REPUTATION IN BARGAINING:
NATIONAL FOOTBALL LEAGUE CONTRACT NEGOTIATIONS

by

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Abstract

This paper examines a sequence of two bargaining games where a single buyer participates in both. The bargaining games are "linked" through the buyer's valuation which is positively correlated across bargaining games. This linkage results in the outcome of the first bargaining game having predictive powers on the second bargaining game's outcome. Each bargaining game is modeled with two-sided private information where the buyer and seller can either make a conceding offer, continue negotiating or terminate negotiations at any time. The model's structure results in a unique sequential equilibrium outcome. I empirically test the comparative static results obtained from the equilibrium outcome using National Football League contract data. The empirical results suggest that an NFL team's contract negotiations are affected by not only the terms agreed to in the team's prior contract negotiations but also on the length of time required to negotiate these prior contracts.

(**JEL Classification**: **J41, J50**)

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I. INTRODUCTION

The notion of reputation has been used to explain everything from limit pricing to the chain store paradox to cooperation in the finitely repeated prisoners' dilemma game. Robert Wilson (1985) states that: "Reputation can explain many behaviors-perhaps too many. It is too easy to suppose that there is an unobserved state variable called reputation that explains all that happens. The better approach is to develop a well-specified model in which the effects of reputation are delineated...". Wilson also discusses the difficulty of empirically testing the effects of reputation. This difficulty has led researchers such as Camerer and Weigelt (1988) to perform controlled experiments designed to test these effects. This paper develops a well-specified bargaining model in which reputation effects are analyzed. A unique data set of National Football League (NFL) player contracts allows me to empirically test the predictions of my model.

Many bargaining games do not occur in isolation. Rather, individuals often negotiate in several bargaining games sequentially. For example, a union representative often negotiates a sequence of contracts for different locals and a lawyer who represents a number of different clients in sequence may negotiate "out of court" settlements. Professional sports teams and professional athletes illustrate another example of sequential bargaining. Sports teams negotiate with a number of players sequentially in an effort to reach contractual agreements. This paper addresses the issue of reputation effects in a sequence of bargaining games. Reputation effects refer to an individual's actions in a bargaining game providing some information about the individual, which influences his actions and his opponents' beliefs about his actions in subsequent bargaining games. In this manner, the outcome of a bargaining game has predictive powers on the outcome of subsequent bargaining games.

This paper presents a model in which a buyer faces a sequence of two bargaining games with different sellers. The model addresses how reputation effects influence sequential bargaining games by having the buyer's valuation be positively correlated across bargaining games. Each bargaining game is structured as a "War of Attrition" Game where both the buyer and seller can either make a conceding offer, continue negotiating, or terminate negotiations at any time. There are costs per unit time incurred by the buyer and seller during negotiations and their surpluses are discounted after a certain time. A

unique sequential equilibrium outcome is calculated from which well defined comparative static results are obtained.

The model is applied to NFL contract negotiations where the team is the buyer who negotiates with different players sequentially. The surpluses of the buyer and seller are discounted after the start of training camp based on the commonly held belief that a player's expected performance is adversely affected by missing the start of training camp. Conlin (1999) finds empirical support for this belief.[1] The comparative static results are empirically tested using rookie contract data of players selected in the 1986 through 1991 NFL drafts. These empirical results suggest that an NFL team's contract negotiations are affected by the terms agreed to in prior contract negotiations (with different players) and when these terms were agreed upon.

The paper is organized in the following manner. Section II presents a brief literature review on reputation and bargaining and discusses this paper's contribution. Section III describes a model of two bargaining games where a single buyer negotiates with different sellers sequentially. Section IV discusses the NFL draft, the contract negotiation process for those players drafted and NFL rookie contracts. Section V relates the model to NFL rookie contract negotiations. Section VI summarizes the NFL contract data and Section VII describes empirical tests of the model's comparative static results. Section VIII presents conclusions of the analysis.

II. REPUTATION AND BARGAINING - LITERATURE REVIEW

Reputation deals with the notion that an individual's (identified as a long-run player) past actions have an effect on opposing players' beliefs regarding the individual's future actions. Incomplete information must exist in order for reputation effects to impact opponents' beliefs. This incomplete information may take several forms: 1) the long-run player's payoff from choosing specific actions may not be known with certainty; 2) all actions available to the long-run player may not be known; and 3) the

[1] The empirical results in Conlin (1999) indicate that the adverse affect of missing the start of training camp is largest the year the player is drafted and decreases in subsequent years. The primary result of Conlin (1999) is that players reveal private information by delaying contractual agreement. Revealing private information on ability is not accounted for in this paper's theoretical model or empirical specifications.

long-run player's knowledge of the game may be uncertain. The different possible payoffs, actions and knowledge of the long-run player are modeled as different "types" of long-run players. The incomplete information gives the long-run player the ability to take certain actions to convince his opponent that he is a specific type. The incomplete information in my model involves the player's payoff while the actions consist of the player's offer, whether to accept an offer, or whether to terminate negotiations.

Reputation effects have been analyzed for games with a single long-run player, many long-run players, and a single "big" long-run player versus many "small" long-run opponents.[2] Kreps & Wilson (1982b) and Fudenberg & Kreps (1987) analyze an infinite horizon game between two long-run players where each player has private information. This type of game is commonly called the War of Attrition Game. My model considers two sequential bargaining games where each bargaining game is structured as a War of Attrition Game. It is similar to that of Kreps & Wilson (1982b) in that it restricts to two the types of players and the permissible offers. In terms of the bargaining literature, Chatterjee & Samuelson (1987) consider a discrete time War of Attrition bargaining game. By allowing only two types of players and two permissible offers, a unique Nash equilibrium is obtained.[3] In a similar manner, I restrict the players' types and permissible offers for each bargaining game which allows me to obtain a unique sequential equilibrium.

My model differs from the existing literature in that: (1) the buyer and sellers have the option of terminating negotiations at any time; (2) the costs of negotiating change over time; and (3) the buyer participates sequentially in two bargaining games with different sellers. The bargaining games are linked through the buyer's valuation which is positively correlated across bargaining games. This linkage results in the buyer's actions in the first bargaining game providing information on his valuation, which influences his actions and the seller's beliefs about his actions in the second bargaining game.

