Pareto-superiority of Corporate Social Responsibility in unionized industries

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Abstract

Economists believe that a firm's engagement in Corporate Social Responsibility (CSR) is motivated by objectives beyond increasing profits. Using a duopoly framework with convex technology and an industry-wide union-setting wage at the central level, this work shows that, when owners cooperatively select a level of CSR engagement, profits under CSR are higher than under standard profit maximization; thus, the firms' owners' simple self-interest leads to the adoption of CSR. Moreover, the union, consumers, and the overall social welfare in the presence of CSR activities are higher than without CSR. As such, the firms' owners' social concerns yield a Pareto-superior outcome.

Keywords: Cournot Duopoly; Labor Union; Corporate Social Responsibility

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1.   Introduction

"The game seems to be going on rather better now," she said. "Tis so," said the Duchess:
"and the moral of it is - 'Oh, 'tis love, 'tis love, that makes the world go round.' "
"Somebody said," whispered Alice, "that it's done by everyone minding their own business"

Lewis Carroll, Alice's Adventures in Wonderland.

Companies' worldwide engagement in Corporate Social Responsibility (CSR) activities has become a growing trend in the last decades, and today it represents a dominant global business practice. KPMG (2005, 2015) states that, in 2002, 23 percent of the top 100 companies from 45 countries declared in their financial reports the realization of CSR activities; those figures increased to 73 percent in 2015. Furthermore, according to the 250 Global Fortune Index (i.e. the world's 250 largest companies), those figures have more than doubled, from 45 percent to 92 percent, in the same period of time.

However, a large strand of the industrial organization literature has recognized the key role of unions in oligopoly markets (e.g. Dowrick, 1989, 1990; Horn and Wolinsky, 1988; Correa-López and Naylor, 2004). Because a number of large companies engage in CSR operates in oligopoly industries with a unionized labor force, a further enlightenment regarding the links between CSR and unionization is needed and the effects that union wage-setting has on firms (and their profitability) and their overall welfare.[3]

Although several empirical works have examined the correlation between CSR and profitability performances, their findings have generally been mixed or contradictory (even within a given analysis). Thus, these studies have failed to provide an unambiguous, general consensus. In fact, the majority of the researchers have identified either only negative (e.g. Bromiley and Marcus, 1989; Davidson et al., 1987; Davidson and Worrel, 1988) or indecisive empirical evidence (e.g. Aupperle et al., 1985; Ingram and Frazier, 1983). In contrast, an increasing number of works has shown a positive correlation between the social responsibility of corporations and their financial performance (e.g. Griffin and Mahon, 1997; Roman et al., 1999; Waddock and Graves, 1997).

The topic of firms' engagement in CSR has been examined from different standpoints.[4] The puzzle of why firms owned and managed by shareholders (directly or through managers who have opportunely hired and instructed them) should embark on social activities (which initially seem unprofitable) has so far remained unresolved, unless the first principle of the rationality of "homo oeconomicus" is abandoned. Indeed, concentrating our attention to the realm of economics, and according to the first principles of economics, corporations are only responsible to their shareholders.[5] As a consequence of this approach, corporations only aim to

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[3] For example, in the automotive and car-maker components industries, German companies Bosch, BMW, and Daimler, whose labor force is notably unionized, rank among the top companies with the best CSR reputation (6th, 12th, and 23rd place, respectively) (Reputation Institute, 2017). Moreover, some full-time workers at Microsoft, another company known worldwide for its CSR activities (11th place in the rank of the Reputation Institute, 2017), has recently formed a union, the Temporary Workers of America (BloombergBusinessweek, 2015).

[4] Garriga and Mele` (2004) classify the most relevant CSR theories and related approaches with respect to the following aspects of social reality: economics, politics, social integration, and ethics.

[5] Regarding the economics point of view, see also the considerations in Benabou and Tirole (2010).

maximize returns to shareholders within the legal framework and the ethical custom of the country, as Friedman (1970) states in an article in *The New York Times* with the suggestive title: "The social responsibility of business is to increase its profits."

Though no general agreement has been reached about the precise definition of CSR, two different viewpoints exist, stating that it is 1) a specific social activity that firms conduct in a voluntary way (i.e. beyond legal requirements), without inquiring about either the rationale for the occurring of this choice or the purely economic effects it induces; or 2) an explicit profit-sacrificing social activity (i.e. any damage caused to a firm's profits precisely defines true CSR).[6] It seems to be rather unexpected that, in the domain of economics, the firms' extensive engagement in CSR activities either is not explained and it is not worthwhile to explain it, or it clearly inflicts profit damage. Therefore, taking seriously into consideration the economic point of view, it is natural to ask whether the introduction of CSR may contribute to a firm's profitability, thus also providing a solution to the puzzle. In this paper, we start from the basic model of duopolistic Cournot competition, which clearly shows that firms – which maximize short-run profits – always reduce their profits by introducing social concerns into their objectives.[7]

