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ORIGINAL ARTICLE

Trade unions and corporate social responsibility

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Abstract

Trade unions distort a profit-maximizing firm's input choice. The nature of the resulting inefficiency depends on whether there are wage negotiations or there is efficient bargaining. Moreover, trade unions redistribute income and thereby affect welfare. If firms also pursue Corporate Social Responsibility (CSR) objectives, input choices may be distorted already in the absence of collective bargaining. Adopting a positive perspective, we show that CSR objectives, which induce a firm to expand production, have ambiguous wage and employment consequences in case of wage negotiations and raise employment if there is efficient bargaining. Importantly from a normative vantage point, such CSR objectives make a welfare-enhancing role of trade unions more likely in the presence of wage negotiations. The reverse is true in case of efficient bargaining.

KEYWORDS
corporate social responsibility, efficient bargaining, trade unions, wage bargaining, welfare

JEL CLASSIFICATION
D60, J51, L31, M14

1 | INTRODUCTION

Corporate Social Responsibility (CSR) activities have become "mainstream" (The Economist, 2008). According to a KPMG (2017) survey, most large firms and more than 90% of the 250 globally leading firms report on corporate responsibility. These widespread CSR (reporting)

activities are not only an indicator of the almost universal acceptance of such responsibility. They also reflect the fact that CSR is an encompassing concept, which includes a variety of undertakings, as two commonly cited definitions clarify. The European Commission (2011, p. 6) states that CSR is "…the responsibility of enterprises for their impacts on society. Respect for applicable legislation, and for collective agreements between social partners, is a prerequisite for meeting that responsibility". The World Business Council for Sustainable Development (2000, p. 8) asserts that CSR "…is the continuing commitment by business to contribute to economic development while improving the quality of life of the workforce and their families as well as of the community and society at large". These characterizations also illuminate the relevance of employees. Hence, the question of whether CSR activities can alter the behavior of (potential) employees in order to enhance the firm's payoff has been debated intensely (Kitzmueller & Shimshack, 2012).

The relevant contributions usually neglect that regulations and institutions affect the labour market and employee behavior. Examples of resulting restrictions are constraints on working time, minimum wages, employment protection legislation, taxes, unemployment insurance schemes, co-determination and collective bargaining (Boeri & van Ours, 2013; European Commission, 2015; OECD, 1998, 2013, 2015, 2017, 2019). The importance of such labor market features and the interaction with CSR have not found much attention. In this paper, we focus on one particular institution, namely trade unions. In many OECD and European Union member states, collective bargaining determines wages and working conditions for an overwhelming fraction of the workforce (Visser, 2019). Moreover, the likelihood of collective bargaining is highest in large firms (OECD, 2017; Tijdens & van Klaveren, 2007, p. 139), which are also most likely to report on and undertake CSR activities.

Annual reports of large companies, particularly from countries with strong trade union tradition, indicate the relevance of collective negotiations for the company's CSR activities. Volvo Group, a Sweden-based manufacturer of trucks, construction equipment and industrial engines, asserts that it "respects the right of all employees to form and join a union or their choice to refrain from doing so". It further states that "dialogues and relationship with our employee and union representatives results also in collective bargaining agreements around the world that cover about 73% of our regular employees" (Volvo Group, 2019, p. 68). Daimler, the car-maker headquartered in Germany, provides similar statements in its sustainability report: "Our employees have the right to organize themselves in labor unions. We also ensure this right in countries in which freedom of association is not legally protected. … Collective bargaining agreements apply to the majority of our employees" (Daimler, 2020, p. 161). As a third example, the annual financial report by Axa, a Paris-based insurance conglomerate, asserts that the company "is committed to uphold the right to freedom of association and collective bargaining" (Axa, 2019, p. 402). The three examples clarify that in many large companies trade union activities constitute an integral part of CSR. This view is consistent with evidence for OECD countries that union density can have a positive impact on CSR activities (Kindermann & Lutter, 2018).

When moving from mostly anecdotal evidence to analytics, one issue facing researchers is how to integrate CSR into formal investigations of firm behavior. A common approach is to interpret such concerns as an alteration in the firm's objective. If such change takes place, also the firm's behavior and the outcome of collective bargaining are affected. Therefore, CSR activities alter labor costs and the profitability of pursuing such objectives. This consequence of CSR has been widely disregarded.[1] Similarly, the effects of trade unions have generally been looked at for

[1] This neglect is nicely captured by Jackson, Doellgast, and Baccaro (2018, p. 5) in their introduction to the Symposium of the British Journal of Industrial Relations on Corporate Social Responsibility and Labour Standards. They state that

profit-maximizing firms, while CSR aspects have not been considered. Accordingly, the question arises if the wage, employment and welfare effects of collective bargaining and resulting policy advice are altered if a firm's objective features CSR concerns.

In this paper, we, therefore, assume that a firm, which incorporates the payoff from CSR activities into its objective, bargains with a firm-specific trade union over wages or, alternatively, wages and employment. The Nash solution determines the bargaining outcome. Since the firm has market power, its profit-maximizing output choice is too low. Accordingly, the CSR payoff increases in output to counteract this effect. This assumption reflects the feature of virtually all sustainability reports that firms take into account their impact on customers and consumers. In addition, a profit-maximizing company views its employees as input factor and does not care about their utility per se. However, sustainability reports generally emphasize the concern for the well-being of staff.[2] Accordingly, we assume that the employees' payoff figures in the firm's CSR objective directly. For such a set-up, we analyze two issues. From a positive vantage point, we enquire how CSR activities affect collective bargaining outcomes. From a normative perspective, we analyze the welfare consequences of trade unions in the presence of CSR.

In our positive analysis, we clarify that more pronounced CSR objectives increase the firm's and the union's gain from an agreement. Because the Nash-bargaining solution shares the payoff gains, and since it is uncertain whether the firm or the union benefits by more, the wage and employment impact resulting from CSR can generally not be determined in the case of wage negotiations. If the firm and trade union bargain over wages and employment, the CSR output objective raises employment, while the employee objective has no such impact. As the union already participates in the firm's higher payoff owing to the rise in employment, the wage change due to the output objective will be ambiguous. This is not the case for the employee objective, such that the Nash-solution requires a higher wage. Using these findings, we can show that the profit effects of CSR may well be negative due to the increase in labor costs. If this is the case, firms negotiating wages and, possibly, employment with a trade union may be less inclined to adopt CSR objectives than firms without collective bargaining.

In our normative analysis, we show that the welfare effects of trade unions that arise for a profit-maximizing firm may no longer occur if it pursues CSR objectives. On the one hand, collective bargaining distorts input choices. On the other hand, CSR activities result in a deviation from the first-best and the two distortions can neutralize each other. Accordingly, our analysis represents a further example of the feature that "it is not true that a situation in which more, but not all, of the optimum conditions are fulfilled is necessarily (…) superior to a situation in which fewer are fulfilled" (Lipsey & Lancaster, 1956, p. 12). More specifically, output is, ceteris paribus, too low in the absence of CSR activities due to the firm's market power. In the case of wage bargaining, the existence of trade unions aggravates this negative output effect. In a framework with efficient bargaining, collective negotiations tend to compensate for the output market distortion. If the firm pursues a CSR objective and its effects dominate the consequences of market power, output in the absence of collective bargaining is too high. In the case of wage bargaining, therefore, the resulting output reduction is less likely to reduce production to below the optimal level than in the absence of a CSR objective. In the case of efficient bargaining, however, output is more likely to

"(i)t is striking that employees and trade unions play almost no role in the business literature on CSR". There are a few exceptions, such as by Fanti and Buccella (2019, 2020), which we discuss in more detail below.

[2] The World Business Council for Sustainable Development (2000, p. 21) proposes to "(p)ut employees first. … In the quest to enhance shareholder value, be prepared to say that your employees are the number one consideration among a range of other stakeholders."

rise to above the optimal amount. In addition to their effects on output, trade unions redistribute income. This will raise welfare if the workers' marginal utility from wages is higher than the profit effect of a wage increase. Combining the output and distributional impact, we can show that trade unions are more likely to enhance welfare in the presence of CSR objectives than in their absence if there is wage bargaining. The reverse is true in case of efficient bargaining.

Our findings have far-reaching implications because the welfare effects of trade unions crucially depend on the extent of CSR activities. Therefore, policies or regulations, either supporting or restricting unions, may have different consequences, depending on firms' CSR policies. Conversely, the welfare impact of CSR can vary with how wages and employment are determined. This implies that Milton Friedman's (2002, p. 133) famous claim that "there is one and only one social responsibility of business—to use its resources and engage in activities designed to increase its profits …" need not hold in the presence of trade unions, even if CSR activities as such reduce profits. Additionally, we show that a firm's payoff from CSR depends on the characteristics of the input market and not only, as mostly analyzed, on those of the output market. Since the intensity of labor market regulations and the strength, for example, of trade unions vary across countries (European Commission, 2015; OECD, 2017), the effects of CSR activities will also be different. Moreover, our findings suggest that features of the labor market influence the optimal nature and intensity of CSR activities.

