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Social preferences, monopsony and government intervention

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Abstract. Monopsony power by firms and social preferences by consumers are well established. We analyze how wages and employment change in a monopsony if workers compare their income with that of a reference group. We show that the undistorted, competitive outcome may no longer constitute the benchmark for welfare comparisons and derive a condition that guarantees that the monopsony distortion is exactly balanced by the impact of social comparisons. We also demonstrate how wage restrictions and subsidies or taxes can be used to ensure this condition, both for a welfarist and a paternalistic welfare objective.

Résumé. Préférences sociales, monopsone et intervention de l'État. Le pouvoir de monopsone des entreprises et les préférences sociales des consommateurs sont des concepts bien établis. Nous analysons la façon dont les salaires et l'emploi évoluent au sein d'un monopsone lorsque les salariés comparent leurs revenus à ceux d'un groupe de référence. Nous montrons que l'effet concurrentiel non faussé ne représente plus la référence en matière de comparaison du bien-être, et qu'il en dérive une condition permettant de garantir que l'effet de distorsion du monopsone soit exactement contrebalancé par l'impact des comparaisons sociales. Nous montrons également la façon dont les restrictions salariales, les subventions ou les impôts peuvent être utilisés pour garantir cette condition, à la fois dans une approche favorisant le bien-être ou dans une optique paternaliste.

JEL classification: D10, H21, J30, J42

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1. Introduction

Social preferences, or more specifically social comparisons, play an important role in life. Individual decisions are substantially influenced by relative or positional considerations. Very often these positional considerations unfold in the labour market. For example, Neumark and Postlewaite (1998) and Park (2010) show that relative income concerns spur the entry of women into the labour market. Bracha et al. (2015) report experimental findings that relative pay enhances labour supply. Additionally, Bowles and Park (2005) present evidence suggesting that greater income inequality is associated with longer work hours. Clark and Oswald (1996) find that workers' satisfaction levels vary negatively with the wages of peers—an outcome that also arises when neighbours with higher earnings are chosen as the reference group (see, e.g., Luttmer 2005). Finally, the increased use of social media, such as Facebook or Instagram, has enhanced the scope for social comparisons (Appel et al. 2016, Krause et al. 2019).

Concurrently, market power of firms has risen and labour markets have become more concentrated. The Council of Economic Advisors (2016) points out that increased firm concentration is accompanied by a downward trend in geographic mobility in the United States. Furthermore, forces counteracting monopsony power, such as labour unions, are becoming weaker. In line with these observations, there is evidence that more than a half of regional labour markets in the United States are highly concentrated, comprising 17% of employment (Azar et al. 2020).

We also observe the emergence of crowd-working platforms that exhibit particularly high levels of monopsony power (Dube et al. 2020). Moreover, non-compete and non-poaching agreements are no longer restricted to high-skilled employees but are also requested from low-skilled staff, such as those at fast food franchises (Krueger and Posner 2018). These various indications of firms' market power suggest that the narrative of a competitive labour market, according to which workers move on to another firm if their current employer lowers the wage by an even very small amount, is misplaced. Whether firms actually have market power can, inter alia, be derived from estimates of the labour supply elasticity to a single firm. After the pioneering work by Nelson (1973) and Sullivan (1989), these labour supply elasticities have been estimated in many contexts. Positive and finite values suggest that monopsony power exists in many countries, sectors and occupations (Sokolova and Sorensen 2018).

These highly pervasive facts, the prevalence of social comparisons and of monopsonistic labour markets, constitute the empirical basis for our theoretical analysis. In particular, we investigate what happens if the two distortions interact. In addition, we derive the normative consequences of the coexistence of market power due to monopsony and income or consumption externalities owing to social preferences. We show that policy implications

essentially depend on the size of two empirically observable parameters—the labour supply elasticity to the firm and the strength of social comparisons.

Individuals who compare their income or consumption with that of others and exhibit jealousy have an incentive to expand labour supply in order to raise income and thereby improve their relative position (Frank 1984). This results in a downward movement of the labour supply curve in the wage–employment space. In monopsony, employment is determined by the marginal cost curve that exceeds the wage (Robinson 1933). Combining both aspects, our positive analysis indicates that predicting the wage and employment impact of social comparisons in monopsony requires restrictions relating to the labour supply elasticity to the firm. Adopting a normative perspective, we characterize efficiency both for a welfarist and a paternalistic objective. Interestingly, a welfarist social planner will not always prefer an employment level that equals the one that occurs on a competitive market without social comparisons. The planner internalizes the externalities resulting from social comparisons, but internalization is not generally equivalent to the absence of social preferences as the latter affects the marginal utility from consumption. Using these insights, we next consider the optimal regulation of wages and use of fiscal incentives. We show that the magnitude of the labour supply elasticity to the firm and an indicator of the strength of social comparisons can be used to determine whether minimum wages or wage caps (respectively taxes or subsidies) are required to achieve efficiency. The empirical evidence suggests that even substantial monopsony power may be balanced by the effects of jealousy, therefore limiting the efficiency-enhancing role of a minimum wage or wage subsidies.

While there is extensive work on monopsonistic labour markets (Manning 2003) and widespread interest in the effects of social comparisons on market outcomes (see, among others, Persson 1995; Ireland 2001; Corneo 2002; Liu and Turnovsky 2005; Aronsson and Johansson-Stenman 2008, 2014, 2015, 2018; Wendner and Goulder 2008; Mujcic and Frijters 2015), our paper contributes to a less developed literature that looks into market outcomes when the two distortions, market power and income or consumption externalities, meet. Desiraju and Sappington (2007) and von Siemens (2010, 2012) study the impact of social comparisons in a monopsony. Contrary to our contribution, they are interested in workers' sorting behaviour into particular jobs, and firms' profits when workers have private information relating to their ability or social preferences. Goerke and Neugart (2017) analyze social comparisons in oligopsony in which heterogeneous firms have limited market power and compete for the same pool of labour. Using a framework based on Salop (1979), they show that a stronger prevalence of comparisons decreases wage inequality, shifts the functional income distribution in favour of workers and increases welfare. In contrast to Goerke and Neugart (2017), we scrutinize the suitability of various policy instruments to remedy the welfare losses resulting from the interaction of social comparisons and market power by employers for alternative objectives. Finally, Sandmo (1994) studies a two-part wage

schedule. He shows that the monopsonist will equalize the effort-related wage component and a worker's marginal productivity and use the fixed income component to raise profits at the expense of wage income. These benefits of second-degree price discrimination extend to a setting in which individuals undertake social comparisons. Consequently, there is no interaction between the two distortions we consider.

In the next section, we describe our analytical apparatus. In section 3, we show how social comparisons affect the market outcome in a monopsony. We then characterize optimal employment from a welfarist perspective and investigate the use of wage regulations and taxes and subsidies in section 4. We assume a paternalistic social planner in section 5 as an important robustness check and conclude in section 6.

2. The model

2.1. General set-up

We consider a world in which a monopsonist employs a large number of homogeneous individuals. All workers are employed by the monopsonist and variations in employment take place at the intensive margin. Workers derive utility from consumption and exhibit social preferences because they compare their own consumption with that of a reference group. From the perspective of an individual worker, reference consumption is exogenous. This kind of Nash behaviour implies that each individual creates an externality when deciding about consumption—and thereby labour supply—and, hence, neglects the impact on other individuals. We follow earlier contributions (e.g., Persson 1995, Dupor and Liu 2003) and assume that all workers are also identical ex post. This simplifies the exposition considerably and helps us to focus on efficiency aspects of the interaction of monopsonistic market power and social comparisons. In addition, we can then define welfare in a straightforward manner because we do not have to compare payoffs across individuals.