The present paper aims to develop a framework in which the firms' owners are incentivized to consider social concerns because, by doing so, they maximize their profits. The model is a standard unionized Cournot duopoly in which owners can choose the level of CSR (under the usual form of the consumer's surplus incorporated in the firm's objective function). In detail, it is assumed that the owners cooperatively choose the level of CSR to undertake, while also remaining competitive on the product market. Although not widely adopted, the cooperative choice of CSR activities can be observed in the real world. Cooperative CSR can take place with the involvement of single or multiple Non-Governmental Organizations (NGOs). An example of such collaborations among competitors can be seen in the chemical industry in Ecuador, where companies have established a relationship with a single NGO, Fundación Natura, as part of the industry self-regulation, called Responsible Care. One benefit of this model is that it creates a common platform for all firms signed on to Responsible Care, leading to the establishment of best practices across the industry. The collaboration has led to the development of many operational aspects of member companies, such as process safety, environmental protection, community awareness and emergency response, and occupational health management. In the case of multi-firm, multi-NGO collaboration, the leading example is the Fair Labor Association (FLA), which comprises more than 20 apparel manufacturers

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[6] Doni and Ricchiuti (2013, 382) describe in an enlightening way these definitions and their different implications: "There are two polar definitions that can appear in sharp contrast. According to a first point of view, a firm is socially responsible when it takes environmentally friendly actions not required by law. In this light, CSR can be defined without any regard either to the motivation of the firm's choices or to the impact of such choices on the firm's profit. From a different point of view, other authors believe that a firm is truly responsible only when it sacrifices its profit, at least in part, in order to carry out some social objective. Baron (2001) names the first behaviour as strategic CSR and the second one as altruistic CSR. This second concept of CSR is quite disputed: according to some authors, altruistic CSR is neither sustainable in a competitive market nor desirable from a social point of view (see Reinhardt et al., 2008, and literature quoted therein)."

[7] Most industrial organization literature has formalized firms' CSR actions by supposing that, when market variables must be chosen, a part of consumer surplus is also taken into account; in the current paper, we strictly follow this stance. However, it should be noted that consumers' welfare may not be the main CSR action in practice, because in many firms, CSR behaviors are directed to social goals such as environment, culture, and education.

(such as Nike, Eddie Bauer, and Nordstrom) and dozens of NGOs. The FLA's Workplace Code of Conduct addresses wide-ranging issues including exploitation (forced and child labor), work environment (harassment and abuse, discrimination, health, and safety), and employment criteria (collective bargaining, wages, and compensation) (Peloza and Falkenberg, 2009).

Battaglia et al. (2010) describes the COOPERATE Project (COmpanies OPErating in a Responsible Area and with Transparent Ethics), a project co-financed by the European Commission, whose aim was to promote and spread CSR concepts, practices, and tools in three industrial clusters in the Tuscany region (Italy). In each cluster, the COOPERATE Project proposed innovative approaches for cooperative management of CSR activities, based on the interactions of local industrial and non-industrial organizations, which established and implemented a series of formalized CSR practices and tools that rely on cooperative actions.

In this respect, regarding the choice of CSR, we examine a semi-collusive behavior that the IO literature has largely investigated with respect to many other firms' activities; however, the topic of semi-collusion on CSR activities has been disregarded. In this respect, this paper contributes to the literature on semi-collusion, in which firms compete in one dimension (usually price or quantity), but collude in another dimension, such as R&D (e.g. D'Aspremont and Jacquemin, 1987), location (e.g. Friedman and Thisse, 1993), capacity (Osborne and Pitchik, 1987), quality (Foros et al., 2002), or advertising (e.g. Dewenter, Haucup and Wentzel, 2010). Firms may make higher profits without incurring anti-trust prohibitions, as in the case of collusion on quantities, given that this semi-collusion is beneficial, instead of being detrimental to consumers (as usual). This paper examines firms that collude on a socially acceptable action, such as the adoption of social labels; this refers to a labeling system that provides information on some properties of environmental and/or social matters and thus allow those products to be differentiated for consumers (Baudry and Chassagnons, 2012). Moreover, in line with the short-run context of any Cournot model, we assume increasing marginal labor costs. Indeed, according to the first principles of economics, some factors are fixed in the short run, with remaining factors subject to diminishing returns, so that short-run marginal cost increases in output. Typical arguments for the existence of rising marginal labor costs mention the additional costs of overtime work and the higher cost of bringing into use older equipment to meet the additional demand.[8]

Given the current scarcity of economic theory on the solution of the above mentioned CSR puzzle, the present paper aims to fill this gap. In particular, the paper focuses on the following questions: 1) Will owners choose to undertake CSR activities at equilibrium? and 2) If this is the case, what are the consequences of such social concerns on the firm's profitability at equilibrium? Are such CSR activities encouraged also by workers? Can the firms' CSR behavior lead to a Pareto-improvement?