The present analysis relates to various strands of the literature: First, contributions look at the labor market effects of CSR, usually focusing on employees but ignoring labor market institutions. The hypothesis is that employees derive utility from working in socially responsible firms. In consequence, they are willing to provide higher effort or to accept lower wages (Brekke & Nyborg, 2008). The empirical evidence, based on survey and register data, as well as field experiments, is generally, but not unanimously consistent with this view.[3]

Second, there are analyses which consider trade unions in the presence of CSR activities. Fanti and Buccella (2019, 2020) investigate a Cournot-duopoly in which a centralized monopoly trade union sets wages. They show for specific functional forms of production technology and the trade union's objective that firms can raise their profits by incorporating consumer surplus into their objective. This effect comes about because adopting a CSR objective commits firms to higher output and allows them to pay lower wages. The increase in output and employment ensures that also consumers and workers benefit. However, Fanti and Buccella (2019, 2020) do not undertake a welfare analysis of trade unions.

Third, the wage and employment effects of trade unions have been looked at, assuming the firm to pursue other objectives than profits. Falch (2004) analyzes wage bargaining between a rent-maximizing trade union and a firm for which he considers various objectives, inter alia, profits, profits plus consumer surplus, output and revenues. The comparison of bargained wages yields no consistent relationship concerning the different objectives. Gravelle (1984) compares a profit-maximizing monopolist and a public-sector firm, which maximizes the utility of the sum of profits and consumer surplus. The firm bargains over wages and employment with a utilitarian trade

[3] See Bolvig (2005), Burbano (2016), Huber, Pavlíková, and Basovníková (2017), Nyborg (2014), Nyborg and Zhang (2013), and Newman, Rand, Tarp, and Trifkovic (2020) who look at wages. Hedblom, Hickman, and List (2019) consider application rates, Carnahan, Kryscynski, and Olson (2017) investigate turnover, and Koppel and Regner (2014) and Hedblom et al. (2019) analyze various measures of effort. List and Momeni (2020) find evidence that CSR raises misbehavior by employees. In one of the few contributions also scrutinizing a theoretical model, Becchetti, Solferino, and Tessitore (2016) assume that CSR implies extra care for stakeholders' wellbeing. Stakeholders are employees and since they dislike employment variations in a world of output price variability, CSR is interpreted as a constraint of the firm to adjust employment.

union. Using general functional forms, Gravelle (1984) cannot establish the wage and employment effects of privatizing the public-sector firm. Privatization is modelled as a lower weight of the consumer surplus objective and, hence, comparable to a lesser importance of a CSR output objective. Haskel and Szymanski (1993) compare outcomes in a wage-bargaining framework for a profit-maximizing and a public-sector firm. The latter maximizes a weighted sum of profits, consumer surplus and union utility. The trade union is a rent maximizer, and product demand and the production function are specified explicitly. Haskel and Szymanski (1993) show that privatization lowers wages on account of union utility being part of the public-sector firm's objective. Employment is higher in the public sector firm due to the consumer surplus component.[4] Importantly, neither Gravelle (1984) nor Haskel and Szymanski (1993) consider welfare effects.

Fourth, bargaining in the public sector has been investigated. Some contributions consider cash limits (Holmlund, 1997; Leslie, 1985). Others focus on the cooperation between trade unions (Holmlund, 1993) or the timing of budgetary decisions relative to wage negotiations (Falch, 2001). None of the analyses compares bargaining outcomes in the public sector with those arising in profit-maximizing firms, thus providing a benchmark for our investigation.

Finally, the efficiency consequences of trade unions in the presence of other market imperfections have been looked at. The classic example is that of a monopsony in which a wage increase due to collective bargaining can raise employment and enhance efficiency (Boeri & van Ours, 2013, p. 89 ff; Kaufman, 2004; Manning, 2004; Oswald, 1982; Viscusi, 1980). These contributions usually assume negotiations over wages.

In sum, the related questions of how CSR activities affect (1) collective bargaining outcomes and (2) alter the welfare consequences of trade unions have not been looked at. We tackle these two issues by, initially, describing the model in Section 2. Section 3 characterizes optimal behavior. In Section 4, we analyze how CSR objectives affect collective bargaining outcomes and payoff levels. We investigate the welfare effects of trade unions in Section 5, while Section 6 concludes. The Appendix contains some of the proofs and derivations.

2 | MODEL

2.1 | Setting

We consider a single firm, which uses labor as the only input. It bargains with a firm-specific, utilitarian trade union over wages or wages and employment (Oswald, 1982). The asymmetric Nash-solution determines the bargaining outcome. Working time per employee is fixed. The output market is imperfectly competitive and a firm with a profit objective that paid the competitive wage, hence, would produce less than the efficient amount.[5] We assume that the firm maximizes a weighted sum of profits and two CSR objectives. The CSR objectives mitigate the output market externality and incorporate the feature that employee utility is not maximal. They may reflect

[4] See also Haskel and Szymanski (1992). Haskel and Sanchis (1995) extend the setting by Haskel and Szymanski (1993), as firm and union also bargain over workers' effort. De Fraja (1993) considers a simplified version of Haskel and Szymanski (1993) and analyses a monopolist, which faces a linear demand function and uses a linear production technology. Monteiro, Portela, and Straume (2011) incorporate efficiency wage considerations. Finally, Grönblom and Willner (2008) interpret privatization as a simultaneous change in a firm's objective and a move from monopoly to oligopoly.

[5] In the concluding section, we briefly comment on a setting in which output is excessive since the firm does not have market power but causes an environmental damage which it does not fully take into account.

preferences of firm owners or the (non-monetary) payoff from succumbing to the demands of political agents, pressure groups or consumers to behave in a particular manner. Hence, CSR concerns are exogenously given, and their strength is independent of union bargaining power.[6] Finally, CSR has no direct impact on the consumers' willingness to pay for the goods produced by the firm.

2.2 | Trade Union

The utilitarian trade union has M, $M > 0$, members, N of which are employed in the firm, earning the wage w. Those members who are not employed in the firm under consideration work in a perfectly competitive labor market obtaining the wage, $\bar{w}$. The utility of workers depends on their income only, implying that CSR has no direct beneficial impact, for example, by enhancing work motivation. The utility function of each ex-ante identical member of the trade union is denoted by u and increases in income at a decreasing rate ($u' > 0 > u''$). Trade union utility, U, can be expressed as (Oswald, 1982)

$$U = Nu(w) + (M - N)u(\bar{w}). \tag{1}$$

2.3 | Firm

The production function $f(N)$ is increasing in employment, N, at a decreasing rate, $f' > 0 > f''$, for $N > 0$. Moreover, $f(0) = 0$ and $f'(0) \to \infty$. We assume the price of output to be unity in a competitive market and model the impact of the firm's market power in a general, but simplifying manner. In particular, we specify revenues as $f(N) - \rho(N)$, where $\rho(0) = 0$, $\rho(N) < 0$ if $N > 0$ to guarantee $f(N) - \rho(N) > f(N)$, and $0 < \rho'$, $0 \leq \rho''$. This general approach enables us to capture the crucial features of market power without specifying the market structure in detail. First, revenues exceed the amount a competitive enterprise will obtain at a given level of output (as $\rho(N) < 0$). Second, marginal revenues, $1 - \mathrm{d}\rho(N)/\mathrm{d}f(N) = (\mathrm{d}\rho(\mathrm{N})/\mathrm{dN})(\mathrm{dN}/\mathrm{d}f(N)) = 1 - \rho'(N)/f'(N)$, fall short of the competitive price of unity.[7] Moreover, we can focus on one firm and abstract from the repercussions, which output market interactions can have on collective bargaining outcomes.

Because the firm incurs no other costs than wages, profits, π, are

$$\pi = f(N) - \rho(N) - wN. \tag{2}$$

In its Green Paper, *Promoting a European Framework for Corporate Social Responsibility*, the European Commission (2001) differentiates between an internal and an external dimension of CSR. We take up this distinction and assume that the firm has two CSR objectives. One focuses on the external dimension and allows the firm to counteract the welfare loss resulting from its market power. Therefore, in line with other contributions, the first CSR objective is given by output

[6] Two recent contributions provide evidence that CSR activities are related to the strength of unions in the UK (Boodoo, 2020) and workforce representation on company boards in Germany (Scholz & Vitols, 2019).

[7] Suppose the firm under consideration is a monopolist obtaining a price p per unit sold, which declines in output $f(N)$. Revenues of the monopolist are given by $p(f(N))f(N)$, such that we obtain $\rho(N) = f(N)(1 - p(f(N)))$ from $p(f(N))f(N) = f(N) - \rho(N)$. In case of a homogeneous Cournot-oligopoly with m other firms, which each employ $\bar{N}$ individuals, revenues of the Cournot oligopolist under consideration equal $p(f(N) + mf(\bar{N}))f(N)$, implying that $\rho(N) = f(N)(1 - p(f(N) + mf(\bar{N})))$.

(Willner, 2013). The underlying idea is that the firm takes into account the interests of consumers, which benefit from the greater output. Therefore, our results qualitatively also hold if we incorporate a measure of consumer surplus into the firm's objective explicitly, as long as it rises in the firm's output, as our specification assumes.[8] Inclusion of the output level into the firm's objective, Z, could also be interpreted as an indication of customer orientation since this expression does not depend on output choices of other firms (Königstein & Müller, 2001; Planer-Friedrich & Sahm, 2018).

The second CSR objective concentrates on the internal dimension, that is, on employee well-being. While it is often argued that firms pursuing CSR objectives incorporate the employees' interests only partially or inadequately (e.g., Donaghey & Reinecke, 2018) we, for simplicity, assume that the firm is concerned additionally with the expected utility of its M prospective employees. Since N of them are employed at the wage w, while the rest obtains an income $\bar{w}$, the employee CSR objective of the firm is given by union utility, $U(w, N)$.[9]

In the firm's objective, Z, we normalize the weight of profits to unity and set the weights of the CSR objectives equal to α, $\alpha \geq 0$, and β, $0 \leq \beta < 1$.[10] Hence, Z can be expressed as

$$\begin{aligned} Z &= \pi(w,N) + \alpha f(N) + \beta U(w,N) \\ &= (1+\alpha) f(N) - wN - \rho(N) + \beta \left[N u(w) + (M-N) u(\bar{w}) \right]. \end{aligned} \tag{3}$$

The specification of Z makes it possible that the firm's payoff is positive while profits are not.

