Civil Unions and Covenant Marriage: The Economics of Reforming Marital Institutions*

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Abstract

Many governments throughout the world have recently debated proposals that would alter the incentives to establish or terminate family relationships. To understand the incentives such reforms would create, this paper develops a model in which couples establish relationships under one of several possible institutional arrangements, aware that unforeseeable developments may induce future separation. Comparative statics on policy parameters are then used to predict the effects of several reforms. The main insight is that a reform affecting a particular institution also influences search behavior and the incentives to enter or exit other institutional arrangements—often in conflict with reformers' apparent goals.

1 Introduction

Economists are well aware that legislative initiatives often fail to achieve their intended goals. This paper argues that the recent debates over reforming marital institutions suffer from that common downfall due to the failure to recognize that reforms of particular institutions also provide incentives to enter or exit *other* institutions involving more or less commitment.

In short, the argument is that the benefits of particular relationship forms can be obtained in two different ways: either by accepting the benefit immediately with one's current partner or by looking for a new partner with whom to accept that benefit. Thus, a reform that promotes marriage, say, would encourage marriage directly, but it would also increase the benefit of searching for a partner one wishes to marry—possibly reducing the willingness of more tenuous couples to remain together at all. While it is conceivable that such an effect might be viewed favorably, the fact that the public discussion has completely ignored it raises suspicions that discussants are simply unaware of the possibility.

In order to make this point, the paper develops a model of couples choosing to incorporate their union under one of several possible institutional arrangements, all the while aware that future events or new information may lead them to alter their choice in the future. It then analyzes the effects of proposed reforms by observing the effects on the couples' optimal decisions of three different types of policy perturbations that describe (possibly in combination) virtually all proposals to alter the relative benefits and costs of different institutional arrangements: (A) changes in the benefits provided by different institutions, (B) changes in the cost of ending a match from a particular type of institutions (e.g., increasing the cost of divorce), and (C) changes in the cost of incorporating the match under a particular type of institution.

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Such comparative statics will even allow us to investigate the effects of inventing new institutional forms—at least insofar as it has always been possible (if very expensive) to negotiate a private contract that replicates the "new" arrangement—because the invention is essentially a (possibly dramatic) decrease in the cost of entering that institution. This is relevant because at least two major policy proposals involve inventing new legally-recognized relationship forms, "covenant marriage" and "civil unions," both of which are defined in Section 2 below.

In addition, the analyzed perturbations also correspond to other social changes that may affect family structure decisions by changing the relative benefits of different marital institutions—for instance, the legalization of oral contraceptives for unmarried women (Goldin and Katz, 2002) or the increasing social acceptance of cohabitation and divorce. Thus, while it is not the main focus of this paper, the theory developed here also has implications for some other hypotheses about recent trends in family structure that do not involve legislation directly intended to influence family structure.

Throughout the paper, the focus is solely upon the incentives reforms would create for couples to choose particular marital institutions involving more or less commitment. Many others have written about the legal, moral, political, and sociological aspects of these proposals, as well as their consequences for things like poverty rates, bargaining power within the household, the incidence of domestic violence, and the division of labor across genders. All of those are significant issues in their own right, but the relevance of each depends in part upon the effects that reforms would have upon couples' decisions to live under a given set of rules, or even to remain together at all.

The discussion proceeds as follows. The next section provides some institutional background with a brief discussion of reforms that have been proposed in recent years, especially those that are not self-explanatory. Section 3 then presents the formal model and analysis of policy perturbations. The implications of that analysis for proposed reforms are discussed in Section 4, and Section 5 concludes with some reflections on more normative aspects of the proposed reforms.

2 Institutional Background

In recent years numerous governments throughout the world and within the United States have considered a diverse series of proposals specifically intended to influence couples' decisions about family structure, typically with the goal of creating more stable families and/or higher fertility rates. It would probably be impossible to list every variation that has been considered, but a number of examples should help to illustrate the scope of the discussion.

Perhaps the most straightforward reforms designed to promote marriage involve direct cash payments to married couples. For example, West Virginia currently adds \$100 to couples' monthly welfare checks if they are legally married, a policy that has been seriously considered in other states as well (perhaps especially Colorado). At least two nations have adopted a similar approach to promoting fertility. The government of Singapore provides a number of benefits to parents, including an annual payment equivalent to 300 for six years upon the birth of a second child, plus an additional \$600 per year for a third child (Fullbrook, 2000). The Japanese government is even more generous, paying parents \$50 per month (each) for their first two children under the age of six, and \$100 per month for each subsequent child under six. In addition, child care and preschool are heavily subsidized, and some employers privately provide very large cash benefits for employees who have multiple children—including one-time bonuses of up to \$10,000 (Sims, 2000).

Another popular reform is the promotion of marriage through advertising, scholarly conferences on marriage, subsidized premarital counseling or marriage training (often through reductions in marriage license fees, as in Florida, Maryland, and Minnesota), the incorporation of marriage classes into high school curricula (Florida), or the production of handbooks and videos designed to educate couples about marriage (distributed by the states of Arizona, Florida, and Utah). Last year President Bush proposed spending \$300 million per year to promote marriage among poor citizens as part of his anti-poverty program, and several states are already using federal welfare funds for that purpose. See

Ooms (2001) and Parke and Ooms (2002) for a longer list of such programs.

One other well-known debate concerns the "marriage penalty" in the U.S. federal tax code, including the Earned Income Tax Credit system. Many proposals to reduce such disincentives to marry have been debated over the past decade, and the issue does not appear to be going away.

Two other reform may not be so self-explanatory because they involve the creation of new institutions: covenant marriage and civil unions. Covenant marriages are defined by a more rigid set of rules than "ordinary" marriages are. Specifically, couples forming covenant marriages agree to abide by a set of conditions designed to make divorce very difficult—such as long waiting periods, mandatory counselling, and few acceptable grounds for divorce. No special rights or benefits are included with the arrangement, although some couples may view the arrangement itself as a benefit (either because the greater difficulty of divorce reduces interspousal bargaining costs, say, or simply because the greater commitment is desired for its own sake). Notably, covenant marriage legislation is not a reform of the existing marriage laws, but rather the creation of a new option for couples that will exist alongside "standard" marriage.[1]

To date, covenant marriage is available in only three states (Louisiana, Arizona, and Arkansas), though a majority of the other U.S. states have considered bills to create the institution. However, it has not proven popular. Only about two percent of new marriages in Louisiana take the covenant form (Sanchez *et al.*, 2002)—and that is where the institution has attracted the most adherents. Only about one-fourth of one percent newly married couples in Arizona select the option, and during the first year that covenant marriage was offered in Arkansas (August 2001–August 2002), only 71 of the roughly 38,000 marriages there took that form—including 14 conversions of standard marriages to the covenant form (Center for Arizona Policy, 2001; DeMillo, 2002). While proponents claim that this unpopularity is largely due to lack of awareness, Sanchez *et al.* (2002) find that covenant marriage is very uncommon even among those who are fully informed.[2] Further, couples who do choose covenant marriage are atypical in their political and religious orientation, and they tend to have characteristics typically associated with a low risk of divorce.

