Strategic Delegation and Fairness in Bargaining *

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Abstract

This paper studies a buyer-seller ultimatum game where the buyer ("responder") may delegate negotiation authority to an agent with social preferences for the fairness of the outcome. This paper investigates the types of delegation contracts that can provide the buyer strategic benefits when her agent has social preferences. It is found that delegation can give the buyer a strategic gain. This is because if the agent has less payoff at stake than the buyer, then he is freer to reject unfair surplus divisions, which serves as a commitment to induce a fairer split. Furthermore, a contingency fee contract and a retainer contract are compared, and the latter is found to have greater strategic bite because it divorces the agent's payoff from his strategy, giving him more freedom to reject unfair offers.

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I Introduction

The bargaining literature often assumes that strategic decisions are made by the main parties of interest (hereafter called the "principals").[1] However, a simple glance into the real world reveals that many negotiations do not take place between the principal parties, but rather through agents sent on their behalves – union leaders on behalf of employees, managers on behalf of firm owners, political leaders on behalf of citizens, divorce lawyers, personal injury lawyers, consultants, sports agents, etc. While there are many possible motivations for delegation of negotiation authority, one particularly interesting motivation first noted by Schelling (1960) is that of *strategic delegation* — to serve as a commitment that influences rivals to a more favorable outcome. This paper focuses on the question: In a one-shot environment, what type of contracts can give delegation a strategic edge when the agent may be concerned about the fairness of the outcome?

As far as I am aware, previous studies of strategic delegation ignore players' social preferences.[2] The basic intuition of the paper is that the less payoff an agent has at stake, the greater liberty he has to reject unfair surplus divisions. This can induce a more socially fair outcome and provide the delegating principal greater payoff.

In line with many others in the literature, I study the effect of strategic delegation through the lens of an ultimatum game.[3] By giving one party as little strategic power as reasonably feasible, this setup leaves much room for exploring the strategic gains from her delegation. In the ultimatum game, there is a buyer who values a good at 1 and a seller who values it at 0. The seller can offer the good at any price $p \in [0, 1]$. If the buyer accepts, the good is sold at price p and the buyer and seller receive payoffs of $1 - p$ and p respectively. Otherwise, the good is not sold and both players receive 0 payoff.

The standard subgame perfect equilibrium prediction is that the seller offers a price equal to or just below 1 ($p = 1$) and the buyer accepts, allowing the seller to extract all the surplus from trade. I introduce an agent that can represent the buyer in bargaining.[4]

The model of fairness applied is derived from Fehr and Schmidt (1999) (hereafter "Fehr-

[1] See Roth (1985) and Osborne and Rubinstein (1990).

[2] See Sengul et al. (2012) and Salanié (2005) for a review of the strategic delegation literature.

[3] For example, see Fershtman and Kalai (1997), Fershtman and Gneezy (2001), Koçkesen and Ok (2004) and Koçkesen (2007).

[4] I do not consider one-sided seller delegation here because the seller has significant strategic power even without delegation. Thus, the model predicts that the seller has no incentive to delegate. The implications of two-sided delegation by both the buyer and seller remains an open question in a setting with social preferences.

Schmidt"), modified to provide traction in the games studied.[5] The model assumes that players weight i) their final payoff and ii) efficiency gains from trade against iii) any inequity between the seller and the buyer and her agent. The intuition behind the model is that as the agent's payoff at stake decreases, the agent places greater relative weight on concerns about inequity (holding the efficiency gains constant) and is more willing to reject unfair prices on behalf of the buyer. As they say, the person who has less to lose in a fight puts up a greater fight. This induces the seller to a less greedy price.

Following this intuition, I study the features of delegation contracts that make them more strategically effective to the buyer in attaining a higher payoff. I focus on two types of contracts frequently used in negotiation. The first is a contingency contract. The American legal tradition defines a contingency contract as paying the agent a fee contingent on the delegating principal (the buyer in our case) being awarded a positive payoff in negotiation. The agent may still be paid something to cover his costs in negotiating if a settlement or agreement is not reached, but such pay is less than that from a successful outcome (Garner, 2004, p. 387). The most common example of a contingency fee is a commission where the agent is paid a percentage of the buyer's award. Contingency contracts are frequently used to pay lawyers in personal injury and worker compensation cases, as well as sports agents, real estate agents, and even employees awarded for positive performance. The second is a non-refundable retainer where the agent is paid a flat fee in advance of the outcome. The retainer contract studied hands negotiation power to the delegate without instruction or financial incentives for certain actions, leaving the agent full discretion in negotiating, and in this sense may be argued to be an incomplete contract (Bolton and Dewatripont, 2005, ch. 11-12). Non-refundable retainers without fully specified instructions or incomplete incentives are often used in real world negotiation. Managers frequently receive fixed wages independent of performance, divorce lawyers are often paid on retainer, union leaders are often paid a fixed salary without fully specified instructions for negotiations and disputes, and political leaders usually receive loose mandates without state-contingent payoff schemes.[6]

The main strategic difference between these two contracts stems from the fact that the

[5] Indeed, experimental evidence indicates that concerns about fairness can play a role in affecting strategies and outcomes in the ultimatum game. The buyer (or "responder" as its typically referred) usually rejects offers below 20% of surplus and the seller (or "proposer") usually claims only $50 - 60\%$ of the pie (Güth and Kocher, 2013).

[6] For further evidence on the abundance of retainer and incomplete delegation contracts, see Bernheim and Whinston (1998), Merzoni (2003), Hart (2017), Salanié (2005) and Persson et al. (1997).

contingency fee ties the agent's payoff to a positive outcome, while the retainer divorces the agent's payoff from the outcome. This paper does not study the institutional reasons why these two types of contracts arise, but rather studies their merits and demerits given their existence. Neoclassical theory can make a prediction for the contingency fee contract in this setting, as the agent has some self-interest at stake in negotiation. However, it cannot make a prediction for the retainer contract in this setting since a self-interested agent is indifferent between any price. On the other hand, introducing social preferences implies that not all prices are made equal in the eyes of an agent on retainer.