III. THE MODEL

[2] See Kreps & Wilson (1982b), Milgrom & Roberts (1982), Kreps, Milgrom, Roberts & Wilson (1982), and Fudenberg & Kreps (1987).

The model has two bargaining games that occur sequentially with a single buyer participating in both. Each bargaining game has two-sided private information. The buyer and sellers have two possible types; $\{\underline{b}, \bar{b}\}$ and $\{\underline{s}, \bar{s}\}$, respectively, where $\bar{b} > \bar{s} > \underline{b} > \underline{s}$. A type $\bar{b}$ ($\underline{s}$) is termed a soft buyer (soft seller) while a type $\underline{b}$ ($\bar{s}$) is termed a hard buyer (hard seller). The probability the seller (buyer) believes that the buyer (seller) is a hard type at time t is denoted by π_b^t (π_s^t). The set of permissible offers is restricted to $\{v_H, v_L\}$ where $v_H=(\bar{b}+\bar{s})/2$ and $v_L=(\underline{b}+\underline{s})/2$. These are the offers of the Rubinstein complete information alternating offers bargaining game when the time between offers converge to zero for the soft buyer and hard seller and for the hard buyer and soft seller, respectively.[4] So that the cost of negotiating is the same for the soft types, $\bar{b}-v_H$ is set equal to $v_L-\underline{s}$.[5] If a buyer (seller) makes an offer of v_H (v_L) it is termed a *conceding* offer.

The buyer and seller can either make a conceding offer, continue negotiating, or terminate negotiations at any time. The strategy set for both types of buyers and sellers maps continuous time into the probabilities of conceding, continuing, and terminating negotiations. A strategy identifies two functions, F(t) and G(t), which specify the probabilities of conceding and terminating prior to time t. The probability of conceding [terminating negotiations] in time interval (t,t`) is F(t`)-F(t) [G(t`)-G(t)]. For instance, consider a soft buyer with a pure strategy of continuing to negotiate until time T* and then conceding. This strategy is specified as F(t)=0 for $t<T^*$, F(t)=1 for $t \geq T^*$ and G(t)=0 for all t. A bargaining game ends when either the buyer or the seller makes a conceding offer or terminates negotiations.

There are costs per unit time imposed on the buyer and seller during negotiations. The soft buyer's and soft sellers' costs per unit time of negotiating are denoted as c. The costs per unit time for the hard buyer and hard sellers are normalized to zero.[6] Negotiations begin at time 0. At a certain time in the

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[3] Chatterjee & Samuelson (1987) also prove that the uniqueness result holds if a continuum of types is considered. Chatterjee & Samuelson (1988) examine the unrestricted offers case and show that a unique Nash equilibrium is not obtained.

[4] What is actually required is that $\bar{b} > v_H > \bar{s}$ and $\underline{b} > v_L > \underline{s}$.

[5] While this is not a necessary condition, it greatly simplifies the calculations.

[6] What is actually required is that the cost per unit time of negotiation for the hard types be minimal so that, when there is positive probability their opponent will concede, the hard types prefer continuing to terminating negotiations.

negotiations, T, the surpluses the buyer and seller obtain from reaching an agreement are discounted. The surplus a buyer obtains from agreeing to a contract v at time t is b-v if $t \leq T$ and $e^{-r(t-T)}(b-v)$ if $t>T$ (where b equals $\underline{b}$ or $\bar{b}$ and v equals v_H or v_L). The surplus a seller obtains from agreeing to a contract v at time t is v-s if $t \leq T$ and $e^{-r(t-T)}(v-s)$ if $t>T$ (where s equals $\bar{s}$ or $\underline{s}$ and v equals v_H or v_L).[7] The surpluses obtained from terminating negotiations are zero for the buyer and seller.

The seller in the second bargaining game is denoted by s while the seller in the first bargaining game is denoted by s_1. All the notation associated with the first bargaining game is subscript with a 1. The sequential bargaining games are linked through the buyer's valuation which is positively correlated across bargaining games. Specifically, the probability the seller believes that the buyer is a hard type at the start of the second bargaining game, π_b^0, is $\alpha_1 + \alpha_2 \pi_{b_1}^e$ where $\alpha_1, \alpha_2 > 0$, $\alpha_1 + \alpha_2 < 1$, and $\pi_{b_1}^e$ is the probability the buyer is a hard type at the conclusion of the first bargaining game. This positive correlation across bargaining games results in the buyer being concerned with how his actions in the first bargaining game affect negotiations in the second bargaining game. In other words, the buyer must consider how his reputation in the second bargaining game is affected by his actions in the first bargaining game.

The following three assumptions are made: (1) the first bargaining game concludes prior to the start of the second bargaining; (2) the time at which surpluses are discounted, T and T_1, occurs prior to the time when the bargaining game concludes with certainty; and (3) the soft buyer's expected cost of establishing a reputation as a hard type at any time in the first bargaining game is greater than the expected benefit. The parameter restrictions required to ensure that these three assumptions hold are contained in the appendix. The model's equilibrium outcome does not change appreciably if Assumptions (1) and (2) do not hold. Assumption (3) is important in that it prevents the buyer from credibly committing in the first bargaining game to never making a conceding offer.

To determine the equilibrium of the first bargaining game, the buyer's benefit of establishing a reputation as a hard type must be calculated. Therefore, the equilibrium of the second bargaining game is calculated prior to the first bargaining game.

[7] In terms of NFL contract negotiations, time T corresponds to the start of training camp.

3.1 Second Bargaining Game

The calculations of the Nash equilibrium for the second bargaining game are in the appendix. The equilibrium strategies when $\pi_b^0 > \pi_s^0$ are depicted in Figure 1.