It is shown that owners jointly choose to make CSR activities, provided that the union does not have too much employment-oriented preferences. In equilibrium, the owners' profits benefit from such a choice. In fact, although interest in consumer surplus motivates firms to decide on excess production with respect to maximizing profits at equilibrium, undertaking CSR also has

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[8] For instance Bils (1987), using U.S. manufacturing data for 1957-1983, shows that a short-run increase in production-worker employment of 10 percent was associated with an increase in marginal cost of about 2.4 percent, and most of the rise in marginal cost was due to overtime payments, given that the employment is not perfectly flexible.

the effect of dampening wages. Overall, induced wage reduction more than offsets the induced fiercer competition, therefore resulting in profit enhancement. However, this is not the end of the story. In fact, it is also shown that, although CSR induces a wages reduction, it also induces a larger employment, and the net result of these two counterbalancing forces on the union's utility is positive. Therefore, the firms' social concerns are good even for the workers' welfare. Finally, since (as expected) CSR increases also the welfare of consumers, then also the social welfare rises. As a consequence, these findings lead to two noteworthy conclusions. First, the firm acts as an economic institution, in the sense that it follows the Friedmanian rule that a business holds the social responsibility to increase its profits, while also effectively pursuing social interests. This helps solve the puzzle. Second, because CSR activities lead to a Pareto-superior outcome (that is, all the single agents – owners, workers, and consumers – and the overall society stand to benefit), it follows that owners' selfish interest is socially optimal: in a sense, this result seems to reconcile the opposite "amoral view" (Friedman, 1962) and "social view" (Freeman, 1984).[9]

Thus, to the best of our knowledge, the present paper is the first to study the endogenous cooperative choice of the CSR parameter by firms' owners in a standard Cournot duopoly when wages are endogenously given by an industry-wide union. It then compares the results obtained under this CSR behavior against those related to the standard unionized model with only profit-seeking firms.

In the next section, we present the review of the literature on the theoretical approach to CSR. Section 3 introduces the basic model with unions and the cooperative choice of CSR activities. Then, for comparative purposes, in Section 4 we present the equilibrium outcomes of the model without CSR. Section 5 compares the outcomes of the models without and with firms' social concern and derives the main results. The last section summarizes our findings.

2.   Literature review

The literature mainly models the firms' social concerns either as a partial interest in the consumer surplus embodied in their objective functions through which they choose the strategic variables with which to compete on the market (e.g. Goering, 2007, 2009, 2012, 2014; Brand and Grothe, 2013, 2015; Kopel and Brand, 2013, Lambertini and Tampieri, 2012; Planer-Friedrich and Sahm, 2016; Fanti and Buccella, 2017a,b,c) or a partial consideration for overall social welfare (e.g. Ghosh and Mitra, 2014; Matsumura and Ogawa, 2014). Another approach discusses the internalization of pollution created by production (e.g. Rodriguez-Ibeas, 2007; Garcia-Gallego and Georgantzis, 2009; Doni and Ricchiuti, 2013). Furthermore, some authors jointly consider a few elements in the same model, such as the interest in consumer surplus and in environmental damages (Lambertini and Tampieri, 2015) or interpret CSR as an incentive contract regarding either consumer surplus or social welfare (e.g. Hino and Zennyo, 2017).

Theoretical explanations of the widespread presence of CSR-type firms have offered several standpoints, but most substantially abstract from the puzzle mentioned in the

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[9] Such definitions have been introduced early by the seminal article by Klonoski (1991), in his attempt to classify the different theories on CSR regarding the "amoral view," "personal view," and "social view."

Introduction. To provide a concise classification of these viewpoints, we distinguish in the literature three approaches to the subject. The first assumes that consumers are socially oriented – for instance, broadly speaking, "green" consumers want to pay more for the products that CSR-type firms offer[10] (e.g. Kopel, 2009; Doni and Ricchiuti, 2013; Manasakis et al., 2014). In such cases, it seems evident that CSR designation is profitable for firms; thus, this explanation is irrelevant to solve the puzzle. The second approach assumes that the corporate governance involves all stakeholders (e.g. Freeman et al., 2010),[11] and the owners/shareholders are only one of a firm's components. Therefore, decisions are made through forms of bargaining between potential conflicting interests. As a consequence, it is not surprising that firms consider, for instance, the welfare of consumers to the detriment of that of the owners. However, also in this case, the puzzle is untouched because, in the case that the "stakeholder" theory of the firm holds, owners would be perfectly "rational" in their decisions if they alone could make them. Finally, the third approach assumes that the firm (i.e. shareholders) are altruistic, and a firm can truly be said to be CSR-type only if it sacrifices its profit for social purposes.[12] Also, in this third case, the puzzle is unresolved simply because it is assumed to be a priori a non-rational behavior.

Many articles introduce CSR in the form of a maximization of an objective function, which is a weighted sum of profit and consumer surplus. Among those contributions, some authors (e.g. Kopel, 2009; Kopel and Brand, 2012; Goering 2007, 2009, 2012; Brand and Grothe, 2012; Lambertini and Tampieri, 2012, 2015; Fanti and Buccella, 2017a,b) focus on the effects of firms' CSR on competition under various conditions, such as bilateral monopoly or entry game or managerial delegation. However, in any case, it is assumed that either the levels of CSR are exogenously given or only one firm chooses the level of CSR while other firms remain profit seeking.