2.4 | Nash-bargaining solution

The firm and the trade union negotiate over the wage (Section 3.1) or the wage and employment (Section 3.2). The indicator of the firm's (union's) bargaining power is denoted by γ $(1-\gamma)$, $0 \leq \gamma < 1$.[11] In case of no agreement, employment, output, and profits are zero ($N = f(0) = \rho(0) = \pi = 0$), and all union members obtain the competitive wage, $\bar{w}$. Therefore, the firm's gain from bargaining, $\tilde{Z}$, is

$$\tilde{Z} = Z - (0 + \alpha f(0) + \beta M u(\bar{w})) = f(N) - wN - \rho(N) + \alpha f(N) + \beta N \left[u(w) - u(\bar{w}) \right]. \tag{4}$$

[8] A consistent modelling approach would then additionally require differentiating between consumers and employees. This would make the formal analysis more elaborate, without enhancing our understanding of the questions we are interested in. Contributions in which the CSR objective equals an exogenously or endogenously determined fraction of consumer surplus or welfare include Goering (2008, 2014), Kopel and Brand (2012), Kopel, Lamantia, and Szidarovszky (2014), Lambertini and Tampieri (2015), Lambertini, Palestini, and Tampieri (2016), Fanti and Buccella (2017, 2019, 2020), Goerke (2019), and Planer-Friedrich and Sahm (2020).

[9] Alternatively, the firm can focus on the utility of employed individuals, $Nu(w)$. Because neither the number of union members, M, nor the competitive wage, $\bar{w}$, affect our main results, as will become clear below, our basic findings also hold for this alternative employee CSR objective.

[10] Alternatively, the weight of profits could be $1 - \alpha - \beta$, such that the sum of the weights of all three items in the firm's objective is one. While effects of a greater relevance of the output objective would not be qualitatively altered, as its rise increases the firm's payoff (given $f(N) > \pi$), the impact of a greater importance of the employee objective could depend on the difference between profits and union utility. We can avoid this issue by normalizing the weight of profits to unity, as done in Equation (3).

[11] Since our focus is on an increase in the union's bargaining power, for simplicity γ is the same for negotiations about wages and employment, on the one hand, and about wages only on the other hand.

The trade union's gain from bargaining, $\tilde{U}$, equals

$$\tilde{U} = U - Mu(\bar{w}) = N\left[u(w) - u(\bar{w})\right]. \tag{5}$$

Accordingly, the asymmetric Nash product is

$$NP = \tilde{Z}^{\gamma}\,\tilde{U}^{1-\gamma} = \left[f(N)(1+\alpha) - wN - \rho(N) + \beta N\left[u(w) - u(\bar{w})\right]\right]^{\gamma}\left[N\left[u(w) - u(\bar{w})\right]\right]^{1-\gamma}. \tag{6}$$

2.5 | Social planner

In the specification of welfare, W, we follow other contributions on CSR, which define W as a function of the payoffs of all agents under consideration, excluding potential externalities due, for example, to market power. However, there is no "double counting" because of a firm's CSR objective (see, inter alia, Goering, 2008; Kopel & Brand, 2012; Lambertini & Tampieri, 2015). Accordingly, welfare, W, is defined as the sum of union utility and the value of production, less resulting labor costs:

$$W = f(N) - wN + Nu(w) + (M - N)\,u(\bar{w}). \tag{7}$$

The utilitarian formulation implies that welfare also depends on the distribution of income. The social planner has a sufficient number of instruments to obtain the first-best situation. In such an outcome, the wage, w, the competitive wage, $\bar{w}$, and marginal revenues coincide. Besides, an individual's marginal utility from income is unity ($u' = 1$) (see Appendix A.1).

3 | MARKET OUTCOME

3.1 | Right-to-manage framework

If the firm sets employment, the first-order condition for a maximum of its objective, Z, is:

$$\frac{\partial Z}{\partial N} = (1+\alpha)f'(N) - w - \rho'(N) + \beta\left[u(w) - u(\bar{w})\right] = 0. \tag{8}$$

The second-order condition for a maximum holds, given the restrictions on the production function and the indicator of output market power ($f'' < 0 \leq \rho''$). The optimal number of employees balances the gains in terms of higher output and greater achievement of CSR objectives with the costs resulting from higher wage payments and lower revenues.

The slope of the labor demand curve is

$$\frac{\partial N}{\partial w} = N_w = \frac{1 - \beta u'(w)}{(1+\alpha)f''(N) - \rho''(N)}, \tag{9}$$

where the denominator is negative by the second-order condition. We assume that the (inverse) labor demand curve is downward-sloping in the wage–employment space ($1 > \beta u'(w)$). Otherwise,

the firm's payoff would increase in wages. Moreover, CSR raises the slope of the (inverse) labor demand curve, at a given wage–employment combination.[12]

Maximization of the Nash product (6) with respect to the wage, w, subject to (9), yields

$$\frac{\mathrm{d}NP}{\mathrm{d}w}_{|N=N(w))} = \gamma \tilde{Z}^{\gamma-1}\tilde{U}^{1-\gamma}\left(\frac{\partial \tilde{Z}}{\partial w} + \frac{\partial \tilde{Z}}{\partial N}N_w\right) + (1-\gamma)\,\tilde{Z}^{\gamma}\tilde{U}^{-\gamma}\,\frac{\mathrm{d}\tilde{U}}{\mathrm{d}w} = 0. \tag{10}$$

Using $\partial\tilde{Z}/\partial w = \partial Z/\partial w$ from (4) and the first-order condition (8), we can rewrite Equation (10) as $B = 0$, where B is given by

$$\begin{aligned} B := {} & \gamma\tilde{U}\frac{\partial \tilde{Z}}{\partial w} + (1-\gamma)\,\tilde{Z}\frac{d\tilde{U}}{dw} = -\gamma N\tilde{U}\left(1-\beta u'(w)\right) \\ & + (1-\gamma)\,\tilde{Z}\,\left(N_w\left(u(w)-u(\bar{w})\right) + Nu'(w)\right) = 0. \end{aligned} \tag{11}$$

The wage equals $\bar{w}$ if the trade union has no bargaining power ($\gamma = 1$) because all individuals obtain work in the competitive sector. Moreover, for any interior value of γ, $0 < \gamma < 1$, the derivative in (11) is positive for $w = \bar{w}$, as such a wage implies that $(u(w) = u\bar{w})$ and $\tilde{U} = 0$. Hence, the competitive wage is too low to constitute the bargaining outcome. If the wage equalled the level that the trade union finds optimal, such that the second summand in (11) is zero, the derivative in (11) is positive for $1 - \beta u'(w) > 0$. Hence, this monopoly union wage is too high to constitute the bargaining solution. In consequence, there will be a wage, which exceeds the competitive level, $\bar{w}$, and falls short of the one preferred by the union, which constitutes the solution to (11). This wage balances the union's weighted gain from a higher wage, $\mathrm{d}\tilde{U}/\mathrm{d}w$, with the firm's weighted loss, $\partial\tilde{Z}/\partial w$, where the other party's gain from bargaining constitutes the respective weights. We assume that this solution is unique, such that the second-order condition $\mathrm{d}B/\mathrm{d}w = \partial B/\partial w + (\partial B/\partial N)Nw < 0$ holds not only locally but also globally. The bargained wage declines with the firm's bargaining power, γ ($\mathrm{d}B/\mathrm{d}\gamma < 0$), because the reduction in profits resulting from a wage increase gains importance.

3.2 | Efficient bargaining

Bargaining over wages and employment results in two first-order conditions:

$$\begin{aligned} \frac{\partial NP}{\partial w} = {} & \gamma\tilde{Z}^{\gamma-1}\tilde{U}^{1-\gamma}\frac{\partial \tilde{Z}}{\partial w} + (1-\gamma)\,\tilde{Z}^{\gamma}\tilde{U}^{-\gamma}\frac{\partial \tilde{U}}{\partial w} \\ = {} & \tilde{Z}^{\gamma-1}\,\tilde{U}^{-\gamma}\,\left[-\gamma N^2\left(u(w)-u(\bar{w})\right)\left(1-\beta u'(w)\right) + (1-\gamma)\,\tilde{Z}Nu'(w)\right] = 0 \end{aligned} \tag{12}$$

$$\frac{\partial NP}{\partial N} = \gamma\tilde{Z}^{\gamma-1}\tilde{U}^{1-\gamma}\frac{\partial \tilde{Z}}{\partial N} + (1-\gamma)\,\tilde{Z}^{\gamma}\tilde{U}^{-\gamma}\,\frac{\partial \tilde{U}}{\partial N} = 0. \tag{13}$$

[12] Landsberger and Subotnik (1976) analyze the behavior of a monopolist, which maximises a utility function that increases in revenues and profits. Our finding mirrors their prediction that the revenue objective makes the input demand function steeper (see also Haskel & Szymanski, 1993).

