Do Separation Laws Matter? An Experimental Study of Commitment[†]

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Abstract

Coasian reasoning predicts that the conditions under which parties may terminate a partnership will affect bargaining between partners, but not the durability of partnerships. This paper endeavors to test both predictions in an experimental setting that allows agents to form and end partnerships endogenously and to bargain over resources. We find that separation rules have less effect on bargaining than predicted by theory, but larger effects on partnership stability. Perhaps surprisingly, agents who are weaker relative to their partners are more successful when either party can end a partnership unilaterally than when both must consent to a separation.

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1. Introduction

Relationships of indefinite duration are commonly encountered in economics, including business partnerships, employment relationships, long-term supply arrangements, and marriages. While such relationships often last a long time, sometimes the underlying circumstances change and one or more partners wishes to end the relationship. The rules under which those dissolutions occur vary across applications, however. A worker or employer who wishes to end an employment relationship usually has the right to do so without obtaining the consent of the other party. In contrast, a partner in a firm generally cannot leave the business (except perhaps to retire) without obtaining the consent of the other partners—which frequently can be obtained only at a steep price.

What difference does it make whether one party can end the partnership without consent of the other(s)? As the example of the business partners illustrates, there is little disagreement that the rules governing separations have an effect on the division of assets after the separation. Indeed, insofar as those rules influence bargaining, there may well be effects on allocations before the separations as well. Somewhat more controversial are the effects of such rules on the likelihood that the match will continue. One prominent theory maintains that the rules are irrelevant to these decisions (Becker, 1981; Peters, 1986). Relying on intuition from the Coase Theorem, this idea posits that matches end if and only if there are no gains to be made from trade, and the rules in question can only affect the bargaining over those gains. Skeptics counter that the Coase Theorem does not apply in this context, possibly due to large transactions costs or income effects, but perhaps primarily because the rules themselves influence the costs and benefits of maintaining the partnership. For example, Peters (1992) notes the possibility that unilateral divorce laws may reduce the cost of separating (perhaps because there is less to discuss), Allen (1992) argues that they may reduce the benefits generated by the match by reducing trust between the partners, and Grossbard-Shechtman et al. (2002) claim that

they encourage separations by reducing the "insurance" that the match provides to each party (especially the party who is more vulnerable).

There is also some theoretical ambiguity about how mutual and unilateral separation rules may influence the rate at which partnerships form in the first place. On one hand, by reducing the cost of separation, unilateral rules may help lower the risk of making that commitment. On the other hand, the greater risk of partnership dissolution may well reduce the incentive to make match-specific investments, which could in turn reduce the benefits of being in a committed partnership.

Given these conflicting ideas, one might have imagined that the question would be settled with empirical evidence. However, in the most widely studied application—the change from mutual to unilateral divorce laws—the literature has produced mixed results. Although there is clear evidence that unilateral divorce laws affect the relative well-being of partners (Peters, 1986, 1992; Parkman, 1992; Weiss and Willis, 1993; Gray, 1993, 1998; Chiappori et al, 2002; Dee, 2003; Stevenson and Wolfers, 2003), the evidence about its effects on dissolution rates is much more contentious. Many papers find that unilateral divorce laws raise divorce rates (Allen, 1992; Nakonezny et al, 1995; Rodgers et al, 1997, 1999; Friedberg, 1998; Gruber, 2004), but many other papers conclude that such effects are small or non-existent (Peters, 1986, 1992; Gray, 1993, 1998; Glenn, 1997, 1999; Weiss and Willis, 1997.) The best evidence to date indicates that the change to a unilateral divorce law raises divorce rates, but only during a transitional period of about 8 years (Wolfers, 2006).

Considering that neither theory nor existing empirical evidence has conclusively identified the advantages and disadvantages of different separation rules, there may be some value in complementary evidence from a third methodology. Accordingly, this study investigates the effects of separation rules in a stylized laboratory environment. While we are mindful of the limitations imposed by the laboratory setting, we argue that it has a few advantages in this context. First, an experimental approach allows us to know the exact values of the costs and benefits facing each subject at each point in time. This is considerably different from the ambiguity and imprecision one encounters when studying

(e.g.) unilateral divorce, where there is often debate over simple questions like how a particular law should be classified, say nothing of the magnitude of its impact on the cost of separating, the potential gains from match, the opportunities available to persons who separate, or other similarly crucial parameters. A second advantage of the experimental procedure is that we can be certain that the laws are not endogenous. For the sake of comparison, more than four decades of research on divorce law (at least since Broel-Plateris, 1961) has struggled with the chicken-egg question of whether unilateral divorce laws make people want to get divorced or whether such laws are enacted in places where there is strong demand for divorce. A third benefit is the ability to vary parameters one at a time, which has the potential to provide much greater clarity about the features that have the largest effects on decisions. Therefore, we believe that experimental methods can provide a useful new perspective on the effects of separation rules.

We study the impact of separation rules on (1) incentives to form partnerships in the first place, (2) the likelihood that partnerships dissolve (and thus expected match duration), and (3) the relative well being of two partners. To do this, we adopt a 2×2 design in which the treatment variables are the separation rule and the payoff structure. Depending on whether one needs the other party's consent to dissolve the partnership, the separation rule is called "mutual consent" or "unilateral." The two payoff structures are called "unbalanced" or "balanced," depending on whether the same partner has higher pre-transfer period earnings at all stages of the partnership. While we are primarily interested in the effects of separation rule, examining the two payoff structures provides us some insights into the role of differences in bargaining power and conflicts between partners' incentives to continue the match. Among other things, we shall often find that separation rules seem to matter more when one partner has greater bargaining power and a consistently stronger (pre-transfer) interest in continuing the partnership.

In our experiment, subjects who are newly matched with a new counterpart must decide if they want to start a committed bilateral partnership starting from the following period. Once a partnership is formed, the partners then must decide in each period if they want to stay together for at least one more period, or if they want to seek new partners.

Thus, both the formation and the dissolution of a partnership are endogenous in our experiment. In order to facilitate the formation, continuation, or dissolution of a partnership, they are allowed to negotiate a lump-sum transfer payment from one party to the other.

The experiment is designed so that the separation rules are not expected to influence the likelihood that partnerships will form or continue. The parameters are chosen so that agents would always want to form partnerships with their newly matched counterparts and remain matched to that partner until an identifiable event renders the match inefficient. Even so, as noted earlier, the Coase Theorem predicts that separation laws will influence the schemes of transfer payments between partners.

To our knowledge, this paper is the first experimental study of the Coase Theorem in this particular context, although some previous studies have investigated the Coase Theorem's predictions about resource allocation in much more static environments. While those static studies tend to find that agents achieve efficient bargaining by choosing actions that maximize joint payoffs (See, for example, Hoffman and Spitzer, 1982), [1] we find that our subjects, in some respects, behave differently from the theoretical prediction. First, rather than simply making a huge lump-sum transfer to start or terminate a partnership under the mutual consent law, our subjects opt to make a more stable stream of transfers between two partners. In many cases, the separation laws do not affect the transfer payments nearly as much as expected. Second, the likelihood that partnerships will form or continue is significantly influenced by the separation laws. The mutual consent law implemented in our experiment discourages the formation of partnerships, but strongly encourages their continuation once they are formed. As a result, partnerships last significantly longer under the mutual consent law. Finally, our results indicate that the impact of separation laws on the two partners' relative well being actually depends on the payoff structure being balanced or not. Under the balanced payoff structure, partners appear to be equally well off under the two laws. In contrast, when the payoff structure is unbalanced, the less advantaged partners are significantly

[1] See Davis and Holt (1993, pp 255-262) for a summary of experiments on the Coase Theorem.

worse off than their counterparts, particularly when mutual consent is required to dissolve partnerships. The mutual consent separation law, which is at least sometimes thought to provide weaker parties with more security, turns out to dampen their well being further. Thus, overall, our results do not support the application of the Coase Theorem in this context.

