

Why Not Settle Down Already?

A Quantitative Question*

Cezar Santos, David Weiss[†]

University of Pennsylvania

Preliminary and incomplete

Abstract

One of the most striking changes in American society over the last 40 years has been the decline and delay in marriage. The fraction of young men and women who have never been married has steadily and significantly increased since before 1970. The economics literature has also noted a rise in labor market volatility over this period. The first contribution of this paper is that we propose a new hypothesis: that these two events are linked. Specifically, if marriage involves consumption commitments, then a rise in volatility in income processes could result in a delay in marriage. The second contribution is to assess this new hypothesis vis-à-vis others in the literature, using an estimated structural model. We find that the decrease in the price of home inputs explains a little over a third of the data. The decrease in the gender wage gap explains a third of the data. Rising income volatility explains a little under a third of the data. All three of these stories are needed in order to provide a satisfactory explanation to the question of why young adults are delaying marriage.

Keywords: marriage, labor market volatility, gender wage gap, technological progress, young adults

*We would like to thank Jeremy Greenwood, Iourii Manovskii, Dirk Krueger and seminar participants at the Penn Macro Lunch for their comments. The usual disclaimer applies.

[†]E-mails: santosca@econ.upenn.edu and daw Weiss@econ.upenn.edu

1 Introduction

One of the most striking changes in American society over the last 40 years has been the decline and delay in marriage. The fraction of young men and women who have never been married has steadily and significantly increased since before 1970. This trend has not escaped notice. In the popular press, the current young generation is being referred to as “boomerang kids”, due to their increased propensity to move back home in their 20s, rather than get married and settle down. Frequently, these young adults are being described as “failing to launch”¹.

To illustrate this trend, Figure 1 shows the increase, age by age, of the percentage of young white adults who have never been married. This graph illustrates how marriage has been delayed. By age 35, the differences between the two time periods disappear. People seem to simply be delaying their marriage choice².

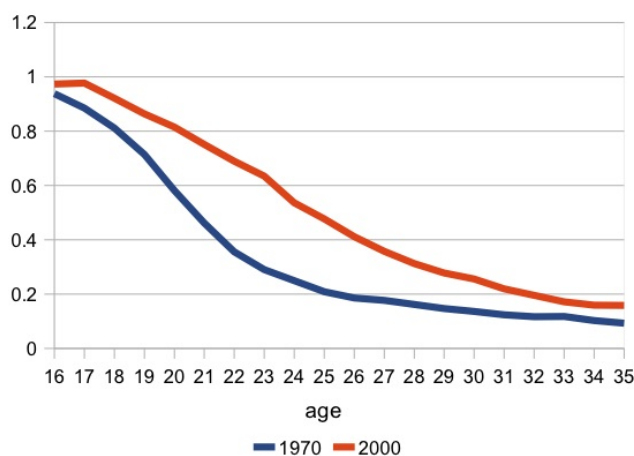


Figure 1: Percentage of White Males Never Married, by age. Source: Authors calculation from U.S. Census Data.

The economics literature has noted a rise in labor market volatility over this period. That is, many studies have documented increasing variances of shocks in income processes, such as Gottschalk and Moffitt (1994), Katz and Autor (1999), and Heathcote et al (2010). The effects of the changing labor market have been widely discussed. Kambourov and

¹New York Times magazine, August 18th 2010

²The graph for women looks very similar.

Manovskii (2009) argue that increasing occupational mobility, which is related to income volatility, may be important to understand the increase in income inequality in the US. Krueger and Perri (2005) discuss the relationship between rising income inequality and consumption inequality. No work has been done relating changes in labor market volatility with changing marriage decisions of young adults.

The first contribution of this paper is that we propose a new hypothesis- that these two events are linked. Specifically, if marriage involves consumption commitments, then a rise in volatility in income processes could result in a delay in marriage. These commitments, such as children or mortgages, are less desirable in a time period when income is more volatile. It might be preferable to wait until one receives a favorable income shock, or search longer for a better spouse, before settling down with a family. There is, of course, a counter argument that marriage is insurance between spouses. The idea here is that marriage allows diversification of risk; income shocks between spouses need not be perfectly correlated. When income volatility increases, marriage might become more desirable. This mechanism is highlighted by Hess (2004), and included in our quantitative work.

We are not the first economists to try to explain the delay in marriage. Greenwood and Guner (2009) make the case that cheaper durable goods, such as washing machines and refrigerators, made the cost of running a household lower. This decreases the gains from marriage, as men no longer need women to specialize in production of home goods, and women can afford to go out into the labor force themselves. Regalia, Rios-Rull and Short (2008) argue that the decrease in the gender wage gap is a major source of the delay. When women become richer, they can afford to be pickier on the mate they choose.

Our second contribution is to quantitatively assess the three mechanisms noted above. To this end, we build and calibrate a structural model, containing marriage as consumption commitments, as well as a form of consumption insurance. We include the ability of spouses to specialize into either market or home production, which takes both time and durable goods. We also include a gender wage gap, for evaluating the role of increased women's market worth.

We find that the decrease in the price of home inputs explains a little over a third of the delay in marriage. The decrease in the gender wage gap explains a third of the data and rising income volatility explains a little under a third. All three of these stories are needed in order to provide a satisfactory explanation of the data.

