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What's in it for the firms?
Living wage adoption as signal of ethical practice*

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Abstract

We analyse the effect of the voluntary adoption of a living wage on firms operating in product markets in which consumption behaviour is at least partly determined by reputational concerns for ethical firm behaviour. We show without recourse to morality or efficiency-wage theories that the adoption of a living wage policy may increase consumer welfare as well as producer surplus through the segmentation of a previously homogenous product market. In particular, we demonstrate that it may serve a firm's profit maximisation interest to voluntarily adopt a living wage. (JEL *J31, J38.* Keywords: *Living wage, Signalling, Reputation.*)

1 Introduction

"the living wage is an idea whose time has come"
David Cameron, UK General Election address, May 2010

In 1894 *The Economic Journal* reported on a 'remarkable series of articles on "A Living Wage" ... contributed to the Leeds Mercury ... representing every variety of opinion ...'.[1] The reported living wage discussions covered the 'scientific definition' of a living wage as well as how it might be afforded: 'by increased efficiency; or out of the profits of capitalists...; or by an increase in price of the product'. Living wage discussions during this era also invoked broader issues of morality; John Ryan a moral theologian and contributor to American economic thought asserted 'that the labourer's claim to a Living Wage is of the nature of a *right*' and that 'the employer's right to obtain interest on the capital ... is subordinate to the labourer's...' (Ryan, 1906, pp.129); and Seebohm Rowntree argued 'Any industry which could not pay a proper wage ... would be regarded as parasitic, and its failure to survive would be no loss to the State' (Rowntree, 1921, pp.152).

The current living wage debate both in the US and UK centres on the same and unresolved issues of the 19th century.[2] In the UK the living wage campaign (initiated by Citizens UK in 2000)

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[1] See Stabile (2008, pp.365) for a reference to this quote and for a full discussion of the history of economic thought on the living wage.

[2] See, for instance, Adams and Neumark (2004); Neumark and Adams (2003); Adams, Thompson, and Koyle (2012); Pollin and Luce (1998); Pollin, Brenner, Luce, and Wicks-Lim (2008).

has focused on the voluntary adoption by firms of an hourly wage rate that is considered adequate to allow an average worker and family to maintain a socially acceptable quality of life, such as based on the JRF minimum income standard.[3] A wage rate that is potentially distinct, and higher than that of the statutory national minimum wage (NMW), the legal wage floor in the labour market.

The living wage debate provides a particular challenge for economists in how to seriously discuss wages based on worker 'need' rather than productivity, wherein a fundamental de-coupling of the worker productivity and wage relationship has been made. With such critical challenges to the underlying notion of a living wage there is a serious question as to what extent the discussion is a useful one to have at all (see Bennett, 2014) or whether it is merely "...a rallying cry to boost the pay of those towards the bottom of the wage league table" (Metcalf, 2008). However what cannot be challenged is how the living wage has become firmly rooted in the UK's public discourse and consciousness in regards to low-waged employment and the rise of in-work poverty. Reported figures of UK workers earning below the living wage rate (Lawton and Pennycook, 2013) have provided a powerful driver for political and public debate. But where does this leave the firm? For employers facing increasing expectations to view their employees' wage through a lens of social responsibility rather than purely productivity or market comparison, this can amount to another significant cost pressure, to be set against a general background of competing wage demands throughout the organisation's workforce, and where the 'moral or social' obligation is challenging if not impossible to offset within the balance sheet.

Although efficiency-wage hypotheses have potential applicability,[4] and particularly so where the living wage adoption is one of an individual firm voluntarily adopting an above market or mandatory minimum wage, these models are all premised on the fact the worker's marginal productivity can be significantly increased. If such productivity increases are limited then in considering the motivation of the firm's living wage adoption we have to ask: *What's in it for the firms?*

Our paper shows that a convincing case can be made for the voluntary adoption of a living wage by an individual firm based mainly on reputational benefits, and where the living wage is above both the statutory minimum wage and the market rate, and assuming (critically) that there are consumers in the market that value this stance. We also show that the firm would wish to brand themselves a living wage employer so as to maximise their reputational gain. As such an organisation trusted by consumers to regulate the wage rates, e.g., the UK's Living Wage Foundation is needed.

The idea is that independent of the effects on workers firms may want to use the adoption of the living wage as a means of signaling ethical practice to the consumers of some homogenous product they try to sell. If this signal is informative (and convincing), then firms can discriminate their products from competitors, an outcome that may increase welfare for both firms and consumers. The present paper develops a simple framework in which we show that even a modest increase in wages for some workers (through voluntary adoption of the living wage by some firms within a market) may increase social welfare.

We consider a labour market in which two firms compete for hiring a single (representative)

[3] See, among others, Hirsch (2011); Hirsch and Moore (2011); Davis, Hirsch, Smith, Beckhelling, and Padley (2012).

[4] See, for instance, Akerlof (1982); Akerlof and Yellen (1990); Shapiro and Stiglitz (1984).

worker with a continuum of observable productivity characteristics. The valuations that consumers have for the perfectly homogenous product that the two firms sell are partly determined by the perceived ethicalness of the firms. We show that, even when firms are perfectly identical, there exist parameter constellations under which one firm adopts a living wage as a means of signaling more ethical behaviour than their counterpart who chooses a lower wage. As our contribution is to show the impact of firm reputation concerns on living wage adoption we entirely abstract from the impact a higher wage has on the workers in our model. From a technical point of view, the model uses contests to model the competition between firms, both for workers and for consumers.[5]

We set out the model in the following section 2, followed by our main results in sections 3.1 and 3.2. These results are set within a more general, encompassing framework in section 3.3. We briefly interpret and summarise our results by example in section 3.4 followed by concluding remarks.

