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The Economics of Vocation
or
Why is a Badly Paid Nurse a Good Nurse?

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Abstract

Given the longstanding shortage of nurses in many jurisdictions, why couldn't nursing wages be raised to attract more people into the profession? We tell a story in which the status of nursing as a 'vocation' implies that increasing wages reduces the average quality of applicants attracted. The underlying mechanism accords with the notion that increasing wages might attract the 'wrong sort' of people into the profession and highlights an (in)efficiency wage mechanism, particular to vocations, which makes wages sticky *upwards*. The analysis has implications for job design in vocation-based sectors such as nursing and teaching.

'Nurses (in the NHS) have always been low paid. Good nurses aren't in it for the money - they have a vocation' Sunday Times (10 January 1999)

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1 A simple (in)efficiency wage story

What do we mean when we say that somebody has a ‘vocation’ for nursing (or teaching, or working with the handicapped)? We take it to mean two things; (a) that that person is particularly devoted, going ‘beyond the call of duty’ in doing their job and (b) they do the job because they like doing it or feel a need to do it (they ‘care’).¹ This is based on standard definitions, for example -

“**Vocation** / *n* **1** [C] a job you do because you have a strong feeling that doing this job is a purpose of your life, especially because you want to help other people: *Teaching isn't just a job its a vocation.* **2** [C,U] a special ability for or devotion to a particular job or activity, especially one that gives service to other people: [+ for] *He has a vocation for teaching.*” (Longmans Dictionary of Contemporary English, 1995).

Consider the following formalisation. The wage for being a nurse is w . The i th individual from a pool of potential applicants has a privately observed alternative outside option which would pay r_i , where r_i is distributed in the population according to a log-concave density function f . The associated cumulative is denoted F .

There are two types of people. Those with a vocation for the job and those without. If somebody without a vocation becomes a nurse then they give quality of care q_L and receive a wage w . If somebody with a vocation does likewise, however, they give care $q_H > q_L$, receive the wage w but also receive a non-pecuniary benefit v (what we will refer to as a ‘vocational premium’).

The q parameter can be thought of as a quality or productivity measure and q_L can be thought of as the maximum contractually enforceable level. The difference between q_H and q_L relate to the extra-role behaviors already described. The story here is based upon incomplete contracts, then, so it is important that q be less than perfectly contractible. The quality of care given by a particular nurse may not be observed by the principal (or may not be verifiable by a third party). Two examples. A nurse can be contracted to

¹By ‘going beyond the call of duty’ we mean that in carrying out their duties they do a better job than could be ensured by contractual compulsion. There is an element of voluntarism in the individual’s workplace behaviour.

monitor the patients on a ward for an 8-hour shift, or to administer a particular number of injections, but cannot be contractually obliged to give those injections with ‘tender loving care’. A teacher can be contracted to deliver a course of lectures, but availability for hallway conversation - something which motivates students and reinforces the learning process - is essentially voluntary, and something which only the devoted teacher (the teacher with a vocation) is willing to give.²

Frey (1993) developed the notion of ‘intrinsic motivation’ which drives individuals to work harder at an activity than a conventional inspection of the private marginal costs and benefits of effort would predict. Here individuals would exhibit excess morale in the execution of those tasks for which he has a vocation.³

In a similar vein, management theorists have a well-developed model of ‘good soldier syndrome’ (Bateman and Organ (1983), Organ (1988)). “Individuals in organizations exhibit a wide range of behaviors, from the minimalist who does the least possible to maintain membership, to those (good soldiers) who go beyond expectations, engaging in extra-role behaviors that are discretionary, going beyond those measured by formal job evaluations.” (Turnipseed (2002: 2)). In the current setting the assumption we will make will be that particular individuals will engage in such behaviors when matched with tasks for which they have a vocation.

Whilst each individual knows privately whether or not they have a particular vocation the fraction of those in the relevant population who have a vocation will be denoted π and is assumed common knowledge.

Somebody without a vocation applies to become a nurse if and only if

$$w > r_i \tag{1}$$

whereas somebody with a vocation does so if and only if

$$w + v > r_i. \tag{2}$$

Other things being equal, then, somebody with a vocation is more likely to choose this career.