The aim of this project is to address the issue of the delay in marriage. We have already introduced a new hypothesis, and two competing stories. However, there are more pieces

in the literature that we have yet to mention. Goldin and Katz (2002) claim that the delay in marriage and increased career development by women can be attributed to decreased gains from marriage associated with the contraceptive pill. Edlund and Machado (2009), on the other hand, argue that the pill worked in the opposite direction: young females would benefit more by using the pill *within* a marriage. Choo and Siow (2006) also argue that gains from marriage decreased over the last few decades; according to them, because of the availability of abortion. Still others argue that changes in legal structure, such as no fault divorce, are responsible. An excellent summary of this literature can be found in Stevenson and Wolfers (2007).

Marriage, in our model, serve as a form of consumption commitment. To that extent, this paper is a contribution to the consumption commitment literature along the lines of Chetty and Szeidl (2007) and Postlewaite, Samuelson and Silverman (2008). When labor market volatility increases, we argue that the effect is to delay marriage decisions. Our mechanism for this is the assumption that the difference between marriage and other forms of social arrangements, such as cohabitation, is consumption commitments. One chief example of this is children. We use the PSID to study white Americans under age 30. We find that, in 1970, 98% of those who were single did not have children. At the same time, 84% of married people either had children or would within the next 2 years. These numbers dropped slightly in 1999 to 87% and 78% respectively. Clearly, the decision to get married is connected with fertility, an unusually persistent form of consumption commitment.

Our model is an application of the search-based models of marriage. It relates to the wide literature emphasizing search frictions of looking for a spouse. Seminal works include Mortensen (1988) and Burdett and Coles (1997).

Finally, we should point out that, as can be seen in Figure 2, the median age at first marriage over the 20th century has been U-shaped. Of all the mechanisms discussed, the labor market volatility story seems the most compelling to be able to account for the full century. While data limitations hurt our ability to evaluate key statistics for the earlier part of the century, leaving our hypothesis untestable, it is plausible that the labor market was volatile during the beginning of the century, causing delayed marriage. At the very least, the other stories mentioned were one time events- the decline in the relative price of certain goods, the decrease of the gender wage gap, the advent of the pill, changing divorce laws, etc. They can not account for the time series of the 20th century. With a more complete data set, perhaps increasing labor market volatility could.

This paper is organized as follows: Section 2 presents the model and Section 3 discusses

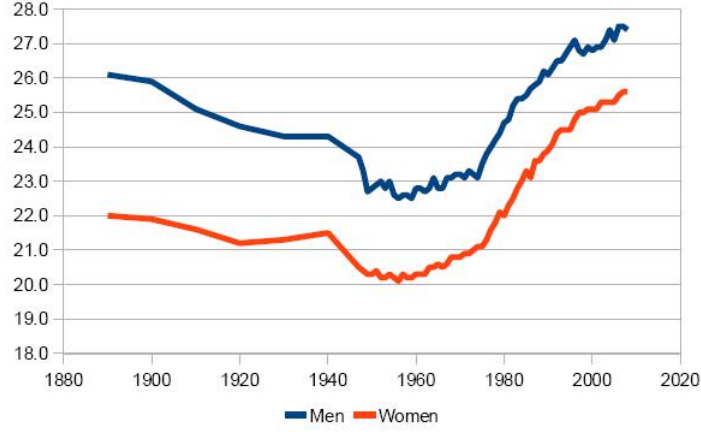


Figure 2: Median age at first Marriage. Source: US Census.

the important channels working in the model. Section 4 discusses calibration. Section 5 discusses the results, and Section 6 concludes.

2 The Model

There are overlapping generations of men and women. There is a unit measure of each gender g and age a . Agents can either be single or married. Every agent is endowed with a unit of time every period.

2.1 Production

There are two goods in the economy: a market good, Y , and a home good n . For the consumption good there is a linear production function, with labor as the only input.

$$Y = AL, \tag{1}$$

where A is a technology parameter normalized to 1, and L is aggregate market labor supply. This implies that wages in the model are equal to efficiency units of labor supplied.

The amount of efficiency units of labor each agent supplies follows a stochastic process that consists of a persistent shock z (with innovations η) and a transitory shock ϵ ; π_t^η (π_t^ϵ) controls for changing variance of the persistent (transitory) shock across time periods. This process is specific to the agent's marital status; in particular, for married agents,

the different shocks that each spouse receives are correlated with each other and both the variance and the persistence of the shocks may be different between the two groups. This allows for the fact that married and single agents may behave differently, especially in the presence of consumption commitments. For example, perhaps people who are married are less likely to want to switch careers, since such moves typically involve a short run cost of lower wages during retraining. Since we are not modeling behavior in the labor market explicitly, we must account for differences in labor market outcomes by estimating income processes separately. Thus, we assume that this process takes the following form for singles (denoted by the subscript s):

$$\begin{aligned}
\ln w_s &= z_s + \pi_s^\epsilon \varepsilon_s \\
z_s &= \delta_s z_{s,-1} + \pi_s^\eta \eta_s \\
\eta_s &\sim N(0, \sigma_{\eta,s}^2) \\
\varepsilon_s &\sim N(0, \sigma_{\varepsilon,s}^2).
\end{aligned} \tag{2}$$

