Who Should Pay the Sports Agent's Commission? An Economic Analysis of Setting the Legal Rules in the Regulation of Matchmakers

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November 2016

Abstract: We study the effects of completing the legal framework of matchmakers with a rule designating which party must pay the commission. The paper examines the two rules currently open to debate at the international level in sport: the "player-pays" principle and the "club-pays" principle. We find that the most appropriate measure entails designating the party with the lesser bargaining power to pay the intermediary's fee. However, our main result indicates that the appropriateness of imposing an additional rule in the legal framework is a preliminary issue. Indeed, even if the best rule is chosen, welfare may be decreased by this legal initiative.

Keywords: Sport intermediaries, Matching, Regulation through rules, Legal framework for contracts.

JEL Classification: C78; D83; K23

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1- INTRODUCTION

In the main sport leagues throughout the world, the sport talent market is widely intermediated. The main feature of this intermediation is that the supply side of the market is fairly concentrated. In the United States in 2010, of the 1728 National Football League professional players, 664 were represented by one of the 7 top agents (an average of 94 players per agent).[1] In Europe, half of the 1945 footballers of the main European leagues are represented by only the 83 top football agents and one quarter are represented by only 24 of them (an average of 20 players per agent) (Poli and Rossi, 2012). Considering other sports, 86% of the 3456 labor contracts signed between 2002 and 2010 in French professional basketball leagues involved one of the only 72 licensed agents (Brocard, 2012). Those stylized facts show that sports agents play a central role in the sport talent market and that they have a significant market power. As an example, during the 2010-11 season, the payments made by English Premier League football clubs to agents reached a record 71,87M£ (86M€).[2]

This paper first analyzes the role of these middlemen negotiators in bilateral search economies such as the labor market of professional athletes. Then, we address the currently debated issue of the appropriateness of regulating the way sports agents are remunerated.

A substantial theoretical literature has considered different roles that middlemen can play and examined the conditions under which middlemen emerge. Yavas (1992) first clarified between two types of intermediaries: marketmakers and matchmakers. A marketmaker corresponds to the traditional definition of intermediaries such as retailers who set an ask price and a bid price, at which they sell and buy for their own account. A matchmaker, on the other hand, does not buy or sell, but rather matches two agents, a buyer with a seller. Common examples are employment agencies or real estate brokers. Those two concepts can be brought together as Yavas (2001) considers that matchmakers are marketmakers that can provide the service of immediacy. The literature analyzes the reasons of the emergence of middlemen with reference to two features of search markets: transaction costs and adverse selection problems. One branch of the literature justifies intermediation by the presence of trading frictions when actors must search. In Rubinstein and Wolinsky (1987) and Gehrig (1993), middlemen extract a surplus by reducing the time period that actors wait for a transaction to occur thanks to an initial advantage given by their ability to match. Shevchenko (2000) and Johri and Leach (2002) have enriched the basic Rubinstein and

Wolinsky model through the introduction of heterogeneous goods and idiosyncratic preferences. They show that middlemen pull some revenues by holding inventories. Another series of papers explains that the role of middlemen is based upon the adverse selection problem that arises when product quality is not immediately observable. In this context, middlemen emerge by acquiring, at some cost, the ability to verify the quality of goods. In Biglaiser (1993), a middleman takes part in a larger number of transactions and stays in the market for several time periods, so that he has more incentive to become an expert in detecting and revealing the real quality of goods. Li (1998) shows that this ability to hold better information has a reputation effect that leads to a situation where the quality of the middleman's goods is more predictable.

In the aforementioned literature, no interest is given to the regulation of middlemen, and especially to the legal framework of contracts they sign with their constituents. However, sport is a field where the regulation of intermediaries is highly developed and currently debated. FIFA defines sports agents as intermediaries who, for a fee, introduce players to clubs with a view to negotiating or renegotiating an employment contract.[3] Their remuneration is governed by the different local regulations which, in particular, contain the rules that lay down the party which is supposed to pay the commission to the middleman.

At the international level, the comparison between the current rules which enable clubs or players to pay the commission indicates an extreme heterogeneity. Rosner (2004) points out that in the United States, the principal-agent relationship is considered under the risk of conflicts of interest as the Law of Agency indicates: "Unless otherwise agreed, an agent is subject to a duty to his principal to act solely for the benefit of the principal in all matters connected with this agency".[4] As an illustration, in the North-American closed sport leagues, players associations have succeeded in introducing in the Collective Bargaining Agreements (CBA) which include sports agents regulation, a rule prohibiting payments from clubs to the intermediaries (Shropshire and Davis, 2008). In particular, the NBA CBA states that "No team shall make any direct or indirect payment of any money, property, investments, loans, or anything else of value for fees or otherwise to an agent, attorney, or representative of a player"[5] and the NFL CBA provides by the same recommendation.[6] Thus, in North American professional leagues, we can consider that intermediaries are paid by their main constituent, the players.[7]

In Europe, the study ordered by the European Commission in 2009 shows that the existing mechanisms for remunerating sports agents are fairly heterogeneous (agents paid by the player, agents paid by the club, or a mixed commission payment) and concluded that harmonization is necessary in presence of international transactions.[8] In fact, in terms of the number of sports agents concerned, the "agent-paid-by-club" mechanism has proved to be the most common in Europe, even when the principal represented by the middleman is the player, and whatever the provisions contained in the various regulations. As an interesting European example, the evolution of the regulation in France shows that the question of which party should pay the agent has been at the core of the discussions for a long time. The French legislation used to establish that the agent might only be paid by the party that has given him a mandate to act on its behalf. But this rule was circumvented with clubs paying intermediaries instead of players.[9] This situation led two parliamentary reports aimed at enhancing sports agents regulation to address the question of their remuneration and those reports both concluded that enabling clubs to pay would make sense, convincing regulators to adapt the rules in 2010.[10] In fact, the Code of Sport now provides for the possibility of an agreement between the agent and the parties mentioned in the contract to have the commission entirely or partially paid by the clubs.[11] Nevertheless, this evolution has, ever since, been highly questioned. The French Ministry of Sport stated in the latest sport-related parliamentary report in 2011: "It seems inadmissible to me that clubs pay agents who are players' constituents".[12] This position is clearly shared at the European level by the General Secretary of the Board of Directors of UEFA who stated in 2011: "I agree on who should pay the agent: the player that uses the agent".[13] Therefore, in Europe, we can consider that, in practice, middlemen are paid by clubs, even when they represent players, but that this situation could change in the near future.

The paper examines the two rules currently open to debate: the "player-pays" principle and the "club-pays" principle. We evaluate how each of these rules affects social welfare. In fact, depending on the context, we can identify the most desirable measure even if we show that imposing the best rule is not necessarily welfare-improving and that the best decision for the regulator can in certain circumstances be the *laissez-faire*. Therefore, the paper also addresses the question of the appropriateness of setting a legal framework specifying the payer in contracts signed by intermediaries.

Our benchmark model (without regulation) is in line with Yavas (1994). We use a two-stage game with three participants. The middleman is a matchmaker. Intermediation may arise because middleman has a more effective matching technology than the two primary agents, the player searching for a club and the club seeking to sign a player. At the first stage, the middleman selects his pricing policy. At the second stage, facing the fees charged by the intermediary, the player and the club simultaneously select either to begin individual searching on their own account, or to go directly to the middleman. Matching is certain if and only if both primary agents choose to go directly to the middleman. If this is not the case, the likelihood of a successful match depends on the individual search intensities of both agents (the time spent on the search, the expenses incurred…). If the match fails in this first step, the agents can still go to the middleman after they have already searched. In this case, each of the three participants incurs the cost of the lag period and their respective surpluses get discounted. It follows that the discount factor is a key parameter in the decision to avoid or choose the middleman in the first step. This parameter also matters in the middleman's choice of pricing policy. Indeed, if the intermediary is impatient to receive his remuneration (if his discount factor is low), he may decide to charge lower prices in order to induce agents not to search on their own account. The second parameter that plays a significant role in the model is the distribution of the bargaining power between the player and the club which depends on the sport, on the league's structure and on the segment of the talent market considered. This parameter determines the gross profit of each side when the two agents share the gain from the match. It follows that a change in the bargaining power distribution affects the choice of each agent to skip or not the middleman at the first step. When an agent does skip the intermediary at stage one, the change in turn affects the agent's search intensity.

Setting rules that determine who should pay the middleman's commission will simply result in choosing constraints to be imposed on the policy choice of the latter at the first stage. As a result, the equilibrium behaviors of agents will adjust accordingly. We assess the consequences using welfare enhancing criterion. Our main results are as follows. In the process of choosing between the "player-pays" principle and the "club-pays" principle, the most appropriate measure consists in designating the party with the lesser bargaining power to pay the middleman's commission. Yet, it is not strictly dominant that setting the best rule will improve welfare. In fact, the welfare is improved only if the discount factor is relatively high, or if the relative bargaining powers of the player and the club are very asymmetric.

The paper is organized as follows. Section 2 presents the model. Using a backward reasoning, Sections 3 and 4 describe the equilibrium behaviors of the three participants in the benchmark situation. Section 5 introduces a legal rule designating the payer of the middleman and evaluates the effects of such regulation, using the welfare as the criterion. Finally, Section 6 concludes the paper and proposes directions for future work. All proofs of the lemma and the propositions are in the Appendix A.

2- THE MODEL

We consider a problem of matching between two agents, namely a seller and a buyer. The seller refers to a player searching for a club and the buyer is a club seeking to sign a player. Each agent can access the service of an intermediary, called the middleman.[14]

We use a two-stage model of complete information. At the first stage, the middleman selects his pricing policy. At the second stage, the seller and the buyer learn the cost of the intermediation services. Each agent then has to choose between beginning individual searching on his own account or going directly to the middleman. With the latter option, the agent is no longer allowed to search on his own account. Each agent makes his decision unaware of the decision of the other agent. Depending on the decisions made by both agents, the second stage can include one or two steps. More specifically:

- if both agents directly sign a contract with the middleman, the game ends at the first step;
- if both agents skip the middleman, the game is concluded at the first step if the individual searches lead to a successful matching whereas if the individual searches are not fruitful, the agents can still use the middleman's services in a second step;
- if one agent chooses to start the search on his own account while the other signs with the middleman, the game ends at the first step if the matching is successful and the middleman collects his commission from the only agent he is under contract with, whereas if the agent's individual search does not lead to a match, this agent can in turn access the service of the intermediary in a second step.