2 The model

Consider a consumer goods market served by two identical, risk neutral firms indexed as $i = 1, 2$ who produce a homogenous good using their individual production technology.[6] Firms pay a wage $w_i \in [0, \infty)$ to their single (representative) employee; a wage payment of zero is interpreted as leaving the market, so all wages used in the strategic analysis are strictly positive.[7] The symmetric firms' productive processes are characterised by individual costs c_i. We assume that there exists a competitive labour market on which, through paying a wage w_i, a firm buys the services of a worker whose labour determines the firm's production cost as $c_i(w_1, w_2)$. We use the notation $w = (w_1, w_2)$ for the pair of wages. Wages are perfectly well know among the two firms but they are neither observable nor verifiable to consumers. For concreteness, we assume that firm i's production cost function is given by[8]

$$c_i(w) = \frac{w_j^a}{w_1^a + w_2^a}, \text{ with } a > 0 \text{ and } j = 3 - i. \tag{1}$$

We interpret this cost function as resulting from firms' competition for the available workers. Workers are otherwise entirely exogenous to our model as it would be perhaps unsurprising if we were to demonstrate worker-consumer welfare to be increasing in the paid wage. Relatively higher wage offers increase the likelihood of recruiting more highly productive workers but there are other, unmodeled, co-determinants reflected in (1). The degree of competitiveness of the labour market is parameterised

[5] For a detailed survey of the contests literature see the comprehensive Konrad (2008). Part of the analytical structure of the firms' competition aspect of the model is borrowed from Fleckinger, Roussillon, and Schweinzer (2012) who develop their framework in order to discuss labelling based on rankings with endogenous precision.

[6] The strategic consequences of creating segmented (i.e., labelled) monopolies from an original duopoly market are starkest in a two-player model. Nothing significant changes in our results if both players are replicated arbitrarily. Then, however, competition among firms dilutes their strategic reputational concerns.

[7] A positive *minimum wage* would have the same effect.

[8] We would like to point out that the same Logit-form that we use to represent production cost stemming from hiring on a competitive labour market is also later used to represent consumer inferences. The two usages are separate and have nothing but technicalities in common. For instance, we could replace (1) with $c_i(w) = (1+a\exp(w_j - w_i))^{-1}$ without changing our results qualitatively. An example for a full model of the labour market structure that we have in mind is, e.g., Dakhlia and Pecorino (2006).

by (and increasing in) a.[9] Firms therefore choose their wage payment w_i in order to maximise profits

$$\max_{w_i} u_i(w) = (p - c_i(w))q(w_i) - w_i \tag{2}$$

in which p is the price charged for the product and q is the captured share of the market.

A large number of consumers with unit demand purchase products on this market. In addition to the private valuation the consumers place on the homogenous goods, they also care about the welfare of the workers employed in the industry producing these goods. Consumer valuations for this worker welfare are given by the distribution function $\mu \sim G_{[0,s]}$, $s > 0$, with positive density g. We assume that G is identical to the uniform distribution throughout the paper.[10] High valuation consumers are willing to pay a higher price $\bar{p} > \underline{p}$ for the product of the firm who is believed to pay the higher wage to its employees. The firm paying the higher wage is therefore thought of as implicitly holding some 'ethical label.' The utility of a type-μ consumer is assumed to be quasi-linear with

$$v(\mu, \eta) \ = \mu\tilde{\eta} - \tilde{p} \geq 0 \tag{3}$$

in which $\tilde{p}$ is the price paid for a product of 'ethical quality' $\tilde{\eta}$. We assume that consumers expect equilibrium values of η_1, η_2, with $\eta_1 \geq \eta_2 > 0$, for the ethically and less-ethically produced products, respectively.[11] Since actual wages are unobservable to the consumers, the firms' ethical stance is not known and consumers need to form beliefs on the firms. We assume that they do this on the basis of the following 'black box' inference mechanism: we assume that the probability with which firm $i = 1, 2$ is believed to be more ethical than its competitor $j = 3 - i$, and is therefore able to charge a higher price, is given as

$$e_i(w) = \begin{cases} \dfrac{w_i^b}{w_i^b + w_j^b} & \begin{cases} \text{if both } w_i < w_L \text{ and } w_j < w_L, \\ \text{if both } w_i > w_L \text{ and } w_j > w_L, \end{cases} \\ 1 & \text{if } w_i \geq w_L \text{ but } w_j < w_L, \\ 0 & \text{if } w_i < w_L \text{ but } w_j \geq w_L, \\ 1/2 & \text{if } w_i = w_j \end{cases} \tag{4}$$

in which $w_L > 0$ is our interpretation of a commonly known *living wage* and $b > 0$ parameterises the reputational responsiveness of consumers to paying a relatively higher wage. This formulation implies that consumers can imprecisely rank firms' wages which are in themselves unobservable. Moreover, we assume that consumers can ascertain precisely whether or not a firm pays a wage above or below the living wage w_L (labelling).

[9] We are constrained in exploiting this parameter a fully in that usually, for the full model, analytical solutions are not available for cases other than $a = 1$. (The same applies to the similar role taken by the exponent b in (4)). Moreover, values of a, b above 1 may result in non-concavities which may be problematic for the existence of the equilibria we characterise. We nevertheless include these parameters in the general specification because we hope they may aid later empirical testing.