INSERT FIGURE 1

The soft buyer's equilibrium strategy is to randomize between conceding and continuing according to F(t). The soft seller's equilibrium strategy is similar to that of the soft buyer except the soft seller concedes with positive probability at the start of the bargaining game. If $\pi_b^0 < \pi_s^0$, the soft buyer instead of the soft seller would concede with positive probability at t=0. The soft buyer's (soft seller's) randomization is such that the soft seller's (soft buyer's) cost and expected benefit per unit time of continuing are equal at all t>0; causing the soft seller (soft buyer) to be indifferent between conceding and continuing. The soft buyer and soft seller concede with probability one prior to time $\hat{T}$. Soft types do not terminate negotiations in equilibrium because conceding strictly dominates terminating negotiations at all t. The equilibrium strategy of the hard buyer (hard seller) is to continue negotiating until the seller (buyer) is a hard type with certainty (at time $\hat{T}$) and then terminate negotiations. Hard types do not concede in equilibrium because terminating negotiations strictly dominates conceding at all t.

3.2 First Bargaining Game

The calculations of the Nash equilibrium for the first bargaining game, based on the equilibrium outcome of the second bargaining game, are in the appendix. The equilibrium strategies for a specific value of ($\pi_{b_1}^0$, $\pi_{s_1}^0$) are depicted in Figure 2.

INSERT FIGURE 2

The soft buyer's equilibrium strategy is the same as in the second bargaining game if the ex-ante probabilities of the buyer and seller being hard types are the same in both bargaining games and $\pi_{b_1}^0 > \pi_{s_1}^0$. This is because the soft buyer's randomization is such that the soft seller's costs and expected benefits per unit time of continuing are equal, and the sellers' costs and expected benefits are the same in both bargaining games. The soft seller's equilibrium strategy is to randomize between conceding and continuing according to F(t) in Figure 2; which makes the soft buyer indifferent between conceding and

continuing. The soft seller's randomization is different than in the second bargaining game because the soft buyer benefits in the second bargaining game from establishing a reputation as a hard type in the first bargaining game. The equilibrium strategy of the hard buyer (hard seller) is to continue until the seller (buyer) is a hard type with certainty (at time $\hat{T}_1$) and then terminate negotiations.

The buyer benefits in the second bargaining game from establishing a reputation as a hard type because the buyer's valuation is positively correlated across bargaining games. By continuing in the first bargaining game, the buyer increases the soft seller's ex-ante belief in the second bargaining game that the buyer is a hard type (π_b^0). This in turn increases the buyer's expected payoff in the second bargaining game by increasing the probability that the soft seller concedes at t=0 (when $\pi_b^0 > \pi_s^0$) and by increasing the probability that the soft seller concedes prior to when surpluses are discounted (T). The fact that the soft buyer's expected payoff in the second bargaining game increases from continuing in the first bargaining game benefits the buyer by increasing the soft seller's probability of conceding at t=0 in the first bargaining game.

3.3 Unique Sequential Equilibrium Outcome

The equilibrium outcome of each bargaining game has the hard types terminating negotiations (at time $\hat{T}$ and $\hat{T}_1$) and the soft types conceding according to their F(t) functions. In terms of the equilibrium outcome, if both the seller and buyer are hard types, the negotiations terminate at $\hat{T}$ in the second bargaining game and $\hat{T}_1$ in the first bargaining game. If a hard type negotiates with a soft type, the soft type concedes in a finite time, dependent on his F(t) function. If two soft types negotiate, then either the soft buyer or soft seller concedes. The timing of the conceding offer and the probabilities the soft buyer and soft seller concede depend on their F(t) functions.

While the first and second bargaining games are infinite horizon games, the Nash equilibrium strategies of each bargaining game result in the games concluding in a finite time not greater than $\hat{T}$ and $\hat{T}_1$. If these finite horizon games are considered, the beliefs corresponding to the Nash equilibria are consistent and the actions specified by the Nash equilibria are sequentially rational. The reason for this is that the Nash equilibria result in all information sets of the finite horizon games being reached with

positive probability. If the buyer's (seller's) beliefs at all information sets after $\hat{T}$ and $\hat{T}_1$ are that the seller (buyer) is a hard type with probability one, then the beliefs are consistent with the Nash equilibria and the actions specified by the Nash equilibria are sequentially rational for the infinite horizon game.[8]

The Nash equilibrium outcomes depicted in Figures 1 and 2 are unique if the tie breaking rule for the hard types is to terminate negotiations when they are indifferent between terminating and continuing.[9,10] However, they do not correspond to a unique Nash equilibrium outcome for the sequential bargaining game. These Nash equilibrium strategies do not prevent the soft seller in the second bargaining game from making a non-credible threat such as never conceding unless the buyer terminates negotiations in the first bargaining game at a certain time. However, the outcomes of the equilibrium strategies do constitute a unique sequential equilibrium outcome for the sequential bargaining games because sequential equilibria prohibit non-credible threats.

3.4 Comparative Static Results

The unique equilibrium outcome enables well defined comparative static results to be obtained. The probability the seller concedes in the second bargaining game is a function of the seller's belief that the buyer is a hard type at the start of the second bargaining game, π_b^0. This belief depends on: (1) whether the first bargaining game concludes with the buyer conceding, the seller conceding or negotiations terminating; (2) when the seller concedes in the first bargaining game; and (3) the ex-ante probability the seller in the first bargaining game is a hard type conditional on the seller conceding.

As proven in the appendix, the unique sequential equilibrium outcome of the bargaining games implies the following comparative static results.

The probability the seller concedes in the second bargaining game is:

(i) greater if the first bargaining game concludes with negotiations terminating rather than with a conceding offer;
(ii) greater if the seller concedes in the first bargaining game rather than the buyer;

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[8] Sequential equilibrium is defined for finite games and is being applied to this infinite game in the conventional manner.

[9] The proof that Figures 1 and 2 depict unique equilibrium outcomes is similar to the proof in Chatterjee & Samuelson (1987). While not contained in the appendix, it is available from the author.

[10] If the hard types costs per unit time of negotiating were greater than zero, then the hard types' best response at $\hat{T}$ and $\hat{T}_1$ would be to terminate negotiations.

(iii) the same if the buyer concedes in the first bargaining game after a long or short negotiation period; [11]
(iv) greater if the seller concedes in the first bargaining game after a long compared to a short negotiation period; and
(v) at least as great if the seller concedes in the first bargaining game and the ex-ante probability the seller was a hard type is high compared to low.

