Chapter 6

Differential Fecundity II: Labor Market Effects

This chapter investigates how differential fecundity interacts with marriage and labor markets to affect gender roles in monogamous societies. We develop a model which predicts that:

1. The age of first marriage for men is positively correlated with their wage.[1]

2. Controlling for age, married men have higher wages than non-married men.[2]

3. Married men spend more time in the labor force than married women. They spend less time on child rearing than their spouses.[3]

4. Married men have higher wages than married women.[4]

[1]Using US data, Bergstrom and Schoeni (1996), Vella and Collins found a positive correlation. Keeley (1975) found a negative correlation. Bergstrom and Schoeni argued that Keeley's results are due to model misspecification. Using Taiwanese data, Zhang (1995) found a positive correlation for one subsample, a negative correlation for another subsample and a positive correlation for the pooled sample.

[2]In all 11 countries, after controlling for age, education in some cases, and hours of work, married men earnings are higher than that of single men (Schoeni 1995).

[3]In 11 countries with time budget studies, married men spend less time on household care per day than married women. In 8 OECD countries, the labor force participation rates of married men are higher than married women (Blau and Ferber 1986: Chapter 10; Blau and Kahn 1995).

[4]This is true for all 9 OECD countries that they have data for (Blau and Kahn).

The model also generates the following predictions which are already known from the previous chapter: Divorced women are less likely to remarry than divorced men. There are proportionately less never married women than men. The average age of first marriage is lower for women than men.

This chapter explains the above differences as follows. Consider a constant population society where individuals live for three periods, one as a child, one as a young adult and one as an old adult. Every young adult has to decide whether to marry or remain single. Abstracting from other benefits of marriage, the only reason to marry is to have children. Young and old men are fecund whereas only young women are fecund.

An adult may have at most one spouse at a time (monogamy). An adult may marry when young, divorce and remarry another person when old. Since the only role of marriage is to procreate, young single men and women, old single and divorced men may marry. Old single and divorced women will not marry or remarry respectively.

Eligible men must offer the same reservation utility to prospective spouses (young women) if they wish to marry. I assume women prefer to marry rather than remain single which means that all young women will marry.

In a stationary equilibrium without population growth and with a equal number of young men and women, some young men must remain single when some divorced men remarry. Some of these single young men will remain unmarried when they are old. If all single young men marry when old, then divorced men cannot remarry since there will not be enough eligible women. Thus when some divorced men remarry, some men will always be single. Since all young women marry, there are proportionately less never married women than men. While some men will always remain single, some single young men will marry when they become old. Thus the average age of first marriage is lower for women than men.

All young adults have the same labor market opportunities. Time at work produces current income and increases the expected future wage of the individual. Due to uncertainty in human capital accumulation, only some old adults will be successful in obtaining a higher wage. Single old men who marry have higher wages than young married men. They use this higher wage to compensate their spouses for marrying older men (Point (**1**); Vella and Collins). Single old men who marry will also have higher wages than single old men who do not marry (Point (**2**)).

When a young couple marry, they each have to decide how much time to spend in the labor market and how much time to spend with their children.

The mother can use her future labor earnings to only buy private consumption when old. The father can use his future labor earnings to buy future private consumption and to compete for a new wife (and have another child) if his current marriage fails. Thus the young father has a potential additional use for future labor income which is not available to the mother. The cost of working, time spent with their child, is the same for both parents. With an additional benefit but the same cost, the father will choose to spend more time at work than the mother (Point (**3**)). His future wage will also be higher (Point (**4**)).

Economists have observed and explained points (**3**) and (**4**) by noting that mothers spend more time at child rearing and accumulate less human capital than fathers (Mincer and Polachek 1974; Browning 1992). Standard explanations include within household comparative advantage and specialization, discrimination and social norms. The contribution is to provide a new rationale for this difference in time use.

The positive correlation between the level of future labor earnings and the incidence of remarriage is critical in generating current differences in time use between husbands and wives.[5] Divorced men who remarry must outbid some old single men for spouses. In this model, human capital uncertainty allows some lucky divorced men to outbid unlucky single old men for spouses. Without human capital uncertainty, divorced men will not be able to outbid single old men for spouses. There is no remarriage and no difference in time use between young husbands and wives. These alternative predictions under alternative market structures show the importance of market structures in determining gender roles.