For couples (denoted by the subscript m), the process takes the following form:

$$\begin{aligned}
\ln w_m &= z_m + \pi_m^\epsilon \varepsilon_m \\
z_m &= \delta_m z_{m,-1} + \pi_m^\eta \eta_m \\
\eta_m &\sim N\left(0, \begin{bmatrix} \sigma_{\eta,m}^2 & \rho \\ \rho & \sigma_{\eta,m}^2 \end{bmatrix}\right) \\
\varepsilon_m &\sim N\left(0, \begin{bmatrix} \sigma_{\varepsilon,m}^2 & 0 \\ 0 & \sigma_{\varepsilon,m}^2 \end{bmatrix}\right).
\end{aligned} \tag{3}$$

We allow the innovations in spousal persistent shocks to be correlated, with parameter ρ , as we need to take into account seriously the level of spousal insurance in the model. This insurance is a counter mechanism to labor market volatility causing a delay in marriage, so getting the level right is important. This parameter helps to that end.

Finally, the amount of efficiency units available to an agent also varies with his/her age a according to the function $f_g(a)$. Females supply a fraction ϕ compared to males - this accounts for the gender wage gap. So, define the function ϕ_g that takes the value of 1 if $g = 1$ (males) or ϕ if $g = 2$ (females).

The home good, n , is produced by a constant elasticity of substitution between a durable

good input, d , and time, t :

$$n = \left[\theta d^\xi + (1 - \theta) t^\xi \right]^{1/\xi} \quad (4)$$

where θ is the relative weight on durables, and ξ is the CES parameter.

2.2 Preferences

Preferences are separable and constant relative risk aversion (CRRA) over both consumption goods and home goods. Preferences also vary by marital status. We begin with singles. Their utility function reads

$$u^s(c, n) = \frac{c^{1-\lambda}}{1-\lambda} + \alpha \frac{n^{1-\zeta}}{1-\zeta}, \quad (5)$$

where λ is the CRRA parameter on consumption, ζ is the CRRA parameter on home goods and α is the relative weight of home goods.

For married agents, we assume a unitary model, i.e. no disagreement. Agents pool their resources, and enjoy economies of scale in consumption - ψ is the parameter controlling economies of scale in marriage. The utility function for married agents reads

$$u^m(c, n) = \frac{\left(\frac{c}{1+\psi}\right)^{1-\lambda}}{1-\lambda} + \alpha \frac{\left(\frac{n}{1+\psi}\right)^{1-\zeta}}{1-\zeta}. \quad (6)$$

Agents total utility is equal to the expected discount value of lifetime utility.

$$U(\{c_{t=1}^{t=T}\}, \{n_{t=1}^{t=T}\}) = E_{t=1} \left[\sum_{t=1}^{t=T} \mathcal{I}_s u^s(c_t, n_t) + (1 - \mathcal{I}_s) u^m(c_t, n_t) \right], \quad (7)$$

where $\mathcal{I}_s$ is an indicator function that the agent is single.

2.3 Budget Sets

All singles divide their time between market and home production at an exogenous rate, such that they work τ amount of their time. Thus, their budget constraint will be given by

$$c + pd = \phi_g w f_g(a) \tau \quad (8)$$

where p is the rental price of durables, ϕ_g is the gender wage gap, w is the idiosyncratic productivity shock, $f_g(a)$ is an age dependent productivity level.

For married agents, spouses pool their resources, and enjoy economies of scale in consumption. Furthermore, there are consumption commitments. This is modeled as a lump sum cost that married agents have to pay every period, denoted by c_k . Married women have the option of whether to work in the market or work only at home - l^f is the indicator function that women choose to work in the market. A wife incurs a utility cost of κ_w (κ_h) if she moves into (out of) the labor force - this cost is an ad hoc mechanism to have the model generate movements into and out of the labor force in accordance with the data. Denote by w and w^* the husband's and wife's wage offers, respectively. Hence, a couple's budget constraint reads

$$c + pd + c_k = \left[w f_1(a) + l^f \phi w^* f_2(a) \right] \tau. \quad (9)$$

2.4 Timing and Marriage

The timing of a period is as follows:

- At the beginning of the period, agents observe the realization of shocks to their wage offers.
- Single agents randomly meet another single agent of the same (model) age and opposite gender and decide whether to get married. Note that marriage is an absorbing state, i.e. there is no divorce³.
- Married agents choose whether or not the wife works⁴. All agents divide their income between consumption goods and durables for home production. Consumption takes place.

³This is a simplifying assumption, to make modeling marriage and keeping track of singles distributions easier. Since we are trying to explain timing of first marriage, the only issue is whether or not there are a lot of young divorces for single people to consider marrying. Empirically, there are not. In 2000, the percentage of young adults (under age 30) who had been divorced/separated was roughly 5% (IPUMS-Census). This figure is slightly lower for 1970. Since there are not too many of these people to worry about in the data, we exclude them from the model.

⁴That is, the extensive, not intensive, margin of female labor force participation.

2.5 Decision Making

How do households make their decisions in the model? Single agents decide how to divide their income between the consumption of market and non-market goods. They also have to decide whether or not to get married with a potential mate. Married agents have a similar consumption decision regarding market and home-produced goods and they have to decide whether the wife should work or not. We will now describe each household's problem recursively.

