About bargaining power

Klaus Kultti*

Department of Economics and Management Science, Helsinki School of Economics and Business Administration,
P.O. Box 1210, Helsinki 00101, Finland

Received 16 November 1999; accepted 25 April 2000

Abstract

I consider a standard search model where agents have an option to wait for other agents upon meeting someone. This restricts the bargaining power that can be assigned to the agents when modelling trading as immediate. © 2000 Elsevier Science S.A. All rights reserved.

Keywords: Bargaining power; Option to wait

JEL classification: C78; D83

1. Introduction

I analyse a standard search model in continuous time where the agents’ meetings take place according to a Poisson process. There are two types of agents, and one of each type is required to generate a unit of production. When analysis is kept simple not much is said about the actual bargaining procedure. Typically, it is assumed that the available surplus is divided according to a Nash-bargaining solution, where one party gets share $a$ of the surplus and the other party the rest. This is a reduced form of many explicit bargaining procedures like alternating offers bargaining, or bargaining where one of the parties is randomly given a chance to make a take-it-or-leave-it offer.

I show that if it is assumed that the agents can wait for other partners to appear, a not so unreasonable assumption, one cannot use any shares in the Nash-bargaining solution. Only values in an interval that is a strict subset of the unit interval are consistent with the parties striking a deal immediately.

If bargaining takes the take-it-or-leave-it form one has to take explicitly into account the expected utility from waiting for other partners. In this case the shares can be assigned freely but the agents’ utilities are still bounded away from zero.
2. The model and results

2.1. Nash-bargaining

Consider a standard search model in continuous time (e.g., Pissarides, 1990). There are sellers and buyers who meet pairwise. The sellers meet buyers at rate $\alpha$, and the buyers meet sellers at rate $\beta$. Let us assume that once a pair is formed, i.e., a match has taken place, sellers continue to arrive to the pair at rate $\alpha$, and buyers continue to arrive to the pair at rate $\beta$. This means that the pair does not go away from the economy or that both parties keep open the option to wait for more partners to arrive. Further, assume that trading between a buyer and a seller results in gains from trade normalised to unity. Finally, assume that the surplus is divided in such a way that the seller receives share $a$ and the buyer share $1-a$, which would be the result of an asymmetric Nash-bargaining solution. The purpose is to determine when it is the case that one of the parties rather waits for other partners to arrive than strikes a deal immediately upon matching.

If it ever happens that a pair of agents waits for other agents to arrive the following happens: If there are more buyers than sellers in a meeting the buyers engage in an auction where the price is such that they receive their reservation utility regardless of whether they get the object or not, and if there are more sellers than buyers there is an auction where the sellers receive their reservation utility.

Let $V$ denote the expected life time utility of a seller, and $W$ that of a buyer. If the agents trade immediately upon meeting their expected life time utilities are determined by the following asset value equations

\[ rV = \alpha [V + V - W - V] \]  
\[ rW = \beta [W + W - V - W] \]  

From (1) and (2) the life time utilities are

\[ V = \frac{\alpha a}{r + \alpha a + \beta (1-a)} \]  
\[ W = \frac{\beta (1-a)}{r + \alpha a + \beta (1-a)} \]  

Think about an economy that functions according to the above equations. This means, in particular, that the agents know each others’ life time utilities, and what the surplus to be divided is. Consider a seller who deviates by not striking a deal immediately upon meeting a buyer. Assume also that the buyer stays paired with the seller. If a new buyer appears the seller gets all the surplus while if a new seller appears the buyer gets all the surplus. I study a one time deviation which here means that if the seller ends up in an auction with another seller, he returns to the old behaviour of striking a deal immediately upon meeting a buyer. The deviating seller’s expected utility is determined by

\[ rD_v = \alpha (1 - V - D_v) + \beta (V - D_v) \]  

From (5) one solves
Waiting is profitable to the seller if it yields more than striking a deal immediately, i.e., \( D_v > V + a(1 - V - W) \) which is equivalent to

\[
a < \frac{\alpha}{r + 2\alpha + \beta} = a_L
\]

(7)

Analogously, waiting is profitable to the buyer if

\[
1 - a < \frac{\beta}{r + \alpha + 2\beta} \quad \text{or} \quad a > \frac{r + \alpha + \beta}{r + \alpha + 2\beta} = a_U
\]

(8)

when \( r \) approaches zero, and \( \alpha = \beta a_L \) approaches one third, and \( a_U \) approaches two thirds. It should be noted that the most common practice of letting the parties divide the surplus equally, i.e., letting \( a = \frac{1}{2} \), is a good idea in a sense that \( a_L < \frac{1}{2} < a_U \). One can show that \( a = \frac{1}{2} \) is the only value that is always between the limits in (7) and (8).

It should be noted that when either party decides to wait it is also in the interest of the other party to wait, as assumed above. If a party, say seller, leaves instead of waiting he gets his expected life time utility which is \( V \). If he stays the worst that can happen to him is that another seller appears in which case he gets his expected life time utility, \( V \). But if another buyer appears the seller gets all the surplus.

The analysis leads to the following observation: If it is postulated that the seller gets share \( a \) upon meeting a buyer, and that the parties strike a deal immediately, the model does not seem to be consistent with the option to wait. In other words, the assumption of immediate trading imposes constraints on the possible values of \( a \), i.e., on how the cake is divided.

2.2. Take-it-or-leave-it bargaining

Usually it is thought that the seller’s share \( a \) of the surplus is a result of some kind of bargaining game between the seller and the buyer. For instance, if the seller gets to make a take-it-or-leave-it offer with probability \( a \) and the buyer with probability \( 1 - a \) their expected utilities should be as above. With the option to wait this, however, is not true anymore. In the standard model the proposing party offers the reservation utility of the respondent but now the reservation utility is the utility from waiting. Since waiting is wasteful there is no waiting in equilibrium but this option has to be taken into account. Let us see formally what happens.

Let \( V \), and \( D_v \) denote the expected utilities of a searching seller, and a waiting seller (who is paired with a buyer), and \( W \), and \( D_w \) the corresponding things for a buyer. The expected utilities are determined by

\[
rV = a[a(1 - D_w) + (1 - a)D_v - V]
\]

(9)

\[
rW = \beta[aD_w + (1 - a)(1 - D_v) - W]
\]

(10)

\[
rD_v = \alpha(1 - W - D_v) + \beta(V - D_v)
\]

(11)
\[ rD_w = \alpha(W - D_w) + \beta(1 - V - D_w) \]  
(12)

Solving (9)–(12) one gets

\[ V = \frac{\alpha[a + a(r + \beta)]}{(r + \alpha + \beta)^2 - \alpha \beta} \]  
(13)

\[ W = \frac{\beta[\beta + (1 - a)(r + \alpha)]}{(r + \alpha + \beta)^2 - \alpha \beta} \]  
(14)

Letting \( r \) approach zero, and assuming that \( \alpha = \beta \) one sees that \( V = 1 + a/3 \) and \( W = 2 - a/3 \). Thus, taking into account the option to wait the sellers’ and buyers’ expected utilities are bounded away from zero; even if the seller never gets to make an offer, i.e., \( a = 0 \), he gets expected utility \( 1/3 \).

**Acknowledgements**

I thank Marcel Jansen, J.-P. Niinimäki, Tuomas Takalo, and Juha Virrankoski for comments.

**References**