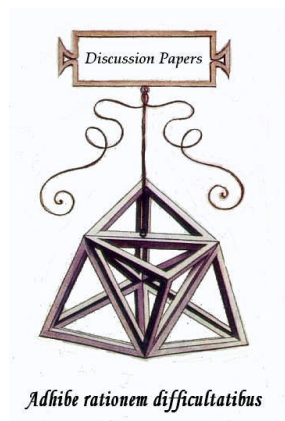




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Luciano Fanti

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Luciano Fanti

Department of Economics, University of Pisa

Via Cosimo Ridolfi, 10, I-56124 Pisa (PI), Italy

e-mail address: lfanti@ec.unipi.it

tel.: +39 050 22 16 369

fax: +39 050 22 16 384

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Welfare effects of cross-ownership in a unionised duopoly

Luciano Fanti*

*Department of Economics, University of Pisa, Via Cosimo Ridolfi, 10, I-56124 Pisa
(PI), Italy*

Abstract The present study analyses the effects of an increase in the share of cross-ownership in a Cournot duopoly with firm-specific monopolistic unions. Since the cross-participation at ownership level implies a lower degree of competition, then in a duopoly without unions, as expected, consumer surplus and social welfare, despite the increase in the industry profits, reduces when cross-participation increases. By contrast, when the labour market is unionised, we show the counterintuitive result, that despite the degree of competition is reduced by cross-ownership, both consumer surplus and social welfare increase with the share of cross-participation. This always occurs provided that unions are sufficiently wage-oriented. Therefore, the policy implication is that, when wage-interested unions are in existence in oligopoly industries, a rise in cross-participation – i.e., a lower degree of competition – is socially preferred. Moreover, all agents (firm's owner, workers and consumers) agree for the highest possible level of cross-participation.

Keywords Cross-ownership, Duopoly, Unions , Social Welfare

JEL Classification D43; L13; L4; J51

* *E-mail address:* lfanti@ec.unipi.it; tel.: +39 050 22 16 369; fax: +39 050 22 16 384.

1. Introduction

In this paper a unionised Cournot duopoly with cross-participation at ownership level comes under study. Since cross-ownership among competing firms reduces competition in the market and a cornerstone of economic theory is that from a social welfare point of view a higher competition is always preferred, then it is expected that the higher the percentage of cross-ownership, the lower social welfare.

There are several cases in which firms acquire their rivals stock as passive investments that give them a share in the rivals profits but not in the rivals price and output choices. For instance in the automobile industry there are examples of partial ownership of rivals (see Alley, 1997, as regards the Japanese and the U.S. automobile industries,¹ and for an explanation of why partial ownership arrangements are formed). Other examples are the telecommunications industry (Parker and Roller, 1997), the global airline industry (Airline Business, 1998), the Dutch financial sector (Dietzenbacher, Smid, and Volkerink, 2000), the Italian bank sector (Trivieri, 2007), the Nordic power market (Amundsen and Bergman, 2002), and the global steel industry (Gilo, Moshe, and Spiegel, 2006).²

From a policy perspective, we note that while cross-ownership may sometimes be restricted in some industries (for instance, in the media industry newspapers was barred from owning television stations in the same market), in general passive investments in rivals were either granted a de facto exemption from antitrust liability or have gone unchallenged by antitrust agencies in recent cases (Gilo, 2000, Gilo et al., 2006).³

As is known, another stylised fact is the existence of unions in oligopolistic sectors interested to partial cross-ownership. As Booth (1995, p. 95) observes: “It appears to be an empirical regularity that imperfections in the labor market are correlated with imperfections in the product market”.

Two natural questions that arise are the following: since unionised oligopolies are usually observed, then (1) what does it happen to the established outcomes of a duopoly with partial cross-ownership when workers are unionised? (2) Does the common wisdom that the anticompetitive effect of cross-ownership to hurt societal welfare still hold under unionisation of labour markets? Although an oligopolistic market with partial cross-ownership has analytically been explored under various extensions,⁴ the relationship between welfare, partial cross-ownership and

¹ Another illustrative example (Barcena-Ruiz and Oilazola, 2001) is given by the French firm Renault, which acquired a 36.8% equity stake in Nissan Motor in 1999 (Renault Presse, 10/20/99).

² Of course also various other industries are interested to the partial cross-ownership phenomenon. For instance, Gilo and Spiegel (2003, p. 2) report that 1) Microsoft acquired in August 1997 approximately 7% of the nonvoting stock of its historic competitor in the PC market, that is Apple, , and in June 1999 it took a 10% stake in Inprise/Borland Corp. which is one of its main rivals in the software applications market; 2) Gillette acquired 22.9% of the nonvoting stock and approximately 13.6% of the debt of Wilkinson Sword, one of its largest rivals in the wet shaving razor blade market.

³ This fact highlights the possibility of anticompetitive practices through partial cross-ownership, instead of horizontal mergers, which, by contrast, are subject to substantial antitrust scrutiny and are often opposed by antitrust authorities.