In contrast to workers, the monopsonist takes into account that a wage change will alter both the consumption of each employee and the reference level and, hence, correctly anticipates the labour supply effects of altering the wage (Sandmo 1994). Therefore, the monopsonist partially internalizes the externalities due to social comparisons.[1] It can sell its output at a fixed price normalized to unity. Therefore, income changes do not alter product or labour demand. All workers are paid a wage, w, as there is no wage discrimination. They supply an amount of labour, L, resulting in labour income, wL. In addition, profits are redirected to workers. Accordingly, the functional income distribution is without impact, and we concentrate on the efficiency

1 This is not feasible in oligopsony, because wages of competitors and, hence, reference income, are given from the perspective of each oligopsonistic firm (Goerke and Neugart 2017).

consequences of social comparisons in the normative part of our analysis. Workers are price-takers. They view profit income, π, as given and, thus, as unaffected by labour supply decisions. This assumption and the differential ability of the monopsonist and an individual worker to affect reference consumption reflect the idea that the firm has market power, while each individual's actions have negligible effects on market outcomes.

2.2. Preferences

A worker's utility, U, increases in own consumption, c, at a decreasing rate and decreases in working time, L, at a weakly increasing rate, such that

$$U = U(c, c^r, \gamma, L) \tag{1}$$

and $U_{cc}, U_L < 0 < U_c$ and $U_{LL} \leq 0$ hold, where subscripts denote partial derivatives. Moreover, utility varies with consumption of a reference group, c^r. In previous empirical contributions, various kinds of such groups have been looked at, such as neighbours, parents, people who are comparable with respect to age, education, etc., and individuals who have the same occupation or colleagues (Luttmer 2005, Senik 2009, Goerke and Pannenberg 2015, Clark et al. 2017). Given our setting, we focus on colleagues. Moreover, we consider the case of jealousy, as defined by Dupor and Liu (2003), such that $U_{c^r} < 0$ holds.[2] Accordingly, in our model the employment-reducing impact of monopsony power could be counteracted by the employment-enhancing effect of social comparisons. Finally, the parameter $\gamma \geq 0$ indicates the intensity with which employees compare their consumption with that of the reference group. If, for example, social preferences are of the additive, or subtractive, type (Clark and Oswald 1998), we could specify utility as $U = U(c - \gamma c^r, L)$. This specification is often distinguished from a multiplicative formulation (Carroll 2000), in which the ratio of own to reference consumption determines utility, such that $U(c/(c^r)^\gamma, L)$ holds. For both specifications, the signs of U_γ and U_{c^r}, as well of $U_{c\gamma}$ and U_{cc^r}, coincide. Nonetheless, the distinction is analytically helpful, because it allows us to vary the intensity, γ, of social comparisons exogenously, whereas reference consumption, c^r, is determined endogenously.

As in Persson (1995), Corneo (2002) or Goerke and Hillesheim (2013), among others, we assume that utility is separable in consumption and labour supply ($U_{cL} = U_{c^rL} = 0$). In our context, this enables us to unambiguously determine the impact of wages and social comparisons on labour supply. Moreover, the constraint implies that jealousy is equivalent to "keeping-up-with-the-Joneses" (KUJ) preferences, which are empirically validated in a series of studies, see, e.g., Clark and Oswald (1996), Blanchflower and Oswald (2004), Ferrer-i-Carbonell (2005), Luttmer (2005) or Senik (2009).

2 In Goerke and Neugart (2020), we extend our analysis to the case of admiration, i.e., if utility is an increasing function of reference consumption or income.

With additively separable preferences, KUJ implies $U_{cc^r} > 0$ (which we subsequently assume to be the case). That is, an increase in reference consumption enhances the marginal utility from own consumption.

Finally, we assume that the direct positive impact of a general increase in consumption dominates the indirect one via reference consumption. This holds both for the utility level, U, (Dupor and Liu 2003) and the marginal utility from consumption, U_c (Liu and Turnovsky 2005), implying that $U_c + U_{c^r} > 0 > U_{cc} + U_{cc^r}$ for $dc = dc^r > 0$. These restrictions ensure that the aggregate labour supply curve is upward sloping.

2.3. Labour supply

Individual labour supply: To reduce notational burden, we set the number of workers equal to one. The representative worker chooses working hours or labour supply to maximize utility subject to the budget constraint, $c = wL + \pi$. Because each worker regards profits π as fixed, the first-order condition for a utility maximum is

$$\frac{dU(c,\, c^r, \gamma,\, L)}{dL} = U_c(c,\, c^r, \gamma)w + U_L(L) = 0. \tag{2}$$

Given the separability assumption, marginal utility from consumption does not depend on working time directly, $U_c = U_c(c,\, c^r, \gamma)$, and the marginal disutility from working is independent of consumption levels, $U_L = U_L(L)$. Accordingly, individual labour supply is increasing in the wage, w, if the direct substitution effect dominates the income effect.

Aggregate labour supply: Next, we consider the consequences of a higher wage paid by the monopsonist. To determine the impact of an encompassing wage increase, we have to incorporate not only the effect on own consumption, $\partial c/\partial w = L$, but also the repercussion on the reference level, $\partial c^r/\partial w$, which will be positive if it is also financed by labour income. Moreover, the reference group will also adjust labour supply. Holding constant profits, the change in aggregate labour supply can be derived from

$$U_c(c(w,\, L),\, c^r(w,\, L), \gamma)w + U_L(L) = 0. \tag{3}$$

Totally differentiating the above expression for $c = wL + \pi$ and $c = c^r(w,\, L)$ yields the slope of the aggregate labour supply curve:

$$\frac{dL}{dw} = -\frac{\frac{d(U_c(c,\, c^r,\, \gamma)w + U_L(L))}{dw}}{\frac{d(U_c(c,\, c^r,\, \gamma)w + U_L(L))}{dL}} = -\frac{U_c + w(U_{cc}L + U_{cc^r}\frac{\partial c^r}{\partial w})}{w(U_{cc}w + U_{cc^r}\frac{\partial c^r}{\partial L}) + U_{LL}}. \tag{4}$$

Because workers are homogeneous, reference consumption equals own consumption ($c = c^r$). As there are no costs other than wages, and with the production function denoted by $f(L)$, profits can, hence, be written as $\pi = f(L) - wL$. It follows that consumption equals $c = c^r = wL + \pi = f(L)$. In addition, we have $\partial c^r/\partial w = \partial c/\partial w = 0$ and $\partial c^r/\partial L = \partial c/\partial L = f'(L)$, so that the slope of the aggregate labour supply curve in equation (4) becomes

$$L_w = -\frac{U_c}{w(U_{cc} + U_{cc^r})f'(L) + U_{LL}} > 0. \tag{5}$$

Hence, the aggregate labour supply curve reflects the substitution effect of a wage increase, but no income effect anymore. Moreover, a greater importance of reference consumption raises aggregate labour supply, $L = L(w,\gamma)$, as $U_{c\gamma}$ is positive.

2.4. Wage choice

The production function, $f(L)$, is characterized by standard properties, that is, $f(0) = 0$, $f'(0) \to \infty$ and $f' > 0$, $f'' < 0$ for $L > 0$. The monopsonist maximizes profits by setting the wage, taking into account the impact on aggregate labour supply (as described in equation (5)):

$$\pi = f(L(w,\gamma)) - wL(w,\gamma). \tag{6}$$

Using the definition of the (aggregate) wage elasticity of labour supply, $\epsilon(w,L(w,\gamma),\gamma) = L_w w/L > 0$, the first-order condition for a profit-maximizing choice can be expressed as

$$\begin{aligned}\pi_w &= f'(L)L_w - L - wL_w \\ &= \frac{L(w,\gamma)\epsilon(w,L(w,\gamma),\gamma)}{w}\left[f'(L) - w\frac{1+\epsilon(w,L(w,\gamma),\gamma)}{\epsilon(w,L(w,\gamma),\gamma)}\right] = 0.\end{aligned} \tag{7}$$

The monopsonist will set a wage equal to the marginal product of labour, corrected by a factor that depends on the labour supply elasticity. The second-order condition is

$$\pi_{ww} = \frac{L(w,\gamma)\epsilon(w,L(w,\gamma),\gamma)}{w} \cdot \left[f''(L)L_w - \frac{1+\epsilon(w,L(w,\gamma),\gamma)}{\epsilon(w,L(w,\gamma),\gamma)} + \frac{w}{(\epsilon(w,L(w,\gamma),\gamma))^2}\frac{d\epsilon(w,L(w,\gamma),\gamma)}{dw}\right] < 0. \tag{8}$$

Given an upward-sloping aggregate labour supply curve, the second-order derivative will surely be negative if the wage elasticity of labour supply, $\epsilon(w,L(w,\gamma),\gamma)$, weakly declines with the wage, w, or does not rise too strongly.