Let's start with couples. The state vector for married households consists of a wage for the husband w , a wage offer for the wife w^* , an indicator function l representing whether or not the wife worked last period, and their age a . With a slight abuse of notation, define the function $\kappa(l)$ to represent the utility cost from moving into and out of the labor force such that $\kappa(0) = \kappa_w$ ($\kappa(1) = \kappa_h$) if the wife is moving into (out of) the labor force. Then the married value function can be written as follows

$$\begin{aligned}
V^m(w, w^*, l, a) &= \max_{l^f \in \{0,1\}, c \geq 0, d \geq 0} u^m(c, n) - \mathcal{I}(l^f \neq l) \kappa(l) + \beta E_{w', w^*} V^m(w', w^*, l^f, a+1) \\
&\text{s.t.} \\
c + pd + c_k &= \left[w f_1(a) + l^f \phi w^* f_2(a) \right] \tau \\
n &= \left[\theta d^\xi + (1 - \theta) \left(2 - (1 + l^f) \tau \right)^\xi \right]^{1/\xi},
\end{aligned} \tag{10}$$

where $\mathcal{I}(x)$ is an indicator function that takes the value of 1 if x is true and 0 otherwise. Define the policy functions for the married problem as follows: $l^f = P_l^m(w, w^*, l, a)$ for the woman's labor force decision, $d = P_d^m(w, w^*, l, a)$ for choice of durables, and $c = P_c^m(w, w^*, l, a)$ for the consumption decision.

The value function for those who are single after the marriage market is as follows:

$$\begin{aligned}
V^s(w, g, a) &= \max_{c \geq 0, d \geq 0} u^s(c, d) + \beta E_{w'} B(w', g, a+1) \\
&\text{s.t.} \\
c + pd &= w f_g(a) \tau \\
n &= \left[\theta d^\xi + (1 - \theta)(1 - \tau)^\xi \right]^{1/\xi}.
\end{aligned} \tag{11}$$

Define the following policy functions associated with the single agent's problem: $d = P_d^s(w, g, a)$ for choice of durables, and $c = P_c^s(w, g, a)$ for the consumption decision.

Now, we can turn our analysis to the marriage phase. Every single for each gender draws a potential partner of the opposite gender randomly. Each potential couple draws a marital bliss shock γ from a distribution $\Gamma(\gamma)$. We assume that $\Gamma(\gamma) \sim N(\mu_\gamma, \sigma_\gamma^2)$. A female enjoys utility γ if a marriage occurs while a male gets $\gamma + b$, which simply allows for the benefits of marrying to vary between the genders. Each potential spouse will agree to marriage if and only if the continuation value in married life plus the marital bliss shock is larger than the continuation value as a single. A marriage occurs if and only if both agents agree to marriage. Formally, a marriage occurs if and only if

$$\underbrace{V^m(w, w^*, 1, a) + \gamma + b > V^s(w, 1, a)}_{\text{male's decision}} \text{ and } \underbrace{V^m(w, w^*, 1, a) + \gamma > V^s(w^*, 2, a)}_{\text{female's decision}}. \quad (12)$$

Let the indicator function $J(w, w^*, \gamma, a)$ take a value of 1 if both people in the match want it and a value of zero otherwise. Thus,

$$J(w, w^*, \gamma, a) = \begin{cases} 1, & \text{if (12) holds,} \\ 0, & \text{otherwise.} \end{cases} \quad (13)$$

We can now write the value function before the marriage market (the “bachelor” phase). Let's start with males:

$$B(w, 1, a) = \int \int \{J(w, w^*, \gamma, a) [V^m(w, w^*, 1, a) + \gamma + b] + (1 - J(w, w^*, \gamma, a)) V^s(w, 1, a)\} d\widehat{\mathbf{S}}(w^*, 2, a) d\Gamma(\gamma), \quad (14)$$

where $\widehat{\mathbf{S}}(w^*, 2, a)$ is the distribution of potential mates from gender $g = 2$ (females) and age a . This will be elaborated on later. For females, we have an analogous expression:

$$B(w, 2, a) = \int \int \{J(w^*, w, \gamma, a) [V^m(w^*, w, 2, a) + \gamma] + (1 - J(w^*, w, \gamma, a)) V^s(w, 2, a)\} d\widehat{\mathbf{S}}(w^*, 1, a) d\Gamma(\gamma). \quad (15)$$

2.6 Equilibrium

Before we formally define the equilibrium for this economy, we must first elaborate on the distribution of single agents, since this distribution appears in the dynamic programming problem for bachelors. Note that, because of the endogenous marriage decisions, this distri-

bution will be an equilibrium object. The non-normalized stationary distribution for singles aged $a > 1$ is given by

$$\mathbf{S}(w', g, a + 1) = \iiint (1 - J(w, w^*, \gamma, a)) \mathbf{S}(w, g, a) d\mathbf{S}(w^*, \sim g, a) d\mathbf{W}^s(w', w) d\Gamma(\gamma), \quad (16)$$

where $\sim g$ represents the opposite gender and $\mathbf{W}^s$ represents the wage process for singles defined above. Singles aged $a = 1$ are distributed over wages according to the invariant distribution of $\mathbf{W}^s$. $\widehat{\mathbf{S}}(w, g, a)$ denotes the normalized distribution for singles and is defined by

$$\widehat{\mathbf{S}}(w, g, a) = \frac{\mathbf{S}(w, g, a)}{\int d\mathbf{S}(w, g, a)}.$$