Both types of delegation contracts are found to provide the buyer a strategic edge relative to no delegation. In other words, delegation can induce the seller to a more generous strategy and yield the buyer a higher payoff. Furthermore, the agent's strategic power is higher under the retainer contract than the contingency contract, as the former does a better job of untying his payoff from the outcome. In fact, when the contingency contract is optimally designed by the buyer and endogenized, monetary incentives are striped from the contract until it ultimately reduces to the retainer contract. This might help in understanding the potential advantages of retainer contracts in real world negotiations.

The paper is organized as follows. Section II summarizes how this paper fits with and contributes to the related literature. Section III describes players' Fehr-Schmidt style utility functions. Section IV describes the setting and games studied. Section V describes the (subgame perfect) equilibrium predictions in the games and under different delegation contracts. Section VI compares the equilibrium price and strategic gains of different forms of delegation. Finally, Section VII concludes.

II Related Literature

The idea of strategic delegation has been applied to Cournot and Stackelberg style competition models in industrial organization, as well as models in trade theory and monetary policy.[7] Generally, the literature tends to discuss either the kinds of contracts that make delegation strategically effective, or the types of agents that make delegation strategically ef-

[7]Some notable applications include, but are not limited to: Vickers (1985), Brander and Lewis (1986), Fersthman and Judd (1987), Sklivas (1987), Dewatripont (1988) and Bernard Caillaud and Picard (1995) in industrial organization; Brander and Spencer (1985) in trade theory; and Persson (1993) and Jensen (1997) in monetary policy. While it is not possible to summarize the entire literature on strategic delegation here, see Sengul et al. (2012) and Salanié (2005) for a more thorough review.

fective, but not their interaction (see Sengul et al., 2012). Here, I study the kinds of contracts that bring out the strategic benefits of an agent's innate type.

Moreover, to the best of my knowledge this is the first research to formally model how fairness concerns can affect strategic delegation. This question about how fairness impacts strategic delegation is raised in the experimental work of Fershtman and Gneezy (2001), upon which the present model can shed new light. Fershtman and Gneezy (2001) ask whether "the delegate's [agent's] willingness to punish the proposer [the seller] for an 'unfair' proposal made to a third party (the responder [the buyer]) is lower than the original responder's [buyer's] willingness to punish for a direct unfair proposal."[8] To test this hypothesis, the authors conduct an ultimatum game experiment in which the agent is paid for accepting and receives nothing for rejecting an offer. They find that agents are very willing to accept unfair offers when paid for doing so. The present model suggests that this result may be influenced by the payment scheme chosen for the agent, and additional evidence of the authors' hypothesis could be provided by giving the agent an identical payment for accepting and rejecting an offer.

Instead of buyer (responder) delegation, there is a set of experimental papers with seller (proposer) delegation in dictator games with punishment (Hamman et al., 2010; Bartling and Fischbacher, 2012; and Oexl and Grossman, 2013) and ultimatum games (Choy et al., 2016).[9] While it is not completely clear whether delegation is strategic in these studies, the prediction of my model is in line with the argument in Choy et al. (2016) that the seller's (proposer's) agent will make less generous offers when paid on a contingency contract than when paid a fixed fee independent of the outcome (all else equal).[10]

Furthermore, this paper also contributes to the literature on retainer contracts. The legal community has long debated the ethicality of non-refundable retainers (Brickman and Cunningham, 1993). Arguments for retainer contracts often center around difficulties in foreseeing future contingencies, or high costs of writing and enforcing state-contingent payoff schemes. This paper explores an additional potential benefit of retainer contracts — strategic

[8] Fershtman and Gneezy (2001), p. 362

[9] These experiments test whether delegation produces a diffusion of blame and responsibility for greedy offers. There is also a bargaining experiment with simultaneous buyer and seller delegation (Schotter et al., 2000). However, the focus in Schotter et al. (2000) is on the impact of agents on disagreement rates due to asymmetric information over players' payoffs.

[10] To be more precise, this model predicts that a selfish seller (proposer) prefers not to delegate. However, she may prefers to hire on a contingency contract rather than for a fixed fee if she does delegate. By contrast, a buyer (responder) might prefer to delegate, and prefers to hire the agent for a fixed fee rather than a contingency contract if she does (see Propositions 2 - 5).

gains from disentangling the agent's incentives from those of the principal. In this line, Croson and Mnookin (1996) argues that a lawyer hired on a non-refundable retainer fee can act as a commitment device in a costly dispute. Their model focuses on the cost of bargaining, and shows that incurring that cost early can act as a commitment to negotiate. By contrast, this model focuses on the preferences of the agent, and how those preferences can interact with contractual features to serve as a commitment in negotiation. More generally, this paper contributes to the growing literature incorporating fairness concerns and other behavioral factors into contract theory to improve our understanding of real world contracts.[11]

III Efficiency-Fairness Model

To capture players' concerns for fairness and efficiency, I assume a version of Fehr-Schmidt utility modified to provide traction in the present games.[12] Formally, let s, b and a denote the seller, buyer and agent respectively with final vector of monetary payoffs $x = (x_s, x_b, x_a) \in \mathbb{R}^3$. Given such payoffs, the utility functions of the three players are:

$$U_s(x) = x_s + \lambda_s\,(x_s + x_b + x_a) - \alpha_s\,\mathbb{1}(\,(x_b + x_a) - x_s) - \beta_s\,\mathbb{1}(x_s - (x_b + x_a)\,)$$

$$U_b(x) = x_b + \lambda_b\,(x_s + x_b + x_a) - \alpha_b\,\mathbb{1}(x_s - (x_b + x_a)\,) - \beta_b\,\mathbb{1}(\,(x_b + x_a) - x_s)$$

$$U_a(x) = x_a + \lambda_a\,(x_s + x_b + x_a) - \alpha_a\,\mathbb{1}(x_s - (x_b + x_a)\,) - \beta_a\,\mathbb{1}(\,(x_b + x_a) - x_s)$$

where the indicator functions equal 1 when the terms inside are positive and 0 otherwise. Furthermore, it is assumed that λ_i, α_i, and $\beta_i \geq 0$; and $\beta_i \leq \alpha_i \leq 1 + \lambda_i$ for all $i \in \{s, b, a\}$.