The other institutional form that has emerged recently is known as "civil unions," or sometimes "domestic partnerships." Civil unions offer many of the rights associated with standard marriage—depending on the ordinance, including such things as some insurance benefits, hospital and jail visitation rights, bereavement leave, powers of attorney, and access to public housing, though they generally do not involve default rules governing inheritance, children, or infidelity. They may also be ended more quickly than formal marriages, usually without passing through the court system (Daley, 2000). Thus, they may be seen as something of a hybrid between marriage and cohabitation. Like covenant marriage, they are also offered as an additional option, rather than as a replacement for standard marriage. Couples currently have the option to register as civil unions in many European nations, Canada, Australia, and Brazil; the states of California, Hawaii, and Vermont; numerous municipalities within the U.S.; and with more than 3,000 U.S. employers who offer some sort of domestic partner benefits (Duncan, 2001).

While civil unions are also like covenant marriage in that they represent a new institution, the idea has been around much longer—at least since the time of Margaret Mead (1970), though she traces the idea back to at least the 1920s. Another difference is that many private firms voluntarily recognized the institution even before governments did, offering domestic partner benefits to their employees.

A third difference with covenant marriage is that the two major motivations for establishing civil unions are decidedly non-traditional. One is simply to recognize the needs of the growing number of couples who choose non-marital cohabitation. Such couples presumably want some of the benefits of

[1] Perhaps surprisingly, some who would like to see divorce laws tightened object to this provision. Some people would prefer that *all* marriages face such disincentives for divorce, while others (including the Roman Catholic Church) complain that the creation of multiple types of marriage de-legitimizes the entire institution of marriage.

[2] While their figures indicate that roughly 1/3 of Louisiana "standard married" couples had never heard of the covenant marriage option, the vastly greater size of that group implies that only about 3% of *informed* couples choose the covenant option.

marriage, but are unwilling to accept the risk of bearing all of the costs associated with divorce. Insofar as that is true, they may have more interest in the civil union form. The other major motivation for creating civil unions is to forge a compromise over the issue of gay marriage. Much of the uproar over the institution stems from this aspect; many people object to legal recognition of homosexual couples and many others object to the exclusion of such couples from institutions available to heterosexuals. Since there is little economics in that issue, it will be ignored in this paper. However, we note that when civil unions are created for gays, the option is usually extended to heterosexual couples too.

A final difference with covenant marriage is that civil unions have been more popular where they have been implemented. For example, in the first six months (Nov. 1999–April 2000) that France offered a civil union option ("civil solidarity pacts," or "PACS," some 14,000 couples registered—forty percent of them heterosexual couples (Daley, 2000). For comparison, only about 400 couples entered covenant marriages during the first *three years* they were offered in Arizona (1998-2000). The difference is perhaps a little surprising in that covenant marriages likely have a much longer expected duration than civil unions—while not exactly the same thing, the closest comparison would probably be to non-marital cohabitation, which has a "half-life" of around 18 months in the United States (with about 2/3 of the exiting couples opting to marry formally). Insofar as there are costs of entering these institutions, they would presumably be easier to justify if the couple expected to maintain that status for a longer time. One might therefore have expected that couples would be more willing to pay the costs of registering as a covenant marriage than those of registering as a civil union, yet that has not proven to be the case.

At any rate, one might legitimately conclude that neither covenant marriage nor civil unions has proved to be very popular. Likewise, many of the other incentive programs described above may seem very weak—for instance, it is hard to believe that the $32.50 discount that Florida offers on marriage licenses has strong incentive effects on marriage or divorce. Some of the other reforms, especially those involving direct cash payments, may appear somewhat stronger, but even so the general impression surely is that the reforms under discussion will have only minor effects on behavior.

Nevertheless, there are two reasons to study them anyway. First, future reforms may not be so impotent. It would not be surprising if policy makers began to recognize that these reforms create only weak incentives and responded by creating new laws with much stronger effects. Second, even if the effects are weak, policy makers devote a good deal of attention to them, and surely that task would be aided by a better understanding of the effects created by their initiatives. Accordingly, the next section of the paper develops the theory of family structure decisions and the effects of policy reforms upon them.

3 A General Model of Family Structure Decisions and the Effect of Policy Reforms

In order to predict the impact of a reform of martial and quasi-martial institutions, one needs to explain why different individuals and couples choose different types of relationships in the first place. This section thus presents a relatively simple dynamic model of family structure decisions, which it then uses to analyze three different types of policy perturbations.

The agents in this model will behave as follows. Single persons will search for partners each period, observe the payoff they would receive from forming a partnership with the most appealing potential partner they encounter, then decide whether or not to form that partnership. If they elect not to form partnerships, the individuals go their separate ways and search again the next period.

Couples forming partnerships may choose among several possible institutional arrangements. Some institutions offer greater benefits than others, but such institutions are also more costly to exit if the couple decides to separate. This relationship between benefits and exit costs may be caused by either (a) society's greater willingness to provide benefits (legal rights, social acceptance, etc.) to couples who demonstrate a greater willingness to commit to staying together, (b) the simplification of intrahousehold bargaining when there is a greater probability that the game will be repeated, or (c) couples' greater willingness to make "match-specific investments" in things like children, jointly-owned property, match-specific knowledge, and a more specialized division of labor when the match is more likely to continue. (We do not explicitly model such match-specific investments here, though little would change if we did.) Regardless, the fundamental trade-off is between greater benefits and greater flexibility.

Once a match forms, couples' underlying "compatibility" changes randomly each period. After observing its new degree of compatibility, the couple may decide to dissolve by paying some cost that depends on the institution under which the couple was formerly incorporated. In that case, the separated individuals would return to the pool of single persons, searching for mates again the following period. Alternatively, the couple may elect to remain together either under the old institutional form or under another form involving greater commitment.

3.1 Notation and Assumptions

Let $\pi \in [\underline{\pi}, \overline{\pi}]$ (where $\underline{\pi} > 0$) index a given couple's degree of compatibility, and let $\tau \in \{0\} \cup [a, b]$ (with $a > 0$) represent the institutional form under which the couple is operating (e.g., dating, cohabiting, married, etc.). When $\tau = 0$, the couple is unmatched, although the couple may elect to form a match at that time. Otherwise, greater τ indicates an institution with both greater benefits and greater costs of ending the match. Agents discount the future at constant rate $\beta \in (0, 1)$, live forever, and always agree with their partners on the optimal τ. (That is, we are abstracting from intrahousehold bargaining in order to focus exclusively on the choice of τ). Unmatched agents draw new potential partners each period from the cumulative distribution function $G(\pi')$, then decide whether or not to form a relationship with that partner. The (random) evolution of existing couples' compatibility from one period to the next is described by the stationary cumulative distribution function $F(\pi_{t+1}, \pi_t)$, where $\pi'_t \geq \pi_t$ implies that $F(\pi_{t+1}, \pi'_t)$ first-order stochastically dominates $F(\pi_{t+1}, \pi_t)$. After observing the new compatibility, a couple in institution τ can choose a new institutional arrangement from the set $\{0\} \cup [\tau, b]$—in other words, their options are to end the match, remain in the same institution, or switch to a new institution with more greater benefits and exit costs.[3]

