

The Relative Contributions of Wage and Hours Constraints to Working Poverty in Britain

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Abstract: We explore the implications of labour demand constraints on the propensity to experience poverty. Since these constraints can manifest themselves in terms of both prices and quantities, we focus particularly on the relative contributions of underemployment and underpayment. Our analysis suggests that there has been a significant increase in working poverty in Britain over the period 1985-1996, the majority of which can be attributed to underpayment. Underemployment, however, is seen to represent a significant, and increasing, constraint on the ability of employees to escape poverty.

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I. Introduction

In this paper we investigate the effects of labour demand and constraints on an individual's propensity to experience poverty. Although poverty is most often associated with unemployed or otherwise disaffected individuals, it can also impact upon those in work if they are paid especially low wages – a possibility to which the recent minimum pay legislation stands testament. There is another aspect of poverty, however, that has received relatively scant attention amongst economists. Labour demand and constraints can manifest themselves in terms of both prices and quantities, and even relatively well-paid workers can slip into poverty if there is a ceiling on the number of hours they are able to work.

Although in principle the array of employment contracts on offer to a particular worker of given skills could be very large, in practice they tend to be quite small – normally a full-time contract of 35–40 hours per week or a part-time contract of 15–20 hours per week. The question as to why this is the case involves issues regarding the nature of the firm's production process: Many jobs require very precisely defined hours constraints on account of the co-ordination between factor inputs. Such contracts typically specify very clearly where and when workers are expected to be present. For example, a contract for production line workers will be heavily influenced by the fact that the line has an optimum staffing level. Start and finish times will, therefore, be carefully co-ordinated with the operating times of the line. Indeed they are often staggered in order that the flow of production through the line might be matched by the staffing level.

Indeed, for a battery of institutional and / or technical reasons many jobs are characterised by a fixed length working week and there is little scope for employees to adjust their supply of work except by changing job. But changing job is costly and there are relatively few job opportunities available in large sectors of the spectrum of weekly hours. Consequently many individuals are likely to be observed out of equilibrium with respect to their labour supply at any given time [Inakunias and Pudney (1990)].

There are a number of labour market models, as well as mounting empirical evidence, suggesting that employment contracts specify both hours and pay [Stewart and Swaffield (1997),

Dickens and Lundberg (1993), Altonji and Paxson (1992), Kahn and Lang (1991)]. Altonji and Paxson (1992) find evidence which is consistent with the hypothesis that constraints on the choice of hours within individual firms limit the extent to which workers experiencing a change in their marginal rate of substitution between income and leisure are able to change hours of work within a job. Similarly, Kahn and Lang (1991) obtain results that suggest that using actual hours of work causes bias in labour supply estimates. Further evidence supporting the existence of hours constraints and the resulting bias in estimates is documented by Dickens and Lundberg (1993).

In what follows we examine the extent to which such constraints in fact impact upon poverty. Our analysis suggests that there has been a significant increase in working poverty in Britain over the period 1985-1996, the majority of which can be attributed to underpayment. Underemployment, however, is seen to represent a significant, and increasing, constraint on the ability of employees to escape poverty.

The paper is set out as follows: Section II outlines our data whilst Section III discusses some terminology and estimates the proportion of the low paid and underemployed workers who we define as poor. In Section IV we estimate labour supply functions and stochastic frontier earnings equations to measure the extent of underemployment and underpayment for a representative sample of male employees. In Section V, we estimate the potential change in the poverty gap following the elimination of underpayment and underemployment. Final comments are collected in Section VI.

II. Data

Our data are derived from the British Social Attitudes (BSA) Surveys. These are an annual series of surveys initiated in 1983 by Social and Community Planning Research and funded by the Monument Trust. Additional contributions are also made by the Countryside Commission, the Department of the Environment, the Economic and Social Research Council (ESRC), Marks and Spencer Plc, the Nuffield Foundation and Shell UK Ltd. The data are derived from a cross-sectional sample of

individuals, aged 18 and over, living in private households whose addresses were on the electoral registrar.¹

The BSA surveys for the years 1985, 1987, 1990, 1993, 1994 and 1996 ask employees if: (a) they would like to work fewer hours than they are currently working; (b) if they would like to work more hours than they are currently working; and (c) if they are satisfied with their current hours of work and, hence would not like to change these contractual hours. We focus exclusively on male employees, thereby abstracting from participation issues that so occlude female labour supply decisions, and classify those who respond positively to question (b) as underemployed.

Given the time frame of our data we pooled the three earliest (1985, 1987, 1990) and three latest surveys (1993, 1994, 1996) to better highlight how low pay, underemployment and poverty has evolved over the past two decades. All income and wage data are deflated to 1996 values.