To be clear, we do not consider it overly surprising that we find some inefficiencies. For one thing, our artificial laboratory environment is not only unfamiliar, but also dynamic and complex. Subjects were required to decide if they wanted to form, continue or terminate partnerships that could evolve over three different stages at different point in time, and also their respective side payments. If they attempted to find a theoretical equilibrium strategy, they would need to apply backward induction reasoning, which some previous work has found to be a difficult task for many people.[2] While it may be easy to understand why we observe some inefficient outcomes, it is a bigger challenge to understand why they are more common under one separation rule than the other, or why their frequency is affected by the payoff structure. There is no reason to believe that a separation rule requiring mutual consent is more or less confusing than one that allows agents to end a match unilaterally, and if anything, it is probably easier to comprehend a payoff environment in which one agent always has an advantage over the other. Accordingly, it is difficult for confusion to explain, e.g., our finding that inefficient matches are most likely to persist in an unbalanced payoff structure when the separation rule requires mutual consent.

Rather, we find some suggestive evidence that some inefficient actions were taken as responses to unfair treatment. For instance, we find that a partnership is likely to be terminated prematurely as a consequence of an unequal (post-transfer) earning distribution between two partners under the Unilateral/Balanced treatment, and a similar scenario appears to explain why some partnerships entered the most inefficient stage in our Consensus/Balanced treatment. In other words, it appears that some subjects were willing to punish their unfair counterparts at the expense of themselves.

[2] In addition to Johnson et al. (2002), see Davis and Holt (1993, pp 102-109) for a summary of experiments on testing backward induction rationality.

By itself, this is not a new finding. Negative reciprocity has been widely observed in the experimental literature on, say, ultimatum bargaining games (see, for example, Guth et al., 1982). What is particularly interesting here is that institutions like separation laws could dramatically influence the partnership stability and individuals' well being simply because they impose different restrictions on how punishment can be carried out. Under the unilateral separation law, the most effective way to penalize the other party is perhaps to end the relationship so that he will not be able to continue extracting a larger share of the surplus for the rest of the relationship. Under the consensual separation law, such an option does not exist. One either needs to pay a large ransom to get out, as observed in the Consensus/Unbalanced treatment, or drags the unfair party long enough to see him suffering in the worst possible state of the relationship, as observed in the Consensus/Balanced treatment.

As a practical matter, it is perhaps worth mentioning that factors like confusion and revenge are often thought to be especially relevant when durable partnerships end. One reason is that durable partnerships, by their very nature, do not end frequently, so a given individual often lacks experience with the situation. While it is certainly possible and advisable for a person in those circumstances to seek counsel, it can hardly be surprising if they—like the subjects of our experiment—are tempted to make some inefficient decisions. If so, our results would seem to offer some insights that suggest some institutional arrangements that might discourage such inefficiencies.

The rest of our paper is organized as follows. The theoretical model is presented in Section 2. Section 3 describes the experimental design and procedures. The results are reported in Section 4, and Section 5 concludes with a brief summary and discussion.

2. Model

Assume that the economy is populated by a continuum of infinitely lived agents of two equally populous types, A and B. Time is discrete and the common discount factor is $\delta \in (0,1)$. In every period, all agents are matched in pairs consisting of one agent of each type. When two *strangers* meet for the first time, they must decide if they will form

a partnership starting from the beginning of the next period, or move on to meet new randomly selected counterparts instead. Once a partnership is formed, the decision two *partners* have to make each period is whether to stay together or to separate and meet new counterparts in the following period.

2.1 Decision Environment

To study the impact of separation laws on partnership formation and dissolution, we need to provide agents with incentives to form partnerships when they first meet and incentives to terminate them later on. In our environment, we assume that the benefit of forming a partnership is at least initially greater than the benefit of staying "unattached," but the benefit of remaining matched decreases gradually over time. At some point the benefits of remaining matched fall just a bit below the benefit of starting a new partnership, but eventually they become even smaller than the benefit received by agents who do not form a match.

More specifically, in our model a match consists of four stages. Stage 0 corresponds to the initial period in which two unattached strangers meet for the first time and decide whether to form a partnership. A partnership that forms begins in Stage 1, and it progresses to Stage 2 (and subsequently from Stage 2 to Stage 3) with a fixed probability $\lambda \in (0,1)$ in any given period. This uncertainty is resolved one period in advance, so agents know what stage their partnership will be in if it is maintained into the next period.

Now suppose that the total period payoff $u_i \geq 0$ to a pair in Stage $i \in \{0,1,2,3\}$ satisfies the following inequalities:

$$\frac{\delta}{1+\lambda\delta}(u_1 - u_0) > u_2 - u_0 > 0 > u_3 - u_0 . \tag{1}$$

If these inequalities hold, we claim that they clearly define the efficient choices for partners to make, where by "efficient" we mean the decisions that maximize the total expected payoffs earned by the two partners together. (We are not yet claiming that such decisions are individually rational.) To see this, note that equation (1) implies $u_1 > u_0$, so

any two agents could collectively benefit by forming a new partnership and maintaining it throughout Stage 1. However, since $u_3 - u_0 < 0$, they would definitely be better off ending the partnership before it enters Stage 3.

The efficient decision is perhaps less clear for Stage 2. Partners receive a larger aggregate period payoff in Stage 2 than in Stage 0 ($u_2 - u_0 > 0$), but this does not necessarily imply that they would benefit from staying together through Stage 2 because separating and returning to Stage 0 would provide an opportunity to form new partnerships and acquire larger benefits in the subsequent Stage 1. In fact, it turns out that partners can always expect larger combined payoffs if they separate as soon as they enter Stage 2. To see this, note that if a pair of unattached agents always forms a partnership in Stage 0 and stays together throughout Stage 1 (only), its aggregate discounted lifetime payoff is

$$V_0 = \frac{u_0}{1-\delta} + \frac{\delta(u_1 - u_0)}{(1-\delta)(1+\lambda\delta)} \ . \tag{2}$$

Since it is never optimal to remain together in Stage 3, the only plausible deviation we need to consider is for a pair of partners to stay together for any $T > 0$ periods in Stage 2, which would yield an aggregate discounted lifetime payoff of $u_2 + \delta u_2 + ... + \delta^{T-1} u_2 + \delta^T V_0$. It would only be optimal to maintain a partnership into Stage 2 if this sum is greater than V_0 from equation (2)—i.e., if $u_2 > u_0 + \frac{\delta}{1+\lambda\delta}(u_1 - u_0)$. Such behavior is thus ruled out by the first inequality in (1).

Thus, condition (1) ensures that the efficient strategy is to form a partnership in Stage 0, continue the partnership through Stage 1, and terminate the partnership as soon as it becomes clear that it will enter Stage 2 in the next period. Stage 3 should thus never occur, but in the event that it did, the efficient decision would be to terminate the partnership immediately.

Although this strategy is efficient in the sense that it maximizes the expected combined payoffs of both partners, it may not be individually rational if the parameters do not satisfy an individual version of (1),

i.e., $\frac{\delta}{1+\lambda\delta}\left(\alpha_{1,k}u_1-\alpha_{0,k}u_0\right)>\alpha_{2,k}u_2-\alpha_{0,k}u_0>0>\alpha_{3,k}u_3-\alpha_{0,k}u_0$, where $\alpha_{i,k}\in[0,1]$ denotes the initial share of payoff u_i that Type $k\in\{A,B\}$ receives. However, that problem can always be overcome if we allow period payoffs to be redistributed through lump-sum transfers between two counterparts. This is the essence of the Coase Theorem.

Specifically, we assume that in order to form a partnership, a pair of unattached agents must agree on a contract that specifies a transfer $s_{0,k}$ from Type $k\in\{A,B\}$ agent to her counterpart. Once an agreement on some amount $s_{0,A}(=-s_{0,B})$ is reached, the payment is transferred and the match between two unattached agents becomes a potentially long-term relationship beginning the next period. While the partnership lasts, in each period partners can negotiate a transfer payment $s_{i,A}(=-s_{i,B})$ that motivates both parties to stay together for one more period in Stage *i*, or alternatively, a different transfer $t_{i,A}(=-t_{i,B})$ that allows them to terminate the partnership and meet new counterparts for the next period. If an agreement is reached, the payment is transferred and the partnership continues or ends accordingly.

