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Bargaining Agenda, Timing, and Entry

Luciano Fanti* and Domenico Buccella

Abstract

In a unionised Cournot duopoly, the present paper extensively re-examines the subject of the bargaining scope between firms and unions. It investigates the endogenous equilibrium agenda (Right-to-Manage vs Efficient Bargaining) that can arise under three timing specification of the bargaining game both for a given duopoly and monopoly with threat of entry. A novel result is that, in sequential negotiations, Efficient Bargaining emerges in equilibrium for a range of the unions' power larger than in simultaneous negotiations. Moreover, given the potential market deterrence effect of the Efficient Bargaining, the conventional wisdom that this agenda is socially "efficient" can be reversed.

Keywords: Efficient Bargaining; Right-to-manage; Cournot duopoly; Firm-union bargaining agenda

JEL Classification: J51, L13

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1 Introduction

The subjects of the scope of bargaining and the choice of the negotiation agenda are pivotal in labour-management relations and negotiations and, therefore, for the functioning of labour market institutions in the most advanced economies, notably in Europe. In the present work, we focus the analysis on the two most frequently discussed models in the economic literature, and empirically observed in real word bargaining agendas: the Right-to-Manage (RTM) and the Efficient Bargaining (EB) models.

In the RTM model (Nickell and Andrews 1983; Dobson 1997; Naylor 2002; Correa-López and Naylor, 2004), unionised labour and firms bargain over wages; nevertheless, once wages are fixed, the firms have the right to decide the employment level. On the other hand, in the EB model, the firms and unionised labour negotiate over wages and employment either simultaneously (e.g. McDonald and Solow 1981; Ashenfelter and Brown, 1986; Espinosa and Rhee 1989; Bughin 1995, 1996), or in a sequential way (Manning, 1987a,b).

Precisely, the present paper analyses which institution about the scope of bargaining, and therefore the bargaining agenda, may prevail at market equilibrium and whether firms and unions may (endogenously) agree with this institution. The reference framework of the article is a unionized Cournot duopoly with firms producing homogeneous goods. Three different cases related to the timing of the bargaining game are taken into consideration. In this respect, the paper provides an exhaustive treatment of the different strategic effects of the bargaining agenda in relation with the different cases of the timing of the bargaining game, so also integrating the previous literature which treated only partially as well as separately such cases. In the first case, in the presence of the mixed duopoly, the firm which introduces the EB agenda negotiate wages and employment when the RTM firm decides output; in other word, the EB firm is Stackelberg wage follower. In the second case, the firm with the EB agenda negotiate wages and employment when the RTM firm bargains the wage with its union, that is, the EB firm is Stackelberg output leader. Finally, in the third case, despite the diverse agendas, both firms negotiate with unions first wages concurrently, and subsequently the EB firm negotiates with its union over employment, while the RTM firm chooses employment unilaterally; in other words, there is no leadership. The negotiation processes between unions and firms entail interesting problems not only for the bargaining parties, but also for consumers and society. The comprehension of these issues are significant for the design of policies to regulate labour markets for their appropriate functioning, the organisation of productive activities in different sectors of the economy and product markets as well as the assessment of the effects on social welfare. Consequently, governments and policy-makers as well as guarantees authorities such as antitrust bodies are concerned.

The article contributes to the growing literature on unionised oligopoly (e.g., Horn and Wolinsky, 1988; Dowrick 1989; Bughin, 1995; Correa-López and Naylor, 2004; Fanti and Meccheri, 2011, 2013). However, despite the relevance of the topic for the labour economics as well as the industrial organization, the analysis of the bargaining agenda selection and the impact of different labour market institutions on labor and product markets is scanty in the existing literature. The present paper is one of the few that focuses exactly on these issues. Noteworthy exceptions are the works of Petrakis and Vlassis (2000), Kraft (2006), Vannini and Bughin (2000), and Fanti (2014, 2015).

Petrakis and Vlassis (2000) build a model where the benchmark equilibrium institution is RTM. Then, the authors test whether the RTM agenda lasts all the possible deviations which need both bargaining parties to agree with. They show that an agreement on the EB agenda can never occur. On the other hand, depending on whether the unions' bargaining power is

larger or lower than that of firms, an agreement arises on either RTM or a mixed result where, in equilibrium one firm-union pair selects EB while the other pair chooses RTM.

Kraft (2006) mirrors the assumption of Petrakis and Vlassis (2000) that, when one firm commits to EB, then the rival firm always becomes a Stackelberg follower in the output market. Nevertheless, Kraft (2006) argues, in sharp contrast with Petrakis and Vlassis (2000), that EB is the firms' dominant strategy for a large range of the bargaining power parameter.

In an oligopoly context, Vannini and Bughin (2000) concentrates on the firms' decision whether to adopt cost-raising strategies through the recognition of labour unions. The authors show that in precise circumstances (low union power, low product differentiation and centralised bargaining), firms can prefer an EB arrangement rather than a RTM arrangement, despite higher unit wage costs. However, Kraft (2006) and Vannini and Bughin (2000) do not take into account the union's utilities to determine the equilibrium agenda and, therefore, abstract from the issue of the endogenous agreement on the bargaining scope.

Thus, the approach of those papers with regard the issues of the bargaining scope and agenda is totally different from the one of the present paper. As a consequence, their results are not directly comparable with those of the present work, which follows and complements Fanti (2014, 2015) who revisited such an issue in a standard game-theoretic approach.

Fanti (2014) first compares the exogenously given equilibria, and then investigates which agenda endogenously arises in equilibrium when the bargaining institutions are the monopoly union and EB, and in the mixed duopoly, the EB firm negotiates wages and employment when the other firm decides the output level (EB firm Stackelberg wage follower). The author finds that, when the equilibrium is exogenous, firms prefer EB when the union bargaining power is lower, equals or slightly higher than that of firms while, for a sufficiently high value of the union bargaining power, unions prefer EB. On the other hand, for a medium-high value of the unions' bargaining power, the parties agree on the monopoly union institution. As for the endogenous equilibria, Fanti (2014) shows that the bargaining parties agree on the selection of the EB agenda for arrangement for a wide medium-high value range of the union's power. Fanti (2015) analyse the endogenous selection of the bargaining agenda in a duopoly where, in the mixed case, the firm with the EB agenda negotiate wages and employment when the RTM firm bargains the wage with its union (EB firm Stackelberg output leader). Fanti (2015) shows that only EB can arise as sub-game perfect Nash equilibrium (SPNE) in pure strategies and under the risk-dominance criterion, provided that the union bargaining power is not too high .

Nonetheless, the previous contributions have carried out their analysis considering the duopoly market structure as given, therefore abstracting from the topic of the potential entry and the use of the bargaining agenda as a market entry deterrent mechanism.

The focus on the relationship between entry and bargaining agenda is the subject of the papers of Bughin (1999) and Buccella (2011). Bughin (1999) considers different market structures, that is, duopoly vs. monopoly with threat of potential entry, and different entry modes and constraints on the choice of bargaining scope. Bughin (1999) proposes the timing of the game when the EB firm in the mixed duopoly is a Stackelberg follower. The author argues that, under a unionized duopoly, the EB agenda arises as the industry equilibrium for each firm. Adopting the same timing of Bughin (1999) and making use of a conjectural variation model, Buccella (2011) shows that a conflict of interest among the parties arises with regard to the bargaining agenda, in sharp contrast with the previous finding (due to some limitations in Bughin's result). In particular, when the duopoly is the given market structure, RTM is the firms' dominant strategy while EB is the unions' dominant strategy. However, in the case of threat of entry, the incumbent bargaining parties can agree on the EB agenda to deter a potential entrant to enter the market.

The primary results of the paper are as follows. In the absence of entry, the specification of the timing in the negotiation process is fundamental to determine the endogenous equilibrium agenda between firms and unions. In line with Buccella (2011), we show that, when in the mixed duopoly the EB firm is Stackelberg wage follower, no endogenous equilibrium bargaining agenda arises in union-firm negotiations. On the other hand, when in the mixed duopoly the EB firm is Stackelberg output leader, we confirm the results of Fanti (2015). Finally, in the absence of leadership, that is, when the EB firm negotiates sequentially over wages and employment, we find that, similarly to Fanti (2015), only the Efficient Bargaining can emerge as the endogenous equilibrium agenda, in pure strategies and under the risk-dominance criterion for a range of the union's power values larger than that of the case of simultaneous EB (i.e., provided that the union's bargaining power is not extremely high). In the presence of potential entry, the timing of the negotiation, the entry mode as well as the restrictions on bargaining are fundamental to determine the equilibrium agenda in each bargaining unit. The central results are mainly confirmed: the EB is the predominant endogenous equilibrium agenda that arises in pure strategies, even for a larger range of the union bargaining power parameter than for the given duopoly market structure. Nonetheless, in circumscribed situation, also the RTM agenda can emerge as the equilibrium bargaining agenda. Noteworthy, the incumbent union-firm unit can strategically use only the EB agenda as an entry deterrence tool.

The remainder of the article is organized as follows. Section 2 describes the basic duopoly model. Section 3 develops the case of the unionisation of the labour market under the two institutions, EB and RTM, and the three timing characterizations. Section 4 derives the sub-game perfect Nash equilibrium outcomes as well as the key propositions with regard to the choice of the preferred agreement by firms and unions when duopoly is the established market structure. Section 5 extends the analysis to an oligopoly incumbent-entrant game with threat of potential entry, and provides the key findings and propositions concerning the agreed agenda. Finally, the last section summarises the main results and implications, and propose plausible directions for further research on the topic.

