Marriage and Career: The Dynamic Decisions of Young Men

Eric D. Gould
Hebrew University, Shalem Center, Centre for Economic Policy Research, and Institute for the Study of Labor

This paper examines the extent to which human capital and career decisions are affected by their potential returns in the marriage market. Although schooling and career decisions often are made before getting married, these decisions are likely to affect the future chances of receiving a marriage offer, the type of offer, and the probability of getting divorced. Therefore, I estimate a forward-looking model of the marriage and career decisions of young men between the ages of 16 and 39. The results show that if there were no returns to career choices in the marriage market, men would tend to work less, study less, and choose blue-collar jobs over white-collar jobs. These findings suggest that the existing literature underestimates the true returns to human capital investments by ignoring their returns in the marriage market.

I. Introduction

This paper examines the extent to which human capital investments and career choices are affected by their potential returns in the marriage market. To do this, I develop a dynamic programming model of the joint marriage and career decisions of young men over time, using panel data from the National Longitudinal Survey of Youth (NLSY). The model traces out the sequential and joint schooling, work, occupation, and marital decisions of white males between the ages of 16 and 39. During this time period, young men have to make critical decisions regarding their careers and marital status, and in most cases, individuals have to make important decisions regarding their education and career options well before finding a marriage partner. Therefore, to estimate the extent to which human capital decisions and career choices are affected by their potential returns in the marriage market, one has to examine this issue in the context of a forward-looking, dynamic model of marriage and career decisions over time.

For helpful discussions and comments, I thank Petra Todd, Isaac Ehrlich, three anonymous referees, Chris Taber, Chuck Manski, Ken Wolpin, Robert Sauer, and seminar participants at Northwestern, Penn, Virginia, Tel Aviv University, Maastricht University, and Vanderbilt. I especially want to thank Simcha Srebnik for computer support. I also thank the Maurice Falk Institute for financial support. Any errors are my own responsibility.

[*Journal of Human Capital,* 2008, vol. 2, no. 4]

The large literature on human capital has ignored the idea that men may be motivated to succeed in the labor market as a way of improving their prospects in the marriage market and/or to reduce their chances of divorce. After estimating the structural parameters of the joint marriage and career decision process, I construct the counterfactual career path of individuals when there is no return to career decisions in the marriage market. The results of this experiment reveal a strong influence of marriage considerations on the career choices of men: if there were no returns in the marriage market, men would work less, go to school less, and choose the blue-collar sector over the white-collar sector more often. These findings suggest that traditional estimates of the returns to human capital investments are underestimated by simply looking at their returns on the labor market and demonstrate the importance of considering the forward-looking nature of marriage and career decisions.

Additional results from the model indicate that human capital and career decisions are influenced by the increasing education levels and labor force participation of women. Both of these phenomena increase men's incentives to invest in education and white-collar work in order to increase the chances of marrying a college-educated wife or a wife who works full-time. Marrying a college-educated wife also increases the stability of marriages, but the labor force participation of wives is not found to affect the durability of a marriage. The results also suggest that changes in laws and social norms regarding divorce could have significant effects on the career decisions of men by affecting the incentives to take precautionary measures to reduce the risk of divorce. For example, the parameter estimates show that investing in education and working in the white-collar sector increase marital stability. If, however, divorce becomes cheaper through changes in divorce laws or if the chances of remarrying increase through changing social norms or by the increasing size of the "second-marriage" market, men would take fewer precautionary measures in their human capital and career decisions to increase the chances of a successful first marriage.

To implement the model, the analysis follows 1,871 white men aged 16–39 from the NLSY79. In each year of the sample, individuals are categorized into one of four "career sectors": schooling, white-collar, blue-collar, and "home." The latter category includes all individuals whose main activity during the year was not going to school or working. In each year, an individual's marital status is recorded as one of the following: never married, first marriage, divorced once (not remarried), second marriage, second divorce, third marriage, and third divorce. In each period, individuals are presented with options in each career sector and potential marriage offers in the marriage market. The probability of receiving a marriage offer in any period is conditional on current and previous marriage and career decisions and the individual's unobserved type. Wage offers in each occupation and labor force status are also conditional on current and previous decisions and the person's unobserved type. In each period, individuals maximize their expected lifetime utility by deciding whether or not to change their current marital status (conditional on receiving an offer) and whether to work in one of the occupations, go to school, or stay at home.

Estimation of the model involves the numerical solution of a finite-horizon, discrete-choice dynamic programming problem, nested within an algorithm that maximizes a likelihood function. The dynamic program is solved by backward recursion, and the likelihood function is constructed by following the method developed by Keane and Wolpin (2001). This method is based on simulating the solution of the optimization problem for a set of artificial agents and then maximizing the probability that the simulated agents match the decisions of individuals in the data, assuming that there is error in the classification of individuals into the various marriage and career categories. This method is particularly suitable for data sets in which there is missing information on endogenous state variables, as is often the case when using the NLSY, because the method does not require knowledge of the complete historical set of choices for an individual to be included in the analysis.

Although there is considerable research on female marriage and labor supply decisions (e.g., Heckman and MaCurdy 1980; Hotz and Miller 1988; Eckstein and Wolpin 1989; van der Klaauw 1996), the interaction of marriage and career decisions for men has received scant attention.[1] A few recent papers have developed structural models of marriage and cohabitation (Brien, Lillard, and Stern 2006) and the process of two-sided matching in the marriage market (Seitz 2002; Anderberg 2003; Wong 2003). However, these papers have focused on the role of the endogenous sex ratio in determining matches and how cohabitation interacts with divorce and match quality. In contrast, this paper is the first to address the dynamic interaction of marriage and career decisions of men over time.

A few of the issues addressed in this paper have been examined in isolation within a nondynamic framework. Several papers have analyzed the relationship between wages and marital status (Korenman and Neumark 1991), but this is the first paper to highlight the ways in which marriage considerations affect wages by influencing investments in education, labor force participation, and occupational choices over time. There is also related work on the high rate of assortative mating between men and women according to their education level (Fernandez and Rogerson 2001; Fernandez et al. 2005) and on several aspects of divorce and remarriage. Becker, Landes, and Michael (1977) examined marital "turnover" and suggested two general causes: (1) search is costly and

[1] The focus of this paper is on the dynamic decisions of individuals on the micro level. However, the macro implications of related issues have received wide attention recently in papers by Aiyagari, Greenwood, and Guner (2000), Fernandez and Rogerson (2001), Regalia and Rios-Rull (2001), and Fernandez, Guner, and Knowles (2005).

meetings occur randomly; therefore, a marriage offer that was accepted in the past may be discarded when a better match is offered in the future; and (2) traits that determine the gains from the marriage match can change in unpredictable ways, such as changes in labor market prospects. Becker et al. use cross-sectional data to examine these issues, and Weiss and Willis (1997) build on their analysis by using longitudinal data to separate "changes in match quality" from "initially bad matches." However, Weiss and Willis focus on the dissolution of the first marriage only, while abstracting from the process of getting married in the first place. This paper builds on this literature by explicitly modeling the decision to get married, divorced, and remarried for up to three times, while embedding this process in a dynamic model of career decisions. The model of career decisions closely parallels the framework developed by Keane and Wolpin (1997). This paper enriches their model of occupational choice by exploring how occupational choice interacts with marriage decisions.

II. The Data

The analysis sample is taken from the 1979 NLSY (the main file and the work history file) from 1979 until 2002. The analysis uses the random sample of white men aged 14–21 in 1979 from the "core" NLSY sample. We follow each individual from the time he is at least 16 years old until the end of the sample period (up to 39 years old) and record the individual's marriage, education, work, and occupational status for every year available. The unit of time is the academic year because being in school is more closely aligned with the academic year than with the calendar year. The main analysis consists of a sample of 1,871 men who report their joint career and marital status for at least 10 years. Since 1994, the NLSY interviewed respondents every other year instead of annually. However, the work history files contain detailed information on labor market outcomes for each week throughout the sample period. In addition, indicators for marital status were double-checked and filled in for missing years using the latest interview in which the respondent answered retrospective questions regarding the start and end dates for each marriage. Individuals appear in the sample for an average of 21.6 years.[2] The analysis uses data on weekly wages for individuals who work, as well as the education levels and labor force participation of wives of married men.[3]

The estimation procedure follows the method developed by Keane and Wolpin (2001). One of the main advantages of this method is that it does not require a complete history of choices to be observed for an

[2] Ninety percent of the men in the sample report the joint marriage and career status for at least 18 years and 98 percent for at least 14 years.

[3] The wages for self-employed workers are generally not reliable and therefore are treated as missing. Individuals who served in the military are not included in the sample.

individual to be included in the sample, as is the case in many previous dynamic models such as Keane and Wolpin (1997). The estimation strategy uses information on each individual at each point in time, regardless of whether the person's wage, marital status, or career status is unknown at any given time period.

I now describe how individuals were categorized into one "marriage" category and one "occupation" sector.

A. *Marriage Sectors*

Each individual in the NLSY was asked about his marital status in each sample year and was asked retrospective questions about when each marriage started and ended.[4] When sufficient marriage information was available, individuals were classified into one of seven marital status categories in each year: (1) single (never married), (2) first marriage (currently married for the first time), (3) first divorce (married once, divorced, and currently single), (4) second marriage (divorced once and remarried), (5) second divorce (divorced twice and currently single), (6) third marriage (remarried for the second time), and (7) third divorce (divorced for the third time and currently single). Table 1 displays the marriage sector distribution for the sample over time. As expected, individuals gradually get married, divorced, remarried, and so forth. The median individual waits until the age of 25 to get married, and 73 percent of first marriages are still intact after 10 years. Table 2 presents the proportion of wives of married men who obtained a college degree and the proportion who work full-time (at least 30 weeks in the year and 20 hours per week). As expected, the labor force participation rate of wives increases with the husband's age to roughly 80 percent, and approximately 32 percent of the wives are college graduates by the time the husband is in his 30s.

B. *Career Sectors*

In each period, individuals were classified into one of the following four mutually exclusive career sectors: schooling, blue-collar, white-collar, and home. These classifications are similar to those used by Keane and Wolpin (1997) and were constructed using information on schooling enrollment status for each month and using the work history files to check the labor force status, occupation, and wages for 9 weeks during

[4] The NLSY contains data on the month and year each marriage begins and ends. A person's marital status for any given year corresponds to the status that he enjoyed for the majority of the year. In addition, the "year" of measurement corresponds to the academic year (September to the following August).

TABLE 1
Marriage Choices of Men over Time

Age	Never Married (Single)	First Marriage	First Divorce (Single)	Second Marriage	Second Divorce (Single)	Third Marriage	Sample Size
16	.96	.03	.00	.00	.00	.00	1,871
17	.96	.04	.00	.00	.00	.00	1,871
18	.93	.06	.00	.00	.00	.00	1,871
19	.89	.10	.01	.00	.00	.00	1,871
20	.83	.16	.01	.01	.00	.00	1,871
21	.76	.22	.01	.01	.00	.00	1,871
22	.69	.28	.02	.01	.00	.00	1,871
23	.62	.34	.03	.02	.00	.00	1,871
24	.54	.40	.04	.02	.00	.00	1,871
25	.48	.44	.05	.03	.00	.00	1,871
26	.42	.48	.05	.04	.00	.00	1,871
27	.38	.51	.06	.05	.01	.00	1,871
28	.34	.53	.07	.05	.01	.00	1,871
29	.30	.55	.07	.06	.01	.01	1,871
30	.27	.56	.08	.07	.01	.01	1,865
31	.25	.56	.09	.08	.01	.01	1,862
32	.23	.57	.08	.09	.01	.01	1,850
33	.21	.58	.09	.10	.01	.01	1,840
34	.19	.58	.09	.10	.02	.01	1,821
35	.18	.58	.09	.10	.02	.02	1,796
36	.17	.58	.09	.11	.02	.02	1,746
37	.15	.58	.09	.12	.03	.02	1,716
38	.14	.58	.09	.12	.03	.02	1,483
39	.14	.58	.10	.12	.03	.02	1,248

Note.—The numbers represent the fraction of the sample of men in each marital status. The suppressed category is for those who are divorced three times and single, which is never above 1 percent of the sample.

the academic year.[5] To be classified as being in school in year t, the person had to be enrolled at some point during the academic year t and complete a grade.[6] To be considered working, individuals not classified as being in school had to work at least two-thirds of the 9 weeks checked during the academic year and average at least 20 hours per working week. If these criteria were satisfied, the respondent was assigned to the occupation, white-collar or blue-collar, that he worked for the most during the 9 weeks that were checked during the year.[7] Respondents with nonmissing information about weeks worked and school-

[5] The weeks checked for academic year t include weeks 40, 45, and 50 in calendar year $t-1$ as well as weeks 1, 5, 10, 15, 20, and 25 in calendar year t. The summer months were excluded in order not to confuse temporary summer employment for full-time work.

