depend on the parametric functional form of total gains, π_{ij}^{st}. These invariances are not necessarily true for the correlation coefficient. We can also compute the local log odds for different types of marital matches. Thus, using local log odds to measure PAM has both statistical and economic advantages.

Using equation (3), we test the book's hypothesis by investigating whether $l(i,j,s,t)$ is related to wage inequality in society (s,t).

Using equations (2) and (3),

$$
\begin{aligned}
& l(i,j,s,t) = \Omega_{ij}^{t} + W_{ij}^{st} + U_{ij}^{st} \qquad (4)\\
& \Omega_{ij}^{t} = \beta_{ij}^{t} + \beta_{i+1,j+1}^{t} - \beta_{i+1,j}^{t} - \beta_{i,j+1}^{t}\\
& W_{ij}^{st} = \beta_{mf}(\ln w_i^{st} \ln w_j^{st} + \ln w_{i+1}^{st} \ln w_{j+1}^{st} - \ln w_{i+1}^{st} \ln w_j^{st} - \ln w_i^{st} \ln w_{j+1}^{st})\\
& U_{ij}^{st} = u_{ij}^{st} + u_{i+1,j+1}^{st} - u_{i+1,j}^{st} - u_{i,j+1}^{st}
\end{aligned}
$$

Using our estimated parameters, we can decompose $l(i,j,s,t)$ into the contributions made by Ω_{ij}^{t} and W_{ij}^{st}.

The impact of changes in population supplies, changes in parameters and earnings inequality on marriage rates have to be obtained by simulating the estimated MMF.

4 Empirical results

We estimate equation 2 using data from the 1970-2000 Censuses and the 2010-2012 American Community Surveys. Since most men marry younger women, our main respondents of interest are men aged 27-31 and women aged 26-30. There are three education groups: less than high school, high school graduates and college graduates. We have two race groups, black and whites.

We construct a sample that closely mirrors the set of potential partners available to men and women of this age group. This may, of course, include partners outside of the indicated age ranges. We construct our sample by first including all married women aged 26-30 and their spouses of any age and all married men aged 27-31 and their spouses of any age. We then sample singles in such a way that the age distribution of singles matches the age distribution of spouses for each sex.[6]

Our sample has marriage rates that are similar to those of the main respondents of interest. The marriage rate for all women aged 26-30 was 40.3% in 2012, while in our sample the marriage rate for women is 37.3%. The discrepancy is accounted for by the fact that our sample of women is slightly younger on average than the full set of 26-30 year old women (this arises because men tend to marry women younger than themselves.) Relative marriage rates across education groups in our sample show similar patterns to those for women aged 26-30.

We use the number of matches and the supply of unmarrieds at the state by year by race by match type level from our sample in order to construct the left hand side of the equation. Our wage measure is the average of wages for full-time, full-year workers of the same education level, state and race. We use this measure of potential wages in order to abstract from the labour supply decision.

[6] Details available upon request.

Table 4 shows the results of estimating variants of equation (2), using both linear and log wages, with and without a wage interaction term. The regressions also include state, year, match type, match type and year, and race fixed effects. We include match type and year interactions to allow the total gains to marriage to vary by match type and year. An observation is the total gains to marriage for an (i, j, s, t) marriage. There are 3688 observations for each regression. In all four columns, the R^2 exceeds 0.9. Simple regressions are able to capture significant variations in the marital distributions across states, races and years.

Except for column 3, the estimated coefficients on wages are statistically significant. In column 3, male wages are negatively related to total gains which is implausible. In column 4 with the interaction term, both male and female wages directly increase match values, with a negative interaction term. We include columns 1 and 2 as a robustness check. Table 4 shows that changes in wages do affect the marital distribution.