²There may, of course, be scope for performance-related pay to play a motivational role in both of these contexts. Our analysis relates to performance above the maximum contractually enforceable level.

³In the labour market context the primary contention of Frey relates to “the tendency of extrinsic motivation (*e.g.* organizational incentive schemes) to drive out intrinsic motivation (*e.g.* the internal drive to excel at your vocation)” (Rabin (1998: 12)).

Denote as $p(w, \gamma)$ the proportion of applicants that have a vocation given an offered wage w and a particular value of a ‘job content’ variable which we will define and motivate in Section 2. Given that the vocational-status of an individual is assumed unobservable to the employer p will also be the proportion of employed nurses with a vocation.⁴

Ignoring γ (which we will see later equates with holding $\gamma = 1$) we can note that

$$p(w, \gamma) = \frac{\pi.F(w + v)}{\pi.F(w + v) + (1 - \pi).F(w)}. \quad (3)$$

Differentiation with respect to w gives

Proposition 1 *Increasing the wage will decrease the proportion of employed nurses who have a vocation.*

The proof is straight-forward. Differentiating 3 yields

$$\frac{\partial p(w, 1)}{\partial w} = \frac{\pi(1 - \pi)(F(w)F'(w + v) + F(w + v).F'(w))}{D^2}$$

where D is the denominator in 3. This implies that $\partial p(w, 1)/\partial w < 0$ if and only if

$$\frac{F(w + v)}{f(w + v)} > \frac{F(w)}{f(w)},$$

a condition which holds everywhere for any log-concave function.

This is an interesting result, and ‘drives’ the paper. It says that increasing the wage will, other things being equal, reduce the proportion of applicants (and hence employees) who have a vocation. It corresponds to the notion that high wages might attract the ‘wrong sort’ of person. In the current setting - where the ‘right sort’ of person over-performs (compared to what can be ensured by contract) - this matters.

A variety of authors have devised efficiency wage models incorporating mechanisms which imply a (causal) link between increased wages and increased performance. Examples include Summers (1988), Shapiro and Stiglitz (1984) and Yellen (1984). In the model here, in contrast, an increase in w necessarily *reduces* the quality of work done by the average employee.

⁴There may exist screening technologies (interviews, psychometric tests *etc.*) that allow the extent of an individual applicants vocation to be assessed - atleast imperfectly - and we ignore these here.

The mechanism relies on an unconventional self-selection constraint, which we have argued is particular to vocations, whereby *higher* productivity workers tend to have *lower* reservation wages.

It is important to recognize that vocation, as conceived here, is conceptually different to the notions of ‘organizational citizenship behavior’ (OCB, Organ (1988)) or ‘public service motivation’ (PSM, Francois (2000)), under each of which the individual is assumed motivated by organizational output. “Suppose all workers are endowed with PSM. This is an outcome-oriented motivation so the workers do not care who provides the service, and do not get utility from the very act of providing it, rather they care about the service level. ... This is different from an action-oriented motivation under which agents experience an increase in utility just by performing certain actions” (Francois (2000: 276)). These are alternative *ad hoc* behavioral assumptions and whilst outcome-orientation seems plausible in the context of public service ethic more generally, we do not believe it corresponds well with the phenomenon of ‘vocation’. The analogous assumption here would render an individual with a vocation equally happy to work as a merchant banker and then channel the money into the teaching of handicapped children (if an efficient transmission mechanism existed) as to do the equivalent teaching himself. We do not believe that this would capture the usual understanding of the term ‘vocation’ (nor the dictionary definition) which is more action-based - a desire by an individual to be directly engaged in the worthy activity. Our approach is more akin, then, to the Rose-Ackerman’s (1996) action-oriented conception of PSM.

So what? The mechanism itself is potentially interesting in its own right. It also has the potential to generate unfamiliar implications when built into a model of health-care provision. These will depend upon the assumptions made about the structure and objectives of the health provider.

2 Example: Nurses in a monopoly NHS

Suppose there exists a monopoly supplier of health called a National Health Service (NHS).