[6] For 1979 and 1980, individuals who were currently in the grade appropriate for the age of someone who went continually to school were classified retrospectively as being in school from the age of 16 to the current age.

[7] White-collar workers are defined as including the following occupations: professional, technical, and kindred, managers, officials and proprietors, salesworkers, clerical, and kindred. Blue-collar workers included craftsmen, foremen, and kindred, operatives and kindred, laborers, farm managers, farm laborers, foremen, service workers, and household workers.

TABLE 2
WIFE CHARACTERISTICS OF MARRIED MEN

	Labor Force Participation		Educational Attainment	
Age of the Husband	Fraction of Wives Working Full-Time	Sample Size	Fraction of Wives with College Degree	Sample Size
16	.33	3	.00	3
17	.38	8	.00	4
18	.33	39	.00	36
19	.35	99	.00	96
20	.42	217	.01	201
21	.47	322	.02	326
22	.54	433	.06	442
23	.54	563	.11	567
24	.57	693	.15	687
25	.58	767	.18	775
26	.62	850	.20	856
27	.63	892	.22	916
28	.63	912	.24	968
29	.64	859	.25	1,034
30	.67	852	.27	1,038
31	.69	702	.27	1,066
32	.74	725	.28	1,065
33	.73	569	.29	1,088
34	.78	589	.31	1,081
35	.75	431	.32	1,095
36	.80	442	.32	1,045
37	.79	414	.32	1,043
38	.79	321	.32	935
39	.80	292	.32	440

Note.—The samples for each category are restricted to married men with enough information in the data to categorize their wives' labor force participation and educational attainment. A wife is considered to work full-time if she worked at least 30 weeks in the year and at least 20 hours per week.

ing status who were not classified into one of the other three sectors were placed into the home sector.

Table 3 reveals the expected pattern of career choices as the cohort ages over time. At first, most of those in the sample attend school, and gradually they move into the blue-collar and white-collar occupations over time. Interestingly, the white-collar sector eventually becomes as big as the blue-collar sector—a pattern not detected by Keane and Wolpin's (1997) study of career choices since their study stopped at the age of 26.

C. *The Interaction of Marriage and Career*

The patterns revealed in tables 1–3 show that individuals make key decisions over their human capital investments and labor force behavior at the very time when they are very active in the marriage market. In addition, it has been well noted in the literature that education is cor-

TABLE 3
Career Choices of Men over Time

Age	Home	School	Blue-Collar	White-Collar	Sample Size
16	.03	.95	.03	.00	1,432
17	.06	.89	.05	.00	1,604
18	.12	.57	.27	.05	1,517
19	.16	.39	.36	.09	1,560
20	.16	.30	.41	.13	1,630
21	.14	.25	.47	.15	1,785
22	.13	.15	.49	.23	1,786
23	.12	.10	.49	.30	1,795
24	.10	.07	.50	.37	1,796
25	.09	.05	.49	.39	1,809
26	.08	.04	.49	.39	1,817
27	.07	.03	.49	.40	1,805
28	.07	.03	.49	.40	1,805
29	.07	.02	.46	.45	1,784
30	.07	.02	.47	.44	1,808
31	.08	.01	.46	.45	1,802
32	.07	.01	.46	.46	1,769
33	.08	.01	.46	.45	1,774
34	.06	.01	.47	.47	1,740
35	.06	.00	.46	.49	1,718
36	.06	.00	.47	.47	1,672
37	.07	.00	.47	.47	1,642
38	.06	.00	.46	.48	1,408
39	.06	.00	.47	.46	1,168

Note.—Each number represents the fraction of the sample of men in each of the mutually exclusive and exhaustive career categories.

related with delays in marriage (Gould and Paserman 2003), married men earn more than unmarried men (Korenman and Neumark 1991), and divorce probabilities are correlated with wages and education (Becker et al. 1977; Weiss and Willis 1997). These patterns, however, do not necessarily establish any causal relationships, and each of these issues has been examined in isolation rather than in a unified framework. Furthermore, given that most individuals make key human capital decisions, such as whether to go to college or not, before they find a prospective wife, it is reasonable to conjecture that individuals might consider the future benefits in the marriage market of their human capital decisions at an earlier age. The model described in the next section is designed to capture in a unified framework the forward-looking and joint nature of the marriage and career decisions of young men during this crucial time.

III. The Model

This section presents the basic structure of the model and the parameterizations of each structural equation. The solution to the model and the estimation method are also discussed. The model corresponds to the decision problem of a single individual choosing his career and marital status in each time period t ($t = 1, \ldots, T$) in order to maximize his expected present discounted value of available alternatives, which are functions of previous decisions. Each period is associated with a certain age (ages 16–39). There is also unobserved heterogeneity in men, characterized by four different types of men (type $\in$ 1, 2, 3, 4). Incorporating these four unobserved types into the model is intended to capture the selection on unobservables that could be correlated with the observable choices of men and therefore could bias the estimated structural parameters if not incorporated into the model.[8]

A. *Marriage and Career Choice Set*

In each period, individuals choose one of four broadly defined career sectors: home ($k_t = 0$), school ($k_t = 1$), blue-collar employment ($k_t = 2$), and white-collar employment ($k_t = 3$). The number of years accumulated in each career choice k at the end of year t is represented by x_{kt}; because the individual must choose one of these sectors in each period, the sum of the accumulated experience levels in each of the choices at any given year t must equal t (i.e., $\sum_{k=0}^{3} x_{kt} = t$). Initial conditions for the experience levels in each sector are normalized to zero: $x_{10} = x_{20} = x_{30} = 0$. Individuals are free to choose any career sector in any given period.

To capture the logical sequence of marriage possibilities, the marital choice set contains 10 options, denoted by mstatus_t:

Single, never married	$\text{mstatus}_t = 0$
First marriage, type 1 match	$\text{mstatus}_t = 1$
First marriage, type 2 match	$\text{mstatus}_t = 2$
Divorced once, single	$\text{mstatus}_t = 3$
Second marriage, type 1 match	$\text{mstatus}_t = 4$
Second marriage, type 2 match	$\text{mstatus}_t = 5$
Divorced twice, single	$\text{mstatus}_t = 6$
Third marriage, type 1 match	$\text{mstatus}_t = 7$
Third marriage, type 2 match	$\text{mstatus}_t = 8$
Divorced three times, single	$\text{mstatus}_t = 9$

The initial condition for marital status is never married ($\text{mstatus}_0 = 0$). In addition, if the person is married ($\text{mstatus}_t \in (1, 2, 4, 5, 7, 8)$), his wife is characterized in period t by her labor force status and educational attainment. Specifically, she is modeled as working full-time ($\text{wifework}_t = 1$) or not working full-time ($\text{wifework}_t = 0$), and whether she has completed college ($\text{wifeduc}_t = 1$) or not completed college ($\text{wifeduc}_t = 0$). Both of these characteristics are subject to change from period to period, but naturally, the education level can go in only one

[8] Taber (2001) finds that the inclusion of unobserved heterogeneity in the model can explain the perceived increase in the return to education in the 1980s.

direction—from being without a college education to becoming college educated.

The set of potential marriage options includes keeping the same marital status from one period to the next:

$$\text{mstatus}_t = m_{t-1} \quad \text{if mstatus}_{t-1} \in (0, 1, 2, 3, 4, 5, 6, 7, 8, 9).$$

Or, individuals can change their marital status according to the following logical sequence of marriages:

$$\begin{array}{ll} \text{mstatus}_t \in (1, 2) & \text{if mstatus}_{t-1} = 0 \\ \text{mstatus}_t \in (3, 4, 5) & \text{if mstatus}_{t-1} \in (1, 2) \\ \text{mstatus}_t \in (4, 5) & \text{if mstatus}_{t-1} = 3 \\ \text{mstatus}_t \in (6, 7, 8) & \text{if mstatus}_{t-1} \in (4, 5) \\ \text{mstatus}_t \in (7, 8) & \text{if mstatus}_{t-1} = 6 \\ \text{mstatus}_t = 9 & \text{if mstatus}_{t-1} \in (7, 8) \end{array}$$

In this manner, marital options are restricted so that marriages must occur in sequential order (i.e., one cannot go directly from the first marriage to the third marriage). In addition, individuals are potentially free to go from one marriage to the next marriage without spending a period being divorced and single, and they are allowed to marry one type of match in one marriage and a different type in a future marriage (i.e., $\text{mstatus}_{t-1} = 4$ and $\text{mstatus}_t = 8$). Within the set of potential marital options described above, the only option that is always available is to be single. That is, every man has the right to be single at any time. Therefore, single men can always reject any possible marriage offer and remain single ($\text{mstatus}_t = \text{mstatus}_{t-1} \in (0, 3, 6, 9)$), and married men always have the option to divorce their current wife and become single again.

However, available marital options are restricted in three further ways: (1) marriages can occur only if a man receives an offer; (2) although a man knows in advance the education level and labor status of the woman associated with any marriage offer, both characteristics of the wife are subject to change after marriage in probabilistic ways that the husband must accept or reject as a package deal; and (3) marriages may be terminated by the wife (i.e., the man does not have the option to continue with his current marriage). Formally, a married man will have his current marriage terminated unilaterally by his wife with probability π_t^D, in which case the man has to be single in the next period or choose to remarry if a new marriage offer was received. Marriage offers arrive with probability π_t^μ, which is the probability of receiving an offer to marry a woman with match quality type μ ($\mu = 1$ or 2). Marriage offers can be received by single or married men, and men are always free to reject the offer in the hope of getting a better offer in the future. If no marriage offer is forthcoming, a single man must remain single and a married man can remain married (if his wife did not terminate the marriage) or become divorced and single again. Therefore, the set of available marital options at each time t includes the 10 marital status levels (mstatus$_t$ $\in$ (0, 1, 2, 3, 4, 5, 6, 7, 8, 9)), and if mstatus$_t$ is associated with being married, there are four possible combinations of wife characteristics: wifework$_t$ $\in$ 0, 1 and wifeduc$_t$ $\in$ 0, 1. Consequently, there are 28 possible marriage states, denoted by m_t ($m_t = 1, 2, \ldots, 28$). The potential choice set of marriage states is denoted by M_t; however, the actual choice set is a function of the marital state in the previous period, m_{t-1}, and is conditional on whether a new marriage offer is received, the type of marriage offer, possible changes in the current wife's labor force activity and education level (if he is married), and whether the current wife terminates the current marriage (if he was married).

Thus, the full choice set contains four career options and 28 potential marriage options, all of which are assumed to be mutually exclusive and exhaustive. However, not all the options in the choice set have observable counterparts in the data. The four career choices are observable as well as the marital status of each man in our sample, including whether he is divorced or on his first, second, or third marriage. If the person is married, the education level and labor force status of the wife are also observed. The match quality "type" is not directly observable in the data, but variation in the quality of marriage matches is expressed indirectly in the data, because we do observe that certain types of marriages are more successful (endure longer) and are able to withstand certain types of observable shocks (i.e., wage shocks).[9] Allowing for heterogeneity in match types to enter the model controls for the selection on unobservables that, if not considered, could bias the estimated structural parameters. For example, if a "high unobserved ability" type of man has a strong marriage with a woman with observable traits that are typically associated with weak marriages (perhaps a low education level), it could be the case that he accepted the match because of its strength on unobservable dimensions. Without explicitly considering this possibility, the estimated structural parameters would be biased, because they would be influenced by the correlation between observable and unobservable traits of each person and his potential matches. In addition, allowing for variation in match quality produces a more realistic search process in the model's marriage market. With heterogeneity in "match offers," the model allows for the possibility that a man would turn down an offer from a weaker match in the hope of receiving an offer from a stronger match in the future, and thus captures the complex, forward-looking decision-making process inherent in the choice of marital status. As described later, this strategic decision process in the marriage market will interact with career choices.

[9] It does not necessarily have to be the case that all men agree who are the strong types of matches and who are the weaker matches. All that is necessary is that, for any given person, there is variation in the quality of the potential marriage with different women.