A couple in institution τ with compatibility π that chooses to switch to new institution τ' receives a single-period payoff given by the function $R(\pi, \tau, \tau')$. If $\tau' = 0$, $R = 0$. Otherwise for $\tau' > 0$, we specify $R(\pi, \tau, \tau') = \pi H(\tau, \tau')$, where H is positive, continuous (and thus bounded), and differentiable over its domain; weakly increasing in both arguments and strictly increasing in at least one of them; and and $H_{12} \geq 0$.[4] Likewise, the cost of switching from τ to $\tau' > 0$ is given by the non-negative, continuous, differentiable function $q(\tau, \tau')$, where $q_1 \leq 0$, $q_2 \geq 0$, and $q_{12} \leq 0$. The cost of ending a match formerly constituted under institution τ is given by the positive, increasing, continuous, differentiable function $k(\tau)$. It is convenient to define $k(0) \equiv 0$ and

$$c(\tau, \tau') \equiv \begin{cases} k(\tau) & \text{if } \tau' = 0 \\ q(\tau, \tau') & \text{if } \tau' > 0 \end{cases} .$$

Since agents seek to maximize the discounted expected value of net payoffs given current compatibility π and degree of commitment τ, define value function $V(\pi_t, \tau_t)$, conditional (on choosing a

[3] Even if it were allowed, it is only under somewhat strange conditions that it would ever be optimal to choose $\tau' \in (0, \tau)$ because that would involve paying a cost to leave the old institution in order to enter a new institution with lower benefits. In practice, very few married couples decide to divorce in order to continue living together as a cohabiting couple. (The only case of which I am aware involves the idiosyncratic musician sometimes known as "Prince.")

[4] The multiplicative separability of R is for convenience only. Virtually identical results would hold under additive separability, and indeed under much more general assumptions (Drewianka, 2003).

particular $\tau' > 0$) value function $J(\pi, \tau, \tau')$, and value of search W as follows:

$$\begin{aligned} V(\pi_t, \tau_t) &\equiv E\left[\sum_{\tau=0}^{\infty} \beta^t (R_\tau - c_\tau) \mid \pi_\tau, \tau_\tau\right] \\ J(\pi, \tau, \tau') &= R(\pi, \tau, \tau') - q(\tau, \tau') + \beta \int_{\underline{\pi}}^{\overline{\pi}} V(\pi', \tau') dF(\pi', \pi) \\ W &\equiv \beta \int_{\underline{\pi}}^{\overline{\pi}} V(\pi, 0)\, dG(\pi). \end{aligned}$$

Then the Bellman equation is $V(\pi, \tau) = \max \left\{ W - k(\tau), \sup_{\tau' \in [\tau, b]} J(\pi, \tau, \tau') \right\}$.

3.2 Some Basic Results

The model described above is a special case of a more general model I recently developed in another paper (Drewianka, 2003). Accordingly, much is already known about agents' optimal behavior in such a framework (and under a number of other variations as well). Specifically, the value functions V and J have a number of useful properties, many of which are common in the literature on job search (e.g., Jovanovic, 1979; Mortensen, 1986): they are increasing and convex in π (strictly increasing except where $V = W - k$), with globally non-negative cross-derivatives. See the paper cited above for proofs.

The convexity property is interesting in that implies that greater risk (in the sense of a mean-preserving spread of F or G) would make everyone better off, at least privately. This is perhaps surprising in that it implies that individuals would privately prefer a system in which there is more divorce, provided that the increase arises because of greater unpredictability of individual relationships and not because relationships are of lower average quality.

That said, the more meaningful result is the non-negativity of the cross-derivatives, especially for J. It implies that the optimal choice among the available marital institutions is an increasing function of both compatibility π and the couple's existing institutional form τ. Accordingly, couples in any existing institution τ (including newly matched couples) decide to separate if their compatibility falls below some reservation level $\pi^*(\tau)$; among those who stay together, the most compatible couples elect to switch to institutions involving more commitment. Likewise, for couples with a given compatibility π, those in institutions with more commitment are more willing to switch to a new institution involving greater commitment and less willing to end the match (i.e., π^* is decreasing in τ).

While our model does not contain match-specific investments, my previous work (Drewianka, 2003) shows that they would tend to be complementary with one another and with institutional commitment. That is, couples in institutions involving more commitment would make greater match-specific investments, those with greater existing match-specific investments would be more willing to enter institutions involving more commitment, and those with more of one type of match-specific investment would make greater investments in other types of match-specific instruments. Because of these complementarities, little is lost by the decision here to simplify the analysis by considering only the decision over the formal status of the relationship, since the predictions would be extremely similar if other types of match-specific decisions were added to the model.

3.3 Policy Perturbations

Having established a model of family formation decisions, we now ask how those decisions are affected by changes in policy parameters. Our approach will be to examine policies that increase the appeal of only certain types of relationships, either by raising their benefits or by lowering the cost of entry into or exit from that type of relationship. To implement this, suppose changes in public policy operate by increasing some parameter x that raises the attractiveness of some subset of relationship types $\tau \in [\tau_c, \tau^c] \subset [a, b]$. Three policy changes that seem most relevant are as follows:

$$\begin{array}{lcc} \text{Case A} & : & R(\pi, \tau, \tau', x) \equiv R(\pi, \tau, \tau') + h^1(\tau, x) \\ \text{Case B} & : & k(\tau, x) = k(\tau) - h^1(\tau, x) \\ \text{Case C} & : & q(\tau, \tau', x) \equiv q(\tau, \tau') - h^2(\tau, \tau', x) \end{array}$$

$$\text{where} \qquad h^1(\tau, x) \equiv \begin{cases} x & \tau \in [\tau_c, \tau^c] \\ 0 & \text{otherwise} \end{cases}$$

$$\text{and} \qquad h^2(\tau, \tau', x) \equiv \begin{cases} x & \tau' \in [\tau_c, \tau^c],\ \tau < \tau' \\ 0 & \text{otherwise} \end{cases} .$$

Case A corresponds to a reformulation that raises the payoff to the affected types of relationships, Case B to one that lowers the cost of exiting those types of relationships, and Case C to a policy reducing the cost of entering those types of relationships.

The results will be most interesting if we add the assumption that initially marginal couples ($\pi = \pi^*(0)$) are more likely to receive the benefits of the policy shift by looking for new partners than by remaining together, unless the change directly benefits marginal relationship types (that is, unless $\tau_c \leq a \leq \tau^c$). The intuition here is that a person in a low-compatibility relationship is more likely to find a more compatible partner by searching anew than by hoping for the current relationship to evolve into a more compatible one. Under that assumption, we would expect a change in the benefit/cost schedule to encourage marginal new couples to separate and search for new partners—again, unless the change directly increased the appeal of the minimal institutional form (a). As the first line of intuition suggests, it would suffice to assume that $G(\pi')$ stochastically dominates $F(\pi', \pi^*(0))$, but we will instead follow the more limited logic of the second line of intuition and make the much less restrictive assumption that $\frac{\partial}{\partial x}[J(\pi^*(0), 0, a) - h] \leq \frac{\partial}{\partial x}W$.