The supply of nurses is denoted $L(w, \gamma)$ where w is the wage and $0 \leq \gamma \leq 1$ is a job content variable which measures the fraction of a nurses working day spent ‘at the bedside’ (t_b) or in direct contact with patients. The rest of a nurse’s day is spent on other tasks not involving direct contact patient

care which we label ‘administration’ (t_a).

A nurse without a vocation is assumed indifferent between time spent on administration and time spent at the bedside. A nurse with a vocation derives a non-pecuniary vocational premium on (and only on) that fraction of time spent in direct patient contact. Including the job content variable is not essential for the main points that we want to illustrate (those that have regard to wage and quality effects), but does allow us to say something about job design issues in vocational settings Chung and Ross (1977)). If not convinced by the assumption made on job design and vocational reward then the reader can ignore γ .

Inequality 1 remains unchanged, then, whilst 2 becomes

$$w + v.\gamma > r_i. \tag{2'}$$

Both t_a and t_b are assumed valuable inputs to the production of care. Consider Figure 1. The -45° line captures the time constraint for a single nurse. Standard assumptions about the production technology yield convex isocare lines and the point of tangency between one of these and the time constraint imply a care-maximising value of γ for a nurse *of known type*. Significantly, that value of γ will vary by type. In particular, the marginal product of time spent at the bedside is everywhere higher for a nurse with a vocation than for one without such that γ_1 (the care-maximising value given that the nurse in question has a vocation) is greater than γ_0 (the analogous value given that she doesn’t).

We will denote the total production of care by a nurse with a vocation to be $h(\gamma|V)$. Without specifying a particular production technology (though any with standard features would suffice) we will assume that $h(\gamma|V)$ is twice differentiable and monotonically decreasing around γ_1 . We make similar assumptions for $h(\gamma|NV)$ and assume, further, that

$$\frac{d(h(\gamma|V) - h(\gamma|NV))}{d\gamma} \geq 0 \tag{4}$$

It is true by construction that $h(0|V) = h(0|NV)$. The assumption in 4 says that any marginal increase in γ , and hence the proportion of a nurses time spent at the bedside, cannot reduce the productivity advantage of that a nurse with a vocation has over one without. This is reasonable.

We abstract from non-nursing inputs and assume that the NHS hires nurses such as to maximise net production of care subject to an exogenous

budget constraint (this is dual to the problem of minimizing the cost of delivering some externally determined care level).

As noted, the labour-supply constraint will always be binding such that the NHS's problem becomes choosing w and γ to maximise

$$L(w, \gamma) \cdot ((p(w, \gamma) \cdot h(\gamma|V) + (1 - p(w, \gamma)) \cdot h(\gamma|NV))) \quad (5)$$

subject to

$$w \cdot L(w, \gamma) \leq B.$$

The term in big brackets in (5) is the care provided by an average nurse, where that average depends upon the proportion exhibiting a vocation. That proportion is, of course, endogenous, and is sensitive to changes in wage and job content.

We restrict attention to contracts uniform in γ . This is in part motivated by the institutional realities of the NHS in the United Kingdom (and other countries) where nursing terms and conditions are determined centrally. In addition, however, the practicalities of hospital management may preclude a solution in which applicants select amongst a menu of contracts differing in γ . It may be possible to run a hospital such that at any time 60% of nurses are at the bedside and 40% are involved in administration, such that random allocation of daily tasks would mean that over a long enough period (say a year) γ would converge on 0.6 for all nurses. Practicalities, however, may make it impractical to treat individual nurses heterogeneously.