B. Parameterizations

1. Marriage Utility

The single-period utility associated with marriage option m_t is a function of whether the person is married, the type of match (if he is married), his wife's characteristics (if he is married), and how many divorces the person went through. The latter element is intended to capture the alimony (monetary costs) and psychological costs that accompany a divorce. After each divorce, the individual is assumed to pay an additional monetary cost each period thereafter.[10] Thus, divorce costs in period t can be characterized as follows:

$$\text{div}(m_t) = \begin{cases} 0 & \text{if mstatus}_t \leq 2 \\ \delta_1^d & \text{if } 3 \leq \text{mstatus}_t \leq 5 \\ \delta_1^d + \delta_2^d & \text{if } 6 \leq \text{mstatus}_t \leq 8 \\ \delta_1^d + \delta_2^d + \delta_3^d & \text{if mstatus}_t = 9. \end{cases} \tag{1}$$

The current utility of being married depends on whether the match is type 1 ($\text{mstatus}_t \in 1, 4, 7$) or type 2 ($\text{mstatus}_t \in 2, 5, 7$) and the education level of the wife and whether she works full-time or not.[11] Thus, the model allows for the pecuniary returns (the wife's income) and the monetary equivalent of the utility of being married to vary with the wife's characteristics and the match quality:

$$\text{marr}(m_t) = \begin{cases} \delta_1^m I(\text{type } 1) + \delta_2^m I(\text{type } 2) + \delta_3^m I(\text{wifework} = 1) \\ \quad + \delta_4^m I(\text{wifeduc} = 1) + \varepsilon_t^m & \text{if married} \\ 0 & \text{if single,} \end{cases} \tag{2}$$

where $I(\cdot)$ an indicator function equal to one if the argument is true (zero otherwise) and ε_t^m is an identically distributed random utility shock to the current marriage, which is uncorrelated over time and is experienced only by married individuals. This specification allows for variation in the utility of marriage across unobservable types of matches and observable characteristics of the wife, and also for the utility of the marriage itself to be stochastic, since, as pointed out in Mortensen

[10] It would be more realistic to make divorce costs a function of when each marriage ended, as well as the characteristics of the man and his wife at the time of divorce. However, interacting every marriage state with every possible combination of dates for each marriage ending and each characteristic of the husband and wife would explode the state space beyond any realistic possibility of estimating it with current computer resources.

[11] Allowing for more than two types of marriage would produce a richer search process; however, variation in the quality of the marriage is also produced by variation in the characteristics of women (education and labor force status). Since the marriage type is unobserved, it would be difficult to identify more than two types of marriage in addition to the four unobserved types of men.

(1988), the quality of the marriage match can change over time.[12] Therefore, if the marriage match deteriorates by the individual receiving a sufficiently bad shock to the marriage, he may decide to terminate the marriage and become single or marry someone else if a new marriage offer was received.

The net current-period utility associated with marital status m_t is the combined marriage utility and divorce costs:

$$u^m(m_t) = \text{marr}(m_t, \varepsilon_t^m) + \text{div}(m_t). \tag{3}$$

2. Career Utility

The current-period utility associated with each of the four career sectors is dependent on the accumulated levels of experience in each career sector as of year t (x_{0t}, x_{1t}, x_{2t}, and x_{3t}) and the individual's unobserved type (type = 1, 2, 3, or 4). To ease the notation, the vector of experience levels in all four career sectors is represented by X_t. For the home sector, utility is also a function of marital status and wife characteristics. Therefore, the one-period utility of choosing career sector j is generally represented by $u_t^k(j, m_t)$,which are specified for each of the four career sectors. Each function below is linear in its arguments, as detailed in Appendix table B1.

Home sector utility ($k_t = 0$):

$$u_t^k(0, m_t) = \sum_{m=1}^{4} b_{0m}^0 \text{type}_m + b_1^0 \text{age} + b_2^0 \text{age}^2 + b_3^0(\text{match type 1}) + b_4^0(\text{match type 2}) + b_5^0 \text{wifework} + b_6^0 \text{wifeduc} + \varepsilon_t^{k0}, \tag{4}$$

where b_{0m}^0 is the intercept for a type m person (m = 1, 2, 3, 4), Match type 1 is a dummy variable equal to one if married with a type 1 match, match type 2 is a dummy variable for being married with a type 2 match, wifework is a dummy variable for being married to a woman who works full-time, and wifeduc is a dummy for having a college-educated wife. The marriage variables are included because the decision to work is likely to be dependent on whether the person is married and the characteristics of the wife. This is especially true if the wife's income, which is a function of her education and whether she works, affects the man's decision to participate in the labor force. In addition, there could be psychological factors affecting the value of leisure that depend on the

[12] The model is not explicit about the motivation for marriage. The marriage literature focuses on the production of children in terms of their quantity and quality. Although fertility is not directly modeled in this paper, one reason why the utility of marriage should depend on the characteristics of the wife is that these characteristics affect her productivity in raising higher-quality children (see Gould, Moav, and Simhon 2008). Also, fertility outcomes will indirectly affect male decisions in the model if they work through the labor force participation decisions of the wife.

individual's marital status and, if married, the education level and labor force status of the spouse. The ε_t^{k0} term is a stochastic shock to the value of leisure in period t that is uncorrelated over time. The structure of all the shocks in the model will be discussed later.

Schooling sector utility ($k_t = 1$):

$$u_t^k(1, m_t) = b_0^1 + b_1^1\text{age18} + \text{tuition}(x_{1t}) + \text{entry}^1(x_{1t}, k_{t-1}) + \varepsilon_t^{k1}, \quad (5)$$

where age18 is a dummy variable for being 18 or younger at time t. The one-period net utility of being in school takes into consideration both the direct monetary costs of schooling and the potential consumption value of schooling. The tuition function allows for the costs of schooling to change with levels of schooling and is parameterized as a step function with steps for high school ($x_{1t} \leq 2$), college ($x_{1t} \leq 6$), and graduate school ($x_{1t} > 6$). The entry[1] function allows for the one-time costs of returning to school from a different sector (i.e., $k_{t-1} \neq 1$) to vary with the amount of schooling. That is, the costs of returning to high school are γ_1^1, and returning to college or graduate school costs γ_2^1 and γ_3^1, respectively.

Blue-collar sector utility ($k_t = 2$):

$$u_t^k(2, m_t) = \text{wage}^2(X_t, \text{type}, k_{t-1}, \varepsilon_t^{k2}) + \text{entry}^2(k_{t-1}), \quad (6)$$

where wage[2] is the blue-collar wage offer and entry[2] is the one-time (nonwage) cost of entering the blue-collar sector if the individual was not working in the blue-collar sector in the previous period ($k_{t-1} \neq 2$). The blue-collar wage function is parameterized as

$$\begin{aligned}\ln(\text{wage}^2) = \sum_{m=1}^{4} b_{0m}^1\text{type}_m + b_1^1\text{bcexp}_t + b_2^1\text{bcexp}_t^2 + b_3^1\text{wcexp}_t \\ + b_4^1\text{wcexp}_t^2 + b_5^1\text{HSG}_t + b_6^1\text{COG}_t + b_7^1\text{educ}_t \\ + b_8^1\text{age18}_t + b_9^1 I(k_{t-1} = 2) + \varepsilon_t^{k2}, \quad (7)\end{aligned}$$

where bcexp equals the accumulated years of experience in blue-collar work, wcexp equals the accumulated years of experience in white-collar work, HSG is a dummy for being a high school graduate, COG is a dummy for being a college graduate, educ is total years of schooling, and $I(k_{t-1} = 2)$ is an indicator variable equal to one if the person was in the blue-collar sector in the previous period. The nonwage entry cost captures the idea that there may be search costs in finding blue-collar work or starting work in the blue-collar sector (transportation, clothing, etc.). Inclusion of a return to white-collar experience in the blue-collar sector allows for the full or partial transferability of occupation-specific experience to the other occupation. In addition, the return to continuing to work in the blue-collar sector (b_9^1) is designed, along with the entry cost function, to capture the persistence of career choices across time periods (see Keane and Wolpin 1997). Also, specifying a return to staying in the same sector is equivalent to incorporating a human capital depreciation effect. The log wage offer is also subject to a linear stochastic component ε_t^{k2}, which is uncorrelated across time.[13]

White-collar sector utility ($k_t = 3$):

$$u_t^k(3,\ m_t) = \text{wage}^3(X_t,\ \text{type},\ k_{t-1},\ \varepsilon_t^{k3}) + \text{entry}^3(k_{t-1}), \tag{8}$$

where each component is defined analogously to the utility components in the blue-collar sector, although the parameters differ for each sector.

3. Correlation of Marriage and Career Shocks

In each period t, an individual receives four separate shocks (as shown above) to each career sector (ε_t^{kj}, $j = 0, 1, 2, 3$) and, if he is married, a marriage shock ε_t^m. All these shocks are presumed to be normally distributed (with mean zero) and contemporaneously correlated with each other, but mutually serially independent over time (Keane and Wolpin 1994). The variances of each shock and the correlations are calculated by the estimated components of the Cholesky decomposition matrix. Specifically, the realizations of ε_t^{kj} ($j = 0, 1, 2, 3$) were computed by

$$\begin{aligned}
\varepsilon_t^{k0} &= l_{00} f_{0t},\\
\varepsilon_t^{k1} &= l_{10} f_{0t} + l_{11} f_{1t},\\
\varepsilon_t^{k2} &= l_{20} f_{0t} + l_{21} f_{1t} + l_{22} f_{2t},\\
\varepsilon_t^{k3} &= l_{30} f_{0t} + l_{31} f_{1t} + l_{32} f_{2t} + l_{33} f_{3t},\\
\varepsilon_t^{m} &= l_{40} f_{0t} + l_{41} f_{1t} + l_{42} f_{2t} + l_{43} f_{3t} + l_{44} f_{4t},
\end{aligned}$$

where l_{kj} ($k = 0, 1, 2, 3, 4$; $j = 0, 1, 2, 3, 4$) are estimated parameters and f_{kt} ($k = 0, 1, 2, 3, 4$) are normally distributed, independently and identically distributed shocks with zero mean and variance equal to one. With the estimated parameters, it is straightforward to compute the variance of each shock and the correlation between any two types of shocks.

4. Marriage Offer Functions

In each period t, individuals may receive a new marriage offer with a type 1 or type 2 match quality. The probability of receiving an offer of either type is specified as a trivariate logit in which the three outcomes

[13] In a previous version, the wage functions were allowed to depend on marital status. The estimates suggested that the marriage premiums are much less than typical ordinary least squares estimates and are essentially zero for higher-skilled men. Because of these findings and the fact that it is difficult to interpret marital status as human capital, marital status is not specified in the wage function in this version.

are (1) no offer, (2) an offer for a type 1 match, or (3) an offer for a type 2 match.[14] The probability of receiving an offer for a type μ match is

$$\pi_t^{\mu} = \pi^{\mu}(X_{t-1},\ k_{t-1},\ m_{t-1},\ \text{type},\ t), \quad \mu = 1,\ 2,$$

where the base (suppressed) state is not receiving an offer at all. The probability of receiving an offer for either type of match depends on the individual's historical and current career and marital choices, as well as his age and type. Note that married people are allowed to receive new offers, but the probability of receiving an offer is likely to be affected by marital status. If the person receives a marriage offer, the probability that the woman associated with that offer is a college graduate is represented by

$$\pi_t^{\text{educoffer}} = \pi^{\text{educoffer}}(\mu,\ x_{1t},\ k_t,\ t), \tag{9}$$

which is modeled as a logit function dependent on the match quality of the offer μ, the man's current education level, his current career sector, and his age. The initial labor force status of the woman associated with the offer is determined by the logit probability

$$\pi_t^{\text{workoffer}} = \pi^{\text{workoffer}}(\mu,\ k_t,\ t),$$

which is a function of the match quality μ and the man's current career choice and age. In this manner, a marriage offer is composed of three elements packaged together: the match quality, the education level (college graduate or not), and whether she works full-time or not. In addition, this structure allows for the wife's characteristics to be correlated with the match quality of the offer.

Individuals can get married only if they receive an offer, and their choices are restricted to the type of match and characteristics associated with the received offer.