The probability the seller concedes in the second bargaining game increases with the seller's belief that the buyer is a hard type at the start of the second bargaining game. If negotiations terminate in the first bargaining game, then the buyer is definitely a hard type in the first bargaining game and more likely a hard type in the second bargaining game (due to the positive correlation of the buyer's type across bargaining games). This is the intuition for comparative static i). Comparative static ii) and iii) hold because only a soft type of buyer concedes in the first bargaining game. By conceding in the first bargaining game (after a long or short negotiation), the buyer reveals he is a soft type in the first bargaining game and more likely a soft type in the second bargaining game. If the seller concedes in the first bargaining game, the buyer could be a hard or soft type. The probability the buyer is a hard type is greater if the seller concedes in the first bargaining game after a longer negotiation period because the soft buyer is randomizes between conceding and continuing. Due to the positive correlation of buyer's type across bargaining games, the probability that the buyer is hard at the start of the second bargaining game is also greater. This is the intuition behind comparative static iv). Similar to the other results, comparative static v) relies on Bayes Rule and the positive correlation of buyer's type across bargaining games.

IV. NFL DRAFT AND CONTRACT NEGOTIATIONS - INSTITUTIONAL BACKGROUND

I test the comparative static results using data from NFL rookie contracts. An explanation of the events and details surrounding these contract negotiations is useful.

[11] This comparative static result is due to the restriction imposed on the distribution of buyer types. Because the buyer is restricted to two possible types and a hard type never concedes, a conceding offer in the first bargaining game reveals that the buyer is a soft type in this game. If the distribution of buyer types was not so restrictive, *when* a buyer concedes in the first bargaining game could reveal information on his type. This in turn could impact the seller's beliefs about the buyer at the start of the second bargaining game. If this was the case, when the buyer

From 1986 through 1991, the 28 NFL teams were given one draft pick in each of 12 rounds to select a player or trade. The order in which teams draft in each round depends on the teams' performances the previous season with the weaker teams selecting before the stronger teams. When a team drafts a player, other NFL teams are prohibited from signing the player unless they acquire the "rights" to the player through a trade.[12] The NFL draft occurs in late April. Each team conducts a training camp beginning in July during which players under contract learn the team's offensive and defensive systems, work on conditioning and play exhibition games against other NFL teams. Prior to 1989, teams were not allowed to start training camps more than 15 days before the first exhibition game. After the collective bargaining agreement expired in 1989, many teams started training camp three weeks before the first exhibition game. Rookies were scheduled to report to training camp up to two weeks before veterans and the regular season began in late August or early September.

The majority of players who are drafted hire agents prior to the draft to negotiate their contracts with the team. Draft choices primarily select agents who make their livings by representing professional athletes, although lower round draft choices sometimes select family or friends to represent them. Each NFL team has a representative directly responsible for negotiating contracts, and this individual receives input on specific contract negotiations from the coaches, general manager and owner. The majority of drafted players who sign do so in June, July and August and sign with the NFL team that drafted them. Those players that do not sign with the team that selected them are: (1) either traded to another NFL team with whom they sign; (2) sit out a year and sign a contract the subsequent year; (3) sign with a Canadian Football League (CFL) team; or (4) pursue alternatives outside of football.

Draft choices, who agree to terms with an NFL team, sign what is termed a Standard Form Contract. Contracts are standard because of the NFL teams' concern with the antitrust issues associated

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concedes in the first bargaining game would affect the seller's probability of conceding in the second bargaining game.

[12] Beginning with the 1982 draft, if the team and the player do not agree on a contract and if the player does not play professional football that year, the team maintains the player's rights for one year. The player could then reenter the NFL draft the following year. If the player did play professional football (such as in the Canadian Football League), the NFL team maintains the player's rights for three years.

with the draft and the teams' desire to ensure the legality of the contracts.[13] While fringe benefits in terms of insurance coverage and pension plans are identical for all players, contracts do differ in the monetary payments and the duration. The contracts are non-guaranteed in the sense that if the player is cut from the team prior to the regular season, the team does not pay the player the base salary.

V. NFL CONTRACT NEGOTIATIONS AND THE MODEL

In terms of the model, the NFL team is the buyer and the player is the seller. The expected value of the player to the team is denoted by b. The team can be of two possible types: a soft type ($\bar{b}$) or a hard type ($\underline{b}$). The soft type of team perceives the expected value of the player to the team to be greater than that of the hard type. A player's value to a team depends not only on the player but also on the team. Certain teams value draft choices more highly than others and the benefit obtained from winning is different across teams. The value a team places on draft choices and the benefit derived from winning are in some degree private information for the team. This explains why a team's valuation type is positively correlated across contract negotiations. The perceived value of the player's best alternative is denoted by s. The player can be of two possible types: a soft type ($\underline{s}$) or a hard type ($\bar{s}$). The hard type of player perceives the CFL, sitting out a year, forcing a trade or alternatives outside of football to be more attractive than the soft type. A contract v_H occurs when the team makes a conceding offer and a contract v_L occurs when the player makes a conceding offer.

The player and team incur costs during negotiations. These costs include opportunity costs and the direct costs of negotiating. After training camp begins, there are additional costs associated with the player's expected performance being adversely affected by missing the start of training camp. There is an opportunity cost to the team and player of analyzing the contracts proposed and formulating a counteroffer. There are other opportunity costs such as lost endorsement and promotion opportunities, the possibility of a player (free agent) who plays the same position as the draft choice signing with another team, the anxiety associated with the uncertainty of not having reached a contractual agreement,

[13] See Shapiro (1993) for a history of the NFL's nonstatutory labor exemption which insulates the NFL from anti-trust violations.

and a trade option being lost. These opportunity costs are likely to be greater for the team with a high valuation for the player and for the player whose best alternative to signing with the team is not very attractive. These costs are incurred by the team and player before and after the start of training camp. The team's and player's expected surpluses from a particular contract do not change before training camp. After training camp begins, expected surpluses would decrease if the probability the player makes the team decreases and/or the player's expected value to the team, conditional on the player making the team, decreases. This occurs because the player misses the opportunity to learn the team's offensive or defensive system and fails to achieve proper conditioning which negatively affects his expected performance.