2 The basic model

As Bughin (1999), Petrakis and Vlassis (2000), Naylor (2003), and Kraft (2006), just to mention a few, we consider a duopolistic Cournot model. The two firms, labelled 1 and 2, produce homogeneous goods. The linear (inverse) product demand is

$$p = a - q_i - q_j, \quad i, j = 1, 2; \quad i \neq j \quad (1)$$

where P is the market price (the slope is normalised to the unity), q_i and q_j are the output levels of the two firms. Without loss of generality, it is possible to normalize the parameters $a = 1$. Labour, l , represents the unique input factor. A constant returns-to-scale technology characterises the production function - identical for both firms - with constant (marginal) returns to labour, such that

$$q_i = l_i, \quad i = 1, 2 \quad (2)$$

where l_i represents the labour force employed by firm i . The i -th firm faces an average and marginal cost $w_i \geq 0$ for every unit of output produced, where w_i is the wage per unit of labour. Therefore, the firm i 's cost function is linear and described by:

$$C_i(q_i) = w_i l_i = w_i q_i. \quad (3)$$

Thus, the expression for each firm's profits is

$$\Pi_i = (1 - q_i - q_j - w_i)q_i, \quad i, j = 1, 2; \quad i \neq j. \quad (4)$$

3 The unionised labour market.

Both firms are unionized, and negotiations are conducted at decentralized level. We assume that the members of the unions are large enough to meet the firm's labour demand. We consider the two typical negotiation models of the trade-union economics (Booth, 1995): 1) the Right-to-Manage model (RTM) (e.g. Nickell and Andrews, 1983), in which wages are the outcome of negotiations between firms and unionized labour; however, once wages are set, the firms have the right to set the employment levels; and 2) the efficient bargaining model (EB) which prescribes that the union and the firm are bargaining over both wages and employment (or, more realistically, hours of work). Wages and employment negotiations may occur either simultaneously (e.g. McDonald and Solow, 1981; Ashenfelter and Brown, 1986), or sequentially (Manning, 1987a,b).

Each firm-specific union has the following utility function:¹

$$V_i = w_i l_i. \quad (5)$$

We assume that unions are identical. Therefore, by recalling that $q_i = l_i$, (5) becomes:

$$V_i = w_i q_i, \quad (6)$$

that is, the unions' objective function is to maximise the total wage bill. Let us begin by illustrating the cases of RTM and EB, both in the simultaneous and sequential configurations.

3.1. Right-to-manage institution

First, we construct a firm-union two-stage game according to the Right-to-Manage (RTM) model. In the first stage, each firm-union bargaining unit simultaneously negotiates over

¹ This a specific case of the more general Stone-Geary utility function, i.e., Pencavel (1984, 1985), Dowrick and Spencer (1994):

$$V = (w - w^\circ)^\theta l,$$

where w° is the reservation or competitive wage. A value of $\theta = 1$ gives the rent-maximising case (i.e., the union seeks to maximise the total rent); values of $\theta < (>)1$ imply that the union is less (more) concerned about wages and more (less) concerned about jobs). Moreover, the unions aims to maximise the wage bill when $w^\circ = 0$.

wages (given the output chosen by firms); in the second stage, firms simultaneously choose their output level (given the wages bargained with the unions). We solve for the equilibrium in the usual backward fashion.

In the second stage of the game, firms compete on quantities (the market game). The FOCs of (4) lead to the firms' reaction functions

$$q_i(q_j) = \frac{1}{2}(1 - w_i - q_j), \quad i, j = 1, 2; \quad i \neq j \quad (7)$$

From (7), we obtain firm i 's output, for given w_i, w_j

$$q_i(w_i, w_j) = \frac{1}{3}(1 - 2w_i + w_j), \quad i, j = 1, 2; \quad i \neq j. \quad (8)$$

In the first stage of the game, under RTM, the firm-union bargaining unit i selects w_i to maximize the following generalized Nash product

$$\max_{w_i, w_j} N_i = (V_i)^b (\Pi_i)^{1-b} = (w_i q_i)^b [(1 - q_i - q_j - w_i) q_i]^{1-b}, \quad i, j = 1, 2; \quad i \neq j \quad (9)$$

where b represents the bargaining power of the union. Using (8), the maximisation of (9) with respect to w_i leads to the sub-game perfect best-reply function in wages of the union-firm pair i under the assumption of a non-cooperative Cournot-Nash equilibrium in the product market:

$$w_i(w_j) = \frac{b}{4}(1 + w_j) \quad i, j = 1, 2; \quad i \neq j \quad (10)$$

Solving the system of equations in (10), we obtain the sub-game perfect equilibrium wages:²

$$w_i = w_j = w^{RTM/RTM} = \frac{b}{4-b}. \quad (11)$$

Further substitution of (11) into (8), (4) and (6) determines, after the usual algebra, the equilibrium values output, profits and union's utility

$$q_i = q_j = q^{RTM/RTM} = \frac{2(2-b)}{3(4-b)} \quad (12)$$

$$\Pi_i = \Pi_j = \Pi^{RTM/RTM} = \frac{4(2-b)^2}{[3(4-b)]^2} \quad (13)$$

$$V_i = V_j = V^{RTM/RTM} = \frac{2b(2-b)}{3(4-b)^2} \quad (14)$$

² The apex – e.g. RTM/RTM – denotes the choice of the type of bargaining arrangement by firms i and j , respectively.

3.2. Efficient Bargaining institution.

Case A: Simultaneous wage and employment negotiations

Under the simultaneous efficient bargaining, the union and the management of the firm negotiate the wages and employment at the same time. Given the assumption of identical unions having symmetric power across units bargaining units, we have to maximize the following generalised Nash product,

$$\underbrace{\max}_{w.r.t. w_i, q_i} N_i = (V_i)^b (\Pi_i)^{1-b} = (w_i q_i)^b [(1 - q_i - q_j - w_i) q_i]^{1-b} \quad (15)$$

From the system of first-order conditions of the efficient bargaining game between firms and unions, the firms' reaction functions in output as well as the unions' wages functions are

$$q_i(q_j, w_i) = \frac{1}{2-b} (1 - w_i - q_j), \quad i, j = 1, 2; \quad i \neq j \quad (\text{contract curve}) \quad (16)$$

$$w_i(q_i, q_j) = b(1 - q_i - q_j), \quad i, j = 1, 2; \quad i \neq j \quad (\text{rent-sharing curve}) \quad (17)$$

From (16), the firm i 's output level, for given w_i, w_j , is

$$q_i(w_i, w_j) = \frac{[b(1 - w_i) - (1 + w_j) + 2w_i]}{(3 - b)(1 - b)}, \quad i, j = 1, 2; \quad i \neq j. \quad (18)$$

Substituting (18) into (17), we get

$$w_i(w_j) = \frac{b[(1 - b) + w_j]}{3 - 2b}, \quad i, j = 1, 2; \quad i \neq j \quad (19)$$

which defines the sub-game perfect best-reply function in wages of the bargaining unit i . Solving the system in (19), we obtain the sub-game perfect equilibrium wages

$$w_i = w_j = w^{EB/EB} = \frac{b}{3}. \quad (20)$$

Further substitution of (20) into (18), (4) and (6) allows for the derivation of the equilibrium values of output, profits and union's utility

$$q_i = q_j = q^{EB/EB} = \frac{1}{3} \quad (21)$$

$$\Pi_i = \Pi_j = \Pi^{EB/EB} = \frac{(1 - b)}{9} \quad (22)$$

$$V_i = V_j = V^{EB/EB} = \frac{b}{9} \quad (23)$$

Case B: Sequential wage and employment negotiations

Under the sequential efficient-bargaining the union and the management of the firm negotiate the wages and employment at different stages. In the first stage, each firm-union pair negotiates over wages; in the second stage, each union-firm pair bargains the employment level (given the previously bargained wages). In other words, the firm-union bargaining unit i selects in the first stage w_i and in the second stage q_i . We solve for the equilibrium in the usual backward fashion. In this case, we have to maximise the following generalised Nash product,

$$\underbrace{\max}_{w.r.t. q_i} N_i = (V_i)^b (\Pi_i)^{1-b} = (w_i q_i)^b \left[(1 - q_i - q_j - w_i) q_i \right]^{1-b} \quad (24)$$

where b is the union's bargaining power. In the first stage, from the system of FOCs of the efficient bargaining game between firms and unions, the firms' output reaction functions are:

$$q_i(q_j, w_i) = \frac{1}{2-b} (1 - w_i - q_j), \quad i, j = 1, 2; \quad i \neq j \quad (25)$$

From (25), we obtain the firm i 's output level, for given w_i, w_j :

$$q_i(w_i, w_j) = \frac{[(1-b) + w_j - (2-b)w_i]}{(1-b)(3-b)}, \quad i, j = 1, 2; \quad i \neq j \quad (26)$$

Making use of (26), in the first stage the firm-union bargaining unit i negotiates w_i and, therefore, maximises the following generalised Nash product:

$$\underbrace{\max}_{w.r.t. w_i} N_i = (V_i)^b (\Pi_i)^{1-b} = (w_i q_i(w_i, w_j))^b \left[(1 - q_i(w_i, w_j) - q_j(w_j, w_i) - w_i) q_i(w_i, w_j) \right]^{1-b}. \quad (27)$$

The FOCs of the efficient bargaining game between firms and unions lead to

$$w_i(w_j) = \frac{b[(1-b) + w_j]}{2(2-b)}, \quad i, j = 1, 2; \quad i \neq j, \quad (28)$$

which define the sub-game perfect best-reply function in wages of union-firm pair i . Solving the system in (28), we obtain the sub-game perfect equilibrium wages,

$$w_i = w_j = w^{EB/EB} = \frac{b(1-b)}{4-3b} \quad (29)$$

Further substitution of (29) into (26) allows for the derivation of the output level:

$$q_i = q_j = q^{EB/EB} = \frac{(2-b)^2}{(4-3b)(3-b)} \quad (30)$$

Finally, by substituting both (29) and (30) into (4) and (6), we obtain the equilibrium profits and union utilities:

$$\Pi_i = \Pi_j = \Pi^{EB/EB} = \frac{(2-b)^4(1-b)}{[(4-3b)(3-b)]^2} \quad (31)$$

$$V_i = V_j = V^{EB/EB} = \frac{b(2-b)^2(1-b)}{(4-3b)^2(3-b)}. \quad (32)$$

3.3 The mixed case: one bargaining unit chooses EB and the other one chooses RTM.

Let us consider the case that the bargaining unit i chooses EB while the rival j selects RTM. As regards the mixed case, there are three alternatives for how the rules of the game can be specified, two of them relates to the simultaneous negotiations and one to the sequential negotiations over wage and employment levels.

Simultaneous EB, mixed case 1 (Bughin, 1999; Buccella, 2011; Fanti, 2015): in the second stage, firm i and union i bargain over wage and employment taking as given the negotiated wage at j and firm's j output. Firm j chooses employment for given wage and output of the bargaining unit i and its own wage at j . In the first stage, the firm and the union j bargain over the wage taking as given the solutions of the production stage for wage and output in i and output in j . In this case, firm i acts as Stackelberg wage follower, $i, j = 1, 2, i \neq j$.