III. What do We Mean by 'Poverty'?

Our first task is to define the issue in hand. This is difficult because there is no universally accepted definition of poverty.² At its most abstract, poverty could be used to describe a situation in which a particular social unit is deficient in a particular measure of economic wealth. But there is no consensus as to either the appropriate social unit (e.g. individual, nuclear family, household) and / or measure of wealth (e.g. labour income, money income, expenditure). This opaqueness can have important repercussions for qualitative statements regarding trends in poverty. For example, although the income of the poorest decile of British male employees fell by 18 per cent in real terms over the period 1979-1992, their expenditure rose by 14 per cent [Goodman and Webb (1995)].³

One approach is to compare a scalar measure of a particular social unit's income with a specified poverty line. But again there is no agreement as to where this line should be set. An 'absolute' measure could be constructed according to the resources requisite to buy what is considered to be a 'minimum' basket of goods and services. The income level constituting this

¹ For an extensive discussion of the BSA surveys see Blanchflower (1991).

² See Atkinson (1987) for review of poverty concepts and methods of measurement.

³ A related issue here concerns the sharing of resources among members of the unit of analysis. It is customary to assume that income is redistributed equally within the family unit. However, an alternative assumption is that redistribution does not occur and that any sharing is minimal.

minimum', however, is debatable. Joseph and Sumption (1979), for example, argue that '... a family is poor if it cannot afford to eat.' Indeed, since food is a fundamental necessity, a traditional starting-point in poverty analysis has been to calculate the level of income requisite to purchase a 'nutritionally adequate' diet and to adjust this figure to allow for expenditures on non-food necessities. Poverty is then defined as the inability of income to meet requirements. This so called budget standard approach has a long history in the UK, having been adopted in the pioneering studies of Rowntree (1901).⁴

A related approach is the food ratio method based on Engel's (1895) observation that the share of total income spent on necessities tends to fall with income. The proportion of income spent on food (or necessities more generally) may therefore be used as a poverty yardstick, with a household being regarded as poor where necessities account for a large part of its total expenditure. This method differs from the budget standard approach in that no attempt is made to define 'nutritional adequacy' and is used in Canada as the basis for the 'Low Income Cut-Offs' presented in official statistics.

If poverty is related to society's views about an acceptable standard of living then one approach to determining a poverty line is to assess popular views on this issue on the basis of large-scale surveys. A variety of methods have been adopted, including asking respondents to specify the incomes that hypothetical families would need to reach a certain standard of living. The answers to these questions are then used to link welfare levels with incomes. Finally, a 'critical' welfare level is selected and mapped onto a corresponding income level and that income level is then used as a poverty line. An example of such consensual approaches is Van Praag et al. (1982). Others regard this definition as too stringent. Lansley and Mack (1985), for example, measure poverty by asking respondents what they thought 'poor' people should be able to afford, and defining as poor those with insufficient resources to meet these demands.

An alternative is to set the line according to the prevailing social security system and to define a unit as poor if its income falls below the minimum benefit allowances available [Abel-Smith

⁴ A contemporary and somewhat broader approach is adopted by Lansley and Mack (1985) who focus on the ability of individuals to consume 'socially defined necessities'. These may include the ownership of consumer durables or even the ability to participate in a hobby or leisure activity.

and Townsend (1965)]. Since these allowances represent the level of income that society, via the government, is prepared to provide they are perhaps the closest approximation to a socially approved definition of poverty. However, schemes such as income support are generally increased in line with inflation rather than assessed for their ability to meet expenditure needs. The setting of benefit rates is not made purely on basic human requirements, with issues such as work incentives, political climate and normative judgments of relative merit also affecting the decision.

Perhaps the least contentious way forward is to adopt a relative measure whereby the poverty threshold is defined as a certain percentage of median or mean household income [Blackburn (1993), Buhman et al (1988), Forster (1994), O'Higgins and Jenkins (1990)]. Moreover, to control for the multi-dimensionality of welfare and the heterogeneity of individuals, income is generally 'equivalised' to control for characteristics that proxy the exigency of demand – for example family size, composition, location and health. The equivalised income for an individual i can be expressed as:

$$Y_i = \frac{X_i}{E(C_i)} \quad (1)$$

where X_i denotes individual i 's household income, C_i individual i 's household characteristics, and E the equivalence scale as a function of i 's household characteristics.⁵ In what follows we adopt the equivalence scaling method used by the OECD (1982) which equivalises for household expenditure needs using the weighting system for household composition set out in Table I below.

Table I: Equivalence Scale Details

Household Member	Weight
Single adult	1.00
Second and subsequent adults	0.70
Each child	0.50

Note: A child is classified as someone under 14
Source: OECD (1982)

⁵ It is apparent that that empirical results are critically dependent on the equivalence scale chosen. The adoption of an inadequate scale may well misrepresent the true overlap between low pay and poverty. The composition of those defined as poor could also be affected. This is supported by Whiteford's (1985) comparison of the method in which equivalence scales adjust the income of a single person, a couple and a couple with two children are treated. Assuming that a couple's income is not adjusted, a single person's calculated equivalised income varies between 49% and 94% of his/her actual income. For a couple with two children, the equivalised income ranges from 111% to 193% of their actual income.