Fehr-Schmidt assumes a linear and additively separable utility function with positive utility for one's own payoff and disutility for the differences in payoff between oneself and others ("difference aversion").[13] Fehr-Schmidt does not seem wholly wedded to any particular reference point for a fair division, and leaves it to the econometrician to determine the appropriate social groups in a given context and game: "The determination of the relevant reference group and the relevant reference outcome for a given class of individuals is ultimately an

[11] Some examples include Filiz-Ozbay (2012); Bartling and von Siemens (2010) and Englmaier and Wambach (2010). See Kőszegi (2014) for a survey of the behavioral contract theory literature.

[12] In addition to having an axiomatic foundation (see Neilson, 2006), Fehr-Schmidt utility has been applied numerous times in other principal-agent problems such as those involving moral hazard. See for example Englmaier and Wambach (2010) and Bartling and von Siemens (2010).

[13] Another influential difference-aversion model is Bolton and Ockenfels (2000), which considers the difference between one's own payoff and a portion of an equally divided pie.

empirical question. The social context, the saliency of particular agents, and the social proximity among individuals are all likely to influence reference groups and outcomes" (Fehr and Schmidt, 1999, p. 821).

Here, we assume the players consider the relative payoff of two teams: the seller, and the buyer plus her agent. The socially fair price becomes $p^{fair} = \frac{1}{2}$, because at this price the two groups equally split the pie. This is motivated by thinking of delegation as an elective choice to the buyer (in a first stage of the game as in Section VI.I), and as such does not change what makes for a fair price. Indeed, in the examples given in the introduction such as a divorce proceeding, a personal injury case, a union wage negotiation or a real estate bargain, the fair division is arguably independent of the agent's involvement in negotiating. When considering what is a fair division in these examples, it would seem unnatural for players to separately consider inequity between the agent and the non-delegating principal, or the agent and the delegating principal. While this is a slight departure from common applications of inequity aversion in the experimental literature which consider a fair division to be an equal split between all players, it seems a natural fit for the applications here.[14]

More specifically, the seller (buyer and agent) receives disutility from advantageous and disadvantageous inequity with respect to the buyer and agent (seller), weighted by β_s (β_b and β_a) and α_s (α_b and α_a) respectively. As in Fehr-Schmidt, it is assumed that $\beta_i \leq \alpha_i$ for $i \in \{s, b, a\}$ so that players are (weakly) more concerned with disadvantageous inequity than advantageous inequity.

I modify the original Fehr-Schmidt utility function to incorporate players' efficiency concerns. Mathematically, players sum the total surplus gains and weight this by λ_i where $i \in \{s, b, a\}$. Without efficiency concerns, the utility functions described above make the unrealistic prediction that an agent paid on retainer rejects any price, no matter how fair or generous. However, the agent may receive positive utility for some fair prices with efficiency concerns. Indeed, Charness and Rabin (2002) argues that difference-aversion preferences like Fehr-Schmidt should be adjusted to accommodate efficiency concerns.[15] Furthermore, experimental evidence in Engelmann and Strobel (2004) makes a strong case for including efficiency

[14]That said, the model could be easily adjusted to accommodate different reference points for a fair price. Previous drafts of this paper considered other reference points, such as an equal split between the buyer and seller only, or an equal split between all players. Similar results to those in Sections VI - VI.I hold, albeit with a more complicated mathematical exposition.

[15]The utility function they propose cannot explain the rejection of unfair offers in ultimatum games (Charness and Rabin, 2002, fn. 5)

concerns.[16] Finally, analogous to Fehr-Schmidt, I assume that all coefficients are weakly positive and that $\beta_i < 1 + \lambda_i$ for $i \in \{s, b, a\}$ so that a player is unwilling to burn money to lessen advantageous inequity.

IV The Setting

I consider the strategic effects of delegation in the one-shot ultimatum game described in the introduction. Here, I more carefully define the game with and without delegation, with retainer and contingency delegation contracts.[17] The comparison of equilibria that follows allows us to better understand when and under what contractual forms delegation can provide the buyer a strategic edge. For ease of exposition, I treat the contractual terms of delegation as exogenous. However, in Section VI.I I extend the analysis to a setting where the agent's contract and payment is determined endogenously by the buyer.

The Principals Only Game. Denoted by P, this game is the standard ultimatum game. The seller offers the buyer a take-it-or-leave-it price for the good $p \in [0, 1]$. If the price is accepted, then the request is granted and the seller and buyer receive payoffs of p and $1 - p$ units respectively, otherwise both players receive 0 payoff.

The Contingency Delegation Game. Denoted by C for contingency fee, this game is identical to P except that the agent decides on behalf of the buyer whether to accept or reject the seller's price. Furthermore, the agent is employed by the buyer for an exogenously determined contingency fee $f(p, y) : [0, 1] \times \{0, 1\} \to \mathbb{R}$ specifying a payoff to the agent for any given price $p \in [0, 1]$ and action $y \in \{0, 1\}$ ($y = 1$ for accept and $y = 0$ for reject). Following the legal literature, I define contingency contracts $f(p, y)$ as satisfying the following assumptions: i) $f(p, 1) \geq f(p, 0)$ for all $p \in [0, 1]$ so that the agent receives a *weakly* higher payoff from accepting than rejecting an offer, ii) $f(p, 1) - f(p, 0) < 1 - p$ for all $p \in [0, 1)$ so that the agent's award from accepting a price cannot be greater than the seller's offered

[16] Engelmann (2012) warns about being careful when including efficiency concerns because the efficiency parameter may not be empirically identifiable for the experiment or game in question. However, their concern does not apply in this setup because the agent's efficiency concerns impact her strategic behavior and is identifiable. As mentioned, without efficiency concerns the model predicts that an agent on retainer rejects all prices, whereas with efficiency concerns an agent paid on retainer may accept some fair divisions.