The basic model is discussed in Sections (6.1) and (6.2). Another market structures are discussed in Section (6.3). The conclusion is in Section (**??**).

6.1 The Basic Model

In this model, every adult can potentially consume two goods: (i) children services, which are public goods for the parents, and (ii) a private consumption good. As emphasized by Bergstrom (1995) and Weiss, it is convenient to use transferable utilities to model the preferences of parents when there are public and private goods within a household. So in the basic model, we

[5] Becker et al. (1977), Wolf and MacDonald (1979) provide evidence of this correlation in US data.

assume that parents have constant marginal utility of private consumption. We will also assume that there are no financial markets. After presenting the basic model, we will discuss a model with general utility functions and complete financial markets.

The discount rate is assumed to be zero throughout this chapter.

There are equal numbers of men and women born in every period. Each individual lives for three periods, one as a child and two as adults. While parents can invest in children, child quality is purely a consumption good. Every young man is alike and every young woman is alike. In the first period of their adult lives, each adult has a wage of l. The adult who works τ hours will earn $l\tau$. Let the wage of an adult in the second period be h ($> l$) if the adult is successful in his or her human capital accumulation and l otherwise. The probability of successful human capital accumulation is equal to $p\tau$ where τ is the individual's hours of work in the first period and $0 < p < 1$. Let $\underline{p\tau} = 1 - p\tau$.

Young men, young women and old men can have children if they can find fertile spouses. Old women cannot have children. Every marriage produces two identical twins in the first period of marriage. Two children per new marriage are needed to keep the population constant over time. We abuse language and will talk about the child from a marriage since both children are identical. If a young woman marries an old man, the marriage ends after one period because the old man dies afterwards. If a young man marries a young woman, the marriage may survive into the second period because a married couple derive more services from their child than a divorced couple. Let the exogenous probability of divorce be π. A divorced man may remarry and have another child. A divorced woman will not remarry because she cannot have another child and there is no other gain from marriage.

All young women will marry. They can marry young men, old divorced men or old single men. Since there are more marriageable men than young women, a necessary condition for the marriage market to clear is that young women derive the same expected discounted utility from each type of mate. Let the expected discounted utility that a young woman receives from a marriage be Z.

It is convenient to begin the analysis with the behavior of single old men.

6.1.1 Single Old Men

Actions in the first and second period of an adult's life are denoted by lower and upper case letters respectively. Children follow the ages of their fathers because mothers are always young.

The price of the consumption good is 1. A single old single man has a wage W equal to h or l. If he does not marry, he will spend all his time, normalized to 1, working and obtain a consumption of W. We assume he obtains a utility equal to his consumption W.

If he marries, let him consume E and produce a child of quality Q. Let his utility in the second period be $u(Q, E) = QE$. $Q \geq 1$ since we have implicitly assumed that the quality of the child is one for a man without a child. Child quality is determined in the first period of marriage and no further investment in the child is necessary.

Let the father spends T time at work and $\underline{T} = 1 - T$ time with the child. Let the mother spends n time at work and $\underline{n} = 1 - n$ time with the child. Let the amount of child's consumption be K. Child quality, $Q = q(K, x(\underline{T}, \underline{n}))$. q is increasing and linearly homogenous in K and x. x is increasing, symmetric and linearly homogenous in $\underline{T}$ and $\underline{n}$. $x_{\underline{TT}} < 0$ and $x_{\underline{nn}} < 0$. Father's and mother's time can be either substitutes or complements in producing child quality. The symmetry restriction on x rules out comparative advantage by a mother in child rearing. Furthermore, q is linearly homogenous in K, $\underline{T}$ and $\underline{n}$.

Let the mother's consumption in the first period be c. Her first period utility is $u(Q, c) = Qc$. Let her consumption in the second period be C. Her utility in the second period is then δQC where $\delta \leq 1$ reflects the fact that she is a single mother. Since there is no need to further invest in the child, C is equal to her second period wage, W^f. W^f is equal to h with probability pn or l with probability $\overline{pn}$. Her expected utility in the second period is $\mathcal{E}(\delta QW^f|n)$ where $\mathcal{E}$ is the expectation operator. Her expected discounted utility from marriage to an old single man is therefore $Qc + \mathcal{E}(\delta QW^f|n)$. This expected discounted utility must be at least as large as Z for her to be willing to marry him.