Once the wage has been determined as shown in equation (7), the employment level can be found by calculating labour supply, implicitly defined by equation (3).

3. Positive analysis

In this section, we investigate how wages and employment change with the intensity of social comparisons. We also consider two particular utility functions often used to resolve some of the ambiguities that remain for the general specification of preferences.

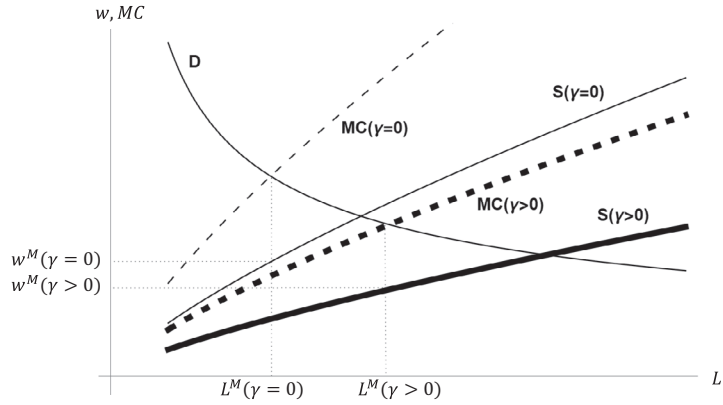

FIGURE 1 Wages and employment in monopsony with social comparisons
NOTES: S is labour supply and D labour demand. Bold lines for labour supply refer to the case of $\gamma > 0$ and thin lines refer to the case of $\gamma = 0$. Dashed lines correspond to the marginal costs (MC) of the monoposonist. The underlying calculations are based on a Cobb–Douglas production function and a utility function as in Ljungqvist and Uhlig (2000).

3.1. A general result

The wage and employment effects of a change in the strength of social comparisons are summarized in the following proposition.

PROPOSITION 1. *Sufficient conditions for a greater intensity of KUJ preferences:*

(1) *to increase labour supply and employment are* $\partial\epsilon/\partial\gamma \geq 0$ *and* $\partial\epsilon/\partial w \leq 0$. *and*
(2) *to decrease the wage are* $\partial\epsilon/\partial\gamma \leq 0$ *and* $\partial\epsilon/\partial L \leq 0$.

Proof. See appendix. ∎

We can explain the proposition graphically and thereby also provide intuition. Figure 1 contains the textbook illustration of a monopsony. The thin, upward-sloping lines ($\gamma = 0$) refer to the case without social comparisons. As is well known, the marginal cost curve for the monopsonist (thin dashed line) is situated above the labour supply curve it faces. The relative difference between the marginal product of labour and the wage is determined by the inverse of the labour supply elasticity to the firm, i.e., Pigou's measure of exploitation (Boal and Ransom 1997, p. 88)

Incorporating social comparisons ($\gamma > 0$) has no impact on labour demand, as it is independent of employees' incomes. Jealousy, however, shifts the labour supply curve downwards in the wage-employment space. The bold line illustrates this effect in figure 1. Moreover, social comparisons affect the monopsonist's marginal costs $w(1 + (1/\epsilon))$ via alterations in the labour supply elasticity. If the labour supply elasticity weakly rises with more intense social comparisons and with a lower wage, originating from the shift in the labour

supply curve, the marginal costs curve (bold dashed line) will surely move downwards in the wage–employment space. This set of sufficiency requirements, as stated in part (a) of proposition 1, also ensures that employment rises and is compatible with the illustration in figure 1. It depicts a rise in employment from $L^M(\gamma = 0)$ to $L^M(\gamma > 0)$ due to social comparisons, while wages slightly decline from $w^M(\gamma = 0)$ to $w^M(\gamma > 0)$.

Turning to wages, it is immediately obvious from inspection of figure 1 that they would fall if the marginal cost curve moved upwards because this would result in lower wages already for an unchanged supply curve $S(\gamma = 0)$. This negative wage impact would be strengthened by the downward shift of the supply curve to $S(\gamma > 0)$. An upward shift of the marginal cost curve will come about if the labour supply elasticity declines with more intense social comparisons. Because an upward shift, ceteris paribus, results in less employment, moreover, the labour supply elasticity must not increase with employment in order to ensure the negative wage effect.[3]

3.2. Specific utility functions

Proposition 1 formulates sufficiency conditions for a general specification of utility. It is of interest to ascertain for which kind of preferences these conditions hold. Furthermore, even if the requirements are not warranted it may nonetheless be possible to determine outcomes for less general specifications of preferences because counteracting effects can be compared. Due to reasons of tractability, the analysis of social preferences in various economic contexts mostly starts from the definition of a specific utility function (Grodner et al. 2011). There is no lack of candidates that we could look into. We will exemplify our general results with two utility functions, which have frequently been used. The first, additive or substractive formulation, assumes that absolute consumption differences matter and has been employed by Ljungqvist and Uhlig (2000), inter alia,

$$U(c,\, c^r,\, \gamma,\, L) = \frac{1}{1-\beta}\left(\frac{c-\gamma c^r}{1-\gamma}\right)^{1-\beta} - AL, \tag{9}$$

where A, $\beta > 0$ and $0 < \gamma < 1$. Our second example is a multiplicative specification, which focuses on relative consumption differences, suggested by Gali (1994):

$$U(c,\, c^r,\, \gamma,\, L) = \frac{1}{1-\beta}\left(\frac{c}{(c^r)^\gamma}\right)^{1-\beta} - AL, \tag{10}$$

3 The proof of proposition 1 relies on the derivatives of the labour supply curve and on variations in the labour supply elasticity. The specificities of the utility function and, in particular, the separability between consumption and working time, do not play a role. If, therefore, the characteristics of the aggregate labour supply curve remain unaffected, proposition 1 will also apply for non-separable preferences.

for which we assume $\beta > 1$ in order to ensure KUJ preferences. In addition, $\gamma(1-\beta) + \beta > 0$ guarantees that the labour supply curve to the monopsonist is upward-sloping and the existence of an equilibrium (Dupor and Liu 2003). Both formulations assume separability and also warrant the other assumption underlying our analysis, such as $U_c > 0 > U_L$, U_{c^r}, U_{cc} and $U_{LL} \leq 0$. Our choice is also motivated by an ongoing discussion on whether social comparisons should be modelled in relative or absolute terms (see, inter alia, Persson 1995, Clark and Oswald 1998, Choudhary and Levine 2006, Pérez-Asenjo 2011, Goerke and Hillesheim 2013, Mujcic and Frijters 2013). Thus, we consider an example for each case. We continue to assume symmetry ($c = c^r$) and specify a Cobb–Douglas production function, $f(L) = L^m$, $0 < m < 1$.

Example 1. *Absolute consumption differences*
Because individuals regard reference consumption as given, the first-order condition for a maximum of utility as defined in equation (9) *is*

$$\frac{dU(c,\, c^r,\, \gamma,\, L)}{dL} = \left(\frac{c-\gamma c^r}{1-\gamma}\right)^{-\beta} \frac{1}{1-\gamma} w - A = 0. \tag{11}$$

Given the assumptions stated above ($c = wL + \pi = L^m$), aggregate labour supply is defined by

$$L^{-m\beta} \frac{1}{1-\gamma} w - A = 0. \tag{12}$$

With $dL/dw = L/(m\beta w) > 0$, the labour supply elasticity to the monopsonist becomes

$$\epsilon = \frac{dL}{dw}\frac{w}{L} = \frac{1}{m\beta}. \tag{13}$$

The aggregate labour supply curve shifts downwards with more intense social comparisons in the wage–employment space ($L_\gamma > 0$). As $\epsilon_\gamma = \epsilon_L = \epsilon_w = 0$, employment increases, while wages decline (see proposition 1). Therefore, social comparisons counteract the employment effects of a monopsony and aggravate the wage consequences.

