



WP 07_12

Luciano Fanti

University of Pisa, Italy

Nicola Meccheri

University of Pisa, Italy

The Rimini Centre for Economic Analysis (RCEA), Italy

MANAGERIAL DELEGATION UNDER ALTERNATIVE UNIONIZATION STRUCTURES

Copyright belongs to the author. Small sections of the text, not exceeding three paragraphs, can be used provided proper acknowledgement is given.

The *Rimini Centre for Economic Analysis* (RCEA) was established in March 2007. RCEA is a private, nonprofit organization dedicated to independent research in Applied and Theoretical Economics and related fields. RCEA organizes seminars and workshops, sponsors a general interest journal *The Review of Economic Analysis*, and organizes a biennial conference: *The Rimini Conference in Economics and Finance* (RCEF). The RCEA has a Canadian branch: *The Rimini Centre for Economic Analysis in Canada* (RCEA-Canada). Scientific work contributed by the RCEA Scholars is published in the RCEA Working Papers and Professional Report series.

The views expressed in this paper are those of the authors. No responsibility for them should be attributed to the Rimini Centre for Economic Analysis.

The Rimini Centre for Economic Analysis

Legal address: Via Angherà, 22 – Head office: Via Patara, 3 - 47900 Rimini (RN) – Italy

www.rcfea.org - secretary@rcfea.org

Managerial delegation under alternative unionization structures

Luciano Fanti and Nicola Meccheri*

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

January 19, 2012

Abstract

This paper studies a three-stage duopoly game with managerial delegation and (monopoly) unions that can be either decentralized or industry-wide. Main findings point out the opposite role played by the introduction of managerial delegation according to the different nature of unionization structure. Indeed, while under industry-wide union managerial delegation leads to incentives for sales, lower profits and higher consumer surplus as well as overall welfare, in the presence of decentralized (firm-specific) unions all those results are reversed. Moreover, and most importantly, introducing managerial delegation makes unionization structure neutral in relation to consumer's surplus and overall efficiency.

Keywords: managerial delegation, unionized duopoly, union's structure

JEL codes: J51, L13, L21

* E-mail addresses: lfanti@ec.unipi.it (L. Fanti); meccheri@ec.unipi.it (N. Meccheri)

1 Introduction

Since the seminal work by Berle and Means (1932), corporate governance literature evidenced that, at least in large companies, ownership and management are separated and agency issues are widespread (e.g. Fama and Jensen 1983). For instance, starting from Baumol (1958), several works highlighted that managers may be driven by other motives than pure profit-maximization, such as sales-maximization, and this implies that firms' owners must rely on managerial incentive contracts in order to align managers' goals with their own.¹

The strategic use of incentive contracts in oligopolistic product markets where decisions are delegated to managers has been introduced in the literature by the pioneering works by Vickers (1985), Fershtman (1985), Fershtman and Judd (1987) and Sklivas (1987) (VFJS from here onwards). Accordingly, each owner has the opportunity to compensate his/her manager with a bonus based on a weighted sum of objective performance measures, such as profits or sales ("sales delegation"), in order to drive the manager to a more aggressive behaviour in the market and, as a consequence, to force the rival firm to reduce output. Typically, a two-stage game is analyzed into this framework: at the first stage, the owners of each firm simultaneously determine the incentive structure for their managers; at the second stage, the competing managers play an oligopoly game, with each firm's manager knowing his incentive contract and those of competing managers.

Another important feature characterizing labour markets is that they are often unionized. However, in this respect, there exist substantial differences between countries. Specifically, a salient dimension that differentiates national unionization structures is the degree of wage setting centralization (Calmfors and Driffill 1988; Freeman 1988; Layard and Nickell 1999; Flanagan 1999). At the industry level, a decentralized wage setting structure, involving firm-specific unions, is commonly contrasted with a completely centralized one, in which a single industry union sets a standard wage for the entire industry. Particularly, while centralized unions representing all workers in an industry are widespread in Continental Europe, firm-specific unions and decentralized wage setting are largely predominant in UK, North America and Japan (e.g. Flanagan 1999).

¹ Also the empirical evidence (e.g. Jensen and Murphy 1990) confirms that owners try to motivate their managers through compensation contracts aiming to gain a competitive advantage in the market.