[17] The setup of the delegation games implicitly assume that the seller cannot "buy-off" the agent and that delegation is fully observable, non-renegotiable and one-sided. I note that there exists a theoretical literature exploring each of the aforementioned assumptions with neoclassical preferences.

surplus and iii) $f(p,0) \geq 0$ for all $p \in [0,1]$ so that the agent can never be forced to pay the buyer. Such contracts include commission style contracts: $f(p,1) = (1-p)c$ and $f(p,0) = 0$ where $c \in (0,1)$ is the commission cut of the buyer's surplus paid to the agent. If the agent accepts the seller's price on behalf of the buyer, then the vector of payoffs (x_s, x_b, x_a) is (p, $1-p-f(p,1)$, $f(p,1)$). If the agent rejects the price, then the vector of payoffs is (0, $-f(p,0)$, $f(p,0)$).

The Retainer Delegation Game. Denoted by R, this game is similar to C except that the agent is employed on retainer and receives no instructions or incentives for pursuing certain strategies. More formally, the agent receives an exogenously determined retainer fee r where $r \in (0,1)$ regardless of his strategy or the outcome.[18] If the agent accepts the seller's price on behalf of the buyer, then the vector of payoffs (x_s, x_b, x_a) is (p, $1-p-r$, r). If the agent rejects the price, then the vector of payoffs is (0, $-r$, r).

V Equilibrium

Next, I characterize and compare the subgame perfect equilibrium ("SPE") predictions in games P, C and R. For illustrative purposes, I assume a commission contract (as specified above) in game C as it is impossible to give a closed form equilibrium characterization for the more general set of contingency contracts. However, I consider the more general set of contingency contracts in exploring the strategic implications in Sections VI and VI.I. Lastly, I assume that players have the efficiency-fairness utility functions over payoffs described in Section III, and complete information about those utility functions and payoffs.[19]

[18] In Section VI.I, I consider a setting where the retainer payment is endogenously determined by the buyer.

[19] Even though the current model only analyzes the complete information case, the results in Sections VI and VI.I are conjectured to carry over to a setting with incomplete information over preferences if the support of the distribution of preference parameters is sufficiently within the relevant limits set out in Sections VI and VI.I. This is because the basic idea of the results relies on the agent having sufficiently strong pro-social preferences, and sufficiently low payoff tied to the bargaining outcome to generate more fair outcomes.

Principals Only Game SPE.

$$\text{Seller's offer } p_P^* = \begin{cases} \frac{1}{2} & \text{if } \beta_s \geq \frac{1}{2} \\ \overline{p_P} & \text{otherwise} \end{cases}$$

$$\text{Buyer's decision} = \begin{cases} \text{accept} & \text{if } p_P \leq \overline{p_P} \\ \text{reject} & \text{otherwise} \end{cases}$$

where $\overline{p_P} = \min\{\ \frac{1+\lambda_b+\alpha_b}{1+2\alpha_b},\ 1\ \}$.[20] If $\beta_s \geq \frac{1}{2}$ so that the seller's concern about advantageous inequity outweighs her self-interest, then she offers a fair price of $p_P^* = \frac{1}{2}$ and the buyer accepts. If $\beta_s < \frac{1}{2}$ so that the seller cares comparatively less about advantageous inequity, then the seller drives the buyer to her maximum acceptable price by offering $p_P^* = \overline{p_P} = \min\{\ \frac{1+\lambda_b+\alpha_b}{1+2\alpha_b},\ 1\ \} \geq \frac{1}{2}$ (the last inequality holds due to the weak positivity of λ_b and α_b). The buyer accepts. Note that these equilibrium strategies are identical to those derived in Fehr-Schmidt, with the addition of the buyer's efficiency concern (λ_b) to her maximum acceptable price ($\overline{p_P}$).

Contingency Delegation Game SPE.

$$\text{Seller's offer } p_C^* = \begin{cases} \frac{1}{2} & \text{if } \beta_s \geq \frac{1}{2} \\ \overline{p_C} & \text{otherwise} \end{cases}$$

$$\text{Agent's decision} = \begin{cases} \text{accept} & \text{if } p_C \leq \overline{p_C} \text{ and } p_C \geq \underline{p_C} \\ \text{reject} & \text{otherwise} \end{cases}$$

where $\overline{p_C} = \min\{\ \frac{c+\lambda_a+\alpha_a}{c+2\alpha_a},\ 1\ \}$ and $\underline{p_C} = \max\{\ \frac{\beta_a-c-\lambda_a}{2\beta_a-c},\ 0\ \}$.[21] If $\beta_s \geq \frac{1}{2}$ so that the seller's concern about advantageous inequity outweighs her self-interest, then she offers a fair price of $p_C^* = \frac{1}{2}$ and the agent accepts on behalf of the buyer. If $\beta_s < \frac{1}{2}$ so that the seller cares comparatively less about advantageous inequity, then the seller drives the agent to his maximum acceptable price by offering $p_C^* = \overline{p_C} = \min\{\ \frac{c+\lambda_a+\alpha_a}{c+2\alpha_a},\ 1\ \} \geq \frac{1}{2}$, and the agent accepts on behalf of the buyer (the last inequality holds due to the weak positivity of λ_a and

[20] The derivation of the buyer's maximum acceptable price $\overline{p_P}$ can be found in the Appendix.

[21] The derivation of the agent's maximum and minimum acceptable prices ($\overline{p_C}$ and $\underline{p_C}$) can be found in the Appendix.

α_a, and restriction of c to the unit interval).

As a preview to the result in Proposition 3, it should be mentioned that the agent's maximum acceptable price ($\overline{p_C}$) is similar to the buyer's maximum acceptable price ($\overline{p_P}$), with the buyer's efficiency and disadvantageous inequity concerns (λ_b and α_b) replaced by the agent's (λ_a and α_a), and the buyer's self-interest (1) replaced by the agent's commission ($c < 1$).

