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Efficient bargaining versus right to manage: A stability analysis in a Cournot duopoly with trade unions

Luciano Fanti [1], Luca Gori *

Department of Economics and Management, University of Pisa, Via Cosimo Ridolfi, 10, I-56124 Pisa (PI), Italy
Department of Law, University of Genoa, Via Balbi, 30/19, I-16126 Genoa (GE), Italy

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ABSTRACT

The present study considers a unionised (nonlinear) duopoly with two different labour market institutions, i.e. efficient bargaining (EB) and right to manage (RTM), to analyse product market stability under quantity competition with trade unions. We show that when the preference of unions towards wages is small, (*i*) the parametric stability region under RTM is higher than under EB, and (*ii*) a rise in the union power in the Nash bargaining played between firms and unions monotonically increases (resp. reduces) the parametric stability region under RTM (resp. EB). In contrast, when the preference of unions becomes larger, an increase in the union's bargaining power acts: (1) as an economic stabiliser when the union power is small; (2) as an economic de-stabiliser when the union power is high. In addition to established results with regard to equilibrium outcomes, our findings shed some light on the effects of how the labour market regulation affects out-of-equilibrium behaviours in a Cournot duopoly.

1. Introduction

The existence of trade unions represents a hard stylised fact in several developed countries, especially in Europe, and empirical evidence of a positive correlation between high rates of unemployment and trade union behaviours exists in the long term (Layard et al., 2005), even if such a relationship can actually depend on the way unions operate.

As is known, wage and employment bargaining can be modelled in different ways: the "efficient bargaining" (EB) model and "right to manage" (RTM) model represent two standard examples. The key feature of the former is that both the wage and employment are chosen according to a bargaining process played by firms and employees' representatives (McDonald and Solow, 1981). In contrast, with the latter approach only the wage is subject to negotiation and firms are free to unilaterally choose employment (Oswald, 1982; Pencavel, 1984, 1985).[2]

The relative importance of wages and employment in the union's preferences may be different in the sense that trade unions can be either wage-oriented or employment-oriented. Furthermore, firm-specific (decentralised) and industry-wide (centralised) unions can also be distinguished. If unions are decentralised, the wage is bargained by potentially competitive unions at the firm level. If unions are centralised, the wage is bargained at the industry-wide level and all workers are covered by the unionised wage. The EB and RTM models represent the two most popular alternatives of wage-employment outcomes of collective bargaining. The trade union literature (Booth, 1995; Layard et al., 2005) has established some clear normative implications arising from the two alternatives.

(1) The RTM bargaining brings upon inefficiently low (high) levels of employment (wage), implying that unions may be viewed as socially inefficient institutions so that a weakening of union power would likely enhance social welfare.
(2) The EB bargaining causes either an efficient employment level or, at least, even in those cases in which employment will either be too high or too low for social efficiency, it causes a social inefficiency lower than that caused by the RTM outcome.

While static outcomes in a duopoly with different typologies of unions and bargaining structures have deeply been explored (e.g. Bughin, 1995; Correa-López and Naylor, 2004; Dowrick, 1989; Fanti and Meccheri, 2011; Kraft, 1998; Pal and Saha, 2008; Petrakis and Vlassis, 2000), less attention has been paid to stability outcomes in a nonlinear duopoly with quantity competition (e.g. Bischi and Kopel, 2001; Bischi et al., 2010; Kopel, 1996; Puu, 1991, 1998; Wu et al., 2010) and trade unions, with

* Corresponding author. Tel.: +39 010 209 95 03; fax: +39 010 209 55 36.
E-mail addresses: lfanti@ec.unipi.it, fanti.luciano@gmail.com (L. Fanti), luca.gori@unige.it, dr.luca.gori@gmail.com (L. Gori).
[1] Tel.: +39 050 22 16 369; fax: +39 050 22 16 384.
[2] A special case of the RTM model is the so-called "monopoly union" model.

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some exceptions (Fanti and Gori, 2012a). The aim of this paper is to fill this gap by explicitly taking into account both the EB and RTM bargaining between firms and unions, and by comparing the stability outcomes of the two models when players have either limited information with regard to their objective functions (they use "local" estimation – where local means at the current state of production – of the marginal value of the objective function in order to follow the steepest local slope of that function), or complete information with static (naïve) expectations with regard to output decisions of the rival. Indeed, according to several scholars (Agliari et al., 2006; Bischi and Naimzada, 2000; Bischi et al., 1998, 1999; Dixit, 1986), adaptive or static expectations may well represent the context of partially "bounded" rationality in which oligopolistic firms operate, while also serving the purpose of allowing for complex dynamics. Since the economies in several European economies are characterised by large companies and unionised workers, the study of labour market institutions different from the competitive market in a nonlinear duopoly is relevant. With regard to this issue, the paper by Fanti and Gori (2012a) represents a first attempt in this direction and studies the effects of co-determination laws on local stability of the Nash equilibrium, by extending the paper by Kraft (1998) to a nonlinear framework. Co-determination rules are applied especially in Germany. They imply that unionised workers employed in large companies have almost the same decision rights as capital owners *with regard to employment bargaining* at the firm-level. The wage is outside the field of application of such laws: it is bargained at the industry-level and it is taken as given by every firm in the bargaining game with firm-specific unions to determine employment. The aim of that paper was to contrast the effects on local stability of an exogenous shock in wages in the cases of both co-determination and profit-maximising firms. The results are that under co-determination (resp. profit-maximising firms), an increase in the wage is ambiguous on stability depending on the relative size of the union bargaining power (resp. acts as an economic stabiliser). Therefore, the rules of application of the co-determination model are different from the rule of application of the EB model. At most, it may be viewed an efficient bargaining constrained by the fact that the wage is fixed at the centralised level.