Using this formulation, we can show the following proposition. All proofs appear in the appendix.

Proposition 1 *Suppose a policy change raises the attractiveness of types of relationships $\tau \in [\tau_c, \tau^c]$. Then all of the following are true.*

1. *Everyone is privately better off than before the policy change.*
2. *Policy shifts of types (B) and (C) (see above) raise the standards for maintaining all types of relationships for another period, thus making it more likely that any couple would separate in a given period of time. For policy shifts of type (A), the same is true except for couples in affected types of relationships ($\tau \in [\tau_c, \tau^c]$).*
3. *For any type of policy shift, the welfare of couples already in relationship types $\tau \geq \tau^c$ does not rise as quickly as that of single persons. Accordingly, such couples become less likely to make additional investments or commitments and more likely to end their relationship.*
4. *For any type of policy shift, couples in relationship types $\tau < \tau^c$ and considering a new relationship type $\tau' \geq \tau^c$ will now have less incentive to make the additional commitment than in the past. Such couples will also make no more relationship-specific investments than they would have prior to the policy change.*

The intuition for Proposition 1 is that no one can be privately hurt by a policy shift that makes some options better than before. There are two ways that the policy shift could make a couple better off. First, the couple could benefit from the policy shift, either now or at some point in the future. We will call reactions to this straightforward process the *direct effect*. Alternatively, the members of the couple might benefit from the shift in a subsequent relationship should their current one end. This second possibility causes the opportunity cost of current relationships to rise, a phenomenon we shall call the *opportunity cost effect*. Accordingly, all couples will raise the minimum level of compatibility they require to continue their current relationship, and thus relationship would be more likely to end. The only possible exception would be for a policy shift that increases the flow of benefits to certain types of relationships (Case A), which would tend to make couples in those affected types of relationships (only) more likely to stay together. Furthermore, since couples with relationship types exceeding those affected by the policy would never receive the new benefits without first ending their relationships (at least not without following the suboptimal strategy of moving to a lower relationship type), such couples would only benefit because of the increased opportunity cost. Consequently, such couples would be more likely to end their relationship and less likely to receive the rewards of any additional investments or commitments they might make, so they would respond by making fewer investments and commitments than they otherwise would have.

To see this concretely, consider a world with three kinds of relationships, call them dating, cohabitation, and marriage, as well as the option to be single, and suppose that the flow of benefits from dating suddenly increased. The immediate effect would obviously be to raise the attractiveness of dating relative to the other three options. In addition, singleness would be more attractive than before (though not as much as dating is) because potential future relationships may involve dating, which will be more attractive. The future also looks brighter for married and cohabiting couples, but only because their opportunity cost has risen—that is, because they will have better alternative options in the event that their relationships end. Thus, the relative attractiveness of singleness grows by more than the relative attractiveness of either marriage or cohabitation, implying that both types of relationship are now more likely to end. Finally, since cohabitations are more likely than marriages to end, the change raises the attractiveness of cohabitation relative to marriage, even though both are rising absolutely and falling relative to dating and singleness.

If the policy change made cohabitation more attractive, rather than dating, it would be less clear how dating couples would respond. Proposition 1 tells us that those dating couples considering ending their relationships would be more likely to do so, opting instead to look for new and better mates, and that those who would have considered legal marriage before may now decide to cohabit instead. But what about dating couples who would have just continued dating? On one hand, it is more attractive than before to cohabit, but on the other hand it is also more attractive to end the current relationship and seek a better one. This conundrum is addressed by Proposition 2.

Proposition 2 *Consider a couple with current type of relationship less than or equal to those affected by the change in policy ($\tau \leq \tau_c$), and suppose that its current compatibility is such that prior to the policy change, the couple's optimal new relationship type is also less than or equal to those affected by the change in policy ($\tau' \leq \tau_c$). Then*

1. *Such couples respond to the policy change either*
   - (a) *by making less commitment than they would have before the policy change, or*
   - (b) *by increasing their commitment and moving to a directly affected type of relationship ($\tau \in [\tau_c, \tau^c]$).*
2. *Furthermore, if the optimal relationship type increases for a couple with compatibility and degree of commitment (π_1, τ_1), then it does for all couples with more compatibility and higher degrees of commitment $[(\pi_2, \tau_2) \geq (\pi_1, \tau_1)]$ for whom the optimal relationship type would initially have been less than τ_c.*

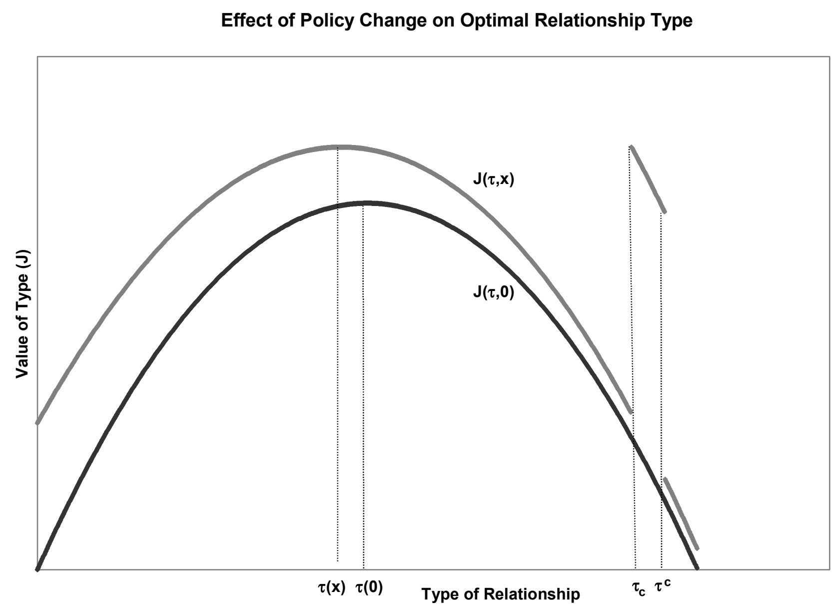

Figure 1: Effect of policy change on the values of different relationship types

The key to understanding the first part of this proposition is to recognize that the conflicting direct and opportunity cost effects create a convexity in the couple's objective function that happens to include the type of relationship that was initially optimal, as shown in Figure 1. Whereas the opportunity cost effect makes lower types of relationships more attractive than before, causing the objective function to shift upward and leftward, the direct effect increases the appeal of the directly-affected types of relationship, causing the portion of the objective function above them to rise discretely above the remainder of the function. As a result of this discontinuity, the new optimal type of relationship for these couples either will be less than what it otherwise would have been (in the figure, $\tau(x) < \tau(0)$), or it will be one of the affected types of relationships. For shifts of types (B) and (C), the optimal relationship type over the affected range is the lower bound τ_c (as shown in the figure), and thus a couple choosing greater commitment than before would necessarily choose relationship type τ_c. However, for a shift of type (A), such a couple may choose an affected relationship type greater than the minimum ($\tau \in (\tau_c, \tau^c]$) because higher relationship types are more likely to stay intact and continue receiving the new benefits in the future.