Lastly, note that the agent's minimum acceptable price ($\underline{p_C}$) only affects behavior off the equilibrium path, and is positive when the agent is highly averse to advantageous inequity aversion: $\beta_a > \lambda_a + c$.

Retainer Delegation Game SPE.

$$\text{Seller's offer } p_R^* = \begin{cases} \frac{1}{2} & \text{if } \beta_s \geq \frac{1}{2} \\ \overline{p_R} & \text{otherwise} \end{cases}$$

$$\text{Agent's decision} = \begin{cases} \text{accept} & \text{if } p_R \leq \overline{p_R} \text{ and } p_R \geq \underline{p_R} \\ \text{reject} & \text{otherwise} \end{cases}$$

where $\overline{p_R} = \min\{ \frac{\lambda_a + \alpha_a}{2\alpha_a}, 1 \}$ and $\underline{p_R} = \frac{\lambda_a + \beta_a}{2\beta_a}$.[22] If $\beta_s \geq \frac{1}{2}$ so that the seller's concern about advantageous inequity outweighs her self-interest, then she offers a fair price of $p_R^* = \frac{1}{2}$ and the agent accepts on behalf of the buyer. If $\beta_s < \frac{1}{2}$ so that the seller cares comparatively less about advantageous inequity, then the seller drives the agent to his maximum acceptable price by setting $p_R^* = \overline{p_R} = \min\{ \frac{\lambda_a + \alpha_a}{2\alpha_a}, 1 \} \geq \frac{1}{2}$, and the agent accepts the offer on behalf of the buyer (the last inequality holds due to the weak positivity of λ_a and α_a).

As a preview to the results in Propositions 2 and 4, it should be mentioned that the agent's maximum acceptable price ($\overline{p_R}$) is similar to the buyer's maximum acceptable price ($\overline{p_P}$), with the buyer's efficiency and disadvantageous inequity concerns (λ_b and α_b) replaced by the agent's (λ_a and α_a), and without the self-interest concern (1). Furthermore, the agent's maximum acceptable price in the retainer delegation game ($\overline{p_R}$) is the equivalent to that in the contingency delegation game ($\overline{p_C}$) in the case of zero commission ($c = 0$).

Lastly, note that as in game C, the agent's minimum acceptable price ($\underline{p_R}$) only affects behavior off the equilibrium path.

[22]The derivation of the agent's maximum and minimum acceptable prices ($\overline{p_R}$ and $\underline{p_R}$) can be found in the Appendix.

VI Surplus Division

The subgame perfect equilibria described in Section V yield a number of interesting implications about the strategies and division of surplus in games P, C and R. In game C, I do not restrict attention to the commission contract, but consider the larger set of contingency contracts $f(p, y)$ outlined in Section IV. To focus on the more interesting cases of competitive strategies and an unfair price, suppose that $\beta_s < \frac{1}{2}$ so that the seller's self-interest outweighs her disutility from advantageous inequity. In order to keep clear notation, suppose that the agent and buyer have identical efficiency concerns ($\lambda_b = \lambda_a = \lambda$).[23] Furthermore, to keep the analysis interesting, suppose these efficiency concerns are small enough such that both the buyer and agent reject some prices above the fair price ($\lambda < \min\{\ \alpha_b, \alpha_a\ \}$, which implies $\overline{p_P}$, $\overline{p_R}$ and $\overline{p_C} < 1$).[24]

Assumption 1. $\beta_s < \frac{1}{2}$.

Assumption 2. $\lambda_b = \lambda_a = \lambda < \min\{\ \alpha_b, \alpha_a\ \}$.

In what follows, I mention when these assumptions are needed for particular observations to hold. All proofs can be found in the Appendix. First, I ask how the size of the agent's retainer (r) affects his decision to accept or reject a price in the retainer delegation game.

Proposition 1. *The agent's maximum acceptable price in game R ($\overline{p_R}$) is unaffected by the size of the agent's retainer (r).*

The intuition behind this observation is that the agent receives the retainer fee independent of accepting or rejecting a price. Thus, the retainer size should not influence the agent's decision (assuming linearity and separability in the agent's utility).[25] To put it another way, the retainer contract separates the agent's self-interest from the consequences of his strategy, allowing the agent to make strategic decisions based purely on social concerns for efficiency and fairness.

[23] This assumption eases the mathematical exposition. If one believes that $\lambda_a > \lambda_b$, then then one can interpret Propositions 2 and 3 with a slightly stronger condition on the size of α_a. Propositions 1, 4 and 5 would be unaffected.

[24] A stronger set of assumptions could be that only the agent has social preferences, and the buyer and seller have selfish preferences. The results in Propositions 1 - 5 carry forward to such a setting.

[25] This result immediately sheds light on the agent's maximum acceptable price under a hybrid contract ($\overline{p_{R,C}}$) with both a retainer $r \in (0, 1)$ and a commission $c \in (0, 1)$. The agent's maximum acceptable price under this hybrid contract is equivalent to that with no retainer and an identical commission ($\overline{p_C}$). The only change in equilibrium is that the buyer would receive weakly less payoff due to the additional retainer fee to the agent.

The next proposition shows how freeing the agent from the straitjacket of self-interest and more able to reject unfair prices can give the buyer a strategic edge. Basically, seeing that the agent is paid on retainer, the seller backwards inducts and acts more cooperatively, offering a more fair price than she otherwise would if facing the buyer directly.

Proposition 2. *Suppose assumptions 1 and 2 hold. For any given efficiency concern (λ) and retainer (r), there exists a positive fraction less than one ($k \in (0,1)$) such that if the agent's disadvantageous inequity concern is greater than that fraction of the buyer's disadvantageous inequity concern ($\alpha_a > k\,\alpha_b$), then the price in game R is less than in game P ($p_R^* < p_P^*$). Thus, if the retainer (r) is sufficiently small, then the buyer's payoff in game R is greater than in game P ($1 - p_R^* - r > 1 - p_P^*$).*[26]

Proposition 2 suggests an interesting potential benefit of retainer contracts. Proposition 2 shows that retainer contracts may give strategic benefits to the delegating principal in comparison to no delegation when players have social preferences. Next, I ask whether a contingency contract can also provide the buyer payoff gains relative to no delegation. The next proposition shows that it can.