Example 2. *Relative consumption differences*
Differentiation of utility as expressed in (10) yields the first-order condition of the worker's maximization problem as

$$\frac{dU(c,\, c^r,\, \gamma,\, L)}{dL} = \frac{w}{c^\beta} - A(c^r)^{\gamma(1-\beta)} = 0. \tag{14}$$

Aggregate labour supply to the monopsonist (for $c = c^r = L^m$) follows from

$$z \equiv w - AL^{m(\gamma(1-\beta)+\beta)} = 0. \tag{15}$$

Inserting $dL/dw > 0$ into the labour supply elasticity to the firm gives

$$\epsilon = \frac{dL/L}{dw/w} = \frac{1}{m(\gamma(1-\beta)+\beta)}. \tag{16}$$

Proposition 1 is based on the assumption that labour supply shifts outwards with γ. This will be the case if $z_\gamma > 0$, that is $L > 1$. As $\beta > 1$ and $\gamma(1-\beta) + \beta > 0$, it holds that $\partial\epsilon/\partial\gamma > 0$ and employment unambiguously increases in the intensity of social comparisons. The wage is determined by $mL^{m-1} = w(1+\epsilon)/\epsilon$. Using this condition and equality (15), we can show that wages rise with the strength of social comparisons, γ, if $m \to 1$, i.e., the production function becomes (almost) linear.[4] Consequently, the labour demand curve is relatively flat in the wage–employment space. Therefore, a given fall in marginal costs results in a relatively large expansion of employment. Accordingly, it becomes more likely that the wage-enhancing effect of higher employment dominates the wage-reducing impact of the shift of labour supply. If, therefore, preferences depend on the ratio of own to reference consumption, more pronounced social comparisons raise both employment and wages. Hence, our second example clarifies that social comparisons counteract the negative employment effects of monopsonistic market power and that this may also be true for wages.

4. Normative analysis

In this section, we move beyond the confines of the positive analysis in which we have compared two market outcomes. For the normative investigation, we assume that a welfarist social planner maximizes utility of the representative individual. Thus, given our assumptions of homogeneous workers and the redirection of the monopsonist's profits to them, the social planner is solely interested in efficiency aspects and her objective is given by $U = U(f(L),f(L),\gamma,L)$. In section 4.1, we derive the condition that ensures that the market equilibrium in the absence of any monopsony power and consumption externalities constitutes the social planner's preferred outcome. Subsequently, in sections 4.2 and 4.3, we demonstrate how restrictions either on wages, or alternatively taxes or subsidies, can be employed to generate the social planner's desired outcome as market equilibrium. Finally, in section 4.4, we present empirical evidence, which can help to gauge which policy instruments may be appropriate.

4.1. Optimality versus undistorted market outcome

Our setting features two distortions: (i) market power and (ii) consumption externalities due to social comparisons. Taking into account both distortions, a welfarist social planner will balance the gains and costs of expanding employment. Denoting the marginal utility from consumption in the absence (presence) of social comparisons by $U_c(\gamma = 0)$ ($U_c(\gamma \neq 0)$), we have the following proposition.

4 A proof is contained in Goerke and Neugart (2020).

Proposition 2. *A welfarist social planner confronted with a monopsony and KUJ preferences will only set an employment level that equals the one prevailing in a competitive market in the absence of social comparisons if* $(U_c(\gamma = 0) - U_c(\gamma \neq 0))/U_{c^r} = 1$.

Proof. See appendix. ∎

The intuition is as follows. The social marginal utility from consumption in the presence of social comparisons differs from the respective (individual and social) marginal utility in the absence of such effects for three reasons. First, employees work more hours. This raises consumption and, ceteris paribus, decreases the marginal utility from consumption, given the strict concavity of U. Second, as $U_{cc^r} > 0$, the marginal utility from own consumption is affected by the reference level of consumption and will be higher in the presence of social comparisons. Third, the welfarist social planner takes into account that an expansion of labour supply alters not only consumption of the individual under consideration but also the reference level. This, ceteris paribus, lowers the gain in utility from working and consuming more. If the sum of all effects is positive and, therefore, the gain in utility from additional consumption is greater in the presence of social comparisons than in an undistorted market without such comparison effects, optimal labour supply and employment will be higher.[5]

Considering our particular utility functions, we may note that, for the difference specification of utility in equation (9), we have $U_c(\gamma \neq 0) = (c^{-\beta})/(1-\gamma)$ and $U_{c^r} = -\gamma(c^{-\beta})/(1-\gamma)$ given $c = c^r = f(L)$. These derivatives imply that $U_c(\gamma = 0) - U_c(\gamma \neq 0) = U_{c^r}$ holds. For the formulation of preferences (10) proposed by Gali (1994), we have $U_c(\gamma \neq 0) = c^{-\beta+\gamma(\beta-1)}$ and $U_{c^r} = -\gamma c^{-\beta+\gamma(\beta-1)}$. Accordingly, the ratio defined in proposition 2 is given by

$$\frac{U_c(\gamma = 0) - U_c(\gamma \neq 0)}{U_{c^r}} = \frac{c^{\gamma(\beta-1)} - 1}{\gamma c^{\gamma(\beta-1)}}. \tag{17}$$

This ratio will be unity only for particular values of output and consumption but will not generally attain this value.

The two starting points of our investigations are the predictions that, first, employment in monopsony declines below the level resulting in a world without any distortions, while, second, KUJ preferences induce excessive

5 The above line of reasoning relies on the feature that marginal disutility from working, U_L, is independent of social comparisons. This will clearly be the case if utility is separable in consumption and working time ($U_{cL} = U_{c^r L} = 0$). If this assumption is relaxed, the ratio defined in proposition 2 would have to be complemented by the ratio of marginal disutility from work, U_L, in the presence and absence of social comparisons. Given this modification, the findings stated above would be unaffected by a more general specification of preferences.

employment. Proposition 2 clarifies that, even if the two effects just balance out and the outcome results that would prevail in a competitive setting without social comparisons, this employment level will be first best only for particular utility functions. The reason is that a welfarist social planner, on the one hand, incorporates that individual preferences feature social comparisons. On the other hand, she takes the externality of such preferences into account. The two effects balance out for certain specifications of utility. A straightforward policy implication is that an employment level of a competitive, undistorted market cannot, in general, guide policymaking.

4.2. Wage regulation

Many analyses of monopsonies have considered settings in which a social planner or government does not have the ability to determine first-best employment directly. Instead, she can establish the price of labour, while the firm continues to choose the number of employees (Boal and Ransom 1997, Manning 2003). In accordance with this approach, we now assume that the social planner can fix only the wage. This may be a minimum wage or a wage cap.

To further aid the exposition, we focus on the ratio of the marginal utility from reference consumption to the marginal utility from own consumption, $U_{c^r}/U_c(\gamma \neq 0)$. Given our specifications in equations (9) and (10), and also more general descriptions of preferences such as $U = U(c - \gamma c^r, L)$ and $U = U(c/(c^r)^\gamma, L)$, the negative of this ratio is given by $-\gamma = U_{c^r}/U_c(\gamma \neq 0)$.[6] Employing this parameter, our main insight can be stated as follows.