In the absence of a match, the profits of both agents equal zero. The match has a value V for the buyer. This surplus is shared depending on the relative bargaining power of each agent. The seller gets the portion $\omega_S V$ (*i.e.* the buyer pays $\omega_S V$ to the seller) and the buyer keeps the portion $\omega_B V = V - \omega_S V$. In order to alleviate the technical aspects of the paper, we consider that V equals one monetary unit. It follows that the respective profits of the seller and the buyer are ω_S and ω_B monetary units with $0 < \omega_i < 1$, i = S,B and $\omega_S + \omega_B = 1$ monetary unit.

The remuneration of the intermediary can be based on the amount ω_S of the transaction but other options are possible. For example, Yavas (1994) considers that the middleman takes the amount $k \times \omega_S$ to the seller and the amount $k \times \omega_B$ to the buyer. In our model, we choose a simple yet general formulation: the middleman takes the amount K_S to the seller and the amount K_B to the buyer. This formulation is general since once the amounts K_S and K_B are chosen by the middleman, the latter can, for example, draft a contract in which these commissions are presented as function of the amount of the transaction ω_S.[15]

Let $e_S \geq 0$ and $e_B \geq 0$ refer to the individual search intensities of the seller and of the buyer. The likelihood of a match without the involvement of the middleman depends on the individual search intensities of both agents. Let $\Phi(e_S,e_B)$ denote this probability and assume that

$$\Phi(e_S,e_B) = e_S + e_B \text{ if } 0 \leq (e_S + e_B) \leq 1 \quad \text{and} \quad \Phi(e_S,e_B) = 1 \text{ if } (e_S + e_B) > 1 . \qquad (1)$$

The matching function we retained enables one agent who is not searching to be contacted with a positive probability by the second agent who is searching. We can also notice that the additive form of the function $\Phi(e_S,e_B)$ makes the efforts e_S and e_B strategically independent. This hypothesis leads to tractable explicit solutions and makes it easier to present economic intuitions for the results. Let us point out that despite the hypothesis, the seller and the buyer are still in a strategic interaction. Indeed, each agent benefits from the positive externality induced by the individual search of the other agent, so that the expected payoff of an agent depends on the option chosen at the first step by the other agent (between an individual search and the use of intermediation services). However, there is no strategic interaction when agents decide about search intensities. In Appendix B, we consider a matching technology involving mutual interdependences so that the optimal search intensity of one agent depends on the search intensity of the other agent. The results show that the conclusions of the paper are not conditional on the additive form of the function $\Phi(e_S,e_B)$.

The individual search yields a cost to each agent

$$C(e_i) = e_i^2 \quad i = S,B. \qquad (2)$$

If both agents go to the middleman, the latter holds enough information to succeed in matching the agents with certainty. The cost of this operation is way lower than the cost of individual searches. In order to simplify, we assume that the cost of such a matching for the middleman is equal to zero.

The convenient way to deal with multi-stage games is to use discounted payoffs. Then, let δ, $0 < \delta \leq 1$, refer to the discount factor, common to the three agents. The usual interpretation for the discount factor is as follows. The player has a time preference by which he ascribes less importance to the payoff in the second step. If δ tends to 0 the player is very impatient and *vice versa* if δ tends to 1 a lag period does not bother the player so that he ascribes the same weight to the payoff in the second step and to the payoff in the first step. Another possible interpretation is the following: believing that "tomorrow is uncertain" the player thinks that there exists a probability $(1 - \delta)$ that the strategic encounter will end after the first step and that the second step will take place with a probability δ less than 1.

The two following sections address the determination of the equilibrium behaviors of the three participants. We use a backward reasoning. First, we analyze the different possible configurations of the second stage and we identify the ones which are likely to belong to an equilibrium path. Then, we undertake the first stage from the middleman's point of view and determine the fees K_S and K_B solution. Finally, unwinding the game gives the subgame perfect equilibria.

3- THE POSSIBLE CONFIGURATIONS AT THE SECOND STAGE

Let Y refer to the individual choice of an agent to sign directly with the middleman and N the choice to search on one's own account. Four configurations are possible at the first step of the second stage: the configuration (N,N) where both agents skip the services of the intermediary and choose to begin with an individual search, the configurations (Y,N) and (N,Y) where one of the agents directly signs a contract with the middleman (the seller in the first configuration, the buyer in the second) while the other agent searches on his own account, and lastly the configuration (Y,Y) where both agents choose to directly sign a contract with the middleman.

In the configuration (Y,Y), the game ends at the first step since agents are matched by the middleman. In the three other configurations, the matching may be unsuccessful in the first step and, in turn, there is a second step where an agent who is not yet under contract has to decide to sign with the middleman or to refuse its services. So, in case of an unsuccessful matching, we must consider different scenarios at the second step for each configuration obtained at the first step: *(a)* (N,N) is followed by (N,N),(Y,N),(N,Y) or (Y,Y), *(b)* (Y,N) is followed by (Y,N) or (Y,Y), *(c)* (N,Y) is followed by (N,Y) or (Y,Y). Such a high number of subgames involving two asymmetric players would imply fastidious analysis that, additionally, should be conducted twice (in the absence of legal rules and under a regulation policy). In order to simplify, we consider that if the individual searches are not fruitful at the first step, the matching is possible at the second step only through the services of the intermediary. Naturally, if the cost of the intermediation is too high, agents can still skip the middleman. A necessary and sufficient condition for them not to skip the middleman - at the last step of the game - is that the offered contract increases their wealth. This implies that the fees K_S and K_B set up in the contract satisfy the individual rationality constraints:[16]

$$(IR_S) : \omega_S - K_S \geq 0 \quad \text{and} \quad (IR_B) : \omega_B - K_B \geq 0. \tag{3}$$

We will see that the threshold values of the fees $K_S = \omega_S$ and $K_B = \omega_B$ lead to the defection of both agents at the first step of the second stage. In spite of this, the middleman may have interest in choosing this policy because it would lead to high payoffs in case of a failure of the individual searches. However, the middleman has no interest in setting higher fees. Indeed setting a fee $K_i > \omega_i$ leads to the defection of agent *i* at the last step of the game even if the individual searches were unsuccessful. This policy would lead to a shortfall in revenue for the middleman. In other words, setting $K_S > \omega_S$ or $K_B > \omega_B$ is a dominated strategy. It follows that looking for equilibrium paths, we can restrict the attention to the subgames where $K_i \leq \omega_i$ $i = S,B$ and, consequently, to the subgames where after an unsuccessful matching at the first step, both agents sign with the middleman at the second step so that the game ends with the configuration (Y,Y).

For the rest of the paper, in order to alleviate the notations, we design a particular scenario by its configuration at the first step without mentioning that, in case of an unsuccessful matching, both agents use the service of the middleman at the second step - e.g., the notation "(N,N) followed by (Y,Y)" is reduced to (N,N).

3.1- BOTH AGENTS BEGIN WITH INDIVIDUAL SEARCH (CONFIGURATION (N,N))

Both agents search individually at the first step and, if they fail to match, use the intermediation services in a second step.

The agents face the respective search costs e_S^2 and e_B^2. The matching is successful at the first step with a probability $(e_S + e_B)$. In case of a failure, both agents have to wait for the second step to get some revenue which is then reduced by the amount of the commission paid to the middleman. We note $\Pi_S^{(N,N)}$ and $\Pi_B^{(N,N)}$ the profits of the seller and of the buyer in this configuration (N,N):

$$\Pi_i^{(N,N)}(e_S,e_B,K_i) = (e_S + e_B)\,\omega_i + \delta\,(1 - (e_S + e_B))\,(\omega_i - K_i) - e_i^2 \quad i = S,B. \tag{4}$$

The variables e_S and e_B are strategically independent, so that the equilibrium is a dominant-strategy equilibrium:

$$e_i^{(N,N)}(K_i) = argmax_{e_i}\Pi_i^{(N,N)}(e_S,e_B,K_i) = [(1-\delta)\omega_i + \delta K_i] / 2 \quad i = S,B. \tag{5}$$

Unsurprisingly, the bigger the potential gain ω_i of the agent *i* and the higher the commission K_i paid to the middleman in case of a failure, the higher is the search intensity of this agent. On the other hand, search efforts correlate negatively with the discount factor. Indeed, a higher discount factor indicates that waiting for the second step to receive the individual payoff $\omega_i - K_i$ is less costly. We note that for any $K_i \leq \omega_i$ we have $0 < e_i^{(N,N)}(K_i) \leq \omega_i/2$. This leads to $0 < \Phi(e_S^{(N,N)} + e_B^{(N,N)}) \leq 1/2$ (recall that $\omega_S + \omega_B = 1$). Under the participation constraints (IR_S) and (IR_B), we thus identify an interior solution for the agents' search efforts.

Reporting (5) in (4) and using $\omega_S + \omega_B = 1$ give the equilibrium profits in the configuration (N,N) for i,j = S,B and i ≠ j

$$\Pi_i^{(N,N)}(K_i,K_j) = [1 - \omega_j^2 + 2\delta(\omega_i - K_i - \omega_i(\omega_j - K_j)) + \delta^2(\omega_i - K_i)(\omega_i - K_i + 2(\omega_j - K_j))]/4. \tag{6}$$

For each agent *i* = S,B, the equilibrium profits depend on the fees paid to the middleman and also on the fees paid by the other agent. The reason is that the search intensity of the latter is increasing in the fees that he pays. Hence, a high fee imposed to agent *j* increases the probability of a successful matching at the first step. Agent *i* can then receive his payoff with a higher probability from the first step. As a result, his expected profit is increased.[17]

3.2- ONE AGENT DIRECTLY SIGNS WITH THE MIDDLEMAN AND THE OTHER SEARCHES ON HIS OWN ACCOUNT (CONFIGURATION (Y,N) OR (N,Y))

Consider the configuration in which the agent *i*, i = S or B, directly goes to the middleman and agent *j*, j ≠ i, begins searching on his own account. We note this configuration (Y_i,N_j).