We assume husbands and wives can enforce first period marriage agreements.[6] For analytic convenience, we study the men's decision problems subject to giving women their reservation utilities. As the within household

[6]The case for efficient intrahousehold allocations is made by Chiappori and his collaborators (e.g. Alderman et al. 1995; Chiappori 1992; Browning, et. al. 1994).

actions are efficient, my choice has no substantive consequence. So an old man with wage W who marries for the first time will choose T, n, K, c, E to solve:

$$u^j(Z, W) = \max_{\{T,n,K,c,E\}} QE \tag{6.1}$$

subject to:

$$\begin{aligned} Z &\leq Qc + \mathcal{E}(\delta Q W^f | n) && (6.2)\\ E + c + K &\leq WT + nl && (6.3) \end{aligned}$$

At the optimum, equation (6.2) should hold with equality because if there is an inequality, the man can reduce his wife's consumption and increase his own without violating equation (6.2). Likewise, equation (6.3) should also hold with equality at the optimum. Let equations (6.2) and (6.3) hold with equality. Solve equation (6.2) for c and substitute it into equation (6.3). Then, solve equation (6.3) for E and substitute it into the objective function (6.1) to get:

$$u^j(Z, W) = \max_{\{T,n,K\}} [Q(WT + nl + \delta\mathcal{E}(W^f|n) - K) - Z] \tag{6.4}$$

The benefit of the transferable utility assumption can be seen in equation (6.4) where the reservation utility of a wife, Z, is additively separable in the husband's objective function. The optimal choices of T, n, K are independent of Z.

Let a^j denote the optimal quantity of a chosen by the husband and $R^j = (Wt^j + n^j l + \delta\mathcal{E}(W^f|n^j) - k^j)/q^j$. The first order conditions with respect to T, n, K are:

$$\begin{aligned} R^j q^j_x x^j_{\underline{T}} &= W && (6.5)\\ R^j q^j_x x^j_{\underline{n}} &= l + \delta p(h - l) && (6.6)\\ R^j q^j_K &= 1 \end{aligned}$$

Combine equations (6.5) and (6.6) to get:

$$\frac{x^j_{\underline{T}}}{x^j_{\underline{n}}} = \frac{W}{l + \delta p(h - l)} \tag{6.7}$$

Since x is linearly homogenous and symmetric in $\underline{T}$ and $\underline{n}$, equation (6.7) implies:

Proposition 1 *An old husband whose wage is h (l) will spend less (more) time with his child than his young wife. Conversely, he will work more (less) than his young wife.*

Compared with her husband, the wife has an additional benefit from working which is that she improve her expected future earnings. Thus if her current wage is the same as that of her husband, she should work more than him. On the other hand, if her husband's wage is h, the difference in their current wage, $h - l$, exceeds the marginal increase in her expected future wages, $\delta p(h - l)$. So he should work more than her.

Using the envelope theorem,

$$u^j_Z = -1 \tag{6.8}$$
$$u^j_W = q^j T^j \tag{6.9}$$

A old single man with wage W who has to decide whether to marry or not will solve:

$$u^o(Z, W) = \max[W, u^j(Z, W)] \tag{6.10}$$

In order to get the result that a wealthier single old man is willing to give up more consumption to marry, let:

Axiom 1 $u^j_W = q^j T^j > 1$

Assumption [1] and equation (6.10) imply that whenever a single old man with wage W chooses to marry, all single old men with higher wages will also choose to marry. Assumption [1] says that the complimentarity between child services and own consumption is sufficiently large so that the income effect dominates the substitution effect (the cost of time with the child increases) with an increase in the wage.

6.1.2 Single Young Men

Young men who do not marry will spend all their time at work ($t^s = 1$), consume l and obtain a utility of l in period 1. A single young man will obtain a second period wage of h with probability $p(1)$ and a second period wage of l with probability $\underline{p(1)}$. His second period utility as a single old man, $u^o(Z, W)$, will depend on his wage. The expected discounted utility of being a single young man is then:

$$U^s(Z) = l + \mathcal{E}(u^o(Z, W)|t^s)$$

Let Z^h and Z^l be such that $h = u^j(Z^h, h)$ and $l = u^j(Z^l, l)$. Then:

$$\begin{aligned} U^s_Z &= -1 \ , \quad Z < Z^l \\ U^s_Z &= -p \ , \quad Z^l \le Z \le Z^h \\ U^s_Z &= 0 \ , \quad Z^h < Z \end{aligned} \tag{6.11}$$

When Z is low ($< Z^l$), both rich and poor single old men will marry. When Z is in the intermediate range, only rich single old men will marry. Old single men will not marry when $Z > Z^h$. A plot of $U^s(Z)$ is shown in Figure 1.