The model has an NFL team facing a sequence of two bargaining games with different players. It is assumed that the team's valuation type is positively correlated across bargaining games. Certain factors that determine a team's valuation are team dependent while others are player dependent. In addition, several of the factors that determine team valuation are private information and persist across negotiations. This results in the positive correlation and gives the team an incentive to establish a reputation as a low valuation type for future negotiations.[14] It is also assumed that the players have no incentive to establish a reputation for possible future negotiations. This is the case when the players believe that current negotiations do not affect possible subsequent negotiations.[15]

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[14] The following examples provide anecdotal evidence suggesting that a team's prior negotiations do influence subsequent negotiations. Walter Murray was a wide receiver from the University of Hawaii selected in the second round of the 1986 NFL draft by the Washington Redskins. Walter Murray and the Redskins could not come to a contractual agreement through training camp and the first several games of the regular season. On October 8, the Redskins traded the "rights" to Walter Murray to the Indianapolis Colts with whom he signed on October 10. In the 1987 draft, the Redskins signed all 11 of their draft choices before the scheduled start of training camp for veterans. Kelly Stouffer was a quarterback for Colorado State chosen by the St. Louis Cardinals with the sixth overall selection in the 1987 draft. Kelly Stouffer could not agree to a contract with the Cardinals and did not play the entire 1987 NFL season. The Cardinals proceeded to trade the "rights" to Kelly Stouffer to the Seattle Seahawks for whom he played the 1988 season. In the 1988 draft, the Cardinals signed all 13 of their draft choices prior to the scheduled start of training camp for veterans. They signed their first round selection a month before the start of training camp.

[15] The role of the agent is trivial if there does not exist a principal-agent problem between the player and agent. This occurs when the player indicates to the agent whether to accept a team's offer, stay firm at the current offer or terminate negotiations. The role of the agent would also be trivial when the agent is not concerned with establishing a reputation for future negotiations, is compensated on a percentage basis and represents the player in future negotiations. Agents are ordinarily paid between 2% and 4% of the value of the contract and approximately two-thirds represent the same players in subsequent negotiations.

VI. DATA AND SUMMARY STATISTICS

The relatively standardized contracts of NFL rookies make them ideal for testing the implications of the model. Only contracts of drafted players are considered because when the player is selected in the draft provides perhaps the most accurate measure of a player's expected performance level. This contract standardization and measure of a player's expected performance level enables the comparison of contracts needed to determine whether the team or the player made the conceding offer.

I obtained information from the NFL Player's Association (NFLPA), the NFL and the 1986 through 1994 NFL Record and Fact Books. The NFLPA provided rookie contract data on players selected in the 1986 through 1991 drafts and team salaries in 1985 while the NFL provided draft choice selection and the starting dates of training camp for the different teams. Roster information, attendance figures, stadium capacities and team won-loss records were obtained from the 1986 through 1994 NFL Record and Fact Books.

A total of 2,016 players were drafted by NFL teams from 1986 through 1991. The NFLPA collected rookie contract data for 1,873 of these players. Of the 1,873 players for whom information is available, 22 signed a contract with a team other than the one that drafted them. The majority of these players were selected in the first five rounds of the draft. Several of these 22 players were traded as the result of an inability to agree to a contract with the team that drafted them. Of the 143 draft choices for which contract information was not collected and are not included in my sample, 15 were selected in the supplemental draft. The remaining 128 either did not sign a contract or did not report their contract to the NFLPA. These players were primarily selected in the lower rounds of the draft.

Standard Form Contracts signed by drafted players range from one to six years in duration and consist of a signing bonus and a base salary each year. In addition, contracts often specify other bonus payments based on making the active roster and reporting to training camp on time. The signing bonus is guaranteed money which the player usually receives immediately after agreeing to the contract. The player receives one sixteenth of each year's base salary after each regular season game conditional on him being on the roster. The base salary is therefore not guaranteed. The player must be on the roster (i.e., have an active contract) in order to receive the payment. Similarly, the roster and reporting bonuses are

not guaranteed and depend on whether the player is on the active roster that year or the prior year. The roster bonus differs from the base salary in that the player receives it if he is on the active roster for at least three games. Occasionally, primarily for first round draft choices, there are incentive clauses in the contracts.

Table 1 provides some descriptive statistics of the data. Table 1 shows that the mean signing bonus and mean annual base salary decrease across rounds. Contracts of first round draft choices have signing bonuses averaging almost a million dollars which is over three times the mean signing bonus of second round draft choices. Table 1 also shows that the proportion of contracts signed before the scheduled starts of training camp for rookies and for veterans increases across rounds. Not surprisingly, the proportion of contracts active the first year, second year and third year decrease across rounds.[16]

VII. EMPIRICAL RESULTS

This section empirically tests the model's comparative static results i) through iv). The first step in testing these comparative static results is to obtain a single figure representing the "value" of a contract. The second step is to determine whether this value corresponds to a contract where the team made the conceding offer or the player made the conceding offer.

In order to obtain a single value representing a contract's value, comparisons of a dollar in signing bonus, base salary, roster bonus and reporting bonus must be made. Since the probability of making the team depends on when the player is drafted, these comparisons are different for players drafted in different rounds. Taking the present discounted value of the flow of payments over the duration of the contract is not appropriate because the base salary, roster bonus and reporting bonus are