[10] The restriction to uniform consumer valuations is made only for expositional reasons. Qualitatively similar results could be derived for any other distribution. The upper bound s is used for scaling the market appropriately. We use it to guarantee an interior solution to the firms' maximisation problems.

[11] We claim no relationship between the firms' true ethical stance and these equilibrium expectations. In fact, apart from the interpretation of the higher wage firm as the more ethical firm, the firms' ethical values are not defined in this paper. In a fully endogenised version we could set the obtained high equilibrium wage equal to η_1 and the derived low equilibrium wage equal to η_2.

The model as set out is one of wage and price competition. If prices are fully flexible, then the prediction under Bertrand competition is that firms lower prices to marginal cost. Whether the implied fully competitive outcome is reached depends on the industry's degree of cartelisation and on the (unmodeled) stickiness of prices. The particular assumptions made here do not matter for our model as long as the same degree of competitiveness is assumed before and after market segmentation through the introduction of a living wage.

3 Results

Consider the following setup with two identical firms $i = 1, 2$ with uniform worker productivity and uniform consumer preferences $\mu \sim U_{[0,s]}$. Paid wages w_i are not precisely observed by the consumers (to the extent that they are not separated by w_L) but commonly known among competitors.

To the consumer, the expected ethical quality of a product is determined by their information on the relative wages paid by the firms. We award a single 'ethical' label to the firm ranked first. A firm i chooses a) the price of her product conditional on the firm's expected relative wage perception and the distribution of consumer preferences and b) the wage w_i it wishes to offer on the labour market in order to optimise worker productivity.[12]

Given an observed ranking $(e_1(w), e_2(w))$ and symmetric announced prices $p = \left(\underline{p}, \bar{p}\right)$, a marginal consumer of valuation $\hat{\mu}_2^1$ is indifferent between buying the 1^{st}- and 2^{nd}-ranked products (i.e., the product perceived ethical and the product perceived as not) if and only if

$$\mu\eta_1 - \bar{p} = \mu\eta_2 - \underline{p} \tag{5}$$

resulting in the threshold valuation-vector

$$\hat{\mu} = \left(\hat{\mu}_1 = s,\ \hat{\mu}_2 = \frac{\bar{p} - \underline{p}}{\eta_1 - \eta_2},\ \hat{\mu}_3 = \frac{\underline{p}}{\eta_2}\right). \tag{6}$$

Depending on where the equilibrium wage pair is located with respect to the commonly known living wage w_L, we can identify two different types of equilibrium candidates for identical firms. The 'symmetric' case in which *identical* firms pay identical wages which are both either above or below w_L is explored in section 3.1 and the 'asymmetric' case in which *identical* firms pay asymmetric wages, one above and one below the living wage w_L, is discussed in section 3.2. A unifying type of asymmetric equilibrium is studied for non-identical firms in section 3.3 which gives rise to both the models of sections 3.1 and 3.2 as special cases.

3.1 Symmetric 'monopolistic' benchmark

This case can be viewed as benchmark representing the situation before living wage adoption. In symmetric pure strategy equilibrium, symmetric firms charge identical prices for their product and expect to capture the high or low market segments depending on their respective wage offers w_i.

[12] We assume that this wage is fixed during the time of interaction which we consider.

Restricting attention to symmetric strategies, firm i's optimisation problem is therefore

$$\underset{(w_i,p)}{max}\ u_i^s(w,p) = \frac{p - c_i(w)}{2} \int_{\hat{\mu}}^{s} g(\mu)\, d\mu - w_i \tag{7}$$

in which $\hat{\mu} = p/\eta$ is the lowest consumer valuation still willing to buy the ethical value η at price p. For uniform preferences $g(\mu) = 1/s$, individual maximisation determines the analytic solution uniquely as

$$w_1^* = w_2^* = w^* = \frac{a(2\eta s - 1)}{32\eta s},\ p_1^* = p_2^* = p^* = \frac{2\eta s + 1}{4}. \tag{8}$$

This is a symmetric equilibrium. To allow for ease of comparison between this equilibrium and the asymmetric equilibrium of the following section, we present a parameterised example. Setting $\eta = 7.5$, $a = 1$ and $s = 1$ results in the pair of symmetric wages and prices[13]

$$(w^* = 0.0583,\ p^* = 4) \tag{9}$$

for which the objective (7) is plotted in figure 1 below. The associated producer surplus—modelled as simply the sum of the firms' expected equilibrium utilities—is given by

$$P^s = \frac{1}{32}\left(8\eta s + \frac{3}{\eta s} - 10\right) = 1.575 \tag{10}$$

where the rhs represents the example value. Similarly, we define consumer welfare as

$$C^s = \int_{\hat{\mu}}^{s} (\mu\eta - p)\, dG(\mu) = \frac{(1 - 2\eta s)^2}{32\eta s} = 0.8167. \tag{11}$$