We use the regression results to simulate female marriage rates and local log odds, under a number of alternative scenarios. This allows us to answer the three questions outlined in the introduction. First, we estimate the impact of changes in population supplies of different groups. Column (A) of Table 5 shows simulated marriage rates for women under a scenario where wages and match values, β_{ij}^t, remain constant at their 1970 levels, but population supplies move to their 2012 levels. Comparing this column to the actual marriage rates for 1970 answers the question: what would have happened to marriage rates if only population supplies had changed? The table shows that changing educational attainment would have pushed the overall marriage rate for women down slightly, from 75.3% to 71.9%. Not surprisingly, this is driven by a very large decline in marriage rates for college educated women, whose supply (both relative and absolute) increased greatly over the time period. Changes in population supplies explain about 40% of the overall decline in marriage rates for this group. On the other hand, changing population supplies should have increased marriage rates for less-educated women, who became relatively scarce. The predicted marriage rate for these women in 2012 is 83.6%, which is 49.7 percentage points higher than their actual 2012 marriage rate of 33.9%. The large decline in marriage for less-educated women is even more puzzling once we have taken population changes into account. In our framework, the decline must then be driven by either wages or a shift in marriage values (the residual in our model.)

The next simulation attempts to evaluate the potential impact of wages in driving changing marriage patterns. Column (B) of 5 shows the results of simulations where marriage valuations π_{ij} are constructed using 2012 wages and 1970 match type fixed effects and residuals. These simulations tell us what would have happened to marriage rates if wages and supplies had changed from 1970-2012, but intrinsic valuations of marriage had remained constant. The shift to 2012 wages does work in the expected direction: it increases marriage rates for high school and college educated women, and decreases marriage rates for women without a high school diploma, relative to column (A). Overall marriage rates increase using the 2012 wage distribution; this is due to the increase in women's wages, as shown in Table 3. The net impact, however, is quite small.

Column (C) of Table 5 presents the results of the converse simulation, where wages remain at 1970 levels and intrinsic match values change to their 2012 levels. This tells us how marriage patterns would have evolved if supplies and match valuations had followed their actual patterns, but wages had stayed at the 1970 levels. The appropriate comparison point for the results from simulation (C) is the second column in Table 5 which shows actual 2012 marriage rates. This simulation shows that predicted marriage rates are similar in the first order to the actual marriage rates in 2012.

With wages held at 1970 levels, simulation (C) show that we over predict the marriage rate of less than high school women by 1 percentage point and under predict the marriage rate of college graduates by 1.5 percentage point. So changes in wages between 1970 and 2012 have second order effects on marriage rates which are consistent with Carbone and Cahn.

Finally, we evaluate the impact of changing wages on PAM. Using equation (3), Table 6 shows the local log odds for college graduates (H) versus high school graduates (M) and for high school graduates (M) versus less than high school graduates (L) for both 1970 and 2012. Contrary to the claim of the book, the first row shows that PAM for (H, M) types did not increase over the period: college graduates did not increasingly prefer to marry their own type. The second row shows that PAM did increase for (M, L) types, which is consistent with the hypothesis that female high school graduates increasingly preferred to marry their own educational type or not marry rather than to marry down. Both findings are consistent with Eika, et. al. who used the PSID dataset.

Figures 3 and 4 present evidence on the relationship between PAM and wage inequality using cross-state data. Recall that W_{ij}^{st} in equation (4) is the piece of local log odds that depend on wages. In Figure 3, we plot estimates of W_{ij}^{st} at the state-race level against the wage ratio of male college-educated workers to those with less than high school. There is a significant, negative relationship between wage inequality and this part of PAM across all groups. This arises because the coefficient on the interaction of male and female wages is negative, implying that male and female wages are substitutable in the marriage value function. Substitutability implies that a potential partner's wages become less important to high-wage men as their own income increases. This is the opposite of the story told in Carbone and Cahn, who claim that increased wage inequality increases PAM.