In industrial organization theory, the prominent role played by unions has been recently recognized by the growing literature on unionized oligopolies (e.g. Horn and Wolinsky 1988; Dowrick 1989; Naylor 1999; Correa-López and Naylor 2004; Correa-López 2007; Lommerud et al. 2005; Pal and Saha 2008). Such models also incorporate two stages of decisions: at stage 1, wages are unilaterally set by monopoly unions or are bargained between firms and unions, while, at stage 2, (given wages) each firm decides its optimal (profit-maximizing) output (or price), which also implies its labour demand.

Motivated by the importance of managerial delegation issues and institutional diversity of industry unionization in market economies, this paper analyzes how unionization structures that differ in the degree of wage centralization affect managerial incentive contracts and product market outcomes. Indeed, despite the widespread inclusion of managerial incentive contracts *à la* VFJS in the oligopoly literature, as well as the recent increasing attention paid to unionized oligopolies, a relatively lower consideration has been devoted to the interaction between the structure of labour unions and the choice of managerial delegation by firms.²

Notable exceptions are Szymanski (1994) and Bughin (1995).³ In particular, Szymanski (1994) extends the VFJS model by introducing wage bargaining between firms' owners and firm-specific unions, showing that owners set incentives closer to profit maximization than to sales maximization and that increasing union power may raise profitability of the firm. Bughin (1995), instead, considers a *two-stage game*, in which, at the first stage, wages are bargained between firms

² Recent contributions in the unionized literature analyze the role of unionization structure (decentralized vs. centralized) in affecting innovation incentives (Haucap and Wey 2004; Mukherjee and Pennings 2011), incentives for foreign direct investment (Mukherjee and Zhao 2007) and welfare effects of downstream mergers (Brekke 2004; Symeonidis 2010).

³ More recently, some works deal with a related, but different issue, namely strategic delegation in wage bargaining. Particularly, Mauleon and Vannetelbosch (2006) consider the possibility that surplus-maximizing unions delegate the wage bargaining to wage-maximizing delegates (such as senior union members) and analyze how this possibility affects the incentives for mergers by firms' owners. Liao (2010), instead, investigates the choice of a firm's delegate (either the owner or the manager) in bargaining wages and employment with a union under a unionized duopoly.

and unions assuming that they have identical bargaining powers and, at the second stage, output decisions are made *cooperatively* by the owner (who maximizes profits) and the manager (who maximizes sales). However, Szymanski (1994) as well as Bughin (1995) focus exclusively on decentralized modes of wage setting, where wages are set by independent unions at the firm-level, hence the relative performance of more centralized wage setting systems remains an open issue, even though, as above discussed, the degree of wage centralization has been identified as a crucial feature of different unionization structures.⁴

In this paper we study a framework, which is partly similar to that considered in Szymanski (1994), with the aim of investigating the interaction between managerial delegation in a duopoly framework and the presence of labour union(s), which can be either firm-specific or industry-wide. In particular, we analyze a *non-cooperative three-stage game*: at the first stage, in accordance with the standard VFJS approach, owners simultaneously choose an incentive contract for their managers given the choices of output by managers (and wages by unions); at the second stage, total wage bill maximizing unions fix wages, given the output chosen by managers (and for given managerial incentive contracts); finally, in the third stage, managers compete *à la* Cournot in the product market, by simultaneously choosing outputs for given wages and incentive contracts.

Particularly, by considering as results differ according to the nature, decentralized and centralized, of labour unions, we aim to assess the relative performance of different unionization structures via their impact on managerial incentive contracts. Moreover, while Szymanski (1994) and Bughin (1995) do not deal with welfare issues, we also derive results as regards consumer surplus and overall welfare. Indeed, we aim to address the following questions: how does the structure of unions modify the choice of the optimal manager's incentive for sales? And how this reflects on equilibrium profits, consumer surplus and overall welfare? Such issues are obviously relevant to the concerns of labour economics and industrial organization.

Our main results can be summarized as follows. Firstly, while firms' owners put a (small) positive weight on sales under a centralized union, sales are even "penalized" when unions are firm-

⁴ Indeed, Szymanski himself recognizes that analyzing the role of industry wide bargaining union is an important issue that deserves to be further investigated (see Szymanski 1994, p. 114).

specific. Secondly, the role of managerial delegation in affecting product market and welfare outcomes proves to be dramatically different according to the unionization structure. In particular, while, in line with VFJS (where unions are not involved), introducing managerial delegation reduces profits and increases output, consumer surplus and overall welfare under a centralized union structure,⁵ the opposite holds true with decentralized unions. Finally, and most strikingly, while without managerial delegation social welfare is higher under decentralized unions, introducing it makes unionization structure neutral in relation to overall efficiency, that is, social welfare becomes the same under decentralized and centralized union structures. At the same time, under managerial delegation, the union structure importantly affects the relative positions of the different actors involved (i.e. it produces important distributional effects).

