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Income prospects and age-at-marriage

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Abstract. This paper provides an empirical investigation of a theoretical model of the marriage market. In the model, women are valued more for their ability to bear children and men are valued more for their ability to make money. Men cannot reveal their labor market ability to potential spouses until they enter the labor force. At the same time, the relevant information for evaluating females as spouses is revealed at a younger age. The model predicts that the income of males will be positively associated with age-at-first-marriage. We find empirical support for the model. However, we also find the association between male earnings and age-at-first-marriage becomes negative for those who married after age 30, which was not predicted by the model. Consistent with the model, we do not find a strong relationship between earnings and age-at-first-marriage among females.

JEL classification: J1, J12

Key words: Marriage market, age-at-marriage

1. Introduction

With striking universality, across time and nations, males tend to marry later in life than females. In a study conducted by the United Nations (1990), the average age of marriage for males exceeded that for females in each of 90 countries and in every time period studied between 1950 and 1985. The age difference tends to be larger in traditional societies than in modern industrial countries and has diminished over time in most industrial countries.

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In a paper called "Courtship as a Waiting Game", Mark Bagnoli and Ted Bergstrom (1993) proposed a theory to explain this difference in behavior between the sexes. They suggest that, at least in traditional societies, women are valued as marriage partners for their ability to bear children and manage a household, while men are valued for their ability to make money. Information about how well a male will perform economically – whether he is diligent and sober – becomes available at a later age than the relevant information about how well a female would perform her household roles. This leads to a kind of "intertemporal lemons model", in which males who expect to do poorly in later life will seek to marry at a relatively young age and males who expect to prosper will postpone marriage until their success becomes evident to potential marriage partners. Females, on the other hand, marry relatively early, with more desirable females marrying the successful, older males who postponed marriage and the less desirable females marrying the young males who want to marry young. In equilibrium, a young male who attempts to marry is signaling a lack of confidence in his future economic prospects. While the most desirable females would not accept such males, the less desirable females have no better alternatives in the marriage market and hence are willing to marry young males.

In addition to its implication that males on average will marry later in life than females, this theory implies that males who marry young will tend to be less prosperous when they reach maturity than males who postpone marriage. This paper investigates the empirical relationship between age-at-first-marriage and lifetime income, for males and females, and for blacks and whites.

2. Empirical findings

We use data on age-at-first-marriage, family income, and individual earnings from a 1/1000 sample of white men and women and a 1/100 sample of black men and women from the 1980 U.S. Census. Additionally, we restrict the analysis to those who are 40 or older and who are once and currently married. This sample consists of 21,755 white men, 15,114 black men, 19,707 white women, and 13,313 black women. We avoid selection bias by confining our observation to persons who were age 40 or older in 1980 because almost all first marriages have taken place by this age. We also re-estimated all of our analyses for a sample restricted to those who are 40–55 years old in order to abstract from differential retirement behavior. This restriction had little effect on the qualitative results.

2.1 *The results for males*

We regressed family income and annual earnings on current age (in cubic form) and, as a control for secular changes in the norms for marital age, cohort-specific mean age-at-first-marriage. For the specification of age-at-first-marriage, single year dummies were used for ages 17–35. Because of the small number of cases, those who married at ages 15–16, 36–37, 38–39, and 40 or older are grouped into respective categories. The regression coefficient estimates and descriptive statistics are reported in Tables 1 and 2 for whites and blacks, respectively. Using the single year age-at-first-marriage dummies is quite demanding on the data. Although the patterns fit a quadratic fairly closely, the semi-parametric form has

Table 1. Relationship between age at first marriage and income. Once and currently married white men 40 or older

	Family income		Annual earnings			
	Coefficient estimate	*t*-statistic	Coefficient estimate	*t*-statistic	Mean	Standard deviation
AFM dummies[a]						
15–16	−4555	3.74	−7533	5.13	0.006	0.075
17	−4857	5.01	−6829	5.84	0.009	0.096
18	−2993	4.85	−4116	5.54	0.028	0.164
19	−2788	5.39	−4159	6.68	0.046	0.210
20	−1898	4.19	−2927	5.36	0.072	0.259
21	−53	0.13	−1118	2.21	0.098	0.297
22	−681	1.64	−894	1.79	0.104	0.305
23	−61	0.15	−337	0.67	0.099	0.299
24	265	0.52	213	0.42	0.091	0.288
25 (omitted)					0.081	0.272
26	597	1.29	1128	2.03	0.067	0.249
27	765	1.57	807	1.37	0.055	0.228
28	453	0.85	488	0.76	0.041	0.199
29	346	0.63	717	1.08	0.037	0.190
30	−258	0.42	−444	0.60	0.028	0.165
31	600	0.91	60	0.08	0.023	0.150
32	−162	0.22	446	0.51	0.018	0.134
33	−94	0.11	48	0.05	0.013	0.112
34	203	0.24	−1318	1.27	0.012	0.110
35	−464	0.62	−2514	2.33	0.011	0.104
36–37	63	0.08	−443	0.49	0.016	0.127
38–39	−1973	2.29	−2890	2.79	0.012	0.109
40 or older	−1767	3.06	−2905	4.17	0.033	0.179
Age	11650	20.53	11761	17.21	57.045	11.122
Age squared	−199	20.67	−194	16.72		
Age cubed	1.053	20.41	0.995	16.02		
Cohort mean AFM	−819	2.74	−777	2.15	25.403	1.511
Constant	−177359	12.06	−177196	10.01		
F-statistic, model	134.2		246.3			
F-statistic, all AFM = 0	10.91		7.42			
R-squared	0.1384		0.2276			
Number of observations	21755		21755			

Mean of family income and annual earnings are $25958 and $13486, respectively.