⁴ For instance, as regards the effects of cross-ownership on: 1) the managerial incentives in a Cournot duopoly framework where owners and managers are separate identities (Macho-Stadler and Verdier, 1991); 2) the non-cooperative provision of public consumption goods and public production factors (Dickescheid, 2001); 3) the incentives of firms to engage in tacit collusion (Reitman, 1994), specifically under symmetric (Gilo et al., 2006) or asymmetric costs (Gilo et al., 2008); 4) the incentives to acquire cost-saving production technologies (Barcena-Ruiz and Oilazola, 2007); 5) the level of privatization in

unionisation has not been so far, at the best of our knowledge, fully investigated. We aim of the present study is to fill this gap. To do so, paper we depart from the standard Cournot duopoly model only by assuming the existence of cross-participation at ownership level and the unionised labour markets.

As the rising literature on unionised oligopolies (e.g. Dowrick 1989, Horn and Wolinsky 1988, Naylor 1999, Correa-Lopez and Naylor, 2004, Fanti and Meccheri, 2011) established, production costs (i.e. wages) are no longer assumed to be as exogenously given for firms, while being the outcome of a strategic game played between each firm and labour union.

In what follows, we will study a two-stage game. In stage 1, since both firms are unionised, unions' choices take place simultaneously across firms, with each union taking the wage of the other firm as given. In stage 2, by playing a non-cooperative Cournot oligopolistic game, firms' owners choose their levels of output and (given the technology) factor input, taking wages as determined in the prior stage. We proceed, as usual, by backward induction.

In the first stage, each firm-specific union monopolistically sets the wage by taking into account how its decision will affect the competitiveness of its firm in the subsequent product market game. For instance, union i , while pushing for a wage increase above that of its rival firm's, takes into account that such an increase in its own firm's unit cost may significantly reduce its output, and thus the number of union members employed in the firm.

As regards the output game, the essential feature of the existence of a certain percentage of cross-ownership is that Firm 1 (which is owned by a shareholder alone) tends to have a lower output than the firm 2 (which is cross-participated) since the former firm, in contrast with the latter firm, internalizes the fact that the two firms compete in the product and thus the latter firm is "more aggressive".

The main result is that, provided that unions are (even slightly) wage-oriented, industry profits, workers' welfare, consumer surplus and thus societal welfare increase with the percentage of cross-ownership. This means that then not only policy should prefer high percentages of cross-participation at ownership level according to a traditional utilitarian social welfare function, but even firm's owner, workers and consumers agree for the highest possible percentage of participation. The economic intuition is that, on the one hand, firm 1's union takes account of the fact that firm 1's owner "internalizes" a percentage of profits of the firm 2 with the consequence that the employment of firm 1 will be lower than in the absence of cross-ownership and thus it moderates wage claims in order to reduce the employment loss in firm 1, but on the other hand, the relative larger "aggressiveness" in terms of output of the firm 2 is in turn moderated by the presence of the firm 2's union which will be stimulated to increase wage claims by a high output "aggressiveness". However when unions are relatively wage-interested employment (i.e. output) has to be relatively higher (than when unions are employment-interested) in order to moderate wage claims. The outcome of these interactions is that the anti-competitive effect of increasing cross-ownership does not hurt output and thus consumer surplus to the extent that to overcome the benefits of profits, as common belief expects, but instead even consumer surplus and thus societal welfare benefit from such an anticompetitive practice. This result offers an interesting anti-trust policy implication.

case of differentiated products mixed duopoly (Pal, 2010; 6) the setting of cooperative and non-cooperative environmental taxes with two firms located in different countries (Barcena-Ruiz and Campo, 2011).

The rest of the article is organised as follows. Section 2 presents the basic Cournot duopoly model, along with the equilibrium conditions and the steady state. In Section 3, the union's wage setting is presented and the basic model is extended with firm-specific unions. In section 4 welfare analysis is conducted and the main result that consumer surplus and social welfare increase with an increasing cross-participation at ownership level, provided that unions are (even slightly) wage-oriented, is presented and numerically illustrated. Section 5 concludes.

2. The “benchmark” model with “competitive” labour markets

We consider a single industry consisting of two firms, 1 and 2, which produce a homogeneous good. There are two shareholders, A and B. Firm 1 is completely owned by share-holder A, who owns a participation also in firm 2. Therefore firm 2 is jointly owned by the two shareholders, with shareholder B having the majority of shares and thus also the control of firm 2. We denote by h ($0 < h < 1/2$) the fraction of shares that shareholder A has in firm 2. Shareholders are assumed to maximize their total profit, which means that the objective function of shareholder A is

$$\pi_A = \pi_1 + h\pi_2 \quad (1.1)$$

while the objective function of shareholder B is

$$\pi_B = (1 - h)\pi_2, \quad (1.2)$$

We assume, following an established literature (Horn and Wolinsky (1988), Dowrick (1989), Naylor (1999), Correa-Lopez and Naylor (2004) that: *i*) labour is the sole productive input; *ii*) there is a constant returns to labour technology, so $q_i = L_i$

$$(2),$$

where q_i represents output, L_i the units of labour employed and thus q_i also represents the employment of firm i . As a consequence, the two firms face the constant marginal cost given by the wage per unit of labour, w_i .