Simultaneous EB, mixed case 2 (Fanti, 2015): in the second stage, firm j selects its optimal quantity, taking the wage and employment level in i as given. In the first stage, firm i and union i bargain over wage and employment taking as given the negotiated wage in j and firm's j reaction function to firm i output decision in the production stage; firm j and union j bargain over the wage taking into consideration its own reaction function to firm i output choice in the subsequent production stage, and taking as given the wage and employment level in i . In this case, firm i is Stackelberg output leader, $i, j = 1, 2, i \neq j$.

Mixed sequential EB: in the second stage, firm j selects its optimal quantity, taking its own wage level and the wage level in i as given, while firm and union i bargain efficiently over employment. In the first stage, the firm and the union in j bargain the wage level taking as given its own reaction function and the negotiated employment in the firm i ; the firm and the union in i negotiate efficiently the wage level, taking as given the reaction function of firm j to the negotiated employment in the firm i , and its own efficiently negotiated employment, $i, j = 1, 2, i \neq j$.

In the following, we examine all the three cases.

Simultaneous EB, mixed case 1

The equilibrium outcomes under the mixed oligopoly with the game specification rules in Case 1 are here derived. Assume that the union-firm pair i bargains under EB, while the union-firm pair j negotiates under RTM. In the second stage, the union-firm pair i negotiates over wage and employment and, therefore, maximises (15). Solving for q_i the system of the FOCs in (16) and (17), we derive

$$q_i = \frac{(1-q_j)}{2} \quad (33)$$

which represents firm i output as function of the rival firm's output. On the other hand, from (4), the FOCs for firm j determine the reaction function in (7). Solving the system composed by (33) and (7) for the firms' quantities, we obtain

$$q_i = \frac{(1+w_j)}{3}, \quad (34)$$

the firm's i output as function of the rival firm's wage rate and

$$q_j = \frac{(1-2w_j)}{3} \quad (35)$$

the firm's j optimal response as function of w_j .

In the first stage of the game, the bargaining unit j under RTM sets w_j to maximize (9), taking as given (34) and (35). The FOCs leads to

$$w_j^{EB/RTM} = \frac{b}{4} \quad (36)$$

the optimal wage of the bargaining unit j under RTM. Further substitution of (36) into (34) allows for the derivation of

$$q_i^{EB/RTM} = \frac{4+b}{12}, \quad (37)$$

the firm's i equilibrium output. Inserting back (36) into (35), we obtain

$$q_j^{EB/RTM} = \frac{2-b}{6} \quad (38)$$

the firm's j output level in equilibrium. Finally, inserting (37) and (38) into (17), the bargained wage in firm 1 is

$$w_i^{EB/RTM} = \frac{b(4+b)}{12} \quad (39)$$

the optimal bargaining unit i wage under EB. Direct substitutions of the equilibrium quantities and wages into (4)-(6) allow to compute the equilibrium profits and union utilities

$$\Pi_i^{EB/RTM} = \frac{(1-b)(b+4)^2}{144}, \quad \Pi_j^{EB/RTM} = \frac{(2-b)^2}{36} \quad (40)$$

$$V_i^{EB/RTM} = \frac{b(4+b)^2}{144}, \quad V_j^{EB/RTM} = \frac{b(2-b)}{24}. \quad (41)$$

Simultaneous EB, mixed case 2

The equilibrium outcomes of the mixed duopoly with the simultaneous EB bargain as in case 2 are here derived. Assume again that firm i negotiates with its union under EB, while firm j negotiates under RTM. From equation (4), the first order condition for firm j determines the best response function, identical to (7). Therefore, making use of (1), (4) and (7), the maximization problem in (9) for the bargaining unit i is

$$\underbrace{\max}_{w_i, q_i} N_i = (V_i)^b (\Pi_i)^{1-b} = (w_i q_i)^b \left\{ \left[1 - q_i - \left(\frac{1 - q_i - w_j}{2} \right) - w_i \right] q_i \right\}^{1-b} \quad i, j = 1, 2, \quad i \neq j. \quad (42)$$

The FOCs lead to the following expressions

$$q_i = \frac{1 + w_j - 2w_i}{2 - b} \quad (\text{contract curve}) \quad (43)$$

$$w_i = \frac{b}{2}(1 - q_i + w_j) \quad (\text{rent sharing curve}) \quad (44)$$

Solving the system of equations (43)-(44) for w_i , we obtain

$$w_i = \frac{b(1 + w_j)}{4}, \quad (45)$$

and consequently

$$q_i = \frac{1 + w_j}{2} \quad (46)$$

the firm-union pair i output and wage as function of the rival wage level. Taking into account of the own optimal response in the subsequent stage, the bargaining problem of the firm-union pair j under RTM is to set w_j to maximise

$$\underbrace{\max}_{w.r.t. w_j} N_j = (V_j)^b (\Pi_j)^{1-b} = \left[w_j \left(\frac{1 - q_i - w_j}{2} \right) \right]^b \left[\left(\frac{1 - q_i - w_j}{2} \right)^2 \right]^{1-b} \quad (47)$$

The FOC leads to

$$w_j = \frac{b(1 - q_i)}{2} \quad (48)$$

the bargained wage in unit J under RTM as function of the output in unit i . Substitution of (46) into (48) allows us for the derivation of the equilibrium bargained wage in unit J under RTM

$$w_j^{EB/RTM} = \frac{b}{4 + b}. \quad (49)$$

Further substitution of (49) into (45) and (46) leads us to

$$w_i^{EB/RTM} = \frac{b(2 + b)}{2(4 + b)} \quad (50)$$

$$q_i^{EB/RTM} = \frac{2 + b}{4 + b} \quad (51)$$

the firm's i output level in equilibrium. Further substitutions of (49) and (51) into the counterpart for j of (7), leads us to

$$q_j^{EB/RTM} = \frac{2 - b}{2(4 + b)}, \quad (52)$$

the firm's J equilibrium output. Simple substitutions of (49)-(52) into (4) and (6) allow deriving the equilibrium profits and union utilities

$$\Pi_i^{EB/RTM} = \frac{(1 - b)(2 + b)^2}{2(4 + b)^2}, \quad \Pi_j^{EB/RTM} = \frac{(2 - b)^2}{[2(4 + b)]^2} \quad (53)$$

$$V_i^{EB/RTM} = \frac{b(2 + b)^2}{2(4 + b)^2}, \quad V_j^{EB/RTM} = \frac{b(2 - b)}{2(4 + b)^2}. \quad (54)$$

Mixed sequential EB

Let the firm-union pair i (J) choose EB (RTM). In the second stage, firm and union i bargain efficiently over employment, taken as given w_i and w_j , and firm J 's reaction function, while firm J selects its optimal quantity, taking as given w_i and w_j , and the firm-union i 's bargained output. Therefore, in the second stage, the firm J 's reaction function is

(7). Given (7), the firm-union pair i maximises (42) with respect to q_i , and the bargained employment is equal to $q_i(w_i, w_j)$ in (43). Substitution of (43) into (7) leads us to

$$q_j = \frac{[1 - b + w_i - w_j(2 + b)]}{3 - 2b}. \quad (55)$$

Further substitutions of (7) and (55) into (42) and (47), and subsequent maximisation of the Nash Products with respect to w_i and w_j , leads us to (45) for the bargaining unit i and

$$w_j = \frac{b(1 + w_i - b)}{2(2 - b)} \quad (56)$$

for the bargaining unit j . Solving the system of equations (45) and (56) for w_i and w_j , we obtain

$$w_i^{EB/RTM} = \frac{b[b + (2 - b)(2 + b)]}{8b + [(4 - b)(4 + b)]} \quad (57)$$

$$w_j^{EB/RTM} = \frac{b(3b - 4)}{8b + [(4 - b)(4 + b)]}, \quad (58)$$

the equilibrium wages in the mixed case with sequential efficient bargaining. Further substitutions of (57) and (58) into (43) and (55) allow us for the derivation of the equilibrium quantities

$$q_i^{EB/RTM} = \frac{2(2 - b)[b + (2 - b)(2 + b)]}{(3 - 2b)[8b + (4 - b)(4 + b)]} \quad (59)$$

$$q_j^{EB/RTM} = \frac{(2 - b)^2(4 - 3b)}{(3 - 2b)[8b + (4 - b)(4 + b)]} \quad (60)$$

Subsequent substitutions of (57)-(59) into (4) and (6) allow for the derivation of the equilibrium values of the profits and union utilities

$$\Pi_i^{EB/RTM} = \frac{4(1 - b)(2 - b)^2[b + (2 - b)(2 + b)]^2}{(3 - 2b)^2[8b + (4 - b)(4 + b)]^2}, \quad \Pi_j^{EB/RTM} = \frac{(4 - 3b)^2(2 - b)^4}{(3 - 2b)^2[8b + (4 - b)(4 + b)]^2} \quad (61)$$

$$V_i^{EB/RTM} = \frac{2b(2 - b)[b + (2 - b)(2 + b)]^2}{(3 - 2b)[8b + (4 - b)(4 + b)]^2}, \quad V_j^{EB/RTM} = \frac{b(4 - 3b)^2(2 - b)^2}{(3 - 2b)[8b + (4 - b)(4 + b)]^2}. \quad (62)$$

4 The equilibrium agendas

Now we are in position to conduct the following analysis. We compare firm's profits and unions' welfare under the three labour market institutions, and we investigate which bargaining agenda will *endogenously* emerge in the subgame perfect Nash equilibrium (SPNE) for both firms and unions.

4.1 The game with simultaneous EB and mixed case 1

Let us first consider the game with simultaneous EB and the characterization of the mixed case 1. Given the payoffs in (13), (14), (22), (23), (40) and (41), we obtain the subsequent Tables 1 and 2 which summarise profits and union's utilities, respectively, in the four strategic situations. An analytical inspection allows us to derive the following results.

Proposition 1 (Buccella, 2011; Fanti, 2014) *In a unionized Cournot duopoly with simultaneous EB and the characterization of the mixed case 1, RTM is the dominant strategy for firms; this is in explicit conflict with the unions' interests because EB is their dominant strategy as regards the bargaining agenda. Therefore, under the endogenous determination of the SPNE, no agreement on the bargaining agenda may occur between unions and firms.*

The rationale for this result is as follows. In the mixed case, the firm with the EB agenda has higher negotiated wages and produces larger output when the competitor is a firm with a RTM agenda, and profits for the RTM firm are higher than those of the EB firm. The reason is that, because of the common price for the products and lower wages, the margins for the RTM firm are higher than the EB firm. Moreover, lower output and wages for the RTM firm ensure lower total costs. On the other hand, from the unions' point of view, EB is the dominant strategy because of higher negotiated wages and employment levels.