Figure 4 plots actual local log odds against the male wage ratio. Note that the axis in this case has expanded significantly, relative to Figure 3; local log odds range from about 1 to 4, while the wage portion is much smaller, ranging from -0.2 to 0.1. In 1970, there is no systematic relationship between PAM by education attainment for either (H, M) or (M, L) marital matches; there is a positive relationship for both odds in 2012, but this is not statistically significant. These graphs indicate that the strongly significant negative relationship between wages and PAM shown in Figure 3 is relatively unimportant, compared to the other components of local log odds.

Table 7 shows the results of the simulations for local log odds. Changes in population supplies should not affect log odds. There are some small changes reported in Column (A) of 7, which are due to error introduced by the simulation process.

Having established an appropriate baseline for marriage rates, we can next ask: how much do changes in wages alter marriage patterns? See Column (B) of Tables 5 and 7. As anticipated in Figure 3, changing wages lowers the log odds slightly for both education groups; however, the change is relatively small. Column (C) of Table 7 also show that changes in match values unrelated to changes in wages have the largest impact on the observed changes in PAM.

5 Conclusion

The arguments of Carbone and Cahn are largely qualitatively consistent with the empirical evidence. However from a quantitative perspective, changes in the relative educational attainment of men and women, and changes in wage inequalities are not first order determinants of the changes in marital behavior of modern Americans. The source of these large recent changes in marital behavior remains to be determined. As cited in the introduction, Greenwood, et. al. (2012); Lundberg and Pollak (2007); and Stevenson and Wolfers (2007) provide some leads.

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Tables & Figures

Table 1: Marriage rates for young women, 1970 and 2012.

	1970	2012
Total	75.3%	37.3%
Less than high school	72.6%	33.9%
High school or some college	77.8%	34.5%
College	69.1%	42.6%

Data is from the 1970 Census and the 2010-2012 American Community Surveys. The sample construction is described in the text; further details are available upon request.

Table 2: Education levels by sex and year

	Male		Female		Sex ratio (M/F)	
	1970	2012	1970	2012	1970	2012
Less than high school	28.4%	10.8%	26.1%	7.3%	1.028	1.483
High school or some college	52.0%	61.8%	61.2%	57.8%	0.803	1.080
College	19.6%	27.4%	12.7%	34.9%	1.460	0.792

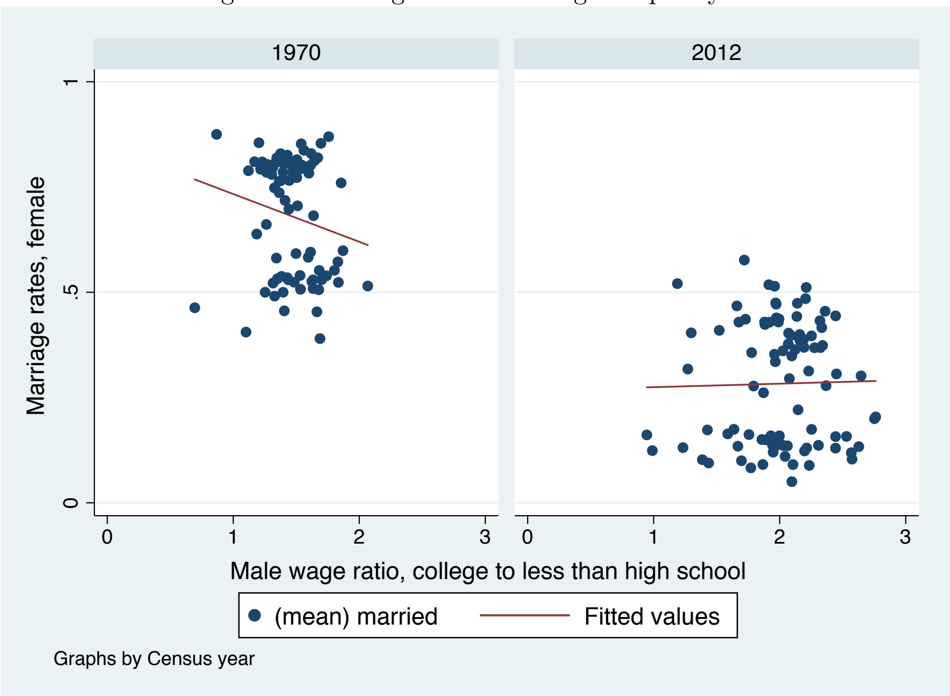
Data comes from the 1970 Census and the 2010-2012 American Community Suvey. The sample construction is described in the text; further details are available upon request.