5. Endogenous Wife Characteristics

The type of match associated with a marriage offer is known in advance, although the match quality of a marriage is subject to change over time stochastically as described in equation (2). The initial education level and work status of a potential wife are also known in advance, but these characteristics are allowed to change over time. If the wife is not a college graduate, the probability that she becomes a college graduate is

$$\pi_t^{\text{wifeduc}} = \pi^{\text{wifeduc}}(\mu),$$

[14] The marriage decisions of women are not explicitly modeled and are considered exogenous (in equilibrium). However, it is worth noting that they may interact with career decisions in a manner similar to the marriage and career decisions of men (see Ehrlich and Kim 2007).

which is a logit function depending on the match quality of the marriage. The probability that the wife works full-time is represented by

$$\pi_t^{\text{wifework}} = \pi^{\text{wifework}}(\mu, \text{wifeduc}_t, \text{wifework}_{t-1}, k_t, t),$$

which is a logit function dependent on the match quality of the marriage, the wife's education level, her labor force status in the previous period, the husband's current labor force status, and the husband's age. In this manner, the characteristics of the wife are endogenously determined over time according to the match quality of the marriage and the husband's career and education choices, and these characteristics affect the choices of men as modeled above.

6. Involuntary Divorce

Individuals who are currently married may have their marriages terminated by their wives. The probability of an involuntary divorce at time t is specified as

$$\pi_t^d = \pi^d(k_{t-1}, x_{1t-1}, \text{type}, \text{wifeduc}_t, \text{wifework}_t).$$

Thus, the involuntary termination of marriages is modeled as a function of the husband's career choice, accumulated levels of schooling x_{1t-1}, the husband's unobserved type, and the wife's current education level and work status. These variables capture the extent to which divorce probabilities depend on the characteristics of the wife, as well as permanent elements of the husband's potential earnings (occupation, education level, and type). Meanwhile, divorce probabilities associated with stochastic career shocks will be picked up by the correlation of the marriage utility shock ε_t^m with the career utility shocks as described above. Although the man's type is exogenously determined, each person can affect his divorce probabilities through the choice of occupation and schooling investments over time. In addition, a man's choices affect his wife's characteristics, which in turn affect the probability of her terminating the marriage unilaterally.

7. Type Probabilities for Men

Each man is assumed to be one of four discrete types corresponding to four mass points in a nonparametric distribution of permanent unobserved heterogeneity (Heckman and Singer 1984). The probability of being a certain type of male is modeled as a multivariate logit represented by π^{type} (type = 1, 2, 3, 4).

8. Objective Function

The individual is assumed to maximize the present discounted value of lifetime utility from age 16 ($t = 1$) to age 39 ($t = T$). Let Ω_t represent the relevant information set with which the individual enters period t. The set Ω_t includes the individual's history of career decisions (denoted by X_{t-1}), marriage decisions (inferred from m_{t-1}), and his type. Given this set of relevant information, the one-period utility associated with any combination of marriage status m_t and career choice k_t is denoted by $U(m_t, k_t|\Omega_t)$ and is determined by equations (3) and (4)–(8) above:

$$U(m_t, k_t|\Omega_t) = u_t^k(k_t, m_t) + u_t^m(m_t). \tag{10}$$

This specification shows the interaction between marriage and career: current and historical marriage decisions affect career choices by altering the incentives to work, study, and choose one occupation over the other.[15] At the same time, current and historical career choices affect marriage opportunities by affecting the chances of getting a marriage offer, the match quality of the offer, the education level and work status of the woman associated with the offer, the education level and work status of the spouse during the marriage, and the probability of experiencing an involuntary divorce in the current and future periods. Thus, the interaction of marriage and career choices demands a maximization decision based on the joint and forward-looking marriage and career choice path.

Although all four career choices are available each period, marriage options are restricted to the available set defined by M_t above. Therefore, the available choice set in period t is given by the Cartesian product of the four career sectors multiplied by the marriage options contained in M_t. We denote the choice of element j in this feasible set in period t as $d_t^j = 1$ $(j = 1, \dots, J_t)$ and the utility associated with that choice as U_t^j (specified in eq. [10]). The individual's objective function is then represented as

$$V_t(\Omega_\tau) = \max_{\{d_t^j\}} E\left[\sum_{\tau=t}^{T}\sum_{j=1}^{J_\tau} \delta^{T-\tau} U_\tau^j d_\tau^j | \Omega_\tau\right], \tag{11}$$

where δ is the discount factor (fixed at 0.95) and E is the expectation operator taken over the joint distribution of utility and marriage shocks $(\varepsilon_t^{k0}, \varepsilon_t^{k1}, \varepsilon_t^{k2}, \varepsilon_t^{k3}, \varepsilon_t^{m})$, as well as the distribution of marriage offer probabilities (π_t^1 and π_t^2), the distribution of education and work status characteristics of potential offers ($\pi_t^{\text{educoffer}}$ and $\pi_t^{\text{workoffer}}$), the distribution of education and work status characteristics of current wives (π_t^{wifedu} and π_t^{wifework}), and distribution of involuntary divorce probabilities π_t^d. The

[15] As described above, the utilities for the various marriage and career choices are specified in a linear function. These functional form assumptions are restrictive and difficult to test, but nonlinear relationships are allowed in a flexible way by making the utility of each choice a function of dummy variables for each type, dummy variables for graduating from high school and college (as well as years of schooling entered linearly), and a quadratic in experience levels for each occupation.

solution to this problem yields the optimal stream of marriage and career decisions over time.

C. Model Solution and Estimation

1. Solution

The solution of the model is not analytic and therefore is solved numerically using backward recursion starting from a terminal age T. The maximization problem in equation (11) can be rewritten as the maximization over the value functions of the available set of joint marriage and career states j ($j = 1, \ldots, J_t$) at time t, denoted as $V_t^j(\Omega_\tau)$, which satisfy the Bellman (1957) equation:

$$V_t(\Omega_t) = \max [V_t^1(\Omega_t), \ldots, V_t^J(\Omega_t)]$$

and

$$V_t^j(\Omega_t) = U_t^j + \delta E[V_{t+1}(\Omega_{t+1})|(d_t^j = 1), \Omega_t]. \tag{12}$$

Therefore, given any set of parameters, solving the model consists of simulating all the stochastic components of the model at each point in the state space (every possible combination of historical marriage and career decisions for every type up to period t) and using backward recursion to calculate U_t^j and $E[V_{t+1}(\Omega_{t+1})]$ (see Keane and Wolpin 1994, 1997). The latter term is called the $E\max_{t+1}$ function for convenience. At each iteration in the estimation, 20 draws of the entire set of stochastic components were taken at every point in the state space with the current set of parameter values to estimate the $E\max_t$.[16] The value of $E\max_T$ for the terminal period T is parameterized as a function of the marriage match quality and historical and terminal career choices: $E\max_T(X_T, k_T, \text{mstatus}_T)$.

2. Estimation

To estimate the model, the numerical solution of the dynamic programming problem described in the previous section is nested within an algorithm that maximizes a likelihood function. The likelihood function is built using a technique developed by Keane and Wolpin (2001), which is based on simulating a set of choice histories and matching these choice histories with observed choices in the data.[17] Suppose that H_i represents the observed vector of marriage and career choices (and wage outcomes) throughout the sample period for individual i in the NLSY data. At each iteration in the estimation procedure, the model is

[16] The estimates were not sensitive to increasing the number of draws.

[17] The presentation of Keane and Wolpin's (2001) method in this section closely follows the discussion in the original paper.

simulated with the current set of parameters to produce the marriage and career histories of N artificial agents. The contribution of individual i to the likelihood function during this iteration would be the fraction of artificial agents with the same history of outcomes observed for individual i. However, given the large array of potential choice histories, this fraction will often be zero, especially when one considers the probability of simulating an agent with an identical set of historical wage levels in each period. Therefore, the likelihood contribution of individual i is built under the assumption that there is measurement error in the reported choices and wages of individual i in the data; and once this possibility is considered, the outcomes of any artificial agent could actually be the true outcomes of individual i. However, the probability that a given artificial agent's outcomes match those of individual i increases with the similarity of their historical outcomes. Therefore, the contribution of individual i to the likelihood is, intuitively speaking, the fraction of artificial agents in the data with the most similar set of choice histories and wages as reported by individual i in the data.

If the choices of individual i are not observed in the data for a particular time period, this choice is simply not considered when matching the observed choices of individual i to the simulated choices of each artificial agent. In this manner, the procedure adopted here deals effectively with the problem of unobserved initial conditions (see Heckman 1981) and state variables. These problems can be quite severe when constructing marriage and employment histories from NLSY data, because the relevant information is frequently missing for some respondents in various years.[18] Consequently, the sample size in this analysis is much larger than the samples used in many previous dynamic programming studies using the NLSY (e.g., Keane and Wolpin 1997). The details of the estimation procedure are described in Appendix A.

IV. Results

A. *Fit of the Model*

Before discussing the results, I first present the fit of the model. Figures 1*A* and 1*B* show that the model produces patterns of career choices very similar to those reported in the NLSY sample. In particular, the model captures the sharp drop in schooling and the eventual overtaking of the blue-collar sector by the white-collar sector. Figure 1*C* displays a close fit of the model for the average blue-collar and white-collar wages as well. The model also fits the marriage choices of men over time. Figure 2*A* shows a very close fit to the age at first marriage and the

[18] The estimation uses techniques developed by a long list of papers. A partial list includes Heckman (1981), Heckman and Singer (1984), Miller (1984), Wolpin (1984), Pakes (1986), Rust (1987), Hotz and Miller (1988), Hotz et al. (1994), Keane and Wolpin (1994, 1997, 2001), and Stern (1997).

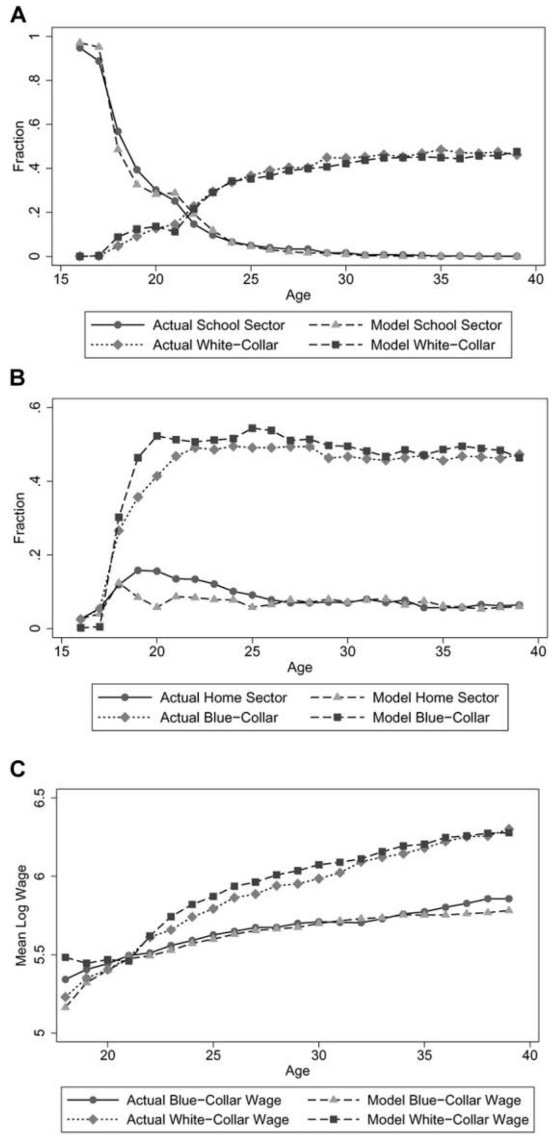

Figure 1.—*A*, Model fit of career choices, school and white-collar sectors. *B*, Model fit of career choices, home and blue-collar sectors. *C*, Model fit of white- and blue-collar wages.

stock of men who are currently on their first marriage. Concerning second and third marriages, the model picks up the broad patterns and magnitudes shown in figures 2*C* and 2*D*, but the fit is not exact (the very small scale on these graphs exaggerates the appearance of rather small differences). The model also provides an accurate fit of the wife characteristics (percent college graduates and percent working full-