The separation law comes into play when two parties cannot reach any agreement. Under the unilateral separation law, each party pays a penalty $p>0$ and their partnership ends immediately after the current period. Under the mutual consent separation law, each party pays the penalty $p>0$ and the partnership continues into the next period.[3]

2.2 Equilibrium Earnings

Let $V_{i,k}$ be Type $k\in\{A,B\}$ agent's discounted net (post-transfer) lifetime earnings at the beginning of any given period in Stage i. An unattached individual can stay single or agree to form a Stage 1 partnership, thus

$$V_{0,k}=\alpha_{0,k}u_0+\max\{\delta V_{0,k},-s_{0,k}+\delta V_{1,k}\}. \tag{3}$$

[3] For simplicity, we assume the same penalty for both unilateral and mutual consent separation rules.

A partner in Stage $i \in \{1,2,3\}$ can agree to continue or to terminate the partnership, or she has to pay a penalty p and the partnership continues or dissolves according to the separation rule:

$$\begin{aligned} V_{i,k} = \alpha_{i,k} u_i \quad &+ \quad (1-\lambda) \quad max\{-s_{i,k} + \delta V_{i,k}, -t_{i,k} + \delta V_{i,k}, -p + \delta D_{i,k}\} \\ &+ \quad \lambda \quad max\{-s_{j,k} + \delta V_{j,k}, -t_{j,k} + \delta V_{0,k}, -p + \delta D_{j,k}\}, \end{aligned} \tag{4}$$

where $j = \min\{3, i+1\}$ is the stage that the partnership will progress into for the next period, and $D_{i,k}$ is the agent's discounted net lifetime earnings at the beginning the next period if no agreement is reached in this period. Under the unilateral separation law $D_{i,k} = V_{0,k}$ because the partnership is automatically dissolved when there is no agreement between two partners. Under the mutual consent separation law, partnership can only be dissolved with consent, so $D_{i,k} = V_{i,k}$.

Finally, let $\beta_{0,k}$, $\beta_{1,k}$, and $\beta_{i,k}$ be type k agent's share of the surplus from the agreement to start a partnership, to continue Stage 1 partnership, and to terminate Stage $i \in \{2,3\}$ partnership, respectively, where

$$\beta_{0,k} \equiv \frac{\delta(V_{1,k} - V_{0,k}) - s_{0,k}}{\delta(V_{1,A} + V_{1,B} - V_{0,A} - V_{0,B})}, \tag{5}$$

$$\beta_{1,k} \equiv \frac{\delta(V_{1,k} - D_{0,k}) + p - s_{1,k}}{\delta(V_{1,A} + V_{1,B} - D_{0,A} - D_{0,B}) + 2p}, \tag{6}$$

and

$$\beta_{i,k} \equiv \frac{\delta(V_{0,k} - D_{i,k}) + p - t_{i,k}}{\delta(V_{0,A} + V_{0,B} - D_{i,A} - D_{i,B}) + 2p}. \tag{7}$$

For a rational, self-interested individual, these shares must be within [0,1] and thus they can be loosely interpreted as the agent's bargaining powers.

Given equations (3), (4) and the definitions of $\beta_{i,k}$ above, it can be shown that if the partnership can be formed and dissolved efficiently, then the equilibrium net lifetime earnings of unattached type k agent are given by the sum of her lifetime earnings as if being forever single and a $\beta_{0,k}$ share of the total surplus from staying throughout Stage 1:

$$V_{0,k}^{*} = \frac{\alpha_{0,k} u_0}{1-\delta} + \beta_{0,k} \frac{\delta(u_1 - u_0)}{(1-\delta)(1+\lambda\delta)}. \tag{8}$$

Since all the parameters other than $\beta_{0,k}$ in equation (8) are predetermined, separation laws can only influence agents' lifetime earnings through their impact on agents' initial bargaining powers during the formation of a partnership.

2.3 Equilibrium Transfers

While the separation laws are not expected to affect the likelihood of partnership formation and dissolution, they may influence the schemes of transfer payments. To illustrate that different separation requirements may result in different transfer payment schemes, we will use $\beta_{i,k} = \frac{1}{2}$, for any agent k in any stage i, in the following as a theoretical benchmark.[4] Under the unilateral separation law, an agent can terminate the partnership unilaterally and, as a result, avoiding the disagreement penalty is the only benefit of an agreement to separate. Since the penalty p is the same for both parties, there is no need to transfer anything in order to dissolve a Stage 2 or Stage 3 partnership:

$$t_{2,A}^{*}\Big|_{Unilateral} = t_{3,A}^{*}\Big|_{Unilateral} = 0. \tag{9}$$

Under the unilateral separation rule, agents must in effect agree to continue a Stage 1 partnership. The party who benefits more from being in Stage 1 thus must compensate his partner:

$$s_{0,A}^{*}\Big|_{Unilateral} = s_{1,A}^{*}\Big|_{Unilateral} = \delta\left[\left(\frac{1}{2} - \alpha_{0,A}\right)u_0 - \left(\frac{1}{2} - \alpha_{1,A}\right)u_1\right]. \tag{10}$$

[4] In our experiment, all unattached agents receive identical earnings which make them equally eager to form partnerships. And because the Coase theorem does not shed light on if and how various separation laws affect individuals' bargaining powers differently, we see the case with equal bargaining power as the most relevant theoretical benchmark. While having greater bargaining power certainly decreases one's transfer to his or her counterpart, this generalization does not alter the prediction that the decisions regarding partnership formation and dissolution should be independent of the separation rule. The solution for the optimal transfers in a general environment with unequal bargaining power between the partners that varies with the stage of the partnership is available upon request.

Under the mutual consent separation law, if one partner wants to separate more than the other does, he must compensate his counterpart with half of the difference in the potential future period payoffs. It can be shown that, if two partners wish to terminate the partnership before it enters Stage 3,

$$t_{3,A}^{*}\Big|_{Mutual} = \frac{\delta}{1-\delta}\left[\left(\frac{1}{2}-\alpha_{3,A}\right)u_3 - \left(\frac{1}{2}-\alpha_{0,A}\right)(1+\delta)u_0\right], \tag{11}$$

and if they wish to separate before the partnership enters Stage 2,

$$t_{2,A}^{*}\Big|_{Mutual} = \frac{\delta}{1-\delta(1-\lambda)}\left[\left(\frac{1}{2}-\alpha_{3,A}\right)u_2 - \left(\frac{1}{2}-\alpha_{0,A}\right)(1+\delta\lambda)u_0 + \lambda t_{3,A}^{*}\right]. \tag{12}$$

Under the mutual consent separation law, the default option is to continue the partnership if no agreement is reached. Avoiding the penalty is the only benefit of an agreement to continue. Since, by assumption, agents always split the benefit of an agreement equally and the penalty p is the same for both parties, the equilibrium transfer for continuing the partnership in Stage 1 is

$$s_{1,A}^{*}\Big|_{Mutual} = 0. \tag{13}$$

Finally, given $s_{1,A}^{*}$ and $t_{2,A}^{*}$, there are two reasons why one agent may need to compensate the other to form a partnership under the mutual consent law. First, one agent may receive larger pre-transfer period payoffs than the other during Stage 1. Thus, a transfer $s_{0,A}$ must include one half of the difference between two agents' discounted lifetime benefit from being in a partnership. Second, $s_{0,A}$ should also take into account of the discounted value of $t_{2,A}$ because one of the agents will have to buy his way out of the partnership before it enters Stage 2. In sum,

$$s_{0,A}^{*}\Big|_{Mutual} = \frac{\delta}{1-\delta(1-\lambda)}\left[\left(\frac{1}{2}-\alpha_{0,A}\right)u_0 - \left(\frac{1}{2}-\alpha_{1,A}\right)u_1 - \lambda t_{2,A}^{*}\right]. \tag{14}$$

3. The Experiment

The experiment consisted of twelve sessions, conducted at the University of Wisconsin-Milwaukee and Hong Kong University of Science and Technology between September 2005 and May 2007. A total of 288 undergraduate students were recruited as subjects. Some of the subjects may have participated in previous economics experiments, but none had any experience in a similar experiment and no subject participated in more than one session of this study. Sessions lasted between 90 and 120 minutes including initial instruction period and cash payment to subjects. Although the experiment was conducted in experimental currency ("francs"), subjects were paid in local currency and earned an average of $18.53 (U.S. dollars).