By construction of the (unrestricted) Nash solution, these first-order conditions define a unique outcome. Because the firm's gain from bargaining must be positive ($\tilde{Z} > 0$), Equation (12) can only hold, if $1 - \beta u'(w) > 0$. Furthermore, from (12) and (13) we can derive the set of efficient wage and employment combinations, namely the contract curve. An outcome on the contract curve requires (see Appendix A.2).

$$C := u(w) - u(\bar{w}) + u'(w)\left[f'(N)(1+\alpha) - w - \rho'(N)\right] = 0 \tag{14}$$

As is true for a profit-maximizing firm, the contract curve, C, is positively sloped in the wage–employment space for $w > \bar{w}$, given a strictly concave utility function ($u''(w) < 0$).[13]

In order to derive the so-called power locus (Creedy & McDonald, 1991; McDonald & Solow, 1981), we combine Equation (12) with the contract curve condition (14):

$$A := w - \beta\left[u(w) - u(\bar{w})\right] - (1-\gamma)\frac{f(N)(1+\alpha) - \rho(N)}{N} - \gamma\left(f'(N)(1+\alpha) - \rho'(N)\right) = 0. \tag{15}$$

The power locus is negatively sloped in the wage-employment space for $\pi \geq 0$ (see Appendix A.2). Greater firm bargaining power reduces the wage as defined by A, for a given level of employment, because a rise in γ shifts the power locus downwards in the wage-employment-space ($\partial A/\partial\gamma > 0$). This shift comes about because the firm can secure a greater share of the entire gain from bargaining for itself. Since the contract curve is independent of γ, greater firm (trade union) bargaining power will reduce (raise) wages and employment in an efficient bargaining setting ($\mathrm{d}N/\mathrm{d}\gamma_{|\mathrm{EB}}$, $\mathrm{d}w/\mathrm{d}\gamma_{|\mathrm{EB}} < 0$; see Nickell & Andrews, 1983).

4 | CORPORATE SOCIAL RESPONSIBILITY AND OPTIMAL CHOICES

In this section, we tackle our first question and consider the wage, employment and payoff effects of CSR activities, distinguishing between wage negotiations and efficient bargaining.

4.1 | Wage bargaining

A greater importance of the CSR output objective will raise the firm's gain from expanding employment.[14] Moreover, for $w > \bar{w}$, the same is true if the CSR employee objective becomes more pronounced (Bastos, Monteiro, & Straume, 2014; Haskel & Szymanski, 1993). Therefore, both CSR objectives enhance the firm's demand for employees. We summarize these findings in the following result.

[13] See Appendix A.2. We briefly comment on the case of a vertical contract curve at the end of Section 5.2.

[14] The same outward shift of the labour demand function occurs if the firm maximises the utility from profits and consumer surplus (Gravelle, 1984; De Fraja, 1993; Fanti & Buccella, 2019, 2020) or a weighted sum of profits, consumer surplus, and union utility (Bastos et al., 2014) and consumer surplus becomes more important.

Result 1

A greater importance of CSR objectives raises labor demand for a given wage.

Proof: The change in labor demand due to a greater importance of the output CSR objective is

$$\frac{\partial N(w,\alpha,\beta)}{\partial \alpha} = -\frac{\frac{\partial^2 Z}{\partial N \partial \alpha}}{\frac{\partial^2 Z}{\partial N^2}} = -\frac{f'(N)}{(1+\alpha) f''(N) - \rho''(N)} > 0\,. \tag{16}$$

For the employee CSR objective, we have

$$\frac{\partial N(w,\alpha,\beta)}{\partial \beta} = -\frac{u(w) - u(\bar{w})}{(1+\alpha) f''(N) - \rho''(N)} > 0 \quad \text{if } w > \bar{w}\,. \tag{17}$$

■

The impact of the CSR output objective on the bargained wage is determined by

$$\begin{aligned}\frac{\mathrm{d}B}{\mathrm{d}\alpha} &= \underbrace{\frac{\partial B}{\partial \alpha}}_{\geq 0} + \frac{\partial B}{\partial N}\underbrace{\frac{\partial N}{\partial \alpha}}_{>0} \\ &= \underbrace{(1-\gamma) f(N) \frac{\mathrm{d}\tilde{U}}{\mathrm{d}w}}_{(1)} + \underbrace{2\gamma N (u(w) - u(\bar{w}))\left(1 - \beta u'(w)\right) \frac{f'(N)}{(1+\alpha) f''(N) - \rho''(N)}}_{(2)} \\ &\quad \underbrace{-(1-\gamma)\tilde{Z}\left(\frac{\partial N_w}{\partial N}(u(w) - u(\bar{w})) + u'(w)\right) \frac{f'(N)}{(1+\alpha) f''(N) - \rho''(N)}}_{(3)}\end{aligned} \tag{18}$$

This derivative is basically ambiguous. First, the firm's payoff rises for a given level of employment. This effect, captured by (1) in Equation (18), requires the union's payoff to go up as well and, hence, contributes to an expansion of the wage. Second, labor demand increases. This effect (2) in Equation (18) raises the union's payoff and does not affect the payoff of the firm because it chooses employment optimally. On its own, this impact necessitates a fall in the wage, unless the union unilaterally determines the remuneration level (such that $\mathrm{d}\tilde{U}/\mathrm{d}w = 0$). Finally, the union's gain from a higher wage changes because the position and slope of the labor demand curve are altered, see (3) in Equation (18). The resulting wage change is uncertain. If the (inverse) labor demand curve does not become (much) flatter in the wage–employment space, the third alteration implies a rise in the wage. The sum of all effects can be determined for the special case of a monopoly union. In such a setting ($\gamma = 0$, $\mathrm{d}\tilde{U}/\mathrm{d}w = 0$), the costs of a wage increase will decline if the slope of the inverse labor demand curve does not fall or does not decline by too much. A monopoly trade union will then raise the wage.[15] For lower levels of the trade union's bargaining power, the wage effect of the output objective is uncertain. Accordingly, we can summarize our findings in the following result.

[15] In Appendix A.3 we derive a condition in terms of exogenous parameters, which ensures a wage increase. I am grateful to an anonymous referee for suggesting this extension of the analysis.

Result 2

A greater importance of CSR objectives will induce a monopoly union to raise the wage if the (inverse) labor demand curve does not become flatter in the wage–employment space.

Proof: The proof follows from above. ■

Turning to employment, a rise in α enhances labor demand for a given wage. However, either the wage change cannot be determined or the increase, which can be established for a monopoly union setting, lowers labor demand. Since the direct impact and the wage induced labor demand effect are then of the opposite direction and cannot be compared quantitatively, the employment change is ambiguous.

The CSR employee objective, namely a change in β, has qualitatively the same effects as the output objective since both raise the parties' gains from an agreement (see Appendix A.4).[16]

4.2 | Efficient bargaining

The derivatives of the power locus (15) are

$$A_\alpha = -\left[(1-\gamma)\frac{f(N)}{N} + \gamma f'(N)\right] < 0 \tag{19}$$

$$A_\beta = -\left[u(w) - u(\bar{w})\right] < 0 \quad \text{if } w > \bar{w}\,. \tag{20}$$

Given $A_w, A_N > 0$, higher values of α and β necessitate more employment for a given wage, or a higher wage for a given number of employees. Therefore, CSR activities shift the power locus upwards in the wage-employment space. The power locus describes how trade union and firm share the gain from an agreement. Since the firm's payoff from more employment increases with CSR objectives, it can agree to the trade union obtaining a greater share of the total surplus.

The contract curve is independent of β because incorporating the CSR employee objective represents a positive affine transformation of the union's payoff, to which the Nash solution is invariant (Mas-Colell, Whinston, & Green, 1995, Chap. 22E). A more pronounced output objective shifts the contract curve downward, as $C_w > 0$, and it is efficient to raise employment at a given wage.

$$C_\alpha = u'(w)f'(N) > 0. \tag{21}$$

Combining the effects on the power locus and the contract curve indicates that the CSR employee objective increases employment and wages. Furthermore, the upward shift of the power

[16] Assuming iso-elastic product demand, a Cobb–Douglas production function (or linear demand and production functions), and a linear union utility function, Haskel and Szymanski (1992, 1993) show that wages are unaffected by a consumer surplus objective and rise with a greater importance of the employee objective, as specified in Equation (3) (see also Monteiro et al., 2011). Employment rises in the former case and remains constant in the latter. Moreover, given the particular specifications employed by Haskel and Szymanski (1992), profits of a firm, which also pursues these additional objectives, are negative. In De Fraja (1993), bargained wages decline with the relevance of union utility in the firm's objective, while the wage effect of consumer surplus and the employment consequences are ambiguous.

locus due to a greater importance of the output objective, combined with a downward shift of the contract curve indicates that employment surely rises.[17] The wage effect is

$$\frac{\mathrm{d}w}{\mathrm{d}\alpha}_{|\mathrm{EB}} = \frac{A_\alpha C_N - C_\alpha A_N}{C_w A_N - A_w C_N}$$
$$= \underbrace{\frac{u'(w)(1+\alpha)(\gamma-1)}{N(C_w A_N - A_w C_N)}}_{>0} \left[\frac{f''(N)-\rho''(N)}{f(N)^{-1}} - f'(N)\left(f'(N)-\rho'(N)-\frac{f(N)-\rho(N)}{N}\right)\right] \tag{22}$$

For a Cobb–Douglas production function, $f(N) = N^\kappa$, $0 < \kappa < 1$, and $\rho(N) = N^\theta$, the term in square brackets in (22) is zero for $\theta = 1$, such that wages remain constant (see Appendix A.5). If $\theta > 1$, wages will decline. In sum, we have the following result.