We can now formally define the equilibrium for this economy:

Definition 1 *A stationary equilibrium is a set of value functions for singles, couples and bachelors, $V^s(w, g, a)$, $V^m(w, w^*, l, a)$, and $B(w, g, a)$, policy functions $P_c^s(w, g, a)$, $P_d^s(w, g, a)$, $P_c^m(w, w^*, l, a)$, $P_d^m(w, w^*, l, a)$, $P_l^m(w, w^*, l, a)$, a matching rule for singles $J(w, w^*, \gamma, a)$, and a stationary distribution for singles $\mathbf{S}(w, g, a)$ such that:*

1. *The value function $V^s(w, g, a)$ and the policy functions $P_c^s(w, g, a)$, $P_d^s(w, g, a)$ solve the single's problem (11), given the value function for bachelors $B(w, g, a)$ and the distribution for singles $\mathbf{S}(w, g, a)$.*
2. *The value function $V^m(w, w^*, l, a)$ and the policy functions $P_c^m(w, w^*, l, a)$, $P_d^m(w, w^*, l, a)$, $P_l^m(w, w^*, l, a)$ solve the couple's problem (10).*
3. *The value function $B(w, g, a)$ solves the bachelor's problems (14) and (15), given the value functions for singles and couples, $V^s(w, g, a)$ and $V^m(w, w^*, l, a)$, and the matching rule $J(w, w^*, \gamma, a)$.*
4. *The matching rule $J(w, w^*, \gamma, a)$ is determined according to (13), taking as given the value functions $V^s(w, g, a)$ and $V^m(w, w^*, l, a)$.*
5. *The stationary distribution $\mathbf{S}(w, g, a)$ solves (16), taking as given the matching rule $J(w, w^*, \gamma, a)$.*

3 Mechanisms

Our purpose is to quantitatively evaluate three different reasons for the delay in marriage between 1970 and 2000. The purpose of this section is to discuss the mechanisms in the model.

3.1 Labor Market Volatility

This is the chief hypothesis we propose. Rising labor market volatility, as defined by increasing variances to both persistent and transitory shocks (increasing π_m^ϵ , π_m^η , π_s^ϵ , and π_s^η), has multiple effects.

1. Mutual insurance between spouses becomes more important. This would tend to cause *more* marriage.
2. Consumption commitments, as embodied in the parameter c_k , cause an increase in risk aversion among married agents relative to single agents. When volatility increases, this decreases the value of being married relative to being single, causing *less* marriage.

If effect 2 is quantitatively more significant than effect 1, then increasing volatility will lead to less marriage.

3.2 Price of Durables

Greenwood and Guner (2009) explain in detail the mechanism by which a decrease in the price of inputs for home production (such as washing machines) would tend to cause a decrease in marriage. The idea is simple. If marriage allows men and women to specialize according to their comparative advantages of market production and home production, respectively, then a decrease in the price of goods used for home production would tend to decrease the gains from specialization. This mechanism is in our model.

However we should note the presence of an additional channel by which the change in the price of durables affects the marriage decision. Marriage in our model is in some ways a normal good. There is a consumption cost to marriage (c_k), and a utility gain (γ, b). While there are other pros and cons to getting married in the model, to the extent that those two numbers determine an agent's choice of whether or not to marry, the agents are more likely to marry when they are wealthier and can more easily cover the fixed costs. If marriage is

a normal good, then a decrease in the price of durables will have an income effect leading to more marriage.

3.3 Gender Wage Gap

The final mechanism explored is decreasing the gender wage gap. Again, we will highlight the various channels through which a change in the gender wage gap affects marriage decisions.

1. The (economic) quality of women increases, leading men to be more willing to marry. This should *increase* marriage.
2. Women are happier to stay single and search longer, since they are wealthier. This should *decrease* marriage.
3. Since marriage is a normal good, the added wealth should act to increase marriage.

The key to assessing how strong channel 1 is relative to channel 2 is simply asking the question: Who says no to marriage proposals in 1970? Taking the extreme cases as examples: if men all want to get married, then increasing the gender wage gap cannot possibly make them want to marry more. Channel 1 would have no effect. Conversely, if all women want to get married, then channel 2 has no effect.

Hence the importance of the parameter b . When this parameter is 0, men and women get the same utility benefit of getting married; they experience the same flow utility during marriage, since this is a unitary model, and get the same bonus for getting married. Men and women are almost symmetric as singles, except that women get lower wages as represented by the gender wage gap. So women are more willing to get married, since their single lives are worse than men's. Decreasing the gender wage gap will simply make men more willing to agree to a better and better marriage. When b is large, men want to get married, and it is the woman who is saying no. When the gender gap decreases, women are even happier to remain single. Regalia et al (2008) have a parameter similar to b and find it to be large. That is how they account for the gender wage gap to have a large impact on marriage.

4 Matching the Model to the Data

The model period is 1 year. Given the age gap of approximately 2 years between the age of marriage for a male and a female (that remained approximately constant through the

period analyzed), the same model age actually corresponds to this two-year gap in the data, i.e. age 1 in the model corresponds to age 18 (16) for males (females) in the data.