The matching is successful at the first step with the probability $(0 + e_j)$ and then the payoff of agent *j* that searches is $\omega_j - e_j^2$. In case of a failure, agent *j* opts for the middleman's services in a second step and obtains the payoff $\omega_j - K_j$. Agent *i* pays the fee K_i as soon as the matching is successful, yet this agent does not bear any search costs. More precisely, the profits are (for i,j = S,B and i ≠ j)

$$\Pi_i^{(Y_i,N_j)}(e_j,K_i) = (0 + e_j)(\omega_i - K_i) + \delta(1 - (0 + e_j))(\omega_i - K_i). \tag{7}$$

$$\Pi_j^{(Yi,Nj)}(e_j,K_j) = (0 + e_j)\,\omega_j + \delta\,(1 - (0 + e_j))\,(\omega_j - K_j) - e_j^2. \quad (8)$$

Solving for the agent j's search intensity:

$$e_j^{(Yi,Nj)}(K_j) = argmax_{e_j}\Pi_j^{(Yi,Nj)}(e_j,K_j) = [(1 - \delta)\omega_j + \delta\,K_j] / 2. \quad (9)$$

Reporting (9) in (7) and (8) and using $\omega_S + \omega_B = 1$ give the equilibrium profits in the configuration (Y_i,N_j) for $i,j = S,B$ and $i \neq j$

$$\Pi_i^{(Yi,Nj)}(K_i,K_j) = (\omega_i - K_i)[\omega_j + \delta(1 + \omega_i - (1 - \delta)(\omega_j - K_j))]/2. \quad (10)$$

$$\Pi_j^{(Yi,Nj)}(K_j) = [\omega_j^2 + 2\delta\,(\omega_j - K_j)(2 - \omega_j) + \delta^2\,(\omega_j - K_j)^2]/4. \quad (11)$$

Observe that the profit of agent *i* who goes directly to the middleman depends on the fees K_j paid by the agent *j* who searches on his own account (see (10)). Again, the reason is that a high K_j increases the search intensity of agent *j*, and hence the probability of a successful match at the first step. As a result, the agent who directly goes to the middleman has an expected profit increasing in K_j. Yet, the profit of agent *j*, who begins searching on his own account depends only on the fees intended for him (see (11)). Indeed, the probability of a successful match at the first step only depends on agent *j*'s own search intensity.

3.3- BOTH AGENTS DIRECTLY GO TO THE MIDDLEMAN (CONFIGURATION (Y,Y))

Both agents directly sign a contract with the middleman, aware that the latter will then succeed in matching them with certainty. In this context, the second stage consists of only one step.

In this configuration (Y,Y) the respective profits of the seller and of the buyer are

$$\Pi_S^{(Y,Y)}(K_S) = \omega_S - K_S \quad \text{and} \quad \Pi_B^{(Y,Y)}(K_B) = \omega_B - K_B. \quad (12)$$

4- THE EQUILIBRIUM BEHAVIORS

A necessary condition for a configuration to belong to an equilibrium path is that the individual choices of the seller and the buyer at the second stage are mutual best responses. The comparison between the individual profits in each of the four possible configurations leads to the three following lemmas.

Lemma 1

The configurations in which one of the agent directly goes to the middleman and the other searches on his own account (configuration (Y,N) or (N,Y)) cannot belong to an equilibrium path.

Lemma 2

The configuration in which both agents begin searching by themselves and then go to the middleman in the event of failure (configuration (N,N)) belong to an equilibrium path if and only if the individual rationality constraints (IR_i): $\omega_i - K_i \geq 0$, $i = S,B$ are satisfied.

Lemma 3

The configuration in which both agents directly use the middleman's services (configuration (Y,Y)) belong to an equilibrium path if and only if the two following incentive constraints are satisfied :

$$(IC_S): \Pi_S^{(Y,Y)}(K_S) \geq \Pi_S^{(N,Y)}(K_S) \quad \Leftrightarrow \quad K_S \leq K_S^{max} \tag{13}$$

$$(IC_B): \Pi_B^{(Y,Y)}(K_B) \geq \Pi_B^{(Y,N)}(K_B) \quad \Leftrightarrow \quad K_B \leq K_B^{max} \tag{14}$$

with $K_i^{max} \equiv [-(1-\delta)(2+\delta\omega_i) + 2(1-\delta)^{1/2}(1-\delta(1-\omega_i))^{1/2}] / \delta^2 < \omega_i$ for $i = S,B$.

Following Lemmas 1 to 3, an equilibrium with the configuration (N,N) on the equilibrium path always exists (under the individual rationality constraints) and a second equilibrium with the configuration (Y,Y) on the equilibrium path may exist, depending of the middleman's decision at the first stage. The middleman then has to choose between two policies. *(i) A resignation policy*. Such policy consists of, for the middleman, implementing a unique equilibrium in which both agents search by themselves before using his services in the event of failure (configuration (N,N)). *(ii) An incentive policy*. In such a case, the middleman decides to implement a second equilibrium configuration in which both agents directly use his services (configuration (Y,Y)).

4.1- THE RESIGNATION POLICY

Under this policy, the fees K_S and K_B which maximize the middleman's profit are determined by (see lemma 2 for the related constraints)

$Maximize_{K_S,K_B}\ \Pi_M^{(N,N)}(K_S,K_B) = \delta\,[1 - (e_S^{(N,N)}(K_S) + e_B^{(N,N)}(K_B))]\,(K_S + K_B)$

st. (IR_S): $\omega_S - K_S \geq 0$ and (IR_B): $\omega_B - K_B \geq 0$

Solving for K_S and K_B gives $K_S = \omega_S$ and $K_B = \omega_B$.[18] The resulting profit is

$$\Pi_M^{(N,N)*} = \delta/2. \tag{15}$$

Unwinding the game, we obtain the search intensities of the agents and their respective profits on the equilibrium path: $e_i^{(N,N)*} = \omega_i/2$ and $\Pi_i^{(N,N)*} = \omega_i(1 + \omega_j)/4$ for i,j = S,B and $i \neq j$.

4.2- THE INCENTIVE POLICY

Under this policy, the fees K_S and K_B which maximize the middleman's profit are determined by (see lemma 3 for the related constraints)

$Maximize_{K_S,K_B}\ \Pi_M^{(Y,Y)}(K_S,K_B) = K_S + K_B$

st. (IC_S): $K_S \leq K_S^{max}$ and (IC_B): $K_B \leq K_B^{max}$

Clearly, the solution is $K_S = K_S^{max}$ and $K_B = K_B^{max}$. The resulting profit is

$$\Pi_M^{(Y,Y)*} = [-4 + 3\delta + \delta^2 + 2(1-\delta)^{1/2}((1-\delta\,\omega_S)^{1/2} + (1-\delta\,\omega_B)^{1/2})] / \delta^2. \tag{16}$$

Unwinding the game, we obtain the respective profits of the agents on the equilibrium path:

$\Pi_i^{(Y,Y)*} = [2(1-\delta) + \delta\,\omega_i - 2(1-\delta)^{1/2}(1-\delta(1-\omega_i))^{1/2}] / \delta^2 \quad i = S,B.$

4.3- THE POLICY CHOICE OF THE MIDDLEMAN

At the first stage, the middleman chooses between the resignation policy and the incentive policy by comparing the profits $\Pi_M^{(N,N)*}$ et $\Pi_M^{(Y,Y)*}$. Examining the sign of the difference $\Delta(\delta,\omega_S,\omega_B) \equiv \Pi_M^{(N,N)*} - \Pi_M^{(Y,Y)*}$ leads to the following proposition.

Proposition 1

Whatever the relative bargaining powers of agents, the middleman resigns himself to letting the parties begin searching by themselves if $\delta > 0.94$; yet, he incites both agents to directly use his services if $\delta < 0.88$. If the discount factor is such that $0.88 < \delta < 0.94$, the incentive policy is still preferred as long as the distribution of the bargaining powers is not too asymmetric.

The figure 1 illustrates the proposition 1.

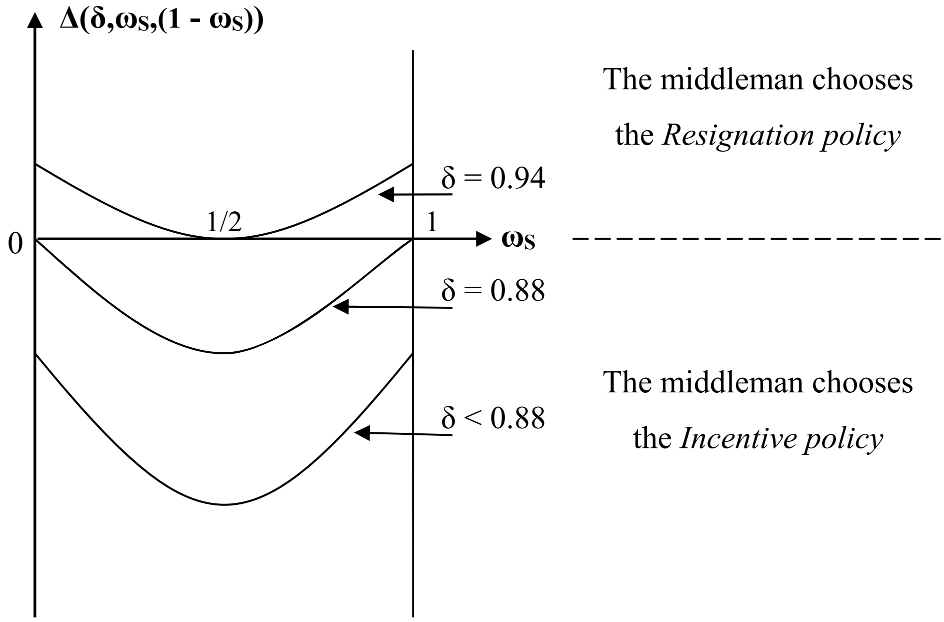

Figure 1: The policy choice of the middleman

The economic rationale of the results is as follows. The middleman can implement a second equilibrium configuration in which both agents forgo searching by themselves and decide to directly go to the middleman (configuration (Y,Y)). This requires the setting of the fees at K_S^{max} and K_B^{max}. Those fees are low enough for any agent's best response to be to directly sign with the middleman if the other agent chooses this option. The relevance of such a policy is evaluated through the comparison between the shortfall which stems from the decrease of the fees K_S and K_B and the benefit related to the absence of individual searches. The result crucially depends on the discount factor δ. Indeed, as is illustrated below, two effects combine in order for the difference $\Pi_M^{(N,N)*} - \Pi_M^{(Y,Y)*}$ to be increasing in δ.