The second part of Proposition 2 states that if a given couple in the sub-affected region finds it optimal to respond to the change by moving to the affected region, then so will all couples with better compatibility and greater current degree of commitment. The intuition for this comes mainly from the fact that the latter couple is already less likely to break up the former, so the opportunity cost effect is smaller for them, while the direct benefits of the new policy are just as large.

For concreteness, return to the previous example (with options of singleness, dating, cohabitation, and marriage), only now suppose that the affected relationship type is marriage. A couple that would otherwise have chosen to date feels two effects. On one hand, they are more interested in marriage than before, so they will be more willing to break up and look for a partner they are more likely to marry in the future. Taken literally, the proposition says that they should necessarily choose a lower type of relationship, but in a discrete world such as the one described here, many couples may continue to remain in their current type of relationship—though the least compatible dating couples will definitely end their relationships. On the other hand, if the couple is sufficiently compatible, the new benefits may encourage the couple to marry. We know that the couple will not cohabit because they were initially uninterested in cohabitation and the opportunity cost effect lowers cohabitation's relative attractiveness that much more. Furthermore, if the couple does elect to marry, then so should every cohabiting couple that is at least as compatible as the dating couple and that has as many existing relationship-specific commitments. However, note that some cohabiting couples may not be as compatible as the dating couple if they once were more compatible than they are now.

4 Applications

Having established the theory of couples' responses to the incentives created by reforms of marital institutions, this section applies those results to predict the qualitative effects of a number of actual reforms that have been proposed. Before launching into those discussions, several points should be made up front. First and most obviously, the effects discussed are purely qualitative in nature—we cannot make quantitative predictions without empirical evidence. It is possible that some of the effects described below will turn out to be minimal in magnitude, but it is also possible that they will be quantitatively large.

Second, it is worth remembering that change takes place at the margin. That is, if a reform induces some couples to marry who would not have married before, those new couples will be drawn from the group that would have cohabited otherwise. By the theory above, those marginal couples would have lower compatibility than couples that would have married in any event, so their marriages lower the average compatibility among married couples and increase the subsequent divorce rate. Nevertheless, since that particular group of marginal couples would have been even more likely to separate if they had cohabited rather than married, the reform would increase the aggregate stability of relationships, even though the divorce rate (from marriage) is higher.

Third, while the theory above concerned only couples' choice among marital institutions, in practice it is also important to think about the reforms' effects on their fertility—governments are often concerned about changes in out-of-wedlock childbearing and the number of children whose parents eventually separate. Fortunately, as we noted earlier, my earlier work (Drewianka, 2003) shows that the two decisions will be complementary, so greater willingness to enter a relationship form involving greater commitment will generally accompany increased fertility.

A final point combines aspects of the first three. Specifically, it will generally be impossible to predict the change in any variable that represents match-specific investments lost due to matches that end. This is unfortunate, since such variables are often of great concern to policy makers—especially the number of children whose parents separate. To use that example, the problem is that when new couples are induced to marry, they may also increase their fertility. The greater difficulty of separating and the additional children increase the likelihood that the couple will remain together, but the fact the couple has more children mean that any separations that do occur are more costly than before. Thus, in order to predict whether the number of single-parent families increases, we would need to know whether the fertility rate rises by more than the separation rate decreases. That is an empirical question whose answer is unknown, so we will not be able to say much about such issues.

With those caveats in mind, let us discuss the effects of four major classes of reforms: (1) reforms that increase the relative appeal of (standard) marriage, (2) the introduction of covenant marriage, (3) the introduction of civil unions, and (4) proposals to increase the cost of divorce.

1. Increases in the relative benefits of marriage. In light of our theoretical results, the easiest reforms to analyze are those that would increase the relative appeal of marriage compared to (e.g.) cohabitation. Several such reforms were noted in Section 2: reductions in the "marriage penalty" in the tax code, other direct financial benefits for legally married couples, and so on.

Such policies would obviously encourage some people to marry who would otherwise cohabit, or even live apart. It would also encourage greater fertility and other match-specific investments by those couples since they would be more likely to remain together than before because it is costlier to end a marriage than a non-marital relationship. Divorce would also be even less likely for a given couple because it would mean forgoing the increased benefit of marriage. However, the effect on the population divorce rate is unclear because the couples induced into marriage have lower compatibility than couples that would have married anyway.

As noted above, there would also be an opportunity cost effect that would tend to reduce commitment by couples that did not marry after the reform passed. Such couples would be more likely to separate than before, though we cannot make broad predictions about the aggregate rate at which couples separate because those who do marry would be more likely to stay together.

2. Covenant Marriage. In the terms defined in Section 3.3, the direct effects of establishing covenant marriages are probably what its proponents expect: entry into the institution, lower divorce rates, and higher fertility among covenant married couples.[5] However, the opportunity cost effect of establishing covenant marriage would tend to reduce commitment because it would increase the attractiveness of searching for a new partner—since one might conceivably form a covenant marriage with them. The net effect is thus to increase the degree of formal commitment, fertility, and stability of the most compatible couples, but to reduce those things for other less compatible couples.

To some extent, such a pattern seems consistent with the apparent goals of those who promote covenant marriage, many whom hope to increase both the desire to marry and the amount of contemplation couples undergo before marrying. Consequently, they may like the idea that couples would tend to vacate marital institutions involving an intermediate level of commitment, making a more clear-cut choice between separating immediately or staying together forever.

Yet that effect may not play out as they anticipate. Depending on the strength of the effects and the point at which the net effects diverge, it is possible (even likely) that the opportunity cost effect would exceed the direct effect even for some couples who form standard marriages—in which case the creation of covenant marriages would tend to increase the incidence of non-marital cohabitation and perhaps out-of-wedlock fertility.

3. Civil Unions. The creation of an option to enter civil unions also has direct and opportunity cost effects. The direct effect would induce some informally cohabiting couples to register as a civil union and may increase their willingness to make match-specific investments and to have children. This would tend to increase the stability of those couples who are now able to form civil unions rather than informal cohabitations.

On the other hand, the ability to form a civil union with a potential future partner would tend to reduce commitment by all other couples via the opportunity cost effect. The least compatible couples would take fewer actions than before that would help their matches succeed, and they would be more likely to separate. Likewise, some couples who would have been marginally willing to marry before may now choose to form civil unions, and even those who continue to marry would unambiguously make fewer commitments to those matches than before, have fewer children, and be more prone to divorce. The aggregate rate at which couples separate would almost certainly increase, but the measured divorce rate could either rise or fall because the greater risk of divorce for the couples who continue to marry is mitigated by the fact that the least compatible couples who would have married before now elect to form civil unions instead.

4. Increasing the cost of divorce. A fourth reform that one hears often involves increasing the cost of obtaining a divorce. No such law has passed in the United States, but the idea clearly motivates many advocates of covenant marriage and many others who decry the historically high divorce rates seen in recent decades.