We adopted a 2×2 design in which the treatment variables were the separation law and the payoff structure. The two separation laws were unilateral and mutual consent separation laws, depending on whether agents needed their partner's consent to dissolve the partnership. The two payoff structures were balanced and unbalanced, depending on if one always received higher pre-transfer period payoff than his counterpart at all stages of the partnership. Table 1 provides the number of subjects and periods in each of the twelve sessions under all four treatments (Unilateral/Balanced, Consensus/Balanced, Unilateral/Unbalanced, and Consensus/Unbalanced).

[Table 1: About Here]

To ensure that subjects had enough cash on hand to make large lump-sum transfers (especially under the mutual consent separation law), we gave each subject 50 francs as an endowment at the beginning of a session in all four treatments.

Upon arriving at the experiment, subjects were randomly assigned to two groups, Type A and Type B, and were divided by a center aisle in a large computer lab. The experiment instructions were then read aloud for the subjects, who followed along with their own copy of the instructions. Subjects were allowed to ask questions at any time. When there were no further questions, the first period began, and new periods followed until the experiment ended, as described below, at a randomly determined time. All

communication between subjects took place via a computer interface that was programmed and conducted using the Ztree software package (Fischbacher, 2007).

3.1 Parameters

In all specifications, the pair's aggregate payoffs $\{u_0, u_1, u_2, u_3\}$ in the four stages were 12, 28, 18 and 8 francs respectively. We set $\delta = \frac{9}{10}$ and $\lambda = \frac{2}{9}$, and thus equation (1) is satisfied. The disagreement penalty was set at p = 2. The initial shares of u_i under the balanced payoff structure were set as follows: $\alpha_{0,A} = \frac{1}{2}$, $\alpha_{1,A} = \frac{18}{28}$, $\alpha_{2,A} = \frac{3}{18}$, and $\alpha_{3,A} = \frac{1}{2}$. These parameters were chosen so the sum of discounted payoffs from all stages was the same for both Type A and Type B. Thus, if both types of agents exercised equal bargaining power, unattached agents would be willing to form partnerships with zero transfer under the mutual consent separation law. Under the unbalanced payoff structure, $\alpha_{0,A} = \frac{1}{2}$, $\alpha_{1,A} = \frac{18}{28}$, $\alpha_{2,A} = \frac{15}{18}$, and $\alpha_{3,A} = \frac{1}{2}$. That is, a Type A agent always acquired larger pre-transfer period payoffs than his Type B counterpart in both Stage 1 and Stage 2. Finally, note that regardless of the payoff structure, the pre-transfer period payoffs for Type A and Type B agents in Stage 3 were 4 francs each, smaller than the pre-transfer period payoffs if they were unattached. These parameters were chosen so that it would be apparent for subjects to terminate their partnerships before they even entered Stage 3.

Given these parameters, the model presented above predicts that agents would always agree to form partnerships with their newly matched counterparts, regardless of the separation rule. Once in a partnership, partners would choose to stay together as long as their partnership remains in Stage 1. Nonetheless, as soon as they realize the current on-going partnerships will progress into Stage 2 in the next period, they would dissolve the partnership immediately.

In the benchmark case where agents exercise equal bargaining powers, the equilibrium earnings for each type are 12 francs per period in all four treatments, and the equilibrium transfers under the unilateral separation law would be

$\{s^*_{0,A}, s^*_{1,A}, t^*_{2,A}, t^*_{3,A}\}$ = {3.6, 3.6, 0, 0}, regardless of the payoff structure. Under the mutual consent separation law, the equilibrium transfers would be $\{s^*_{0,A}, s^*_{1,A}, t^*_{2,A}, t^*_{3,A}\}$ = {0, 0, 18, 0} when the payoff structure is balanced, and $\{s^*_{0,A}, s^*_{1,A}, t^*_{2,A}, t^*_{3,A}\}$ = {24, 0, –18, 0} when the payoff structure is unbalanced.

In sum, even though the transfers between partners may vary, the expected earnings of each type and the likelihood for partnerships to form or to dissolve are all independent of the separation rule and the payoff structure.

3.2 Bargaining Procedure

The decision regarding the formation of a partnership could be facilitated by a transfer payment from one to another. Subjects were given one minute to negotiate transfer payments with their counterparts. To encourage full communication between bargainers, our bargaining procedure was organized in a rather unstructured way. Either party could initiate bargaining simply by clicking a button indicating the amount they wanted to offer to or request from their counterparts (which could be zero). If an agent's proposal (request or offer) was not accepted, he or she could make a new request (offer) that was required to be lower (higher) than his last proposal. (Fewer buttons were left on the screen after each proposal was made, so previous requests and offers were non-retrievable during that period. If the match continued into the next period, all options were restored for the new round of bargaining.) Subjects could click an ACCEPT button at any time during the bargaining phase to accept their counterparts' request or offer.

Once an agreement was reached, the lump-sum payment was transferred between two counterparts, and the partnership entered Stage 1. If no agreement was reached, subjects were automatically matched with new counterparts at the beginning of next period. All individual decisions were made anonymously, and the experiment was designed so that a participant would never be matched with the same counterpart twice in a row.

Once a partnership was formed, subjects in each period had to decide if they wanted to continue or terminate the partnership. Subjects first observed the stage of the partnership for the next period. They were then given one minute to bargain over the transfer payment for continuing their partnership into the next period, or for terminating it immediately after the current period. The bargaining procedure was the same as described above.

When there was a mutual agreement on a transfer payment to continue or terminate the partnership at the end of the bargaining, the payment was automatically transferred and the partnership was continued or terminated accordingly. The separation law was implemented only when no agreement was reached. Under the unilateral separation law, both parties paid 2 francs as a penalty and moved on to meet new counterparts next period. Under the mutual consent law, both parties paid a 2 franc penalty, as in the unilateral separation law, but had to stay together with the same partner for at least one more period, in which the same decision had to be made. Note that the 2-franc penalty was imposed only when two parties failed to reach an agreement to continue or to terminate an on-going partnership. No penalty was paid if the disagreement was on the formation of a new partnership.

At the end of each period, the computer displayed a summary screen of the bargaining outcomes, which included the status of their partnership for the next period, the net period earnings, defined as the pre-transfer period payoff plus the transfer payment (which was negative for the partner who paid) minus any disagreement penalty, and the agent's accumulated wealth.

3.3 Random Ending Rule

We used a random ending rule to create the infinite-horizon decision environment with $\delta = \frac{9}{10}$ in our experiment.[5] Regardless of the bargaining result, there was a fixed 10 percent chance that a match would be dissolved exogenously at the end of each period.

[5] A random ending rule is commonly used in the experimental literature to create an infinite-horizon decision environment with discounting. See, for example, Camerer and Weigelt (1993), Duffy and Ochs (1999, 2002), Noussair and Matheny (2000), and Lei and Noussair (2002).

Note that one drawback of adopting such a random ending rule is that sessions can be brought to an end before any consistent behavior pattern even emerges. So to avoid this problem, we divided each session into two phases: Phase I (period 1 to period 25) and Phase II (period 26 to the end).

During each period of Phase I, every tenth match was terminated exogenously.[6] Specifically, after the summary screen came up at the end of each period, partners and unattached subjects were all informed whether their own partnerships, if still existing after the bargaining, were randomly terminated by the computer using the 10% ending rule. As a result, partnerships were terminated at different points in Phase I. During each period of Phase II, there was a 10% chance that the computer would terminate all matches simultaneously and thus end the session altogether. Table 1 shows the exact number of periods in each of the twelve sessions.

4. Results

Subjects were required to make the following decisions each period: (a) whether to form, continue, or terminate a match, and (b) how much to transfer between the counterparts. These decisions determined how long the partnerships lasted and the payoffs received by each subject in each period. This section reports how those outcomes varied with the circumstances faced by the partners and with the rules governing the end of relationships.

4.1 Partnership Formation and Continuation

One choice that may be affected by the laws governing separations is the decision to form, continue, or end a partnership. Note that in the Coasian view, such choices should not depend on the separation rule because partners can always negotiate to reach a Pareto efficient agreement.

[6] Since there were about 11 to 13 pairs of subjects in a session, only one or two matches or partnerships were exogenously terminated at the end of each period in Phase I. The combination of a 10% probability of ending rule and having more than 10 pairs of subjects in each session ensured that there were always enough unattached agents so that no one would be paired with the same counterpart for two consecutive matches.