Proposition 3. *A welfarist social planner who can affect welfare by fixing the wage will set it at higher level than the monopsonist if*

$$1 - \gamma > \frac{\epsilon}{1+\epsilon}. \tag{18}$$

Proof. See appendix. ∎

The intuition is as follows. Employment in monopsony in the absence of other distortions is too low because marginal costs exceed the wage by the factor $(1 + \epsilon)/\epsilon$. The labour supply effect of not taking into account social comparisons is due to the increase in the marginal rate of substitution from $-U_L/U_c(\gamma = 0)$ to $-U_L/(U_c(\gamma \neq 0) + U_{c^r})$. Using $U_{c^r}/U_c(\gamma \neq 0) = -\gamma$, the marginal rate of substitution can be expressed as $-U_L/(U_c(\gamma \neq 0)(1 - \gamma))$. Monopsony power will exactly neutralize consumption externalities if the labour demand impact of higher costs, $(1 + \epsilon)/\epsilon$, equals the labour supply effect of ignoring

6 Note that the parameter γ, $\gamma \equiv -U_{c^r}/U_c(\gamma \neq 0)$, measuring the strength of social comparisons, is equivalent to the (negative of the) degree of positionality as used by Aronsson and Johansson-Stenman in a series of papers (see, e.g., Aronsson and Johansson-Stenman 2008, 2010), given their specification of utility as, $U = U(c, L, c - c^r)$.

social comparisons, measured by $1/(1-\gamma)$. If the cost impact is higher, i.e., if $(1+\epsilon)/\epsilon > 1/(1-\gamma)$, the social planner will want to expand employment. In a monopsony this is feasible by raising the wage because a (small) general wage increase actually lowers the marginal cost of employment.

In a "standard" monopsony, a minimum wage slightly above the amount paid by the monopsonist will always be beneficial. Our result shows that this will not generally be the case if workers exhibit social preferences. More precisely, a wage increase will enhance employment and raise welfare only if the extent of monopsony power outweighs the strength of social comparisons.[7] Therefore, proposition 3 establishes an easily observable and widely applicable condition that helps to ascertain whether a minimum wage or a wage cap enhances welfare. Section 4.4 collects according empirical evidence and provides a tentative assessment of appropriate policy instruments.

4.3. Taxes and subsidies

While a restriction on the level of wages is one feasible instrument to affect employment and to increase welfare, there is ample evidence that minimum wages are not always paid. Moreover, both the monopsonist and individual employees have incentives not to adhere to wage regulations.[8] Hence, a social planner may want to employ other means to enhance the society's payoff, such as taxes or subsidies.

Taxes that internalize the externalities due to social comparisons have been analyzed comprehensively, generally assuming competitive labour markets (see, inter alia, Duesenberry 1949; Boskin and Sheshinski 1978; Persson 1995; Ireland 1998; Corneo 2002; Gómez 2008; Micheletto 2011; Dodds 2012; Aronsson and Johansson-Stenman 2010, 2013, 2018; Eckerstorfer and Wendner 2013; Eckerstorfer 2014; Wendner 2014). Moreover, some contributions investigate the efficiency impact of subsidies or taxes in monopsonistic labour markets. Manning (2004) ascertains the effects of a progressive income tax system in a general equilibrium search and matching framework. Cahuc and Laroque (2014) analyze taxation in a monopsonistic labour market that hosts heterogeneous workers, and Strobl and Walsh (2007) allow firms to choose wages and hours of work when examining the effects of subsidies. However, the combined impact of monopsony and consumption externalities due to social comparisons on optimal tax policy has not been considered.

To analyze this issue, we assume that the firm pays a payroll tax, $t > 0$, or receives an according subsidy, $t < 0$. Thus profits can be expressed as

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7 This condition is independent of the separability feature imposed on preferences above ($U_{cL} = U_{c^r L} = 0$) because the derivation of the proposition does not require second-order or cross derivatives.

8 See the evidence surveyed in Danziger (2010), who then builds a model to show that imperfectly enforced minimum wages in a competitive labour market will induce small firms to become monopsonists.

$$\pi = f(L(w,\gamma)) - (1+t)wL(w,\gamma). \tag{19}$$

Because considerations of individuals are unaffected, the features of the labour supply curve are the same as outlined in section 2.2. Any tax receipts are returned in a lump-sum manner. Similarly, in case of t being a subsidy, a profit tax or another non-distortionary means of raising revenue is assumed to balance the government's budget. Consequently, the only impact of the tax is the change in the firm's wage choice.

Maximization of profits as defined in equation (19), possibly amended to incorporate profit taxation or lump-sum payments, yields as first-order condition

$$f'(L^{M,t}) - w(1+t)\frac{1+\epsilon}{\epsilon} = 0, \tag{20}$$

where $L^{M,t}$ denotes employment in the presence of a payroll tax or subsidy. Combining equation (20) with the outcome of the individual optimization (cf. equation (2)), we obtain

$$f'(L^{M,t}) = -(1+t)\frac{1+\epsilon}{\epsilon}\frac{U_L(L^{M,t})}{U_c(\gamma\neq 0)}. \tag{21}$$

The socially optimal outcome is defined by the derivative (A4) in the appendix, where the proof of proposition 2 is found. Evaluating this derivative at the market outcome, $L^{M,t}$, and using our notation of $U_{c^r}/U_c(\gamma\neq 0) = -\gamma$, we obtain

$$\begin{aligned} \tfrac{dW}{dL}_{\gamma\neq 0, L=L^{M,t}} &= -(U_c(\gamma\neq 0) + U_{c^r})(1+t)\frac{1+\epsilon}{\epsilon}\frac{U_L(L^{M,t})}{U_c(\gamma\neq 0)} + U_L(L^{M,t}) \\ &= U_L(L^{M,t})\left[1-(1-\gamma)(1+t)\frac{1+\epsilon}{\epsilon}\right]. \end{aligned} \tag{22}$$

The expression in square brackets will be zero, such that welfare is maximized if

$$t^{opt} = \frac{1}{1-\gamma}\left[\frac{\epsilon}{1+\epsilon} - (1-\gamma)\right]. \tag{23}$$

The optimal tax or subsidy rate will be zero if the two distortions just balance out and the wage set by the monopsonist induces the optimal employment level. If $1-\gamma < \epsilon/(1+\epsilon)$, the impact of consumption externalities dominates the consequences of market power and t^{opt} will be positive. In a competitive labour market ($\epsilon \to \infty$), the optimal tax equals $t^{opt}(\epsilon\to\infty) = \gamma/(1-\gamma) = -U_{c^r}/(U_c(\gamma\neq 0) + U_{c^r}) > 0$. If the effects of social comparisons are relatively weak, and $1-\gamma < \epsilon/(1+\epsilon)$, the monopsonist will be subsidized. In the limiting case of preferences exhibiting no social comparisons, $t^{opt}(\gamma = 0) = -1/(1+\epsilon) < 0$.

Alternatively, an income tax, τ, or consumption tax, s, could be imposed on workers, such that their budget constraint, in the absence of any transfer or lump-sum tax, reads $wL(1-\tau) + \pi - c = 0$ or $wL + \pi - c(1+s) = 0$. In this case, the labour supply elasticity also depends on the tax ($\tau, s > 0$) or subsidy ($\tau, s < 0$). Proceeding in the same manner as in the derivation of t^{opt}, the

optimal income tax or subsidy rate, setting the consumption tax rate to zero, is (implicitly) defined by

$$\tau^{opt} = \frac{1+\epsilon(\tau^{opt})}{\epsilon(\tau^{opt})}\left[\frac{\epsilon(\tau^{opt})}{1+\epsilon(\tau^{opt})} - (1-\gamma)\right], \tag{24}$$

while $s^{opt} = t^{opt}$. The optimal income tax rate, τ^{opt}, will be positive (negative) if $1 - \gamma < (>)\epsilon/(1 + \epsilon)$. In the absence of labour market imperfections, the optimal tax rate equals $\tau^{opt}(\epsilon \to \infty) = \gamma = -U_{c^r}/U_c(\gamma \neq 0) > 0$.[9]

We can summarize the considerations of this section in the proposition below.

Proposition 4. *Assume that a social planner can affect welfare by setting tax or subsidy rates. A welfarist social planner will set the tax/subsidy rate on labour costs or on consumption expenditure in accordance with equation* (23) *and the tax/subsidy rate on wage income in line with the expression in* (24).