Table 3: Male and female wages, by education group and year

	1970		
	Female wage	Male wage	Ratio of female to male
Less than high school	\$12,032.77	\$31,304.59	0.38
High school or some college	\$16,728.83	\$38,492.95	0.43
College	\$23,658.16	\$46,503.83	0.51
	2012		
	Female wage	Male wage	Ratio of female to male
Less than high school	\$11,622.98	\$17,896.95	0.65
High school or some college	\$17,797.99	\$25,954.16	0.69
College	\$29,053.78	\$39,621.95	0.73

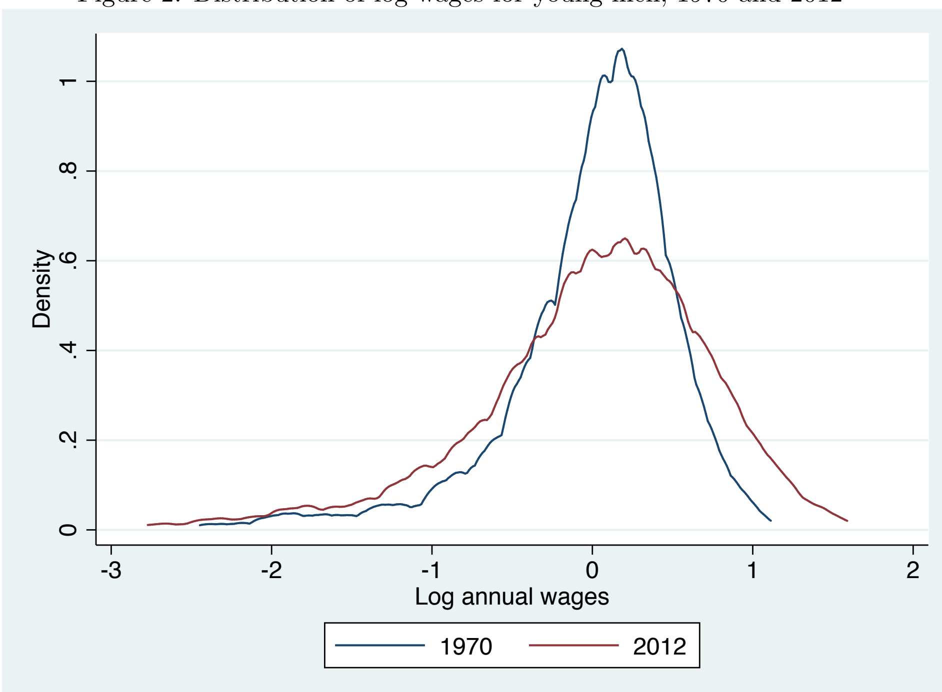
This table shows average annual wages for full-time, full-year workers. Data comes from the 1970 Census and the 2010-2012 American Community Suvey. The sample construction is described in the text; further details are available upon request.

Figure 1: Marriage rates and wage inequality



This graph plots the state by race-level ratio of wages for male college educated workers to workers with less than high school, against marriage rates. Data comes from the 1970 Census and the 2010-2012 American Community Suvey. Further details of the sample construction are available upon request.