We solve two steady states for the model; one that represents the world in 1970 and the other in 2000. Most parameters are kept constant for both steady states. The only parameters that change are those that govern the variance of income shocks, the gender gap and the price of household inputs. A more detailed discussion of how the parameters in the model are calibrated will now follow.

4.1 Parameters calibrated a priori

Some parameters are standard in the literature or have direct counterparts in the data. These parameters are listed in Table 1.

Table 1: Parameters set using a priori information

Parameter	Description	Value	Source
β	Discount	.96	Standard
λ	CRRA Consumption	2.0	Standard
θ	Weight on durables in production	.206	McGrattan et al (1997)
ξ	CES home production	.189	McGrattan et al (1997)
ρ	Correlation of Spousal Persistent shocks	.25	Attanasio et al (2008)
τ	Time spent at work	.4	40h work week
ψ	Economies of Scale	.7	OECD equiv. scale
–	Decline in the price of home inputs	6%/year	Greenwood and Guner (2009)

4.2 Labor Market parameters

For the income processes, we use data from the Panel Study of Income Dynamics (PSID) for the years 1968-1997. We first run a Heckit Mincer-style regression for every year in the sample controlling for education and age, generate the residuals and then estimate the parameters from (2) and (3)⁵. Note that we separately estimate the parameters for the process for married and single individuals. The results of this estimation procedure are reported in Table 2. The time loading factors reported (the π 's) are HP-filtered values.⁶

The functions $f_g(a)$ are determined by fitting a quadratic function through the average real income for different ages in the data. The gender gap ϕ is determined through a Heckit

⁵A Heckit procedure is important here in order to control for the endogeneity of female labor force participation decisions in the data. In the Heckit's selection equation we also include marital status and

Table 2: Parameters for the wage process

Parameter	Description	Value
δ_m	Married Autoregressive Coefficient	0.9833
$\sigma_{\eta,m}$	Married Persistent Shock Stdev	0.0105
$\sigma_{\varepsilon,m}$	Married Transitory Shock Stdev	0.0705
$\pi_{m,1970}^{\varepsilon}$	Married Transitory Shock Time Loading Factor (1970)	1.2856
$\pi_{m,1970}^{\eta}$	Married Persistent Shock Time Loading Factor (1970)	0.8948
$\pi_{m,2000}^{\varepsilon}$	Married Transitory Shock Time Loading Factor (2000)	1.4295
$\pi_{m,2000}^{\eta}$	Married Persistent Shock Time Loading Factor (2000)	1.5801
δ_s	Single Autoregressive Coefficient	0.9097
$\sigma_{\eta,s}$	Single Persistent Shock Stdev	0.0174
$\sigma_{\varepsilon,s}$	Single Transitory Shock Stdev	0.0729
$\pi_{s,1970}^{\varepsilon}$	Single Transitory Shock Time Loading Factor (1970)	1.2114
$\pi_{s,1970}^{\eta}$	Single Persistent Shock Time Loading Factor (1970)	1.0785
$\pi_{s,2000}^{\varepsilon}$	Single Transitory Shock Time Loading Factor (2000)	1.2681
$\pi_{s,2000}^{\eta}$	Single Persistent Shock Time Loading Factor (2000)	1.4788

Mincer-style regression in which we control for sex. We run this regression for both 1970 and 2000 using IPUMS data and find $\phi_{1970} = .441$ and $\phi_{2000} = .646$.

4.3 Estimated parameters

The remaining parameters are calibrated/estimated by solving the model. We first choose a set of data targets. For a given set of parameter values, the model will generate statistics that can be compared to the data targets. The parameter values are then chosen to minimize the distance between the model statistics and the data targets. Let Ω be the vector of parameters to be estimated. Then, the estimation procedure solves the following problem:

$$\min_{\Omega} \sum_{i=1}^I \omega_i [M_i(\Omega) - T_i]^2,$$

where $M_i(\Omega)$ is the i -th moment generated by the model when it is solved using parameter values Ω , T_i is the corresponding data target, ω_i is the weight assigned to target i . In our

number of children as regressors.

⁶We also estimated the parameters for an age-specific income process in the spirit of Karahan and Ozkan (2010). Since the results were similar to the ones obtained here, we opted for the simpler model described above.

case, we need to estimate nine parameters so that we have the following vector of parameters to be estimated: $\Omega = (\alpha, \zeta, \kappa_h, \kappa_w, \mu_\gamma, \sigma_\gamma, b, p, c_k)$.

The first step then is to choose the data targets. We try to choose targets that will inform on the parameters we are estimating. Let's first start with parameters that influence the production and consumption of home goods: the weight of home goods in the utility function α , the CRRA for home goods ζ , and the initial price of home inputs in 1970 p ⁷. One of the targets we use to identify these parameters is the fraction of income spent on household operation in 1970. According to the U.S. National Income and Product Accounts (NIPA), this number is approximately 12.5%. Greenwood and Guner (2009) also include food as an example of their measure of home goods; according to NIPA, this would lead to approximately 36% of consumption share. We target an intermediate number: 20%. Since home goods are produced using time and, in our model, married females choose whether to work in the market or not, we use the labor force participation rate (LFPR) of married females as data targets to identify these parameters. We target LFPR in both 1970 and 2000 since this can give us information on the elasticity of labor supplied by married females.