[16] I define an active contract as one which is active for at least three games. Players on injured reserved are classified as active since they receive the payments specified in their contract for that year. If a player is traded, his contract is also still active. If a player is cut from a team, that player goes on "waivers" for 24 hours where he can be selected by any of the other 27 NFL teams. If a team selects a player from waivers, they are required to honor his existing contract. Therefore, a player's contract is still active if he is claimed off of waivers. Starting in 1989, the NFL established development/practice squads. Each NFL team is allowed six players on these squads and these players cannot participate in games. These players receive approximately $3,000 per week. NFL teams can select a player on another team's development/practice squad and place them on their active roster. The contract of a player on a development/practice squad is not considered active. If that player is on the active roster the following year, I consider the contract active for that year. In reality, the player signs a new contract but the terms are usually similar to his original contract. The NFL also began Plan B in 1989. Under Plan B, each NFL team protected 37 players. The remaining players were "free agents" for a period of two months and could sign a new contract with any other

conditional on the player making the team that year or the prior year. Instead, the value of a contract will be based on the expected present discounted value (EPDV) of the flow of payments the player is expected to receive over the duration of the contract. The EPDV is the present value of each payment the player may receive (calculated using the returns of 3-year treasury bills, r_t, for the appropriate years) multiplied by the probability of receiving the payment. The expected probability a player receives a given payment depends on which round the player was drafted (See Table 1).[17] The expected annual payments, Y, of a three-year contract is obtained from the EPDV using the following equation.

$$EPDV = Y + \frac{Y}{(1+r_t)} + \frac{Y}{(1+r_t)(1+r_{t+1})}$$

Contracts of other duration are calculated in a similar manner. The Consumer Price Index is used to convert Y into 1986 dollars. The variable Y represents the value of a contract and enables comparisons between contracts. The mean of Y is given by round in Table 1.

Whether a specific value of Y is considered a contract where the team conceded (v_H) or the player conceded (v_L) depends on a number of factors including round drafted and length of contract. For example, a Y of \$120k may be considered a v_H for a fourth round draft choice but a v_L for a first round draft choice. A Y of \$93k may be considered a v_H for a fourth round draft choice with a four-year contract but a v_L for a fourth round draft choice with a two-year contract. In order to determine whether a contract is v_H or v_L, I regress Y on characteristics which differ across contracts and are important factors when determining who made the conceding offer. These independent variables include when the player was selected in the draft, the length of the contract,[18] dummy variables for the year of the draft, dummy

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team. If an unprotected player signed with another team under Plan B, I considered their contract active. Usually, players signed under Plan B receive a new, more lucrative contract. I do not have information on these contracts.

[17] The expected probabilities in the fourth, fifth and sixth years of a contract are estimated using the probability of an active contract in the third year and the average yearly decrease in the probability of an active contract from the first year to the third year for that round. I assume that the decrease in the round specific probability of an active contract is the same from the third to fourth year, fourth to fifth year and fifth to sixth year as from the average yearly decrease in the probability of an active contract from the first year to the third year for each round.

[18] While the length of contract is arguably endogenous, there are no obvious instrumental variables to resolve this problem. If the length of the contract is not included as an independent variable, contracts of shorter duration are much more likely to have a positive residual and appear as if the team made the conceding offer. To accurately compare contracts of different lengths, I would require more accurate information on what players drafted in different rounds obtain in their subsequent contracts and a measure of their risk aversion. There exists a trade-off between signing bonus and length of contract. A player who signs a longer contract is likely to receive a larger

variables for the player's position and numerous interactive terms.[19] The coefficient of determination for this regression is .98, which means that 98% of the variation in Y can be explained by the variation in the independent variables. The remaining 2% may be explained by team characteristics which affect the team's valuation of the player (such as stadium capacity, attendance figures, won-loss records, other players on the team that play the same position and the wealth of the team's owner). It may also be explained by unobservable such as whether the team or the player made the conceding offer.

Table 2 identifies by draft year the sum of each team's percent residuals from this first regression (residual divided by Y). The table indicates that the sum of the percent residuals for certain teams (such as numbers 10 and 16) are negative every year and for other teams (such as number 6) are positive every year. These percent residuals are used to test comparative static results i) through iv).[20] A contract with a positive (negative) percent residual indicates that the team (player) made the conceding offer and/or the public information at the time of contract negotiation is such that the team's expected valuation for the player is relatively high (low).

The theoretical model considers two bargaining games which occur sequentially where the team's valuation is positively correlated across the bargaining games. This correlation causes the outcome of the first bargaining game to have predictive powers on the second bargaining game's outcome. Empirically, I assume that a team's valuation of a draft choice is positively correlated with their valuations of draft choices in the prior year. In this manner, a team's reputation depends entirely on the outcomes of all prior year's negotiations with draft choices. Because certain teams value draft choices more highly relative to free agents and veteran players than do others, I assume that a team's reputation does not depend on these

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signing bonus, conditional on when the player was drafted. Therefore, the length of contract is an indication of the player's risk aversion and time preference for money.

[19] The set of independent variables was selected based on fit. Those independent variables that I expect would influence the type of contract a player received were initially selected. I then plotted the residuals across many different independent variables to detect patterns. Additional independent variables were added to eliminate these patterns. For example, the interactive term between round 1 and quarterback was included after observing that the residuals of quarterbacks selected in the first round were almost always positive. The interactive terms between rounds 9 through 12 and length of contract were included after observing that the residuals of longer contracts signed by players drafted in the later rounds had a strong tendency to be negative. The reason for this is that the tradeoffs associated with a longer contract differ for late round compared to earlier round draft choices.

[20] Percent residuals are used, instead of the residuals, because a residual of +5,000 for a low round draft choice provides more information on who made the conceding offer than the same residual for a high round draft choice.

other contract negotiations. This allows a team to have a different reputation when negotiating contracts with draft choices compared to experienced players.[21]

The model's comparative static results are initially tested by estimating the following model.

$$e_{i,t} = \alpha + \beta_1 T_{i,t-1} + \beta_2 e_{i,t-1} + \beta_3 pe_{i,t-1} + \beta_4 ne_{i,t-1} + \beta_5 ATC_{i,t-1} + \psi \mathbf{X} + \varepsilon_i \qquad \text{for i=1,..,28; for t=1987,...,1991}$$

The dependent variable $e_{i,t}$ is the sum of the percent residuals for team i in year t. The independent variables are the fraction of negotiations terminated by team i in year t-1 ($T_{i,t-1}$), the sum of the percent residuals for team i in year t-1 ($e_{i,t-1}$), the sum of the positive percent residuals of those contracts signed after the start of training camp for team i in year t-1 ($pe_{i,t-1}$), the sum of the negative percent residuals of those contracts signed after the start of training camp for team i in year t-1 ($ne_{i,t-1}$), the fraction of team i's contracts signed after the start of training camp in year t-1 ($ATC_{i,t-1}$), and a vector of team characteristics (**X**). Separate models are estimated for when $pe_{i,t-1}$, $ne_{i,t-1}$ and $ATC_{i,t-1}$ are based on contracts signed after the start of training camp for rookies and for veterans. Each team's error terms are assumed to follow a first-order autoregression (AR1) process.