Again, such a reform would have both direct and indirect effects. There are actually several direct effects here. First, the divorce rate would be reduced in the short run because existing couples could not divorce so easily. Second, the reform would make marriage a riskier proposition, thereby discouraging some couples from entering marriage in the first place—likely increasing the incidence of non-marital cohabitation and out-of-wedlock fertility, but further reducing the measured divorce rate

[5] Sanchez *et al.* (2002) find that couples who choose covenant marriage in Louisiana have a substantially greater interest in having children than other married couples do.

because the couples driven away from marriage would be those most prone to divorce in the first place. In addition, couples who continued to marry may have higher fertility rates than before because they are less likely to divorce, which in turn may augment the reduction in the divorce rate.

As for the opportunity cost effect, the reform would make marriage less attractive and thus reduce the potential benefits of searching for a new partner. This would tend to increase commitment by couples of all types. Specifically, among couples who chose to marry, it would further increase match-specific investments and fertility and further reduce the likelihood that the marriage would end in divorce. Even couples who did not marry would be more willing to continue their current matches, since they would be less likely to marry a different potential partner anyway. They would also (therefore) be more willing to enter (non-marital) relationships involving more commitment—for instance, the reform would make unmarried couples more likely to cohabit and have children.

In short, increasing the cost of divorce would tend to promote fertility and stability for all couples except those discouraged from marrying by the higher costs. However, these effects may include more cohabitation and non-marital fertility.

5 Conclusion

The word "however" appeared often in the discussion above. Its frequent use is indicative of the many complex, contradictory, and perhaps unexpected incentives that are generated by reforms of marital institutions. The complexity seems to be driven by two factors that were explained above. First, any benefit that would promote a particular marital institution is available to either existing relationships or to new relationships that could be formed if the couple split and searched for new mates. Consequently, depending on a couple's compatibility and history, a given reform could make the couple either more or less stable. Second, when a reform alters a couple's decision to enter particular institution, the couple then does not enter some other institution. For instance, while the divorce rate may fall when some less compatible couples are discouraged from marrying, those couples do not cease to exist, but may become incorporated as non-marital cohabitations.

Unfortunately, public discourse on these matters reflects almost none of these complexities. Often the discussion turns into a simple debate of the relative merits of more or less traditional family arrangements—as if policy makers simply faced a choice between promoting one form or the other. If nothing else, it is hoped that his paper has shown that the choices are not that stark. Even if it were desirable, the changes in behavior over the past several decades could not be undone by simply through regulations on family structure decisions.

The complexity of the effects also makes normative recommendations particularly difficult. As we noted earlier, in some cases it is impossible to know how important variables (e.g., the number of children whose parents separate) will change in response to reforms—not just the magnitude, but also the direction. Even where qualitative effects, or even magnitudes, are known, the mixture of effects renders virtually any package controversial.

In large measure, the normative issue hinges on the question of moderately compatible couples. Inducing such couples to marry would indeed reduce the likelihood that they would separate, and that in turn would increase their fertility—further reducing the risk of separation. Nevertheless, while that risk may be lower than before for those particular couples, it remains greater for them than for the more compatible couples who would have married in any event. This creates a real quandry: is it preferable to encourage or discourage such couples?

Surely reasonable people can easily disagree over that matter—even those who similar beliefs about the magnitudes of those effects and similar philosophical stances. Such issues cannot be resolved here. Nevertheless, it is hoped that the analysis here has helped to clarify the issues involved and to demonstrate the need for both more empirical evidence and more thorough, complex debate about the difficult trade-offs involved in crafting family policy.

References

[1] Blackwell, David. February 1965. "Discounted Dynamic Programming." *Annals of Mathematical Statistics* 36 (1), 226–235.

[2] Center for Arizona Policy. March 2001. "Covenant Marriage Update." *Arizona Citizen*, March 2001, 2.

[3] Daley, Suzanne. April 18, 2000. "Law Lets French couples Say 'I Do,' To a Degree." *New York Times*, Online Edition.

[4] DeMillo, Andrew. August 26, 2002. "Covenant Marriages Slow to Take Off: 57 Couples File for Pact that Requires Counseling, 2-year Divorce Wait." *Arkansas Democrat-Gazette*, B3.

[5] Drewianka, Scott D. 2003. "Theories of Family Structure: Implications from a Generalized Model of Commitment." Unpublished manuscript.

[6] Duncan, William C. 2001. "Domestic Partnership Laws in the United States: A Review and Critique." *Brigham Young University Law Review* 2001(3), 961–992.

[7] Fullbrook, David. September 27, 2000. "Singapore Offers $300 Bonus for Second Child." *Christian Science Monitor*, Electronic Edition.

[8] Goldin, Claudia, and Lawrence F. Katz. August 2002. "The Power of the Pill: Oral Contraceptives and Women's Career and Marriage Decisions." *Journal of Political Economy* 60 (4), 730–770.

[9] Jovanovic, Boyan. December 1979."Firm-specific Capital and Turnover." *Journal of Political Economy* 87(6), 1246–1260.

[10] Mead, Margaret. 1970. "Marriage in Two Steps." *The Family in Search of a Future*, Herbert A. Otto, ed. (New York: Appleton-Century-Crofts), 75–84.

[11] Mortensen, Dale. 1986. "Job Search and Labor Market Analysis." *Handbook of Labor Economics, Volume 2*, Orley Ashenfelter and Richard Layard, eds. (Amsterdam: Elsevier Science), 849–919.

[12] Ooms, Theodora. Fall 2001. "The Role of the Federal Government in Strengthening Marriage." *Virginia Journal of Social Policy & the Law* 9(1), 163–191.

[13] Parke, Mary, and Theodora Ooms. October 2002. "More than a Dating Service? State Activities Designed to Strengthen and Promote Marriage." *Center for Law and Social Policy (CLASP) Policy Brief, Couples and Marriage Series*, Brief Number 2.

[14] Sanchez, Laura, Steven L. Nock, James D. Wright, and Julia L. Wilson. May 2002. "Social and Demographic Factors Associated with Couples' Choice between Covenant and Standard Marriage in Louisiana." Paper presented at the 2002 Annual Meetings of the Population Association of America.

[15] Sims, Calvin. May 30, 2000. "$10,000 Bonus Offered for Baby No. 3 in Japan: Toy Company's Latest Plan to Promote Births." *New York Times*, Online Edition.

Appendix: Proofs

Proof of Proposition 1: Recall that here institutions $\tau \in [\tau_c, \tau^c]$ are more attractive than before because some parameter x rose. Now consider $\tau_0 > \tau^c$ and $\tau' \geq \tau_0$, and define reservation compatibility $\pi^*(\tau)$ by $J(\pi^*(\tau), \tau, \tau) = W - k(\tau)$. Then

$$\begin{aligned}
\frac{\partial}{\partial x} J(\pi, \tau_0, \tau') &= \frac{\partial}{\partial x}\left[R(\pi, \tau_0, \tau') - q(\tau_0, \tau') + \beta\left(W - k(\tau')\right) F(\pi^*(\tau'), \pi)\right] + \beta \int_{\pi^*(\tau')}^{\overline{\pi}} \frac{\partial}{\partial x} V(\pi, \tau') dF \\
&\leq \frac{\partial}{\partial x}\left[R - q + \beta\left(W - k\right) F(\pi^*, \pi)\right] + \beta\left[1 - F(\pi^*, \pi)\right] J_{x,\max},
\end{aligned}$$

where $J_{x,\max} = \sup\limits_{\pi' \geq \pi^*(\tau')} \sup\limits_{\tau'' \geq \tau'} \frac{\partial J}{\partial x}(\pi', \tau', \tau'')$. (This will exist because we have assumed that $\frac{\partial R}{\partial x}$ and $\frac{\partial c}{\partial x}$ are bounded.) Since $\tau_0 > \tau^c$, $\partial\left[R - q - \beta k F(\pi^*, \pi)\right]/\partial x \equiv 0$. Further, since $\tau' \geq \tau_0$,

$$\begin{aligned}
J_{x,\max} &\leq \beta F(\pi^*(\tau''), \pi') \frac{\partial}{\partial x} W + \beta\left[1 - F(\pi^*(\tau''), \pi')\right] J_{x,\max} \\
&\leq \frac{\beta F(\pi^*, \pi')}{1 - \beta + \beta F(\pi^*, \pi')} \frac{\partial W}{\partial x}.
\end{aligned}$$