Therefore, profits of firm i can be written as

$$\pi_i = p_i q_i - w_i q_i, \quad i=1, 2 \quad (3)$$

where w_i denotes the wage paid by firm i and is assumed to capture all short-run marginal costs.

The derived product market demand is linear and, for firm i for example, is given by

$$p_i(q_i, q_j) = a - q_j - q_i \quad (4)$$

From (1) and (4), under profit-maximization, firm i 's best-reply function is

$$q_1(q_2) = \frac{(a - q_2(1 + h) - w_1)}{2} \quad (5)$$

$$q_2(q_1) = \frac{(a - q_1 - w_2)}{2} \quad (6)$$

As $h > 0$, by assumption, the best-reply functions are downward-sloping, that is, under the Cournot assumption, the product market game is played in strategic substitutes. From (5) and (6) we obtain equilibrium output, profits, (respectively, by firm i , given w_i and w_j), consumer surplus (CS) and social welfare (SW) :

$$q_1 = \frac{[a(1 - h) - 2w_1 + w_2(1 + h)]}{3 - h} \quad (7)$$

$$q_2 = \frac{[a - 2w_2 + w_1]}{3 - h} \quad (8)$$

$$\pi_1 = \frac{[h(w_1 - w_2) + a + w_1 - 2w_2][(1 - h)(a - w_2) - 2w_1]}{(3 - h)^2} \quad (9)$$

$$\pi_2 = \frac{(2a + w_1 - 2w_2)^2}{(3 - h)^2} \quad (10)$$

$$\pi_A = \pi_1 + h\pi_2 \quad (11)$$

$$\Pi = \pi_1 + \pi_2 \quad (12)$$

$$CS = \frac{(q_1 + q_2)^2}{2} = \frac{[(2 - h)a - w_1 - (1 - h)w_2]^2}{2(3 - h)^2} \quad (13)$$

$$SW = \frac{h^2 S_1 - 2h[3a^2 - 2a(2w_1 + w_2) + w_2^2 + 2w_1^2] + 8a^2 - 8a(w_1 + w_2) + 11w_1^2 - 14w_1w_2 + 11w_2^2}{(3 - h)^2}$$

(14)

where $S_1 = a^2 - 2aw_1 + w_2(2w_1 - w_2)$ and social welfare is defined as $SW = CS + \Pi$.

For a purpose of comparison with the case with unions developed in the subsequent section, we define the total wage bill (W) of the present model as the sum of the wage bill in both firm 1 (w_1q_1) and firm 2 (w_2q_2), that is:

$$W = w_1q_1 + w_2q_2 = \frac{[-2w_2^2 + w_2[a + w_1(2 + h)] + w_1[a(1 - h) - 2w_1]]}{3 - h} \quad (15)$$

In the absence of firm-specific unions, firms pay the same wage, namely the “competitive” or reservation wage, i.e. $w_1 = w_2 = w^\circ$.

Therefore

$$q_1 = \frac{[(a - w^\circ)(1 - h)]}{3 - h} \quad (16)$$

$$q_2 = \frac{[a - w^\circ]}{3 - h} \quad (17)^5$$

$$\pi_1 = \frac{(1 - h)(a - w^\circ)^2}{(3 - h)^2} \quad (18)$$

$$\pi_2 = \frac{(2a - w^\circ)^2}{(3 - h)^2} \quad (19)$$

⁵ The condition for a non-negative output is the usual one, i.e. $q_1, q_2 \geq 0 \Leftrightarrow a \geq w^\circ$.

$$\Pi = \frac{(2-h)(a-w^o)^2}{(3-h)^2} \quad (20)$$

$$CS = \frac{[(2-h)(a-w^o)]^2}{2(3-h)^2} \quad (21)$$

$$SW = \frac{(8+h^2-6h)(a-w^o)^2}{(3-h)^2} \quad (22)$$

Moreover, it is useful – mainly for comparison purposes as regards the later case in which unions are present and therefore their utilities should be considered, as usual (e.g. Correa-Lopez and Naylor, 2004), in the definition of social welfare – to take account of the workers’ welfare which is, in this case of “competitive” labour markets, given by the total wage bill W^C .⁶

Therefore we now define social welfare as $SW^{oo} = CS + \pi_1 + \pi_2 + W^C$, that is

$$SW^{oo} = \frac{(2-h)(a-w^o)[a(4-h) + w^o(2-h)]}{2(3-h)^2} \quad (23)$$

It is easy to see that: 1) profits of firm 1, firm 2, shareholder A and total industry benefit from an increase in the cross-ownership percentage h , (i.e. $\frac{\partial \pi_1}{\partial h}, \frac{\partial \pi_2}{\partial h}, \frac{\partial \pi_A}{\partial h}, \frac{\partial \Pi}{\partial h} > 0$); 2) consumer surplus and societal welfare (both with and without workers’ welfare) are harmed by an increase in the cross-ownership percentage h , (i.e. $\frac{\partial CS}{\partial h}, \frac{\partial SW}{\partial h}, \frac{\partial SW^{oo}}{\partial h} < 0$).⁷ Therefore the “benchmark” model with “competitive” labour markets gives the result that the higher the cross-ownership percentage h , the lower welfare is (despite the increased total profits): this result is expected since the increase of the cross-ownership percentage h means a “reduction” in the product market competition.