6.1.3 Divorced Men

A marriage between a young man and a young woman may break up after the first period with probability π. Every divorced man has a child from his marriage in the first period. Let the quality of the child be q. This quality cannot be changed in the second period. Let the divorced man have wage W. If he does not remarry, he will work full-time and achieve a utility of βqW. $\beta \le 1$ reflects the cost of divorce.

If he remarries, let him consume E and produce another child of quality Q. Let his utility from remarriage be $\beta qu(Q, E)$.

As specified above, the utility function of a divorced man is the same as the utility function of a single old man multiplied by βq.

Assume that young women are willing to marry divorced men as long as they provide the same level of discounted expected utility, that is Z, as other potential husbands. In this case, a remarried man chooses T, n, K, q, E to solve:

$$u^r(Z, W) = \max_{T,n,K,q,E} [\beta q Q E] \tag{6.12}$$

subject to equations (6.2) and (6.3). Except for the constant factor, βq, in the objective function (6.12), the remarried man solves the same problem as the single old man who marries for the first time. Let a^r denote the optimal quantity of a that the remarried man chooses. Then $a^r = a^j$ for $a = T, n, K, c, E$. Thus young women who marry divorced men have the same outcomes as those who marry single old men.

The utility of a divorced man with wage W is:

$$u^d(Z, W) = \max[\beta q W, \beta q u^j(Z, W)] = \beta q u^o(Z, W) \tag{6.13}$$

The Z cutoffs for remarriage by rich and poor divorced men are the same as those for the single old men, that is , Z^h and Z^l.

6.1.4 Divorced Women

Divorced women do not remarry because they cannot have more children and there is no other gain to marriage. Thus a divorced woman with wage W^f will work full-time and consume W^f. Let the quality of her child from the first period be q. Her utility in the second period is $\beta q W^f$.

6.1.5 Old Married Men and Women

Men and women who marry when young will remain married in the second period with probability $\underline{\pi} = 1 - \pi$. Without loss of generality, we assume that there is no risk sharing within marriage in the second period.[12] Thus an old husband with wage W and an old wife with a wage of W^f will consume W and W^f respectively. Let their child from the first period have quality q. The old husband will achieve a utility of $u(q, W) = qW$ and the old wife will achieve a utility of $u(q, W^f) = qW^f$. There is no discounting of the child's quality because the marriage stays intact. The gain from marrying young is that parents can enjoy their child in both periods. The cost of marrying young is that human capital accumulation by the parents are adversely affected.

6.1.6 Married Young men

Consider the marriage between a young man and a young woman. Let the husband spend time t time at work and $\underline{t}$=1−t time with their child. Let the wife spend time n at work and $\underline{n} = 1 - n$ with their child. Let the father's, mother's and child consumption in the first period be e, c and k respectively. Then the child's quality is $q = q(k, x(\underline{t}, \underline{n}))$. The first period utility of the wife is qc. Her expected discounted utility from marriage is:

$$qc + (\underline{\pi} + \pi\beta)q\mathcal{E}(W^f|n)$$

The young man's utility in the first period is qe. His expected discounted utility from marriage is:

$$qe + (\underline{\pi}\mathcal{E}(W|t) + \pi\beta\mathcal{E}(u^o(Z, W)|t))q$$

In order to attract a wife, the young man must offer his wife a reservation utility of Z. So he will choose t, n, k, q, e to solve:

$$U^m(Z) = \max_{\{t,n,k,q,e\}} qe + (\underline{\pi}\mathcal{E}(W|t) + \pi\beta\mathcal{E}(u^o(Z, W)|t))q \tag{6.14}$$

subject to:

$$Z \leq qc + (\underline{\pi} + \pi\beta)q\mathcal{E}(W^f|n) \tag{6.15}$$
$$c + e + k \leq l(t + n) \tag{6.16}$$

Following the earlier discussion, both constraints must bind in equilibrium. Then substitute e and c from the now binding constraints into the objective function (6.14) to get:

$$U^m(Z) = \max_{\{t,n,k\}} q(l(t + n) + (\underline{\pi} + \pi\beta)\mathcal{E}(W^f|n) - k + \underline{\pi}\mathcal{E}(W|t) + \pi\beta\mathcal{E}(u^o(Z, W)|t)) - Z \tag{6.17}$$