The remaining part of the paper is organized as follows. In Section 2 we introduce the basic framework and recall results of the (VFJS) benchmark case of managerial delegation without unions. In Section 3 unions are introduced into the analysis and we derive equilibrium outcomes of the three-stage game with both decentralized (firm-specific) and centralized (wide-industry) union(s). In Section 4, by comparing the outcomes obtained in the previous section, we derive and discuss the paper's main results. Finally, Section 5 concludes, while in the final Appendix the derivation of other results used for comparisons in Section 4 is provided.

2 The basic framework

We adopt a managerial delegation basic framework, which is partially modelled along the lines of Jansen et al. (2007, 2009) and van Witteloostuijn et al. (2007), where we introduce the presence of

⁵ In relation to the standard (without unions) managerial delegation framework Fershtmann and Judd (1987, pp. 932-933), for instance, point out that “total output in the incentive equilibrium always exceeds Cournot output, and profits and prices are lower [...]. Since output is increased and oligopoly rents are lower, efficiency is improved”.

labour unions in determining workers' wages. In particular, we consider a normalized duopolistic Cournot market for a single homogenous product, with inverse demand given by:

$$(1) \quad p = 1 - Q$$

where p denotes price and Q is the sum of the firms' output levels ($Q = q_1 + q_2$).⁶

We assume that both firms produce according to a standard production function with constant returns to labour $q_i = L_i$, where L_i represents the level of employment of firm i . The firm i faces a marginal (and average) cost $w_i \geq 0$ for any unit of output produced, where w_i is the per-worker wage. Therefore, the firm i 's cost function is linear and described by:

$$(2) \quad C_i(q_i) = w_i L_i = w_i q_i.$$

For each firm, the cost of producing one output unit equals $w_i < 1$ and we assume that wages are monopolistically chosen by union(s) (see Section 3).

We also admit that the owners of both firms hire a manager and delegate the output decision to this manager. Each manager receives a fixed salary plus a bonus element, which is related to a weighted combination between firms' profits and sales. More specifically, following Jansen et al. (2007, 2009), if the firm i 's profits π_i are positive – otherwise there is no bonus – manager i receives a bonus that is *proportional* to $u_i = \pi_i + b_i q_i$, where the weight b_i is chosen by the owner i to maximize profits and can be either positive or negative according to the fact that the owner provides incentives or disincentives to the manager's choice of output (sales).⁷

⁶ Notice that the standard inverse demand $p' = a - bQ'$ can be obtained from this normalized model simply by fixing $p = p'/a$ and $Q = (b/a)Q'$.

⁷ We also follow the standard assumption by managerial delegation theory that the fixed component (salary) of the manager pay is chosen by the firm's owner such that the manager exactly gets his/her opportunity cost, which is normalized to zero.

Figure 1 provides the timing of events and, in what follows, we proceed into the analysis according to the standard backward logic.

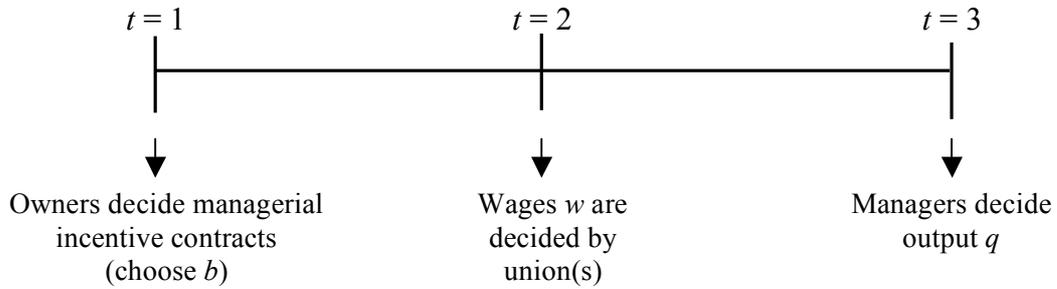


Figure 1: Timing of events

Given that $\pi_i = (1 - w_i - Q)q_i$, u_i (which drives the manager i 's utility) can be rewritten as:

$$(3) \quad u_i = \pi_i + b_i q_i = (1 - w_i - Q + b_i)q_i$$

hence, the equilibrium of the third stage of the game (the market game) must satisfy:

$$(4) \quad \frac{\partial u_i}{\partial q_i} = 0 \Leftrightarrow 1 - w_i - 2q_i - q_j + b_i = 0$$

for $i, j = 1, 2$ and $i \neq j$. According to (4), firms' reaction functions are:

$$(5) \quad q_i(q_j) = \frac{1 - w_i - q_j + b_i}{2}$$

and from (5), by substituting for the corresponding of firm j , we get the equilibrium output by firm i , for given w_i, w_j, b_i and b_j :

$$(6) \quad q_i(w_i, w_j, b_i, b_j) = \frac{1 + 2b_i - b_j - 2w_i + w_j}{3}.$$

2.1 A benchmark case: managerial delegation without unions

For following comparisons and discussion, it can be useful to derive, in our framework, equilibrium outcomes with managerial delegation without unions (that is, VFJS standard results). In this respect, we can start from (6) taking into account that the (reservation) wage paid by firms to employees in the absence of unions is zero (i.e. $w_i = w_j = 0$). This leads to the firm i 's profits as given by:

$$(7) \quad \pi_i(b_i, b_j) = \frac{(b_i + b_j - 1)(b_j - 2b_i - 1)}{9}.$$

Maximizing (7) with respect to b_i drives to the following reaction function in bonuses space:

$$(8) \quad b_i(b_j) = \frac{1 - b_j}{4}$$

which, in turn, leads to the following (symmetric) equilibrium value for b (where the subscript MD refers to the “managerial delegation without unions” case):

$$(9) \quad b_{MD}^* = 0.2.$$

As well known from the received literature, (9) implies that it is optimal for firms' owners to twist their manager's incentives away from strict profit maximization toward sales incentives. Furthermore, it also leads to the following results on equilibrium output (using (6) with $w_i = w_j = 0$) and profits (using (7)):

$$(10) \quad q_{MD}^* = 0.4; \quad \pi_{MD}^* = 0.08$$

which drive to social welfare outcomes, as reported in the following Table 1. In particular, in Table 1 the equilibrium results with managerial delegation are compared against those related to the textbook framework of profit-maximizing firms (i.e. where no managerial delegation and unions issues are considered),⁸ confirming that shifting from profit-maximizing firms to managerial delegation increases both consumer surplus and overall welfare (e.g. Fershtmann and Judd 1987).

Table 1: Equilibrium outcomes: managerial delegation vs. profit-maximizing firms

Outcomes	Managerial delegation	Profit-maximizing firms
q	0.4	0.3333
p	0.2	0.3333
π	0.08	0.1111
CS	0.32	0.2222
SW	0.48	0.4444

3 Unions

3.1 Decentralized (firm-specific) unions

In the presence of labour unions, the latter set wages at the second stage of the game (see Figure 1). Particularly, we assume monopoly total wage bill maximizing unions,⁹ distinguishing between two

⁸ Such results can be easily obtained by standard analysis by imposing $w_i = w_j = b_i = b_j = 0$.

⁹ In the unionized oligopoly literature, the case of monopoly union is adopted, e.g., by Brekke (2004) and Lommerud et al. (2005).

possible different cases: i) there are two decentralized or firm-specific unions which simultaneously fix wages for their own workers; or ii) there is a single industry-wide union that fixes a single wage for all workers in the industry. We begin our analysis with the first case, where the utility function of firm i 's union is given by:¹⁰

$$(11) \quad V_i = w_i L_i = w_i q_i.$$

Unions maximize their objective functions with respect to wages, taking managers' output decision into account. Substituting (6) in (11) and maximizing with respect to w_i , we get:

$$(12) \quad w_i(w_j, b_i, b_j) = \frac{1 + 2b_i - b_j + w_j}{4}$$

which defines 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. Solving the system composed by (12) and its counterpart for j , we obtain the sub-game perfect equilibrium wage, for given weight on sales, b_i and b_j :

$$(13) \quad w_i(b_i, b_j) = \frac{5 + 7b_i - 2b_j}{15}.$$

By substituting (13) in (6), we get output as a function of the weights on sales only:

$$(14) \quad q_i(b_i, b_j) = \frac{10 + 14b_i - 4b_j}{45}.$$

¹⁰ The following utility function is a specific case of the more general Stone-Geary utility function (e.g. Pencavel 1984, 1985; Mezzetti and Dinopoulos 1991; Dowrick and Spencer 1994; Petrakis and Vlassis 2000; Fanti e Gori 2011).