By contrast, a few authors study the endogenous strategic choice of the CSR parameter by profit-maximizing firms' owners. In a bilateral monopoly model, Goering (2014) assumes that the upstream wholesaler will select a two-part contract, consisting of a wholesale price for the goods and level of CSR that maximize its profits: that is, the wholesaler is only profit seeking when it contracts with its retailer to include CSR in its business activity. Meanwhile, the retailer must maximize its weighted payoff, including both its own profit and its consumer surplus, under the weight on consumer surplus chosen by the manufacturer. Unlike Goering (2014), Brand and Grothe (2015) assume that both the manufacturer and the retailer maximize the socially responsible objectives and show that, when both firms simultaneously choose their level of social responsibility, both firms do not have an incentive to deviate from pure profit maximization, while if the manufacturer commits itself to social concerns before the retailer does, then at equilibrium, both endogenously decide to follow CSR rules, and both benefit. Hino and Zennyo (2017) analyze endogenous decision-making with regard to the level of CSR in a delegation game with Cournot–Stackelberg competition. They show that a follower can

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[10] Some convincing empirical evidence supports the idea that many consumers are willing to pay a price premium to purchase environmentally friendly goods (see Bansal, 2008; Kitzmueller and Shimshack, 2012).

[11] In this case, the firm is viewed as a social institution instead of an economic institution. Therefore, notice that we are interested only in firms as economic institutions.

[12] On the other hand, Kitzmueller and Shimshack (2012) argue that the hypothesis of altruistic CSR is not corroborated by empirical evidence.

derive a greater profit than a leader and achieve maximum profit when firms sequentially choose their CSR level. Using a standard Cournot duopoly with homogeneous product, Planer-Friedrich and Sahm (2016) show that firms prefer to care for all consumers rather than for their own customers only, thus choosing positive levels of CSR, but at equilibrium, choosing CSR reduces firms' profits.

In a Cournot duopoly framework, Fanti and Buccella (2017b, Supplement) study the situation in which firms non-cooperatively select their endogenous level of social concerns (i.e. the weight on consumers' surplus in the firm's objective function is completely under the control of the owners and does not depend on the stakeholders). Those authors find that, when goods are substituted, a unique sub-game perfect Nash equilibrium exists in which both firms engage in CSR and, given that pure profit-maximization payoff dominates the CSR strategy, this equilibrium is Pareto inefficient; a standard prisoner's dilemma arises. On the other hand, when goods are complements, two pure-strategy asymmetric Nash equilibria emerge; that is, one firm engages in CSR activities while the rival remains profit seeking. The game then becomes an anti-coordination game.

On the other hand, in a Cournot duopoly market with managerial delegation (i.e. owners delegate output decisions to a manager), Fanti and Buccella (2017d) show that, in the subgame-perfect Nash equilibrium, both firms are of CSR type, and the presence of CSR activities improves the firms' profitability while harming the welfare of consumers and society. This result is in contrast to the conventional wisdom under non-managerial firms.

3. The (basic) model

We assume that firms produce homogeneous goods. As usual, the standard linear inverse market demand is

$$p = a - q_i - q_j \tag{1}$$

where p defines the price of the goods, and q_i and q_j are the firms' output levels for $i, j = 1, 2; i \neq j$.

A decreasing returns-to-scale production function in the sole input, labor, is assumed to be identical for both firms:

$$q_i = A\sqrt{L_i} \tag{2}$$

where L_i is the labor force firm i employs and A is an index of the labor productivity fixed for analytical convenience and, without loss of generality, to one. The per-unit rate of labor wage of the i-th firm is w_i. Thus, firm i's quadratic cost function is: [13]

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[13] A convex (quadratic) cost function in the industrial organization literature is a frequent assumption (e.g. Heywood and McGinty, 2007; Fanti and Meccheri, 2011, 2016; Fanti and Buccella, 2017c). In the present context, constant returns-to-scale (i.e. linear costs) technology does not lead to an interdependence between the choice of

$$C_i(q_i) = w_i \sqrt{L_i} = w_i q_i^2. \tag{3}$$

The profits of the i-th firm are denoted as follows:

$$\pi_i = (a - q_i - q_j)q_i - w_i q_i^2, \quad i, j = 1, 2, \ i \neq j \tag{4}$$