Table 1: Profit matrix, simultaneous EB, mixed case 1

Profit Matrix Case 1		Firm 2	
		RTM	EB
Firm 1	RTM	$\frac{4(2-b)^2}{[3(4-b)]^2}; \frac{4(2-b)^2}{[3(4-b)]^2}$	$\frac{(2-b)^2}{36}; \frac{(1-b)(b+4)^2}{144}$
	EB	$\frac{(1-b)(b+4)^2}{144}; \frac{(2-b)^2}{36}$	$\frac{(1-b)}{9}; \frac{(1-b)}{9}$

Table 2: Unions matrix, simultaneous EB, mixed case 1

Union rent Matrix Case 1		Union 2	
		RTM	EB
Union 1	RTM	$\frac{2b(2-b)}{3(4-b)^2}; \frac{2b(2-b)}{3(4-b)^2}$	$\frac{b(2-b)}{24}; \frac{b(4+b)^2}{144}$
	EB	$\frac{b(4+b)^2}{144}; \frac{b(2-b)}{24}$	$\frac{b}{9}; \frac{b}{9}$

4.2 The game with simultaneous EB and mixed case 2

Let us consider the game with simultaneous EB and the characterization of the mixed case 2. Given the payoffs in (13), (14), (22), (23), (53) and (54), we obtain the following Tables 3 and 4 which sum up profits and union's utilities, respectively, in the four strategic situations. A closer analytical inspection reveals the following results.

Proposition 2 (Fanti, 2015) *In a unionized Cournot duopoly with simultaneous EB and the characterization of the mixed case 2: a) as regards firms, it holds that: when $1 > b \geq .833$, the unique SPNE is RTM/RTM; when $.833 > b \geq .42$, there exist two SPN equilibria, RTM/RTM and EB/EB; when $.42 > b \geq 0$ the unique SPNE is EB/EB; b) as regards unions, there exists a unique SPNE, given by EB/EB, irrespective of the values of b , that is, EB is the dominant strategy for unions.*

Proof: From direct payoff comparison in Tables 3 and 4; see also Fanti (2015).

Table 3: Profit matrix, simultaneous EB, mixed case 2

Profit Matrix Case 2		Firm 2	
		RTM	EB
Firm 1	RTM	$\frac{4(2-b)^2}{[3(4-b)]^2}; \frac{4(2-b)^2}{[3(4-b)]^2}$	$\frac{(2-b)^2}{[2(4+b)]^2}; \frac{(1-b)(2+b)^2}{2(4+b)^2}$
	EB	$\frac{(1-b)(2+b)^2}{2(4+b)^2}; \frac{(2-b)^2}{[2(4+b)]^2}$	$\frac{(1-b)}{9}; \frac{(1-b)}{9}$

Table 4: Unions matrix, simultaneous EB, mixed case 2

Union rent Matrix Case 2		Union 2	
		RTM	EB
Union 1	RTM	$\frac{2b(2-b)}{3(4-b)^2}; \frac{2b(2-b)}{3(4-b)^2}$	$\frac{b(2-b)}{2(4+b)^2}; \frac{b(2+b)^2}{2(4+b)^2}$
	EB	$\frac{b(2+b)^2}{2(4+b)^2}; \frac{b(2-b)}{2(4+b)^2}$	$\frac{b}{9}; \frac{b}{9}$

The results in Proposition 2 are in contrast with those in Proposition 1. The intuition behind this finding is as follows. It can be easily verified that the firm which selects EB with the mixed case 2 produces more output than in the identical situation in case 1 by paying lower wages. Therefore, the firm improves its margins and, its profitability. On the other hand, for $b \in [.42, .833)$, the firm which adopts EB in the mixed case experiences an increase in its wage to a level such that $\Pi^{RTM/RTM} \geq \Pi^{EB/RTM}$, while $\Pi^{EB/EB} > \Pi^{RTM/EB}$. As a consequence, the game shows multiple symmetric equilibria. Finally, for $b \in [.833, 1)$, the firms' payoff structure is such that $\Pi^{RTM/RTM} \geq \Pi^{EB/RTM}$ and $\Pi^{RTM/EB} \geq \Pi^{EB/EB}$: the RTM is the firms' dominant strategy. With regards to unions, direct payoff comparison shows that, once again, EB is their dominant strategy. Thus, from Proposition 2 and the above analysis, we can derive the following result.

Proposition 3 (Fanti, 2015) *The unambiguous agreement between unions and firms with regard to the scope of bargaining is on the EB agenda, provided that $.42 > b \geq 0$. When $.833 > b \geq .42$, there are multiple equilibria: in this case, the game shows the structure of a coordination game for firms. Therefore, in principle, it could also be possible a coordination between firms towards the selection of the EB agenda.*

Focusing on the case of multiple equilibria for firms (i.e. the situation $.833 > b \geq .42$), we note that there is also one mixed-strategy equilibrium (see Fanti, 2015). Moreover, considering only, for simplicity, the pure-strategy equilibrium selection problem, it is shown the following:

Proposition 4 (Fanti, 2015) *The RTM equilibrium Pareto-dominates the EB equilibrium (that is the firms would coordinate on the RTM equilibrium). The strategic pair (EB, EB) risk-dominates the strategic pair (RTM, RTM) if $.66 > b \geq 0$. (The proof easily follows from Table 3).³*

³ A Nash equilibrium is Payoff-dominant if it is Pareto superior to all other Nash equilibria in the game. On the other hand, a Nash equilibrium is considered Risk-dominant if it is less risky (e.g., Harsanyi and Selten, 1988). Two analogous definitions of the Risk-dominance in a 2x2 symmetric coordination game are the following: 1) a strategy is Risk-dominant if it is a best response to a 50-50 randomization by the other player; and 2) a strategy is Risk-dominant if it has the smallest probability in the mixed strategy Nash equilibrium.

Therefore, if we assume that the firms are interested in minimising the risk of coordination failure in the selection of the labour market institution, the unique outcome is the EB agenda for $b \leq 2/3$. To sum up, we have shown that the EB agenda is the arrangement on which each firm/union pair may agree with, provided that the union's bargaining power is either sufficiently low ($b \leq .42$ under pure strategies) or not too high ($b \leq 2/3$ under risk-dominance criterion).

4.3 The game with sequential EB

Let us finally consider the game characterized by the sequential EB. Given the payoffs in (13), (14), (31), (32), (61) and (62), we obtain the following Tables 5 and 6 which summarize profits and union's utilities, respectively, in the four strategic situations. An analytical inspection leads to the following results.

Table 5: Profit matrix, sequential EB

Profit Matrix Case 2		Firm 2	
		RTM	EB
Firm 1	RTM	$\frac{4(2-b)^2}{[3(4-b)]^2}; \frac{4(2-b)^2}{[3(4-b)]^2}$	$\frac{(4-3b)^2(2-b)^4}{(3-2b)^2[8b+(4-b)(4+b)]^2}; \frac{4(1-b)(2-b)^2[b+(2-b)(2+b)]^2}{(3-2b)^2[8b+(4-b)(4+b)]^2}$
	EB	$\frac{4(1-b)(2-b)^2[b+(2-b)(2+b)]^2}{(3-2b)^2[8b+(4-b)(4+b)]^2}; \frac{(4-3b)^2(2-b)^4}{(3-2b)^2[8b+(4-b)(4+b)]^2}$	$\frac{(2-b)^4(1-b)}{[(4-3b)(3-b)]^2}; \frac{(2-b)^4(1-b)}{[(4-3b)(3-b)]^2}$

Table 6: Unions matrix, sequential EB

Union rent Matrix Case 2		Union 2	
		RTM	EB
Union 1	RTM	$\frac{2b(2-b)}{3(4-b)^2}; \frac{2b(2-b)}{3(4-b)^2}$	$\frac{b(4-3b)^2(2-b)^2}{(3-2b)[8b+(4-b)(4+b)]^2}; \frac{2b(2-b)[b+(2-b)(2+b)]^2}{(3-2b)[8b+(4-b)(4+b)]^2}$
	EB	$\frac{2b(2-b)[b+(2-b)(2+b)]^2}{(3-2b)[8b+(4-b)(4+b)]^2}; \frac{b(4-3b)^2(2-b)^2}{(3-2b)[8b+(4-b)(4+b)]^2}$	$\frac{b(2-b)^2(1-b)}{(4-3b)^2(3-b)}; \frac{b(2-b)^2(1-b)}{(4-3b)^2(3-b)}$

Proposition 5 In a unionized Cournot duopoly with sequential EB: a) as regards firms, it holds that: when $1 > b \geq .79$, the unique SPNE is RTM/RTM; when $.79 > b \geq .61$, there exist two SPN equilibria, RTM/RTM and EB/EB; when $.61 > b \geq 0$ the unique SPNE is EB/EB; b) as regards unions, there exists a unique SPNE, given by EB/EB, for $.93 > b \geq 0$, while for $1 > b \geq .93$, there exist two SPN equilibria, namely RTM/EB and EB/RTM.

The results in Proposition 5 as regards firms are similar to those in Proposition 2, though valid for different ranges of the bargaining power parameter. In fact, the firm which selects EB in the mixed duopoly with sequential bargaining produces more output than the rival with RTM, by paying a higher wage, as Figure 1 shows. Nonetheless, for a sufficiently low value of the union bargaining power, the total output is not so large to drive down the product price, and the negotiated wages are low enough to ensure that $\Pi^{EB/RTM} > \Pi^{RTM/RTM}$, as Figure 2 depicts. On the other hand, for $b \in [.61, .79)$, the firm which adopts EB in the mixed case experiences an increase in its bargained wage to a level such that $\Pi^{RTM/RTM} \geq \Pi^{EB/RTM}$, while $\Pi^{EB/EB} > \Pi^{RTM/EB}$, leading to multiple equilibria.

Finally, for a sufficiently high value of the union bargaining power ($b \geq .79$), the total output in the mixed duopoly is large enough to reduce the price at a level that RTM is more profitable. In fact, in the mixed case, the common price for the goods lowers while the wage level paid by the EB firm is extremely high with respect to that of the RTM rival.