Proof. Follows from the above. ∎

Accordingly, in our simple setting either a minimum wage or a subsidy can raise employment if it is below the optimal level. Alternatively, a tax or a wage cap are both equally suitable as policy instruments if the effects of social comparisons dominate the monopsony distortion and employment needs to be reduced to enhance welfare.

4.4. An empirical assessment

Our investigation reveals that the optimal use of wage regulation and fiscal incentives depends crucially on the magnitude of two measures. These are the ratio, γ, of the marginal utility from reference consumption to the marginal utility from own consumption on the one hand and the labour supply elasticity to the firm, ϵ, on the other hand.

Estimates of the strength of income comparisons have, inter alia, been obtained from data on consumption choices and subjective well-being. Maurer and Meier (2008) and Alvarez-Cuadrado et al. (2016) estimate values of γ between 0.11 and 0.44 and of around 0.3 for US and Spanish data, respectively. Most findings for the parameter γ, however, result from discrete choice experiments, in which individuals compare two hypothetical situations. In one of them, own income is higher than in the other situation, while the reverse is true with respect to relative income. Such experiments have been conducted for various countries, groups of individuals and sample sizes. Most show a substantial heterogeneity in the prevalence of social comparisons. Estimates of the average magnitude of γ range from about 0.25 (Solnick and Hemenway

9 See, e.g., Persson (1995), Ljungqvist and Uhlig (2000), Dupor and Liu (2003), Aronsson and Johansson-Stenman (2010, 2013, 2018). From the results obtained by Liu and Turnovsky (2005) and Alvarez-Cuadrado (2007), we can derive comparable expressions, taking into account that they incorporate various taxes.

1998, 2005 [United States]; Carlsson, Nam, et al. 2007 [Vietnam]; Shigeoka and Yamada 2019 [Japan]) to values of between 0.4 and 0.6 (Alpizar et al. 2005 [Costa Rica]; Johansson-Stenman et al. 2002 [Sweden]; Carlsson, Johansson-Stensman, et al. 2007 [Sweden]; Yamada and Sato 2013 [Japan]; Clark et al. 2017 [Japan]).[10] Similar magnitudes are obtained when comparisons refer to consumption goods, such as cars or housing (Alpizar et al. 2005; Carlsson, Johansson-Stensman, et al. 2007). In sum, the conclusion by Wendner and Goulder (2008, p. 1978) referring to earlier studies, according to which $\gamma \in [0.2,0.4]$ is "a range for the status parameter that is consistent with the existing survey experimental evidence," may be rather conservative.

Turning to monopsony power, at least for the United States there is a prominent if not dominating view that "[m]onopsony prevails in a large number of ... labor markets" (Marinescu and Posner 2020). This interpretation is often based on indicators of labour market concentration, such as the Herfindahl–Hirschman index (Azar et al. 2019), and estimates of the labour supply elasticity to the firm. The latter vary widely across markets and countries (Manning 2011). The meta-analysis by Sokolova and Sorensen (2018) reports a mean elasticity of 7 and a median of 1.43 for European countries. The respective values for other advanced countries, including the United States and Canada, are somewhat lower. In addition, there is evidence for the United States that the labour supply elasticity has decreased substantially from 1.2 to about 1 on average over the last two decades (Webber 2021). For online labour markets, labour supply elasticities, ϵ, as low as 0.1 have been computed (c.f. Dube et al. 2020).

Combining information on the labour supply elasticity to a firm and the strength of social comparisons allows us to determine the nature of optimal wage regulation and welfare-enhancing fiscal incentives. Assume, initially, a low impact of reference group income on the marginal utility from consumption ($\gamma = 0.2$). In such a case, a minimum wage or subsidies enhance welfare if the labour supply elasticity, ϵ, is less than 4. The extant literature suggests that this is usually the case. For an intermediate value for the strength of social comparisons, namely $\gamma = 0.4$, employment will be excessive if the labour supply elasticity is greater than 1.5. The meta-analysis by Sokolova and Sorensen (2018) indicates that about 50% of all estimated values exceed this threshold. If, finally, a high comparison intensity is presumed, $\gamma = 0.6$, employment will be excessive if the labour supply elasticity is greater than $\frac{2}{3}$. This is likely to be the case in most labour markets.

Assuming $\epsilon = 1.5$ and $\gamma = 0.5$, the optimal tax rate on labour costs as defined in equation (23) would be $t^{opt}(\epsilon = 1.5,\gamma = 0.5) = 0.2$, setting the other rates to zero ($s^{opt} = \tau^{opt} = 0$). The optimal income and consumption tax rates would be $\tau^{opt}(\epsilon = 1.5, \gamma = 0.5) = 0.16\bar{6}$ and $s^{opt}(\epsilon = 1.5,\gamma = 0.5) = 0.2$,

10 Shigeoka and Yamada (2019) estimate a somewhat smaller value for γ for the United Kingdom, but observe no envy or jealousy for respondents from the United States.

respectively. Raising the measure of the intensity of social comparisons to $\gamma = 0.6$, increases optimal tax rates to $t^{opt}(\epsilon = 1.5,\ \gamma = 0.6) = 0.5$, $\tau^{opt}(\epsilon = 1.5, \gamma = 0.6) = 0.33\bar{3}$ and $s^{opt}(\epsilon = 1.5,\ \gamma = 0.6) = 0.5$. Because real-world fiscal systems consist of a combination of many more tax and contribution rates than we consider, the optimal rates as defined in equations (23) and (24) are more indicative of the total marginal tax burden than comparable to actual rates.

These illustrative computations clarify that the question whether social comparisons mitigate monopsony power, or even dominate its effects, is not only of academic interest but also of great empirical relevance. Our summary indicates that wage restraints or taxation of income, labour costs and consumption may be a relevant policy option even in many monopsonistic labour markets.

5. Paternalistic social planner

Section 4 assumes that the social planner maximizes the utility of the representative worker. However, it has been argued that individual preferences that incorporate jealousy may be inappropriate as starting point of a normative investigation. Accordingly, the analysis of optimal taxation in competitive settings has occasionally been based on the assumption of a paternalistic or non-welfarist social planner (see, for example, Aronsson and Johansson-Stenman 2018, Dodds 2012, Eckerstorfer and Wendner 2013, Micheletto 2011). In this case, the social planner maximizes the payoff of the representative consumer, ignoring repercussions of her choice via changes in utility due to social comparisons. This is tantamount to maximizing utility as specified in equation (1) for an exogenously given reference consumption.[11]

While it is clearly debatable if jealousy harms another individual, if this individual has no such preferences and, thus, if jealousy has to be disregarded, it is nonetheless insightful to investigate in how far propositions 3 and 4 depend on the specification of the normative objective. Therefore, we subsequently assume that the social planner is paternalistic (or non-welfarist). We denote her objective by W^p and indicate the modification by expressing utility as function of an exogenous level, $\bar{c^r}$, of reference consumption, $W^p = U(c, \bar{c^r}, L)$. Workers are homogeneous and obtain the monopsonist's profits as (exogenous) income. Consequently, we continue to focus on the efficiency properties of the allocation. Maximization of W^p yields

$$\frac{dW^p}{dL} = U_c(f(L), \bar{c^r})f'(L) + U_L(L) = 0. \tag{25}$$

11 Hence, we adopt the approach chosen, for example, by Aronsson and Johansson-Stenman (2018) and Aronsson et al. (2019). The former also provide a thorough discussion of the merits of such an approach. If we instead assume that the objective depends on consumption, c, and working time, L (see Dodds 2012, inter alia) only, the social planner completely ignores relative preferences.

We denote the ratio of the marginal utility from own consumption when repercussions via social comparisons are ignored, $U_c(f(L), \bar{c}^r)$, to the marginal utility in their presence, $U_c(f(L),f(L),\gamma)$, by $\mu(L,\gamma)$, $1 > \mu(L,\gamma) = U_c(f(L), \bar{c}^r)/U_c(f(L), f(L), \gamma) > 0$. This ratio is an (inverse) indicator of the strength of the consumption externality resulting from social comparisons. This is because an increase in the strength of social comparisons and in reference consumption raises the marginal utility from own consumption, $U_c(f(L),f(L),\gamma)$, and reduces $\mu(L,\gamma)$. Employing the ratio μ, we can establish the proposition below.