In line with the recent established literature (e.g. Goering 2007, 2008; Lambertini and Tampieri, 2012), the model considers that social concern can be interpreted as taking care of consumers; therefore, the characteristic of a CSR firm is to be responsive for them. As a consequence, in its objective, each firm is supposed to maximize its profits plus a fraction k_i of the consumer's surplus, which represents the firm's "social concern" or care for consumer outcomes in the market. Thus, the CSR-type firm's objective function is a parameterized combination of profits and consumers' surplus. Consumers' surplus is

$$CS = \frac{(q_i^2 + q_j^2 + 2q_i q_j)}{2}. \tag{5}$$

Thus, the objective function of each CSR firm (W_i) is

$$W_i = \pi_i + k_i CS = (a - q_i - q_j)q_i - w_i q_i^2 + k_i \frac{(q_i^2 + q_j^2 + 2q_i q_j)}{2} \quad i, j = 1, 2, \ i \neq j \tag{6}$$

where $k_i \in [0,1]$ is the weight the CSR-type firms assign to consumer surplus. The game is structured as a three-stage game. At stage one, owners cooperatively decide the weight $k_i = k_j = k$ of consumer surplus in the objective function through the maximization of the joint profits with respect to such a weight. At stage two, an industry-wide union fixes the workers' wages. At stage three, firms competitively choose output, adopting a CSR objective.
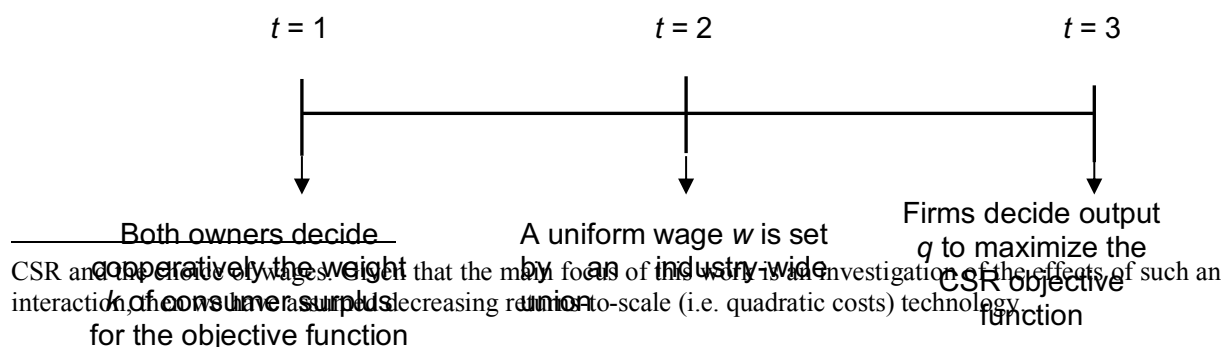
$t = 1$ $t = 2$ $t = 3$

Both owners decide cooperatively the weight of consumer surplus for the objective function

A uniform wage w is set by means of an industry-wide union

Firms decide output q to maximize the CSR objective function

Fig. 1. Sequence of moves

As usual, the game is solved by backward induction. The specific sequence of moves for this game is shown in Figure 1.[14] At the third stage, the maximization of the firms' objective function in (6) by the i-th firm leads to the following reaction functions

$$q_i(q_j, w, k) = \frac{a - q_j(1 - k)}{2(1 + w) - k} \qquad (7)$$

Solving the system given by (7) and its counterpart for j, the firms' output as a function of the common CSR level (and wages) is

$$q_i(k, w) = \frac{a}{(3 + 2w - 2k)}, \quad i = 1, 2. \qquad (8)$$

We assume that the wage per unit of labor is unilaterally chosen by a centralized union,[15] which sets a uniform wage for the industry as a whole (i.e. $w_i = w_j = w$).[16]

The union's utility function is given by:[17]

$$V = (w - w^\circ)^\theta (L_i + L_j)^{1-\theta} = (w - w^\circ)^\theta (q_i^2 + q_j^2)^{1-\theta} \qquad (9)$$

where w° is the reservation wage, that is, the wage that could be earned in the competitive sector of the economy, and the parameter $\theta \in [0,1]$ is the union's wage sensitivity (or wage orientation). Note that this functional form encompasses both the case of a total wage bill maximizing union (with $w^\circ = 0$) and that in which the union is rent maximizing (when $w^\circ > 0$

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[14] We may note that this sequence of decisions rather realistically reflects the fact that the choice to engage in CSR activities (stage 1) is adjusted less frequently than the stipulation of wage contracts (stage 2), which in turn is adjusted less frequently than the market competition decisions (stage 3).

[15] Centralized unions representing all workers in an industry are widespread in Continental Europe, while firm-specific unions are predominant in UK and North America (e.g. Flanagan 1999). However, here the assumption of firm-specific unions, adding to the second stage of the presence of inter-union competition, would make the model algebraically intractable.

[16] Concerning the monopoly union assumption, we recall that, "for tractability reasons, the combination of linear Cournot oligopoly and monopoly unions is commonplace in the literature on unionized international oligopoly. The monopoly union can be seen as that special case of the right-to-manage model in which unions have all the bargaining power. We use this model as a simple representation of a situation in which wage bargaining is inefficient, because workers have a larger degree of control over wage setting than over how employment is determined." (Lommerud et al., 2006, 6). Moreover, in the presence of wage bargaining, several problems with the analytical tractability of the model can appear.

[17] This represents a particular specification of the more general Stone-Geary utility function (e.g. Pencavel, 1985).