Result 3

Assume an efficient bargaining framework. A greater importance of the employee CSR objective will raise the bargained wage and employment. A greater importance of the output CSR objective will not alter (reduce) the negotiated wage if the production function is Cobb–Douglas and $\rho(N) = N$ ($\rho(N) = N^\theta$, $\theta > 1$), and increase employment.

Proof: See the computations above and Appendix A.5. ■

4.3 | Payoff consequences of CSR

In order to analyze whether collective bargaining affects the desirability of CSR from a firm's and a trade union's point of view, we consider the change in profits and the union's utility.

The profit impact of the output objective is given by

$$\frac{\mathrm{d}\pi}{\mathrm{d}\alpha} = \frac{\partial \pi}{\partial N}\frac{\mathrm{d}N}{\mathrm{d}\alpha} - N\frac{\mathrm{d}w}{\mathrm{d}\alpha} \tag{23}$$

The effect of a greater importance of the employee objective is defined analogously. The employment effect, namely the first summand in (23), will be zero in a wage bargaining setting because the firm chooses employment optimally. Moreover, we know that an increase in the importance of either of the CSR objectives will raise employment in an efficient bargaining context ($\mathrm{d}N/\mathrm{d}\alpha_{|\mathrm{EB}}$, $\mathrm{d}N/\mathrm{d}\beta_{|\mathrm{EB}} > 0$, Result 3). Since employment exceeds the profit-maximizing level ($\partial\pi/\partial N < 0$), the rise in employment lowers profits. Accordingly, a positive (non-negative) wage change resulting from a greater importance of CSR activities suffices to reduce profits in a wage (efficient) bargaining context. This condition will surely be fulfilled for the employee objective in an efficient bargaining setting, as $\mathrm{d}w/\mathrm{d}\beta_{|\mathrm{EB}} > 0$ holds.

[17] Gravelle (1984) shows that the effect of a consumer surplus objective on the position of the power locus is ambiguous while the contract curve shifts downward, as it is the case for the output objective.

Results 2 and 3 establish cases in which CSR concerns can result in higher bargained wages. Hence, the findings suggest a negative profit impact of CSR concerns on account of their impact on collective bargaining. Therefore, it may be conjectured that, ceteris paribus, firms will be more hesitant to pursue CSR objectives if there is collective bargaining than if such negotiations are absent. CSR activities may also raise productivity for a given wage. Such an effect will raise profits, ceteris paribus. Unless productivity consequences substantially weaken or reverse the collective bargaining effect, the above tentative conclusion will continue to hold if such additional effects are incorporated.[18]

The change in union utility owing to the output objective in the presence of wage bargaining is determined by

$$\frac{\mathrm{d}U}{\mathrm{d}\alpha}_{|\mathrm{WB}} = \frac{\partial U}{\partial N}\frac{\mathrm{d}N}{\mathrm{d}\alpha}_{|\mathrm{WB}} + \underbrace{\left\{\frac{\partial U}{\partial N}N_w + \frac{\partial U}{\partial w}\right\}}_{=\mathrm{d}\tilde{U}/\mathrm{d}w}\frac{\mathrm{d}w}{\mathrm{d}\alpha}_{|\mathrm{WB}}, \tag{24}$$

where $\partial U/\partial N = u(w) - u(\bar{w}) > 0$ and $\partial U/\partial w = N(w)u'(w) > 0$. The term in curly brackets in (24) is positive unless the trade union sets the wage, see Equation (11). The wage effect of a greater relevance of the employee CSR objective is also defined by Equation (24), replacing β for α. Since labor demand rises with CSR objectives ($\partial N/\partial\alpha$, $\partial N/\partial\beta > 0$; see Result 1), a sufficient condition for union utility to increase owing to the firm's CSR objectives is that wages do not fall ($\mathrm{d}w/\mathrm{d}\alpha_{|\mathrm{WB}}$, $\mathrm{d}w/\mathrm{d}\beta_{|\mathrm{WB}} \geq 0$).

In the case of efficient bargaining, we have

$$\frac{\mathrm{d}U}{\mathrm{d}\alpha}_{|\mathrm{EB}} = \frac{\partial U}{\partial N}\frac{\mathrm{d}N}{\mathrm{d}\alpha}_{|\mathrm{EB}} + \frac{\partial U}{\partial w}\frac{\mathrm{d}w}{\mathrm{d}\alpha}_{|\mathrm{EB}} \tag{25}$$

The effects of a greater importance of the employee objective can be defined in analogy to (25). The bargained employment level rises with the firm's CSR objectives ($\mathrm{d}N/\mathrm{d}\alpha_{|\mathrm{EB}}$, $\mathrm{d}N/\mathrm{d}\beta_{|\mathrm{EB}} > 0$; Result 3). Moreover, a greater importance of the employee CSR objective will raise the wage, whereas the wage consequences of the output objective are ambiguous (see Result 3). Hence, the employee objective raises union utility in the presence of efficient bargaining, while the impact of the output objective cannot be ascertained.

In sum, the findings for the trade union's payoff mirror those for profits. If unions are powerful enough to raise wages, they will benefit from the change in the firm's objective, independently of the scope of bargaining. The firm, however, is likely to incur a fall in profits.

5 | WELFARE EFFECTS OF TRADE UNIONS

In this section, we turn to our second question and analyze how trade unions affect welfare, W. Initially, CSR activities are absent, to isolate the consequences of CSR subsequently.

[18] Boodoo's (2020) findings for the UK are partly consistent with this interpretation. He observes a u-shaped correlation between union density and non-employee-oriented CSR scores, albeit a positive one for the employee-oriented indicator.

5.1 | Wage bargaining

The derivative of W with respect to the firm's bargaining power, γ, taking into account the wage adjustment and the feature that labor demand falls with the wage, is found to be:

$$\frac{\mathrm{d}W}{\mathrm{d}\gamma}_{|\mathrm{WB}} = \left(\frac{\partial W}{\partial N}N_w + \frac{\partial W}{\partial w}\right)\underbrace{\frac{dw}{d\gamma}_{|\mathrm{WB}}}_{(-)}$$

$$= \left(f'(N) - w + u(w) - u(\bar{w})\right) N_w \frac{\mathrm{d}w}{\mathrm{d}\gamma}_{|\mathrm{WB}} - N\left(1 - u'(w)\right)\frac{\mathrm{d}w}{\mathrm{d}\gamma}_{|\mathrm{WB}} \tag{26}$$

Using labor demand (8), Equation (26) can be simplified:

$$\frac{\mathrm{d}W}{\mathrm{d}\gamma}_{|\mathrm{WB}} = \left(-\alpha f'(N) - \beta\left[u(w) - u(\bar{w})\right]\right) N_w \frac{\mathrm{d}w}{\mathrm{d}\gamma}_{|\mathrm{WB}}$$

$$+\left(\underbrace{N_w\left(u(w) - u(\bar{w}) + \rho'(N)\right)}_{(-)} - N\left(1 - u'(w)\right)\right)\underbrace{\frac{\mathrm{d}w}{\mathrm{d}\gamma}_{|\mathrm{WB}}}_{(-)}. \tag{27}$$

Inspection of Equation (27) yields the following result.

Result 4

An increase in the trade union's bargaining power lowers welfare in a right-to-manage framework with a profit-maximizing firm ($\alpha, \beta = 0$) if $1 - u'(w) \geq 0$.

Proof: Since the wage declines with γ, $\mathrm{d}W/\mathrm{d}\gamma_{|\mathrm{WB}} > 0$ for $1 - u'(w) \geq 0$ and $\alpha = \beta = 0$. ■

Greater union bargaining power, namely a decline in γ, raises the bargained wage. The resulting employment reduction is detrimental to welfare because, first, some of the employees who earn the union wage instead of $\bar{w}$ will no longer obtain this utility gain. Moreover, the firm produces too small an amount ($\rho'(N) > 0$), such that the reduction in output strengthens this negative effect.[19] Lastly, $1 - u'(w) > 0$ implies that individuals earn too much, relative to the optimal situation. If that is the case, a redistribution of income towards employees by raising the wage further lowers welfare. If the employees' income is insufficient, $1 - u'(w) < 0$, the distributional impact of greater union bargaining power and its allocative consequences have the opposite direction.

The next result considers a setting in which the firm pursues both CSR objectives ($\alpha, \beta > 0$).

[19] While market power of the firm reinforces the negative welfare impact of trade unions, it is not essential. Accordingly, Result 4 also holds in a framework in which CSR has no immediate positive welfare impact on its own. This will not be true if the firm faces a binding profit constraint, $\pi = k \geq 0$. In this case, a higher wage will alter labour demand according to $\mathrm{d}N/\mathrm{d}w = N/(f'(N) - w - \rho'(N))$. Hence, a substitution using (8) is not feasible in (26) and the welfare impact of trade unions is independent of CSR objectives.

Result 5

The condition that ensures that greater bargaining power by the trade union decreases welfare in a right-to-manage setting if the firm maximizes profits is not sufficient to guarantee a welfare decline if the firm also pursues CSR objectives.

Proof: Assume $1 - u'(w) \geq 0$. This restriction does not ensure $\mathrm{d}W/\mathrm{d}\gamma_{|\mathrm{WB}} > 0$ for $\alpha, \beta > 0$. ■

The intuition for the stricter condition is as follows: Both CSR objectives induce the firm to expand output. Thus, an output reduction due to greater union bargaining power is less likely to decrease production to below the optimal level, relative to a setting in which these output-enhancing incentives do not exist. In consequence, the condition ensuring a decline in welfare due to collective bargaining becomes stricter.