Thus, $|J_{x,\max}| < \left|\frac{\partial W}{\partial x}\right|$.

Similarly, if we define $J_{x,\min} \equiv \inf\limits_{\pi' \geq \pi^*(\tau')} \sup\limits_{\tau'' \geq \tau'} \frac{\partial J}{\partial x}(\pi', \tau', \tau'')$, we find that

$$J_{x,\min} \geq \frac{\beta F(\pi^*, \pi')}{1 - \beta + \beta F(\pi^*, \pi')} \frac{\partial W}{\partial x}.$$

In general, the π' and τ'' for $J_{x,\min}$ will differ from that for $J_{x,\max}$, so the fraction $\frac{\beta F}{1-\beta+\beta F}$ will differ for the two expressions. However, $\frac{\beta F}{1-\beta+\beta F} \in (0,1)$ everywhere, so we can say that $\alpha_1 \frac{\partial W}{\partial x} \leq \frac{\partial J}{\partial x} \leq \alpha_2 \frac{\partial W}{\partial x}$ where $\alpha_1, \alpha_2 \in (0,1)$. We thus establish that $\frac{\partial J}{\partial x}$ has the same sign as $\frac{\partial W}{\partial x}$.

Now suppose that $\frac{\partial W}{\partial x} \leq 0$. Then for $\tau' \geq \tau^c$, $\frac{\partial J}{\partial x}$ is everywhere a smaller negative number than $\frac{\partial W}{\partial x}$, as above (or both are zero). For $0 \leq \tau' \leq \tau^c$, let π^{**} be defined as the minimum π such that the optimal new relationship type is greater than τ^c. It follows that for $\tau' > 0$,

$$\frac{\partial J}{\partial x} = \frac{\partial}{\partial x}\left[R - q - \beta F(\pi^*, \pi) k\right] + \beta F(\pi^*, \pi) \frac{\partial W}{\partial x} + \beta \int_{\pi^* \leq \pi \leq \pi^{**}} \frac{\partial J}{\partial x} dF + \beta \int_{\pi \geq \pi^{**}} \frac{\partial J}{\partial x} dF \qquad (1)$$

and by our results above

$$\frac{\partial J}{\partial x} \geq \frac{\partial}{\partial x}\left[R - q - \beta F(\pi^*, \pi) k\right] + \beta\left[1 - F(\pi^{**}, \pi) + F(\pi^*, \pi)\right] \frac{\partial W}{\partial x} + \beta \int_{\pi^*(0) \leq \pi \leq \pi^{**}} \frac{\partial J}{\partial x} dF$$

Letting $J_{x,\min(2)} \equiv \inf\limits_{\pi^*(0) \leq \pi \leq \pi^{**}} \sup\limits_{\tau''} \frac{\partial}{\partial x} J(\pi, \tau', \tau'')$, we can thus say that

$$J_{x,\min(2)} \geq \left[1 - \beta F(\pi^{**}, \pi) + \beta F(\pi^*, \pi)\right]^{-1} \frac{\partial}{\partial x}\left[R - q - \beta F(\pi^*, \pi) k\right] + \frac{\beta - \beta F(\pi^{**}, \pi) + \beta F(\pi^*, \pi)}{1 - \beta F(\pi^{**}, \pi) + \beta F(\pi^*, \pi)} \frac{\partial W}{\partial x}$$

Since $\frac{\beta - \beta F(\pi^{**}, \pi) + \beta F(\pi^*, \pi)}{1 - \beta F(\pi^{**}, \pi) + \beta F(\pi^*, \pi)} \in (0,1)$ and $\frac{\partial}{\partial x}\left[R - q - \beta F(\pi^*, \pi) k\right] \geq 0$ in the relevant range, if $\frac{\partial W}{\partial x} \leq 0$, then $J_{x,\min(2)} \geq \frac{\partial W}{\partial x}$. We have thus established that if $\frac{\partial W}{\partial x} \leq 0$, $\frac{\partial J}{\partial x} \geq \frac{\partial W}{\partial x}$ everywhere that $\tau' \neq 0$.

Accordingly,

$$\begin{aligned}\frac{\partial W}{\partial x} &= \beta G(\pi^*(0))\frac{\partial W}{\partial x} + \beta \int\limits_{\pi \geq \pi^*(0)} \frac{\partial}{\partial x} J(\pi, 0, \tau^*(\pi, 0))\, dF \\ &\geq \frac{\beta\left[1 - G(\pi^*(0))\right]}{1 - \beta G(\pi^*(0))}\frac{\partial W}{\partial x}.\end{aligned}$$

However, $\frac{\beta - \beta G}{1 - \beta G} \in (0, 1)$, so this inequality is a contradiction for $\frac{\partial W}{\partial x} < 0$. Hence we conclude that $\frac{\partial W}{\partial x} > 0$ and that for $\tau' \geq \tau^c$, $\frac{\partial J}{\partial x} \in (0, \frac{\partial W}{\partial x})$.

Further, Equation 1 reveals that for $\tau' \leq \tau^c$, there is some positive z such that

$$\frac{\partial J}{\partial x} = z + \beta \int\limits_{\pi^* \leq \pi \leq \pi^{**}} \frac{\partial J}{\partial x} dF,$$

so

$$J_{x, \min(2)} \geq \frac{z}{1 - \beta\left[F(\pi^{**}, \pi) - F(\pi^*, \pi)\right]} > 0.$$

Hence we have shown that $\frac{\partial J}{\partial x} > 0$ everywhere.