First of all, we consider the configuration (N,N) in which both agents search on their own account at the first step and, if they failed to match, use the intermediation services in a second step. We showed that the search intensities of agents are decreasing in the discount factor δ. The likelihood of a failure at the first step, which leads to a payoff for the middleman at the second step, is then increasing in δ. We note that this positive effect of a high δ on $\Pi^{M*}_{(N,N)}$ is strengthened by the fact that a high discount factor means a high discounted expected payoff for the middleman.

We now consider the configuration (Y,Y), subject to compliance with the incentive constraints (IC_S) et (IC_B). The role of these constraints is to assure that the profits $\Pi_i^{(Y,Y)}(K_i) = \omega_i - K_i$, i = S,B (which are independent of δ) are respectively higher than the profits $\Pi_S^{(N,Y)}(K_S)$ and $\Pi_B^{(Y,N)}(K_B)$ given at (11). In fact, these profits are each increasing in δ.[19] This leads the fees K_S^{max} and K_B^{max} able to incite agents to sign directly with the middleman to be decreasing in the discount factor. For the middleman, this means that the shortfall which stems from the decrease of the fees K_S and K_B is increasing in the discount factor.

In sum, $\Pi_M^{(N,N)*}$ is increasing in δ and $\Pi_M^{(Y,Y)*}$ is decreasing in δ. This explains why the incentive policy is not relevant for the middleman if the discount factor is too high.

Finally, we point out that the policy choice of the middleman also depends on the relative bargaining powers of agents. For a given δ, the curve $\Delta(\delta,\omega_S)$ is U-shaped formed. The explanation of this result is as follows: an increase $d\omega_S$ of the seller's bargaining power raises his profit $\Pi_S^{(Y,Y)}(K_S)$ by $d\omega_S$ and increases his profit $\Pi_S^{(N,Y)}(K_S)$ of a lower amount since, with a positive probability, the seller needs to wait for the second step to be successfully matched (see (8)). It follows that the bigger the bargaining power ω_S of the seller the easier is the respect of the incentive constraint (IC_S). Hence, an increase of ω_S from 0 to ½ tips the scale in favor of the incentive policy. However, as ω_S increases, ω_B decreases and a symmetric reasoning applies for the buyer. The lower the buyer's bargaining power ω_B, the more difficult is the respect of the incentive constraint (IC_B). A decrease of ω_B from ½ to 0, *i.e.* an increase of ω_S from ½ to 1, tips the scale in favor of the resignation policy.

5- THE INTRODUCTION OF A LEGAL RULE

We first analyze the impact on the equilibrium behaviors of a legal rule that lays down the party which is compelled to pay the commission to the intermediary. Then, we assess the consequences of such a rule with regards to its impact on the collective surplus of the three participants.

5.1- THE EFFECTS OF THE RULE ON THE EQUILIBRIUM BEHAVIORS

Setting a rule that determines who should pay the middleman's commission will simply result in imposing a constraint $K_S = 0$ or $K_B = 0$ to the fees to be chosen by the middleman at the first stage of the game. The lemma 1 was established for any K_S and K_B; the results then still hold. It follows that the resignation and the incentive policies still are the two policies to be examined.

5.1.1- THE RESIGNATION POLICY UNDER THE LEGAL CONSTRAINT

We consider the legal rule "the agent *i* (i = S or B) must be the payer of the middleman". Setting $K_j = 0$ (j = S or B and j ≠ i) in (5) gives the search intensities of both agents under this legal rule

$$e_{i}{}_{K_j=0}^{(N,N)}(K_i) = [(1-\delta)\omega_i + \delta K_i]/2 \quad \text{and} \quad e_{j}{}_{K_j=0}^{(N,N)} = (1-\delta)\omega_j/2 \quad i,j = S \text{ or } B \text{ and } j \neq i. \quad (17)$$

Notice that agent *j* retains a positive search intensity despite the fact that he can use the middleman's services at no cost. Indeed, retaining $e_j > 0$ enables this agent to reduce the probability to obtain his payoff only at the second step. Thus, the more impatient agent *j* (the lower δ), the higher is this search intensity.

For the resignation policy under legal rule, the amount K_i which maximizes the middleman profit is determined by (see lemma 2 for the first constraint)

$$Maximize_{K_i}\ \Pi_{M}{}_{K_j=0}^{(N,N)}(K_i) = \delta\,[1 - (e_{i}{}_{K_j=0}^{(N,N)}(K_i) + e_{j}{}_{K_j=0}^{(N,N)})]\ K_i$$

$$\text{st. } (IR_i)\text{: } \omega_i - K_i \geq 0 \quad \text{and} \quad K_j = 0 \quad i,j = S \text{ or } B \text{ and } j \neq i.$$

The solution is $K_i = \omega_i$.[20] The resulting profit is

$$\Pi_{M}{}_{K_j=0}^{(N,N)*} = (\delta/2) - \delta[\omega_j\,(1 - \delta\omega_i)]/2 \quad \text{for } i,j = S \text{ or } B \text{ and } j \neq i. \quad (18)$$

The result (18) is not surprising. The legal constraint reduces the set of contracts available to the middleman and thus penalizes the latter: $\Pi_{M}{}_{K_j=0}^{(N,N)*} < \Pi_M^{(N,N)*} = \delta/2$.

Unwinding the game with $K_i = \omega_i$ and $K_j = 0$ gives the search intensities of the agents, $e_{i}{}_{K_j=0}^{(N,N)*} = \omega_i/2$ and $e_{j}{}_{K_j=0}^{(N,N)*} = \omega_j(1-\delta)/2$, and their respective profits: $\Pi_{i}{}_{K_j=0}^{(N,N)*} = \omega_i[\omega_i + 2(1-\delta)\omega_j]/4$ and $\Pi_{j}{}_{K_j=0}^{(N,N)*} = \omega_j[1 + \omega_i + \delta(2 + \delta\omega_j)]/4$ for i,j = S or B and j ≠ i.

5.1.2- THE INCENTIVE POLICY UNDER THE LEGAL RULE

The incentive constraints without legal rule are given at Lemma 3. Let us examine the incentive constraints $(IC_i)_{K_j=0}$ and $(IC_j)_{K_j=0}$ under the legal rule. Observe that K_i^{max} given at

Lemma 3 is independent of K_j. So, for agent i who pays the middleman, the constraint $(IC_i)_{K_j=0}$ is similar to the constraint(IC_i). Likewise, K_j^{max} only depends on K_j. So, the incentive constraint $(IC_j)_{K_j=0}$ of agent j is similar to the constraint (IC_j) and this constraint always holds if $K_j = 0$.

It follows that the fee K_i set by the middleman for the incentive policy under the legal rule $K_j = 0$ is determined by

$$Maximize_{K_i}\ \Pi_{M}{}^{(Y,Y)}_{K_j=0}(K_i) = K_i \quad \text{st. } (IC_i)_{K_j=0}\text{: } K_i \leq K_i^{max}$$

Clearly, the solution is $K_i = K_i^{max}$. The resulting profits are for i,j = S or B and $i \neq j$

$$\Pi_{M}{}^{(Y,Y)}_{K_j=0}* = K_i^{max} = [-(1-\delta)(2+\delta\omega_i) + 2(1-\delta)^{1/2}(1-\delta(1-\omega_i))^{1/2}] / \delta^2. \tag{19}$$

Unwinding the game, we obtain the respective profits of each agent (for i,j = S or B and $i \neq j$): $\Pi_{i}{}^{(Y,Y)}_{K_j=0}* = [2(1-\delta) + \delta\omega_i - 2(1-\delta)^{1/2}(1-\delta(1-\omega_i))^{1/2}] / \delta^2$ and $\Pi_{j}{}^{(Y,Y)}_{K_j=0}* = \omega_j$.

5.1.3- THE EFFECTS OF THE LEGAL RULE ON THE POLICY CHOICE OF THE MIDDLEMAN

Finally, we consider the choice of the middleman at the first stage. The middleman opts for the resignation policy or the incentive policy depending on the sign of the difference $\Delta_{K_j=0}(\delta,\omega_S,\omega_B) \equiv \Pi_{M}{}^{(N,N)}_{K_j=0}* - \Pi_{M}{}^{(Y,Y)}_{K_j=0}*$.

From the comparison of the sign of $\Delta_{K_j=0}(\delta,\omega_S,\omega_B)$ with the sign of $\Delta(\delta,\omega_S,\omega_B) \equiv \Pi_M{}^{(N,N)}* - \Pi_M{}^{(Y,Y)}*$, we can establish the following Lemma.

Lemma 4

Introducing the legal constraint $K_j = 0$ (j = S or B) reduces the parameter space from which the middleman chooses an incentive policy able to induce agents to directly use his services.

The intuition of this result is as follows. Imposing $K_j = 0$ (j = S or B), the legal rule reduces the commission taken out by the middleman. The drop of his revenue is $K_j = \omega_j$ in the resignation policy case and $K_j = K_j^{max}$ in the incentive policy one. We have $K_j^{max} \leq \omega_j$. The result of the Lemma 4 may then seem surprising. However, the drop of K_j also has an indirect effect within the resignation policy framework as it reduces the search intensity of agent j.