Proposition 5. *A paternalistic social planner who can affect welfare solely:*

(1) *by fixing the wage will set it at a lower level than the monopsonist if* $1/\mu(L,\gamma) > (1 + \epsilon)/\epsilon$,
(2) *by taxing or subsidizing labour costs* (t) *or consumption expenditure* (s) *will set the tax/subsidy rate equal to* $t^{opt,W} = s^{opt,W} = 1/\mu(L,\gamma)[\epsilon(s^{opt,W})/(1 + \epsilon(s^{opt,W})) - \mu(L,\gamma)]$ *or*
(3) *by taxing or subsidizing wage income* (τ) *will set the tax/subsidy rate equal to* $\tau^{opt,W} = 1 - \mu(L,\gamma)(1 + \epsilon(\tau^{opt,W}))/\epsilon(\tau^{opt,W})$.

Proof. See appendix. ∎

The gain from more employment is given by the increase in consumption for the representative worker. The respective gain for the worker is larger than the social planner's. This is the case because the worker also fares better in terms of social comparisons. Since the utility loss from working more is unaffected by the existence of social preferences, the individual incentives to work more are greater than the socially optimal ones. Consequently, labour supply is, ceteris paribus, excessive not only for a welfarist but also for a paternalistic social planner. However, as the labour market features a monopsonistic employer, employment is, ceteris paribus, too low. Proposition 5, part (a), indicates that if the supply side distortion, as captured by $1/\mu(L,\gamma)$, exceeds the demand side distortion, $(1 + \epsilon)/\epsilon$, wages need to be lowered because employment is excessive. In line with this, labour costs, consumption or income will have to be taxed if $\mu(L,\gamma) < \epsilon/(1 + \epsilon)$.[12]

12 If the social planner completely ignores relative preferences, W^p depends on only consumption, c, and working time, L, only, and she sets an employment level that equals the one that results in a competitive market in the absence of social comparisons. Our previous results are not affected qualitatively by whether reference consumption is held constant or omitted, since they depend on the magnitude of the labour supply elasticity, ϵ, relative to an indicator of the consumption externality, given by $\tilde{\mu}(L,\gamma) = U_c(f(L))/U_c(f(L), f(L), \gamma)$. Note that if utility were not separable, U_{cL}, $U_{c^rL} \neq 0$, the ratios $\mu(L,\gamma)$ or $\tilde{\mu}(L,\gamma)$ would have to be redefined to also include the ratio of the marginal utility from work in the presence of social comparisons and when they are ignored. Given this modification, results would also be unaffected.

Turning to the specific utility functions in equations (9) and (10), the marginal utility from own consumption, holding constant the reference level or, alternatively, setting $\gamma = 0$, equals $U_c(f(L), \bar{c^r}) = c^{-\beta}$ for $c = f(L)$. If the repercussions of a marginal variation in consumption via reference consumption are taken into account, marginal utility for specification (9) is given by $U_c(f(L), f(L), \gamma) = (c^{-\beta})/(1-\gamma)$. Consequently, we obtain $\mu(L, \gamma) = U_c(f(L), \bar{c^r})/U_c(f(L), f(L), \gamma) = 1-\gamma$. Comparing proposition 5 with propositions 3 and 4, we can observe that for this specification of preferences, the normative implications of the joint existence of monopsony power and social comparisons are independent of social planner's preferences. This is the case because the extent of the consumption externality, which is relevant for the welfarist objective, is the same as the extent of the deviation from the undistorted outcome, which determines a paternalist's behaviour. Although the objectives of a welfarist and a paternalist social planner therefore differ, their choice of wages or taxes/subsidies will be the same. This assertion holds not only for the preferences defined in equation (9) but also more generally for all difference specifications of utility, $U = U(c - \gamma c^r, L)$.[13]

For the formulation of preferences in equation (10) proposed by Gali (1994), we have $U_c(f(L), f(L), \gamma)) = c^{-\beta+\gamma(\beta-1)}$, implying that $\mu(L, \gamma) = c^{\gamma(\beta-1)} = f(L)^{\gamma(\beta-1)}$. Therefore, the social planner's choice of wages or taxes does not depend only on the strength of social comparisons. This is because the extent of the consumption distortion resulting from social comparisons, which the paternalist social planner needs to internalize, varies with the consumption level. Consequently, for the multiplicative specification of preferences defined in equation (10) the behaviour of a paternalist social planner will deviate from that of her welfarist counterpart.

We can conclude that the social planner's basic trade-off is independent of her objective. The optimal response in terms of wage regulation or taxes/subsidies depends on the strength of the monoposony distortion relative to the consumption externality.

6. Conclusions

We derive fairly general conditions on the labour supply elasticity to the firm that allow us to sign the wage and employment effects of social comparisons in monopsony. Two specific utility functions exemplify the more general conditions. Assuming that workers compare their consumption in absolute terms and using a utility function suggested by Ljungqvist and Uhlig (2000), we find that employment increases in the prevalence of social comparisons, while

13 A similar result is obtained by Aronsson and Johansson-Stenman (2018), who look at optimal taxation and show (cf. proposition 1 and corollary 1) that the marginal tax rate chosen by a welfarist and a paternalist social planner are the same if individuals are homogeneous and preferences are additive.

wages decline. Using a utility function as in Gali (1994), we derive for a case of relative comparisons that the employment and the wage effects of more intensive social comparisons will both be positive if the production function is not too concave. Interestingly, a welfarist social planner will not necessarily choose an employment level equal to the one in a competitive market without social comparisons. She will do so only for rather special properties on the marginal utility of a worker's own and reference consumption.

Our findings bear novel and important policy implications. A social planner who tries to achieve optimal employment by setting wages would not always employ a minimum wage. If the labour supply elasticity to the firm is sufficiently large, she would rather cap wages. Such a wage restriction will prevent the monopsonist from choosing employment in excess of the optimal level. This will be the case if the externality due to social comparisons is strong enough. Analogously, we find conditions for an optimal use of either subsidies, or alternatively, taxes in a monopsony with social comparisons. Given the evidence that the labour supply elasticity to a monopsonist varies with the business cycle (Hirsch et al. 2018), this implies that optimal policy may alternate between minimum and maximum wages or positive and negative tax rates, respectively. A qualitatively similar conclusion emerges if supply elasticities vary across labour markets, providing an additional argument for differentiations of wage regulations. Such challenges to determining optimal policies would be augmented if also the intensity of social comparisons varied with the economic situation or regionally. Importantly, these conclusions are qualitatively independent of the exact specification of the welfare objective. This clarifies that policy conclusions are rather robust with respect to society's preferred outcome because the nature of the distortions is unaffected.

In our set-up, focusing on the efficiency properties of the interaction of market power and consumption externalities, one instrument is sufficient to achieve the social planner's objective. Therefore, in section 4, we consider wages and taxes separately. If the social planner pursued a distributional objective in addition, for example, because individuals were heterogeneous ex post or firms were not owned by workers, she would require more than one instrument to achieve her objective. In particular, non-linear taxes could then help to realize the distributional aims. In addition, we assume that the monopsonist pays uniform wages. If, however, the monopsonist could undertake price discrimination, the monopsonistic employment inefficiency would be mitigated. In case of perfect wage discrimination, only the distortion resulting from consumption externalities would remain. Given incomplete wage discrimination, it can be conjectured that the monopsony distortion becomes less relevant, relative to the consequences of social comparisons, and that taxes and wage caps become more important as policy instruments. The investigation of policy implications in such more comprehensive set-ups, in which also distributional questions become an issue, is clearly beyond the scope of the present paper. It represents a promising topic for future inquiry.