In our model, married females would be able to move into and out of the labor force freely if it were not for the parameters κ_h and κ_w . In the absence of these parameters, this fact might lead to counterfactually high levels of movements into and out of the labor force, in turn leading to too much consumption insurance between husband and wife. So, we choose these two parameters so that the model generates reasonable movements. In the data, we measure these movements using PSID data. Since this is a panel data set, we can follow married females over time and we can observe how often they move. The data targets we use are the fraction of wives that move into and out of the labor force in a given year: these numbers both turn out to be 4%.

In our model, couples have to pay a fixed consumption cost c_k every period; this is supposed to represent all the consumption commitments that married agents have to incur. As discussed in the introduction, most couples (throughout the period of the analysis) have children; most of them have more than one. We then choose to target the average fraction of household expenditures attributable to children in households that have both a husband and a wife and one child. According to the US Department of Agriculture, estimates for this number range from 21% to 32% with their own estimate at 27%. We choose 30% as our target which lies on the upper end of these estimates, but we think that this is a

⁷For the price of home inputs in 2000, we decrease the price p by 6% per year, the number reported by Greenwood and Guner (2009) - see Table 1.

reasonable lower bound for the consumption commitments of married agents since these people typically have more than one child, are more likely to have mortgages, etc.

Finally, we need to estimate the parameters that govern the marital bliss shocks: μ_γ , σ_γ , and b . The first two parameters determine how good and how varied are the match qualities in the economy. This will both control the level of marriages that take place but also the timing. Imagine that the variance of the Γ distribution was 0, for instance. Then, a potential couple wouldn't have to worry about all the different potential relationships are also available in the economy - they are all the same. Then, μ_γ would control the level of marriages. With a more dispersed distribution, potential mates might prefer to wait for a better draw. In order to identify these parameters, we target the overall profile of single males aged 21-29 in 1970.

We still need to identify the parameter b , the difference in marital bliss that a male receives upon marriage compared to a female. As discussed in Section 3.3, this parameter determines which gender usually prefers marriage over single life. If females do, then the narrowing of the gender wage gap will likely lead to less marriage, since they are relatively richer and more able to afford a single life, and vice-versa. Since we do not have a direct statistic that would inform on this gender difference, we take the following approach: we target the profile of single males aged 21-29 in 2000. The idea is that the parameters for the other mechanisms, price of household inputs and labor market volatility, are otherwise identified. So, whatever residual is left to be explained regarding the delay in marriage will be attributed to gender gap through the effect of b on this channel.

The estimated parameter values are reported in Table 3 and the model fit is discussed in Section 4.5.

Table 3: Estimated parameters

Parameter	Description	Value
α	Utility Weight on Home Goods	1.497
ζ	CRRA Parameter on Home Goods	3.002
κ_h	Cost of wife leaving the labor force	0.943
κ_w	Cost of wife entering the labor force	0.00005
μ_γ	Mean marital bliss shock	-56.146
σ_γ	St. Deviation of marital bliss shock	19.201
b	Added male marriage bonus	42.1445
p	Price of Durables, 1970	23.114
c_k	Marital Consumption Commitments	0.832

4.4 Computation

We solve using backwards induction on value functions. The model is solved for males from ages 18 to 35 (16 to 33 for females). After age 35 (33 for females), the marriage market is shut down, and the agents gain access to a savings technology. They live until age 65 (63 for females).

4.5 Model Fit

Let us first discuss how well the model is able to reproduce the data statistics targeted in the estimation procedure. We target the age profile of percentage of singles in 1970 and 2000. We target female labor force participation rate in both periods, female movements in and out of the labor market in 1970, percentage of household's expenditures spent on home inputs in 1970, and consumption commitments as a fraction of couple's expenditures in 2000. We start with marriage. As figures 3 and 4 show, the model is able to hit the profile of singles both in 1970 and 2000 quite well.

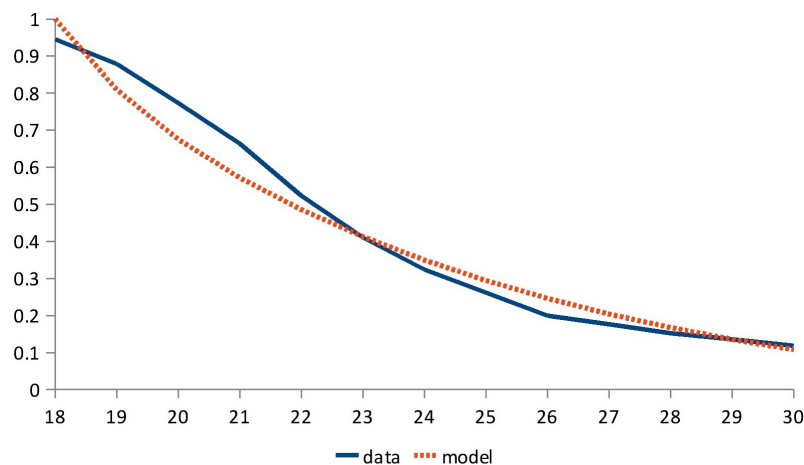


Figure 3: Model fit: Single males profile - 1970

Table 4 compares the model statistics with the other data targets. The model is able to match the data statistics well.