Here, the drop of K_j from ω_j to zero reduces the search intensity of agent j of $\delta\omega_j/2$.[21] The probability of a failure of the matching at the first step increases accordingly. As a result, the middleman obtains K_j with a higher probability. This indirect positive effect cannot recoup the drop of K_j (the legal rule reduces the profit of the middleman). Yet, when the latter chooses between the two policies, this effect can compensate for the fact that the revenue drop within the resignation policy ($K_j = \omega_j$) is higher than the revenue drop within the incentive policy ($K_j = K_j^{max}$). It follows that, starting from a situation where $\Pi_M^{(Y,Y)*} > \Pi_M^{(N,N)*}$, introducing the legal rule can lead to a situation where ${\Pi_M}_{K_j=0}^{(Y,Y)}* < {\Pi_M}_{K_j=0}^{(N,N)}*$ for an unchanged parametric space.

This possibility is illustrated in the figure 2. The middleman opts for the incentive policy in the absence of a regulation and switches to the resignation policy when the legal rule is introduced.

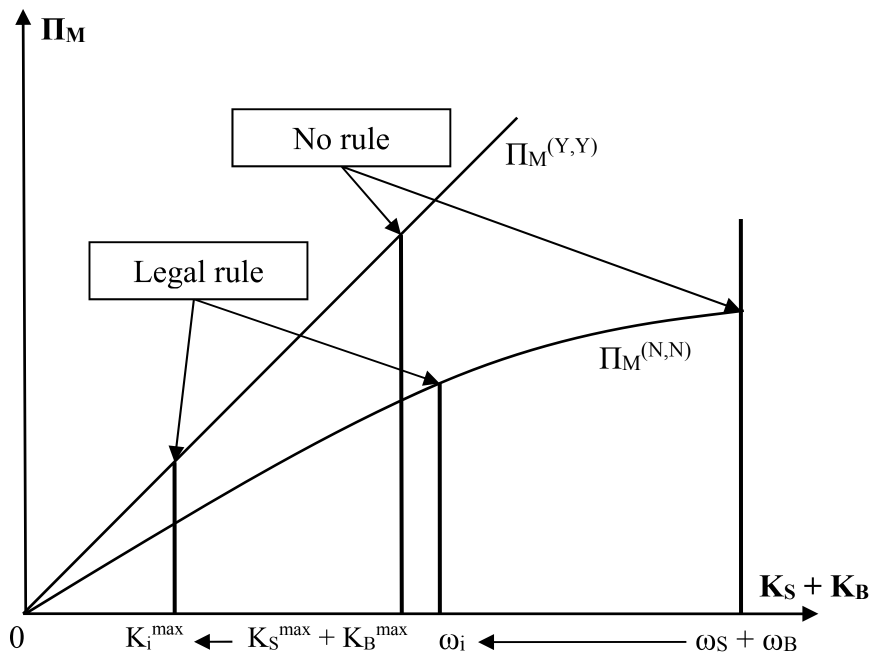

Figure 2: The effect of the rule on the middleman's policy

5.2- THE WELFARE IMPLICATIONS OF THE INTRODUCTION OF A LEGAL RULE

The benchmark situation is that in which the middleman is not subject to any regulation. We analyze the changes in collective surplus generated by the introduction of a legal rule designating the payer of the middleman.

5.2.1- THE EFFECTS OF THE LEGAL RULE ON THE INCENTIVE POLICY

The incentive policy implements the match from the first step. Agents don't bear any search costs as they directly go to the middleman. The match provides a payoff of one monetary unit shared between the seller, the buyer, and the middleman. As a result, the social welfare associated to this incentive policy is maximum:[22]

$$W^{(Y,Y)*} = 1 \tag{20}$$

If the legal rule does not lead the middleman to give up the incentive policy (when he did opt for this policy), the maximum level of welfare $W^{(Y,Y)*} = 1$ is not affected by the introduction of the rule. The legal rule only affects the sharing of the maximum surplus. Yet, introducing a legal rule which restrains the set of policies available to the middleman may change the policy choice of the latter. This is the result pointed out in the Lemma 4. Using the Lemma, the following proposition is straightforward

Proposition 2

Introducing a legal constraint reduces the parameter space for which a subgame perfect equilibrium that implements the maximal social welfare exists.

The interpretation of Proposition 2 and that of Propositions 3 and 4 in the next sub-section is postponed to Section 5.2.3.

5.2.2- THE EFFECTS OF THE LEGAL RULE ON THE RESIGNATION POLICY

Under the resignation policy, the matching is successful with a probability $(e_S + e_B)$. In case of a failure, the three participants need to wait for the second step to obtain the collective payoff of one monetary unit. In addition, the agents bear the search costs e_S^2 and e_B^2. Hence, the social welfare associated to the resignation policy can then be written:[23]

$$W^{(N,N)} = (e_S + e_B) + \delta\,(1 - (e_S + e_B)) - e_S^2 - e_B^2. \tag{21}$$

Using $e_i^{(N,N)*} = \omega_i/2$ for i = S,B gives the social welfare in the absence of a legal rule

$$W^{(N,N)*} = [1 + 2\delta + 2\,\omega_S\,\omega_B] / 4. \tag{22}$$

Using $e_{i\,K_j=0}^{(N,N)*} = \omega_i/2$ and $e_{j\,K_j=0}^{(N,N)*} = \omega_j(1-\delta)/2$ gives the social welfare under the legal rule "the agent *i* must be the payer of the middleman"

$$W_{K_j=0}^{(N,N)*} = [1 + 2\delta + 2\,\omega_S\,\omega_B + \delta\omega_j(\delta(1+\omega_i) - 2\omega_i)]\,/\,4 \quad \text{for i,j = S or B and } i \neq j. \tag{23}$$

Observe that $W_{K_j=0}^{(N,N)*} = W^{(N,N)*} + [\delta\omega_j\,(\delta(1+\omega_i) - 2\omega_i)\,]/4$. Hence, the legal rule "the agent *i* must be the payer of the middleman" is welfare improving if the term between brackets is positive *i.e.* if

$$\delta > \delta_{K_j=0}^{min}(\omega_i) \equiv 2\omega_i\,/\,(1+\omega_i) \quad \text{for i,j = S or B and } i \neq j. \tag{24}$$

We consider the best legal rule as the one which leads to a welfare increase for the largest parameter space. This parameter space is defined by the minimum acceptable value of the discount factor δ. Note that this minimum value $\delta_{K_j=0}^{min}(\omega_i)$ increases with ω_i. As a result, the smaller ω_i (the smaller the bargaining power of the agent designated as the payer) the larger is the parameter space for which the welfare is increased. Then the following proposition is straightforward.

Proposition 3

In the process of choosing between the two rules: "the seller pays the commission" and "the buyer pays the commission", the best legal rule is to designate the agent with the lesser bargaining power to pay the middleman's commission.

However, imposing the best policy does not ensure that social welfare is increased. First, we know from Proposition 2 that introducing a legal constraint reduces the parameter space for which the middleman chooses an incentive policy and as a result reduces the parameter space for which there exists a subgame perfect equilibrium that implements the maximal social welfare. Moreover, we see below that the welfare can be reduced even when the middleman uses the resignation policy which implements a unique equilibrium with the configuration (N,N) on the equilibrium path. More precisely, we must distinguish:

- When $0 < \omega_S < ½$, the best policy is to set $K_B = 0$. The welfare is increased if $\delta > \delta_{K_B=0}^{min}(\omega_S)$. The lower bound is an increasing function of ω_S, and takes the maximal value $\delta = 2/3$ at the upper value of ω_S ($\omega_S = 1/2$). It follows that setting $K_B = 0$ is welfare improving if $\delta > 2/3$. If $\delta < 2/3$, the welfare is improved if and only if $\delta > \delta^{min}_{K_B=0}(\omega_S) \Leftrightarrow \omega_S < \delta/(2 - \delta)$.

- When $½ < \omega_S < 1$, the best policy is to set $K_S = 0$. The welfare is increased if $\delta > \delta^{min}_{K_S=0}(\omega_B)$. The lower bound is an increasing function of ω_B, that is to say a decreasing function of ω_S (recall that $\omega_S + \omega_B = 1$), and takes the maximum value $\delta = 2/3$ at the lower value of ω_S ($\omega_S = 1/2$). It follows that setting $K_S = 0$ is welfare improving if $\delta > 2/3$. If $\delta < 2/3$, the welfare is improved if and only if $\delta > \delta^{min}_{K_S=0}(\omega_B) \Leftrightarrow \omega_B < \delta/(2 - \delta) \Leftrightarrow \omega_S > 2(1 - \delta)/(2 - \delta)$.

The following proposition covers these results.

Proposition 4

Under the resignation policy which implements a unique equilibrium where both agents begin individual searching on their own account, we have: (a) Imposing a legal rule which corresponds to the best policy is welfare improving if $\delta > 2/3$ or if $\delta < 2/3$ and if the distribution of bargaining powers is very asymmetric. (b) If $\delta < 2/3$ and if the bargaining powers are comparable, that is to say if $\delta/(2 - \delta) < \omega_S < 2(1 - \delta)/(2 - \delta)$, the best legal policy is welfare decreasing.

The figure 3 illustrates the proposition.