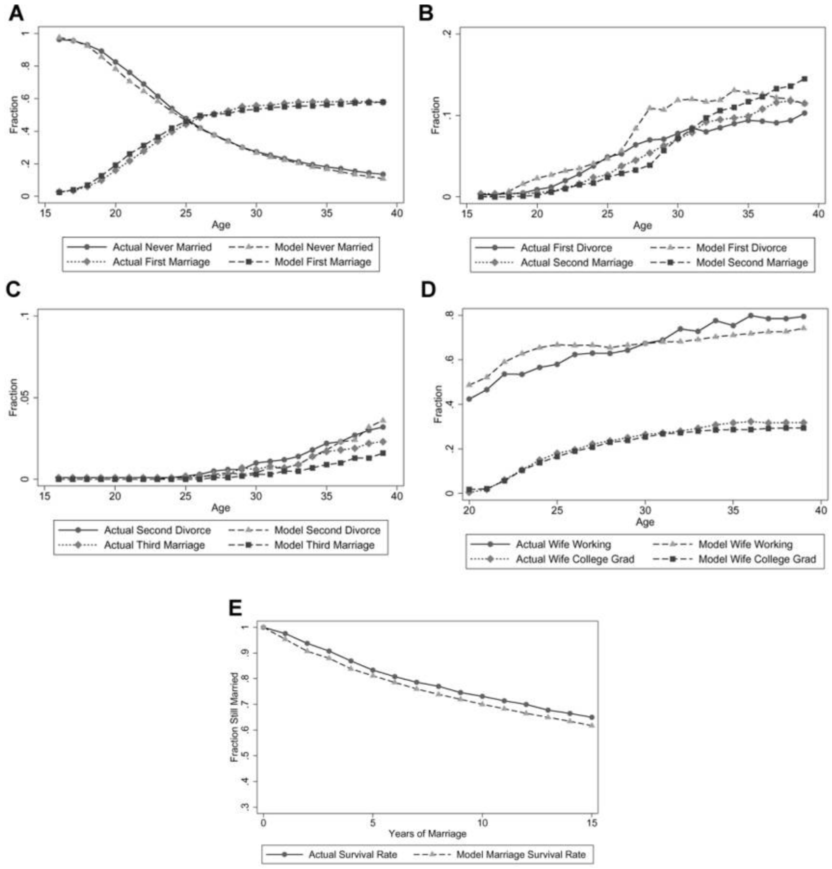

Figure 2.—*A*, Model fit of marriage choices, never married and first marriage. *B*, Model fit of marriage choices, first divorce and second marriage. *C*, Model fit of marriage choices, second divorce and third marriage. *D*, Model fit of wife characteristics. *E*, Model fit of first-marriage survival rate.

time), as shown in figure 2*D*. In figure 2*E*, the model is shown to estimate the survival rates of first marriages quite well, although marital success is somewhat underestimated. Tables 4 and 5 display a close fit for the transitions between marital states and career choices across adjacent time periods.

Overall, the model appears to capture many of the patterns over time observed in the data: marriage choices, wife characteristics, career choices, wages in both sectors, transitions, and the survival rate of marriage. However, it is left to the reader to decide whether the fit is good enough to draw credible inferences from the results and counterfactual experiments presented in the rest of the paper.

TABLE 4
ACTUAL AND MODEL PREDICTED MARRIAGE TRANSITION MATRIX

	Status in Period $t+1$							
Status in Period t	Never Married (Single)	First Marriage	First Divorce (Single)	Second Marriage	Second Divorce (Single)	Third Marriage	Third Divorce (Single)	Row Sample Size in NLSY
Never married (single):								
Actual	.92	.07						20,137
Model	.92	.08						
First marriage:								
Actual		.97	.03	.0				16,546
Model		.97	.03	.0				
First divorce (single):								
Actual			.88	.12				2,149
Model			.88	.12				
Second marriage:								
Actual				.95	.04	.01		2,037
Model				.96	.04	.00		
Second divorce (single):								
Actual					.89	.11		326
Model					.89	.11		
Third marriage:								
Actual						.93	.07	245
Model						.99	.01	

Note.—The actual entries represent the actual transitions in the NLSY data (the percentage of persons in the row's marriage category who move to the category in the column); the model entries represent the model predictions. The empty cells represent transitions that defy a logical order of marriage situations, so they are by definition empty. Persons who transition into the "third marriage" are not allowed to transition out of this category in the analysis.

TABLE 5
Actual and Model Predicted Career Choices Transition Matrix

Choice in Period t	Choice in Period $t+1$: School	Blue-Collar	White-Collar	Home	Row Sample Size in NLSY
School:					
Actual	.67	.12	.12	.08	2,942
Model	.69	.11	.13	.07	
Blue-collar:					
Actual	.01	.82	.10	.07	5,603
Model	.00	.90	.01	.08	
White-collar:					
Actual	.02	.11	.84	.03	16,118
Model	.01	.02	.93	.04	
Home:					
Actual	.08	.46	.17	.29	12,596
Model	.05	.57	.23	.15	

Note.—The actual entries represent the actual transitions in the NLSY data (the percentage of persons in the row's career category who move to the category in the column); the model entries represent the model predictions.

B. *Discussion of the Estimates*

There are too many (148 to be exact) coefficients to discuss individually, but several patterns emerge in the estimates presented in Appendix table B1. First, there are four unobserved types of men, which serve to produce a positive correlation between starting wages in each occupation and marriage success (indicated by the intercepts in the marriage offer functions and divorce function). As a result, these unobserved types are showing that part of the correlation between marriage market success and labor market success is due to the unobserved characteristics of individuals, and not to the choices they make. However, the estimates also show that higher investments in human capital (education and occupational-specific work experience) increase the probability of getting a marriage offer and decrease the chance of suffering an exogenous divorce. In addition, these same variables increase the chances of receiving a "better" marriage offer, which turns out to be the type 2 match. The current-period utility of type 2 matches is 166.9 versus 94.8 for a weaker, type 1 match. Type 1 matches are roughly twice as common as the stronger, type 2 matches (as shown in fig. 3). A wife who works full-time adds 41.3 to the current-period utility of marriage, whereas a wife with a college education adds 48.0. Moreover, type 1 matches are less likely to be college graduates and more likely to work than the stronger, type 2 matches.[19] The chances of obtaining a type 2 match increase with education and working in the white-collar sector, and for the unobserved types of men with the higher wage intercepts—a pattern consistent with

[19] For example, when the husband is 30 years old, 86 percent of the wives associated with type 1 matches work and only 17 percent are college graduates. For type 2 matches, only 31 percent work full-time and 42 percent are college graduates.

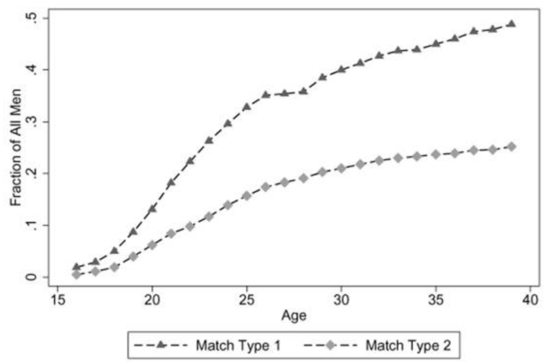

Figure 3.—Model prediction of marriage match types

the high rate of assortative mating found to be important in many advanced countries (Fernandez and Rogerson 2001; Fernandez et al. 2005).

Overall, the estimates show that higher levels of ability and education increase the chances of getting married, finding a higher-quality match, and staying married longer. These patterns demonstrate the interactive, joint, and forward-looking nature of the marriage and career decision-making process for men. The extent to which marriage considerations affect career choices is examined in the next section.

C. *Counterfactual Experiments*

The estimation of the structural parameters of the model allows for countless counterfactual experiments, which are performed by simulating the model after changing the parameters in various ways. The following experiments were chosen to demonstrate and quantify the importance of the interaction between marriage and career decisions.[20]

Experiment 1: No Returns to Career Decisions in the Marriage Market

This experiment is designed to see how much career decisions are governed by their returns in the marriage market. To examine this question, I simulate the model after turning off the possibility of marriage.[21] In this manner, I estimate how men would react if there were no possibility that their actions would affect their chances of getting a marriage offer,

[20] It is important to interpret the results from these counterfactual simulations as measuring what would happen to the average individual under current labor market and marriage market conditions, rather than a general equilibrium effect.

[21] Technically, this was done by setting the current utility of each marriage type to be equal to −999, which produces the result that no one chooses to get married in the simulation.

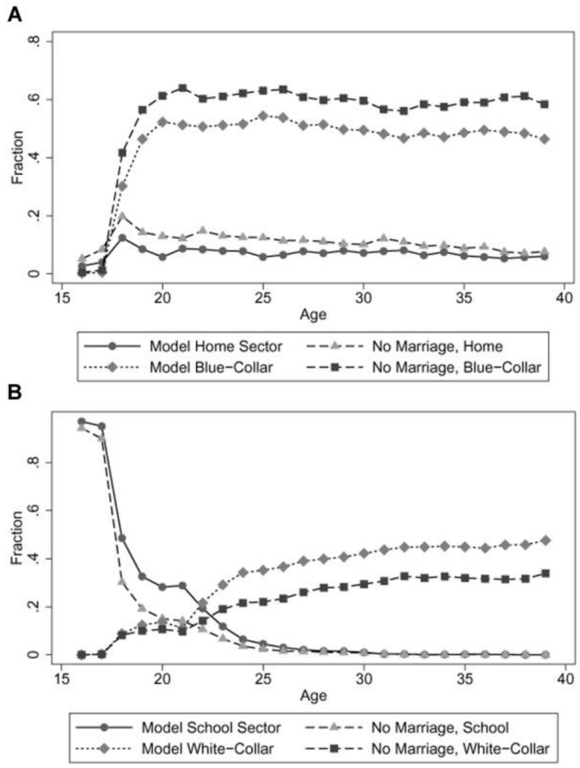

Figure 4.—Experiment 1 (no marriage market). *A*, Home and blue-collar sectors. *B*, School and white-collar sectors.

the type of marriage offer, and the chances for divorce. Figures 4*A* and 4*B* compare the differences in career decisions from the estimated model and from the experimental simulation. The results suggest that marriage plays a significant role in the career decisions of men. Without the possibility of marrying, men would work less and study less; and if they do work, they would work more in the blue-collar sector than in the white-collar sector. For example, at age 35, the percentage of men at home increases from 6.2 to 8.8, the percentage of men in the white-collar sector drops from 44.9 to 32.0, the percentage in the blue-collar sector increases from 48.6 to 59.1, and average years of schooling drops from 13.8 to 12.9.

These differences show that there is a significant payoff in the marriage market to working, studying, and working in the white-collar sector over the blue-collar sector. Without the returns to these activities in the marriage market, men would make career decisions in a distinctly different manner. Although there is an existing literature on the "marriage premium" in the wage function, the results of this experiment highlight the ways in which marriage considerations and outcomes affect wages

TABLE 6
Returns to a College Education

Returns to Completing College Instead of Working from Age 18 to 22	Type 1	Type 2	Type 3	Type 4
Total expected utility (%)	32.1	30.3	35.4	35.6
Wage in white-collar sector (%)		27.4		
Wage in blue-collar sector (%)		20.2		

Note.—The return to total utility is computed as the return to the maximum *E*max value at age 22 among those who completed college to the maximum *E*max value for those who are only high school graduates. The wage returns are equal to the increase in the current wage (in each sector) due to an extra 4 years of schooling instead of an extra 4 years of experience within the same sector.

and labor market choices—by affecting decisions about investing in education, labor force participation, and occupational choices before marriage, during marriage, and after marriages end. Furthermore, these results show that traditional estimates of the returns to labor market decisions underestimate the true private returns without considering their impact in the marriage market. These findings are consistent with those of Angrist (2002), who shows that marriage prospects, represented by the sex ratio within an individual's ethnic group, affect the labor market outcomes of men and women within that ethnic group.

This point is explored further in table 6 which calculates the total return to obtaining a college education versus entering the workforce after high school completion. To be precise, table 6 computes the wage increase at the age of 23 in both occupations due to obtaining a college education versus the alternative of working in the sector continuously since high school completion. The wage return to college is 27.4 percent in white-collar work and 20.2 percent in blue-collar work. In contrast, the difference in expected utility at age 23 for someone with a college degree versus someone with only a high school diploma varies from 30.3 percent (type 2 men) to 35.6 percent (type 4 men).[22] Therefore, the returns to college in terms of wages substantially underestimate the total returns to expected utility. The difference is due to the significant returns to college in the marriage market, thus highlighting the importance of considering the full return to schooling when making the investment decision.