Assuming that the budget constraint binds we can define the Lagrangean

$$G(w, \gamma) = L(w, \gamma) \cdot \Omega(w, \gamma) - \lambda \cdot [w \cdot L(w, \gamma) - B] \quad (6)$$

where

$$\Omega(w, \gamma) = p(w, \gamma) \cdot h(\gamma|V) + (1 - p(w, \gamma)) \cdot h(\gamma|NV)$$

is the average care produced by an employed nurse. The first-order conditions associated with an interior solution to the NHS's problems are:

$$G_w = \frac{\partial L}{\partial w} \cdot (\Omega - \lambda w) + L \cdot \Omega_w - \lambda L \quad (7)$$

$$G_\gamma = \frac{\partial L}{\partial \gamma} \cdot (\Omega - \lambda w) + L \cdot \Omega_\gamma \quad (8)$$

and

$$G_\lambda = B - wL(w, \gamma) = 0 \quad (9)$$

Where, significantly,

$$\Omega_w = p_w \cdot (h(\gamma|V) - h(\gamma|NV)) < 0$$

and

$$\Omega_\gamma = p_\gamma \cdot (h(\gamma|V) - h(\gamma|NV)) + ph_\gamma(\gamma|V) + (1 - p)h_\gamma(\gamma|NV)$$

The first two conditions have some non-standard features. Increasing w increases labor supply, but reduces the proportion with a vocation implying a loss in average productivity ($\Omega_w < 0$). Increasing γ increases labor supply but has a qualitatively ambiguous affect upon average productivity.

The adverse impact of raising wages (and/or cutting γ) impacts, then, upon job design. If γ' is the optimal value of the job content variable taking p as exogenous (*i.e.* assuming $p_w = p_\gamma = 0$, which we will take to be conventional wisdom), we can compare γ' with γ^* by noting that if γ is set to ensure

$$G_\gamma(\gamma') = 0$$

then since

$$G_\gamma(\gamma^*) = G_\gamma(\gamma') + L \cdot p_\gamma \cdot (h(\gamma|V) - h(\gamma|NV)) > 0$$

it must be the case (given the convexity of the problem) that $\gamma' < \gamma^*$.

This provides a foundation for the criticism, often levelled at the NHS in the United Kingdom, that it has been mistaken in redesigning the job of a nurse in such a way that the typical nurse now spends less than half of her time in direct contact with patients (there is a campaign in the UK to ‘let the nurses nurse’). The trend away t_b is said to have reduced morale amongst nurses and lead to lower productivity, and many of the most capable nurses leaving the profession. This is consistent with the story here.

A similar exercise with respect to wages implies that if w is set to ensure

$$G_w(w') = 0$$

then

$$G_w(w^*) = G_w(w') + L \cdot p_w \cdot (h(\gamma|V) - h(\gamma|NV)) < 0,$$

implying that $w' > w^*$. Defining ‘standard analysis’ to be that which proceeds on the basis that vocational-motivation in the workforce is exogenous ($p_w = p_\gamma = 0$), this leads to the following:

Proposition 2 *If nursing is a vocation (in the sense defined) then nurses should be (a) paid less and (b) spend more time ‘at the bedside’ than standard analysis would predict.*

The mechanism is based on the incentives for self-selection into the profession.⁵ Individuals with a vocation over-perform when given the opportunity to do so (when put at the bedside), and enjoy doing so. Decreasing the wage and increasing the proportion of time spent on the vocationally-rewarding activity increases the proportion of individuals applying for nursing jobs who have a vocation.

3 Conclusions

This short paper has provided a simple mechanism for why increasing wages paid to workers in vocation-intensive sectors (such as nursing and teaching) may be more costly than just the additional payroll cost. Other things equal a lowly-paid nurse is more likely to have a vocation, and so over-perform in his role, than a highly paid one. This accords with our intuition that a higher wage may attract the ‘wrong sort’ of person.

The mechanism has implications for the provision of healthcare, as the example in 2 illustrates. It does not suggest that a healthcare organization cannot pay more to attract more nurses, but suggests that there is a cost to so doing in terms of the ‘type’ that will be attracted. It also suggests that raising nursing wages in order to mitigate shortage of supply should become easier as either (a) an applicants ‘vocation’ becomes more readily observable (through psychometric testing, for example) or, (b), the quality of care provided becomes more fully-contractible. It also suggests that a political desire to ‘give more’ to nurses - as many people would like to do - might face a hurdle in terms of efficiency.

⁵It is quite different from the mechanism identified by Francois (2000), for example, where *all agents are identical*. Preston (1989) hypothesises that different *types* of individuals will be likely to be attracted into profit versus non-profit firms.

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