Finally, substituting both $w_i(b_i, b_j)$ (Eq. (13)) and $q_i(b_i, b_j)$ (Eq. (14)) in $\pi_i = (1 - w_i - Q)q_i$ leads to profits as a function of the weights on sales:

$$(15) \quad \pi_i(b_i, b_j) = \frac{(10 - 31b_i - 4b_j)(10 + 14b_i - 4b_j)}{2025}.$$

At the first stage, each owner i simultaneously chooses b_i , the weight through which forcing the manager to choose the desired quantity, with Nash equilibrium describing the outcome. In this game among the owners, each of them knows the profits of each possible third and second-stage games as a function of b_i and b_j , as given by (15). The stage-one equilibrium choice of b_i and b_j and the resulting output, prices and wages is usually referred as the incentive equilibrium. In particular, by maximizing (15) with respect to b_i , we get:

$$(16) \quad \frac{\partial \pi_i(b_i, b_j)}{\partial b_i} = \frac{170 + 868b_i - 68b_j}{2025} = 0$$

which implies the following reaction function for the owner i :

$$(17) \quad b_i(b_j) = \frac{-85 + 34b_j}{434}$$

and, in symmetric equilibrium ($b_i = b_j = b^*$), we get:

$$(18) \quad b_{MD}^D = -0.2125$$

where indexes refer to the case with *decentralized* unions and managerial delegation. According to (18), owners will twist their manager's incentives away from sales (i.e. they will disincentive sales). By substituting (18) in (13), (14) and (15) (and taking (1) and (11) into account), we find the following equilibrium outcomes:

$$(19) \quad w_{MD}^D * = 0.2625; \quad q_{MD}^D * = 0.175; \quad p_{MD}^D * = 0.65; \quad \pi_{MD}^D * = 0.0678.$$

Furthermore, the equilibrium results, as defined in (19), also imply the following (equilibrium) social outcomes in terms of consumer surplus (CS), unions' utility and overall welfare (which, in this context, is given by $SW = CS + 2\pi_i + 2V_i$):

$$(20) \quad CS_{MD}^D * = 0.0612; \quad V_{MD}^D * = 0.0459 \quad ; \quad SW_{MD}^D * = 0.2888.$$

3.2 Centralized (industry-wide) union

We consider now the case of a monopoly industry-wide union that chooses a single wage for all workers in the industry ($w_i = w_j = w$) to maximize:¹¹

$$(21) \quad V = w(q_i + q_j).$$

Substituting (6) and the corresponding equation of firm j (with $w_i = w_j = w$) in (21) and maximizing with respect to w , we get:

$$(22) \quad w(b_i, b_j) = \frac{2 + b_i + b_j}{4}$$

and, by substituting (22) in (6), we obtain output as a function of the weights on sales only:

$$(23) \quad q_i(b_i, b_j) = \frac{2 + 7b_i - 5b_j}{12}.$$

Finally, by substituting both (22) and (23) in profits, we obtain:

¹¹ Clearly, since there is only one union, we do not need to use an index anymore to denote it.

$$(24) \quad \pi_i(b_i, b_j) = \frac{(2 - 5b_i - 5b_j)(2 + 7b_i - 5b_j)}{144}.$$

By maximizing (24) with respect to b_i , we get:

$$(25) \quad \frac{\partial \pi_i(b_i, b_j)}{\partial b_i} = \frac{2 - 35b_i - 5b_j}{72} = 0$$

which implies the following reaction function for the owner i :

$$(26) \quad b_i(b_j) = \frac{2 - 5b_j}{35}.$$

In symmetric equilibrium, with $b_i = b_j = b^*$, we obtain:

$$(27) \quad b_{MD}^C = 0.05$$

where indexes refer to the case with *centralized* union and managerial delegation. By substituting (27) in (22), (23) and (24) (and taking (1) and (21) into account), we find the following equilibrium outcomes for this case:

$$(28) \quad w_{MD}^C = 0.525; \quad q_{MD}^C = 0.175; \quad p_{MD}^C = 0.65; \quad \pi_{MD}^C = 0.0219.$$

which also imply the following (equilibrium) social outcomes in terms of consumer surplus, unions' utility and overall welfare (which is given now by $SW = CS + 2\pi_i + V$):

$$(29) \quad CS_{MD}^C = 0.0612; \quad V_{MD}^C = 0.1837 \quad ; \quad SW_{MD}^C = 0.2888.$$

4 Results

The following Table 1 summarizes the equilibrium results derived in Section 3. It also compares such results with those obtained in a framework with (decentralized and centralized) unions without managerial delegation (columns 2 and 4), that is, the standard unionized duopoly framework where wages are set by unions but output decisions are directly taken by firms' owners to maximize profits (see the final Appendix for their formal derivations).