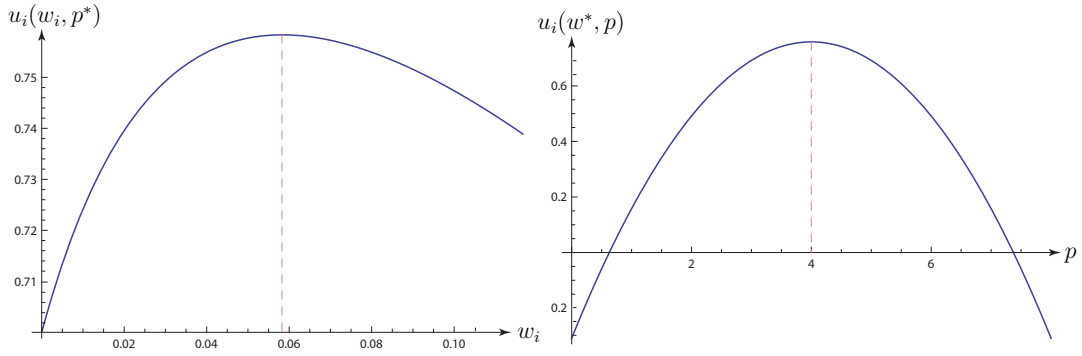

Figure 1: Unilateral deviations are not profitable for parametrisation (9). Shown left is the choice of w_i, right the choice of symmetric p. The shown maxima are global.

This fully symmetric benchmark *presupposes* that firms are identical in symmetric equilibrium in the sense that they are restricted to using symmetric pricing strategies.[14] Thus, the realised outcome is a shared monopoly. This may be sustained through regulatory favouritism in the form of fixed prices or stem from tacit collusion for instance through price matching guarantees.

[13] These values are not intended to represent any real situation; their mere purpose is to facilitate easy comparison between the presented examples.

[14] Note that we do not restrict strategies on wages; there we merely concentrate on the symmetric case.

In the absence of such coordination, fully competitive firms would drive down prices through Bertrand competition. In this extreme case, the zero profits condition $u_i^s(w,p)$ together with the optimal choice of w_i characterises the outcome

$$w^B = \frac{a(2+a-4\eta s}{32\eta s} = 0.1125,\ p^B = \frac{2+a}{4} = \frac{3}{4} \tag{12}$$

with associated surplus

$$P^s \equiv 0,\ C^s = \int_{\hat{\mu}}^{s} (\mu\eta - p)\, dG(\mu) = \frac{(2+a-4\eta s)^2}{32\eta s} = 3.0375. \tag{13}$$

The unifying model of section 3.3 makes no special assumptions on pricing strategies and derives this section's equilibrium as a limiting case in a more complex environment.

3.2 Asymmetric 'monopolistic competition' equilibrium

Consider now the case in which one of the two identical firms is asymmetrically awarded the ethical label while the other firm goes unlabelled. Then, in the asymmetric equilibrium of a monopolistic competition model, the ethically-labelled firm pays a high wage and charges a high price for its product and the non-ethically-labelled firm pays a low wage and charges a low price. Thus consumer expectations are correct and confirmed in equilibrium. In this case, the two equilibrium prices charged are invertible to obtain the wages paid. Thus, equilibrium prices are perfect signals of the firms' ethical practice. Without loss of generality we assume in the following that firm 1 is the ethically labelled firm.

Given threshold types (6), the first and second ranked firms maximise their profits (2) by choosing $\bar{p}$ and $\underline{p}$, respectively, such as to

$$\begin{aligned} \underset{w_1,\bar{p}}{max}\ u_1(w) &= (\bar{p} - c_1(w)) \int_{\hat{\mu}_2}^{\hat{\mu}_1} g(\mu)d\mu - w_1, \\ \underset{w_2,\underline{p}}{max}\ u_2(w) &= \big(\underline{p} - c_2(w)\big) \int_{\hat{\mu}_3}^{\hat{\mu}_2} g(\mu)d\mu - w_2. \end{aligned} \tag{14}$$

The full simultaneous solution $(w_1 > w_2, \bar{p} > \underline{p})$ to these maximisation problems is relatively lengthy and not shown; the involved first-order conditions are

$$\begin{aligned} a\left(\frac{\underline{p}-\bar{p}}{\eta_1-\eta_2} + s\right) w_1^{a-1} w_2^a &= s\left(w_1^a + w_2^a\right)^2, \\ a(\eta_2\bar{p} - \eta_1\underline{p}) w_1^a w_2^{a-1} &= (\eta_1-\eta_2)\eta_2 s\left(w_1^a + w_2^a\right)^2, \\ \underline{p} + \eta_1 s + \frac{w_2^a}{w_1^a + w_2^a} &= 2\bar{p} + \eta_2 s, \\ 2\eta_1\underline{p} &= \eta_2\bar{p} + \frac{\eta_1 w_1^a}{w_1^a + w_2^a}. \end{aligned} \tag{15}$$

Here we develop, for presentational convenience, the simpler case of $\eta = \eta_2 = \eta_1/2$, $a = 1$ and

$s = 1$ which results in the analytical solution

$$w_1^* = \frac{2\left(279+66\sqrt{18-30\eta+9\eta^2}+\eta\left(42\eta\left(13-3\eta+\sqrt{18-30\eta+9\eta^2}\right)-705-112\sqrt{18-30\eta+9\eta^2}\right)\right)}{63\eta},$$

$$w_2^* = \frac{1794\eta-792-1218\eta^2+252\eta^3-2\sqrt{18-30\eta+9\eta^2}(93+7\eta(6\eta-19))}{63\eta}, \tag{16}$$

$$p_1^* = \frac{18+6\eta+2\sqrt{18-30\eta+9\eta^2}}{21},\ p_2^* = \frac{4\eta-2-\sqrt{18-30\eta+9\eta^2}}{7}$$

for equilibrium threshold levels

$$\hat{\mu}_1\ = 1,\ \hat{\mu}_2 = \frac{24-6\eta+5\sqrt{18-30\eta+9\eta^2}}{21\eta},\ \hat{\mu}_3 = -\frac{2-4\eta+\sqrt{18-30\eta+9\eta^2}}{7\eta}. \tag{17}$$

Using the parameter set $(s = 1, \eta_1 = 10, \eta_2 = 5 = \eta)$, this gives

$$(w_1^* = 0.1008,\ w_2^* = 0.0275,\ \bar{p}^* = 3.2042,\ \underline{p}^* = 1.1938). \tag{18}$$

which is shown to be a global maximum in figure 2. Note that all utility levels are positive, i.e., individually rational with respect to market exclusion.