Proposition 3. *Suppose assumptions 1 and 2 hold. For any given efficiency concern (λ) and contingency contract ($f(p,y)$), there exists a positive fraction less than one ($q \in (0,1)$) such that if the agent's disadvantageous inequity concern is greater than that fraction of the buyer's disadvantageous inequity concern ($\alpha_a > q\,\alpha_b$), then the price in game C is less than in game P ($p_C^* < p_P^*$). Thus, if the agent's payoff ($f(p_C^*,1)$) is sufficiently small, then the buyer's payoff in game C is greater than in game P ($1 - p_C^* - f(p_C^*,1) > 1 - p_P^*$).*[27]

The intuition behind the observation is that if the agent has less at stake in negotiation than the buyer ($f(p,1) - f(p,0) < 1 - p$), and the agent cares adequately about inequity ($\alpha_a > q\,\alpha_b$), then the agent is more willing to reject unfair offers. Facing an agent paid a contingency fee, the seller backwards inducts and offers a more fair price than she otherwise would if facing the buyer directly.

A natural next question is whether the contingency contract or the retainer contract induces the seller to a more fair price. In other words, which form of delegation provides

[26]Note that since the buyer's utility is increasing in her payoff for a price above the fair price, this is formally equivalent to saying that under such circumstances the buyer's utility is weakly greater in game R than in game P.

[27]Note that since the buyer's utility is increasing in her payoff for a surplus share below the fair split, this is formally equivalent to saying that under such circumstances the buyer's utility is greater in game C than in game P.

greater strategic edge to the buyer? The next proposition compares the buyer's payoff under the two forms of delegation.

Proposition 4. *Suppose assumptions 1 and 2 hold. For any retainer and contingency contract (any $r \in (0,1)$ and $f(p,y)$), the price in game R is less or equal to that in game C ($p_R^* \leq p_C^*$). Thus, if the retainer is less than or equal to the contingency fee ($r \leq f(p_C^*, 1)$), then the buyer's payoff in game R is at least as great as that in game C ($1 - p_R^* - r \geq 1 - p_C^* - f(p_C^*, 1)$).*

The intuition behind the observation is that since the agent has zero payoff at stake under the retainer contract and weakly positive payoff at stake under the contingency contract, the former gives the agent at least as great ability to reject unfair prices ($\overline{p_R} \leq \overline{p_C}$). The seller backwards inducts and acts at least as fairly when facing an agent paid on retainer as on contingency ($p_R^* \leq p_C^*$). Therefore, a retainer payment less than or equal to the contingency fee ($r \leq f(p_C^*, 1)$) weakly improves the buyer's payoff.

It thus seems like the buyer should weakly prefer the retainer contract to the contingency contract (and the seller should prefer the opposite). However, this result clearly depends on the size of the retainer (r). Section VI.I addresses the question of what the optimal retainer payment (r^*) or contingency contract ($f^*(p,y)$) would be if chosen by the buyer.

VI.I Endogenous Delegation Payment

In this section, I more carefully compare strategic interactions in a setting where payments (r in the case of an retainer contract and $f(p,y)$ in the case of a contingency contract) are no longer exogenous but are chosen optimally by the buyer. I assume that in the first stage of the game the buyer offers a contract (r^* or $f^*(p,y)$) and the agent chooses between taking on the delegation role or declining and receiving his reservation utility ($\delta > 0$). This reservation utility can be thought of as arising from expenses incurred in negotiating, and the agent's opportunity cost from foregoing other activities.[28] If the agent declines, the seller and buyer continue to bargain without the agent. The modified games are described more carefully below.

The Retainer Delegation Game with Endogenous Payment. Denoted by R', in the first stage of the game the buyer makes a take-it-or-leave-it offer of a retainer payment $r \in (0,1)$ to the

[28]Proposition 5 would not be materially changed from allowing the agent's reservation utility to be non-positive.

agent. If the agent rejects the buyer's retainer, then the seller and buyer bargain as in game P and the agent earns his reservation utility $\delta > 0$. If the agent accepts the buyer's retainer, then the seller and agent bargain as in game R.

The Contingency Delegation Game with Endogenous Payment. Denoted by C', in the first stage of the game the buyer makes a take-it-or-leave-it offer of a contingency contract $f(p, y)$ to the agent. If the agent rejects the buyer's contract, then the seller and buyer bargain as in game P and the agent earns his reservation utility $\delta > 0$. If the agent accepts the buyer's contract, then the seller and agent bargain as in game C.

Having defined the rules, I sketch the SPE in games R' and C'. In order to explore cases where delegation can increase the buyer's payoff, I assume that the agent's disadvantageous inequity concern is sufficiently large to reject some unfair price offers when paid on retainer ($\alpha_a \geq k\,\alpha_b$).

Assumption 3. *$\alpha_a \geq k\,\alpha_b$ where $k \in (0, 1)$ is as defined in the proof of Proposition 2.*

Retainer Delegation Game with Endogenous Payment SPE. Suppose assumptions 1, 2 and 3 hold. In the first stage, the agent accepts any retainer at least as large as his reservation utility ($r \geq \delta$). The buyer offers the agent his reservation utility $r^* = \delta$ if she receives a utility gain from delegating over bargaining alone with the seller. This occurs if the agent's reservation utility is sufficiently small ($\delta \leq \frac{\alpha_a - \lambda + 2\lambda(\alpha_a - \alpha_b)}{2\alpha_a}$).[29] In this scenario, the agent's and seller's strategies continue as in the SPE of game R. Otherwise, if the agent's outside option is too large to make delegation cost-effective to the buyer, then the buyer offers a retainer payment such that the agent rejects ($r^* < \delta$), and the buyer's and seller's strategies proceed as in the SPE of game P.