[a] AFM = Age at first marriage. Classical (0.01 level) and Schwarz critical values for all coefficients of AFM indicators = 0 are 1.86 and 9.99 (= ln (21755)), respectively. Schwarz critical *t*-value is 3.16.

a greater (adjusted) *R*-Square, and we prefer not to impose additional structure; therefore, we use this specification throughout.

For both men and women, the test that all of the age-at-first-marriage indicators are jointly equal to 0 is reported in Tables 1–4. This hypothesis is rejected at the 0.01 level of significance in all specifications under classical testing procedures. Due to the fact that relatively large sample sizes are examined, we also

Table 2. Relationship between age at first marriage and income. Once and currently married black men 40 or older

	Family income		Annual earnings			
	Coefficient estimate	*t*-statistic	Coefficient estimate	*t*-statistic	Mean	Standard deviation
AFM indicators[a]						
15–16	−4031	3.83	−3342	4.84	0.013	0.113
17	−4050	4.23	−3296	5.25	0.016	0.127
18	−2812	3.69	−2118	4.24	0.030	0.172
19	−935	1.45	−1334	3.15	0.052	0.223
20	−1457	2.44	−1288	3.28	0.071	0.256
21	−854	1.46	−1085	2.83	0.078	0.268
22	−1484	2.52	−865	2.24	0.076	0.266
23	177	0.31	−105	0.28	0.080	0.272
24	121	0.20	−780	2.00	0.073	0.260
25 (omitted)					0.062	0.242
26	−550	0.86	−742	1.76	0.053	0.225
27	−249	0.37	−316	0.71	0.045	0.207
28	−56	0.08	−488	1.06	0.040	0.196
29	−957	1.28	−490	1.00	0.032	0.177
30	−525	0.69	270	0.54	0.030	0.172
31	−1726	2.16	−1073	2.04	0.026	0.160
32	−1485	1.75	−950	1.71	0.023	0.149
33	−2769	3.16	−1733	3.01	0.021	0.142
34	−2947	3.17	−1404	2.30	0.018	0.132
35	−1471	1.57	−498	3.30	0.017	0.130
36–37	−2589	3.36	−1691	3.34	0.030	0.169
38–39	−4051	4.82	−2206	4.00	0.023	0.150
40 or older	−3486	6.06	−2075	5.50	0.088	0.284
Age	7842	11.03	5601	12.01	55.319	10.899
Age squared	−133	10.93	−98	12.26		
Age cubed	0.696	10.62	0.523	12.15		
Cohort mean AFM	−122	0.31	−340	1.32	25.182	1.462
Constant	−119584	6.33	−79463	6.41		
F-statistic, model	71.248		135.8			
F-statistic, all AFM = 0	6.21		5.29			
R-squared	0.1094		0.1897			
Number of observations	15114		15114			

Mean of family income and annual earnings are $ = 19590 and $ 9250, respectively.

[a] AFM = Age at first marriage. Classical (0.01 level) and Schwarz critical values for all coefficients of AFM indicators = 0 are 1.86 and 9.62 (= ln (15114)), respectively. Schwarz critical *t*-value is 3.10.

is rejected in some specifications even at the stringent level required by Schwarz; however, in other cases the test cannot be rejected if the Schwarz criterion is used.

Figure 1 shows the predicted incomes and annual earnings by age-at-first-marriage for whites based on the regressions reported in Table 1. The relationship follows a flattened inverted *U*-shape with a peak in income for those who married in their late 20s. White males who married before the age of 21, on average, have incomes that are substantially less than males who married in their late 20's. It is interesting to see that men who married after age 30 also do less well than those

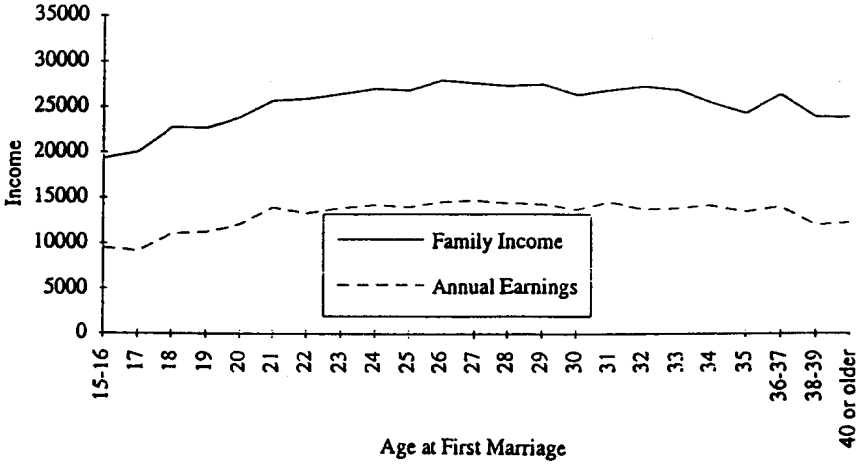

Fig. 1. Predicted income by age at first marriage. Once and currently married white men 40 or older