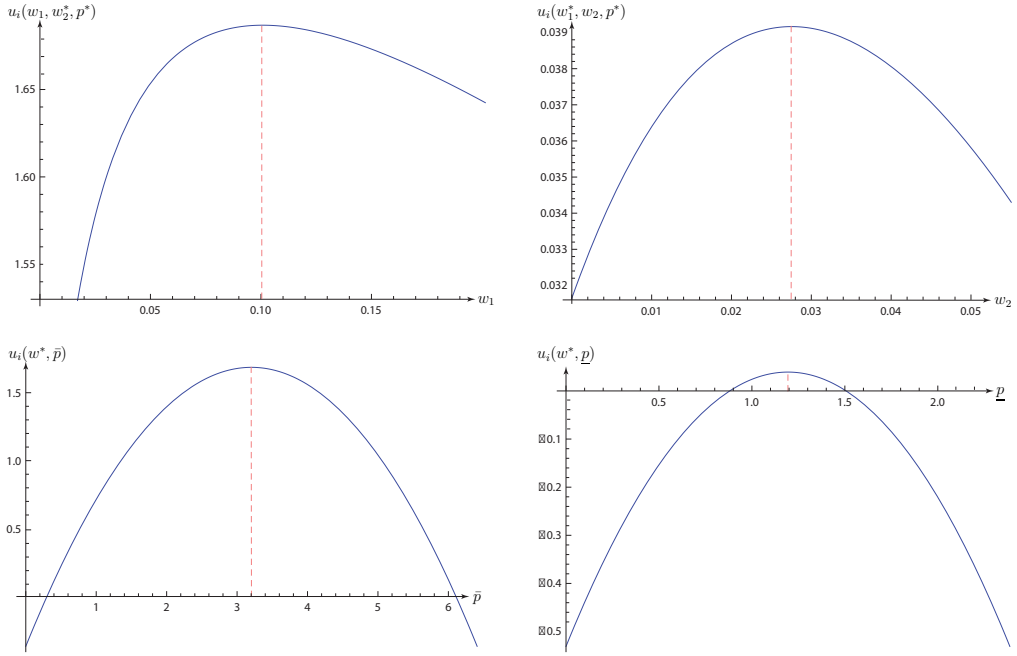

Figure 2: Unilateral deviations are not profitable for parametrisation (18); the shown maxima are global. The first line shows the pair (w_1^*, w_2^*) and the second line $(\bar{p}^*, \underline{p}^*)$.

The wage and price structures are different in the two equilibrium types (9) and (18). The reason is that the introduction of a living wage allows for product differentiation in an otherwise fully homogenous market.

Proposition. *Based on an exogenously assigned label, monopolistic competition between two identical firms results in the asymmetric set of equilibrium wages and prices* (16)*.*

Proof. As (16) follows uniquely from (15), it is necessary for a critical point. The example parametrisation (18) shows that the set of instances where (16) identifies a global maximum is non-empty. Hence, we have identified an equilibrium of the game. □

This result characterises an asymmetric equilibrium of the model considered and is the main result of this paper. We hasten to add that we do not provide a general existence result for this equilibrium. Our argument merely shows that this set is non-empty and open. The equilibrium considered is made possible only through the introduction of a living wage. This living wage is in our story set by an exogenous authority trusted to some extent by the consumers. Any living wage, $w_2 < w_L < w_1$ would work to separate firms in this case.

The producer surplus—again simply taken to be the sum of the firms' expected equilibrium utilities—is now represented by

$$P^{as} = \frac{1230 + 286\sqrt{18 - 30\eta + 9\eta^2} + 2\eta\left(381\eta - 1039 - 118\sqrt{18 - 30\eta + 9\eta^2}\right)}{147\eta} \tag{19}$$

which equals 1.7260=1.6868+0.0392 under the parametrisation (18). Note that total P^{as} is *higher* than in the symmetric equilibrium benchmark (10). Hence, prior to the availability of a ranking, the firms expect a higher surplus than half of the shared symmetric surplus P^s. A firm without expectation to be labelled, however, will lose surplus relative to the symmetric case.

Analogous to (11), we define consumer welfare as

$$\begin{aligned} C^{as} &= \int_{\hat{\mu}_2}^{\hat{\mu}_1} (\mu\eta_1 - \bar{p}) g(\mu) d\mu + \int_{\hat{\mu}_3}^{\hat{\mu}_2} (\mu\eta_2 - \underline{p}) g(\mu) d\mu \\ &= \frac{1}{147\eta^2}\left(120\eta^3 - 2\left(102 + 23\sqrt{18 - 30\eta + 9\eta^2}\right)\eta + \eta^2\left(66\eta - 610 - 58\sqrt{18 - 30\eta + 9\eta^2}\right)\right. \\ &\qquad \left. + \eta\left(408 + 92\sqrt{18 - 30\eta + 9\eta^2} + 22\left(11 + \sqrt{18 - 30\eta + 9\eta^2}\right)\eta\right)\right) \end{aligned} \tag{20}$$

which gives 2.3425 in the example (18). Hence, wages are higher than in the symmetric equilibrium and the combination of reduced prices and product differentiation results in higher consumer welfare in the labelled model. Finally, efficiency is higher in the labelled market because the fraction of consumers who are denied service is dramatically smaller (about 53% in the cartelised, symmetric model versus 24% in the labelled market).