One can get an initial sense of the data by examining the probability that partners will continue their matches conditional on the separation law. The raw data are reported in Table 2. Note that if agents always behaved as theory predicts, the probabilities of forming new partnerships (Stage 0) and continuing Stage 1 partnerships would always be 1. The probability to continue Stage 2 partnerships should be zero, and Stage 3 partnerships should thus never be observed. This is true regardless of the separation law and the payoff structure.

The top panel of Table 2 shows that, for all four treatments, the probability that new partnerships formed or Stage 1 partnerships continued was indeed high. Nevertheless, partners were considerably more likely than expected to maintain their matches in Stage 2 or 3 in all four cases. There were substantial differences in these probabilities between the two laws irrespective of the payoff structure. Agents who knew they may end their partnerships unilaterally were more willing to form a new partnership, and also more likely to end an inefficient, Stage 2 or Stage 3 partnership. Surprisingly, they were also more likely to end an efficient, Stage 1 partnership.

[Table 2: About Here]

The lower panel of Table 2 compares the average number of periods that partnerships persisted in each of the four treatments. On average, matches lasted 1.52 periods (61%) longer under the balanced payoff structure, and 1.45 periods (52%) longer under the unbalanced payoff structure, when there was a mutual consent separation rule. These differences are consistent with the evidence in the top portion of the panel. Taking each session as one independent observation, Mann-Whitney rank-sum tests indicate that they are significant at the 5% level (p-value = 0.0495 in both cases). In contrast, the tests indicate that, conditional on the separation law, there are no statistically significant differences in partnership duration between the two payoff structures.

Suggestive as these results are, it is perhaps premature to assign much significance to them, since it is possible that the results may reflect differences in the likelihood that different types of agents may face each situation. We address this possibility in a few different ways. Table 3 reports results from eight probits on the

probability that a newly matched pair formed a partnership. In each of these probits, the key explanatory variables describe the separation rule and the payoff structure. For example, the first four probits include dummy variables for the separation law (which equals 1 for the mutual consent law and 0 otherwise) and the payoff structure (which equals 1 for the unbalanced payoff structure and 0 otherwise). The other four probits reported in Table 3 include dummy variables describing each treatment (mutual consent law with unbalanced payoffs, mutual consent law with balanced payoffs, and unilateral separation law with unbalanced payoffs, with unilateral/balanced as the excluded category). In order to control for the possibility that outcomes are affected by differences between men's and women's strategies, we have also included in each case two other dummy variables describing the gender composition of the pair—one that equals 1 if both partners are female, and another that equals 1 if both partners are male.

[Table 3: About Here]

Since strategies may change during the duration of the experiment, half of the probits shown include dummy variables for the period of the experiment, although these dummy variables are generally not found to be statistically significant. We have also run some probits with person-specific random effects in order to address the possibility that results may have been influenced by some agents' idiosyncratic strategies. Since subjects interacting with one another throughout the entire session are more likely to provide observations that are not independent, we correct for such an intra-class correlation by clustering the remaining estimates (without random effects) at the session level.

Regardless of which specification one prefers, the results lead to the conclusion that separation rules affect partnership formation rates, especially when the payoff structure is unbalanced. We summarize our results in the following.

RESULT 1: *The mutual consent separation law significantly reduces the likelihood that a partnership will be formed, especially when the payoff structure is unbalanced.*

SUPPORT FOR RESULT 1: The first four probits reported in Table 3 all estimate the coefficient on the mutual consent rule to be about –0.30, and all four are statistically significant at the 5 percent level. Evaluated at the mean of the data, this estimate implies

that, compared to the unilateral separation law, the mutual consent law decreases the probability that a partnership will be formed by about 30 percentage points. The remaining four probits indicate that the effect is larger when the payoff structure is unbalanced. The estimated coefficient on the consensus/unbalanced treatment is somewhat larger than before (about –0.34), and the random effects estimates are significant at the 5 percent level. (The estimates without random effects have marginal significance, with *p*-values of about 0.12.) The estimated coefficients for the unilateral/unbalanced treatment are positive and nearly as large (although only (modestly) statistically significant in the random effects specifications), further suggesting that the consensus rule depresses match formation when payoffs are unbalanced. In contrast, the estimated coefficient on consensus/balanced is small and statistically insignificant, indicating that the separation rule did not affect match formation rates when payoffs were balanced. ■

The results in Table 2 also suggested that separation laws influence the expected duration of the matches that form. We investigated such effects further using Cox's (1972) proportional hazards model. In that model, the baseline probability that an on-going match ends in a particular period (the hazard rate) is assumed to be a function of the number of periods that the match has been in existence, but that hazard rate may be proportionally higher or lower for any individual match depending on the circumstances it faces. In particular, we have allowed the hazard rate to vary with the current stage of the match, the match the stage will enter if it persists for another period, the gender composition of the partnership, and the treatment. Matches that ended due to the random ending rule described in Section 3.3 were treated as right-censored, and once again we have clustered our standard errors at the session level to account for possible non-independence of observations gathered from the same set of individuals.[7]

[7] We have also run a variation on this model that includes person-specific multiplicative random effects ("frailty") that are gamma distributed with mean 1. The estimated variance of those random effects was small (0.06), and the hypothesis that the variance equaled zero was not overwhelmingly rejected ($p = 0.03$), so Table 5 reports results from a model without random effects. However, as one might expect, the two specifications produced very similar results.

The results of this procedure are reported in Table 4. To interpret these results, recall that the baseline hazard rate is the rate at which matches in Stage 1 end under the unilateral/balanced treatment. Thus, the first estimate in the top row of column (2) indicates that the hazard rate is only about 1/3 as large under the consensus/balanced treatment as it is under unilateral/balanced. Likewise, the fifth estimate in column (2) indicates that Stage 3 matches under the consensus/balanced treatment were 3.31 times more likely to end than were Stage 1 matches under unilateral/balanced. The two *p*-values next to that estimate indicate that this estimate is statistically significant compared to 1 ($p = 0.00$), but not compared to the Stage 3 hazard rate under unilateral/balanced ($p = 0.83$). It is not surprising that the hazard rates would increase as partnerships progress to latter stages (indeed, that is the efficient outcome), so for our purposes the latter of those p-values addresses the more relevant comparison.

[Table 4: About Here]

The estimates in Table 4 lead to several interesting conclusions:

RESULT 2: *The mutual consent separation law significantly increases the likelihood that an efficient (Stage 1) partnership will be continued.*

SUPPORT FOR RESULT 2: In Table 4, the row labeled Stage 1 reports the hazard ratios for the rate at which Stage 1 partnerships end under the four treatments, with the unilateral/balanced treatment as the reference group. Whether the payoff structure is balanced or unbalanced, the results indicate that Stage 1 partnerships were only about 1/3 as likely to end at any given duration if both partners must agree to the separation. These estimates are significant at the 1% level. ■

RESULT 3: *The mutual consent separation law increases the likelihood that an inefficient (Stage 2) partnership will be continued.*

SUPPORT FOR RESULT 3: In Table 4, the relevant estimates appear in the four rows labeled "Stage 1, entering stage 2" through "Stage 3." With the exception of the results for Stage 3, whether the payoff structure is balanced or unbalanced, the estimated hazard ratio is always much smaller when the separation rule requires mutual consent. The "Stage 1, entering stage 2" and "Stage 2" estimates are statistically significant at the

1 percent level when the payoff structure is unbalanced. The remaining differences are large in absolute terms, so the lack of statistical significance is likely due to small sample size, which is not terribly surprising given that it is inefficient to continue matches in those cases. ■

We wonder whether approaches to bargaining may help to explain why some efficient matches end earlier than expected, or why some inefficient matches persist longer than expected. Suppose that some players have idiosyncratic approaches to bargaining, such as an unusually aggressive stance. Then a partner who came to believe they had been matched with such a person might reasonably contemplate whether that partnership is likely to realize the potential gains from an efficient match, and thus he or she might prefer to end the match in the hopes of finding a more cooperative partner. We will call this strategy "dropping" the undesirable partner. Of course, this strategy is much more likely to be feasible when each partner has the power to end the partnership unilaterally.