Our next finding relates to the direction of the welfare change in the presence of CSR activities. Since the employment variation of greater union bargaining power is ambiguous (see Section 4.1), we focus on the effect due to the wage adjustment. In order to do so, we presume that the CSR output objective effectively neutralizes the market imperfection.

Result 6

Assume that the weight of the CSR output objective is such that the firm's and the social planner's objectives coincide in this respect. An increase in the trade union's bargaining power reduces welfare in a right-to-manage framework if $1 - u'(w) \geq 0$ holds and raises welfare if the marginal utility of income for employees is sufficiently high.

Proof: Assume $\alpha = \rho'(N)/f'(N)$ at the optimal employment level $N = f'^{-1}(\bar{w})$ (see Appendix A.1). Substitution in (27) yields

$$\frac{\mathrm{d}W}{\mathrm{d}\gamma}_{|\mathrm{WB},\ \alpha f'(N)=\rho'(N)} = \left(N_w\left(u\left(w\right)-u\left(\bar{w}\right)\right)\left(1-\beta\right)-N\left(1-u'\left(w\right)\right)\right)\frac{\mathrm{d}w}{\mathrm{d}\gamma}_{|\mathrm{WB}}. \tag{28}$$

Since $\mathrm{d}w/\mathrm{d}\gamma_{|\mathrm{WB}} < 0$, a fall in γ will lower welfare if $1 - u'(w) \geq 0$. However, if $1 - u'(w) < Nw(u(w) - u(\bar{w}))(1 - \beta)/N < 0$, the expression in brackets in (28) will be positive. ■

If the firm internalizes the positive output externality, employment will nonetheless be inefficiently low because the firm does not fully take into account the employees' interests. If higher wages have detrimental distributional effects, greater union bargaining power will surely reduce welfare. However, if the marginal utility from wages is sufficiently high, the distributional impact of higher wages may outweigh the negative allocative consequences due to the decline in employment. The greater the weight of the CSR employee objective, β, is, the more likely that the distributional effect dominates.

Contrasting Results 4, 5 and 6 clarifies that $1 - u'(w) \geq 0$ is a sufficient condition for welfare to decline with greater bargaining power of trade unions if the firm maximizes profits. The greater the importance of the CSR objectives, the less stringent the condition for a positive welfare effect of trade union becomes. Therefore, it can be argued that CSR objectives make a welfare-enhancing role of trade unions more likely in the case of wage negotiations. Put differently, the welfare

consequences of trade unions are crucially dependent on the existence and strength of CSR considerations in the firm's objective.

5.2 | Efficient bargaining

Using Equation (14), the welfare impact of a trade union in an efficient bargaining framework can be expressed as

$$\begin{aligned}\frac{\mathrm{d}W}{\mathrm{d}\gamma}_{|\mathrm{EB}} &= \frac{\partial W}{\partial N}\frac{\mathrm{d}N}{\mathrm{d}\gamma}_{|\mathrm{EB}} + \frac{\partial W}{\partial w}\frac{\mathrm{d}w}{\mathrm{d}\gamma}_{|\mathrm{EB}} \\ &= \left(f'(N) - w + u(w) - u(\bar{w})\right)\frac{\mathrm{d}N}{\mathrm{d}\gamma}_{|\mathrm{EB}} - N\left(1 - u'(w)\right)\frac{\mathrm{d}w}{\mathrm{d}\gamma}_{|\mathrm{EB}} \qquad (29) \\ &= \left(\rho'(N) - \alpha f'(N) - \frac{u(w) - u(\bar{w})}{u'(w)}\left(1 - u'(w)\right)\right)\frac{\mathrm{d}N}{\mathrm{d}\gamma}_{|\mathrm{EB}} - N\left(1 - u'(w)\right)\frac{\mathrm{d}w}{\mathrm{d}\gamma}_{|\mathrm{EB}}.\end{aligned}$$

Our first finding relates to a setting in which the CSR output objective plays no role ($\alpha = 0$).

Result 7

A sufficient condition for welfare to rise with the trade union's bargaining power in an efficient bargaining framework in which the firm maximizes profits or a weighted sum of profits and the CSR employee objective, such that $\alpha = 0 \leq \beta$ applies, is $1 - u'(w) \leq 0$.

Proof: Setting $\alpha = 0$ in (29) and taking into account $\mathrm{d}w/\mathrm{d}\gamma_{|\mathrm{EB}}$, $\mathrm{d}N/\mathrm{d}\gamma_{|\mathrm{EB}} < 0$ shows that the derivative will be negative for $1 - u'(w) \leq 0$ and $\beta \geq 0$. ■

The wage rises with union bargaining power. If the marginal utility of income exceeds unity, higher wages will have a positive distributional welfare impact. Furthermore, the firm produces too small an amount in a competitive labor market due to its market power. Given a positively sloped contract curve and the absence of a CSR output objective, employment and production in the efficient bargaining setting are higher than in the absence of collective negotiations. This mitigates or perhaps more than compensates the negative welfare because of the output market imperfection ($\rho'(N) > 0$). The second line of Equation (29) clarifies that the net impact of union bargaining power is potentially ambiguous. However, making use of the definition of the contract curve (14), the counteracting influences, namely too little output due to $\rho(N)$ and excessive production due to efficient bargaining, can be compared. If the marginal utility of income is greater than unity, the output enhancing effect will never dominate. This also clarifies that output market power of the firm makes a positive welfare effect of trade unions more likely, but is not essential. Consequently, greater union bargaining power unambiguously raises welfare if $1 - u'(w) \leq 0$.[20]

Comparing Results 4 and 7 indicates that the welfare effects of trade unions in the absence of CSR objectives tend to depend on the scope of bargaining. This is the case because output is

[20] If the firm faced a binding profit constraint, CSR considerations would be without effect. This is because the contract curve is independent of bargaining power, and the wage is determined by the profit constraint, $\pi = f(N) - \rho(N) - wN = k$, and not the power locus.

higher in an efficient bargaining setting. Moreover, the profit-maximizing output level is too low ($\rho'(N) > 0$). Wage bargaining aggravates this effect, while efficient negotiations mitigate it, given the positively sloped contract curve. Furthermore, the contract curve is independent of the weight of the CSR employee objective. Hence, the efficiency consequences due to efficient bargaining are independent of the magnitude of β, while this is not the case if wages are negotiated.

We next consider a setting in which the firm pursues a CSR output objective, namely $\alpha > 0$. In this case, we can establish the following result.

Result 8

The condition that ensures that greater trade union bargaining power raises welfare in an efficient bargaining setting if the firm has no CSR output objective is not sufficient to guarantee an increase in welfare in the presence of such component in the firm's objective.

Proof: The restriction $1 - u'(w) \leq 0$, which guarantees that (29) is negative for $\alpha = 0$ does not ensure that this is the case for $\alpha > 0$. ■

The CSR output objective implies that the firm produces a greater amount than in the absence of such an objective. Therefore, the condition is stricter, which ensures that an increase in union bargaining power raises welfare due to higher level of output.

Finally, we assume that the CSR output objective neutralizes the market imperfection.

Result 9

Assume that the weight of the CSR output objective is such that the firm's and the social planner's objectives coincide in this respect. An increase in the trade union's bargaining power in an efficient bargaining framework will raise (reduce) welfare if $1 - u'(w) < (>)\, 0$.

Proof: Setting $\alpha = \rho'(N)/f'(N)$ in (29), where N is the optimal employment level defined by $N = {f'}^{-1}(\bar{w})$ (see Appendix A.1), we obtain

$$\frac{\mathrm{d}W}{\mathrm{d}\gamma}_{|\mathrm{EB},\ \alpha f'(N)=\rho'(N)} = -\left(1-u'(w)\right)\left[\underbrace{\frac{u(w)-u(\bar{w})}{u'(w)}\frac{\mathrm{d}N}{\mathrm{d}\gamma}_{|\mathrm{EB}} + N\frac{\mathrm{d}w}{\mathrm{d}\gamma}_{|\mathrm{EB}}}_{<0}\right] \tag{30}$$

■

If the weight of the CSR output objective internalizes the output market distortion, bargaining over employment induces an optimal outcome from an allocative perspective. Hence, raising trade union bargaining power has no impact on welfare via the efficiency properties of the bargaining outcome. However, the increase in the wage will have positive welfare consequences if the marginal utility from wage income is greater than that of profits.

A comparison of Results 6 and 9 indicates that if the CSR objective internalizes the output market distortion, the welfare effects of trade unions are largely, though not entirely independent of the scope of bargaining. This contrasts with a setting in which the firm maximizes profits (see Results 4 and 7). This difference arises because the welfare consequences of unions in the absence

of CSR considerations depend on their allocative and their distributional impact. In contrast, only the latter aspect is decisive in the cases considered in Results 6 and 9.

Results 7 to 9 have been derived, assuming a positively sloped contract curve. If the utility function of union-members is linear, the contract curve will be vertical (see Equation (A.6) in Appendix A.2), and the outcome will be strongly efficient (Layard & Nickell 1990). In this case, a change in bargaining power will not alter employment. The welfare effects of trade unions will solely depend on the distributional consequences of the wage change.