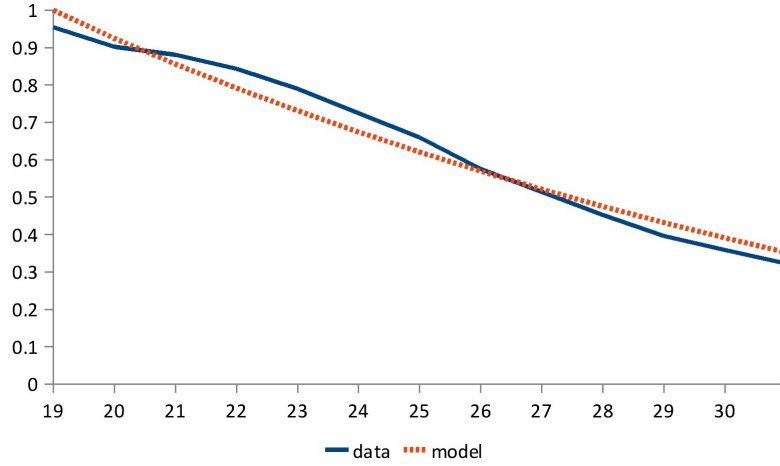


Figure 4: Model fit: Single males profile - 2000

Table 4: Model fit

Statistic	Model	Data
Female LFP - 1970	0.40	0.40
Female LFP - 2000	0.70	0.70
% of wives moving into LF in 2000	0.03	0.04
% of wives moving out of LF in 2000	0.03	0.04
Fraction of household expenditures on home inputs in 1970	0.21	0.20
Consumption commitments: % of couple's expenditures, 2000	0.29	0.30

5 Results

In this section we decompose the effects of various mechanisms on the delay in marriage. To do this, we maintain the 1970s parameters and change, one at a time, the price of household inputs, the gender wage gap, and labor market volatility. We look at how much each mechanism affects the change from the model benchmark in 1970 to the model benchmark in 2000. The results are in figure 5.

Roughly speaking, the gender gap accounts for a third of the delay, the price of inputs accounts for a little more than a third, and labor market volatility accounts for a little less than a third.

We can also decompose the effects of various mechanisms on the rise of female labor force participation - the results are reported in table 5. The mechanism here would be as

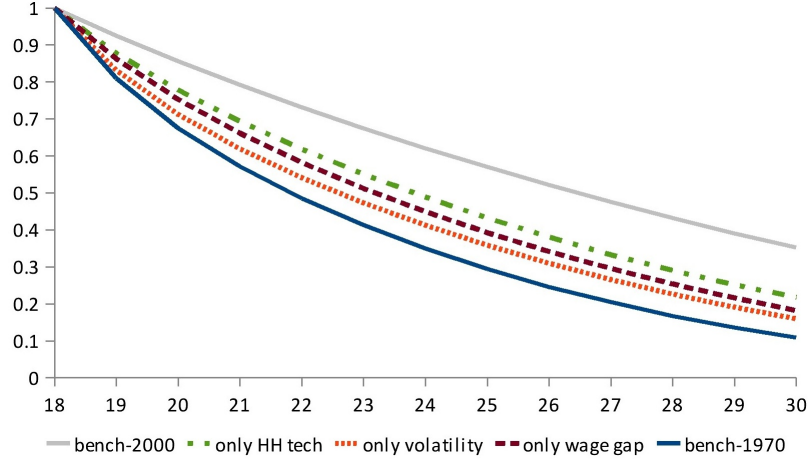


Figure 5: Single males profile in 2000 - Decomposition

Table 5: Married females labor force participation - decomposition

Channel	1970	2000
Benchmark	0.40	0.70
Gender Wage Gap	0.40	0.66
Price of Home Inputs	0.40	0.69
Volatility	0.40	0.40

follows: When labor market volatility increases, women might enter the labor force in order to insure their husbands. In the model, this mechanism has no effect. When the gender wage gap narrows, the opportunity cost of a wife staying at home increases. Also, when the price of home inputs declines, women are no longer needed in home production. These two mechanisms have large effects on married females labor force participation - again, see table 5.

6 Conclusions

There have been drastic changes in American society over the last 40 years. Young adults have been delaying marriage, in a manner that is frequently described as “failing to launch”. We make two contributions towards answering the most natural question: Why?

Our first contribution towards answering this question is to propose a new hypothesis: increasing income volatility has led to a delay in marriage. The idea is simple: if marriage

involves consumption commitments, such as kids, then an increase in labor market volatility makes marriage less desirable. Despite the implicit insurance between spouses, this story appears to be important.

The second contribution is to assess this new hypothesis vis-à-vis others in the literature. We estimate income processes for single and married Americans. We document both the lower volatility for married people, and increasing volatility over time. We estimate changes in the gender wage gap, and take documented changes in prices of home inputs, such as washing machines. We then estimate a model with increasing income volatility, a narrowing gender wage gap, and decreasing prices of home inputs. We find that the decrease in the price of home inputs explains a little over a third of the data. The decrease in the gender wage gap explains a third of the data. Rising income volatility explains a little under a third of the data. All three of these stories are needed in order to provide a satisfactory explanation to the question of why young adults are delaying marriage.

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