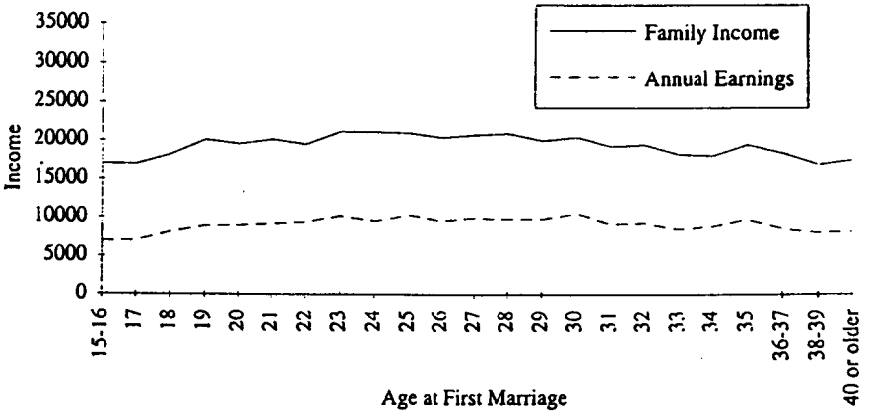

Fig. 2. Predicted income by age at first marriage. Once and currently married black men 40 or older

who married in their late 20's, although only 13% of white men marry after age 30. A similar story is told for the relation between age-at-first-marriage and individual's earnings.

The patterns for black men also demonstrate an inverted *U*-shape (Fig. 2). The primary difference between the groups is that the peak appears to occur at an earlier age for black men – in the mid 20s instead of the late 20s, as it is for white men.

It is sometimes argued that the higher incomes of men who marry later are "explained by" the fact that men who marry young are less likely to go to college than those who marry in their late 20's. But this begs the question of why it is that those who go to college tend to marry later than those who do not. The Bagnoli-Bergstrom model suggests an explanation for why males tend to postpone marriage until they complete their educations. A convincing way for a

male to demonstrate that he is persistent and able is to finish a college (or for that matter, a high school or a graduate) degree. If completed education is itself an indicator of success in later life, the hypothesis that males who expect to be successful will marry later is better tested by the relation between age-at-first-marriage and income, without including education level as an explanatory variable. Nevertheless, we investigated the relationship that remains when one controls for education (see Fig. 3 and 4 for whites and blacks, respectively; full regressions are not reported here). To control for education we used a cubic function in highest grade attained, plus an indicator for having exactly a high school degree, and an indicator for having at least 16 years of schooling. When we control for schooling, it remains true that those who marry in their teens and early 20's earn less on average than those who marry in their mid to late 20's, but the differences are much smaller. The effect of age-at-first-marriage is statistically significant, however. A test that the coefficient estimates for the set of age-at-first-marriage dummy indicators are each different from zero leads to F-statistics of 3.04 and 2.46 for family income and annual earnings, respectively for white men, and 4.83 and 2.83 for black men, respectively. Each of these are significant at the 0.01 level under classical testing procedures.

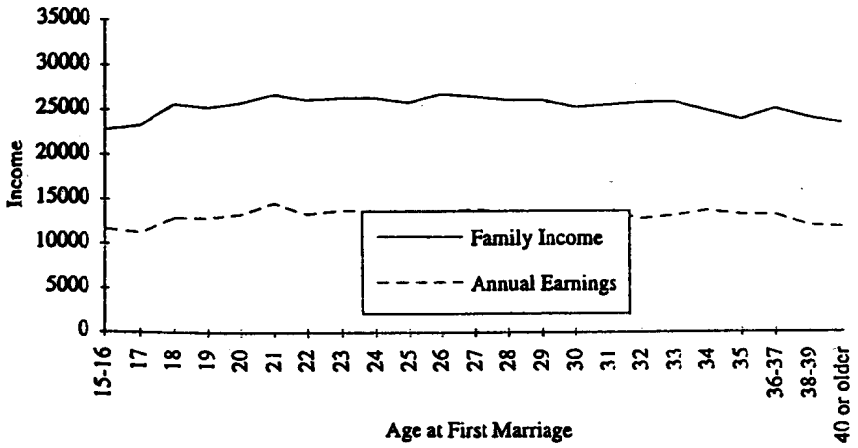

Fig. 3. Predicted income by age at first marriage. Once and currently married white men 40 or older. Controlling for education

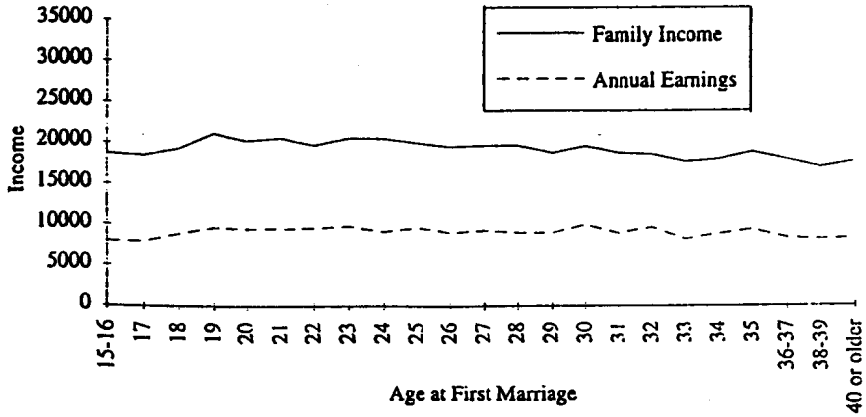

Fig. 4. Predicted income by age at first marriage. Once and currently married black men 40 or older.