At the other extreme, one could imagine that a partner who felt slighted might be able to use a consensus separation rule to exact revenge on his or her partner by "dragging" the match into an inefficient stage. Although this decision likely would cause some harm to the slighted partner, it could be used to extract a larger transfer (one might even call it a "ransom") from the other partner, and at the least it may yield some psychological satisfaction. Obviously, this strategy should not be feasible under a unilateral separation rule, since the partner set to receive this punishment could simply opt out of the partnership. Moreover, the cost of dragging might be smaller when one is better endowed than when one is not. Thus, we expect to see more effective dragging under the Consensus/Balanced treatment.

One way to explore this hypothesis is to modify the Cox model reported in Table 4 to include a new variable describing the absolute value of the difference between the partners' post-transfer payoffs per previous period of the match's existence.[8] Considering that this new variable is endogenous and determined by the same bargaining process that

[8] For example, if the match is entering its sixth period, the new explanatory variable is the absolute value of the total difference in the partners' net earnings over the previous five periods, divided by five periods.

produces the decision to continue or terminate the partnership, it would be improper to consider the coefficient on this variable as a causal effect. For instance, if the estimates implied that earnings differentials between the partners raised the separation hazard, it would be premature to conclude that such couples would have been more likely to remain together if, e.g., the partners were somehow forced to share there resources equally. Nevertheless, having said that, such estimates could still be considered descriptive evidence about which matches end, so it would be proper to say that the hypothesized finding implied that couples who had larger differences in earnings were more likely to separate.

We have thus run this augmented Cox model, and Table 5 reports the hazard ratios associated with those earnings differentials. Although the table does not report their estimated coefficients, the specification also includes all of the factors that were reported in Table 4.

[Table 5: About Here]

RESULT 4: *Terminating an efficient partnership prematurely is more likely to be the result of an unequal past earning distribution under the Unilateral/Balanced than under the Consensus/Balanced treatment.*

SUPPORT FOR RESULT 4: In Table 5, the first row of column (1) indicates that a 1-franc increase in the difference between partners' average past earnings significantly increases the risk that a Stage 1 partnership would end under Unilateral/Balanced treatment, with the hazard rate increasing by 4 percentage points per franc. This estimate (1.04) is significantly different from the alternate hypothesis that there is no effect (hazard ratio equals 1) at the 1% level. The estimated hazard ratio in the Consensus/Balanced treatment is a statistically insignificant 0.99, and the difference between the estimates under the two treatments is statistically significant at the 1% level. ■

It is also notable that the results in Table 5 suggest that subjects under Consensus/Unbalanced also exercised early dropping to avoid being further exploited for the rest of the relationship. However, as suggested by Table 6, such a strategy cost them

much more than those under other treatments. Type B subjects paid an average transfer of 2.41 francs to their Type A partners in order to dissolve their Stage 1 partnerships under the Consensus/Unbalanced treatment. In the Consensus/Balanced treatment, Type A agents would be the ones to fear exploitation in Stage 2, and thus they paid an average transfer of 1.41 francs to their Type B partners to dissolve a Stage 1. Under the Unilateral/Balanced or Unilateral/Unbalanced treatments, either party could end the partnership at any time without the other's consent, so it is not surprising that average transfers accompanying Stage 1 terminations are quite small in those cases (0.23 and 0.18, respectively).

[Table 6: About Here]

RESULT 5: *Stretching an inefficient partnership is more likely to be the result of an unequal past earning distribution under the Consensus/Balanced treatment.*

SUPPORT FOR RESULT 5: In Table 5, note the columns labeled Unilateral/Balanced and Consensus/Balanced in the row representing Stage 3. The estimates suggests that a 1-franc increase in the difference between partners' average past earnings significantly increases the probability that a Stage 3 partnership would end under the Unilateral/Balanced treatment (with the hazard ratio increasing by 18 percentage points), but the same difference decreases the probability that a Stage 3 partnership would end under Consensus/Balanced. Both estimates and their difference are statistically significant at the 1 percent level. ■

As expected, subjects under Consensus/Balanced retaliated against unfair treatments by effectively keeping their counterparts longer in Stage 3. The reward for such retaliation was that Type A subjects had to pay Type B an average of 4.31 to terminate their Stage 3 partnerships. Type B received only 0.28 under Unilateral/Balanced, 1.15 under Unilateral/Unbalanced, and 1.00 under Consensus/Unbalanced for the dissolution of Stage 3 partnerships.

One other conclusion from Table 5 requires a bit more thought.

RESULT 6: *Stretching an inefficient partnership is more likely to be the result of an unequal past earning distribution under the Unilateral/Unbalanced treatment.*

SUPPORT FOR RESULT 6: In Table 5, the column labeled Unilateral/Unbalanced implies that a 1-franc increase in the difference between partners' average past earnings increases the probability that a partnership would continue in Stage 1 (entering Stage 2), Stage 2, and Stage 2 (entering Stage 3). The estimates for the first and last of these are statistically significant at the 1 percent and 7 percent levels, respectively. The estimate for Stage 2 is somewhat noisy, and thus not statistically significant, but its magnitude is similar to the magnitudes of the statistically significant estimates. The two estimates for the two transitional states also differ from the estimates under Consensus/Unbalanced at the 1 percent and 8 percent levels of statistical significance. ■

In the discussion above, we hypothesized that some subjects may have punished their partners for unfair treatment by forcing the match to continue into an inefficient stage where both partners earned low payoffs. At first glance, it may seem that the behavior identified in Result 6 is simply another type of punitive strategy. However, that explanation is not sensible in light of the fact that the behavior is observed under a unilateral separation rule. Punishment cannot be a credible threat in such an environment because the partner who would be punished has both the right to end the partnership and every incentive to do so.

Instead, we suspect these matches survive into Stage 2 because the advantaged partners have a strong interest in maintaining the match. Prior to the negotiated transfers, Type A partners in the Unilateral/Unbalanced treatment earn 15 francs in Stage 2 partnerships, a much larger sum than they would receive if the match ended. They should thus be willing to offer a reasonably large transfer to their Type B partners if they agree to extend the match. Theory predicts that this strategy will fail because the Type B partners would require an even larger transfer than the Type A partners would be willing to offer, but in practice the match could continue if one party or the other miscalculated the expected costs and benefits. That possibility is perhaps more likely when the payoff structure is unbalanced, since neither agent has any experience with the other's position—the Type A agents always have larger pre-transfer earnings and always expect

to pay positive transfers, while the Type B agents always have smaller pre-transfer earnings than their partners and always expect to receive transfers.

Nevertheless, even if some agents miscalculate, it should be clear that Type B agents have little incentive to maintain Stage 2 partnerships unless they receive significant transfers. This observation is consistent with some evidence in Table 6. Under Unilateral/Unbalanced, Type A subjects paid their partners an average of 3.41 francs per period to continue Stage 2 partnerships, a somewhat larger amount than they paid in Stage 1 (2.92 francs). It is also significantly larger than the 1.34 francs transferred by Type A agents in Stage 2 partnerships under the Consensus/Unbalanced treatment, exactly as one would expect if the Type A partners were more interested in maintaining the match.

4.2 Transfer Payments and Welfare

Table 6 presented above summarizes the average levels of transfers made from Type A to Type B under the four treatments, as well as the theoretical predictions in the benchmark case in which the two parties have equal bargaining power. The partnerships could be in any of the three stages, and in each of those stages the partners could decide to stay together or separate. The only case in which a transfer is not possible is if agents were meeting for the first time and decided not to form a partnership in the first place.

It is apparent from Table 6 that the average transfers to form a new partnership, to continue a Stage 1 partnership, and to terminate a Stage 2 partnership are all considerably different from their respective benchmark predictions. For example, under the unilateral separation law, the benchmark predicts that a Type A agent should transfer 3.60 to his Type B counterpart to form a new partnership or to continue a Stage 1 partnership regardless of the payoff structure, whereas the average transfer is only 1.55 under the balanced and 1.74 under the unbalanced payoff structure to form a new partnership, and 2.20 under the balanced and 2.92 under the unbalanced payoff structure to prolong a Stage 1 partnership. Type A agents also transferred smaller but nontrivial amounts—0.44 and 0.32 under the balanced and unbalanced payoff structures respectively—to their

counterparts in order to terminate inefficient partnerships in or entering Stage 2, even though the theory predicts otherwise.