3. The union’s wage setting

Following the well-established static unionised oligopoly literature mentioned above, we assume that the cost of production of the i th firm (i.e., the wage per unit of labour, w_i) is no longer exogenous while being the outcome of a strategic decision of its upstream supplier (labour union), as described below.

A decentralised union, distinctly oriented towards wages (employment), unilaterally chooses the wage. As is known, union objectives are not necessarily dominated by wages. In order to derive analytical tractable results for the wage, we assume – following, amongst many others, Pencavel (1984, 1985), Dowrick and Spencer (1994), and Petrakis and Vlassis (2000) –, that the union determines the wage by maximising the following Stone-Geary objective function:

$$V = (w - w^o)^{\theta} L, \quad (24)$$

⁶ Of course W^C is given by eq. (15), where $w_1=w_2=w^o$.

⁷ The proofs of the sign of the derivatives are straightforward and thus omitted here for economy of space.

where w_i is the union's wage, w° is the reservation or competitive wage, L is the labour employed by the firm and $\theta > 0$. A value of $\theta = 1$ gives the rent-maximising case (i.e., the union seeks to maximise the total rent); values of θ smaller (higher) than 1 imply that the union is less (more) concerned about wages and more (less) concerned about jobs (see, e.g., Mezzetti and Dinopoulos, 1991; Fanti and Gori, 2011). Moreover, the unions aims to maximise the wage bill when $w^\circ = 0$.

By recalling that $q_i = L_i$, the firm-specific (decentralised) union i 's objective Eq. (24) can then be written as follows:

$$\max_{\{w_i\}} V_i = (w_i - w^\circ)^\theta q_i, \quad (25)$$

where q_i (that is the firm's output for any given level of wages) is given by Eqs. (7) and (8), respectively.

In particular, as regards firm 1's union, the maximisation of

$$\max_{\{w_1\}} V_1 (w_1 - w^\circ)^\theta q_1 \quad (26)$$

after substitution of eq. (7) in (26), obtains

$$w_1(w_2) = \frac{2w^\circ + \theta[w_2(1+h) + a(1-h)]}{2(1+\theta)} \quad (27)$$

and, as regards the firm 2's union, the maximisation of

$$\max_{\{w_2\}} V_2 = (w_2 - w^\circ)^\theta q_2 \quad (28)$$

after substitution of eq. (8) in (27), obtains

$$w_2(w_1) = \frac{2w^\circ + \theta[w_2 + a]}{2(1+\theta)} \quad (29)$$

Eqs. (27) and (29) define the sub-game perfect best-reply function in wages of union-firm pair i under the assumption of a non-cooperative Cournot-Nash equilibrium in the product market.

In sub-game perfect equilibrium wages are

$$w_1 = \frac{\theta h(a(\theta + 2) - 2w^\circ) + (\theta + 2(1 + \theta))(-a\theta - 2w^\circ)}{\theta^2 h + \theta^2 - 4(\theta + 1)^2} \quad (30)$$

$$w_2 = \frac{\theta^2 a h + (\theta + 2(1 + \theta))(-a\theta - 2w^\circ)}{\theta^2 h + \theta^2 - 4(\theta + 1)^2} \quad (31)$$

Finally, the sub-game perfect equilibrium quantities – after substitution of (30) in (7) and of (31) in (8) – and profits – after substitution of (30) in (9) and of (31) in (10) – are given by:

$$q_1 = \frac{2(a - w^\circ)[\theta(1+h) + 2(1+h) - 4(1+\theta)]}{(3-h)[\theta^2(1+h) - 4(1+\theta)^2]} \quad (32)$$

$$q_2 = \frac{2(a - w^\circ)[\theta(1+h) + 2 - 4(1+\theta)]}{(3-h)[\theta^2(1+h) - 4(1+\theta)^2]} \quad (33)$$

$$\pi_1 = \frac{4(a - w^\circ)^2 [h(\theta + 1) - (3\theta + 2)] [h^2\theta - 2h\theta - (3\theta + 2)]}{(3-h)^2 [h\theta^2 - (3\theta^2 + 8\theta + 4)]^2} \quad (34)$$

$$\pi_2 = \frac{4(a - w^\circ)^2 [h\theta - (3\theta + 2)]^2}{(3 - h)^2 [h\theta^2 - (3\theta^2 + 8\theta + 4)]^2} \quad (35)$$

$$\Pi = \frac{4(a - w^\circ)^2 [h^3\theta(\theta + 2) - 2h^2\theta(2\theta + 3) - h(2 + \theta)(3\theta + 2) + 2(3\theta + 2)^2]}{(3 - h)^2 [h\theta^2 - (3\theta^2 + 8\theta + 4)]^2} \quad (36)$$

4. Welfare analysis

4.1 Consumer's welfare

After substitution of (30) and (31) in (13), the consumer's surplus is as follows:

$$CS = \frac{8(a - w^\circ)^2 [h(\theta + 1) - (3\theta + 2)]^2}{(3 - h)^2 [h\theta^2 - (3\theta^2 + 8\theta + 4)]^2} \quad (37)$$