The asymmetric equilibrium (18) exists because we assume that labels are already in place ex-ante, i.e., before the price and wage competition between firms. Otherwise, the equilibrium payoff of the unlabelled firm needs to be above the symmetric equilibrium payoff from section 3.1. Examples for such cases can be constructed and show circumstances in which the expectation of being labelled is already sufficient for the existence of an asymmetric equilibrium. The corresponding analysis is conducted in section 3.3.

Similarly to the previous section, there is a caveat with respect to (Bertrand) competition. Introduction of the label only creates a bilateral monopoly from the ex-ante duopoly in the two-firm market. If there is Bertrand competition in the unlabelled market and pre-labelling market conditions carry over to the labelled market, then the labelled Bertrand-competing firms would compete each other down to the marginal cost implied by the living wage. The remaining unlabelled firms would compete in the lower market segment and serve the same (large) market as in (13).

3.3 Firms with different productivities

This model captures both previous sections as special cases and provides a rationalisation for both. In particular, we correct the defect that our model from subsection 3.1 is only symmetric by assumption. For this purpose, we start by developing an asymmetric version of (7) without (or 'on the same side' of the) living wage in which asymmetric prices and wages determine market shares using the Logit expectation. Firms are (ex-ante) asymmetric since they are modelled using private productivities of $c_i(w) = \frac{\gamma_i w_j}{w_i + w_j}$ in which the parameters γ_1 and γ_2 are assumed to be commonly known to firms but not to consumers.[15] In this more general model, firm $i = 1, 2$, $j = 3 - i$, maximises

$$e_i(w)\left(\bar{p}_i - \gamma_i c_i(w)\right)\int_{\frac{\bar{p}_i - \underline{p}_j}{\eta_1 - \eta_2}}^{s} g(\mu)\,d\mu + e_j(w)\left(\underline{p}_i - \gamma_i c_i(w)\right)\int_{\frac{\underline{p}_i}{\eta_2}}^{\frac{\bar{p}_j - \underline{p}_i}{\eta_1 - \eta_2}} g(\mu)\,d\mu - w_i \tag{21}$$

in which firm 1 has a (among firms commonly known) cost advantage $\gamma_1 \leq \gamma_2$.[16] In our one-shot model, firms are contractually tied to their announced wages and cannot change the wages they pay in the short run (according to their consumer's perceptions). The prices charged are fully flexible.

As in the previous sections, the resulting first-order conditions are well-behaved and tractable but for presentational convenience we nevertheless switch into the case of $\eta = \eta_2 = \eta_1/2$, $\gamma_1 = 1$, and $\gamma_2 = \gamma$. In this simplified case, we obtain the pair of first-order conditions

$$\begin{aligned}
&\frac{a w_2^a w_1^{a+b-1}(\eta s - \bar{p}_1 + \underline{p}_2)}{\left(w_1^a + w_2^a\right)^2\left(w_1^b + w_2^b\right)} + \frac{b w_1^{b-1}\left(\bar{p}_1 - \frac{w_2^a}{w_1^a + w_2^a}\right)(\eta s - \bar{p}_1 + \underline{p}_2)}{w_1^b + w_2^b} \\
&\quad + \frac{w_2(2\underline{p}_1 - \bar{p}_2)\left((\underline{p}_1 - 1)w_1^a + \underline{p}_1 w_2^a\right)}{(w_1 + w_2)^2\left(w_1^a + w_2^a\right)} \\
&\quad + \frac{a w_2(2\underline{p}_1 - \bar{p}_2)(w_1 w_2)^a}{w_1(w_1 + w_2)\left(w_1^a + w_2^a\right)^2} = \frac{\eta b w_1^{2b-1}\left(\bar{p}_1 - \frac{w_2^a}{w_1^a + w_2^a}\right)(\eta s - \bar{p}_1 + \underline{p}_2)}{\eta\left(w_1^b + w_2^b\right)^2} + \eta,
\end{aligned} \tag{22}$$

$$\begin{aligned}
&1 + \frac{a(\bar{p}_1 - 2\underline{p}_2)w_1^{a+b}w_2^{-1+a}\gamma}{\eta\left(w_1^a + w_2^a\right)^2\left(w_1^b + w_2^b\right)} + \frac{b(\bar{p}_1 - 2\underline{p}_2)w_1^b w_2^{-1+b}\left(\underline{p}_2\left(w_1^a + w_2^a\right) - w_2^a\gamma\right)}{\eta\left(w_1^a + w_2^a\right)\left(w_1^b + w_2^b\right)^2} \\
&\quad + \frac{b(\underline{p}_1 - \bar{p}_2 + \eta s)w_2^{-1+2b}\left(\bar{p}_2 - \frac{w_1^a\gamma}{w_1^a + w_2^a}\right)}{\eta\left(w_1^b + w_2^b\right)^2} \\
&\quad = \frac{(\underline{p}_1 - \bar{p}_2 + \eta s)w_2^{-1+b}\left(a(w_1 w_2)^a\gamma + b\left(\bar{p}_2\left(w_1^{2a} + w_2^{2a} + 2(w_1 w_2)^a\right) - \left(w_1^{2a} + (w_1 w_2)^a\right)\gamma\right)\right)}{\eta\left(w_1^a + w_2^a\right)^2\left(w_1^b + w_2^b\right)}
\end{aligned} \tag{23}$$

[15] The motivation for the assumptions on γ_i is that firms are in frequent interaction and should therefore sooner or later learn the opponent's type. A consumer, by contrast, interact only through occasional purchases which do not necessarily reveal the firm's type. The purpose of these assumptions are to make it impossible for a consumer to learn the ethical type (i.e., the firm's wage payments) from the market price.