Results. *From simple comparisons of the outcomes displayed in Table 2, the following main results can be stated:*

- i. in the presence of managerial delegation, firms' owners put a positive weight on sales under a centralized union, while output is even "penalized" (that is, the weight b is negative) with decentralized unions;*
- ii. similarly to what applies in a world without unions, managerial delegation reduces profits and increases output, consumer surplus and overall welfare under a centralized union (compare results in column 3 against those in column 4). By contrast, under decentralized unions, managerial delegation increases profits and reduces output, consumer surplus and overall welfare (compare results in column 1 against those in column 2);*
- iii. managerial delegation is harmful (i.e. it decreases both wages and employment) for decentralized unions, but is advantageous (i.e. it increases both wages and employment) for a centralized union;*
- iv. while without managerial delegation social welfare is higher under decentralized unions (compare column 2 against column 4), introducing it makes unionization structure neutral in relation to overall efficiency (i.e. with managerial delegation, social welfare is the same under decentralized and centralized unions), even if firms' owners (unions) are better (worse) off under a decentralized unions structure (i.e. distributional effects realize according to the union structure).*

Table 2: A comparison of equilibrium outcomes with managerial delegation and unions

Outcomes	Decentralized unions with managerial delegation (1)	Decentralized unions without managerial delegation (2)	Centralized unions with managerial delegation (3)	Centralized unions without managerial delegation (4)
b	-0.2125	-	0.05	-
q	0.175	0.2222	0.175	0.1667
p	0.65	0.5555	0.65	0.666
w	0.2625	0.3333	0.525	0.5
π	0.0678	0.0494	0.0219	0.0278
V	0.0459	0.0741	0.1837	0.1667
CS	0.0612	0.0988	0.0612	0.0556
SW	0.2888	0.3457	0.2888	0.2779

Hence, while introducing managerial contracts is preferred from consumers and society as a whole if labour unions are centralized, consumers and society are damaged by the introduction of managerial contracts when there are firm-specific unions that choose their workers' wages. Moreover, in the latter case, since also wages, employment and, as a consequence, unions' utilities are harmed from delegating the output choice to managers, managerial delegation (provided that sales are penalized) can be also used by firms' owners as an effective instrument to recover profits, which otherwise were accrued to workers through unionization. The intuition behind this result is that, while choosing a positive weight b makes managers more aggressive as regards quantities (hence, employment) and this drives unions to raise wages, by "penalizing" quantities (with a negative b), owners can instead put a brake on wage rises (further than on employment), hence leading to higher profits.

By contrast, with an industry-wide union the advantage for the owner to “tune” the selling-aggressiveness of his/her own manager in order to menace employment (that is, the possibility for the owner to weaken the union’s wage claim) is lost because the union’s centralization prevents the inter-union competition, which is the cause of the effectiveness in reducing wage costs and increasing profits by delegating output decision to the manager.

Moreover, this also leads to another important finding. Namely, in equilibrium, the output-enhancing effect under a central union linked to the higher bonus weight on quantities is exactly counterbalanced by the output-reducing effect of a higher wage cost, so that consumers are unaffected by whatever unionization structure. Therefore, the latter only affects the surplus distribution between owners and workers, hence determining a very important result: while with firm-specific unions owners obtain a relatively sizable profit gain by delegating the output game to managers, under central union the introduction of such a delegation causes a relatively sizable profit loss. Clearly, these results also shed some light on the interaction between unions’ structure and managerial firms, and could provide some testable implications. Particularly, according to them, one would expect that, in the presence of firm-specific unions, managers are penalized on their sales and it is more likely the diffusion of managerial firms.

4 Concluding comments

By developing a non-cooperative three-stage duopoly game with managerial delegation and monopolistic unions, we have studied how unionization structures that differ in the degree of wage centralization affect managerial incentive contracts and product market outcomes.