Additionally, a comparison of Results 7 and 9 indicates that $1 - u'(w) < 0$ is a sufficient condition for welfare to rise with union bargaining power in an efficient bargaining setting in the absence of a CSR output objective. The greater the importance of the CSR output objective, the more stringent the condition for a welfare-enhancing role of trade union becomes. In case of a full internalization of the output externality, $1 - u'(w) < 0$ constitutes a necessary condition. Therefore, it can be argued that a CSR output objective makes a welfare-enhancing role of trade unions less likely in the presence of efficient bargaining.

6 | CONCLUSIONS

In many economies, institutions strongly affect the functioning of the labor market. In this paper, we focus on trade unions. We analyze the interaction of Corporate Social Responsibility (CSR) elements in the firm's objective and collective bargaining. When doing so, we differentiate between wage negotiations and efficient bargains. Moreover, the CSR objectives focus on output and employee utility.

The first main result is that the impact of CSR objectives on collective bargaining outcomes depends on the scope of negotiations. In the case of wage bargaining, the wage and employment variation can only be determined for special cases. If the firm and trade union bargain over wages and employment, CSR activities will raise employment. Furthermore, the wage will rise with the employee CSR objective, whereas the wage change owing to a greater importance of the output component is ambiguous. Lastly, the theoretical analysis yields no indication that CSR raises profits. Instead, we can identify cases in which CSR reduces profits and raises union utility on account of the resulting change in bargaining outcomes.

Our second set of findings concerns the welfare effects of trade unions. These consequences are due to the change in output and the income distribution. We show that unions are more likely to have a positive welfare effect in the presence of CSR than in its absence if there is wage bargaining. The reverse is true in case of efficient bargaining.

This ambiguity gives rise to the question of whether collective bargaining is more likely to be over wages or wages and employment. While explicit employment negotiations appear to be rare, suggesting the predominance of wage bargaining, in many countries, there are indirect agreements on employment. They may be enforced via job security guarantees, as in the UK (Bryson, Cappelari, & Lucifora, 2009), or via assurances of specified employment levels and agreements preventing layoffs, as it is the case in Germany (Seifert & Massa-Wirth, 2005). Accordingly, both scenarios, that is, negotiations about wages only and efficient bargaining, are empirically relevant, such that also both sets of findings derived above are significant.[21]

[21] I am grateful to an anonymous referee for emphasizing this theoretical ambiguity and pointing out the resulting problems for an empirical validation of the findings.

In our analysis, the bargaining agenda is given exogenously. However, the scope of negotiations may also be chosen optimally. Corresponding investigations suggest that profit-maximizing firms prefer wage negotiations to efficient bargaining (see, for example, Naylor, 2003). The existence of CSR concerns may affect this preference.[22] Therefore, it may be worthwhile to allow for an endogenous determination of the scope of bargaining in unionized settings with firms pursuing CSR activities, for which our results can provide valuable input.

Our analysis has been based on a number of further, possibly restrictive assumptions. Therefore, the question arises if the results summarized above also apply for alternative set-ups. In our framework, the only, homogeneous factor of production is labor. If instead, firms could substitute one type of labor for another with different productivity or costs or if there were a second factor of production, such as capital, firms may adjust CSR activities differently in response to collective bargaining than derived above. Additionally, we have considered firm-specific trade unions, whereas in many countries collective bargaining takes place at a less decentralized or even national level (OECD 2019, Visser, 2019). Moreover, as indicated in the introduction, there are many institutions, regulations and laws, which affect labor market outcomes. They may also alter the effect of a firm's CSR activities, of trade unions, and their interaction. Finally, we have selected a well-accepted but specific manner of modelling CSR. In particular, the analysis has been based on the assumption that CSR is tantamount to adding a component to the firm's objective. The definitions of CSR at the beginning have indicated that CSR has many facets. CSR may not only relate to output, consumer surplus and employee utility, but can also incorporate other aspects. Assume, for example, that the firm produces a product, which harms the environment, and does not fully incorporate these environmental effects. In this case, the profit-maximizing output level will be excessive, and a reduction of employment due to collective wage negotiations will mitigate this distortion. More generally, findings relating to the CSR output objective will be reversed if output in the absence of collective bargaining exceeds the optimal level.

In addition to analyzing the comprehensive validity of the theoretical predictions, it may be worthwhile to look empirically at the effects of CSR activities on union behavior and, more generally, collective bargaining. Corresponding findings can also help to resolve the theoretical ambiguities about the wage and employment consequences of CSR activities. Currently, comprehensive empirical analyses of the effects of CSR on collective bargaining are scarce.

The multitude of open questions clarifies that the consequences of a firm's CSR activities in the presence of trade unions and, more generally, in an imperfectly competitive labor market are largely uncharted territory. It deserves further exploration.

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[22] Fanti and Buccella (2017) demonstrate such effect for a particular setting, namely a unionized monopoly producing a good that exhibits positive network effects.

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APPENDIX A

A.1 | Social optimum

The social planner can determine wages, w, employment, N, and a lump-sum tax, T, paid by the firm, which all employees receive in equal amounts, T/M. Hence, W is

$$W(T,w,N) = f(N) - wN - T + Nu\left(w + \frac{T}{M}\right) + (M-N)\,u\left(\bar{w} + \frac{T}{M}\right). \tag{A.1}$$

The first-order conditions for a maximum read

$$\frac{\partial W}{\partial T} = -1 + \frac{N}{M}u'\left(w + \frac{T}{M}\right) + \frac{M-N}{M}u'\left(\bar{w} + \frac{T}{M}\right) = 0 \tag{A.2}$$

$$\frac{\partial W}{\partial w} = -N + Nu'\left(w + \frac{T}{M}\right) = 0 \tag{A.3}$$

$$\frac{\partial W}{\partial N} = f'(N) - w + u\left(w + \frac{T}{M}\right) - u\left(\bar{w} + \frac{T}{M}\right) = 0. \tag{A.4}$$

It is straightforward to establish the second-order conditions. (A.3) implies that the marginal utility from income for employees must equal the marginal utility from income for firms, that is, be unity. Substituting (A.3) into (A.2) clarifies that also the marginal utility from $\bar{w}$ must be unity. This will only be feasible for $w = \bar{w}$. (A.4) then shows that $f'(N) = w = \bar{w}$.

A.2 | Characteristics of the efficient bargaining solution

The division of the first line of Equation (12) and of (13) yields

$$\frac{-N\left(1 - \beta u'(w)\right)}{f'(N)(1+\alpha) - w - \rho'(N) + \beta\left(u(w) - u(\bar{w})\right)} = \frac{Nu'(w)}{u(w) - u(\bar{w})}\ . \tag{A.5}$$

Equation (A.5) defines the set of efficient wage and employment combinations, that is, the contract curve. Equation (A.5) can only hold if $C = 0$ (defined in Equation (14) in the main text).

The slope of the contract curve results from total differentiation of C:

$$\frac{\mathrm{d}w}{\mathrm{d}N}_{|\mathrm{CC}} = -\frac{C_N}{C_w} = -\frac{u'(w)\left[f''(N)(1+\alpha) - \rho''(N)\right]}{u''(w)\left[f'(N)(1+\alpha) - w - \rho'(N)\right]} > 0 \quad \text{if } w > \bar{w}\,. \tag{A.6}$$

The slope of the power locus (PL) is obtained from total differentiation of (15) and given by

$$\begin{aligned}\frac{\mathrm{d}w}{\mathrm{d}N}_{|\mathrm{PL}} &= -\frac{A_N}{A_w} \\ &= \frac{\gamma - 1}{N^2}\,\frac{\left[f(N)(1+\alpha) - \rho(N) - N\left(f'(N)(1+\alpha) - \rho'(N)\right)\right]}{1 - \beta u'(w)} \\ &\quad + \gamma \underbrace{\frac{f''(N)(1+\alpha) - \rho''(N)}{1 - \beta u'(w)}}_{(-)} < 0\end{aligned} \tag{A.7}$$

The term in square brackets in the numerator will surely be negative if profits, π, are non-negative, as $\pi = f(N) - wN - \rho(N) < f(N)(1+\alpha) - wN - \rho(N) < f(N)(1+\alpha) - (f'(N)(1+\alpha) - \rho'(N))N - \rho(N)$, since $f'(N)(1+\alpha) - \rho'(N) < w$ holds, see Equation (8). Hence, the power locus is negatively sloped in the wage–employment space for $\pi \geq 0$.

A.3 | Result 2 for a monopoly union and Cobb–Douglas specifications

For a monopoly union, we have $\gamma = d\tilde{U}/dw = 0$. Hence, $N_w(u(w) - u(\bar{w})) + Nu'(w) = 0$ (see Equation (11)) defines the optimal wage. The derivative of this condition with respect to α is

$$\left[\frac{\partial N_w}{\partial N}(u(w) - u(\bar{w})) + u'(w)\right]\frac{\partial N}{\partial \alpha}, \tag{A.8}$$

where $\partial N/\partial \alpha > 0$ according to (16); see Result 1. If (A.8) is positive the wage rises with α.

Using the first-order condition, we can rewrite the expression in square brackets in (A.8) as

$$\frac{\partial N_w}{\partial N}(u(w) - u(\bar{w})) + u'(w) = (u(w) - u(\bar{w}))\underbrace{\left(\frac{\partial N_w}{\partial N} - \frac{N_w}{N}\right)}_{:=\,A1}. \tag{A.9}$$

We subsequently establish $A1 > 0$ for a set of assumptions relating to functional forms. In particular, $f(N) = N^{\kappa}, 0 < \kappa < 1$ and $\rho(N) = N^{\theta}, \theta \geq 1$. The respective derivatives are: $f'(N) = \kappa N^{(\kappa-1)} > 0$, $f''(N) = \kappa(\kappa-1)N^{(\kappa-2)} < 0$, $\rho'(N) = \theta N^{(\theta-1)} > 0$ and $\rho''(N) = \theta(\theta-1)N^{\theta-2} \geq 0$. Moreover, we assume $u(\bar{w}) = 0$ and $\beta = 0$. These latter normalizations simplify the subsequent calculations, without affecting the nature of our findings. Finally, we specify utility as $u(w) = \sqrt{w}$, to calculate the wage as a function of exogenous parameters.