The deviations from the theoretical predictions appear to be even larger under the consensus separation law. For instance, under the balanced payoff structure, a Type A agent should compensate his Type B counterpart with a large once-and-for-all lump-sum transfer only to end an inefficient partnership. Rather, Type A agents in our experiment preferred to make a fairly stable stream of transfers in that they paid an average of 1.03 to form, 1.10 to continue, and 2.59 to terminate a (Stage 2) partnership. Type B agents seemed to be quite underpaid even after we take the average duration of a partnership along with all these payments into account. The same story also applies to the unbalanced payoff structure. Thus, on the whole, the agents who were less eager to form, continue, or end the partnership were not able to extract the large concessions from their partners that should have been possible under our mutual consent regime.

It should come as no surprise that Type A's average net period earnings (including transfers and penalties) were significantly higher than Type B's in most of the treatments, considering that they generally transferred significantly smaller amount to their counterparts than in the equal bargaining power benchmark. Table 7 reports the average net period earnings made by both types of partners under the four treatments. Type A's net period earnings ranged from 10.45 under Unilateral/Balanced to 12.14 under Consensus/Unbalanced. Type B's net period earnings, on the other hand, varied from 7.77 under Consensus/Unbalanced to 9.93 under Consensus/Balanced. The difference between A's and B's net period earnings appears to be larger when the payoff structure is unbalanced than balanced, and the disparity is particularly prevalent under the Consensus/Unbalanced treatment. Specifically, if we treat each session as an independent observation, Mann-Whitney rank-sum tests suggest that the difference between A's and B's net period earnings is not significantly influenced by the separation law unless the payoff structure is unbalanced (p-value = 0.0495). Our data thus suggest that a person who brings less to the partnership generally has a smaller bargaining power and thus earns significantly less than his advantaged counterpart under the mutual consent law.

[Table 7: About Here]

Regression results summarized in the following further supports this observation.

RESULT 7: *The difference between Type A's and Type B's net period earnings is significantly positive under all four treatments. It is larger under the unbalanced than under the balanced payoff structure, and the largest under the Consensus/Unbalanced treatment.*

SUPPORT FOR RESULT 7: We examine the impact of separation laws and payoff structures on the distribution of net period earnings by regressing the difference between Type A's and Type B's net period earnings on two dummy variables representing the mutual consent law and the unbalanced payoff structure and the interaction of the two dummies. The gender effect is also controlled for in our regression. Table 8 reports the OLS estimates with robust standard errors adjusted for within-session correlations.

[Table 8: About Here]

After controlling for gender, Table 8 indicates that the Type A's net period earnings is 0.96 francs higher than Type B's under Unilateral/Balanced and Consensus/Balanced treatments. The difference in partners' net period earnings is 0.96 + 1.07 = 2.03 in the Unilateral/Unbalanced treatment, and 0.96 + 1.07 + 2.45 = 4.48 under the Consensus/Unbalanced treatment. ■

5. Conclusion

The relationship between the flexibility of separation laws and the likelihood that relationships form or continue has not always been as clear as one might like, either in theory or in empirical evidence. This study provides new, complementary evidence on that relationship by examining the impact of unilateral and mutual consent separation laws in a laboratory environment. We find that the separation laws do influence the likelihood that partnerships form and persist: our subjects are more likely to form partnerships under the unilateral separation law, but they are more likely to maintain existing partnerships under a mutual consent law.

Also, the separation laws implemented in our experiment affect the relative well being of the two partners only when the pre-transfer payoffs of one party significantly dominate those of the other—in our "unbalanced" treatments. Regardless of the separation rule, the weaker party's well being is significantly lower than his rich counterpart's, but the difference is larger under the mutual consent rule than under the unilateral rule. In other words, our results do not support the common notion that mutual consent separation rules provide more security or insurance to the weaker party. However, they are consistent with, for example, Stevenson and Wolfers' (2006) finding that unilateral divorce laws improve the welfare of abused spouses.

There are three possible reasons why a mutual consent law might further reduce the weaker party's welfare when the distribution of the pre-transfer payoffs is unbalanced. First, matches are more likely to enter an inefficient stage under the mutual consent separation law. That is, the mutual consent law implemented in our experiment encourages the continuation of partnerships even to a point where two parties would be better off by separating and matching with new partners. Second, it appears to be more difficult to reach an agreement in negotiations when the separation law requires mutual consent. In our experiment with unbalanced payoff structure, partners failed to reach an agreement 13 percent of the time under the unilateral separation rule, but 22 percent of the time under the mutual consent rule. Finally, the advantaged partners transfer significantly less to their partners under the mutual consent rule.

Like other experimental studies, ours is vulnerable to criticisms of oversimplification. Our experimental design suppresses match-specific considerations that are undoubtedly important in determining the duration of partnerships and the outcome of negotiations in the naturally occurring world. Even so, there is no clear reason to believe that such issues are more important under one separation law or another (except perhaps through the rules' direct effect on match duration), so we believe the experiment effectively isolates the effect of the treatment.

Finally, it is worth noting that the categories of "unilateral" and "mutual" do not exhaust the set of possible separation laws. A significant example of an alternate rule is

the French labor law (the CPE: *Le Contrat Première Embauche*) that has attracted so much recent attention. The CPE might be aptly described as "unilaterally unilateral": French workers may quit their jobs without their employer's consent, but employers cannot ordinarily shed workers without their consent. This is a more complicated arrangement than we have considered in this experiment, but it involves many similar issues, and it might make for an interesting extension in future work. Regardless, the large violent protests that arose in response to the French government's attempt to replace the CPE with "employment at will" (and just for workers under the age of 26) only underscore the depth of the passions ignited by separation rules.

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Table 1: Numbers of Subjects and Periods in All Four Treatments

Treatment	Session	# of Subjects (# of Periods)
Unilateral/Balanced (UB)	UB1	22 (35)
	UB2	24 (28)
	UB3	24 (26)
Consensus/Balanced (CB)	CB1	24 (36)
	CB2	24 (33)
	CB3	24 (28)
Unilateral/Unbalanced (UU)	UU1	24 (49)
	UU2	24 (33)
	UU3	24 (38)
Consensus/Unbalanced (CU)	CU1	26 (35)
	CU2	24 (32)
	CU3	24 (41)

Table 2: Statistical Summary of Partnership Duration

A. Percent of Partnerships Continuing, by Treatment and Stage

	Stage 0		Stage 1		Stage 2		Stage 3	
	Unilateral	Consensus	Unilateral	Consensus	Unilateral	Consensus	Unilateral	Consensus
Balanced	76.90	76.51	73.68	92.23	60.75	78.62	33.33	50.60
Unbalanced	83.88	65.95	77.87	92.80	65.37	85.16	40.74	52.34

B. Completed Duration of Partnerships, by Treatment

	Unilateral		Consensus	
	Mean	SD	Mean	SD
Balanced	2.48	1.82	4.00	3.17
Unbalanced	2.77	2.59	4.22	3.21

Table 3: Estimated Coefficients from Several Probits on Match Formation

Explanatory Variables	Est	SE	*P*	Est	SE	*P*	Est	SE	*P*	Est	SE	*P*
Consensus rule	-0.31	0.15	0.04	-0.30	0.14	0.04	-0.30	0.11	0.01	-0.30	0.11	0.01
Unbalanced payoffs	-0.04	0.17	0.79	-0.03	0.14	0.80	-0.06	0.11	0.58	-0.06	0.11	0.58
Both partners male	0.06	0.11	0.57	0.07	0.12	0.55	0.00	0.09	0.97	0.02	0.09	0.80
Both partners female	-0.07	0.15	0.64	-0.08	0.14	0.56	0.02	0.11	0.88	-0.01	0.12	0.94
Period dummies?	no			yes			no			yes		
Random effects?	no			no			yes			yes		
Log likelihood	-826.6			-788.1			-801.2			-768.0		

Explanatory Variables	Est	SE	*P*	Est	SE	*P*	Est	SE	*P*	Est	SE	*P*
Consensus/unbalanced	-0.34	0.22	0.12	-0.32	0.20	0.12	-0.34	0.14	0.02	-0.34	0.14	0.02
Consensus/balanced	-0.01	0.17	0.97	-0.02	0.16	0.89	0.04	0.15	0.79	0.01	0.15	0.92
Unilateral/unbalanced	0.23	0.20	0.24	0.22	0.20	0.26	0.26	0.15	0.08	0.23	0.15	0.12
Both partners male	0.06	0.12	0.60	0.08	0.13	0.56	0.01	0.09	0.94	0.03	0.09	0.77
Both partners female	-0.07	0.15	0.65	-0.08	0.14	0.57	0.02	0.11	0.88	-0.01	0.12	0.96
Period dummies?	no			yes			no			yes		
Random effects?	no			no			yes			yes		
Log likelihood	-818.8			-781.9			-796.7			-764.1		

Notes: Reported values are estimated coefficients from eight separate probits in which the dependent variable describes whether a pair of potential partners actually decided to form a match. For models without random effects, standard errors are clustered at the session level.