Figure 1 Up: Firm Output (left box) and wage (right box) in sequential negotiations; Down: industry output

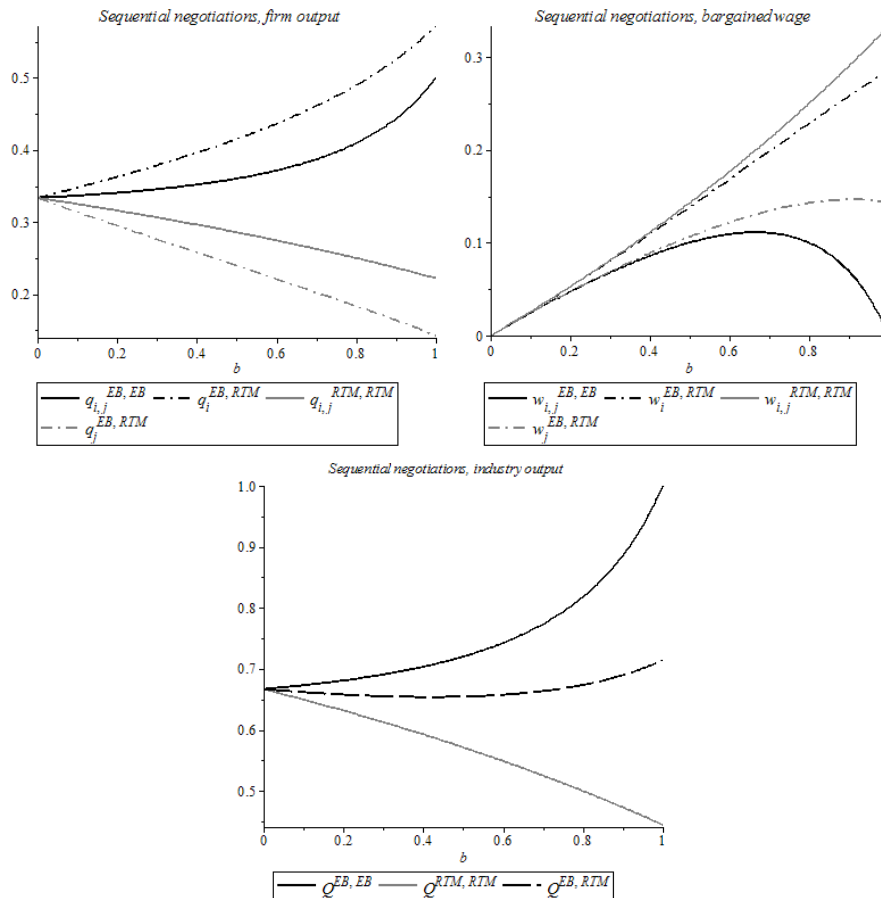
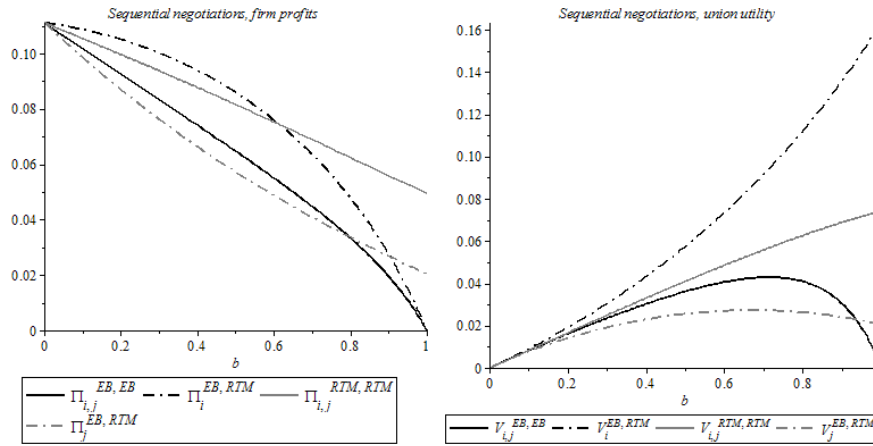


Figure 2 Firm Profits (left box) and union utility (right box) in sequential negotiations



When both firms negotiate with EB, the total output is even larger than the mixed case and, the effect is a price level lower than the mixed case. Consequently we have that $\Pi^{RTM/EB} > \Pi^{EB/EB}$ and $\Pi^{RTM/RTM} \geq \Pi^{EB/RTM}$: RTM is the most preferred agenda for firms.

The situation for the unions is not only quantitatively (as for firms, as seen above) but also qualitatively slightly different under sequential (rather than simultaneous) EB. In fact, for $b \in (0, .93)$, EB is the always most preferred agenda. However, for $b \geq .93$, every union has an incentive to deviate towards the RTM agenda, provided that the rival bargaining unit negotiates with EB, and vice versa. Therefore, two asymmetric equilibria arise. The result that each union finds convenient to switch to RTM when its power is very high is due to the fact that under sequential EB wages and union's utilities tends to strongly reduce for too high union's power, as clearly displayed in Figs. 1 and 2. This is a feature of the sequential EB game, because a rise in union's power in the stage of employment determination might make the union even worse off,⁴ in that such a rise alters the level of employment for any given level of the wage, and in principle "we can not say whether the bargaining set in the first stage alters in a way favourable to the union or the employer. Consequently, we cannot say how the wage will change." (Manning, 1987a, 130).⁵ Therefore, we may argue that in the present Cournot model an extremely high union's power alters the level of employment to the extent that in the first stage wages become relatively lower.

Let us focus on the case of multiple equilibria. As regards firms, for $.79 > b \geq .61$, the game is a standard coordination game. In addition to the two pure-strategy equilibria, there is also one mixed-strategy equilibrium. We consider again only the pure-strategy equilibrium selection problem, according to the Pareto-dominance and Risk-dominance criteria.

Concerning the Pareto-dominance criterion, the firms would coordinate on the RTM equilibrium: from Table 5, it can be easily checked that RTM dominates EB. On the other hand, according to the risk-dominance criterion, if we assume again that each firm assigns a

⁴ This may never occur in a one stage bargaining game such as the simultaneous EB, where an increase in the union's bargaining power always makes unions better off.

⁵ As noted by Manning (1987a, 130, where q is the union's power in the stage of the employment bargaining) "one implication of this result is that it is conceivable that both union and employer could agree to raise or lower q or, rather more strangely, that the union might want to reduce its influence over employment while the employer might want to increase it.

probability of $1/2$ to the RTM and EB each, then the pair (EB,EB) risk-dominates the pair (RTM,RTM) if the expected payoff of EB exceeds the expected payoff of RTM, that is, if $\Pi^{EB/RTM} + \Pi^{EB/EB} \geq \Pi^{RTM/RTM} + \Pi^{RTM/EB}$. Simple algebraic computation shows that the pair (EB, EB) risk-dominates the pair (RTM, RTM) if $.68 > b \geq 0$.

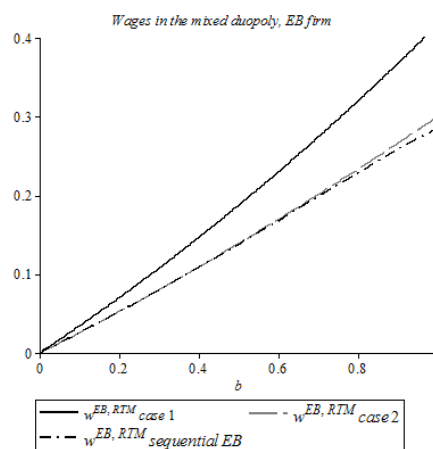
On the other hand, concerning unions, for $1 > b \geq .93$, the game presents the characteristics of an anti-coordination game where neither the Pareto-dominance nor the risk-dominance criterion allow for the selection of an equilibrium. These findings can be summed up in the next Proposition.

Proposition 6 *The unambiguous agreement between unions and firms with regard to the scope of bargaining is on the EB agenda, provided that $.61 > b \geq 0$. Moreover, the strategic pair (EB, EB) risk-dominates the strategic pair (RTM, RTM) if $.68 > b \geq 0$.*

Thus, if we assume again that the firms are interested in minimising the risk of coordination failure in the selection of the labour market institution, the unique outcome is the EB agenda for $b \leq .68$, a value slightly higher than the mixed case 2. To summarise, also in the presence of sequential negotiations, the EB agenda is the arrangement on which each bargaining pair may agree with, provided that the union's bargaining power is not too high ($b \leq .61$ under pure strategies and $b \leq .68$ under the risk-dominance criterion).

The findings of this section have shown that, in the negotiations process between firms and unions, the specification of the timing is crucial to determine the endogenous equilibrium agenda. We have shown that only EB can arise as the endogenous equilibrium arrangement on which each bargaining unit can agree, provided that: 1) the bargaining units concurrently negotiate wages in the mixed duopoly as in the simultaneous EB, case 2, and sequential EB. In fact, in those cases, as Figure 3 shows, the bargained wage of the EB firm is low enough to make this agenda sufficiently profitable; and 2) the union's power is intermediate under pure strategies ($b \leq .42$ in the case of simultaneous EB, mixed case 2; $b \leq .61$ in the case of sequential EB) or not too high under the risk-dominance criterion ($b \leq .66$ simultaneous EB, mixed case 2; $b \leq .68$, sequential EB).

Figure 3 EB firm, negotiated wages in the mixed duopoly



4.4 Discussion of the outcomes of the three timing cases of the bargaining agenda game

The results of this section have shown that the endogenous choice of the union-firm bargaining agenda crucially depends on the specification of the timing. In fact, when the timing is specified as in the mixed case 1, where the EB firm is Stackelberg wage follower, no endogenous agreement between the bargaining parties arises (Buccella, 2011; Fanti, 2014). However, in the mixed case 2, with the EB firm Stackelberg output leader (Fanti, 2015) and in the case of mixed sequential bargaining, with no leadership, EB is the sole institution that can emerge as the endogenous agenda. These findings reveal that EB emerges as equilibrium in the two cases when wages are concurrently negotiated in the rival units, suggesting that in the mixed case 1, having knowledge of the wage level at the RTM rival firm, the EB unit does not reduce enough the negotiated wage to a level to improve its profitability. Moreover, a new result is that, in sequential bargaining, EB appears as the equilibrium agenda for a range of the unions' power larger than in the mixed case 2 both under pure strategies and the risk-dominance criterion. New results also are that unions may prefer RTM and that the mixed agenda is the equilibrium for unions when their power is remarkably high.