A few alternative samples were examined to ensure that the observed relationships were not artifacts of sample selections. In Fig. 5 we report the same relationship as in Fig. 1 for white men, but we examine ever-married men instead of once-and-currently-married men. As the figures show, the patterns are quite similar for these two groups. In Fig. 6 we demonstrate the relationship when the sample is restricted to 40–55 year olds, who are those who are most likely to still be in the labor force; this is done to abstract from differential retirement behavior. Again, the results continue to hold.

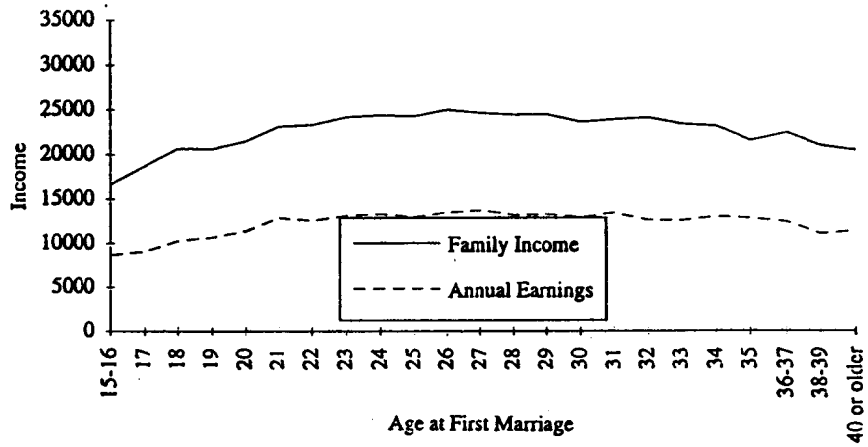

Fig. 5. Predicted income by age at first marriage. Ever married white men 40 or older

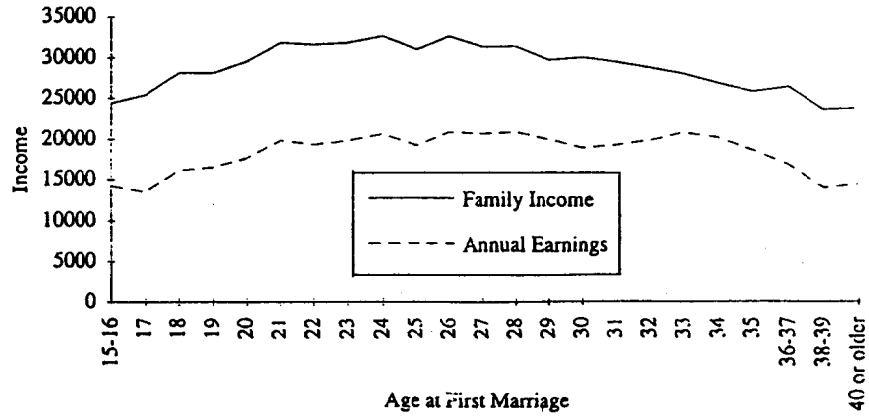

Fig. 6. Predicted income by age at first marriage. Once and currently married white men 40–55

2.2 *The results for females*

If females are expected to be less frequently engaged in market work than males, then there is less reason for their wage earnings in later life to be related to their desirability as marriage partners. Furthermore, the motive to marry at a later age, when she can show her earnings capacity, would be less strong than for males. Accordingly, we expect a weaker relation between wage earnings and age-at-first-marriage for females than for males. This is the case, as we see in Figs. 7 and 8, which relate women's family income and earnings to age-at-first-marriage for whites and blacks. (Tables 3 and 4 report the full regression estimates.) While Figs. 7 and 8 are based on regressions which include all women and do not control for education, analyses of women with positive wages, and analyses which control for education (not shown here) are qualitatively the same.

We were surprised by the fact that although the relation between age-at-first-marriage and *own earnings* was much weaker for women that for men, the relation between age-at-first-marriage and *family income* was about as strong as

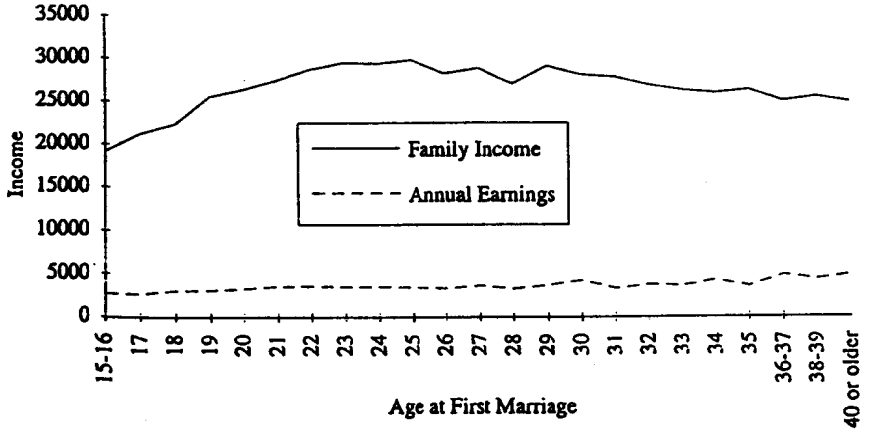

Fig. 7. Predicted income by age at first marriage. Once and currently married white women 40 or older