Comparative static i) asserts that the probability a player concedes is greater if the team's previous negotiations conclude with negotiations terminating. Therefore, I expect the $T_{i,t-1}$ coefficient to be negative. The $e_{i,t-1}$ variable is a measure of who was more likely to concede in the previous year's negotiations. A negative value indicates that the players were more likely to concede. Comparative static ii) implies that the probability a player concedes is greater if the previous year's players concede. Therefore, I expect the $e_{i,t-1}$ coefficient to be positive. Comparative static iii) states that the probability a player concedes is the same if the team conceded in the prior negotiations after a long or short negotiation period. By including $pe_{i,t-1}$ as an independent variable, the specification differentiates prior year contracts where the team conceded before training camp from those where the team conceded after the start of training camp. If when the team concedes in prior negotiations does not affect the probability of conceding in subsequent negotiations, the $pe_{i,t-1}$ coefficient should equal zero. Finally, comparative static iv) implies that the player is more likely to concede if players who made conceding offers in the prior

[21] Discussions with the NFLPA indicate that many teams have a different reputation when negotiating contracts with draft choices than when negotiating with veterans.

year's negotiations did so after, rather than before, the start of training camp. By including $ne_{i,t-1}$ in the specification, I test whether when a player concedes affects the probability that the team concedes in subsequent negotiations. A positive $ne_{i,t-1}$ coefficient would provide support for this comparative static result.

The model's comparative static results assume that the ex-ante probability in the first bargaining game that a team is a hard type is held constant. The variable $ATC_{i,t-1}$ is included to account for the difference in this ex-ante probability across teams and its impact on the probability a contract is agreed to after the start of training camp. I expect that a team is more likely to reach an agreement after the start of training camp if the team's ex-ante probabilities of being a hard type is lower.[22] Team characteristics are included in an effort to control for information which may affect a team's expected valuation for the drafted player and is available to the player during contract negotiations. These team characteristics include the number of regular season wins in the prior year, the salary of all the team's players in 1985, total home game attendance in the prior year, total away game attendance in the prior year, stadium capacity in the current year and whether the team's stadium changed from the prior year.

Columns 1 and 2 in Table 3 present the regression results when the independent variables $pe_{i,t-1}$, $ne_{i,t-1}$ and $ATC_{i,t-1}$ are based on contracts signed after the scheduled start of training camp for rookies and for veterans, respectively. The coefficient estimates are similar for both regressions. I expect the coefficient on $T_{i,t-1}$ to be negative based on comparative static i). While the coefficient is unexpectedly positive, it is not statistically significant. There are simply not enough negotiations that conclude in termination to determine the effect. The coefficient associated with $e_{i,t-1}$ is positive and statistically significant at the one percent level. This provides support for comparative static ii). Based on comparative static iii), I expect the coefficient associated with $pe_{i,t-1}$ to equal zero. As discussed in footnote 11, this comparative static result is the direct consequence of restricting to two the types of buyers. The negative and statistically significant $pe_{i,t-1}$ coefficient in Table 3 suggests that the distribution of team types specified in the model is too restrictive. By specifying a less restrictive distribution on team types (see Chatterjee and Samuelson, 1987), the theoretical model would predict that the probability the

player concedes is greater if the team concedes in prior negotiations after a long compared to short negotiation period. This would explain the negative $pe_{i,t-1}$ coefficient. Finally, the negative $ne_{i,t-1}$ coefficient is contrary to the prediction of comparative static iv). However, the coefficient is not statistically significant when $pe_{i,t-1}$, $ne_{i,t-1}$ and $ATC_{i,t-1}$ are based on contract signed after the scheduled start of training camp for veterans. The coefficient associated with $ATC_{i,t-1}$ is, as expected, positive. To summarize, the coefficient estimates do provide support for several of the model's comparative static results. The results suggest that not only the terms of prior contracts but also when the contracts were agreed upon do affect the contractual terms reached by the team in subsequent negotiations.

While many of the coefficients associated with the team variables are the expected sign, none are statistically significant. Due to the revenue sharing agreement among NFL teams, these team variables may not provide an adequate proxy for the public information available on the team's expected valuation at the time of contract negotiations.[23] Therefore, the coefficient estimates in the first two columns of Table 3 could reflect this public information (such as the wealth of the team's owner) instead of who actually conceded in the negotiations. This is especially true for the positive coefficient associated with $e_{i,t-1}$. I address this concern by including team specific effects in the prior specification. These results are presented in Columns 3 and 4 in Table 3. The coefficient estimates do not change appreciably from the specification without team indicator variables. This suggests that the coefficient estimates in the first two columns of Table 3 are not attributable to the teams' public information at the time of contract negotiations.

VIII. CONCLUSION

Reputation effects only apply to an individual participating in a sequence of bargaining games when there is some type of "linkage" across bargaining games. In my model this linkage is the buyer's

[22] This holds when the ex-ante probability of being a hard type is below a critical value. I expect this to be the case based on the minimal number of negotiations that are terminated.

[23] See Horewitz (1997) for a discussion on the different revenue sources of NFL teams.

type being positively correlated across bargaining games.[24] If there is no linkage (for example, if the buyer's type is not correlated across bargaining games) then the bargaining games could be analyzed separately. This would result in the buyer's action in a bargaining game having no influence on his actions in subsequent bargaining games. Therefore, the outcome of a bargaining game would have no predictive powers on subsequent bargaining games.

This paper tests whether the outcome of an NFL team's contract negotiations with a specific player affects the contractual terms reached in subsequent negotiations with different players. The empirical results suggest that a team's contract negotiations are affected by not only the terms agreed to in prior contract negotiations but also on the length of time required to negotiate these prior contracts.