5 The entry game

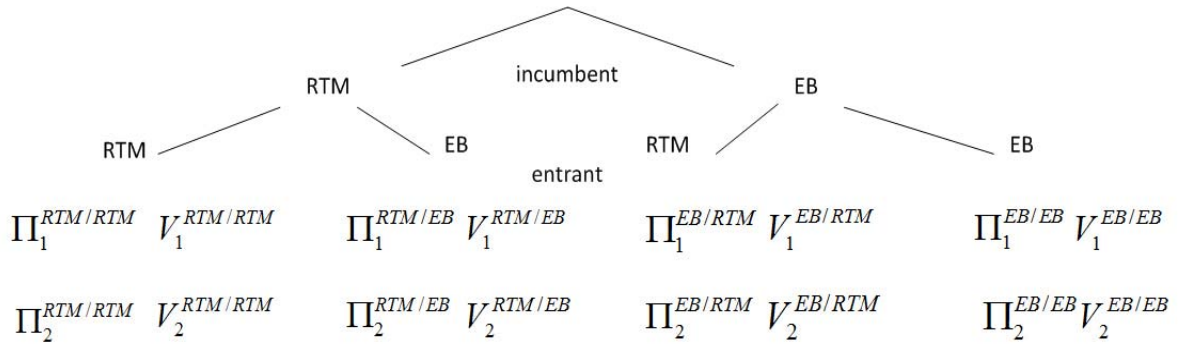
In the previous subsections, we have investigated the endogenous selection of the bargaining agenda by considering a simultaneous game between firms and unions. In other words, we have examined the case where duopoly is the market structure. In the following, we deal with the issue of the bargaining agenda selection in the context of market entry. As benchmark, we scrutinise the equilibria that arise when the firms have the right to choose the bargaining agenda, and then the endogenous selection.

As Bughin (1999) and Buccella (2011), we analyse the strategic selection of bargaining scope in negotiations for different market structures, that is, duopoly vs. monopoly with threat of potential entry. We also consider different entry modes and constraints on the choice of bargaining scope: 1) committed bargaining, where the incumbent first selects its bargaining agenda, and then the entrant is obliged to “join the pack” and adopt the agenda of the incumbent; and 2) flexible bargaining, where the entrant can freely choose its agenda.

Following Bughin (1999) and Buccella (2011), entry in the industry is modelled as a change from a monopoly to a duopoly market structure. We denote firm 1 as the incumbent and firm 2 the potential entrant. The profit function in (4) for the potential entrant firm now incorporates the term E , which represents an exogenous fixed cost.

The game, as usual, is solved by backward induction to derive sub-game perfect Nash equilibria. Depending on the market structure, the game is a four/five-stage game. The timing of the game is the following. In the first stage, the incumbent firm/union pair chooses which bargaining agenda to introduce into negotiations, that is, either EB or RTM. In the case of blockaded duopoly (duopoly is the given market structure), in the second stage the entrant firm/union pair, given the range of its possibilities, decides the bargaining agenda to adopt when there is flexible bargaining; or adopt the agenda of the incumbent pair in the presence of the committed bargaining. In the case of monopoly with threat of entry, in the second stage, the potential entrant unit, on the basis of its possibilities, decides whether to enter in the industry, whereas in the third stage it selects the agenda when there is flexible bargaining, or introduce the agenda of the incumbent pair when there is committed bargaining. The last stages of the game are equal to those of section 3. Figure 4 depicts the simplified general framework.

Figure 4 Timing of the game, general framework



The analysis of the entry game leads to a rather rich taxonomy. In fact for each of the three timing characterizations of the bargaining, we have to distinguish for the two cases of blockaded duopoly and monopoly with threat of entry. In turn, for each of the two entry modes, the distinction is relative to the different constraints on the choice of the agenda by the entrant firm (i.e. committed vs. flexible bargaining). Finally the analysis is separated according to whether the endogenous bargaining agenda is chosen only by firms (FC) or in agreement between firms and unions (EC). This leads to twenty-four different outcomes to discuss and compare between them.

5.1 The game with simultaneous EB and mixed case 1

Let us first consider the game with simultaneous EB and the characterization of the mixed case 1. Given the payoffs in Tables 1 and 2, and following Buccella (2011), a close analytical inspection allows us to derive the following results.

a) Blockaded entry

Proposition 7 (Buccella, 2011) *In a unionized Cournot duopoly with simultaneous EB and the characterization of the mixed case 1, RTM is the dominant strategy for firms, both under flexible and committed bargaining; this is in explicit conflict with the unions' interests because EB is their dominant strategy with regard to the bargaining agenda. As a consequence, under the endogenous determination of the SPNE, no agreement on the bargaining agenda may occur between unions and firms.*

b) Threat of entry

On the other hand, in the case of threat of entry, under “flexible bargaining” the incumbent firm (M) selects RTM, again in conflict of interest with its union. In fact, if the incumbent selects EB, the entrant will deviate toward RTM which guarantees larger profits than the rival firm in the mixed case. However, as Bughin (1999) and Buccella (2011) point up, in the case of “committed bargaining”, if the fixed costs the entrant has to face are such that

$$\Pi_1^{EB/M} = \frac{(1-b)}{4} < E < \frac{4(2-b)^2}{9(4-b)^2} = \Pi_1^{RTM/RTM}$$

where $\Pi_1^{EB/M}$ are the monopoly profits with EB, a duopoly exists under RTM, but the incumbent remains a monopolist if it selects EB. In this case, the incumbent firm may commit to EB to deter market entry. Bughin (1999) does not derive analytically the threshold value of the union bargaining power; however, simple algebra shows that the monopoly profits of firm 1 with EB are larger than RTM duopoly profits if $b \leq .73$. Because EB is the union's most preferred agenda, the bargaining parties at each unit have a common interest in selecting EB. Proposition 8 summarizes these findings.

Proposition 8 (Buccella 2011) *In the case of “flexible bargaining”, the threat of market entry strengthens the RTM argument for the incumbent firm without eliminating the conflict of interest with its union as regards the bargaining agenda. By contrast, in the case of “committed bargaining”, the EB agenda can be used as a market entry deterrence mechanism, provided that the union’s relative bargaining power is not too high (i.e. $b < .73$).*

5.2 The game with simultaneous EB and mixed case 2

Let us consider the game with simultaneous EB and the characterization of the mixed case 2.

As benchmark, we analyze the entry game with blockaded entry and firms choosing the bargaining agenda.

a) Blockaded entry and FC

a.1) flexible bargaining

In the case of “flexible bargaining”, if the incumbent chooses RTM, the entrant evaluates $\Pi_2^{RTM/RTM}$ e $\Pi_2^{RTM/EB}$. Given the payoffs in Table 3, we get that the entrant selects EB because $\Pi_2^{RTM/EB} \geq \Pi_2^{RTM/RTM}$ if $b \leq .42$ while, if $b > .42$, the entrant opts for the RTM agenda because $\Pi_2^{RTM/EB} < \Pi_2^{RTM/RTM}$. On the other hand, if the incumbent chooses EB, the entrant compares $\Pi_2^{EB/RTM}$ e $\Pi_2^{EB/EB}$. In this case, we get that the entrant selects EB because $\Pi_2^{EB/EB} \geq \Pi_2^{EB/RTM}$ if $b \leq .88$, while it selects RTM for $b > .88$ because $\Pi_2^{EB/EB} < \Pi_2^{EB/RTM}$.

Given the choices of the entrant, in the first stage the incumbent has to evaluate:

- for $b \leq .42$, $\Pi_1^{RTM/EB}$ and $\Pi_1^{EB/EB}$: the incumbent chooses EB because $\Pi_1^{EB/EB} > \Pi_1^{RTM/EB}$. Thus, the equilibrium is $\Pi_1^{EB/EB}$, $\Pi_2^{EB/EB}$;
- for $.42 < b \leq .88$, $\Pi_1^{RTM/RTM}$ and $\Pi_1^{EB/EB}$: because $\Pi_1^{RTM/RTM} > \Pi_1^{EB/EB}$, the incumbent chooses RTM. Therefore, equilibrium is $\Pi_1^{RTM/RTM}$, $\Pi_2^{RTM/RTM}$;
- for $.88 < b \leq .1$, $\Pi_1^{RTM/RTM}$ and $\Pi_1^{EB/RTM}$: because $\Pi_1^{RTM/RTM} > \Pi_1^{EB/RTM}$, the incumbent selects RTM. As a consequence, the equilibrium is $\Pi_1^{RTM/RTM}$, $\Pi_2^{RTM/RTM}$.

These findings can be summarised in the following Proposition.

Proposition 9 *In a blockaded unionized Cournot duopoly with simultaneous EB and the characterization of the mixed case 2, in the entry game with firms choosing the agenda and*

“flexible bargaining”, it holds that: when $1 > b \geq .42$, the unique SPNE is RTM/RTM; when $.42 > b \geq 0$ the unique SPNE is EB/EB.

Prop. 9 shows that in the mixed case 2 the results of Prop. 7 does not longer hold, as regards the “flexible bargaining” under FC. This is due to the fact that in the mixed case 2 the firm adopting EB becomes leader in the output (employment) game (instead of follower in the wage determination game) and thus one firm may find convenient to switch from RTM to EB (while the rival firm continues to adopt RTM).

a.2) committed bargaining

As regards the “committed bargaining”, the results do not change with respect to Prop. 7.

Now we turn next to the case of the endogenous choice of the bargaining agenda with threat of market entry.

b) Threat of entry and FC

Proposition 8 is also valid in the case of monopoly with potential entry under both constraints when firms choose the agenda.

Let us now turn the attention to the case of the endogenous choice of the bargaining.

a) blockaded entry and EC

a.1) flexible bargaining

Given the payoffs in Tables 3 and 4 and the above analysis, if the incumbent chooses RTM:

- the entrant endogenously selects EB because $\Pi_2^{RTM/EB} \geq \Pi_2^{RTM/RTM}$ if $b \leq .42$; however, at the same time, $V_2^{RTM/EB} \geq V_2^{RTM/RTM} \forall b \in (0,1)$;
- the entrant would like to negotiate adopting the RTM agenda if $b > .42$ because $\Pi_2^{RTM/RTM} > \Pi_2^{RTM/EB}$; however, $V_2^{RTM/EB} \geq V_2^{RTM/RTM} \forall b \in (0,1)$. Thus, the bargaining parties in the entrant unit are in conflict of interest.

On the other hand, if the incumbent chooses EB:

- the entrant endogenously negotiates with the EB if $b \leq .88$ because $\Pi_2^{EB/EB} > \Pi_2^{EB/RTM}$, and $V_2^{EB/EB} \geq V_2^{EB/RTM} \forall b \in (0,1)$;
- the entrant would like to negotiate with RTM if $b > .88$ because $\Pi_2^{EB/RTM} > \Pi_2^{EB/EB}$; however, $V_2^{EB/EB} \geq V_2^{EB/RTM} \forall b \in (0,1)$. Thus, there is conflict of interest between the entrant firm and its union.