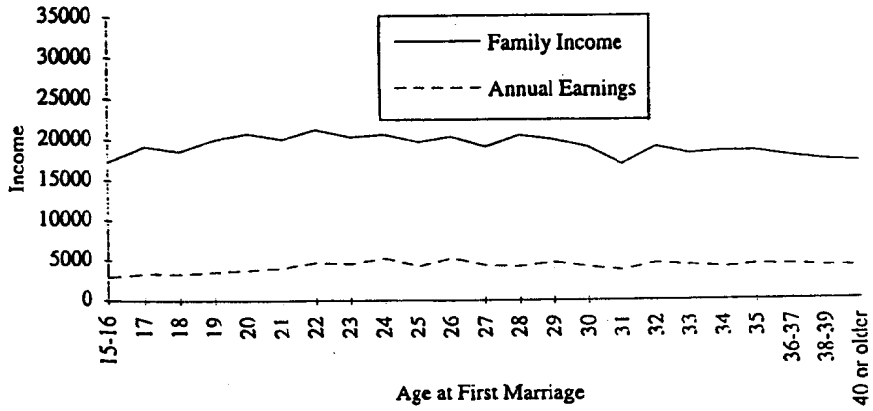

Table 3. Relationship between age at first marriage and income. Once and currently married white women 40 or older

	Family income		Annual earnings			
	Coefficient estimate	*t*-statistic	Coefficient estimate	*t*-statistic	Mean	Standard deviation
AFM dummies[a]						
15–16	−10573	14.11	−709	2.70	0.044	0.206
17	−8519	12.16	−769	3.14	0.059	0.236
18	−7446	11.63	−421	1.88	0.098	0.297
19	−4249	6.80	−334	1.52	0.115	0.319
20	−3399	5.43	−148	0.68	0.112	0.315
21	−2353	3.73	111	0.50	0.106	0.307
22	−1042	1.63	158	0.70	0.095	0.293
23	−307	0.46	81	0.35	0.076	0.264
24	−412	0.59	58	0.24	0.061	0.239
25 (omitted)					0.044	0.206
26	−1544	1.93	−105	0.38	0.035	0.183
27	−970	1.12	236	0.78	0.027	0.161
28	−2797	3.07	−149	0.47	0.022	0.148
29	−727	0.73	290	0.84	0.018	0.132
30	−1713	1.57	796	2.09	0.014	0.116
31	−2028	1.71	−121	0.29	0.011	0.104
32	−2974	2.24	329	0.71	0.008	0.091
33	−3576	2.56	151	0.31	0.007	0.086
34	−3855	2.73	850	1.72	0.007	0.085
35	−3492	2.31	100	0.19	0.006	0.078
36–37	−4861	3.70	1413	3.07	0.009	0.092
38–39	−4321	2.85	865	1.63	0.006	0.078
40 or older	−4953	5.25	1470	4.45	0.021	0.142
Age	9719	12.47	3125	11.46	55.70	10.38
Age squared	−168	12.52	−54.04	11.49		
Age cubed	0.901	12.18	0.29	11.11		
Cohort mean AFM	−936	2.65	150	1.21	22.605	1.354
Constant	−123037	6.70	−55679	8.66		
F-statistic, model	142.2		66.4			
F-statistic, all AFM = 0	30.64		5.07			
R-squared	0.1582		0.0806			
Number of observations	19707		19707			

Mean of family income and annual earnings are $25981 and $3254, respectively.
[a] AFM = Age at first marriage. Classical (0.01 level) and Schwarz critical values for all coefficients on AFM indicators = 0 are 1.86 and 9.89 (= ln (19707)), respectively. Schwarz critical *t*-value is 3.14.

that for men. These income differences are largely differences in the incomes of the males whom they married rather than in their own wage incomes.

One possible explanation for the relationship between age-at-first-marriage and income is similar to that which Bagnoli and Bergstrom proposed for males. Females who are confident of their abilities believe that their attractiveness to successful mates will increase as they mature. The racial differences for women provide additional evidence for this hypothesis. Black women are more likely to work

Table 4. Relationship between age at first marriage and income. Once and currently married black women 40 or older

	Family income		Annual earnings			
	Coefficient estimate	*t*-statistic	Coefficient estimate	*t*-statistic	Mean	Standard deviation
AFM dummies[a]						
15–16	−2520	3.53	−1421	4.47	0.076	0.265
17	−549	0.75	−932	2.86	0.067	0.250
18	−1181	1.69	−954	3.06	0.085	0.279
19	292	0.42	−672	2.16	0.085	0.280
20	1043	1.50	−467	1.51	0.090	0.286
21	328	0.46	−189	0.60	0.080	0.272
22	1569	2.15	463	1.42	0.067	0.250
23	629	0.84	272	0.81	0.059	0.236
24	966	1.26	1019	2.99	0.053	0.225
25 (omitted)					0.041	0.199
26	675	0.79	1007	2.66	0.035	0.183
27	−635	0.72	76	0.19	0.030	0.171
28	847	0.92	−31	0.08	0.026	0.160
29	288	0.29	491	1.12	0.021	0.144
30	−602	0.58	−97	0.21	0.018	0.133
31	−2779	2.55	−519	1.07	0.016	0.125
32	−600	0.56	330	0.69	0.017	0.128
33	−1503	1.36	83	0.17	0.015	0.123
34	−1184	0.96	−186	0.34	0.012	0.107
35	−1214	0.95	107	0.19	0.011	0.102
36–37	−1897	1.83	84	0.18	0.018	0.134
38–39	−2395	2.16	−135	0.27	0.015	0.122
40 or older	−2612	3.50	−191	0.58	0.061	0.240
Age	7644	8.86	2292	5.96	54.052	10.033
Age squared	−136	9.04	−42	6.32		
Age cubed	0.747	8.96	0.236	6.36		
Cohort mean AFM	−244	0.62	−89	0.50	22.395	1.299
Constant	−107329	5.18	−30846	3.34		
F-statistic, model	65.21		56.48			
F-statistic, all AFM = 0	5.63		7.03			
R-squared	0.1132		0.0995			
Number of observations	13313		13313			