What about the delegation contract offered in game C'? Notice that the retainer contract is a specific case of a contingency contract in which $f(p, y) = r$ for all prices $p \in [0, 1]$ and agent actions $y \in \{0, 1\}$. Furthermore, by Proposition 4, we know that the retainer payment allows the buyer the weakly lowest price and weakly highest payoff. Thus, it must be that the

[29]Derivation is in the Appendix

buyer offers a contract with the retainer structure at the equilibrium price. This is described more carefully below.

Contingency Delegation Game with Endogenous Payment SPE. Suppose assumptions 1, 2 and 3 hold. Furthermore, let $p^*_{R'}$ $(= \frac{\lambda_a+\alpha_a}{2\alpha_a})$ be the equilibrium price in game R' when delegation ensues. First, suppose the agent's reservation utility is small enough such that buyer receives a utility gain from delegating over bargaining alone with the seller (as in game R', this occurs if $\delta \leq \frac{\alpha_a-\lambda+2\lambda(\alpha_a-\alpha_b)}{2\alpha_a}$). The buyer offers the agent a contingency contract $f^*(p^*_{R'},1) = f^*(p^*_{R'},0) = \delta$, $f^*(p,1) = f^*(p,0) \geq 0$ for all $p > p^*_{R'}$, and $f^*(p,y) \geq 0$ is arbitrary for all $p < p^*_{R'}$. After the agent accepts delegation, the seller offers $p^*_{C'} = p^*_{R'}$ and the agent accepts the price on behalf of the buyer.[30] Otherwise, if the agent's outside option is too large to make delegation cost-effective to the buyer, then the buyer offers any cheap enough contract such that the agent rejects, and the buyer's and seller's strategies proceed as in the SPE of game P.

The intuition is that in inducing the lowest possible price, the buyer wants to minimize the agent's payoff gain from accepting. Ultimately, the optimal contingency contract mimics the retainer contract on the equilibrium path (it can, but does not have to mimic the retainer contract off the equilibrium path), and the same prices result in the two games. The next proposition summarizes these results.

Proposition 5. *Suppose assumptions 1, 2 and 3 hold. The set of optimal delegation contracts in game C' ($f^*(p,y)$) includes the set of optimal delegation contracts in game R' (r^*). Furthermore, the same prices ($p^* = p^*_{R'} = p^*_{C'}$) and thus payoff vectors result in the two games.*

It should then be less surprising to see retainer contracts in real world negotiations.

VII Conclusion

This paper takes a first step in understanding how social preferences can impact the commitment power of delegation and induce a more fair bargaining outcome. The paper studies two forms of delegation contract, a contingency contract and a retainer contract. While both contracts are found to be strategically advantageous under certain circumstances, the retainer

[30] Off the equilibrium path, the agents accepts prices below $p^*_{C'}$ and rejects prices above $p^*_{C'}$.

contract is more strategically powerful. The reason is that it does a better job of divorcing the agent's incentives from those of the delegating principal, making it easier for the agent to reject unfair surplus divisions. In fact, when optimally crafted, the contingency contract reduces to the retainer contract. While the model is theoretical, an interesting avenue for future research would be to collect experimental data to shed empirical evidence on the question of the optimal delegation contract for an agent with social preferences.

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A Appendix

Derivation of $\overline{p_P}$. Suppose $p \geq \frac{1}{2}$. The vector of payoffs from rejecting a price is $(0,0,0)$. Thus, the buyer accepts any price such that: $1 - p_P + \lambda_b(p_P + 1 - p_P) - \alpha_b(2p_P - 1) \geq 0$. Simplifying, $p_P \leq \frac{1+\lambda_b+\alpha_b}{1+2\alpha_b}$. Thus, we get $\overline{p_P} = \min\{ \frac{1+\lambda_b+\alpha_b}{1+2\alpha_b}, 1 \}$.

Derivation of $\overline{p_C}$. Suppose $p \geq \frac{1}{2}$. The vector of payoffs from rejecting a price is $(0,0,0)$. Thus, the agent accepts any price such that: $(1 - p_C)c + \lambda_a(p_C + (1-c)(1-p_C) + c(1-p_C)) - \alpha_a(p_C - (1-c)(1-p_C) - c(1-p_C)) \geq 0$. Simplifying, $p_c \leq \frac{c+\lambda_a+\alpha_a}{c+2\alpha_a}$. Thus, we get $\overline{p_C} = \min\{ \frac{c+\lambda_a+\alpha_a}{c+2\alpha_a}, 1 \}$.

Derivation of $\underline{p_C}$. Suppose $p < \frac{1}{2}$. The vector of payoffs from rejecting a price is $(0,0,0)$. Thus, the agent accepts any price such that: $(1 - p_C)c + \lambda_a(p_C + (1-c)(1-p_C) + c(1-p_C)) - \beta_a((1-c)(1-p_C) + c(1-p_C) - p_C) \geq 0$. Simplifying, $p_c \geq \frac{\beta_a-c-\lambda_a}{2\beta_a-c}$. Thus, we get $\underline{p_C} = \max\{ \frac{\beta_a-c-\lambda_a}{2\beta_a-c}, 0 \}$.

Derivation of $\overline{p_R}$. Suppose $p \geq \frac{1}{2}$. The vector of payoffs from rejecting a price is $(0,-r,r)$. Thus, the agent accepts any price such that: $r + \lambda_a(p_R + 1 - p_R - r + r) - \alpha_a(p_R - (1 - p_R - r) + r) \geq r + \lambda_a(r - r) - \alpha_a(r - r)$. Simplifying, $p_R \leq \frac{\lambda_a+\alpha_a}{2\alpha_a}$. Thus, we get $\overline{p_R} = \min\{ \frac{\lambda_a+\alpha_a}{2\alpha_a}, 1 \}$.