As a consequence, for $b \leq .88$, the entrant unit endogenously selects EB. Concerning the incumbent, for $0 \leq b \leq .88$, $\Pi_1^{EB/EB} > \Pi_1^{RTM/EB}$: thus, the incumbent chooses EB. Moreover, as

regards the union, it is $V_1^{EB/EB} \geq V_1^{RTM/EB} \forall b \in (0,1)$. Therefore, the endogenous choice is EB. Proposition 10 sums up these findings.

Proposition 10 *In a blockaded unionized Cournot duopoly with simultaneous EB and the characterization of the mixed case 2, in the entry game with endogenous choice of the agenda and “flexible bargaining”, it holds that, when $.88 \geq b \geq 0$, the unique SPNE is EB/EB.*

Prop. 10 shows that in the mixed case 2 with blockaded entry and “flexible bargaining” the conflict of interests between parties, which is not resolvable in the mixed case 1 (see Prop. 7), may be eliminated when union’s power is sufficiently (very) high.

a.2) committed bargaining

Concerning the “committed bargaining”, the results of Proposition 7 hold also in this case.

Now we focus on the endogenous choice of the bargaining agenda with threat of market entry.

b) Threat of entry and EC

b.1) flexible bargaining

In the presence of “flexible bargaining”, we have a novel result and thus the first part of Prop. 8 does no longer hold, as below detailed.

On the one hand, if RTM is the selected agenda, we have that $\Pi_1^{RTM/M} > \Pi_1^{RTM/RTM}$ and $\Pi_1^{RTM/M} > \Pi_1^{RTM/EB}$ where $\Pi_1^{RTM/M}$ denotes the monopoly profits with RTM: the agenda cannot be utilised as an entry deterrence mechanism.

On the other hand, when EB is the selected agenda, we have that, for $b > .956$, if the fixed costs are such that $\Pi_1^{EB/M} < E < \Pi_1^{EB/RTM}$, the EB agenda can be used as a tool to prevent market entry in case the entrant bargaining unit would like to introduce RTM negotiations.

b.2) committed bargaining

As regards the “committed bargaining”, if the fixed costs are such that $\Pi_1^{EB,M} < E < \Pi_1^{RTM/RTM}$ the incumbent and the union can, also in this case, introduce EB as market deterrent provided that the union’s relative bargaining power is $b < .73$: that is Proposition 8 continues to hold true.

Proposition 11 summarizes these findings.

Proposition 11 *In the case of “flexible bargaining”, EB can be used as entry deterrence mechanism if $b > .956$ when the entrant would like to adopt RTM; RTM cannot be used to deter entry. In the case of “committed bargaining”, Proposition 8 holds.*

The main novelties as regards the mixed case 2 of simultaneous EB with respect to the established results regarding the mixed case 1 concern the “flexible bargaining” case and are that in the blockaded duopoly: 1) RTM is no longer the dominant strategy for firms and also EB may become the SPNE provided b sufficiently low (i.e. $b \leq .42$ as regards pure strategies); 2) there is an agreement on the agenda between parties provided a high union’s

power (i.e. $b \geq 0.88$); 3) under threat of entry EB may be used to deter entry provided that the union's power is very high (i.e. $b \geq 0.956$).

5.3 The game with sequential EB

Let us finally consider the game with sequential EB.

We start the analysis with the case of the firms selecting the agenda and blocked entry.

a) Blockaded entry and FC

a.1) flexible bargaining

In the presence of "flexible bargaining", given the firm payoffs in Table 5, if the incumbent has selected RTM, the entrant chooses EB for $b \leq .61$ because $\Pi_2^{RTM/EB} > \Pi_2^{RTM/RTM}$ while, for $b > .61$, the entrant introduces the RTM agenda because $\Pi_2^{RTM/EB} < \Pi_2^{RTM/RTM}$. On the other hand, if the incumbent has selected EB, the entrant opts for the EB for $b \leq .79$, because $\Pi_2^{EB/EB} \geq \Pi_2^{EB/RTM}$, whereas RTM is the preferred agenda for $b > .79$. Consequently, in the first stage, the incumbent compares:

- for $b \leq .61$, $\Pi_1^{RTM/EB}$ and $\Pi_1^{EB/EB}$: due to the fact that $\Pi_1^{EB/EB} > \Pi_1^{RTM/EB}$, the incumbent chooses EB. Therefore, the equilibrium is $\Pi_1^{EB/EB}$, $\Pi_2^{EB/EB}$;
- for $.61 < b \leq .79$, $\Pi_1^{RTM/RTM}$ and $\Pi_1^{EB/EB}$: given that $\Pi_1^{RTM/RTM} > \Pi_1^{EB/EB}$, the incumbent chooses RTM and, thus, the equilibrium of the game is $\Pi_1^{RTM/RTM}$, $\Pi_2^{RTM/RTM}$;
- for $.79 < b \leq .1$, $\Pi_1^{RTM/RTM}$ and $\Pi_1^{EB/RTM}$: given that $\Pi_1^{RTM/RTM} > \Pi_1^{EB/RTM}$, the incumbent chooses RTM. Hence, the equilibrium is $\Pi_1^{RTM/RTM}$, $\Pi_2^{RTM/RTM}$.

The results can be summed up in the following Proposition.

Proposition 12 *In a blockaded unionized Cournot duopoly with sequential EB, in the entry game with firms choosing the agenda and "flexible bargaining" it holds that: when $1 > b \geq .61$, the unique SPNE is RTM/RTM; when $.61 > b \geq 0$ the unique SPNE is EB/EB.*

Prop. 12 modifies Prop. 9 in the sense that it is less likely the occurrence of the RTM equilibrium. Thus we may state (from the comparison of Props. 7, 9 and 12) that when firms choose the agenda, the RTM arrangement is 1) always chosen, irrespective of the union's power, in the mixed case one (where the firm adopting EB is a follower in the agenda determination game); 2) chosen if the union's power is not too low (i.e. for $b \geq .42$) in the mixed case 2 (where the firm adopting EB is a leader in the product market game); 3) chosen only if the union's power is high (i.e. for $b \geq .61$) in the sequential EB case (where there is a simultaneous choice in each stage of the game by both firms adopting mixed agendas).

a.2) committed bargaining

In the case of “committed bargaining” and blockaded entry, a direct comparison shows that, for $0 < b \leq 1$, $\Pi_1^{RTM/RTM} > \Pi_1^{EB/EB}$ and $V_1^{RTM/RTM} > V_1^{EB/EB}$. As a consequence, RTM is the agreed agenda and the following holds:

Proposition 13 *In a blockaded unionized Cournot duopoly with sequential EB, in the entry game with firms choosing the agenda and “committed bargaining” there is agreement between firms and unions on the unique SPNE, which is RTM/RTM*

Prop. 13 shows that with sequential EB the conflict of interests between parties may be eliminated, while it was not resolvable both in the mixed case 1 and 2. This is due to the unexpected result that when the efficient bargaining is sequential the welfare of unions is higher under the RTM arrangement (while the common wisdom that unions prefers efficient bargaining to RTM bargaining holds true when the efficient bargaining is simultaneous over wages and employment).

Now we deal with the case of monopoly with threat of entry when firms select the agenda.

b) Threat of entry and FC

b.1) flexible bargaining

In the presence of “flexible bargaining”, the sequential EB presents a novel result and thus both the first parts of Props. 8 and 11 have to be changed, as below shown.

On the one hand, if RTM is the selected agenda, we have again that $\Pi_1^{RTM/M} > \Pi_1^{RTM/RTM}$ and $\Pi_1^{RTM/M} > \Pi_1^{RTM/EB}$ where $\Pi_1^{RTM/M}$ denotes the monopoly profits with RTM: the agenda cannot be utilised as an entry deterrence mechanism.

On the other hand, when EB is the selected agenda, we have that, for $b > .83$ (a value lower than in the mixed case 2), if the fixed costs are such that $\Pi_1^{EB/M} < E < \Pi_1^{EB/RTM}$, the EB agenda can be used as a tool to prevent market entry in case the entrant bargaining unit would like to introduce RTM negotiations. This result suggests that EB is slightly more effective as entry deterrence tool in the case of sequential negotiations.

b.2) committed bargaining

In the presence of “committed bargaining” the sequential EB confirms that, the incumbent bargaining unit may commit to the EB to deter market entry. Simple algebra leads to the result of $b \leq .73$. Thus, the results in Proposition 8 as regards “committed bargaining” with threat of entry are valid also in the present case.

The results can be summarised in the next Proposition.

Proposition 14 *In the case of “flexible bargaining”, EB can be used as entry deterrence mechanism if $b > .83$ when the entrant would like to adopt RTM; RTM cannot be used to deter entry. In the case of “committed bargaining”, Proposition 8 holds.*

Let us focus on the endogenous selection of the agenda with threat of market entry.

a) Blockaded entry and EC

a.1) flexible bargaining

Given the payoffs in Tables 5 and 6, if the incumbent has selected RTM, the entrant selects EB for $b \leq .61$ because $\Pi_2^{RTM/EB} > \Pi_2^{RTM/RTM}$, while for $b > .61$ the entrant introduces the RTM agenda because $\Pi_2^{RTM/EB} < \Pi_2^{RTM/RTM}$. As regards the union active in the entrant firm, EB is always the preferred agenda because $V_2^{RTM/EB} > V_2^{RTM/RTM} \forall b \in (0,1)$. Thus, the entrant unit agrees on the EB for $b \leq .61$. On the other hand, if the incumbent has selected EB, the entrant opts for EB for $b \leq .79$, because $\Pi_2^{EB/EB} \geq \Pi_2^{EB/RTM}$, while RTM is preferred for $b > .79$. As regards the union active in the entrant, EB is the preferred agenda for $.93 \geq b > 0$, while for $1 > b > .93$ RTM is the most favoured agenda. Hence, the entrant bargaining unit agrees on EB for $b \leq .79$, and RTM for $.93 < b \leq 1$. It follows that, in the first stage, the incumbent compares:

- for $b \leq .61$, $\Pi_1^{RTM/EB}$ and $\Pi_1^{EB/EB}$: due to the fact that $\Pi_1^{EB/EB} > \Pi_1^{RTM/EB}$, the incumbent chooses EB. In this range, also the union chooses EB because $V_1^{EB/EB} > V_1^{RTM/EB}$. Thus, EB is the agreed equilibrium agenda;
- for $.61 < b \leq .79$, $\Pi_1^{EB/EB}$ because $\Pi_2^{EB/EB}$ is the only entrant's agreed agenda in this range. The union active in the incumbent has a common interest because $V_1^{EB/RTM} < V_1^{EB/EB}$: EB is the agreed agenda;
- for $.79 < b \leq .93$, there is no agreed agenda for the entrant bargaining unit;
- for $.93 < b \leq 1$, RTM is the agreed agenda for the entrant; given that $\Pi_1^{EB/RTM} > \Pi_1^{EB/EB}$ and $V_1^{EB/RTM} > V_1^{EB/EB}$, the incumbent unit agrees on EB.