Mean of family income and annual earnings are $ 19478 and $ 4094, respectively.

[a] AFM = Age at first marriage. Classical (0.01 level) and Schwarz critical values for all coefficients on AFM indicators = 0 are 1.86 and 9.49 (= ln (13313)), respectively. Schwarz critical *t*-value is 3.08.

in the labor force; in our sample, 49.9% of blacks and 40.5% of whites had positive earnings. Therefore potential mates may place greater value on the labor market potential of black women than of white women. Accordingly, black women would have a stronger incentive than white women to delay marriage in order to reveal their labor market potential. Indeed, we do find that the relationship between age-at-first-marriage and own earnings is slightly stronger for black

A related explanation for the observed patterns for women involves search and information. Persons of either sex who expect to be able to attract a successful partner once this person is found may be more willing to postpone marriage to spend more time searching. They also may find it worthwhile to spend a longer time observing and learning about potential marriage partners, since they realize that they will have many options available to them. Accordingly, it may be that those females who wish to marry a prosperous male are well-advised to postpone marriage and to attend colleges or workplaces where they can observe such males and such males can observe them.

Looking at Tables 3 and 4, one might be tempted (rather unromantically) to estimate the financial rate of return that a female can realize by postponing marriage from her early 20's to her mid 20's. If it is the case that relatively capable females can attract more prosperous males if they delay marriage from their early teens until their mid 20's, then they face an "investment problem" in which they can accept a lower income while they remain single in return for better income prospects later. Such an estimate might be used to impute a "consumption value" of being married as a residual (positive or negative). However, if our speculation that the positive relation between age-at-first-marriage and income is explained by the selection process is correct, then it is important to keep in mind that it is only the relatively desirable females who can expect to realize the income gains from postponing marriage.

3. Related empirical studies

3.1 Studies relating income to marital status

Several studies by labor economists indicate that married men tend to earn more money than unmarried men. While these studies are not directly concerned with the question of when people choose to marry, the two issues are quite closely related. Sanders Korenman and David Neumark (1991) study earnings differences between married men and unmarried men. Their paper also offers a fine survey of the literature on this subject. They find that in the cross-section, controlling for age, work experience, and other demographic variables, married men earn about 11% more than unmarried men. When they pool cross-section and time-series data in a fixed-effects model, they find that the longitudinal estimates of the effect of years married is more than 2/3 of the cross-sectional effect. They also find that the positive effect of marriage on income is stronger, the more years that one has been married. Korenman and Neumark concentrate on two competing explanations of the positive association between marriage and income. These are:

- Marriage per se makes male workers more productive.
- Males who marry are selected to have more innate ability to earn money than those who do not.

Marriage could increase the income of workers either because marriage is "good for" a man, or because a married man "has to work harder to support his family." One expression of the former idea is Becker's (1981) argument that marriage allows specialization in the household. Korenman and Neumark argue, on the

basis of their results, that the direct effect of marriage on a given individual's earnings appears to be stronger than any selection effects.

Lee Benham (1974) offers evidence to support the case that marriage is good for a man. He finds a significant positive effect of education of women on the wages of their husbands and suggests that this may be a result of shared information and useful advice. In a comment on Benham's paper, Finis Welch (1974) raises doubts about how much of this effect is a direct effect on productivity and how much is a result of selective mating. Welch presents evidence that Benham's effect is much reduced (but not eliminated) when account is taken of other variables that could be used at the time of marriage as predictors of future income. David Lam and Robert Schoeni (1993) formalize these ideas by simultaneously analyzing marriage market and labor market outcomes. They show that variables such as wife's education and parents' and parents-in-laws' eduction may have statistically significant effects on earnings simply because they are correlated with unobservables that are valued in both the marriage and labor markets.

Lawrence Kenny (1983) presents evidence that married men accumulate human capital more rapidly than unmarried men. He argues that this is likely to be the case because "marriage facilitates the financing of human capital," so that it "may be cheaper to accumulate human capital during married years than during single years." He also suggests that those who anticipate spending a larger fraction of their lifetime as married men will have incentives to work more hours, and they will find it worthwhile to invest in more human capital.

One is led to wonder, given the evidence that marriage may tend to increase male earnings, whether it also tends to increase female earnings. Korenman and Neumark (1990) have investigated this question. They found that while marriage (and children) tends to reduce labor force partition of women, it has no significant effect on the wage rates of women who participate in the labor force.