Appendix

Appendix A1: Proof of proposition 1

The derivative of the aggregate labour supply curve $L(w,\gamma)$ with respect to γ, taking into account wage repercussions, is

$$\frac{dL(w,\gamma)}{d\gamma} = L_\gamma + L_w \frac{dw}{d\gamma} = L_\gamma - L_w \frac{\pi_{w\gamma}}{\pi_{ww}}. \tag{A1}$$

Substituting for the wage effect, we obtain

$$\begin{aligned}\frac{dL(w,\gamma)}{d\gamma} &= L_\gamma - L_w \frac{f''(L)L_\gamma + \frac{w}{\epsilon^2}\left(\frac{\partial \epsilon}{\partial \gamma} + \frac{\partial \epsilon}{\partial L}L_\gamma\right)}{f''(L)L_w - \frac{1+\epsilon}{\epsilon} + \frac{w}{\epsilon^2}\left(\frac{\partial \epsilon}{\partial w} + \frac{\partial \epsilon}{\partial L}L_w\right)} \\ &= \frac{-L_\gamma \frac{1+\epsilon}{\epsilon} + \frac{w}{\epsilon^2}\left(L_\gamma \frac{\partial \epsilon}{\partial w} - L_w \frac{\partial \epsilon}{\partial \gamma}\right)}{\pi_{ww}}.\end{aligned} \tag{A2}$$

Because the denominator is negative according to the second-order condition (8), the employment effect is unambiguously positive for $\partial\epsilon/\partial w \leq 0$ and $\partial\epsilon/\partial\gamma \geq 0$. This proves part (a).

The derivative of the first-order condition of the firm (7) with respect to γ is

$$\pi_{w\gamma} = \frac{L(w,\gamma)\epsilon}{w}\left[f''(L)L_\gamma + \frac{w}{\epsilon^2}\left(\frac{\partial \epsilon}{\partial \gamma} + \frac{\partial \epsilon}{\partial L}L_\gamma\right)\right]. \tag{A3}$$

Because labour supply rises with the intensity of social comparisons ($L_\gamma > 0$), the term in square brackets will surely be negative if the wage elasticity of labour supply rises neither with the strength of social comparisons nor with employment. This proves part (b).

Appendix A2: Proof of proposition 2

Maximizing $W = U(f(L),f(L),\gamma,L)$ with respect to L yields as first-order condition in the presence of social comparisons ($\gamma \neq 0$)

$$\frac{dW}{dL}_{\gamma\neq 0} = (U_c(\gamma\neq 0) + U_{c^r})f'(L) + U_L(L) = 0. \tag{A4}$$

Denote the resulting employment level by $L^{opt,\gamma\neq 0}$. The second-order condition holds, because $f''(L)$, U_{cc}, $U_{c^r c^r} < 0$, and $U_{LL} \leq 0$.

Since there are no distributional effects of the market outcome on welfare in our setting, employment resulting in a competitive market without market power and externalities is equivalent to the social planner's choice for $\gamma = 0$. This choice, $L^{opt,\gamma=0}$, is determined by

$$\frac{dW}{dL}_{\gamma=0} = U_c(\gamma = 0)f'(L) + U_L(L) = 0. \tag{A5}$$

Because $U_L(L)$ and $f'(L)$ are the same for a given employment level, the social planner's choice in the presence of social comparisons and the outcome in a competitive market in their absence will coincide ($L^{opt,\gamma\neq 0} = L^{opt,\gamma=0}$), if $U_c(\gamma\neq 0) + U_{c^r} = U_c(\gamma = 0)$. If $U_c(\gamma\neq 0) + U_{c^r} > U_c(\gamma = 0)$ holds, $L^{opt,\gamma\neq 0}$ will exceed $L^{opt,\gamma=0}$ because W is strictly concave in L.

Appendix 3: Proof of proposition 3

Employment in a monopsony, denoted by L^M, is implicitly defined by equation (7). Moreover, labour supply is given by equation (2). Combining both equations yields

$$f'(L^M)\frac{\epsilon}{1+\epsilon} = -\frac{U_L(L^M)}{U_c(\gamma\neq 0)}. \tag{A6}$$

Evaluating the social planner's choice as defined in (A4) at $L = L^M$ yields

$$\begin{aligned}\tfrac{dW}{dL}_{\gamma\neq 0, L=L^M} &= (U_c(\gamma\neq 0) + U_{c^r})f'(L^M) + U_L(L^M)\\ &= -\frac{U_L(L^M)}{U_c(\gamma\neq 0)}[U_c(\gamma\neq 0) + U_{c^r}]\frac{1+\epsilon}{\epsilon} + U_L(L^M)\\ &= U_L(L^M)\left[-\frac{1+\epsilon}{\epsilon}\left(1+\frac{U_{c^r}}{U_c(\gamma\neq 0)}\right)+1\right].\end{aligned} \tag{A7}$$

Using $U_{c^r}/U_c(\gamma\neq 0) = -\gamma$, the social planner's objective will, hence, be maximized by the market outcome if $1 - \gamma = \epsilon/(1 + \epsilon)$ and she will want to increase (reduce) employment above (below) L^M if $(1 - \gamma)(1 + \epsilon)/\epsilon > (<) 1$ holds, given $U_L < 0$. Employment can be increased (decreased) by marginally raising (lowering) the wage above (below) the level set by the monopsonist.

Appendix 4: Proof of proposition 5

Evaluating the first-order condition shown in equation (25) at the market outcome, as defined by the equality in (A6), and taking into account that marginal utility depends only on L yields

$$\begin{aligned}\tfrac{dW^p}{dL}_{\gamma\neq 0, L=L^M} &= -U_c(f(L^M), \bar{c^r})\frac{U_L(L^M)}{U_c(f(L^M), f(L^M), \gamma)}\frac{1+\epsilon}{\epsilon} + U_L(L^M)\\ &= U_L(L^M)\left[1-\mu(L^M,\gamma)\frac{1+\epsilon}{\epsilon}\right].\end{aligned} \tag{A8}$$

The social planner's objective will, hence, be maximized by the market outcome if $\mu(L,\gamma) = \epsilon/(1 + \epsilon)$ and she will increase (reduce) employment above (below) L^M if $\mu(L,\gamma)(1 + \epsilon)/\epsilon > (<) 1$ holds, given $U_L < 0$. This proves part (a) of the proposition.

If the firm pays a tax on labour costs, t, the market outcome can be described by equation (21). Substituting in equation (25), we obtain

$$\begin{aligned}\frac{dW^p}{dL}_{\gamma\neq 0, L=L^{M,t}} &= -U_c(f(L^{M,t}), \bar{c^r})\frac{U_L(L^{M,t})}{U_c(f(L^{M,t}), f(L^{M,t}), \gamma)}(1+t)\frac{1+\epsilon}{\epsilon} + U_L(L^{M,t}) \\ &= U_L(L^{M,t})\left[1-\mu(L^{M,t}, \gamma)(1+t)\frac{1+\epsilon}{\epsilon}\right].\end{aligned} \tag{A9}$$

Solving this expression yields $t^{opt,W}$ as defined in proposition 5, part (b). If the tax is levied on consumption expenditure, such that the worker's budget constraint equals $wL + \pi - c(1 + s) = 0$, the market equilibrium can be characterized by

$$f'(L^{M,s}) = -(1+s)\frac{1+\epsilon}{\epsilon}\frac{U_L(L^{M,s})}{U_c(f(L^{M,s}), f(L^{M,s}), \gamma)}. \tag{A10}$$

Substituting in the first-order condition (25), and evaluating it at the market outcome, yields $s^{opt,W} = t^{opt,W}$, where $\epsilon = \epsilon(s^{opt,W})$. This completes the proof of part (b) of the proposition.

Finally, if the tax is levied on labour income, τ, the market outcome is given by

$$f'(L^{M,\tau}) = -\frac{1+\epsilon}{\epsilon(1-\tau)}\frac{U_L(L^{M,\tau})}{U_c(f(L^{M,\tau}), f(L^{M,\tau}), \gamma)}. \tag{A11}$$

Proceeding in the same manner as above, part (c) can be established.

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