Table 4: Estimated Hazard Ratios for Separations by Existing Matches under Different Separation Rules and Payoff Structures

Separation rule:	Unilateral			Consensus				Unilateral				Consensus					
Payoff structure:	Balanced			Balanced				Unbalanced				Unbalanced					
Stage	Est	SE	P(=1)	Est	SE	P(=1)	P(=UB)	Est	SE	P(=1)	P(=UB)	Est	SE	P(=1)	P(=UB)	P(=CB)	P(=UU)
Stage 1	(reference stage)			0.34	0.08	0.00	0.00	0.97	0.16	0.88	0.88	0.36	0.10	0.00	0.00	0.85	0.00
Stage 1, entering Stage 2	1.46	0.17	0.01	0.97	0.34	0.93	0.20	1.30	0.27	0.28	0.60	0.49	0.08	0.00	0.00	0.14	0.00
Stage 2	1.68	0.16	0.00	1.33	0.23	0.15	0.18	2.36	0.48	0.00	0.19	1.11	0.18	0.56	0.01	0.14	0.00
Stage 2, entering Stage 3	2.91	0.65	0.00	1.72	0.36	0.05	0.08	3.48	0.89	0.01	0.56	2.59	0.52	0.00	0.65	0.10	0.30
Stage 3	3.00	1.67	0.23	3.31	0.64	0.00	0.83	2.03	0.46	0.03	0.53	3.23	0.62	0.00	0.88	0.89	0.05
Both partners male	1.03	0.16	0.85	0.38	0.10	0.00	0.00	0.96	0.23	0.86	0.73	0.35	0.14	0.00	0.00	0.86	0.02
Both partners female	1.13	0.14	0.34	0.36	0.11	0.00	0.00	0.84	0.30	0.59	0.31	0.37	0.14	0.00	0.00	0.95	0.15
Pseudo log-likelihood	-3979																
Number of observations	3,432																
Number of matches	1,055																
Number of separations	673																

Notes: Reported estimates are hazard ratios for separations by existing matches, relative to stage 1 matches under a unilateral separation rule with a balanced payoff structure, as estimated from a Cox proportional hazards model. Matches that ended due to random draws by a computer are treated as right-censored. Specification also includes dummy variables for each period. Standard errors are clustered at the session level.

Table 5: Estimated Effects of Per-Period Absolute Differences in Earnings between Partners on the Hazard Ratios for Separations, under Different Separation Rules and Payoff Structures

Separation rule:	Unilateral			Consensus				Unilateral				Consensus					
Payoff structure:	Balanced			Balanced				Unbalanced				Unbalanced					
Stage	Est	SE	P(=1)	Est	SE	P(=1)	P(=UB)	Est	SE	P(=1)	P(=UB)	Est	SE	P(=1)	P(=UB)	P(=CB)	P(=UU)
Stage 1	1.04	0.01	0.00	0.99	0.01	0.58	0.00	0.99	0.02	0.54	0.01	1.02	0.01	0.00	0.08	0.06	0.10
Stage 1, entering Stage 2	0.99	0.02	0.76	0.97	0.01	0.04	0.46	0.94	0.01	0.00	0.01	1.03	0.01	0.03	0.21	0.00	0.00
Stage 2	0.94	0.09	0.51	1.03	0.01	0.02	0.33	0.93	0.06	0.21	0.92	1.00	0.03	0.96	0.55	0.43	0.28
Stage 2, entering Stage 3	1.03	0.01	0.00	1.02	0.01	0.11	0.43	0.84	0.09	0.07	0.04	1.01	0.04	0.85	0.58	0.81	0.08
Stage 3	1.18	0.06	0.00	0.92	0.04	0.02	0.00	1.03	0.09	0.75	0.11	1.00	0.05	0.99	0.01	0.16	0.76
Pseudo log-likelihood	-3971																
Number of observations	3,432																
Number of matches	1,055																
Number of separations	673																

Notes: The table reports results from a Cox proportional hazards model with a specification nearly identical to that reported in Table 4, with the exception that the specification here includes a new variable: the absolute difference in earnings per previous period of the match. The table reports only those new coefficients--i.e., the reported estimates are the effect of a 1-unit absolute difference in earnings per previous period of an existing match on the hazard ratios for separations by existing matches, relative to stage 1 matches under a unilateral separation rule with a balanced payoff structure. See Table 4 for further details of the specification.

Table 6: Average Period Transfer from Type A to Type B

	Balanced				Unbalanced			
	Unilateral		Consensus		Unilateral		Consensus	
	Benchmark	Actual	Benchmark	Actual	Benchmark	Actual	Benchmark	Actual
Form new partnership	3.60	1.55	0.00	1.03	3.60	1.74	24.00	2.22
		2.85		5.05		2.47		6.46
		[301]		[250]		[393]		[261]
Continue Stage 1 partnership	3.60	2.20	0.00	1.10	3.60	2.92	0.00	1.10
		3.01		3.87		2.13		4.10
		[309]		[442]		[473]		[478]
Continue Stage 1 partnership, entering Stage 2	n/a	-0.33	n/a	-0.80	n/a	2.65	n/a	1.47
		4.07		5.49		3.98		3.85
		[84]		[110]		[129]		[124]
Continue Stage 2 partnership	n/a	-2.48	n/a	-1.82	n/a	3.41	n/a	1.34
		3.25		3.96		2.72		3.33
		[65]		[122]		[104]		[166]
Continue Stage 2 partnership, entering Stage 3	n/a	-0.17	n/a	-1.03	n/a	1.20	n/a	0.97
		3.44		2.88		4.65		1.88
		[14]		[33]		[17]		[33]
Continue Stage 3 partnership	n/a	-0.30	n/a	1.33	n/a	0.14	n/a	-0.30
		0.73		3.82		1.37		3.31
		[6]		[18]		[13]		[27]
Terminate partnership in Stage 1	n/a	-0.23	n/a	1.41	n/a	0.18	n/a	-2.41
		1.45		3.60		2.03		7.56
		[90]		[34]		[125]		[44]
Terminate partnership in or entering Stage 2	0.00	0.44	18.00	2.59	0.00	0.32	-18.00	-4.00
		1.94		8.22		1.94		8.27
		[65]		[58]		[104]		[53]
Terminate partnership in or entering Stage 3	n/a	0.28	n/a	4.31	n/a	1.15	n/a	1.00
		3.00		10.08		1.70		7.39
		[19]		[32]		[25]		[48]

Notes: Standard deviations are reported beneath means. The number of observations appears in brackets.

Table 7: Summary of Net Period Earnings

	Unilateral/Balanced	Consensus/Balanced	Unilateral/Unbalanced	Consensus/Unbalanced
Type A	10.45	10.77	11.39	12.14
	(6.61)	(7.96)	(5.60)	(7.48)
Type B	9.66	9.93	9.47	7.77
	(3.82)	(5.51)	(4.00)	(5.96)

Notes: Standard deviations are in parentheses.

Table 8: Difference between Type A and Type B's Period Earnings

Constant	0.96**
	(0.44)
Consensus law	-0.02
	(0.62)
Unbalanced payoffs	1.07*
	(0.56)
Consensus × Unbalanced	2.45***
	(0.81)
A is female	-0.77
	(0.52)
B is female	0.14
	(0.63)
Both are female	0.69
	(0.68)
R-squared	0.0237
Number of observations	4968

Notes: Standard errors are adjusted for within-session correlations.
***, **, *: significant at the 1%, 5%, and 10% levels, respectively.