Let j^m denote the choice of quantity j which solves the above maximization problem. Let $R^m = l(t^m + n^m) + (\underline{\pi} + \pi\beta)\mathcal{E}(W^f|n^m) - k^m$. Then the first order conditions with respect to t, n and k satisfy:

$$R^m q_x^m x_{\underline{t}}^m = q^m(l + p(\underline{\pi}(h-l) + \pi\beta(u^j(Z,h) - u^j(Z,l)))) \quad (6.18)$$

$$R^m q_x^m x_{\underline{n}}^m = q^m(l + p(\underline{\pi} + \pi\beta)(h-l)) \quad (6.19)$$

$$R^m q_k^m = q^m \quad (6.20)$$

Divide equations (6.18) by (6.19) to get:

$$\frac{x_{\underline{t}}^m}{x_{\underline{n}}^m} = 1 + \frac{p\pi\beta([u^j(Z,h) - u^j(Z,l)] - [h-l])}{l + p(\underline{\pi} + \pi\beta)(h-l)} \quad (6.21)$$

By assumption (1), $u^j(Z,h) - u^j(Z,l) \geq h - l$. Consequently $t^m \geq n^m$ in order to satisfy equation (6.21). This result is summarized in:

Proposition 2 *Young married men work more than their wives.*

The proposition is due to the fact that young married men may remarry if their first marriages fail. Remarriages are more likely if their second period wages are higher which in turn depend positively on their first period labor supply. The option value of remarriage, which is unavailable to women, causes young men to work more than their wives.

By looking only at labor market opportunities and time use in this model, an analyst may conclude that women have a comparative advantage in child rearing. But by construction, women have no such comparative advantage. Rather, what men and women can do with the same labor market opportunities creates the difference in time use.

Corollary 3 *Young married men earn more than their wives. Married men have higher wage growth than their wives.*

Since old married men and women work the same hours, the following corollary is also immediate:

Corollary 4 *There is convergence in hours of work between husbands and wives over their marriage.*

By the envelope theorem:

$$
\begin{aligned}
U_Z^m &= -(1+\pi\beta)\ , \quad Z < Z^l \\
U_Z^m &= -(1+\pi\beta p t^m)\ , \quad Z^l \le Z \le Z^h \\
U_Z^m &= -1\ , \quad Z^h < Z
\end{aligned}
\tag{6.22}
$$

When Z, the reservation utility of a young wife, is equal to zero, $U^m(0) > U^s(0)$ because the young husband can duplicate the young single man's behavior and additionally have his wife's time to spend on the child.

Figure 1 shows a feasible $U^m(Z)$ function.

6.2 Marriage Market Clearing

Depending on parameter values, there are three types of feasible marriage market equilibria. Only one type of equilibrium involves divorce and remarriage. We will focus on this equilibrium because it is the only equilibrium which is consistent with all the observed gender roles discussed in the introduction. Still, the different types of equilibria in this model are useful because of the diversity of observed marriage experiences across cultures.

6.2.1 Marriage with Divorce and Remarriage

Let Z^* be such that $U^m(Z^*) = U^s(Z^*)$. Z^* exists and is unique. The equilibrium with marriage, divorce and remarriage is characterized by the fact that $Z^l \le Z^* \le Z^h$. Such an equilibrium is depicted in Figure 1. In this case, we will argue that Z^* is the market clearing reservation utility for young wives.

Let $Z = Z^*$. At Z^*, young men are indifferent between marrying or remaining single. Let the number of young men and women in each period be normalized to 1. Let m^* be the market clearing number of young men who marry. Then the number of rich single old men is $(1 - m^*)p$. The number of old divorced men who remarry is $m^*\pi p t^m(Z^*)$. Equate, in each period, the total number of men in search of young wives with the number of young females to get:

$$
m^* + (1 - m^*)p + m^*\pi p t^m(Z^*) = 1 \tag{6.23}
$$

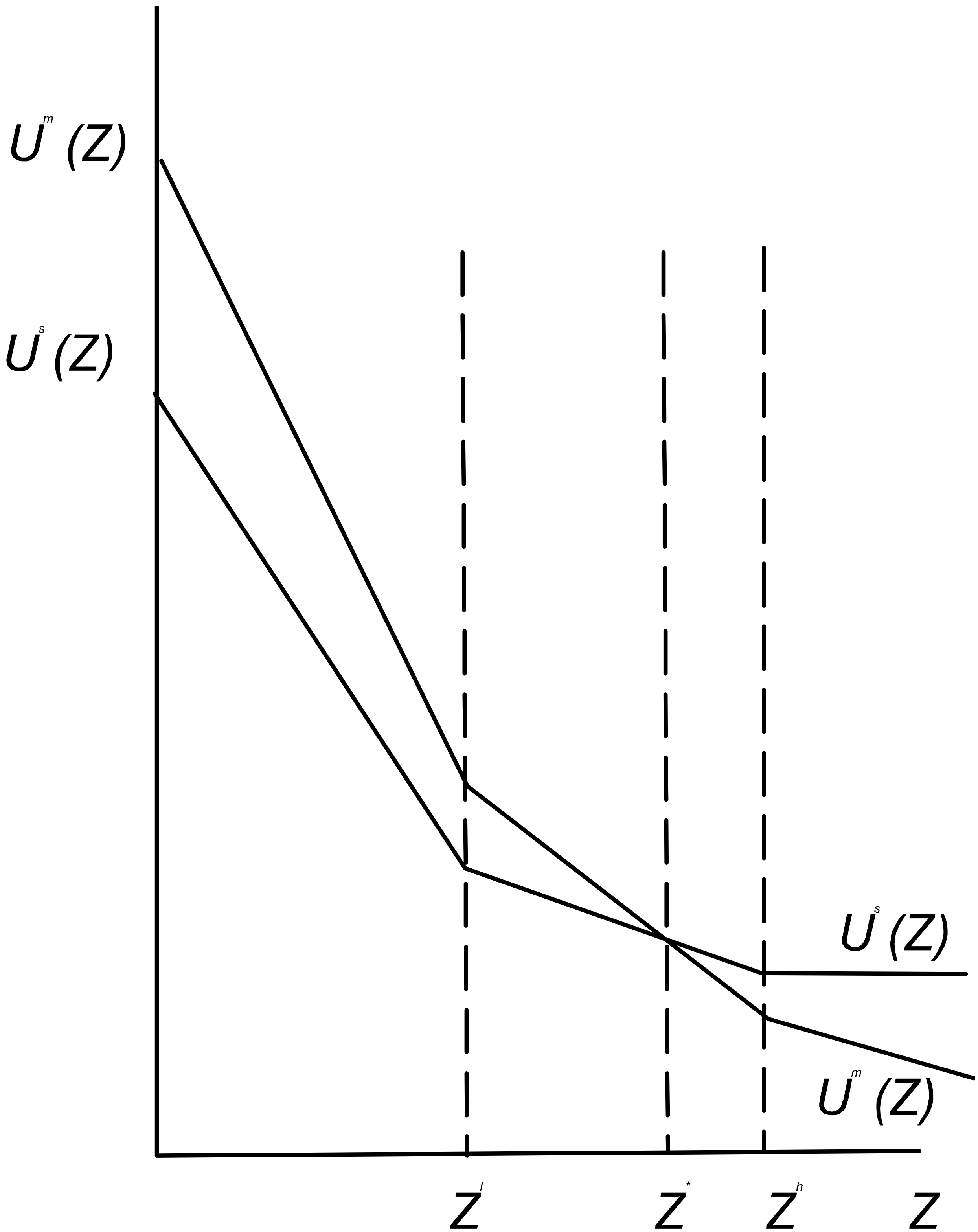

Figure 6.1:

Rearrange equation (6.23) to get:

$$m^* = \frac{1-p}{1-p+\pi p t^m(Z^*)} \tag{6.24}$$

Since m^* is a positive fraction, it is feasible. By construction, it satisfies market clearing.

The propositions below hold for this equilibrium. Since $Z^l \leq Z^* \leq Z^h$,

Proposition 5 *Divorced men who remarry have a higher wage than those who do not.*

Proposition 6 *Single old men who marry have a higher wage than those who do not.*

Corollary 7 *The age of first marriage for men is positively correlated with their age.*

Corollary 8 *Poor single old men never marry.*

The above corollary shows that some men, single men who are unlucky in the labor market, will never marry.