Experiment 2: No Wife Works

This experiment is performed in order to measure the effects of the dramatic increase in labor force participation of married women over

[22] The goal of this exercise is to estimate the difference in utility after exogenously forcing someone to go to college vs. not going to college. As such, the difference was computed after not allowing the high school–educated person to endogenously choose to go to college in later years.

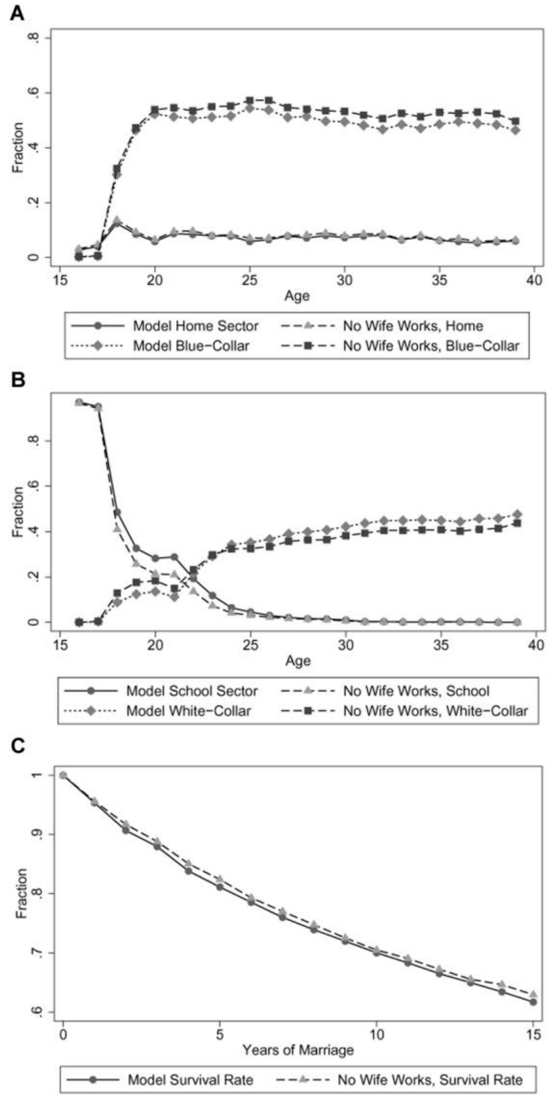

Figure 5.—Experiment 2 (no wife works). *A*, Home and blue-collar sectors. *B*, School and white-collar sectors. *C*, Survival rate of first marriage.

the last few decades. As noted above, the coefficient for "wife works full-time" in the marriage utility function came out to be 41.3, but it remains to be seen how this extra utility associated with a wife who works full-time affects the career and marital outcomes of men. The experiment is performed by simulating the model after reducing to zero the probability that a wife will work. The results are displayed in figures 5*A*–5*C*.

These figures show that reducing the prospects of obtaining a wife who works full-time reduces the incentives to invest in education and causes a shift toward blue-collar work from white-collar work. For example, at age 35, the percentage of men in the white-collar sector drops from 44.9 to 40.8, the percentage in the blue-collar sector increases from 48.6 to 52.9, and average years of schooling drops from 13.8 to 13.3. However, there is no change in the percentage of men at home. Interestingly, there is a very small increase in the success of marriage, as shown in figure 5*C*, but the magnitude is negligible. Overall, these effects move in the same general direction as shutting off the prospects of marriage altogether (as seen in the previous experiment) but are considerably smaller in magnitude. Nonetheless, these results show that a significant portion of the effects of marriage on career decisions stems from the prospects of having a wife who works full-time. But increasing the labor force participation of wives has little effect on the survival rate of marriage.

Experiment 3: No Wife Is a College Graduate

This experiment examines the impact of the dramatic increase in education for women. As noted above, the coefficient for "wife is a college graduate" in the marriage utility function came out to be 48.0. The experiment is performed by simulating the model after reducing to zero the probability that a wife will be a college graduate. The results in figures 6*A* and 6*B* are similar to those of the previous experiment: At age 35, the percentage of men in the white-collar sector drops from 44.9 to 35.6, the percentage in the blue-collar sector increases from 48.6 to 57.5, there is a negligible drop in the home sector, and average years of schooling drops from 13.8 to 13.2. These effects are similar in direction to, but larger in magnitude than, those in the previous experiment. The similarity of results between this experiment and the previous one, however, should not be very surprising given that the utility coefficients are similar for having a wife who is a college graduate or having a wife who works full-time. The effects are larger in this experiment probably because the returns to obtaining a college-educated wife are a bit larger than having a wife who works and also because of the relative scarcity of college-educated women versus wives who work full-time. There are fewer wives with a college education than there are women who work, and the work status of a wife can change easily from year to year, whereas very few women become college graduates after they get married. These factors produce more variation in college attainment among women than there is for working full-time. Therefore, reducing the possibility of marrying a college-educated woman reduces the variation in potential wives more than removing the prospects of marrying a wife who works full-time. This reduction in the variance in

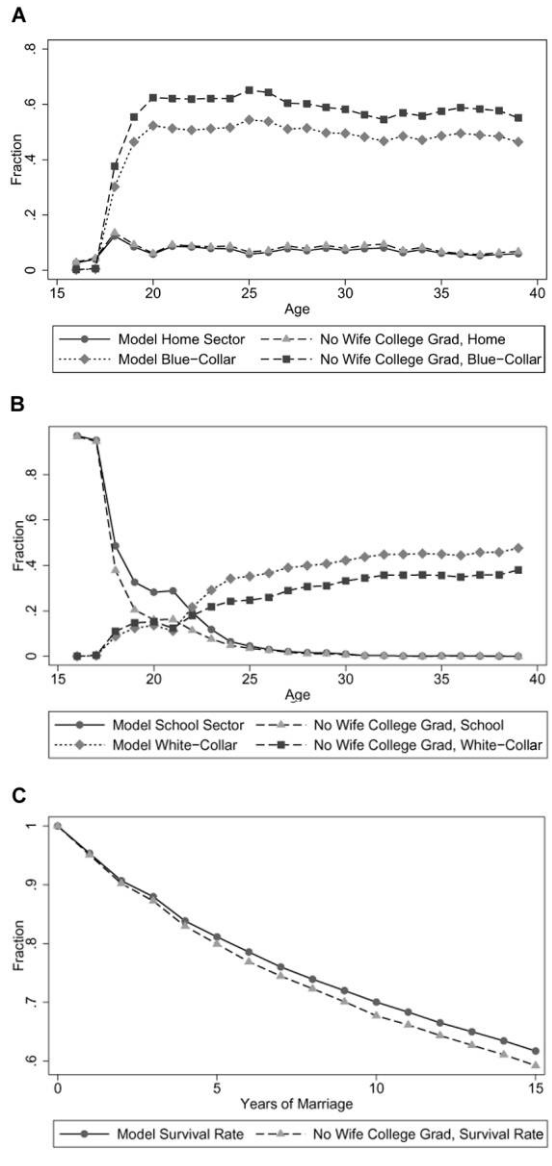

Figure 6.—Experiment 3 (no wife is a college graduate). *A*, Home and blue-collar sectors. *B*, School and white-collar sectors. *C*, Survival rate of first marriage.

the utility of marriage reduces incentives to invest in human capital in order to obtain a better match.[23]

[23] These results are consistent with those of Loughran (2002) and Gould and Paserman (2003), who show that increasing variation in the wages of men caused women to search longer for a husband.

In contrast to the previous experiment, the results of this experiment show that removing the prospects of marrying a college-educated wife leads to less stable marriages. Figure 6*C* shows that the survival rate of a marriage at 10 years drops from 70.0 percent to 67.7 percent. Therefore, the increasing investments in education by women seem to have led to more durable marriages, larger variation in the utility from marriage, larger investments in schooling by men, and a shift by men toward white-collar work.

Experiment 4: Increasing Divorce Costs

A natural policy instrument that affects marriage market decisions is divorce costs. This experiment traces out the effects of doubling the costs of divorce.[24] As a result of this experiment, figures 7*A* and 7*B* show that men shift away from blue-collar work (48.6 percent declines to 41.9 percent) toward white-collar work (44.9 percent increases to 52.0 percent), whereas average years of schooling increases from 13.8 at age 35 to 14.2. These patterns are likely the result of men taking preemptive actions before marriage in order to increase the chances of finding a more durable match, as well as men taking steps during marriage that lead to a more stable relationship. Both of these goals are accomplished by making larger investments in education and white-collar work (vs. blue-collar work). In this manner, men are altering their choices in order to avoid the larger costs associated with divorce.

The marriage outcomes from this experiment are displayed in figures 7*C* and 7*D*. These figures show very little change in the age at first marriage but show a large increase in the survival rate of marriage after 10 years (72.0 percent increases to 85.5 percent). The last result stems from three phenomena: (i) with everything else held constant, increasing divorce costs make it less likely that a man will choose to get divorced; (ii) the increasing human capital investments made by men lower the probabilities that the wife will want a divorce; and (iii) as a man invests more in human capital, his chances of obtaining a better match increase, thus leading to greater stability of the marriage.[25]

Experiment 5: No Possibility for Remarriage

This experiment examines the extent to which men's decisions are influenced by the option of remarriage. Consequently, the probability of receiving a marriage offer in this experiment is set to zero if one is or ever has been married. Figures 8*A*–8*D* show that the results from this

[24] Technically, the current-period costs of divorce were doubled and the terminal values of each divorce were doubled.

[25] These results are consistent with those of Friedberg (1998), who uses state-level panel data to show that the adoption of "unilateral" divorce laws increased the state-level divorce rate. Wolfers (2006) argues that the increase in divorce was not permanent.

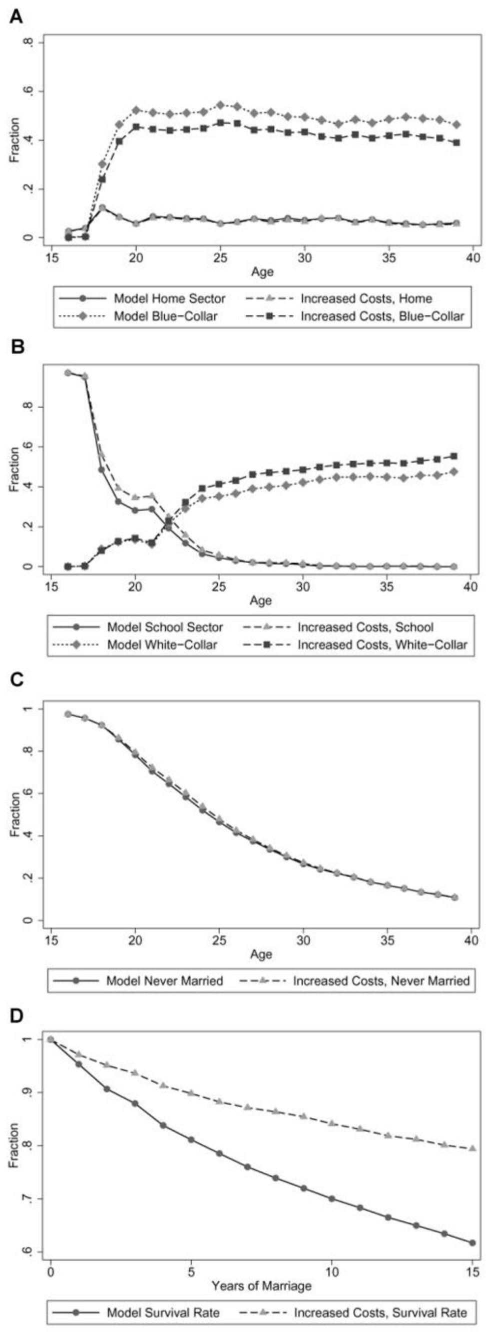

Figure 7.—Experiment 4 (double divorce costs). *A*, Home and blue-collar sectors. *B*, School and white-collar sectors. *C*, Never married. *D*, Survival rate of first marriage.