Our findings show that firms’ owners put a (small) positive weight on sales under a centralized union while sales are even “penalized” when unions are firm-specific. Furthermore, the role of managerial delegation in affecting product market outcomes proves to be dramatically different according to the nature of the unionization structure. Indeed, while in line with the received literature (where unions are not involved) introducing managerial delegation reduces profits and increases output, consumer surplus and overall welfare under a centralized union

structure, the opposite holds true with decentralized unions. Finally, and most strikingly, we have established an irrelevance result of unionization structure in relation to market efficiency when managerial delegation applies. That is, while without managerial delegation social welfare is higher under decentralized unions, when owners delegate output decisions to managers it becomes the same notwithstanding the union's structure. At the same time, however, important distributional effects realize according to the nature of unionization.

Future research directed to extend our results can be carried out along possible different lines. Particularly, the framework could be extended to deal with other managerial incentive structures, such as "relative performance delegation" (e.g. Salas Fumas 1992; Miller and Pazgal 2002).¹² Furthermore, different unions-firms hypotheses in determining wages, such as right-to-manage or efficient bargaining (e.g. Petrakis and Vlassis 2000), are worth investigating.

Notice, however, that in relation to the extension of our results to the right-to-manage hypothesis, some preliminary intuitions could arise from this work by recalling that the monopoly union model, considered in this paper, represents a special case of the right-to-manage model where the union has all the bargaining power. Indeed, we have shown that introducing managerial delegation under an industry-wide union produces the same qualitative results in relation to profits and social welfare than the standard VFJS model (which corresponds to the case with firms having all bargaining power in determining wages). By contrast, with respect to the standard case, qualitative results are reversed under firm-specific unions. Hence, this suggests that in a more general right-to manage model of wage determination, while (qualitative) results that we have obtained with a centralized union could generally hold true, those referring to the firm-specific unions case could apply only if unions' bargaining power *vis-à-vis* firms is sufficiently large. Nonetheless, a more detailed analysis of this and other related points are undoubtedly welcome.

¹² In Fanti and Meccheri (forthcoming) we provide a comparison between (absolute) performance-related-pay and relative performance evaluation in a differentiated duopoly with institutional features that constraint firms in choosing optimal contracts.

Appendix

A.1 Decentralized unions without managerial delegation

To derive equilibrium results in a framework with decentralized unions without managerial, we can start from (6) with $b_i = b_j = 0$, which, by substituting in (11), leads to the following union i 's utility function:

$$(A1) \quad V_i(w_i, w_j) = w_i \left(\frac{1 - 2w_i + w_j}{3} \right).$$

Maximizing (A1) with respect to w_i leads to following reaction function for union in wages space:

$$(A2) \quad w_i(w_j) = \frac{1 + w_j}{4}$$

which, in turn, leads to the following (symmetric) equilibrium value for the wage, where the subscript D refers to the decentralized unions (without managerial delegation) case:

$$(A3) \quad w^{D*} = 0.3333.$$

Finally, by substituting for (A3) we get the following results on equilibrium output and profits, which then also lead to other results for this case, as reported in Table 2:

$$(A4) \quad q^{D*} = 0.2222; \quad \pi^{D*} = 0.0494.$$

A.2 Centralized union without managerial delegation

To derive equilibrium results in a framework with centralized unions without managerial, we can start from (6) (and its counterpart for the firm j) with $b_i = b_j = 0$ and $w_i = w_j = w$, which, by substituting in (21), leads to:

$$(A5) \quad V(w) = w \left(\frac{2 - 2w}{3} \right).$$

Maximizing and solving (A5) with respect to w leads the following equilibrium value for the wage, where the subscript C refers to the centralized unions (without managerial delegation) case:

$$(A6) \quad w^{C*} = 0.5.$$

By substituting for (A6) we get the following results on equilibrium output and profits, which then lead to other welfare results for this case, as reported in Table 2:

$$(A7) \quad q^{C*} = 0.1667; \quad \pi^{C*} = 0.0278.$$

References

- Baumol, W (1958), On the theory of oligopoly, *Economica* 25: 187-198.
- Berle, A.A. and Means, G.C. (1932), *The Modern Corporation and Private Property*, Harcourt, Brace and World, New York.
- Brekke, K.R. (2004), Competition or coordination in hospital markets with unionised labour, *International Journal of Health Care Finance and Economics* 4: 65-89.
- Bughin, J. (1995), Unions and strategic managerial incentives, *Economics Letters* 47: 95-100.