The results are summarized in the next Proposition.

Proposition 15 *In a blockaded unionized Cournot duopoly with sequential EB, in the entry game with the endogenous selection of the agenda and “flexible bargaining”, it holds that: when $1 > b \geq .93$, the incumbent unit endogenously agrees on EB and the entrant unit on RTM; when $.79 > b \geq 0$ the unique SPNE is EB/EB.*

Note that under sequential EB in the blockaded case with “flexible bargaining” there is agreement between parties for the most bargaining power's values,⁶ in particular for very high values of union's power a mixed agenda appears as an equilibrium.

a.2) committed bargaining

In the case of “committed bargaining”, the results replicate those where the firms decide the agenda. As a consequence, with blockaded entry, for $0 < b \leq 1$, $\Pi_1^{RTM/RTM} > \Pi_1^{EB/EB}$ and $V_1^{RTM/RTM} > V_1^{EB/EB}$: RTM is the endogenously agreed agenda, and the result in Proposition 13 is confirmed.

⁶ Only in the narrow interval $0.79 < b < 0.93$ there is conflict of interests.

b) Threat of entry and EC

b.1) flexible bargaining

In the presence of “flexible bargaining”, the results replicate those where the firm decides the agenda (that is Prop. 14, and thus the first part of Prop. 8 is no longer valid).

In fact, if RTM is the selected agenda, we have again that $\Pi_1^{RTM/M} > \Pi_1^{RTM/RTM}$ and $\Pi_1^{RTM/M} > \Pi_1^{RTM/EB}$: the RTM agenda cannot be used as an entry deterrence tool. However, when EB is the selected agenda, we have that, for $b > .83$, if the fixed costs are such that $\Pi_1^{EB/M} < E < \Pi_1^{EB/RTM}$, the EB agenda can be used as a tool to prevent market entry. Moreover, $V_1^{EB/M} > V_1^{EB/RTM} \forall b \in (0,1)$ and, therefore, EB endogenously arises as the selected agenda.

b.2) committed bargaining

On the other hand, in the presence of threat of entry under “committed bargaining”, the incumbent bargaining unit may commit to the EB to deter market entry. Simple algebra reveals that this result applies again for $b \leq .73$, and the result in Proposition 8 is confirmed. Therefore, despite the relevant differences between the three cases of timing of the bargaining game as regards SPNE outcomes, both in the case of firms’ choice and endogenous choice of the agenda, the same value of $b = .73$ is the threshold value for using the choice of EB as deterrent in all three cases.

5.4 Discussion of the outcomes of the entry game

The findings have shown that, in the entry game, in addition to the specification of the timing, the restrictions on bargaining and the market structure are central in the determination of the union-firm equilibrium agenda. The overall picture is composite; however, some general observation can be addressed. First, if firms have the power to decide the agenda, RTM arises more frequently as equilibrium than in the case of endogenous selection, where EB is predominant. Second, in the case of endogenous agenda selection with entry, EB arises as equilibrium of the game in a range of the bargaining power parameter larger than in the game without entry. Third, if the industry is characterized by the “flexible bargaining”, while in the mixed case 1 of simultaneous EB there is always conflict between firms and unions on the choice of the agenda, in the other cases such a conflict may be eliminated, in particular in the mixed case 2 only through an agreement on EB and only when $b \leq 0.88$ while in the sequential EB always with an agreement either on RTM for sufficiently high values of b ($b \geq 0.61$) or on EB for $b < 0.61$. Fourth, if the industry is characterized by the “committed bargaining”, the incumbent bargaining unit can agree only on the EB agenda to deter market entry, in particular if union’s power is lower than $b = .73$ in all three cases.

5.5 Welfare considerations

The conventional wisdom indicates that the EB leads to a social welfare level higher than the RTM. In this section, we verify the welfare implications of the two labour market institutions.

Given the outlined hypotheses of the model, the consumer surplus in the presence of duopoly can be expressed as

$$CS = \frac{1}{2} \left(\sum_i q_i \right)^2, \quad i = 1, 2.$$

The social welfare of the economy is given by the sum of the industry profits, union utility and consumer surplus, that is,

$$SW = \sum \Pi_i + \sum V_i + CS, \quad i = 1, 2$$

which, after algebraic manipulation, can be expressed as

$$SW = \left(\sum q_i \right) \left[1 - \frac{\left(\sum q_i \right)}{2} \right]. \quad (63)$$

Direct substitution of the relevant expressions for quantity into (63) leads to

$$SW^{RTM/RTM} = \frac{4(2-b)(8-b)}{9(4-b)^2}; \quad SW_{Simultaneous}^{EB/EB} = \frac{4}{9}; \quad SW_{Sequential}^{EB/EB} = \frac{2(2-b)^2(2b^2-9b+8)}{(3-b)^2(4-3b)^2}.$$

Straight forward comparison shows that $SW_{Sequential}^{EB/EB} > SW_{Simultaneous}^{EB/EB} > SW^{RTM} \forall b \in (0,1)$. Therefore, both when the duopoly market structure is given and in the case of blockaded entry, the endogenous selection of the EB agenda also ensures the most desirable social welfare outcome.

However, in the case of threat of entry, we have shown that the EB agenda can be used as entry deterrence mechanism, while the RTM agenda never does. More precisely, 1) if the EB institution is in place, a monopoly market structure may arise for $b \leq .73$; and 2) with RTM, a duopoly emerges. A question rises: is a monopoly with EB socially more preferable than a duopoly with RTM? Given that the optimal output with EB negotiations in the presence of monopoly always equals $1/2$ (see Buccella, 2011, Table 1, and Naylor, 2003, pp.60-61), simple algebra shows that

$$\frac{3}{8} = SW^{EB/M} \leq SW^{RTM/RTM} = \frac{4(2-b)(8-b)}{9(4-b)^2} \text{ if } b \leq 0.8,$$

that is, for a value of the union power larger than the one that prevents entry. As a consequence, if we consider the issue of entry, we obtain the striking result that, for $b \leq .8$, the conventional wisdom is reverted, and the EB agenda is socially less efficient than RTM.

On the other hand, in the presence of a strong labour union, i.e. $b > .8$, a monopoly under EB is socially more preferable than a duopoly under RTM. Hence, only for the narrow interval of $0.73 < b < 0.80$ where a duopoly with RTM is the equilibrium product market/labour market institution structure, the most socially efficient agenda is chosen, while for $b \leq .73$ and for $0.80 \leq b$ the equilibrium agenda (with the corresponding product market structure) is the least efficient.

Therefore, the results of the present model can have a direct impact on the governments' decision-making process and antitrust authorities activities. In fact, the elements underlined in our analysis suggest that those institutions should carefully take into account the overall bargaining framework, and the practices in place within an industry, before designing any intervention to regulate labour and product markets.

6 Conclusion

The present work has widely revisited a central aspect of labour union(s)-firm management relations: the bargaining scope and the choice of the agenda in negotiations.

The paper has addressed the analysis to the endogenous equilibrium agenda (Right-to-Manage vs Efficient Bargaining) that can arise under three different timing of the bargaining game in a duopoly market. In the first case, when there is a mixed duopoly, the firm which introduces the EB agenda is Stackelberg wage follower; in the second case, the firm with the EB agenda is Stackelberg output leader; in the third case, despite the different agenda, both firms negotiate with unions first wages concurrently, and subsequently the EB firm negotiates with its union over employment.

First, the study has considered a given Cournot duopoly market structure. Second, it has been analysed the strategic choice of the bargaining agenda by the union-firm bargaining units in the context of potential market entry. The key results we have identified in the analysis are the following. When there is no entry, the timing of the negotiation process plays a crucial role in determining the endogenous equilibrium agenda between firms and unions. We have shown that, when in the mixed duopoly the EB firm is Stackelberg wage follower, no endogenous equilibrium bargaining agenda arises in union-firm negotiations. On the other hand, when in the mixed duopoly the EB firm is Stackelberg output leader or negotiate sequentially over wages and employment, we have found that only the Efficient Bargaining can endogenously emerge as the equilibrium agenda, in pure strategies and under the risk-dominance criterion, provided that the union's bargaining power is not extremely high.

In the presence of potential entry, not only the timing of the negotiation, but also the entry mode and the relative restrictions on bargaining are fundamental to establish the equilibrium agenda in each bargaining unit. The core results are mainly confirmed: the EB is still the prevailing endogenous equilibrium agenda which emerges in pure strategies, even for a wider range of the union bargaining power than for the given duopoly market structure. However, in limited cases, also the RTM agenda can arise as the equilibrium agenda. It is worth to note that the EB agenda can strategically be used by the incumbent union-firm unit as a tool to deter market entry.

The results of the present model are important because of their impact on the governments' decision-making process and antitrust authorities activities. As known, the EB arrangement is "efficient" from a societal point of view. Therefore, the finding that it can arise as the endogenously determined scope of bargaining for a fairly noticeable range of union's bargaining power, is interesting also for policy. However, given the potential market deterrence effect of the EB, our analysis conveys advice that those institutions should cautiously consider the general bargaining framework and the prevalent industry practices, before designing any intervention to regulate labour and product markets.

The results of our model presents several limitations. We have restricted the analysis to specific forms for the demand and cost functions as well as for the union utility function. Moreover, the findings presented in the paper are related to the assumptions of quantity competition, homogenous product and a standard wage system. A further step would be to extend the research toward studying the introduction, on the one hand as regards the product

market side, of price competition and heterogeneous products, and, on the other hand as regards the labour market side, of performance related payment schemes into the negotiations such as the profit sharing and piece rates. Moreover, the robustness of the present results can be verified in an extended game framework where also managerial delegation, R&D investments, externalities in consumption and production, and capacity choices are considered.

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