4.2 Union's utility.

As to the definition of the utility of unions, a preliminary comment is deserved. In unionised oligopoly literature the addition of the unions' utilities to the definition of social welfare (e.g. Correa-Lopez and Naylor, 2004) is usual. However the quantitative weight of unions' utility in the societal welfare function may depend on the specific form of the utility function to the extent that the same preferences can have a different weight depending on possible monotone transformations of the utility function (e.g. although $V = wL$ or $V = w^{0.5} L^{0.5}$ represent the same preferences towards to wage and employment, their quantitative measure is different). Therefore in order to have results robust to a different definition of union's utility, in the definition of the social welfare we alternatively considered either *i*) the value of the total wage bill resulting from the choice of unions under preferences given by the utility function (24) (which is, of course, different from the wage bill), or *ii*) the value of the utility function (24). We find that the result 1 and corollary 1 hold independently of which definition of the welfare of the unionised labourers is included in the societal welfare.

As to case *i*) we define the total wage bill (W) as the sum of the wage bill in both firms 1 and 2, that is:

$$W = w_1 q_1 + w_2 q_2 = \frac{-(a - w^\circ)4[w^\circ h^2 \theta(\theta + 2) + h(\theta + 2)\beta - 2\beta] - a\theta[h^2(\theta^2 + 2\theta + 2) - 2h(1 + \theta)\beta + \beta^2]}{(3 - h)[h\theta^2 - (3\theta^2 + 8\theta + 4)]^2} \quad (38)$$

where $\beta = (3\theta + 2)$

As to the case *ii*), the welfare of each firm-specific union is given by the equilibrium values of eqs. (24) and (26), respectively:

$$V_1 = \frac{2(a - w^\circ)[h(\theta + 2) - \beta] \left[\frac{(a - w^\circ)\theta[h(\theta + 2) - \beta]}{h\theta^2 - (3\theta^2 + 8\theta + 4)} \right]^\theta}{(3 - h)[h\theta^2 - (3\theta^2 + 8\theta + 4)]^2} \quad (39)$$

$$V_2 = \frac{2(a - w^\circ)[h\theta - \beta] \left[\frac{(a - w^\circ)\theta[h\theta - \beta]}{h\theta^2 - (3\theta^2 + 8\theta + 4)} \right]^\theta}{(3 - h)[h\theta^2 - (3\theta^2 + 8\theta + 4)]^2} \quad (40)$$

4.3. Social welfare

In this section, we investigate if the conventional wisdom that a higher share of cross-ownership, that is a reduced competition, should yield lower welfare at equilibrium, holds true.

Following the definitions of the union's utility given in the preceding sub-section, social welfare (SW) is alternatively defined as 1) $SW = CS + \pi_1 + \pi_2 + V_1 + V_2$, and 2)

$$SW^\circ = CS + \pi_1 + \pi_2 + W$$

and is given by

$$SW = \frac{-2(a - w^\circ) \left\{ [(h - 3)(\theta(h - 3) - 2)(\theta^2(h - 3) - 8\theta - 4) \left[\frac{(a - w^\circ)\theta[h\theta - \beta]}{h\theta^2 - (3\theta^2 + 8\theta + 4)} \right]^\theta + B \right\} + C}{(3 - h)^2 [h\theta^2 - (3\theta^2 + 8\theta + 4)]^2}$$

$$B := [\theta^2(h^3 - 2h^2 - 15h + 36) + 2\theta(h - 2)(h^2 + h - 12) + 2(h - 4)(h - 2)]$$

$$C := [(h - 3)(\theta(h - 3) + 2(h - 1)) \left[\frac{(a - w^\circ)\theta[h(\theta + 2) - \beta]}{h\theta^2 - (3\theta^2 + 8\theta + 4)} \right]^\theta$$

(41)

$$SW^\circ = \frac{-4(a - w^\circ)D[a[h^2\theta^2 - 2h(3\theta^2 + 3\theta + 1) + (3\theta + 4)\beta]] - 2w^\circ D}{(3 - h)^2 [h\theta^2 - (3\theta^2 + 8\theta + 4)]^2} \quad (42)$$

$$D = h(\theta + 1) - \beta;$$

Since the relevant expressions of the relationship between industry profits, consumer surplus and social welfare, on the one side, and the percentage of cross-ownership on the other side - (i.e. eqs. (37) - (42)) - are not elegant enough to examine the stability properties analytically, I have explored this numerically by setting $a=2$, $w^\circ=0.5$ (values chosen only for illustrative purposes). However, the following numerical result and corollary are robust to any different specification of parameters:

Result 1. *While with an increasing cross-participation at ownership level, provided that unions are (even slightly) wage-oriented (i.e. $\theta > 1$).*

Corollary 1. *Since, under the circumstances indicated in result 1, not only, in the overall, social welfare but also separately profits, wage bill and consumer surplus are increasing with the percentage of cross-ownership, then firm's owner, workers and consumers agree for an as high as possible percentage.*

Figs. 1- 4 clearly illustrate result 1 and corollary 1: when θ is just beyond the unitary value (see e.g. the case of the value $\theta=1.3$ in figs.) industry profits, total wage bill, consumer surplus and social welfare increase with the percentage of cross-ownership.