- Calmfors, L. and Driffill, J. (1988), Centralisation and wage bargaining, *Economic Policy* 6: 13-61.
- Correa-López, M. (2007), Price and quantity competition in a differentiated duopoly with upstream suppliers, *Journal of Economics & Management Strategy* 169: 469-505.
- Correa-López, 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.
- 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.
- Fama, E.F and Jensen, M.C. (1983), Separation of ownership and control, *Journal of Law and Economics* 26: 301-325.
- Fanti, L. and Gori, L. (2011), A note on trade unions, unemployment insurance, and endogenous growth, *Eastern Economic Journal* 37: 270-280.
- Fanti, L. and Meccheri, N. (forthcoming), Labour incentive schemes, effort and market outcomes in a differentiated duopoly with simple institutional constraints, *Journal of Institutional and Theoretical Economics*.
- Fershtman, C. (1985), Managerial incentives as a strategic variable in duopolistic environment, *International Journal of Industrial Organization* 3: 245-253.
- Fershtman, C and Judd, K. (1987), Equilibrium incentives in oligopoly, *American Economic Review* 77: 927-940.
- Flanagan, R.J. (1999), Macroeconomic performance and collective bargaining: an international perspective, *Journal of Economic Literature* 37: 1150-1175.
- Freeman, R. (1988), Labour markets, *Economic Policy* 6: 63-80.
- Haucup, J. and Wey, C. (2004), Unionisation structures and innovation incentives, *Economic Journal* 114: 149-165.
- Horn, H. and Wolinsky, A. (1988), Worker substitutability and patterns of unionisation, *Economic Journal* 98: 484-497.
- Jansen, T., van Lier, A. and van Witteloostuijn, A. (2007), A note on strategic delegation: the market share case, *International Journal of Industrial Organization* 25: 531-539.

- Jansen, T., van Lier, A. and van Witteloostuijn, A. (2009), On the impact of managerial bonus systems on firm profit and market competition: the cases of pure profit, sales, market share and relative profits compared, *Managerial and Decision Economics* 30: 141-153.
- Jensen, M.C. and Murphy, K.J. (1990), Performance pay and top management incentives, *Journal of Political Economy* 98: 225-264.
- Layard, R. and Nickell, S. (1999), Labor market institutions and economic performance, in: O.C. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics*, vol. 3, North Holland, Amsterdam.
- Liao, P.-C. (2010), Strategic delegation under unionised duopoly: who will bargain with unions?, *Australian Economic Papers* 49: 276-288.
- Lommerud, K.E., Straume, O.R. and Sørgaard, L. (2005), Downstream merger with upstream market power, *European Economic Review* 49: 717-743.
- Mauleon, A. and Vannetelbosch, V.J. (2006), Strategic union delegation and incentives for merger, *Applied Economics Letters* 13: 1-5.
- Mezzetti, C. and Dinopoulos, E. (1991), Domestic unionization and import competition, *Journal of International Economics* 31: 79-100.
- Miller, N. and Pazgal, A. (2002), Relative performance as a strategic commitment mechanism, *Managerial and Decision Economics* 23: 51-68.
- Mukherjee, A. and Zhao, L. (2007), Unionization structure and the incentives for foreign direct investment, Discussion Paper Series 202, Research Institute for Economics & Business Administration, Kobe University.
- Mukherjee, A. and Pennings, E. (2011), Unionization structure, licensing and innovation, *International Journal of Industrial Organization* 29: 232-241.
- Naylor, R.A. (1999), Union wage strategies and international trade, *Economic Journal* 109: 102-125.
- Pal, R. and Saha, B. (2008), Union-oligopoly bargaining and entry deterrence: a reassessment of limit pricing, *Journal of Economics* 95: 121-147.
- 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. and 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.
- Salas Fumas, V. (1992), Relative performance evaluation of management, *International Journal of Industrial Organization* 10: 473-489.
- Sklivas, S. (1987), The strategic choice of managerial incentives, *RAND Journal of Economics* 18: 452-458.
- Szymanski, S. (1994), Strategic delegation with endogenous costs. A duopoly with wage bargaining, *International Journal of Industrial Organization* 12: 105-116.
- Symeonidis, G. (2010), Downstream merger and welfare in a bilateral oligopoly, *International Journal of Industrial Organization* 28: 230-243.
- Vickers, J. (1985), Delegation and the theory of the firm, *Economic Journal* 95: 138-147.
- van Witteloostuijn, A., Jansen, T. and van Lier, A. (2007), Bargaining over managerial contracts in delegation games: managerial power, contract disclosure and cartel behavior, *Managerial and Decision Economics* 28: 897-904.