Derivation of $\underline{p_R}$. Suppose $p < \frac{1}{2}$. The vector of payoffs from rejecting a price is $(0,-r,r)$. Thus, the agent accepts any price such that: $r + \lambda_a(p_R + 1 - p_R - r + r) - \beta_a(1 - p_R - r + r - p_R) \geq r + \lambda_a(r - r) - \beta_a(r - r)$. Simplifying, $p_R \geq \frac{\lambda_a+\beta_a}{2\beta_a}$. Thus, we get $\underline{p_R} = \frac{\lambda_a+\beta_a}{2\beta_a}$.

Derivations for Game R'. The agent's utility from rejecting a retainer payment is δ. The agent's utility from bargaining in game R in equilibrium is r (utility from rejecting a seller offer). Thus, the agent accepts a retainer payment if $r \geq \delta$.

The buyer's utility from bargaining alone in game P in equilibrium is 0 (utility from rejecting a seller offer). The buyer's utility from the the agent bargaining is $1 - p_R^* - r + \lambda - \alpha_b(2p_R^* - 1)$. Thus, the buyer prefers to hire the agent if $1 - p_R^* - r + \lambda - \alpha_b(2p_R^* - 1) \geq 0$. This occurs if $1 - p_R^* + \lambda - \alpha_b(2p_R^* - 1) \geq r$. Plugging in $r = \delta$ and $p_R^* = \overline{p_R} = \frac{\lambda+\alpha_a}{2\alpha_a}$, and simplifying we get that the buyer prefers to hire the agent $\delta \leq \frac{\alpha_a - \lambda + 2\lambda(\alpha_a - \alpha_b)}{2\alpha_a}$.

Proof of Proposition 1. The observation follows immediately from the fact that $\frac{d\overline{p_R}}{dr} = 0$. ■

Proof of Proposition 2. We need to show that for any given λ and $r \in (0,1)$ and some $k \in (0,1)$, if $\alpha_a > k\alpha_b$ then $\overline{p_P} > \overline{p_R}$. If this is true, then it follows from assumptions 1 and 2 and backwards induction that in equilibrium $p_P^* = \overline{p_P} > \overline{p_R} = p_R^*$. Finally, since $p_R^* = \overline{p_R}$ is unaffected by the size of r (Proposition 1), it would follow that for a sufficiently small r the buyer's payoff in game R is greater than that in game P: $1 - p_R^* - r > 1 - p_P^*$.

Due to assumption 2, we know that $\overline{p_R} = \frac{\lambda+\alpha_a}{2\alpha_a} < 1$ and $\overline{p_P} = \frac{1+\lambda_b+\alpha_b}{1+2\alpha_b} < 1$. Rearranging terms and simplifying, the condition that $\overline{p_P} > \overline{p_R}$ is equivalent to $\alpha_a > \alpha_b(\frac{\frac{\lambda}{\alpha_b}+2\lambda}{1+2\lambda})$. Let k equal the fraction in parentheses ($k = \frac{\frac{\lambda}{\alpha_b}+2\lambda}{1+2\lambda}$). It can be shown that $0 < k < 1$ due to the weak positivity of α_b and λ, and the assumption that $\lambda < \alpha_b$. ■

Proof of Proposition 3. First, I show that for any given λ and contract $f(p,y)$ and some $q \in (0,1)$, if $\alpha_a \geq q\alpha_b$ then $\overline{p_P} > \overline{p_C}$. If this is true, then it follows from assumptions 1 and 2 and backwards induction that in equilibrium $p_P^* = \overline{p_P} > \overline{p_C} = p_C^*$. Finally, it follows that if $f(p_C^*, 1)$ is sufficiently small, then $1 - p_C^* - f(p_C^*, 1) > 1 - p_P^*$.

For any given price offer $p \leq \frac{1}{2}$, let's compare the agent and buyer's utility gains from accepting. The buyer's utility gain from accepting is $1 - p + \lambda - \alpha_b(1 - 2p)$ (the buyer accepts if this term is weakly positive). The agent's utility gain from accepting is $f(p,1) - f(p,0) + \lambda - \alpha_a(1 - 2p)$. Suppose $\alpha_b = \alpha_a$. In this case, since $f(p,1) - f(p,0) < 1 - p$, it follows that the buyer has a strictly higher utility gain from accepting any given price than the agent. Thus, $\overline{p_P} > \overline{p_C}$. It follows by a utility continuity argument that there exists a fraction $q \in (0,1)$ such that if $\alpha_a \geq q\alpha_b$, then $\overline{p_P} > \overline{p_C}$. ■

Proof of Proposition 4. First, let's show that $\overline{p_R} < \overline{p_C}$. For any given price offer $p \leq \frac{1}{2}$, the agent's utility gain from accepting under the retainer contract is $\lambda - \alpha_a(1-2p)$. The agent's utility gain from accepting under the contingency contract is $f(p,1) - f(p,0) + \lambda - \alpha_a(1-2p)$. Since $f(p,1) - f(p,0) \geq 0$, it follows that the latter utility gain is weakly higher than the former. Thus, $\overline{p_R} \leq \overline{p_C}$. Moreover, assumptions 1 and 2 and backwards induction implies that $p_R^* = \overline{p_R} \leq \overline{p_C} = p_C^*$. It follows that if $r \leq f(p_C^*, 1)$, then the buyer's payoff in game R is at least as great as that in game C: $1 - p_R^* - r \geq 1 - p_C^* - f(p_C^*, 1)$. ∎

Proof of Proposition 5. From the described SPE of game C', it can be seen that one possible optimal contingency contract is the following. If $\delta \leq \frac{\alpha_a - \lambda + 2\lambda(\alpha_a - \alpha_b)}{2\alpha_a}$, then $f(p,y) = \delta$ for all $p \in [0,1]$ and $y \in \{0,1\}$. Otherwise, $f(p,1) = f(p,0) < \delta$ for all $p \in [0,1]$ and $y \in \{0,1\}$. This is equivalent to the optimal delegation contract in game R'. Furthermore, it has already been shown in their SPE descriptions that the same prices result in games R' and C'. ∎