[24] The linkage across bargaining games need not be valuation. For instance, the linkage could be strictly negotiation costs.

TABLE 1
SUMMARY STATISTICS BY ROUND

Round	Number of Contracts	Mean signing bonus ($1,000)	Mean annual base salary ($1,000)	Proportion who sign before training camp (rookies)	Proportion who sign before training camp (veterans)	Proportion of contracts active 1st, 2nd and 3rd year.	Mean Y ($1,000)
1	161	981	345	.19	.32	.96, .97, .92	537
2	168	272	207	.32	.53	.95, .91, .82	255
3	162	131	158	.35	.62	.83, .80, .68	162
4	164	76	110	.37	.67	.68, .63, .53	98
5	162	42	92.4	.49	.76	.58, .56, .37	69
6	162	26	86.3	.52	.81	.51, .47, .38	53
7	154	21	80.8	.57	.82	.37, .29, .26	36
8	157	17	78	.59	.84	.38, .36, .25	37
9	158	14	75.7	.59	.85	.23, .24, .15	24
10	153	11	74.1	.68	.87	.26, .19, .18	22
11	152	9.4	73	.65	.87	.24, .15, .11	17
12	120	8.5	72.5	.73	.88	.23, .16, .10	19
Total	1873	139	123	.50	.73	.53, .49, .41	115

TABLE 2

Sum of Team's Percent Residuals by Year

Team	1986	1987	1988	1989	1990	1991	Yearly Average
1	-.46	-.02	.27	-.22	-.05	.55	.01
2	-.02	-.16	.55	.61	-.22	-.80	-.01
3	.34	-.08	.05	-.54	.06	-.65	-.14
4	-.12	.03	.14	1.09	.02	.15	.22
5	-.25	.03	-.24	-.73	-.55	-.67	-.40
6	.50	1.58	.68	1.03	1.2	1.7	1.1
7	.07	-.10	-.26	.58	.81	.21	.22
8	-.68	-.23	-1.1	.14	.20	-.54	-.37
9	.24	-.61	-.40	-.40	-.50	.08	-.13
10	-.20	-.57	-.16	-.04	-.35	-.20	-.25
11	-.13	.04	.29	-.40	-.84	.50	-.09
12	-.30	-.62	-1.2	-.91	-.66	-.45	-.69
13	1.2	.82	-.52	.09	.04	.45	.35
14	-.51	.01	.07	-.85	-1.2	-.18	-.45
15	.39	.03	.16	.35	-.25	.08	.13
16	-2.1	-2.3	-2.7	-2.5	-6.6	-6.6	-3.8
17	.97	.25	-.02	-.56	.45	.40	.25
18	-.11	.12	.31	.00	-.74	.15	-.04
19	.28	.60	.46	.04	.65	.54	.43
20	-.31	-.18	-.37	-.43	2.6	1.7	.51
21	-.29	-.81	.22	-.13	-.73	-.49	-.37
22	-.30	.10	-.00	-.51	-.90	-.38	-.33
23	.51	.82	.48	.10	1.8	-.03	.62
24	-1.0	.32	.40	.54	.60	-.61	.19
25	-1.5	-.98	.09	-.08	-.59	-1.1	-.69
26	.56	.17	.67	-.10	-.22	.02	.18
27	.22	.39	.01	-.42	-.45	.22	-.00
28	.54	.30	.89	.29	-.14	.14	.34

TABLE 3

COMPARATIVE STATIC REGRESSION RESULTS

(The dependent variable is the sum of the team's percent residuals in year t.)

Independent Variables	AR1 Autocorrelation		Team Fixed Effects	
	Rookie Training Camp	Veteran Training Camp	Rookie Training Camp	Veteran Training Camp
% of team's negotiations terminated in year t-1 ($T_{i,t-1}$)	0.379 (1.494)	0.785 (1.512)	-0.308 (1.624)	0.220 (1.532)
Sum of team's percent residuals in year t-1 ($e_{i,t-1}$)	1.239** (0.101)	1.178** (0.097)	0.440** (0.155)	0.407** (0.135)
Sum of team's positive percent residuals for contracts signed after the start of training camp in year t-1 ($pe_{i,t-1}$)	-0.959** (0.321)	-1.222** (0.440)	-0.619 (0.385)	-1.025* (0.449)
Sum of team's negative percent residuals for contracts signed after the start of training camp in year t-1 ($ne_{i,t-1}$)	-0.747* (0.294)	-0.677 (0.364)	-0.261 (0.341)	-0.244 (0.380)
% of team's contracts signed after the start of training camp in year t-1 ($ATC_{i,t-1}$)	0.383 (0.289)	0.736** (0.344)	0.452 (0.350)	1.142** (0.381)
Team wins in year t-1	-0.026 (0.024)	-0.024 (0.025)	-0.012 (0.029)	-0.005 (0.028)
Team Salary in 1985 (in terms of 1,000s)	-0.445 (1.100)	-0.452 (1.128)		
Sum of team's home game attendance in year t-1 (in terms of 10,000s)	0.007 (0.008)	-0.001 (0.009)	-0.010 (0.011)	-0.019 (0.011)
Sum of team's away game attendance in year t-1 (in terms of 10,000s)	-0.006 (0.010)	-0.013 (0.011)	-0.020 (0.012)	-0.033** (0.012)
Capacity of team's stadium in year t (in terms of 10000s)	0.029 (0.057)	0.052 (0.059)	0.024 (0.270)	0.093 (0.256)
Stadium dummy variable (=1 if team changes stadium in year t)	0.064 (0.467)	0.059 (0.474)	0.140 (0.542)	-0.018 (0.516)
Constant	-0.041 (0.653)	0.479 (0.618)	1.014 (1.823)	1.370 (1.690)
Team Indicator Variables	No	No	Yes	Yes
Chi-Square	329.54	313.04		
R^2			.74	.76
Number of Observations	140	140	140	140

Notes: Standard errors are in parentheses. (**) and (*) represent statistically significant at one percent and five percent levels, respectively.

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