[16] If $\gamma_1 = \gamma_2$, the model collapses into the case from subsection 3.1. The consumer perceptions $e_i(w)$ is defined as $\frac{w_i^b}{w_1^b + w_2^b}$ in (4). If a separating living wage is introduced, the model turns into the case from subsection 3.2.

which implicitly determines the solution together with the price system

$$\begin{aligned} \bar{p}_1 &= \frac{2}{7}\left(\frac{(\gamma+2)w_2^a}{w_1^a+w_2^a}+2\eta s\right), \quad \underline{p}_1 = \frac{1}{7}\left(\frac{(\gamma+4)w_1^a}{w_1^a+w_2^a}+\eta s\right), \\ \bar{p}_2 &= \frac{2}{7}\left(\frac{(2\gamma+1)w_1^a}{w_1^a+w_2^a}+2\eta s\right), \quad \underline{p}_2 = \frac{\eta s w_1^a + w_2^a(4\gamma+\eta s+1)}{7\left(w_1^a+w_2^a\right)}. \end{aligned} \tag{24}$$

Unfortunately, we could not find a usefully compact analytical representation of the wages. An example parameterised by $s=1$, $a=1$, $b=1$, $\gamma=2$ and $\eta=5$ results in the set of equilibrium wages and prices

$$w_1^* = 0.4318, \bar{p}_1 = 3.4043, \underline{p}_1 = 1.1611, w_2^* = 0.3966, \bar{p}_2 = 3.6018, \underline{p}_2 = 1.3298. \tag{25}$$

Similarly to the previous cases, we determine equilibrium existence graphically in figure 3. Note that all utility levels are positive, i.e., individually rational with respect to market exclusion.

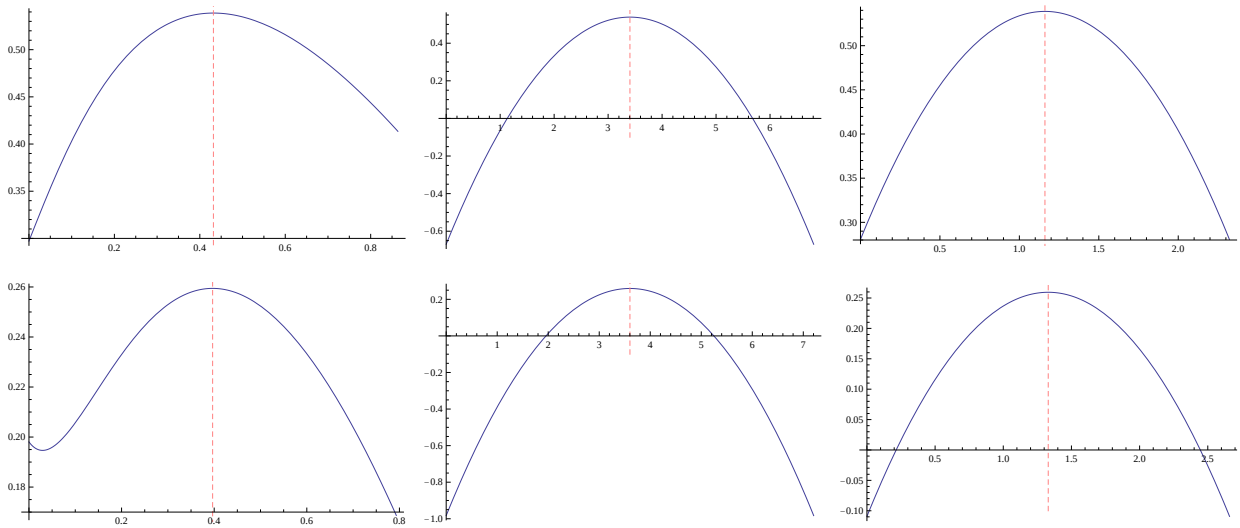

Figure 3: Unilateral deviations are not profitable in equilibrium (25). Row 1 shows all maxima for firm 1 $(w_1^*, \bar{p}_1, \underline{p}_1)$, row 2 depicts firm 2's choices $(w_2^*, \bar{p}_2, \underline{p}_2)$. (Axis labels as in the previous figures.)

Note that the less productive firm 2 charges the higher prices both if perceived more ethical and if not. This is the case because the more productive firm expects a bigger prize from the market and, everything else equal, therefore charges lower prices although paying higher wages. An explanation for the generally much higher wages paid in this setup may be the presence of stronger competition than in both alternative settings. This is not necessarily a problem for us because we will generally have multiple firms 'on both sides' of the living wage, too.