Now suppose that $\tau' > \tau^c$. Then

$$J_x = \beta F(\pi^*(\tau'), \pi) W_x + \beta \int\limits_{\pi' \geq \pi^*(\tau')} J_x\, dF$$

and

$$\begin{aligned}J_{3x} &= \beta\left[W_x - J_x(\pi^*, \tau', \tau^*(\pi^*, \tau'))\right] f(\pi^*, \pi)\frac{d\pi^*}{d\tau'} \\ &< 0 \text{ (because of our earlier result that } W_x > J_x).\end{aligned}$$

To see that this is also true for $\tau' < \tau_c$, define $Z(\pi, \tau, \tau') = J(\pi, \tau, \tau') - W + k(\tau)$. Then the standard for maintaining the relationship increases if and only if $Z_x(\pi^*(\tau), \tau, \tau^*(\pi^*, \tau)) > 0$. We first show that the result holds for Case (A). In that case,

$$\begin{aligned}\frac{d}{d\tau}\frac{\partial}{\partial x}\left[Z(\pi^*(\tau), \tau, \tau^*(\pi^*, \tau)) - h^1(\tau)\right] &= \left(Z - h^1\right)_{1x}\frac{d\pi^*}{d\tau} + \left(Z - h^1\right)_{2x} \\ &= \left(Z - h^1\right)_{1x}\frac{d\pi^*}{d\tau}\end{aligned}$$

Thus $(Z - h^1)_x$ is increasing or decreasing in τ as $(Z - h^1)_{1x}$ is negative or positive.

To examine this more closely, define $\Psi \equiv J - h^1$ and note that

$$\begin{aligned}\Psi(\pi, \tau, \tau') &= R(\pi, \tau, \tau') - q(\tau, \tau') + \beta h^1(\tau')\left[1 - F(\pi^*(\tau'), \pi)\right] \\ &\quad + \beta\left[W - k(\tau)\right] + \beta \int \Psi_1\left[\pi', \tau', \tau^*(\pi', \tau')\right]\left[1 - F(\pi', \pi)\right] d\pi',\end{aligned}$$

so

$$\Psi_{1x} = -\beta h^1_x F_2 - \beta \int \Psi_{1x} F_2\, d\pi'.$$

Now, let $B(X)$ be the space of bounded functions $v : R^n \to R$ with the sup norm, and define operator $T : B(X) \to B(X)$ by $Tv(\pi, \tau, \tau') = -\beta h^1_x F_2(\pi^*(\tau), \pi) - \beta \int v\left[\pi', \tau', \tau^*(\pi', \tau')\right] F_2(\pi', \pi)\, d\pi'$. It is easy to verify that Blackwell's (1965) sufficient conditions apply, so T is a contraction, and thus it has a unique fixed point. Since T maps non-negative functions to non-negative functions, the fixed point must be a non-negative function. Since $Z_{1x} = \Psi_{1x}$, it follows immediately that $Z_{1x} \geq 0$ everywhere. We thus establish that $(Z - h^1)_x(\pi^*(\tau), \tau, \tau^*(\pi^*, \tau))$ is monotonically decreasing in τ.

In addition, $\lim_{\pi\downarrow\pi^*(0)}(Z-h^1)_x(\pi,0,a)=\frac{\partial}{\partial x}\left(J(\pi,0,a)-h^1-W\right)\leq 0$, by our assumption about the effect of the policy change on initially marginal couples.

Therefore, since $F(\pi',\pi^*(0))$ stochastically dominates $F(\pi',\pi^*(\tau))$ for all τ, $(Z-h^1)_x(\pi^*(\tau),\tau,\tau^*(\pi^*,\tau))$ is negative for all $\tau\geq a$, so the minimum standard for maintaining a relationship $\pi^*(\tau)$ decreases for all $\tau\notin[\tau_c,\tau^c]$ in case A.

For case B, the proof is the same as above, except that now the affected region experiences $k_x=-h^1_x<0$. The proof above shows that $J_x(\pi^*(\tau),\tau,\tau)-W_x<0$ everywhere (i.e., for all τ), and now $Z_x=J_x(\pi^*(\tau),\tau,\tau)-W_x+k_x<0$ everywhere.

Finally, for case C, the situation is similar to those above, except that now the "affected" region is not directly affected after the couple has established a type of relationship greater than τ_c. As above, Z_x is decreasing in τ, only now there is no countervailing effect where $\tau\in[\tau_c,\tau^c]$. Accordingly, the minimum standard for continuing the relationship rises everywhere.□

Proof of Proposition 2: We first show that the Proposition holds for case (A), then show how the proof would differ for cases (B) and (C).

For case A, note that

$$J_x(\pi,\tau,\tau')=h^1_x(\tau)+\beta h^1_x(\tau')\left[1-F(\pi^*(\tau'),\pi)\right]+\beta\int\left[V_x(\pi',\tau')-h^1_x(\tau')\right]\,dF(\pi',\pi). \tag{2}$$

The first term on the right-hand side does not vary with τ', and the second only alters the value of the directly-affected types of relationships. Thus, the only indirect distortions come from the last term. Further,

$$\frac{d}{d\tau'}\left[\beta\int\left[V_x(\pi',\tau')-h^1_x(\tau')\right]\,dF(\pi',\pi)\right]=-\beta\left(Z_x-h^1_x\right)\frac{\partial F}{\partial\pi'}\left(\pi^*(\tau),\pi\right)\frac{d\pi^*}{d\tau}<0,$$

where the equality follows in part from the fact that $(J-h)_{2x}=0$ (see equation 2 above).

Accordingly, apart from the direct effect of the policy shift (raising x from x_1 to x_2) , the indirect effect is to increase $J(\cdot,\tau')$ more for lower τ'. It follows that (a) $J_3(\pi,\tau,\tau^*(\pi,\tau,x_1),x_2)<0$, and (b) $\underset{\tau'\notin[\tau_c,\tau^c]}{argmax}\,J(\pi,\tau,\tau',x_2)<\tau^*(\pi,\tau,x_1)$.

Finally, define $\tau^m(\pi,\tau)\equiv\underset{\tau'\in[\tau_c,\tau^c]}{argmax}\,J(\pi,\tau,\tau',x_2)$ and $\Psi\equiv J-h^1$. Then τ^* increases if and only if $x_2>\Psi(\pi,\tau,\tau',x_2)-\Psi(\pi,\tau,\tau^m,x_2)$ for all $\tau'<\tau_c$. Suppose this is true at (π_1,τ_1). Since $\Psi_{13}\geq 0$ and $\Psi_{23}\geq 0$ it will thus be true that

$$x_2>\Psi(\pi_2,\tau_2,\tau',x_2)-\Psi(\pi_2,\tau_2,\tau^m(\pi_1,\tau_1),x_2)\text{ for all }\tau'<\tau_c$$

for all $(\pi_2,\tau_2)\geq(\pi_1,\tau_1)$.

We have thus shown that if τ^* increases at (π_1,τ_1), then it does for all $(\pi_2,\tau_2)\geq(\pi_1,\tau_1)$ such that $\underset{\tau'\notin[\tau_c,\tau^c]}{argmax}\,J(\pi,\tau,\tau',x_2)<\tau_c$. From point (b) above, this last condition will always be met if $\tau^*(\pi,\tau,x_1)<\tau_c$, which verifies the claim.

The same logic follow for Case B, except that then

$$J_x(\pi,\tau,\tau')=-\beta k_x(\tau')F(\pi^*(\tau'),\pi)+\beta\int\left[V_x(\pi',\tau')-k_x(\tau')\right]\,dF(\pi',\pi).$$

Likewise, the proof for case C follows analogously, except that

$$J_x(\pi,\tau,\tau')=-h^2_x(\tau,\tau')+\beta\int V_x(\pi',\tau')\,dF(\pi',\pi).\square$$