Figure 2: Distribution of log wages for young men, 1970 and 2012



Data comes from the 1970 Census and the 2010-2012 American Community Suvey. The graph depicts the kernel density of log annual wages for young males who work full-time and full year. The sample construction is described in the text; further details are available upon request

Table 4: Estimation of marriage matching model

	Dependent variable: $ln\left(\frac{\mu_{ijrst}}{\sqrt{\mu_{i0rst}\mu_{0jrst}}}\right)$			
	Linear	Linear	Log	Log
Male wage	$-5.79 * 10^{-6*}$	$9.42 * 10^{-6*}$	-0.112	6.243***
	$(3.09 * 10^{-6})$	$(5.01 * 10^{-6})$	(0.111)	(1.318)
Female wage	$7.12 * 10^{-6}$	$2.67 * 10^{-5***}$	0.067	6.600***
	$(5.37 * 10^{-6})$	$(8.14 * 10^{-6})$	(0.134)	(1.355)
Male x female wage interaction		$-5.77 * 10^{-10***}$		-0.636***
		$(1.48 * 10^{-10})$		(0.132)
R^2	0.906	0.906	0.906	0.907
Observations	3,688	3,688	3,688	3,688

Data come from the 1970-2000 Public Use Census samples and the 2010-2012 American Community Surveys. The sample construction is described in the text; further details are available upon request. Regressions are weighted by the number of marriages in each cell.

Table 5: Marriage rates for women: actual and simulated with linear model

	Actual		Simulations		
	1970	2012	(A)	(B)	(C)
Total	75.3%	37.3%	71.9%	72.8%	36.2%
By education level:					
No high school	72.6%	33.9%	83.6%	82.8%	35.1%
High school or some college	77.8%	34.5 %	78.5%	79.4%	33.6%
College degree	69.1%	42.6 %	58.8%	60.1%	40.9%
Supplies			2012	2012	2012
Match values			1970	1970	2012
Wages			1970	2012	1970
Model			Logs with interaction	Logs with interaction	Logs with interaction

Data come from the 1970-2000 Public Use Census samples and the 2010-2012 American Community Surveys. The sample construction is described in the text; further details are available upon request.

Table 6: Local log odds

	1970	2012	Change
No high school-high school	1.674	2.657	0.983
High school-college	2.450	2.277	-0.173

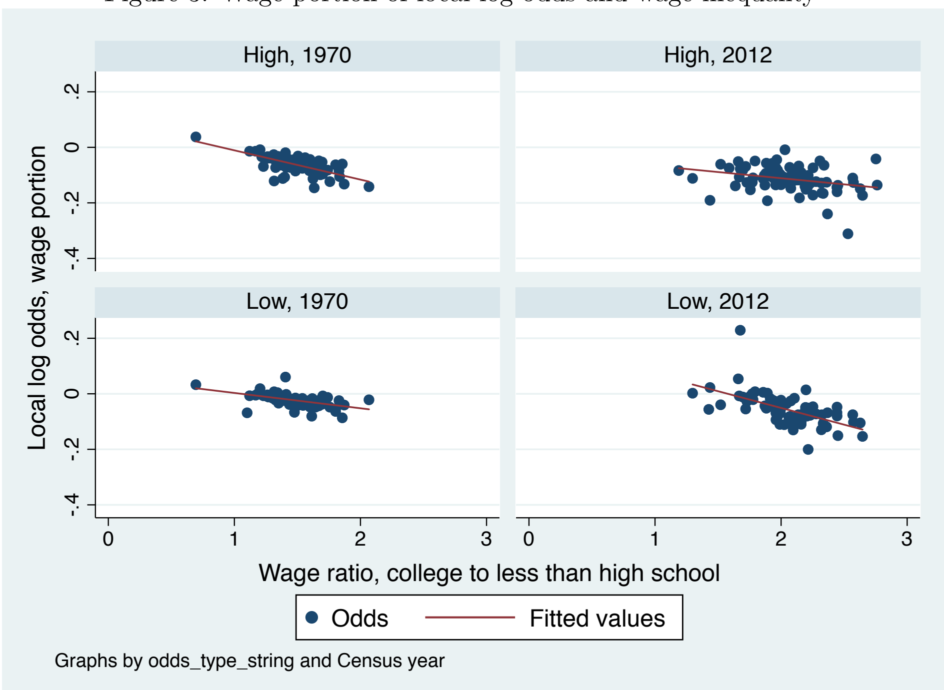
Data come from the 1970 Public Use Census sample and the 2010-2012 American Community Surveys. The sample construction is described in the text; further details are available upon request. Wives' and husbands' education level is measured in three categories: less than high school, high school/some college, and college degree or higher.