Different from Fanti and Gori (2012a), in this paper we inquire about stability outcomes in a duopoly with two of the most important alternatives of *both employment and wage* determination at the firm-level, and to contrast them in the cases of heterogeneous and homogeneous players with regard to the information set about the objective functions. Therefore, this paper extends Fanti and Gori (2012a) and shows that EB and RTM have different effects not only on equilibrium outcomes, as established by the existing static literature, but also on market stability. In particular, four clear-cut results emerge.

The first result concerns the unambiguous role played by the relative degree of "wage-aggressiveness" in the union preferences in both cases of EB and RTM: the higher the relative importance of wages in the union's objective, the more likely the Cournot–Nash equilibrium of the duopoly game is stable.

The second and third results are claimed by separately considering the two typologies of bargaining: under RTM, we find that the lower the union bargaining power, the more likely the loss of market stability, whereas under EB the union power brings upon either an opposite effect (when both the union's power in the bargaining game and the preference towards wage in the union's objective are small) with respect to the case of RTM, or an ambiguous effect on stability: when the union power in the Nash bargaining is small and/or the union's preference towards wages is small, it still remains true that a rise in the union power works for instability, while when both the union power and the preference of unions towards wages are large, a further increase in the power of unions in the Nash bargaining acts as a stabilising device. However, when unions are employment-oriented, higher levels of union power, including the case of monopoly union, always work for market stability.

The fourth result concerns the comparison with regard to local stability of both EB and RTM and states that when the union's power is large and/or unions are employment-oriented, the RTM institution is neatly more favourable for market stability. In contrast, when the power of unions in the bargaining process is small and unions are wage-oriented, the equilibrium is more likely to be stable under EB.

Moreover, it must also be noted that in any case when the union power is approximately less than one half, the parametric stability region under RTM is larger than under EB, irrespective of the relative size of union's preferences.

The paper is organised as follows. Section 2 builds on the Cournot duopoly under RTM and EB assumptions. Section 3 analyses dynamics and local stability. Section 4 compares the stability/instability regions under EB and RTM. Section 5 shows that the results are similar with heterogeneous and homogeneous players. Section 6 presents the conclusion.

2. A Cournot duopoly with unions: efficient bargaining versus right to manage

We consider a normalised Cournot duopoly for a single homogeneous product with a negatively sloped inverse demand given by $p=1-q_1-q_2$, where $p>0$ denotes the price and $q_1\geq 0$ (resp. $q_2\geq 0$) is the output produced by firm 1 (resp. firm 2). The average and marginal costs for firm $i=\{1,2\}$ to provide an additional unit of output are given by $0<w_i<1$, which represents the wage negotiated by unions at the firm-specific level. This implies that production takes place by using a constant (marginal) returns to labour technology, that is $q_i=L_i$ (e.g. Bughin, 1995; Correa-López and Naylor, 2004; Dowrick, 1989), where L_i is the labour force employed by firm i.

2.1. Efficient bargaining

Under EB (McDonald and Solow, 1981) firms and unions bargain over employment and wages. The objective of firms (resp. unions) is to maximise profits $\Pi_i(w_i,L_i)=pq_i-w_iL_i$ (resp. utility $U_i(w_i,L_i)=(w_i-w^\circ)^\theta L_i$) with respect to employment and wages, where $\theta>0$ is the relative weight attached by unions to wages[3] and w° is the reservation or competitive wage, which is set to zero without loss of generality. Since $q_i=L_i$, the Nash bargaining between firms and decentralised unions is summarised by the following equation:

$$V_i=\left[\left(1-q_i-q_j-w_i\right)q_i\right]^{\beta}\left(w_i^{\theta}q_i\right)^{1-\beta}, \tag{1}$$

where the control variables are q_i and w_i, and $0\leq\beta\leq 1$ (resp. $1-\beta$) is the relative bargaining power of firms (resp. unions). The best reply functions of output and wages for the ith player are simultaneously determined by maximising Eq. (1) with respect to q_i and w_i, that is:

$$\frac{\partial V_i}{\partial q_i}=\frac{V_i\left[1-q_i(1+\beta)-q_j-w_i\right]}{\left(1-q_i-q_j-w_i\right)q_i}=0\Leftrightarrow q_i\left(q_j,w_i\right)=\frac{1-q_j-w_i}{1+\beta}, \tag{2.1}$$

$$\frac{\partial V_i}{\partial w_i}=\frac{V_i\left(\theta(1-\beta)\left(1-q_i-q_j\right)-w_i[\beta+\theta(1-\beta)]\right)}{\left(1-q_i-q_j-w_i\right)w_i}=0\Leftrightarrow w_i\left(q_i,q_j\right)$$
$$=\frac{\theta(1-\beta)\left(1-q_i-q_j\right)}{\beta+\theta(1-\beta)}<1. \tag{2.2}$$

[3] Values of θ smaller (higher) than 1 imply that the union is less (more) concerned about wages and more (less) concerned about jobs (e.g. Fanti and Gori, 2011; Mezzetti and Dinopoulos, 1991).