). A value of $\theta = 0.5$ represents the rent-maximizing case (i.e., the union seeks to maximize the total rent), while values of $\theta < (>)0.5$ imply that the union is less (more) concerned about wages and more (less) concerned about jobs. According to an alternative interpretation (e.g. Lommerud and Straume, 2012), the parameter θ may also indirectly represent the degree of insider power, in the sense that the more important insiders of the unions are, the stronger the union's preference for wages is (all else equal). Moreover, although we assume a monopoly union, the parameter θ could also be interpreted as a rough measure of the union's bargaining power in the case of a typical firm-union Nash bargain regarding the wage, in the sense that a higher θ would approach a higher union's power in wage negotiations.[18] From now on, for simplicity, we set $w° = 0$.[19]

At the second stage, after substitution of (8) in (9), the union maximizes its utility function with respect to w, which straightforwardly leads to the wage level as a function of the CSR parameter:

$$w(k) = \frac{\theta(3-2k)}{2(2-3\theta)}. \tag{10}$$

Corollary 1. Wages are increasing as expected, with an increasing wage-orientation of the union, and are decreasing with the level of CSR. Moreover, the higher the union's wage-orientation, the more intense the reductive effect of the CSR parameter is on wages, as clearly demonstrated in (10), that $\frac{\partial w(k,\theta)}{\partial \theta} > 0$, $\frac{\partial w(k,\theta)}{\partial k} < 0$ and $\frac{\partial^2 w(k,\theta)}{\partial k \partial \theta} < 0$.

Substituting (10) into (8), we obtain the quantity as a function of the CSR parameter:

$$q(k) = \frac{a(2-3\theta)}{2(3-2k)(1-\theta)}. \tag{11}$$

We assume that the firms' choice of the level of social concern, i.e. the level of k, is totally under the control of the firms' owners and does not depend on the stakeholders. In particular, we assume that owners choose cooperatively to engage in the same amount of CSR, that is the level of k, which maximizes the joint profits of firms (while, of course, the firms compete on the product market).

In the first stage, the optimal value of the parameter k is obtained, thus maximizing the sum of firms' profits (i.e. eq. (4) plus its counterpart for the firm *j*). Substitution of eqs. (10)

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[18] As noted by Lommerud et al. (2012, 184), both the parameter measuring the union's bargaining power and the parameter θ "will enter the Nash maximand in a mathematically similar way, and we might, in some applications, even choose the alternative interpretation of θ as reflecting the relative bargaining power of the trade union."

[19] It is worth noting that, when both $w° = 0$ and $\theta = 0.5$, the union's maximization problem is equivalent to the issue faced by a profit-maximizing upstream monopoly that is allowed to set the price of a common input it supplies to downstream firms. In other words, all of the results of this paper will also hold true in the case of a vertical industry with a common monopoly manufacturer.

and (11) into (4) and its counterpart for the firm j produces the joint profits equation as a function of k:

$$(\pi_i + \pi_j) = 2\left[\frac{a^2(2-3\theta)[2k(5\theta-4)+4-3\theta]}{8(2k-3)^2(1-\theta)^2}\right] \tag{12}$$

and subsequent maximization of (12) w.r.t. k yields the CSR level in equilibrium:

$$k^* = \frac{9\theta-4}{2(4-5\theta)} \tag{13}$$

Corollary 2. From (13), it follows that the higher the union's preference for wages, θ, the higher the CSR parameter is, k (i.e. $\dfrac{\partial k^*}{\partial \theta} > 0$) .

It is easy to see that the optimally chosen CSR parameter k^* is positive only if $\theta > .444$. This means that, provided that the union is sufficiently wage-interested, owners select a positive value of k, such that the gain of being socially responsible rather than being profit maximizing is beneficial to them. For example, when the union is simply wage-bill maximizing (i.e. $\theta = .5$), it is optimal for owners to take into account about 16.7% of the consumer surplus when they decide on the quantities to produce. Furthermore, note that owners choose to make CSR activities, even when unions are slightly employment-oriented (or, alternatively, by interpreting θ also as a measure either of risk-aversion or union's bargaining power, when slightly risk-averse, or slightly less strong than firms in the wage bargaining), although it would be inconvenient to undertake CSR actions if the union is very employment-oriented (or very risk-averse, or very weak in bargaining). The relationship between CSR activities and wage levels can be resumed in the following Corollary.

Corollary 3. On the one hand, the level of the union's wage-orientation tends to increase both wages (i.e. Corollary 1) and CSR activities (i.e. Corollary 2), and on the other hand, wages are reduced by CSR activities (i.e. Corollary 1). Therefore, it applies the feedback effect of the choice of making CSR actions that tend to dampen wages.

Substituting (13) into (10) and (11), one yields the wage and quantity at the equilibrium:

$$w^* = \frac{4\theta}{4-5\theta} \tag{14}$$

$$q^* = \frac{a(4-5\theta)}{16(1-\theta)}. \tag{15}$$

Lemma 1. The non-negativity condition for the production requires (see (15)) that the union not be too wage-aggressive or, in the alternative interpretation, too powerful in wage bargaining; that is $q \geq 0 \Leftrightarrow \theta \leq 0.80$.