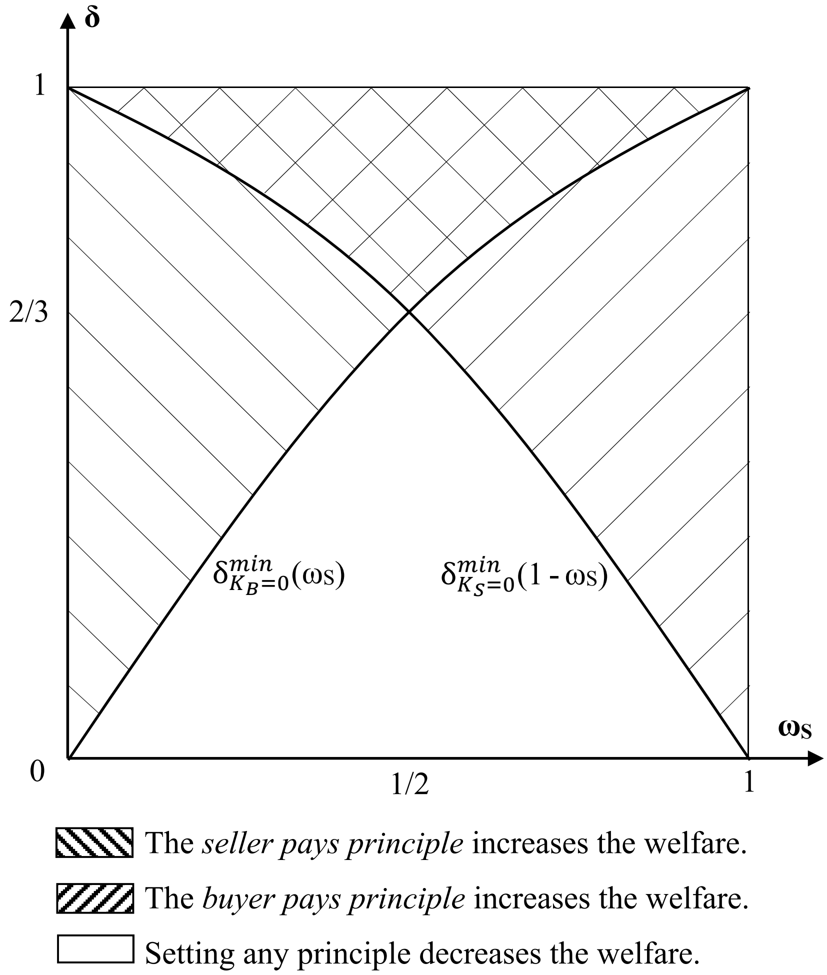

Figure 3: The effect of the legal rule on welfare

5.2.3- INTERPRETATION OF THE RESULTS

Proposition 2 states that the introduction of a legal constraint reduces the parameter space for which a subgame perfect equilibrium that implements the maximum social welfare exists. This result is not surprising if we compare what would be the aim of a welfare maximizer to the objective of the middleman. A welfare maximizer is better off when agents do not search by themselves in order to avoid the social costs of the individual search. For a given parameter space, the middleman prefers to motivate the two agents not to search by themselves by setting low fees since this policy generates a higher profit in spite of the costs of the incentives. In this context, the welfare maximizer and the middleman share the same aim, even if the motives differ. Limiting the possible policy choices of the middleman with a legal constraint can lead the latter to abandon the incentive policy. This can only result in a drop of welfare.

Let us now provide the intuition behind proposition 3. Within the resignation policy, the legal rule which designates agent *i* (i = S or B) to pay the middleman's commission reduces the search effort of agent *j* who is exempted from payment. The impact on social welfare is twofold. Indeed, the search costs drop, but the probability that the matching is only successful at the second step increases.

The legal rule reduces the search intensity of agent *j* from $\omega_j/2$ to $(\omega_j/2 - \delta\omega_j/2)$. So the probability that the matching is only successful at the second step increases of $\delta\omega_j/2$. The negative impact on social welfare is then $(1 - \delta)\delta\omega_j/2$. We note that this social loss is linearly increasing with ω_j. On the other hand, the fall of e_j from $\omega_j/2$ to $(\omega_j/2 - \delta\omega_j/2)$ reduces the search costs of agent *j* of $(2 - \delta)\delta\omega_j^2/4$. We check that, with increasing marginal search cost, the higher the initial search intensity $e_j^{(N,N)*} = \omega_j/2$, the greater is the cost decrease for the same "drop" $\delta\omega_j/2$ of e_j. But the initial search intensity is increasing with ω_j. As a consequence, the best policy is that which implements a drop to the search intensity of the agent with the higher bargaining power. In other words, the best policy consists in designating the agent with the lesser bargaining power to pay the middleman's commission.

Finally, we interpret proposition 4. We assume $\omega_i < \omega_j$ (which implies $\omega_j > ½$). In this case, the best policy designates the agent *i* to pay. Using the results just above, we know that this policy is welfare increasing if the social loss $(1 - \delta)\delta\omega_j/2$ due to the fall in the probability of a successful match at the first step is compensated by the search costs savings $(2 - \delta)\delta\omega_j^2/4$. This is the case if $\omega_j > 2(1 - \delta)/(2 - \delta)$.[24] The aforementioned analysis still applies. The social loss is linearly increasing with ω_j whereas the cost drop increases at an increasing rate with ω_j. The bargaining power ω_j of agent *j* needs to be high enough for the cost drop to compensate the social loss related to the matching probability. If it is not the case, that is to say if the difference in the relative bargaining powers is not sufficiently large (recall that $\omega_j > ½$), welfare is reduced. In other terms, welfare is reduced if the distribution of bargaining powers of the agents is not asymmetric enough.

The role played by the discount factor remains decisive. Let us consider the condition $\omega_j > 2(1 - \delta)/(2 - \delta)$ under which the legal rule is welfare improving (see footnote 23). The higher δ, the less binding is this condition since the minimal bound is decreasing with δ. The explanation is as follows. Agent *j* who is not compelled to pay the middleman, yet chooses a positive search intensity. Indeed, retaining $e_j > 0$ enables this agent to reduce the probability to receive his payoff only at the second step. The higher the discounted value of the payoff in the second step (the higher δ), the lower is the level of e_j chosen by agent *j*. It follows that the reduction of the search intensity of agent *j* and its positive impact on social welfare are increasing with δ. On the other hand, the reduction of the search intensity of agent *j* leads to an increase of the probability that the matching is only successful at the second step and in turn a reduction of social welfare. However, the higher the discount factor, the lesser is the negative impact generated by a lag period. Hence, if the value δ is high enough the two effects combine in order for the best policy to increase the welfare. As quoted above, this is the case if $\omega_j > 2(1 - \delta)/(2 - \delta)$ or, equivalently, if $\delta > 2(1 - \omega_j)/(2 - \omega_j)$.

The minimal bound of δ is decreasing with ω_j and takes the value 2/3 when ω_j takes its lower bound $\omega_j = ½$ (recall that $\omega_i < \omega_j$ implies $\omega_j > ½$). It follows that for $\delta > 2/3$ the condition is always satisfied. Hence, using the best policy increases the social welfare regardless the bargaining powers of agents if $\delta > 2/3$, that is to say if agents are not too impatient to conclude the transaction.

6- CONCLUSION

We addressed the current debate regarding the principle which should prevail in the way sport middlemen are remunerated: "agent-paid-by-player" or "agent-paid-by-club". This paper shows that the question of the appropriateness of imposing an additional rule in the legal framework is a preliminary issue. More precisely, our results indicate that the most appropriate measure consists in designating that the party with the lesser bargaining power be the payer of the sports agent's commission. However, imposing the best rule is welfare improving only if the discount factor is relatively high or if the distribution of bargaining powers between the club and the player is very asymmetric. So, completing the legal framework may not be relevant. It follows that the question has to be addressed at each leagues level, taking into account the prevailing conditions on the labor market of professional athletes. This would go beyond the scope of our article, though it seems that we can observe a shift of the bargaining power in favor of players, both in the US and in Europe. Indeed, in the North-American leagues, stronger player unions and the advent of salary disclosure improved the bargaining power of players (Mason, 2006). In Europe, the removal of transfer fees and the potential severance notice consecutive to the "Bosman" case have given players significant bargaining power to increase their earnings (Magee, 2002).

Nevertheless, we argue that this bargaining power shift has to be put into perspective given the duality of the supply side of the labor market. In fact while superstars can extract great salaries thanks to the new structure of sport markets, average interchangeable players are still dominated by clubs in the negotiation of playing contracts.

It is worth pointing out that we considered a very stylized matching problem involving only two agents and one intermediary. The simplicity of the framework is attractive because it helps explicitly characterizing all equilibrium solutions and giving for each of them the underlying economic intuitions. But this simplicity might be criticized on a main point. In fact, the only role we offer to the intermediary in our model is the matchmaking of the two parties. Nevertheless, empirically, a sport agent faces several clubs and several players. Thus, the latter not only matches players and clubs but also determines the allocation of the different players to the different clubs. Imposing an additional rule in the legal framework will also affect the intermediary's incentives in this allocation process. Thus, this particular aspect of the problem needs to be addressed in future research.

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[1] http://www.nationalfootballpost.com/Agents-by-the-numbers.html, Retrieved November 25, 2016.

[2] For more recent figures: http://www.thefa.com/news/2016/Apr/21/agents-intermediaries-220416, Retrieved November 25, 2016.

[3] FIFA Regulations Players' Agents, 2008, Definition p4.

[4] Restatement (second) of Agency (1958).

[5] Article 2, Uniform Player Contract Section 12 General, subsection d) of the 2005 NBA CBA.

[6] Article 4, NFL Player Contract, Section 5 Notices, Prohibitions, subsection c) of the 2006 NFL CBA.

[7] One may believe that the role of sports agents in the States is to negotiate contracts for players, not to facilitate matching of players with teams. However, as pointed out in Drew Rosenhaus' (one of the most famous NFL agent) book *A shark never sleeps: wheeling and dealing with the NFL's most ruthless agent*, and contrary to what the regulation anticipates, agents play a matching role before the negotiation of the contracts.

[8] "Study on sports agents in the European Union". A study commissioned by the European Commission (Directorate-General for Education and Culture), November 2009.

[9] "Unlike the regulation suggests, in a majority of cases, agents represent players in the negotiations but get paid by clubs". Philippe Diallo (Director of the French Professional Clubs Union) in the Information report n°3741, 2007.

[10] Decree n°2011-686, June 16th 2011 which stems from the Information report n°3741, February 2007 and Information report n°2345, February 2010.

[11] Code du Sport, Article L222-17.

[12] Information report n°3805, October 2011.

[13] *The Guardian*, December 28th 2011.

[14] In common language the third party who facilitates the sports contract negotiation is called an "agent". However that terminology is confusing in the context of formal principal agent models, where the agent is a direct party of the contract. Therefore for the purpose of our formal model we denote the sport agent the intermediary or the middleman.

[15] The commission asked to the agent i, i = S,B can be expressed as, for example, a percentage α_i of the amount of the transaction, *i.e.* $\alpha_i \times \omega_S$ with $\alpha_i = K_i/\omega_S$.