We proceed as follows: First, we calculate the wage that the union sets as a function of employment, N, and combine this relationship with the firm's optimal choice of employment. Thus, we can derive labor demand as a function of exogenous parameters. Second, we compute A1 for the particular functional forms assumed as a function of N. Finally, we use our computations from step one to formulate A1 as a function of exogenous parameters.

Step 1: The optimal wage is defined by

$$N_w(u(w) - u(\bar{w})) + Nu'(w) = N_w\sqrt{w} + \frac{N}{2\sqrt{w}} = 0 \Rightarrow w = -\frac{N}{2N_w}. \tag{A.10}$$

Using the Cobb–Douglas specifications for $f(N)$ and $\rho(N)$, we obtain

$$w = -\frac{N}{2N_w} = -\frac{(1+\alpha)\kappa(\kappa-1)N^{\kappa-1} - \theta(\theta-1)N^{\theta-1}}{2}. \tag{A.11}$$

Equation (8) describing labor demand can, hence, be expressed as

$$\begin{aligned}\frac{\partial Z}{\partial N} &= (1+\alpha)f'(N) - w - \rho'(N)\\ &= (1+\alpha)\kappa N^{\kappa-1} + \frac{(1+\alpha)\kappa(\kappa-1)N^{\kappa-1} - \theta(\theta-1)N^{\theta-1}}{2} - \theta N^{\theta-1}\end{aligned}$$

$$= (1+\alpha)\,\kappa N^{\kappa-1}\left(1+\frac{\kappa-1}{2}\right) - \theta N^{\theta-1}\left(1+\frac{\theta-1}{2}\right) = 0. \tag{A.12}$$

Solving this equality for N, we obtain

$$N^{\kappa-\theta} = \frac{\theta(1+\theta)}{(1+\alpha)\,\kappa(1+\kappa)}\ . \tag{A.13}$$

Step 2: The partial derivative of

$$N_w = \frac{1}{(1+\alpha)\,f''(N) - \rho''(N)} = \frac{1}{(1+\alpha)\,\kappa(\kappa-1)N^{\kappa-2} - \theta(\theta-1)N^{\theta-2}} \tag{A.14}$$

with respect to N can, after some rearrangements, be expressed as

$$\begin{aligned}\frac{\partial N_w}{\partial N} &= \frac{-\left[(1+\alpha)\,\kappa(\kappa-1)(\kappa-2)N^{\kappa-2} - \theta(\theta-1)(\theta-2)N^{\theta-2}\right]}{\left[(1+\alpha)\,\kappa(\kappa-1)N^{\kappa-1} - \theta(\theta-1)N^{\theta-1}\right]\left[(1+\alpha)\,\kappa(\kappa-1)N^{\kappa-2} - \theta(\theta-1)N^{\theta-2}\right]} \\ &= -\frac{(1+\alpha)\,\kappa(\kappa-1)(\kappa-2)N^{\kappa-2} - \theta(\theta-1)(\theta-2)N^{\theta-2}}{(1+\alpha)\,\kappa(\kappa-1)N^{\kappa-1} - \theta(\theta-1)N^{\theta-1}} N_w. \end{aligned} \tag{A.15}$$

Therefore, we can write A1 as

$$\text{A1}: \quad = \frac{\partial N_w}{\partial N} - \frac{N_w}{N} = -\frac{N_w}{N}\left(\frac{(1+\alpha)\,\kappa(\kappa-1)(\kappa-2)N^{\kappa-1} - \theta(\theta-1)(\theta-2)N^{\theta-1}}{(1+\alpha)\,\kappa(\kappa-1)N^{\kappa-1} - \theta(\theta-1)N^{\theta-1}} + 1\right). \tag{A.16}$$

Simplifying (A.16) and using $\text{A2} := (1+\alpha)\,\kappa(\kappa-1)N^{\kappa-1} - \theta(\theta-1)N^{\theta-1} < 0$, we have

$$\begin{aligned}\text{A1} &= -\underbrace{\frac{N_w}{N\,\text{A2}}}_{(-)}\left((1+\alpha)\,\kappa(\kappa-1)^2N^{\kappa-1} - \theta(\theta-1)^2N^{\theta-1}\right) \\ &= -\frac{N_w N^{\theta-1}}{N\,\text{A2}}\left((1+\alpha)\,\kappa(\kappa-1)^2N^{\kappa-\theta} - \theta(\theta-1)^2\right). \end{aligned} \tag{A.17}$$

Step 3: We finally utilize (A.13) and obtain

$$\begin{aligned}\text{A1} &= -\frac{N_w N^{\theta-2}}{\text{A2}}\left((1+\alpha)\,\kappa(\kappa-1)^2\frac{\theta(1+\theta)}{(1+\alpha)\,\kappa(1+\kappa)} - \theta(\theta-1)^2\right) \\ &= -\frac{\theta N_w N^{\theta-2}}{(1+\kappa)\,\text{A2}}\left((1+\theta)(\kappa-1)^2 - (\theta-1)^2(1+\kappa)\right) \\ &= \underbrace{-\frac{\theta N_w N^{\theta-2}}{(1+\kappa)\,\text{A2}}}_{(-)}\underbrace{(\kappa-\theta)}_{(-)}\,(\kappa+\theta+\kappa\theta-3) \end{aligned} \tag{A.18}$$

Given $\kappa < 1 \leq \theta$, A1 will be positive if $\kappa + \theta + \kappa\theta - 3 > 0$, or put differently if:

$$\theta > \frac{3-\kappa}{1+\kappa}. \tag{A.19}$$

Since the right-hand side of (A.19) is decreasing in κ, the inequality is more likely to hold the less concave the production function is, relative to the indicator of the firm's market power. If, for example, we assume $\kappa = 0.5\,(=0.75)$, $\theta > 1.67\,(1.29)$ ensures A1 > 0 and a positive wage effect of the output CSR objective in a framework with a wage setting trade union.

A.4 | Effects of more pronounced CSR employee objective in a wage bargaining framework

$$\begin{aligned}
\frac{\mathrm{d}B}{\mathrm{d}\beta} &= \underbrace{\frac{\partial B}{\partial \beta}}_{>0} + \frac{\partial B}{\partial N}\underbrace{\frac{\partial N}{\partial \beta}}_{\geq 0} \\
&= \gamma N^2 \left(u\left(w\right) - u\left(\bar{w}\right)\right) u'\left(w\right) + \left(1-\gamma\right) N \left[u\left(w\right) - u\left(\bar{w}\right)\right] \left(N_w \left(u(w) - u\left(\bar{w}\right)\right) + N u'\left(w\right)\right) \\
&\quad + 2\gamma N \left(1 - \beta u'\left(w\right)\right) \frac{\left(u\left(w\right) - u\left(\bar{w}\right)\right)^2}{\left(1+\ \alpha\right) f''\left(N\right) - \rho''\left(N\right)} \\
&\quad - \left(\left(1-\gamma\right)\tilde{Z}\left(\frac{\partial N_w}{\partial N}\left(u\left(w\right) - u\left(\bar{w}\right)\right) + u'\left(w\right)\right)\right) \frac{u\left(w\right) - u\left(\bar{w}\right)}{\left(1+\ \alpha\right) f''\left(N\right) - \rho''\left(N\right)}.
\end{aligned} \tag{A.20}$$

A.5 | Result 3 for Cobb–Douglas production function

Substituting in the term in square brackets in (20) for $f(N) = N^{\kappa}, 0 < \kappa < 1$ and $\rho(N) = N^{\theta}$ and its derivatives (see Appendix A.3), we obtain

$$\begin{aligned}
&\left[\frac{f''(N) - \rho''(N)}{f(N)^{-1}} - f'(N)\left(f'(N) - \rho'(N) - \frac{f(N) - \rho(N)}{N}\right)\right] \\
&= \kappa\left(\kappa - 1\right) N^{2\kappa-2} \ - \theta\left(\theta - 1\right) N^{\theta+\kappa-2} - \kappa N^{\kappa-1}\left(\kappa N^{\kappa-1} - \theta N^{\theta-1} - N^{\kappa-1} + N^{\theta-1}\right) \\
&= \kappa\left(\kappa - 1\right) N^{2\kappa-2} \ - \theta\left(\theta - 1\right) N^{\theta+\kappa-2} - \left(\kappa^2 N^{2\kappa-2} - \theta\kappa N^{\theta+\kappa-2} - \kappa N^{2\kappa-2} + \kappa N^{\theta+\kappa-2}\right) \\
&= -\theta\left(\theta - 1\right) N^{\theta+\kappa-2} + \theta\kappa N^{\theta+\kappa-2} - \kappa N^{\theta+\kappa-2} \\
&= N^{\theta+\kappa-2}\ \left(\theta - 1\right)\left[\kappa - \theta\right]
\end{aligned} \tag{A.21}$$

(A.21) is zero for $\theta = 1$ and negative for $\theta > 1$, and so is the derivative in Equation (20).