Table 7: Local log odds: actual and simulated

	Actual, 1970	Actual, 2012	Simulations		
			(A)	(B)	(C)
HH-MM	2.450	2.277	2.472	2.388	2.373
MM-LL	1.675	2.657	1.708	1.669	2.729
Supplies			2012	2012	2012
Match values			1970	1970	2012
Wages			1970	2012	1970
Model			Logs with interaction	Logs with interaction	Logs with interaction

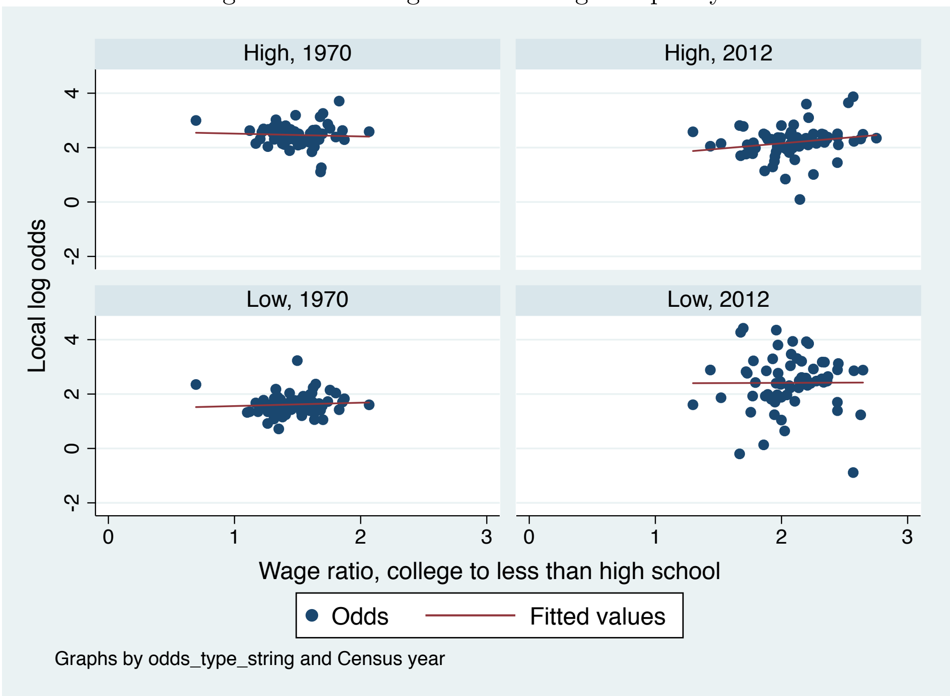
Data come from the 1970-2000 Public Use Census samples and the 2010-2012 American Community Surveys. The sample construction is described in the text; further details are available upon request.

Figure 3: Wage portion of local log odds and wage inequality



This graph plots the state by race-level ratio of wages for college educated workers to workers with less than high school, against wage portion of local log odds for college to high school/some college (high), and high school/some college to less than high school (low) . Data comes from the 1970 Census and the 2010-2012 American Community Suvey. The sample construction is described in the text; further details are available upon request.

Figure 4: Local log odds and wage inequality



This graph plots the state-level ratio of wages for college educated workers to workers with less than high school, against local log odds for college to high school/some college (high), and high school/some college to less than high school (low) . Data comes from the 1970 Census and the 2010-2012 American Community Suvey. The sample construction is described in the text; further details are available upon request.