[16] These constraints are independent of the search costs incurred at the first step since those costs are sunk at the second step. The agent agrees with the middleman if this decision leads to a nonnegative wealth variation.
[17] We have $\partial\Pi_i^{(N,N)}(K_i,K_j)/\partial K_j = \delta[\omega_i - \delta(\omega_i - K_i)]/2 > 0$ for i,j = S,B and $i \neq j$.
[18] Using $e_S^{(N,N)}(K_S)$ and $e_B^{(N,N)}(K_B)$ given in (5), the objective function can be written:
$\Pi_M^{(N,N)}(K_S,K_B) = \delta\ (K_S + K_B)\ [1 + \delta\ (1 - (K_S + K_B))]\ /\ 2$.
We have for i = S,B: $\partial\Pi_M^{(N,N)}/\partial K_i = \delta[1 + \delta(1 - 2(K_S + K_B))]/2$ which is positive for all $K_S \leq \omega_S$ and $K_B \leq \omega_B$ (recall that $\omega_S + \omega_B = 1$). It follows that (IR_S) and (IR_B) are binding at the solution.
[19] $\partial\Pi_j^{(Yi,Nj)}(K_j)/\partial\delta = (\omega_j - K_j)(2 - \omega_j + \delta(\omega_j - K_j))/2 \geq 0$ under (IR_j): $\omega_j - K_j \geq 0$ for j = S,B.
[20] Using (17) and $\omega_S + \omega_B = 1$, the objective function can be written:
$\Pi_{M\,K_j=0}^{(N,N)}(K_i) = \delta\ K_i\ [1 + \delta\ (1 - K_i)]\ /\ 2$. We have $\partial\Pi_{M\,K_j=0}^{(N,N)}(K_i)/\partial K_i = \delta[1 + \delta(1 - 2K_i)]/2$ which is positive for all $K_i \leq \omega_i < 1$. So, the constraint (IR_i) is binding at the solution.
[21] Recall that $e_j^{(N,N)*} = \omega_j/2$ and $e_{j\,K_j=0}^{(N,N)*} = \omega_j(1 - \delta)/2$.
[22] More conventionally: $W^{(Y,Y)*} = \Pi_S^{(Y,Y)*} + \Pi_B^{(Y,Y)*} + \Pi_M^{(Y,Y)*} = 1$.
[23] Again, more conventionally: $W^{(N,N)} = \Pi_S^{(N,N)} + \Pi_B^{(N,N)} + \Pi_M^{(N,N)}$.
[24] Welfare is increased if $(2 - \delta)\delta\omega_j^2/4 > (1 - \delta)\delta\omega_j/2 \Leftrightarrow \omega_j > 2(1 - \delta)/(2 - \delta)$. Note that if agent *j* with $\omega_j > ½$ is the seller, we are back to the condition $\omega_S > 2(1 - \delta)/(2 - \delta)$. If he is the buyer, we are back to the condition $\omega_B > 2(1 - \delta)/(2 - \delta) \Leftrightarrow \omega_S < \delta/(2 - \delta)$.

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APPENDIX A

1- PROOF OF LEMMA 1

Recall that, as we explained at the beginning of section 3, setting fees that do not comply with individual rationality constraints (IR_i) i = S,B is a dominated strategy for the middleman. It follows that looking for equilibrium paths, we can restrict the attention to the subgames where $K_i \leq \omega_i$ i = S,B.

- The configuration (Y,N) can belong to an equilibrium path only if the choice Y of the seller and the choice N of the buyer are mutual best responses, that is to say only if

$$\Pi_S^{(Y,N)}(K_S,K_B) \geq \Pi_S^{(N,N)}(K_S,K_B) \quad \text{and} \quad \Pi_B^{(Y,N)}(K_B) \geq \Pi_B^{(Y,Y)}(K_B).$$

In order to prove that this configuration does not belong to an equilibrium path, we just need to prove that the first condition is not satisfied at the equilibrium *i.e.* that

$$\Omega_S(K_S,K_B) \equiv \Pi_S^{(N,N)}(K_S,K_B) - \Pi_S^{(Y,N)}(K_S,K_B) > 0 \text{ for all } (K_S,K_B) \text{ satisfying } (IR_i)\ i = S,B. \quad (25)$$

Using $\Pi_S^{(N,N)}(K_S,K_B)$ given in (6) and $\Pi_S^{(Y,N)}(K_S,K_B)$ given in (10), we have

$$\Omega_S(K_S,K_B) = [1 - \omega_B(\omega_B + 2(\omega_S - K_S)) - 2\delta(\omega_S(\omega_S - K_S) + K_S(\omega_B - K_B)) + \delta^2(\omega_S - K_S)^2]/4 \text{ and}$$

$$\partial\Omega_S(K_S,K_B)/\partial\delta = [K_S K_B - K_S\,\omega_B - \omega_S(\omega_S - K_S) + \delta(\omega_S - K_S)^2]/2.$$

We replace the product K_SK_B by the product $K_S\omega_B$, with $\omega_B \geq K_B$ according to (IR_B). It follows that $\partial\Omega_S(K_S,K_B)/\partial\delta$ is lower than

$[K_S\,\omega_B - K_S\,\omega_B - \omega_S(\omega_S - K_S) + \delta(\omega_S - K_S)^2]/2 = -\,[\omega_S(\omega_S - K_S) - \delta(\omega_S - K_S)^2]/2 < 0.$

So $\Omega_S(K_S,K_B)$ is decreasing in δ. At the upper bound of δ ($\delta = 1$), $\Omega_S(K_S,K_B)$ takes the value $[K_S(K_S + 2\,K_B)]/4 > 0$. It follows that $\Omega_S(K_S,K_B) > 0$ for all (K_S,K_B) satisfying (IR_i) $i = S,B$.

- The configuration (N,Y) can belong to an equilibrium path only if

$$\Pi_S^{(N,Y)}(K_S) \geq \Pi_S^{(Y,Y)}(K_S) \quad \text{and} \quad \Pi_B^{(N,Y)}(K_S,K_B) \geq \Pi_B^{(N,N)}(K_S,K_B).$$

In order to prove that this configuration does not belong to an equilibrium path, we only have to prove that the second inequality cannot hold at the equilibrium *i.e.* that

$$\Omega_B(K_S,K_B) \equiv \Pi_B^{(N,N)}(K_S,K_B) - \Pi_B^{(N,Y)}(K_S,K_B) > 0 \text{ for all } (K_S,K_B) \text{ satisfying } (IR_i)\ i = S,B. \quad (26)$$

$\Omega_B(K_S,K_B)$ is given by permuting the subscripts S and B into $\Omega_S(K_S,K_B)$. Then, using the same method as above, the proof is straightforward.

2- PROOF OF LEMMA 2

The configuration (N,N) can belong to an equilibrium path if and only if

$$\Pi_S^{(N,N)}(K_S,K_B) \geq \Pi_S^{(Y,N)}(K_S,K_B) \quad \text{and} \quad \Pi_B^{(N,N)}(K_S,K_B) \geq \Pi_B^{(N,Y)}(K_S,K_B).$$

By (25) and (26) we know this is the case for all (K_S,K_B) under (IR_i): $\omega_i - K_i \geq 0$, $i = S,B$.

3- PROOF OF LEMMA 3

The configuration (Y,Y) can belong to an equilibrium path if and only if

$$\Pi_S^{(Y,Y)}(K_S) \geq \Pi_S^{(N,Y)}(K_S) \quad \text{and} \quad \Pi_B^{(Y,Y)}(K_B) \geq \Pi_B^{(Y,N)}(K_B).$$

We note these conditions

$\Psi_i(K_i) \equiv \Pi_i^{(Y,Y)}(K_i) - \Pi_i^{(Ni,Yj)}(K_i) \geq 0$ for $i = S$ and B, and $j = S,B$ with $j \neq i$.

Using $\Pi_i^{(Y,Y)}(K_i)$ given in (12) and $\Pi_i^{(Ni,Yj)}(K_i)$ given in (11), we have

$\Psi_i(K_i) = (\omega_i - K_i) - [\omega_i^2 + 2\delta\,(\omega_i - K_i)(2 - \omega_i) + \delta^2\,(\omega_i - K_i)^2]/4$ and

$\partial\Psi_i(K_i)/\partial K_i = -\,[(1 - \delta)(2 + \delta\,\omega_i) + \delta^2\,K_i]\,/\,2 < 0.$

So $\Psi_i(K_i)$ is decreasing in K_i. When K_i takes its lower bound, we have $\Psi_i(K_i = 0) = \omega_i(1 - \delta)(4 - \omega_i(1 - \delta))/4 > 0$. Hence, the conditions $\Psi_i(K_i) \geq 0$ for $i = S,B$ can be written

$K_i \le K_i^{max}$ where K_i^{max} is the solution of $\Psi_i(K_i^{max}) = 0$. The values K_i^{max} for i = S,B are given in the lemma.

Note that when K_i takes its upper bound we have $\Psi_i(K_i = \omega_i) = -\omega_i^2/4 < 0$. It follows that $K_i^{max} < \omega_i$ for i = S and B and, consequently, the individual rationality constraints (IR_S) and (IR_B) are not binding in the configuration (Y,Y).

Now, we want to prove a useful result for the remaining proofs of the appendix

$$\partial K_i^{max}/\partial\delta < 0 \text{ for i = S and B.} \tag{27}$$

Totally differentiating the equation $\Pi_i^{(Y,Y)}(K_i^{max}) - \Pi_i^{(Ni,Yj)}(K_i^{max}) = 0$ and noting that $\partial\Pi_i^{(Y,Y)}(K_i)/\partial\delta = 0$, we obtain $\partial K_i^{max}/\partial\delta = -[-\partial\Pi_i^{(Ni,Yj)}/\partial\delta \,/\, \partial\Psi_i(K_i)/\partial K_i]$. We have $\partial\Pi_i^{(Ni,Yj)}/\partial\delta = (\omega_i - K_i^{max})(2 - \omega_i + \delta(\omega_i - K_i^{max}))/2 > 0$ and we have proved just above that $\partial\Psi_i(K_i)/\partial K_i < 0$, hence $\partial K_i^{max}/\partial\delta < 0$.