Substituting backwards (13), and considering that, in the Cournot equilibrium, the overall welfare is generically given by $SW = CS + 2\pi + V^\circ$, where V° is the wage bill,[20] we obtain the equilibrium outcomes of all variables of the model:

$$\pi^* = \frac{a^2(4-5\theta)^2}{128(1-\theta)^2} \tag{16}$$

$$V^* = \frac{a^2\theta(4-5\theta)}{32(1-\theta)^2} \tag{17}$$

$$CS^* = \frac{a^2(4-5\theta)^2}{128(1-\theta)^2} \tag{18}$$

$$SW^* = \frac{a^2(4-5\theta)(12-7\theta)}{128(1-\theta)^2}. \tag{19}$$

Although we have shown that, in equilibrium, the cooperative choice by selfish profit-seeking firms' owners leads firms to choose positive CSR activities (provided that the union is not too employment-oriented), we now investigate the impact of the firms' CSR behaviors on the welfare of all the agents – owners' firms, workers, and consumers – as well as on the social welfare as a whole. To do this, we must first consider the equilibrium outcomes without CSR behaviors; the following section explores this issue.

4.   The benchmark case without CSR

For comparative purposes and discussion of the effects of the firms' social responsibility, it is suitable to derive the equilibrium outcomes in our unionized duopoly in a context in which firms do not engage in CSR activities, i.e. for standard profit-maximizing firms.

In this two-stage game, the industry-wide union sets the wages in the first stage, and in the second stage, firms choose output to maximize profits. Therefore, the equilibrium outcomes are obtained considering that firm i maximizes (4) with respect to q_i, taking q_j and w as given. Standard optimization yields the following reaction function in the output space:

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[20] Notice that we use the total wage bill instead of union utility in the welfare function, following the established literature on unionized oligopolies (e.g. Brander and Spencer, 1988). This is because, in our case, the wage bill also corresponds to the union's rent (w° has been normalized to zero), and the latter can be considered as a part of the producer surplus (Bughin and Vannini, 1995). Needless to say, our main results would be qualitatively the same by using unions' utility instead of the total wage bill in the welfare function.

$$q_i(q_j, w) = \frac{a - q_j}{2(1 + w)}. \tag{20}$$

From (20) and its equivalent for firm *j,* we get the firm *i'*s output for given w as:

$$q_i(w) = \frac{a}{2w + 3}. \tag{21}$$

By substituting (21) in (9) and maximizing with respect to $w,$ we obtain the next value for the wage in equilibrium, in which the superscript *PP* stands for "pure profits" (no-CSR) case:

$$w^{PP*} = \frac{3\theta}{2(2 - 3\theta)}. \tag{22}$$

By substituting (22) into (21) and (4), we also get the following results for equilibrium output and profits, respectively:

$$q^{PP*} = \frac{a(2 - 3\theta)}{6(1 - \theta)} \tag{23}$$

$$\pi^{PP*} = \frac{a^2(4 - 3\theta)(2 - 3\theta)}{72(1 - \theta)^2} \tag{24}$$

Inspection of (23) and (24) reveals that, as in the case of CSR-type firms, to ensure the non-negativity of quantities and profits, unions should not be too wage-aggressive (that is, $q^{PP*} \geq 0, \pi^{PP*} \geq 0 \Leftarrow \theta \leq \frac{2}{3}$). Note, however, that the case of CSR-type firms, allowing for the possibility that unions may be more wage-aggressive than in the case of standard profit-seeking firms, allows for a larger feasibility of the economy, which is, therefore, another advantageous feature of CSR activities.

Finally, taking (23) into account, the following results define welfare outcomes for this case:

$$V^{PP*} = \frac{a^2\theta(2 - 3\theta)}{12(1 - \theta)^2} \tag{25}$$

$$CS^{PP*} = \frac{a^2(2 - 3\theta)^2}{18(1 - \theta)^2} \tag{26}$$

$$SW^{PP*} = \frac{a^2(2-3\theta)(4-3\theta)}{18(1-\theta)^2} \tag{27}$$

5.   CSR and profit-seeking behaviors: An outcomes' comparison

This section discusses the impact of the CSR activities on the welfare of the single agents of this model as well as on the overall social welfare. In this regard, we compare the equilibrium outcomes with and without CSR.

Lemma 2. The output in the presence of CSR activities is, as expected, larger than that under profit-seeking behaviors. Proof: $q^* > q^{PP*}$.

Lemma 3. The wage the union sets under the endogenous choice of the CSR parameter is lower than that without CSR activities. Proof: $w^* < w^{PP*}$.

Lemma 3 suggests that the choice to be socially responsible is profitable, because it dampens the wage claims (see also Corollary 3 in Section 2). The rationale for the result in Lemma 3 is as follows. First, from Lemma 2, we observe that, under CSR, the union achieves a higher employment level. At first glance, this employment situation seems to be advantageous for the union to demand a higher wage level. Nonetheless, it can be easily shown that, when the union decides its optimal wage at the second stage, employment is more negatively affected by wage increases under CSR than under profit-seeking behaviors.