Consumer surplus is composed of two parts. First the case where the ranking is correct, i.e., firm 1 (who pays the higher wage) is indeed perceived by consumers to be more ethical. This case happens with probability $e_1(w) = \frac{w_1^b}{w_1^b+w_2^b}$ and realised market prices are $(\bar{p}_1, \underline{p}_2)$. The second case arises when consumers wrongly perceive firm 2 as more ethical. This case happens with probability $e_2(w) = \frac{w_2^b}{w_1^b+w_2^b}$ and realised market prices are $(\bar{p}_2, \underline{p}_1)$. In this second case, consumers consume the

wrong good, contrary to their preferences. More formally, we define consumer surplus as

$$C^g = e_1(w)\left(\int_{\frac{\underline{p}_2}{\eta_2}}^{\frac{\bar{p}_1-\underline{p}_2}{\eta_1-\eta_2}}(\eta_2\mu-\underline{p}_2)g(\mu)\,d\mu+\int_{\frac{\bar{p}_1-\underline{p}_2}{\eta_1-\eta_2}}^{s}(\eta_1\mu-\bar{p}_1)g(\mu)\,d\mu\right) + e_2(w)\left(\int_{\frac{\underline{p}_1}{\eta_2}}^{\frac{\bar{p}_2-\underline{p}_1}{\eta_1-\eta_2}}(\eta_1\mu-\underline{p}_1)g(\mu)\,d\mu+\int_{\frac{\bar{p}_2-\underline{p}_1}{\eta_1-\eta_2}}^{s}(\eta_2\mu-\bar{p}_2)g(\mu)\,d\mu\right). \tag{26}$$

Producer surplus is defined as in the previous sections. In the example (25) surplus amounts to

$$(P^g = 0.7982,\ C^g = 1.4764) \tag{27}$$

which is lower than under the two reference scenarios of the previous sections.

Since the underlying pair of cost parameters is assumed to be unknown to the consumers, even fully rational consumers cannot invert the firms' equilibrium pricing functions to identify the underlying cost parameters and the corresponding wages paid and the model is consistent with our behavioural assumptions.

3.4 Comparative statics

Starting with our first benchmark case of the fully symmetric monopolistic competition the outcomes represent those of a shared monopoly. In our second case of asymmetric monopolistic competition one of the two firms is paying at or above the living wage and is awarded the ethical label and the market segments. In this case, and relative to the benchmark case the producer surplus for the living wage firm is increased above that of (half) the benchmark case whilst the sub-living wage firm experiences a reduction in producer surplus. Although the overall producer surplus is reduced the consumer surplus is substantially increased with the additional efficiency improvement in the labelled market that the fraction of consumers denied service is substantially reduced ($\mu_3 < \mu$). The corresponding numbers are shown in table 1.[17]

In our third and arguably most realistic scenario the two firms are asymmetric in their productivities (and, thus, not directly comparable to the first two scenarios). This asymmetry results in the consumers being unable to accurately infer that a higher product price means that the firm pays the living wage, i.e., is the more ethical firm. This asymmetry in productivities is what drives the importance of the living wage 'labelling'. Such 'trusted' labelling is needed for the producer surplus of the ethical firm to be maximised and for the consumer surplus to be raised above that of the benchmark case.

[17] In each cell, if there is a single line with two entries, the first entry is for firm 1, the second for firm 2. If there are two lines, then the first line refers to firm 1, the second to firm 2 and entry one is the firm if perceived ethical, the second entry if perceived unethical. The bottom-right cell shows first unserved proportion of all consumers if the first firm is perceived ethical and second if the second firm is perceived more ethical.

Table 1: Example equilibrium results.

model variant	consumer surplus	producer surplus	wages	prices	consumers unserved
unlabelled symmetric (cartelised)	0.8167	1.575	0.0583	4.00	53.33%
unlabelled symmetric (competitive)	3.0375	0.00	0.1125	0.75	10.00%
labelled (a)symmetric	2.3425	1.7260	0.1008, 0.0275	3.2042, 1.1938	23.88%
unlabelled asymmetric	1.4764	0.7982	0.4318, 0.3966	3.4043, 1.1611 3.6018, 1.3298	20.32%, 30.95%

4 Concluding remarks

The contribution of the paper is to make a case, leaving aside arguments of morality or efficiency, for why a firm might wish to voluntarily adopt a living wage on reputational grounds. From a technical point of view we show that the introduction of a living wage label into a symmetric market creates the possibility for asymmetric equilibria. In our analysis, the precise living wage rate per se is not important. Indeed this rate could be motivated on grounds of a 'fair wage' or firm level distributional preferences in relation to their internal wage distribution rather than necessarily worker need. The central point though is that some consumers value the payment of this ethically labeled wage and would be willing to reflect this in the price they pay for the product. As the focus of our model is centred on the firms' considerations with regard to living wage adoption we abstract from the workers' role in the interaction.

We view our findings as potentially having the greatest relevance to those sectors with large numbers of low and minimum wage workers, for example in retail where there are a small number of large players and the social care sector where there are a large number of smaller players. To undertake an empirical investigation of our hypothesis would require comparisons of product prices over time for firms with and without the Living Wage Foundation 'kitemark'. However, given the relatively low level of Living Wage Foundation accreditation within the private sector in the UK at this time (less than 400), and the absence of accreditation within the large supermarkets or retail-chains it may be too soon to convincingly take the theory to the data. On an anecdotal level it is still interesting to note that the setting of wage rates marginally 'above' the minimum wage so as not to be a 'minimum wage employer' is an approach used even now by large UK supermarkets. This may have to do with establishing firms' recruitment position within the labour market and, as argued in this paper, to improve product market reputation.

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