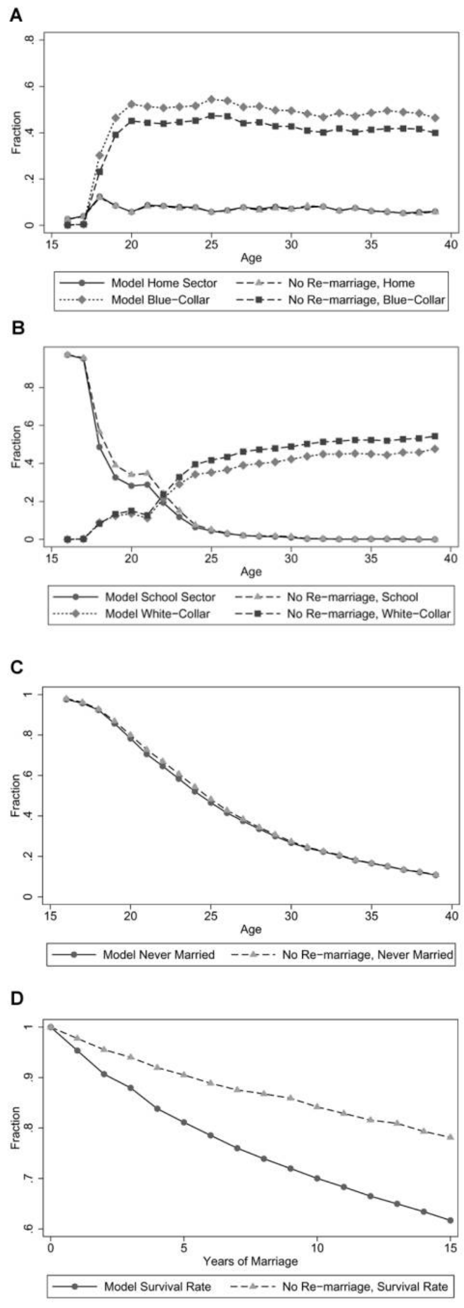

Figure 8.—Experiment 5 (no remarriage). *A*, Home and blue-collar sectors. *B*, School and white-collar sectors. *C*, Never married. *D*, Survival rate of first marriage.

experiment are very similar to those obtained in the last experiment, which doubled divorce costs. For example, there is a decline in blue-collar work (48.6 percent to 41.3 percent) and an increase in white-collar work (44.9 percent to 52.3 percent), and average years of schooling increases from 13.8 at age 35 to 14.2. Also, there is no significant change in the age at first marriage presented in figure 8*C*, but there is a large increase in the survival rate of marriage (the survival rate at 10 years of marriage increases from 72.0 percent to 85.9 percent). All these patterns are very similar in size and direction to the patterns in the previous experiment.

Therefore, the results from the last two experiments demonstrate the extent to which individuals change their behavior preemptively, sometimes even before they get married in the case of choosing to go to college or to start off in the white-collar sector versus the blue-collar sector, in order to lower the risk of their future or current marriage. These findings have implications for the way laws and norms have changed over time regarding divorce. When divorce was costly and rare, men would take preemptive actions in order to increase the chances of a successful first marriage. But, as divorce has become cheaper and the prospects for remarriage increase with the size of the market for people looking for second marriages, preemptive investments in education and white-collar work are less necessary over time.

V. Conclusion

The existing literature largely ignores the possibility that career and educational choices are influenced by potential payoffs in the marriage market. The results in this paper demonstrate that these considerations are important: if there were no returns to career outcomes in the marriage market, men would work less, study less, and work more in the blue-collar sector than in the white-collar sector. In addition, the results of the model highlight several new channels through which marriage affects wages. Although there is an existing literature on the “marriage premium” in the wage function, this paper shows that marriage considerations affect wages over time by affecting decisions about education investments, labor force participation, and occupational choices.

The results also show that men alter their career decisions to increase their chances of matching with a wife who works or is college educated. Specifically, men invest more in education and white-collar work versus blue-collar work to increase the chances of marrying a wife who works or is a college graduate. The largest incentive is for increasing the prospects of obtaining a college-educated wife relative to a wife who works. These larger effects are most likely due to the larger payoff to marrying a college-educated wife than one who works and also to the scarcity of college-educated wives (roughly 32 percent) versus those working full-time (roughly 80 percent). This latter factor is especially important considering that working is something that can change from year to year, but few women become college graduates after they get married. Marrying a college-educated wife also increases the stability of marriage, whereas the labor force participation of wives does not seem to affect the duration of a marriage.

The results also shed light on the changing norms and laws regarding divorce over the last few decades and how these changes have influenced the human capital and career decisions of men. As divorce costs decline, the model suggests that men take fewer precautionary measures to avoid a marital breakup. These measures include investing in education and white-collar work versus blue-collar work, which are shown to affect the probability of divorce directly and also indirectly through increasing the probability of finding a better, more durable match. Similar results are obtained when the market size for second marriages increases: an increase in the chances of getting remarried reduces the risk of marrying someone who is not a great match and increases the incentives to dissolve a deteriorating marriage in the hopes of finding a better match the second or third time around. Therefore, declining divorce costs and an increase in the market size for second marriages both serve to reduce the incentives for men to take precautionary measures through their human capital and career decisions in order to increase the chances of a successful first marriage.

Overall, this paper shows that overlooking the significant returns to career decisions in the marriage market underestimates the true private returns to human capital decisions. As such, the paper demonstrates the importance of considering the interactive and forward-looking nature of the marriage and career decision process of men over time, a process that has not been examined in the existing literature.

Appendix A

This appendix describes the details of the estimation algorithm, which is based on simulating the complete marriage and career histories of a set of artificial agents ($n = 1, \ldots, N$). Given a set of parameter values, the simulation for agent n is performed as follows:

1. Draw agent n's type according to the current probabilities π^{type} (type = 1, 2, 3, 4).
2. Conditional on n's type and state variables (X_{t-1}, m_{t-1}, k_{t-1}), draw from all the stochastic elements in the model to determine the available career and marriage options at time t: the career sector and marriage utility shocks (ε_t^{k0}, ε_t^{k1}, ε_t^{k2}, ε_t^{k3}, ε_t^{m}), the marriage offer functions (π_t^1 and π_t^2), education and work status characteristics of received offers ($\pi_t^{\text{educoffer}}$ and $\pi_t^{\text{workoffer}}$), updated education and work status of a current wife of a married man (π_t^{wifedu} and π_t^{wifework}), and the exogenous divorce probability function of a married man (π_t^d).

3. According to the agent's type and realizations of the stochastic elements in step 2, the agent considers the $E\max_{t+1}$ term for each option, which was already constructed at the current parameterization, and evaluates each current marriage and career option using equation (12). The agent chooses the joint marriage and career option with the highest expected value over the current set of J options: $\max[V_t^1(\Omega_t), \ldots, V_t^J(\Omega_t)]$.
4. The state variables (X_t, m_t, k_t) are updated according to the choice in step 3.
5. Repeat steps 2–4 until $t = T$.

Doing this N times produces N artificial agents with a complete set of marriage and career outcomes over T periods ($N = 2{,}000$ in the actual estimation). The likelihood function is formulated using the simulated choices, although as Lerman and Manski (1981) point out, the probability that the entire career and marriage choices of a simulated agent (including wages) matches someone in the data is infinitely small. Instead, the construction of the likelihood is based on the idea that there is classification error in the reported choices, and therefore, there is a positive probability that the simulated choices of any artificial agent are the true choices of any given person in the data. For example, the probability that a person reports choosing career sector i in year t in the data, while his true choice is indeed i, is given by

$$P_{ii}^t = E + (1 - E)\Pr(\text{true choice}_t = i),$$

and the probability that a person reports sector i while his true choice is j is represented as

$$P_{ij}^t = (1 - E)\Pr(\text{true choice}_t = i),$$

where E is interpreted as the base classification error rate, and $\Pr(\text{true choice}_t = i)$ is equal to the proportion of simulated agents who choose i in period t. This formulation assumes that classification error is unbiased in the sense that the probability that a person reports sector i is equal to the probability that the true choice is sector i. The likelihood is then built by computing the probability that the true history of choices by each person in the data is equal to the simulated choices of each artificial agent. For example, the probability that a person reports a history of choices H when the true choices represented by artificial agent n are H^n is given by

$$\Pr(H|H^n) = \prod_{t=1}^{T} P_{ij}^t, \tag{A1}$$

where the reported choice in any given period is i and the simulated choice of artificial agent n in period t is j. Other discrete outcomes, such as marriage decisions and wife characteristics, are handled similarly and are simply multiplied by the expression above on the basis of the assumption that classification error is distributed independently across decisions and over time. Wages, however, are not discrete outcomes, so they cannot be handled in the exact same way. Therefore, the reported wage is assumed to be measured with error, whereby the measurement error is distributed lognormally. Specifically, the reported wage w_i^k in occupation k is related to the simulated wage w_n^k by

$$w_i^k = w_n^k \exp\{\varepsilon\}, \quad \varepsilon \sim N(0, \sigma_\varepsilon^2),$$

where ε is the measurement error of wages in either occupation.[26] The product of the realized outcomes for ε in each period is simply multiplied by the discrete choice probabilities in equation (A1). In this manner, the likelihood contribution for each individual is constructed by computing the product of the classification error rates for each simulated history of choices by an artificial agent and then averaging over all the simulated agents. If a reported choice is missing in period t, there is no contribution to the product of classification error rates in that period. As such, the estimation method follows very closely the technique developed by Keane and Wolpin (2001), which was shown by Keane and Sauer (2003) to perform well in Monte Carlo experiments.[27]

Appendix B

TABLE B1
Parameter Estimates

	Log Wage Functions			
	Blue Collar		White Collar	
Type 1 intercept	4.715	(.0037)	4.541	(.0041)
Type 2 intercept	4.829	(.0035)	4.598	(.0029)
Type 3 intercept	5.039	(.0040)	4.891	(.0049)
Type 4 intercept	5.357	(.0033)	5.160	(.0025)
Experience	.048	(.0025)	.058	(.0029)
Experience squared/100	−.143	(.0010)	−.136	(.0012)
High school graduate	.205	(.0011)	.184	(.0067)
College graduate	.071	(.0017)	.205	(.0008)
Education	.022	(.0025)	.061	(.0016)
Under 18	−.046	(.0228)	−.471	(.0169)
Experience in the other occupation	.030	(.0012)	.031	(.0006)
Experience squared in the other occupation	−.118	(.0036)	−.043	(.0029)
Worked in same occupation in previous period	.171	(.0009)	.200	(.0066)

	Probability Functions for Four Types of Men (Multivariate Logit)		
	Logit Coefficients		Estimated Percentage of Men of Each Type
Intercept for type 2	.145	(.0124)	30.2%
Intercept for type 3	−.16	(.0083)	21.9%
Intercept for type 4	−.14	(.0073)	23.0%

[26] As in Keane and Wolpin (2001), if the artificial agent is simulated to be in a career sector other than occupation k, the reported wage is assumed to be drawn from the same distribution of true wages, except for being multiplied by a factor $\exp\{\alpha^k\}$: $w_i^k = w_n^k \exp\{\varepsilon^k\}\exp\{\alpha^k\}$.

[27] The likelihood was maximized using a simplex algorithm. Standard errors were estimated as follows. Let g_i be the vector of derivatives of the log contribution to the log likelihood of person i with respect to the set of parameters θ: $g_i = (\partial \ln L_i)/\partial\theta$. This derivative was approximated by taking small steps (h) in the estimated parameters θ: $\hat{g}_i = [\ln L_i(\theta) - \ln L_i(\theta + h)]/h$. The covariance matrix is then estimated by $(\sum_i \hat{g}_i\hat{g}_i')^{-1}$.