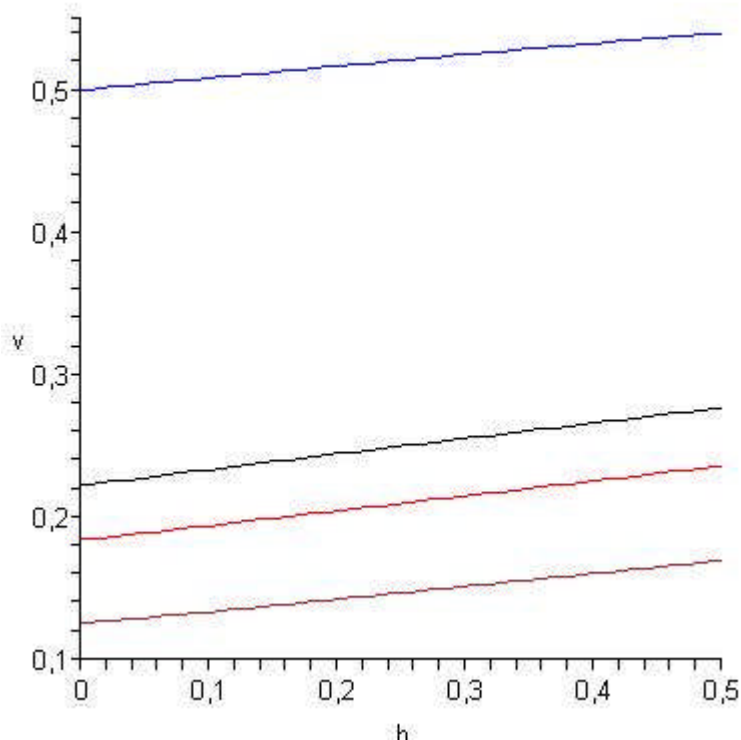


Fig. 1. Industry profits with a varying share of cross-ownership, h , for different levels of “wage-aggressiveness” of unions: $\theta=0$ (blue line), $\theta=1$ (black line), $\theta=1.3$ (red line), $\theta=2$ (brown line) ($a=2$, $w^o=0.5$).

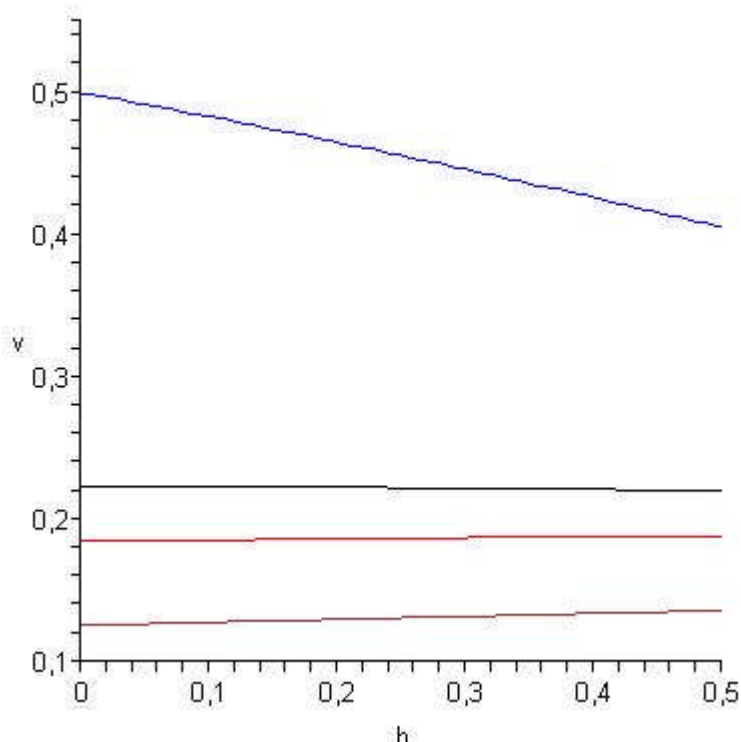


Fig. 2. Consumer surplus with a varying share of cross-ownership, h , for different levels of “wage-aggressiveness” of unions: $\theta=0$ (blue line), $\theta=1$ (black line), $\theta=1.3$ (red line), $\theta=2$ (brown line) ($a=2$, $w^o=0.5$).