If, indeed, marriage increases the earnings of males and also the growth rate of earnings, then our estimates of expected wages as a function of age-at-first-marriage must *understate* the extent to which early marriage signals poor economic prospects for males. If two males are of the same age, but one married at 17 and the other at 27, then the former will have been blessed with 10 more years of marriage than the latter. According to Korenman and Neumark's estimates, each additional year of marriage adds 1 to 2% to annual income. Therefore, other things being equal, they would expect males who married at age 17 to earn 10 to 20% more at age 40 than males who married at age 27.

Evidently other things are not equal, since controlling for current age, males who married at 17 make on the average about 25% *less* income than those who married at 27. To reconcile these results we have to conclude that if those who marry at 27 had married at 17, they would on average have been able to earn 35 to 45% more per year than the persons who actually marry at 17. Perhaps, however, it is only the first few years of marriage that add to a person's earnings capacity. Since the members of our sample are all 40 years old or older, the direct effect of the extra years of marriage may be smaller than these estimates suggest.

Not all of the empirical work that has appeared supports the view that marriage has direct positive influence on male earnings. Cornwell and Ruppert (1991) examine panel data on male earnings as reported to the National Longitudinal Survey. On the basis of their results, they report that in the panel data, "when individual effects are controlled for, the estimated returns to marriage are virtually zero ... We conclude that the usual OLS marital status coefficient is essentially a statistical artifact."

It is beyond the scope of this paper to attempt to resolve the differences between these views or to try to disentangle any direct effect of marriage on income from the advantages that males with good income prospects can gain by postponing marriage until their merits are evident. Perhaps it will be helpful to other researchers in this area to notice that "selection effects" do not automatically mean that prosperous males will spend more time being married than less prosperous men. As we have observed, income in later life is positively related to age-at-first-marriage for males who marry before their late 20's and negatively related to age-at-first-marriage for those who marry in their 30's and 40's.

If Kenny (1983) is correct that marriage makes it cheaper to accumulate human capital, there is need to explain the fact that people who get more formal education tend to marry later than those who get less. The "courtship by waiting" theory suggested by Bagnoli and Bergstrom offers a partial explanation. Although it is likely that married college students would find it easier to study than those who belong to fraternities, this may be outweighed by the likelihood that they will attract more satisfactory females if they first demonstrate that they can finish college and exhibit the social graces that would make them acceptable marriage partners.

3.2 Studies relating age-at-first-marriage and income

We found two interesting papers that present theoretical observations and empirical work on the relation between age-at-first-marriage and income. It seems worthwhile to relate these works to the results found in this paper and to the theoretical model of Bagnoli and Bergstrom (1993).

Michael Keeley (1977) proposes to explain the pattern of ages at marriage using a model based on the work of Gary Becker (1973, 1974). Keeley's theoretical discussion predicts a very different empirical relation between income and age-at-first-marriage for males than is predicted by Bagnoli and Bergstrom. Keeley argues that because high wage males stand to gain more from specialization of labor within the household, they are more likely than low wage males to enter the marriage market at early ages. He also argues that since high wage women stand to gain less from marriage, they will tend to marry later than lower wage women. Keeley proposes another interesting reason for the difference between the sexes in age-at-first-marriage. He suggests that the opportunity cost of postponing marriage is higher for women than for men, because "single women planning to marry are less efficient at accumulating home-specific-human-capital until they marry."

Keeley tests his predictions empirically, using a sample of 18000 households from the 1967 Suvey of Economic Opportunity to investigate the relation between age-at-first-marriage, age, education, and wage rates. He ran regressions separately for men and women, in which the dependent variable was age-at-first-marriage and the independent variables included current wage rate, current age, and years of education. In his regression for men, he found a negative coefficient for wage rate, which would suggest that men with higher hourly wage rates have a statistically significant tendency to marry *earlier* than men with lower hourly wage rates. For women, on the other hand, he found this coefficient to be positive.

We used the 1980 census data to partially replicate Keeley's empirical results. Although the data source is quite different, there is an impressive confirmation of Keeley's results. For the sample of once and currently married white men aged 40–55, we regressed age-at-first-marriage on annual earnings, education, and on current age, age-squared, and age-cubed. Because Keeley wanted to use wage rates, he chose to exclude from his sample all males who had no wage income. While this may be an appropriate procedure for persons of retirement age, it seems quite inappropriate to reject observations on younger males who earn zero wage income. Indeed one of the risks which a female should consider when confronted with a young suitor is the possibility that he will frequently be unemployed.

Our replication of Keeley's results are reported in Table 5. As in Keeley's study, when one includes years of schooling in the regression, there is a significant negative coefficient on earnings. How, then, are Keeley's results reconciled with our results which indicate that people who marry in their late 20's tend to earn more than those who marry in their teens? Part of the story is that when we do include schooling as an explanatory variable, both our results and Keeley's results show a positive relation between age-at-first-marriage and earnings. While we think it more appropriate to *not* use schooling as an explanatory variable for age-at-first-marriage, since completed schooling is itself an indicator of future success, we found that even when controlling for schooling those who marry very early do worse than those who marry in their mid-twenties. However, this effect is masked by the linear specification that Keeley used. The results presented in Table 5 suggest that age-at-first-marriage decreases with earnings for those with low earnings, but that it increases with earnings for those with high earnings.