Old men who marry or remarry have high wages. By proposition (1), they work and earn more than their wives. Together with proposition (2), this market equilibrium implies:

Proposition 9 *Husbands work and earn more than their wives.*

Since $p > pt^m(Z^*)$, the model also predicts that:

Proposition 10 *The incidence of marriage for single old men is higher than the incidence of remarriage for divorced old men.*

Since no divorced woman remarries,

Proposition 11 *Divorced women are less likely to remarry than divorced men.*

As all women marry, the model predicts that:

Proposition 12 *There are proportionately more never married men than women.*

Only young women marry whereas some young men and some single old men will marry for the first time. Thus:

Proposition 13 *The average age of first marriage is lower for women than men.*

6.2.2 Old Husbands and Young Wives

Let $Z^* < Z^l$. In this case, Z^* cannot be market clearing. If $Z = Z^*$, all divorced men and old single men will want to marry. All old single men and young married men must add up to 1 in each period. Thus the addition of divorced men into the market for young wives will exceed the supply of young wives and contradicts market clearing.

Consider Z^{**} such that $Z^* < Z^{**} \leq Z^l$. Then Z^{**} is a market clearing reservation utility for young wives. Let $Z = Z^{**}$. In this case, all young men will remain single and all old single men will marry young women. The market clears. Note Z^{**} is not unique.

There is no divorce or remarriage in this equilibrium. We will not examine this equilibrium further.

6.2.3 Divorce without Remarriage

This equilibrium is characterized by the fact that $Z^* \geq Z^h$. When $Z > Z^h$, no old single or divorced man will want to marry. If $Z < Z^*$, all young men will prefer to marry than remain single. Let Z^{***} be such that $Z^h \leq Z^{***} \leq Z^*$. We claim that Z^{***}, which is not unique, is a market clearing reservation utility for young wives. When $Z = Z^{***}$, only young men marry young women which is market clearing. No divorced man remarries. We will not discuss this equilibrium further.

6.3 No Uncertainty

In this section, we reexamine the model where human capital accumulation is non-stochastic. Instead of the stochastic human capital accumulation technology discussed in the previous section, let a worker's second period non-random wage be $W(\tau) = l + p\tau(h - l)$ where τ is his or her time spent at work in the first period. All other aspects of the model remain as before.

There are two feasible market equilibria with young married men. In the first, all young men marry. In this case, there are no young women for divorced men to remarry. Divorced men face the same opportunities as divorced women. Given the symmetry in the rest of the model, young men will not choose different hours of work from their wives. Due to the transferable utility assumption, symmetric behavior occurs even though husbands and wives may have different expected lifetime utilities.

In the second type of equilibrium, some young men will marry whereas others will remain single. Since all young married men are identical, they will choose the same hours of work, t'. Their second period wage will be $W(t') < W(1)$. Their second period wage is less than those that of single old men who will have a wage of $W(1)$. By assumption [1], single old men will willingly outbid divorced men for wives. Due to the equal number of men and women in each cohort, young married men and single old men who marry will match up with all the young women. There are no young women left for divorced men to marry. Thus in this case as well, divorced men face the same effective opportunities as divorced women. So young married men will choose the same hours of work as their wives. In this equilibrium, there are gender roles. For example, some young men marry and other young men remain single whereas all young women marry.

This section has shown that, without human capital uncertainty, all young married men will work the same hours as their wives which is counterfactual. Every man only has one wife over his life. Whether these findings are robust to other sources of heterogeneity across individuals remains to be investigated.

6.4 Other empirical evidence

In addition to the empirical evidence cited in the introduction in this chapter, the model also implies that, holding other factors constant, mothers will choose to provide relatively more resources to their children than fathers. The is a growing empirical literature in support of this hypothesis. Thomas (1990) showed that after controlling for labor income and education, mother's non-labor income have a larger positive effect on child survival and child anthropometric measures than father's non-labor income in a sample of urban Brazilian households. Lundberg, Pollak and Wales (1997) showed that British mothers provided more resources to their children when they receive child benefits from the government than when the fathers receive the same benefits.

There are many more studies which documents that child outcomes depend differentially on mother's and father's incomes. However most of these studies are difficult to interpret. If parental incomes are systematically correlated with parental preferences, then different parental incomes imply different parental preferences. In this case, it is hard to disentangle the effect of a change in behavior due to changes in income (holding preferences fixed) versus a change in behavior due to changes in income (and preferences changing simultaneously).