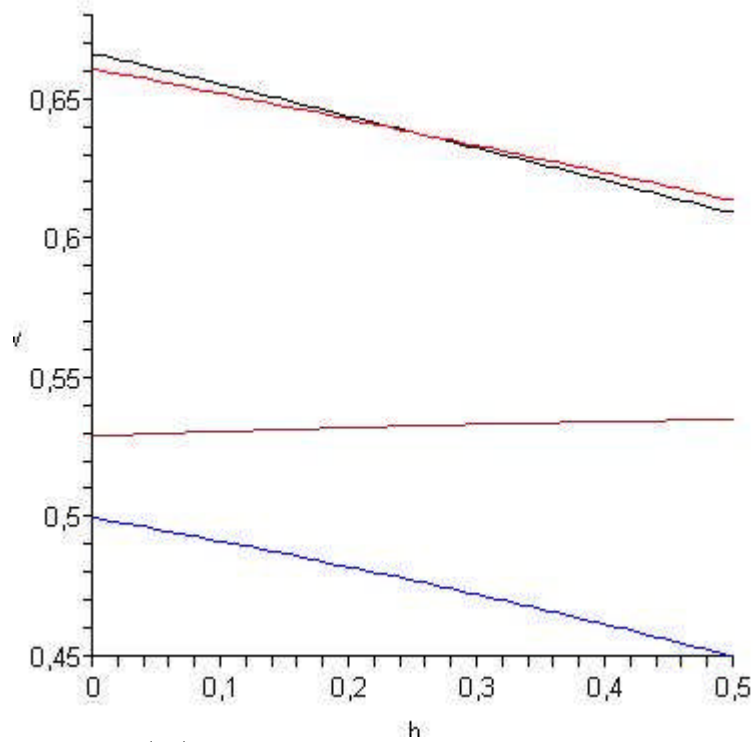


Fig. 3. Total wage bill (W) with a varying share of cross-ownership, h , for different levels of “wage-aggressiveness” of unions: $\theta=0$ (blue line), $\theta=1$ (black line), $\theta=1.3$ (red line), $\theta=3.5$ (brown line) ($a=2$, $w^o=0.5$).

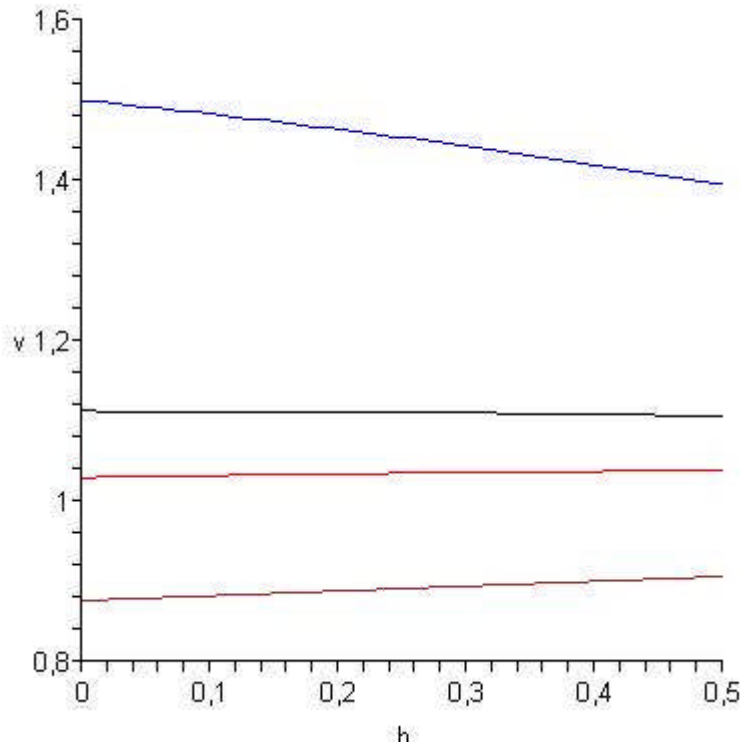


Fig. 4. *Social Welfare (SW) with a varying share of cross-ownership, h , for different levels of “wage-aggressiveness” of unions: $\theta=0$ (blue line), $\theta=1$ (black line), $\theta=1.3$ (red line), $\theta=2$ (brown line) ($a=2$, $w^o=0.5$).*

Note that also the behaviour of the alternative definition of social welfare, SW^o , is “qualitatively” strictly equivalent to that depicted in Fig. 4:⁸ for values of θ just beyond 1, SW^o is increasing with an increasing percentage of cross-ownership, h . This means that our result 1 is robust to different weights of unions’ utility in the societal welfare and thus it is not dependant on the specific form of the union’s utility function.

5. Conclusion

This work analysed the effects of an increase in the percentage of cross-ownership in a Cournot duopoly with firm-specific monopolistic unions, and emphasised the role of unions for the outcome both of the consumer surplus and the social welfare. Since the cross-participation at ownership level implies a lower degree of competition, then in a duopoly without unions, as expected, consumer surplus and social welfare, despite the increase in the industry profits, are reducing with increasing cross-participation. By contrast, when the labour market is unionised, we show the counterintuitive result, that despite the degree of competition is reduced by cross-ownership, both consumer surplus and social welfare are increasing with the share of cross-participation. This always occurs provided that unions are sufficiently wage-oriented. Therefore, in this paper we showed that the conventional wisdom, i.e. a less competitive market (due to an increase of the share of ownership of the other firm by the shareholder which already owns entirely one firm) yields lower welfare at equilibrium, while it holds

⁸ For economy of space we omitted here such a figure, which is strictly similar to the Fig. 4 and is, of course, disposable on request.

when firms pay the same reservation wage, it does no longer hold when firms pay unionised wages and unions are (even slightly) wage-interested.