Frank Vella and Sean Collins (1990) propose another explanation for the distribution of age differences between marriage partners. They suggest that people prefer their marriage partners to be younger rather than older, but also richer rather than poorer. Individuals can gain wealth by postponing marriage and investing in human capital. Since males are more likely to do market work than females, the gains from doing so are larger for females. They also suggest that since males remain fertile to an older age than females, the cost of postponing marriage may be smaller for males than for females. For these reasons, males are likely to marry at older ages. Since individuals are willing to trade income for youth, Vella and Collins expect a positive correlation between income differences and age differences in marriages.

Table 5. Relationship between age at first marriage and wages. White men 40–55 years old. Dependent variable = age at first marriage

Explanatory variables	Regression 1		Regression 2	
	Coefficient estimate	*t*-statistic	Coefficient estimate	*t*-statistic
Wages	−1.05 E-05	3.02	3.09 E-05	1.96
Wages squared			−2.08 E-09	3.21
Wages cubed			2.24 E-14	3.43
Years of schooling	0.165	11.26	0.173	11.69
Age	2.265	0.53	2.596	0.61
Age squared	−0.048	0.56	−0.055	0.61
Age cubed	0.0003	0.00	0.0004	0.63
Constant	−15.249	0.23	−20.761	0.31
F-statistic	39.2		29.8	
R-squared	0.0182		0.0194	
Observations	10564		10564	

The approach taken by Vella and Collins, like that of Bagnoli and Bergstrom, is to view marriage as a matching equilibrium. Bagnoli and Bergstrom go further in spelling out the information available to each participant at each point in time and in building an explicit equilibrium model, in which the decision of each individual about when to marry is determined. This more detailed treatment of the information structure helps to clarify some of the issues left unexplained by Vella and Collins. For example, the argument that people can gain wealth by postponing marriage and acquiring human capital is problematic in an environment of full information. There is no obvious reason why people could not marry before acquiring human capital rather than afterwards. (This seems especially compelling in the light of the evidence offered by Kenny.) But if a male's ability to acquire an education and a high earnings capacity is only revealed to possible marriage partners after he has done so, then we have a reason for those males who expect to be successful to postpone their marriages.

4. Conclusions and remarks

Our motive for writing this paper was to test the Bagnoli-Bergstrom hypothesis that males who expect to do well in the labor market will tend to postpone marriage until their success is evident to potential partners. The evidence from the U.S. census data provides support for this hypothesis since income in later life is largest for males who married in their late 20's. The data also indicate that males who married in their 30's and 40's or not at all tend to earn less than those who married in their late 20's. This effect was not predicted by the Bagnoli-Bergstrom model. While no simple single explanation is likely to explain the entire effect, there are some interesting partial explanations. Some of these men who marry very late in life or not at all may be persons whose successes in life have not met the expectations that led them to postpone marriage and who continue to postpone marriage until their true worth is recognized. There may also be a considerable number of males who are such poor marriage material, that any female whom they would wish to marry would prefer being single to marrying one of these males.

Bagnoli and Bergstrom suggested that females tend to marry at an earlier age than males in part because the passage of time is likely to reveal less about the female's capabilities for performing traditional marriage roles than it does for males. We examined the relation between age-at-first-marriage and the economic success of females in later life. Our data indicate that for females, age-at-first-marriage is not strongly related to future wage earnings. On the other hand, the relation between *family income* and age-at-first-marriage for females has a shape similar to that for males. Females who marry in their teens and early 20's tend to experience smaller family incomes in later life than those who marry in their mid to late twenties. The observed relation between age-at-first-marriage

and family income was not predicted by the Bagnoli-Bergstrom model in its simplest form, though we have suggested some possible explanations for this relation.

The behavioral model implies that there is a systematic relationship between age-at-first-marriage and earnings, which was borne out by the empirical analyses. An implication of this finding is that age-at-first-marriage may be a good indicator of the labor market ability of workers. Because age-at-first-marriage is often reported in survey data, it may be a useful indicator of differences in ability across workers which would otherwise be unmeasured.

While we set out to test the hypothesis advanced by Bergstrom and Bagnoli, we would not want to deny that there are other important economic and social forces that influence labor markets and marriage markets, and other hypotheses that deserve exploration. The data reported here are likely to be of interest to those who wish to pursue alternative explanations.

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Lone mothers: A review

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Abstract. This paper briefly reviews recent empirical studies on the economic behaviour of lone mothers concentrating on the duration of lone motherhood, on labour supply, and on the determinants of their welfare participation. We start out by sketching some stylised facts about lone-mother-families in various countries. With this background we give a guided tour through the empirical literature followed by a summary of the policy implications of the results presented.

JEL classification: H53, I38, J22

Key words: Lone parents, social policy, poverty trap

1. Some stylised facts

Lone mothers are an urgent social problem in many countries because of the dramatically increasing number of these often poor families and because of a shift in their composition: from families headed by widows to families headed by divorced and never-married mothers. The highest share of lone parent families is found in Sweden (32% of all families are headed by a lone mother) followed by the United States (26%) and Denmark (22%). In the mid field percentages range from the United Kingdom's 15% to France's 10%. Only Portugal and Italy have one digit figures (6%). The picture was different some 20 years ago when not one of these countries had a figure higher than 15%. (All figures in this review are from OECD (1993, 1994) unless mentioned otherwise. For a comparative survey of data on the incidence of poverty by family type, causes of lone parenthood, labour market participation, welfare dependency and policy measures relevant to lone parent families see the appendix in Staat and Wagenhals 1996).

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