4- PROOF OF PROPOSITION 1

Consider the difference $\Delta(\delta,\omega_S,\omega_B) \equiv \Pi_M^{(N,N)*} - \Pi_M^{(Y,Y)*}$ where $\Pi_M^{(N,N)*}$ is given in (15) and $\Pi_M^{(Y,Y)*}$ is given in (16). Using $\omega_S + \omega_B = 1$ we obtain $\Delta(\delta,\omega_S)$

$$\Delta(\delta,\omega_S) = (\delta/2) - [-4 + 3\delta + \delta^2 + 2(1-\delta)^{1/2}((1-\delta\,\omega_S)^{1/2} + (1-\delta(1-\omega_S))^{1/2})] / \delta^2 \text{ and}$$

$$\partial\Delta(\delta,\omega_S)/\partial\omega_S = (1-\delta)[1/((1-\delta)(1-\delta\omega_S))^{1/2} - (1/((1-\delta)(1-\delta(1-\omega_S)))^{1/2})] / \delta.$$

The derivative is negative [positive] if $(1-\delta)(1-\delta\omega_S)$ is higher [lower] than $(1-\delta)(1-\delta(1-\omega_S))$ *i.e.* if ω_S is lower [higher] than 1/2. It follows that for δ given, the curve $\Delta(\delta,\omega_S)$ is U-shaped formed and takes its minimum value at $\omega_S = ½$.

Note that for $\delta = 0.94$ we have $\Delta(\delta,\omega_S = ½) = 0$ and that for $\delta = 0.88$ we have $\Delta(\delta,\omega_S = 0) = \Delta(\delta,\omega_S = 1) = 0$.

Let us now consider the role played by the discount factor δ in the difference $\Delta(\delta,\omega_S)$. We have $\partial\Pi_M^{(N,N)*}/\partial\delta = ½ > 0$ and $\partial\Pi_M^{(Y,Y)*}/\partial\delta = \partial(K_S^{max} + K_B^{max})/\partial\delta < 0$ according to (27). So, the difference $\Delta(\delta,\omega_S)$ increases in δ. It follows that for $\delta > 0.94$, $\Delta(\delta,\omega_S) > 0$ for all ω_S and that for $\delta < 0.88$, $\Delta(\delta,\omega_S) < 0$ for all ω_S.

5- PROOF OF LEMMA 4

Consider the difference $\Delta_{K_j=0}(\delta,\omega_S,\omega_B) \equiv \Pi_{M_{K_j=0}}^{(N,N)*} - \Pi_{M_{K_j=0}}^{(Y,Y)*}$ where $\Pi_{M_{K_j=0}}^{(N,N)*}$ is given in (18) and $\Pi_{M_{K_j=0}}^{(Y,Y)*}$ is given in (19). We have $\partial\Pi_{M_{K_j=0}}^{(N,N)*}/\partial\delta = (1 - \omega_j + 2\delta\omega_i\omega_j)/2 > 0$ and $\partial\Pi_{M_{K_j=0}}^{(Y,Y)*}/\partial\delta = \partial K_i^{max}/\partial\delta < 0$ by (27). So the difference $\Delta_{K_j=0}(\delta,\omega_S,\omega_B)$ increases in δ. Again, using $\omega_S + \omega_B = 1$, we obtain $\Delta_{K_j=0}(\delta,\omega_S)$.

In the absence of regulation, from the proof of Proposition 1, we know that

- If $\omega_S = ½$, $\Delta(\delta,\omega_S) \leq 0$ for all $\delta \leq 0.94$.
- If $\delta = 0.88$, $\Delta(\delta,\omega_S) \leq 0$ for all ω_S.

When the legal rule $K_j = 0$ is introduced, we have

- If $\omega_S = ½$, $\Delta_{K_j=0}(\delta,\omega_S) = [16 - 12\delta - 4\delta^2 + 2\delta^3 + \delta^4 - 8.2^{1/2}(2 - 3\delta + \delta^2)^{1/2}]/8\delta^2$ which is negative only if $\delta < 0.86 < 0.94$.
- If $\delta = 0.88$, $\Delta_{K_j=0}(\delta,\omega_S) = 0.29 - 0.87(0.11 + 0.88\omega_S)^{1/2} + 0.96\omega_S - 0.39\ \omega_S^2$ which is negative only if $\omega_S < 0.17$.

So, introducing a legal constraint reduces the parameter space for which $\Delta(\delta,\omega_S) < 0$ *i.e.* the parameter space in which the middleman chooses an incentive policy.

APPENDIX B

Matching technology involving strategic interaction

Let us consider the matching technology where the probability $\Theta(e_S,e_B)$ of a match without the involvement of the middleman is (for $e_i \geq 0$ i = S,B)

$$\Theta(e_S,e_B) = e_S + e_B + (e_S \times e_B)/2 \ \text{ if } \ 0 \leq e_S + e_B + (e_S \times e_B)/2 \leq 1 \text{ and } \Theta(e_S,e_B) = 1 \ \text{ if not.}$$

In the configuration (N,N) where both agents begin with individual search, the profits of the seller and of the buyer are:

$$\Pi_i^{(N,N)}(e_S,e_B,K_i) = \Theta(e_S,e_B)\ \omega_i + \delta\ (1 - \Theta(e_S,e_B))\ (\omega_i - K_i) - e_i^2 \quad i = S,B.$$

The variables e_S and e_B are strategically interdependent in the sense that the optimal search intensity of one agent depends on the search intensity of the other agent. Specifically, the best response functions are:

$$e_i^{(N,N)}(K_i,e_j) = argmax_{e_i}\Pi_i^{(N,N)}(e_S,e_B,K_i) = (2 + e_j)[(1 - \delta)\omega_i + \delta\ K_i]/4 \ \ i,j = S,B \text{ and } i \neq j.$$

These functions are upward sloping because an increase in e_j increases the productivity of e_i and, consequently, gives an incentive to agent *i* to increase its effort. In other words, with the matching technology $\Theta(e_S,e_B)$ efforts are strategic complements.

Solving the system of best response functions, we obtain the Nash equilibrium in efforts for i,j = S,B and $i \neq j$

$e_i^{(N,N)}(K_i,K_j) = 2[(1 - \delta)\omega_i + \delta K_i][4 + (1 - \delta)\omega_j + \delta K_j] / [16 – [(1 - \delta)\omega_i + \delta K_i][(1 - \delta)\omega_j + \delta K_j]]$

For the resignation policy, the fees K_S and K_B which maximize the middleman's profit are determined by (see lemma 2 for the related individual rationality constraints):

$Maximize_{K_S,K_B}\ \Pi_M^{(N,N)}(K_S,K_B) =$

$$\delta\, [1 – (e_S^{(N,N)}(K_S,K_B) + e_B^{(N,N)}(K_S,K_B) + e_S^{(N,N)}(K_S,K_B) \times e_B^{(N,N)}(K_S,K_B) / 2)]\, (K_S + K_B)$$

st. (IR_S): $\omega_S – K_S \geq 0$ and (IR_B): $\omega_B – K_B \geq 0$

The solution is not easy to characterize due to the shape of the objective function which is parametrized by the value of the discount factor δ. More precisely, if for low values of δ the shape of the objective function is such as both individual rationality constraints are binding, it is not the case for high values of the discount factor.

We only present the results for the case where agents are symmetric ($\omega_S = \omega_B = ½$).

- For low values of δ ($\delta < 0.52$) the two constraints (IR_i) i = S,B are binding and the middleman sets the fees $K_S = ½$ and $K_B = ½$ at the first stage of the game. The search intensities of the agents are (using $e_i^{(N,N)}(K_i,K_j)$ above): $e_i^{(N,N)*} = 2/7$, i = S,B.

- For $\delta > 0.52$ two symmetric solutions exist: $K_S = ½$ and $K_B = K_B^*(\delta)$ or $K_S = K_S^*(\delta)$ and $K_B = ½$ where $K_i^*(\delta)$ (i = S or B) decreases with the discount factor δ from the value ½ when $\delta = 0.52$ to the value 0.27 when $\delta = 1$. The search intensities of the agents $e_i^{(N,N)*}(\delta)$, i = S,B are decreasing functions of δ. The related analytical expressions are too cumbersome to be written down here.

For the resignation policy under the legal rule $K_j = 0$ (j = S or B), the middleman sets the fees $K_j = 0$ and $K_i = \omega_i = ½$ (indeed, the shape of the objective function is such as the (IR_i) constraint is binding for all values of δ when $K_j = 0$). The search intensities of the agents then become

$$e_{i_{K_j=0}}^{(N,N)}*(\delta) = 2(9 – \delta) / (63 + \delta) \quad \text{and} \quad e_{j_{K_j=0}}^{(N,N)}*(\delta) = 18(1 – \delta) / (63 + \delta).$$

As we explained in the equation (21) in the text, the social welfare associated to the resignation policy can then be written

$$W^{(N,N)} = \Theta(e_S,e_B) + \delta\,(1 - \Theta(e_S,e_B)) - e_S^2 - e_B^2.$$

Using $e_i^{(N,N)*}(\delta)$ for i = S,B gives the social welfare $W^{(N,N)*}(\delta)$ in the absence of a legal rule (for $\delta < 0.52$ and for $\delta > 0.52$). Alternatively, using $e_{i\,K_j=0}^{(N,N)*}(\delta)$ and $e_{j\,K_j=0}^{(N,N)*}(\delta)$ gives the social welfare $W_{K_j=0}^{(N,N)*}(\delta)$ under the legal constraint $K_j = 0$. In the case considered here where agents are symmetric ($\omega_S = \omega_B = ½$), the best legal rule - which must designate the agent with the lesser bargaining power as the payer of the middleman's commission - can dictate indifferently that the buyer or the seller should be the payer of the middleman.

We must analyze the impact of such a policy on the collective surplus of the three participants. We obtain $W_{K_j=0}^{(N,N)*}(\delta) > W^{(N,N)*}(\delta)$ whenever $\delta > 0.69$.

With a matching technology involving strategic interaction, we obtain the same result as with the additive function $\Phi(e_S,e_B)$: setting a regulation on matchmakers is welfare improving for high values of δ but the policy is welfare decreasing if the discount factor is low (see Figure 3 in the text).