Moreover, interestingly, we noted that profits, wage bill and consumer surplus are all increasing with the percentage of cross-ownership, so that firm's owner, workers and consumers converge in preferring an as high as possible cross-participation at ownership level. Therefore the policy implication, as regards, in particular, anti-trust aspects, is that, where wage-interested unions are present, an increase in the cross-participation – i.e. a less fierce competition – is socially preferable, in the overall, and, interestingly, is also preferred by all economic agents (firms, workers, consumers).

References

Airline Business (1998). Airlines with Ownership by Other Carriers. June 1998, News, 48.

Alley, W. (1997). Partial ownership arrangements and collusion in the automobile industry. *Journal of Industrial Economics* 45, 191-205.

Amundsen E. S., Bergman L., (2002). Will cross-ownership re-establish market power in the Nordic power market? *The Energy Journal*, Vol. 23, n. 2, pp. 73-95.

Barcena-Ruiz, J. C. and Olaizola, N., (2007). Cost-saving production technologies and partial ownership. *Economics Bulletin*, Vol. 15, No. 6 pp. 1-8.

Barcena-Ruiz, J. C. and Campo M.L., (2011). "Partial cross-ownership and strategic environmental policy," IKERLANAK 201147, Universidad del País Vasco - Departamento de Fundamentos del Análisis Económico I.

Booth, A.L., (1995). *The Economics of the Trade Union*, Cambridge (MA): Cambridge University Press.

Correa-Lopez, M. and Naylor, R.A. (2004). The Cournot-Bertrand profit differential: a reversal result in a differentiated duopoly with wage bargaining. *European Economic Review* 48, 681-696.

Dietzenbacher E., B. Smid, and B. Volkerink (2000). Horizontal Integration in the Dutch Financial Sector. *International Journal of Industrial Organization*, 18, 1223-1242.

Dickescheid, T., (2001). Capital Income Taxation, Cross-Ownership, and the Structure of Public Spending, *FinanzArchiv: Public Finance Analysis* 57, 435-458.

Dowrick, S., (1989). Union-Oligopoly Bargaining. *Economic Journal*. 99, 1123-1142.

Dowrick, S. and Spencer, B.J. (1994). Union attitudes to labor-saving innovation: when are unions luddites?. *Journal of Labor Economics* 12, 316-344.

Fanti, L., Gori, L., (2011). A note on trade unions, unemployment insurance, and endogenous growth. *Eastern Economic Journal*. 37, 270-280.

Fanti, L., Meccheri, N., (2011). The Cournot-Bertrand profit differential in a differentiated duopoly with unions and labour decreasing returns. *Economics Bulletin* 31, 233-244.

Gilo D. (2000). The Anticompetitive Effect of Passive Investment, *Michigan Law Review*, 99, 1-47.

Gilo, D., and Spiegel, Y. (2003). Partial cross ownership and tacit collusion, The Center for the Study of Industrial Organization at Northwestern University, Working Paper #0038.

Gilo, D., Moshe, Y. and Spiegel, Y. (2006). Partial cross ownership and tacit collusion. *The RAND Journal of Economics*, 37: 81-99.

Gilo, D., Spiegel, Y. and Temurshoev, U., (2008). Partial cross ownership and tacit collusion under cost asymmetries, mimeo, www.ihs.ac.at/vienna/resources/Economics/.../20090604_Spiegel_Paper.pdf.

Horn, H. and Wolinsky, A. (1988). Bilateral monopolies and incentives for mergers. *RAND Journal of Economics* 19, 408-419.

Macho-Stadler, I., Verdier, T., (1991). Strategic managerial incentives and cross ownership structure: A note. *Journal of Economics*, Volume 53, Number 3, 285-297.

Mezzetti, C., Dinopoulos, E., (1991). Domestic unionization and import competition. *Journal of International Economics* 31, 79–100.

Naylor, R.A. (1999). Union wage strategies and international trade. *Economic Journal* 109, 102-125.

Pal, R., (2010). How much should you own? Cross-ownership and privatization, Indira Gandhi Institute of Development Research, Mumbai September, <http://www.igidr.ac.in/pdf/publication/WP-2010-015.pdf>.

Parker P.M., Roller L.H., (1997). Collusive conduct in duopolies: multimarket contact and cross-ownership in the mobile telephone industry. *RAND Journal of Economics* Vol. 28, No. 2. Summer, pp. 304-322.

Pencavel, J.H., (1984). The tradeoff between wages and employment in trade union objectives. *Quarterly Journal of Economics* 99, 215–231.

Pencavel, J.H., (1985). Wages and employment under trade unionism: microeconomic models and macroeconomic applications. *Scandinavian Journal of Economics* 87, 197–225.

Petrakis, E., Vlassis, M., (2000). Endogenous scope of bargaining in a union-oligopoly model: when will firms and unions bargain over employment? *Labour Economics* 7, 261–281.

Reitman D., (1994). Partial ownership arrangements and the potential for collusion. *Journal of Industrial Economics*, 42:313–322

Trivieri F., (2007). Does cross-ownership affect competition?: Evidence from the Italian banking industry, *Journal of International Financial Markets Institutions and Money*. Volume: 17, Issue: 1, Pages: 79-101.