TABLE B1
(*Continued*)

	Marriage Offer Functions for Two Types of Matches (Trivariate Logit)			
	Type 1 Match		Type 2 Match	
Male type 1 intercept	−4.098	(.0086)	−4.941	(.0092)
Male type 2 intercept	−4.029	(.0072)	−5.046	(.0103)
Male type 3 intercept	−4.265	(.0080)	−5.509	(.0103)
Male type 4 intercept	−4.169	(.0081)	−4.447	(.0078)
Education	.116	(.0015)	.157	(.0017)
Blue-collar experience	.087	(.0013)	.084	(.0013)
White-collar experience	.067	(.0013)	.128	(.0013)
Age	−.094	(.0012)	−.107	(.0029)
High school graduate	.297	(.0046)	.336	(.0050)
College graduate	.131	(.0072)	.269	(.0073)
Currently in high school	.087	(.0191)	−.069	(.0170)
Currently in post–high school studies	.100	(.0090)	−.300	(.0120)
Working in blue-collar job	1.514	(.0042)	1.297	(.0047)
Working in white-collar job	1.296	(.0044)	1.446	(.0054)
Currently in first marriage	−3.743	(.4446)	−5.497	(.0465)
Ever divorced	−3.486	(.0058)	−4.501	(.0130)
Divorced and single	4.058	(.0061)	2.818	(.0115)

	Female Characteristics of Marriage Offer	
	Probability of New Marriage Offer to Be Working Full-Time in Current Period (Logit)	
Male age 22 or under	−.324	(.1024)
Male age	.724	(.0694)
Male in home sector	2.002	(.5844)
Type 1 match offer	−.992	(.1163)
Type 2 match offer	−2.092	(.3548)
	Probability of New Marriage Offer to Be a College Graduate in Current Period (Logit)	
Male age 22 or under	−2.794	(.0652)
Male a college graduate	4.497	(.0352)
Male in home sector	3.008	(.1677)
Type 1 match offer	−3.949	(.0305)
Type 2 match offer	−1.075	(.0326)

	Characteristics of Current Wife	
	Probability of Current Wife to Work Full-Time in Current Period (Logit)	
Husband 22 or under	−1.481	(.0391)
Husband's age	.082	(.0056)
Wife worked full-time in previous period	4.492	(.0234)
Wife college graduate	1.216	(.0312)
Husband in home sector	.688	(.0389)
Husband in school	1.938	(.0528)

TABLE B1
(*Continued*)

Type 1 match	−2.688	(.0269)
Type 2 match	−5.213	(.0296)
	Probability of Non–College Graduate Wife to Become College Graduate in Current Period (Logit)	
Type 1 match	−6.526	(.0383)
Type 2 match	−5.944	(.0497)
	Exogenous Divorce Function (Logit Function)	
Type 1 male intercept	−2.746	(.0097)
Type 2 male intercept	−2.599	(.0086)
Type 3 male intercept	−2.773	(.0103)
Type 4 male intercept	−3.154	(.0109)
Currently in school	.096	(.0104)
Currently in blue-collar job	−.991	(.0061)
Currently in white-collar job	−.807	(.0054)
Education	−.397	(.0045)
Wife works full-time	.867	(.0052)
Wife college graduate	.588	(.0097)
	Current-Period Nonpecuniary Utilities	
	Home Sector (Log Utility)	
Type 1 male intercept	4.754	(.0035)
Type 2 male intercept	4.667	(.0049)
Type 3 male intercept	4.644	(.0053)
Type 4 male intercept	4.693	(.0055)
Age	.030	(.0011)
Age squared/100	−.144	(.0022)
Type 1 marriage	−.050	(.0042)
Type 2 marriage	−.073	(.0060)
Wife works full-time	.037	(.0037)
Wife college graduate	−.196	(.0064)
	School Sector Utility	
Intercept	−16.460	(.1667)
Under 18	186.445	(8.9271)
	Marriage Utility	
Type 1 match	94.782	(.9467)
Type 2 match	166.916	(1.1614)
Wife works full-time	41.356	(1.0537)
Wife college graduate	47.984	(.8614)
	Current-Period Costs	
	Net Tuition Costs	
High school	360.146	(17.8648)
College	−134.887	(.5659)
Postcollege	183.403	(1.2194)
	Entry Costs into School	
Not high school graduate	−413.473	(22.0686)
High school graduate	−539.115	(3.3907)

TABLE B1
(*Continued*)

	Entry Costs into Occupations	
Blue-collar	−119.879	(.6612)
White-collar	−139.527	(.6385)
	Divorce Costs	
Intercept	−9.880	(.9297)
Divorced at least twice	−80.821	(1.5174)
Divorced three times	−140.202	(5.9668)
	Terminal Value *E*max Function	
Working in blue-collar job	162.818	(1.5077)
Working in white-collar job	175.790	(1.3361)
Education	222.777	(1.2833)
Blue-collar experience	37.022	(.1949)
White-collar experience	40.293	(.2165)
Married type 1	547.542	(4.5307)
Married type 2	563.113	(6.7006)
Divorced at least once	−1,234.155	(7.3095)
Divorced at least twice	−387.281	(5.2313)
Divorced three times	−563.781	(23.4371)

	Factor Loadings for the Cholesky Decomposition Matrix of Shocks				
	Log Blue-Collar Wage	Log White-Collar Wage	Log Home Utility	School Utility	Marriage Utility
Log blue-collar wage	−1.450*				
	(.0037)				
Log white-collar wage	−.006	−1.431*			
	(.0014)	(.0043)			
Log home utility	−.063	.084	1.072		
	(.0038)	(.0040)	(.0025)		
School utility	118.863	17.032	5.1916	253.105	
	(.7104)	(.2809)	(.6670)	(.9137)	
Marriage utility	117.607	105.303	−79.606	115.009	688.152
	(1.4272)	(1.0252)	(3.6735)	(3.2176)	(2.3681)
	Standard Deviation of Shocks (Implied by Cholesky Decomposition of Shocks)				
	.23	.24	1.08	280.19	719.75
	Correlation of Shocks				
Log blue-collar wage	1.0				
Log white-collar wage	−.03	1.0			
Log home utility	−.06	.08	1.0		
School utility	.42	.05	−.00	1.0	
Marriage utility	.16	.14	−.11	.22	1.0
	Likelihood Parameters				
Base classification error rate (E)	.840	(.0001)			
Standard deviation of wage measurement Error (σ_ε)	−.897	(.0037)			

TABLE B1
(*Continued*)

Blue-collar wage mismatch adjustment parameter (α^2)	−.150	(.0087)
White-collar wage mismatch adjustment parameter (α^3)	−.285	(.0092)

Note.—Estimated standard errors are in parentheses. Numbers that appear without standard errors are derived from other estimated parameters (with standard errors) or from the simulated data.
* The factor loadings used in the model are equal to *e* raised to the power of the coefficient presented above (in order to restrict variances to be positive).

References

Aiyagari, S. Rao, Jeremy Greenwood, and Nezih Guner. 2000. "On the State of the Union." *J.P.E.* 108 (2): 213–44.

Anderberg, Dan. 2003. "Getting Hitched: The Equilibrium Marriage Market Behaviour of a British Cohort." Working paper, Royal Holloway Univ. London.

Angrist, Joshua D. 2002. "How Do Sex Ratios Affect Marriage and Labor Markets? Evidence from America's Second Generation." *Q.J.E.* 117 (August): 997–1038.

Becker, Gary S., Elisabeth M. Landes, and Robert T. Michael. 1977. "An Economic Analysis of Marital Instability." *J.P.E.* 85:1141–87.

Bellman, R. 1957. *Dynamic Programming*. Princeton, NJ: Princeton Univ. Press.

Brien, Michael J., Lee A. Lillard, and Steven Stern. 2006. "Cohabitation, Marriage, and Divorce in a Model of Match Quality." *Internat. Econ. Rev.* 47 (2): 451–94.

Eckstein, Z., and K. I. Wolpin. 1989. "Dynamic Labour Force Participation of Married Women and Endogenous Work Experience." *Rev. Econ. Studies* 56: 375–90.

Ehrlich, I., and J. Kim. 2007. "Social Security and Demographic Trends: Theory and Evidence from the International Experience." *Rev. Econ. Dynamics* 10 (1): 55–77.

Fernandez, Raquel, Nezih Guner, and John Knowles. 2005. "Love and Money: A Theoretical and Empirical Analysis of Household Sorting and Inequality." *Q.J.E.* 120 (1): 273–344.

Fernandez, Raquel, and Richard Rogerson. 2001. "Sorting and Long-Run Inequality." *Q.J.E.* 116 (4): 1305–41.

Friedberg, Leora. 1998. "Did Unilateral Divorce Raise Divorce Rates? Evidence from Panel Data." *A.E.R.* 88 (3): 608–27.

Gould, Eric D., Omer Moav, and Avi Simhon. 2008. "The Mystery of Monogamy." *A.E.R.* 98 (1): 333–57.

Gould, Eric D., and M. Daniele Paserman. 2003. "Waiting for Mr. Right: Rising Inequality and Declining Marriage Rates." *J. Urban Econ.* 53:257–81.

Heckman, James J. 1981. "The Incidental Parameters Problem and the Problem of Initial Conditions in Estimating a Discrete Time–Discrete Data Stochastic Process and Some Monte Carlo Evidence." In *Structural Analysis of Discrete Data with Econometric Applications*, edited by C. F. Manksi and D. McFadden. Cambridge, MA: MIT Press.

Heckman, James J., and Thomas MaCurdy. 1980. "A Life Cycle Model of Female Labour Supply." *Rev. Econ. Studies* 47:47–74.

Heckman, James J., and Burton Singer. 1984. "A Method for Minimizing the

Impact of Distributional Assumptions in Econometric Models for Duration Data." *Econometrica* 52 (2): 271–320.

Hotz, V. J., and R. A. Miller. 1988. "An Empirical Analysis of Life Cycle Fertility and Female Labor Supply." *Econometrica* 56:91–118.

Hotz, V. J., R. A. Miller, Seth Sanders, and Jeffrey Smith. 1994. "A Simulation Estimator for Dynamic Models of Discrete Choice." *Rev. Econ. Studies* 61 (2): 265–89.

Keane, Michael P., and Robert M. Sauer. 2003. "A Computationally Practical Simulation Estimation Algorithm for Dynamic Panel Data Models with Unobserved Endogenous State Variables." Working paper, SSRN, http://ssrn.com/abstract=448240.

Keane, Michael P., and Kenneth I. Wolpin. 1994. "The Solution and Estimation of Discrete Choice Dynamic Programming Models by Simulation and Interpolation: Monte Carlo Evidence." *Rev. Econ. and Statis.* 17:648–72.

———. 1997. "The Career Decisions of Young Men." *J.P.E.* 105:473–522.

———. 2001. "The Effect of Borrowing Constraints on Educational Attainment." *Internat. Econ. Rev.* 42 (4): 1051–1103.

Korenman, Sanders, and David Neumark. 1991. "Does Marriage Really Make Men More Productive?" *J. Human Resources* 26 (2): 282–307.

Lerman, S. R., and Charles R. Manski. 1981. "On the Use of Simulated Frequencies to Approximate Choice Probabilities." In *Structural Analysis of Discrete Data with Econometric Applications*, edited by C. F. Manski and D. McFadden. Cambridge, MA: MIT Press.

Loughran, David S. 2002. "The Effect of Male Wage Inequality on Female Age-at-First Marriage." *Rev. Econ. and Statis.* 84:237–51.

Miller, Robert. 1984. "Job Matching and Occupational Choice." *J.P.E.* 92:1086–1120.

Mortensen, Dale. 1988. "Matching: Finding a Partner for Life or Otherwise." *American J. Sociology* 94:S215–S240.

Pakes, Ariel. 1986. "Patents as Options: Some Estimates of the Value of Holding European Patent Stocks." *Econometrica* 54 (4): 755–84.

Regalia, Ferdinando, and Jose-Victor Rios-Rull. 2001. "What Accounts for the Increase in the Number of Single Family Households?" Working paper, Univ. Pennsylvania.

Rust, John. 1987. "Optimal Replacement of GMC Bus Engines: An Empirical Model of Howard Zurcher." *Econometrica* 55 (5): 999–1033.

Seitz, Shannon N. 2002. "Accounting for Racial Differences in Marriage and Employment." Working paper, Queen's Univ.

Stern, Steven. 1997. "Simulation-Based Estimation." *J. Econ. Literature* 35 (December): 2006–39.

Taber, Christopher R. 2001. "The Rising College Premium in the Eighties: Return to College or Return to Unobserved Ability?" *Rev. Econ. Studies* 68 (3): 665–91.

van der Klaauw, Wilbert. 1996. "Female Labour Supply and Marital Status Decisions: A Life-Cycle Model." *Rev. Econ. Studies* 63:199–235.

Weiss, Yoram, and Robert J. Willis. 1997. "Match Quality, New Information, and Marital Dissolution." *J. Labor Econ.* 15:S293–S329.

Wolfers, Justin. 2006. "Did Unilateral Divorce Laws Raise Divorce Rates? A Reconciliation and New Results." *A.E.R.* 96 (5): 1802–20.

Wolpin, Kenneth I. 1984. "An Estimable Dynamic Stochastic Model of Fertility and Child Mortality." *J.P.E.* 92:852–74.

Wong, Linda Y. 2003. "Structural Estimation of Marriage Models." *J. Labor Econ.* 21 (3): 699–727.