Lemma 4. Employment with CSR-type firms is more negatively affected by wage increases than with profit-seeking firms.

Proof: $\left|\dfrac{\partial L^*}{\partial w}\right| = \left|\dfrac{\partial q^{*2}}{\partial w}\right| = \dfrac{4a^2}{(2k-3-2w)^3} > \left|\dfrac{\partial L^{PP*}}{\partial w}\right| = \left|\dfrac{\partial q^{PP*2}}{\partial w}\right| = \dfrac{4a^2}{(-3-2w)^3}$

Therefore, if employment with CSR is more negatively responsive to wage increases for any level of CSR chosen by firms, then at the second stage, the union fixes a lower wage under CSR-type firms than under profit-seeking firms.

Now we address the following question: should the union be favorable or not to the social concerns of the firms? Indeed, since (from the above Lemmas 2 and 3) wages and employment under CSR are relatively lower and higher, respectively, than under profit-maximization, it remains to ascertain whether the union's utility under CSR is relatively increased.

Result 2. The union always benefits from the presence of CSR. Proof: $V^* > V^{PP*}$.

The intuition behind Result 2 is that the increase in employment, due to the firms' social interest in the welfare of consumers, overwhelms the wage reduction, so the union's utility is higher when firms are of CSR type.

Finally, we focus on the central question: is the endogenous choice of a positive level of CSR activities sacrificing (as expected by an "altruistic" view of the CSR behaviors) or improving (as expected by a "neoclassical" view of the CSR behaviors) the firms' profitability?

Result 3. Owners are better off when they have positive social concerns. Proof: $\pi^* > \pi^{PP*}$.

The reason for this finding is as follows. The firms' engagement in CSR activities has a moderating effect on the union's wage demand. This wage-dampening effect decreases the costs of production of the firms to such an extent that it more than offsets the effect of output growth (from the viewpoint of profit-maximization) generated by the consumer-friendly social activities. From Lemma 2, we know that output under CSR is higher than under profit maximization; Results 2 and 3 tell us that profits and unions' utility are larger under CSR than profit maximization. Therefore, the next results immediately follow.

Result 4. Consumers improve their welfare under CSR; overall, social welfare is higher under CSR. Proof: $CS^* > CS^{PP*}$; $SW^* > SW^{PP*}$.

The contents of Results 2-4 directly bring in the final Remark, as follows.

Remark. The social concerns of selfish firms' owners leads to socially optimal conditions as well as Pareto-superior outcomes.

6.   Conclusions

This paper applied a Cournot duopoly model with labor decreasing returns to scale and industry-wide union-fixed wages at a centralized level. The findings demonstrate that, if firms' owners cooperatively choose a level of engagement in CSR activities, the profits under CSR are higher than under the standard profit maximization rule. The firms' choice of whether to pursue CSR activities implies an evident trade-off with regard to their profits: on the one hand, the CSR behavior, which favors consumers, reduces product prices; however, on the other hand, it also reduces (more or less) wage costs according to the (less or more) union's employment orientation. The net result is as increase in the firms' profits. In other words, the engagement in CSR activities is the result of firms' pursuit of their simple self-interest. Moreover, the industry-wide union benefits from CSR. In fact, if the union is significantly employment-oriented (i.e. it prefers to be moderated in its wage claims), a given level of CSR causes a wage reduction, which is less important than that of prices. By contrast, when the union is relatively wage oriented in its preferences, the owners' concern for consumers leads to profit improvement, because the dampening of wage costs overwhelms that of a firm's revenue. Finally, the analysis reveals that the welfare of the overall society in the presence of CSR is higher than without CSR: the social concerns of selfish firms' owners' leads to a Pareto-superior outcome.

In conclusion, we highlight two main findings of the paper, valid for a unionized oligopolistic economy: 1) owners who demonstrate social concerns also achieve higher profits;

this seems to provide an explanation for the recent social responsible behavior of many firms demonstrated through the sole behavior admitted by the traditional approach of economics. That is, based on the opinion of Friedman (1970), the maximization of profits to shareholders is only one responsibility of businesses towards society; 2) the purely selfish owners' behavior leads to a Pareto-improvement in society; this fact seems to reconcile the achievement of social objectives with the impersonal mechanism of the profit-maximization behavior.

The findings of the paper offer numerous testable empirical implications. In fact, there should be more often empirical evidence of: 1) a negative relationship between the levels of CSR activities and wage levels, 2) a positive correlation between the presence of CSR and profitability when firms are unionized, and 3) an industry-wide union in favor of CSR activities.

Our basic framework definitely calls for developments to verify the robustness of the paper's results. First, the current model does not analyze the issue of sustainability regarding cooperative CSR activities. A second suitable direction of research is the analysis of different forms of market competition, notably price competition with differentiated products. Third, it would be interesting to extend the analysis to industries characterized by network effects. Finally, given the organizational form of several contemporary companies in which management and control are separated, the case of managerial delegation, in which owners delegate sales and CSR-level decisions to managers, can be of great interest. Those extensions are left for further research.

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