Adopting the above weights the equivalence scale can be expressed explicitly as:

$$E(C_i) = 1 + 0.7A_i + 0.5D_i \quad (2)$$

where A_i denotes the number of other adults and D_i the number of children in individual i 's household. Using this scale, a household with two adults and three children is equivalent to 3.2 adults. We also follow the OECD (1982) in defining male working poverty as equivalised household income below two-thirds of the median overall equivalised household income for any particular year. Similarly, we define 'low pay' as a wage below two-thirds of the median overall wage for each specific year.

Summary statistics, based on (1) and (2) above are set out in Table II. It is apparent that there has been a substantial increase in working poverty and in the proportion of the low paid therein across the two time frames.⁶ Reported underemployment, however, has remained relatively constant.

Table II: Poverty, Low Pay, and Underemployment
Sample: Male Employees

	Period One %	Period Two %
Poverty	6.0	11.3
Low Pay	9.9	13.9
Underemployment	3.9	4.2
% of those in Poverty who are:		
Low Paid	30.6	42.1
Underemployed	10.0	11.9

Note: Period One - 1985, 1987, 1990; Period Two - 1993, 1994, 1996

A common weakness with all poverty line approaches is their 'lumpiness' in ascribing poverty affliction. As Watts (1968) points out:

'Poverty is not really a discrete condition. One does not immediately acquire or shed the afflictions we associate with the notion of poverty by crossing any particular income line' [Watts (1968), p.325]

Alternative measures of poverty take into account the 'poverty gap' - the extent by which an individual's income falls short of the poverty threshold - and therefore offer some control over the intensity of poverty. The Foster Index [Foster et al. (1984)], for example, is defined as:

⁶ For a range of poverty lines, Jenkins and Lambert (1997) find that poverty has increased between 1979 and 1988/89.

$$P(a) = \frac{1}{N} \sum_{i=1}^I \left(\frac{g_i}{\tilde{z}} \right)^{(a-1)} \quad (3)$$

\tilde{z} denotes the imputed poverty line (eg. two-thirds of median overall equivalised income), $g_i = \tilde{z} - y_i$, $\forall y_i < \tilde{z}$, the 'poverty gap' for 'poor' respondent i , and y_i the net equivalised income for 'poor' respondent i . N denotes the total population, I the number of 'poor' households (i.e. those with equivalised income below the imputed poverty line \tilde{z}), and a the welfare judgement attached to the magnitude of g_i . By substituting specific values for a , the following special cases of this index can be derived:

$$P(1) = \frac{I}{N} \quad (4)$$

$$P(2) = \frac{I}{N} \left(\frac{\bar{g}}{\tilde{z}} \right) \quad (5)$$

where $\bar{g} = I^{-1} \sum_{i=1}^I g_i$ denotes the average poverty gap of those in poverty. Equation (4) is simply a measure of poverty using the threshold procedure whilst equation (5) defines the average shortfall as a proportion of the poverty line multiplied by the headcount ratio. For cases when $a > 2$ the index also considers distributional aspects, with more weight being attached to the largest relative poverty gaps. As $a \rightarrow \infty$, the index approaches the 'Rawlsian' poverty measure where only the position of the poorest household is considered. The Foster Index therefore encompasses poverty measures that attach welfare judgements to the magnitude of poverty gaps.⁷

Another advantage of the Foster Index is that it is additively decomposable with the aggregate poverty measured as the weighted average of subgroup poverty. For example, assuming the population can be divided into J subgroups, the Foster index can be expressed as:

⁷ Sen (1976, 1979) proposes that any poverty measure should satisfy the following axioms. The poverty measure must increase as the income of the poorest household is reduced (the monotonicity axiom). An income transfer from a poor household to any other household that is richer should increase the poverty measure (the transfer axiom). Kundu and Smith (1983), however, question the desirability of the transfer axiom. The Foster index satisfies the monotonicity axiom when $a > 0$ (i.e. when this is satisfied, g_i increases as y_i falls). The transfer axiom is also satisfied when $a > 1$.

$$P(a) = \frac{1}{N} \sum_{j=1}^J n_j P_j(a) \quad (6)$$

where:

$$P_j(a) = \frac{1}{n_j} \sum_{k=1}^{K_j} \left(\frac{g_k}{\tilde{z}} \right)^{(a-1)} \quad (7)$$

where K_j denotes the number of poor households in sub-group j and n_j the number of individuals in subgroup j . The percentage of a sub-group that are considered poor, L_j , is then calculated as:

$$L_j = P_j(a) 100\% \quad (8)$$

Defining underemployed and low-paid workers as sub-groups, the contribution of either to total poverty can be measured as:

$$O_j = \frac{n_j P_j(a)}{N P(a)} 100\% \quad (9)$$

Table III sets out summary statistics based on (9) above with a set to 1 and 2 for comparison:

Table III: Working Poverty, Underemployment and Low Pay
Sample: Male Employees

	Average Poverty Gap (£)	Contribution of the Low Paid to Poverty (%)		Contribution of the Underemployed to Poverty (%)	
		a=1	a=2	a=1	a=2
Period One	1203	51.0	61.3	11.8	13.9
Period Two	3136	51.9	51.1	15.6	15.8

It is apparent that the average poverty gap has increased markedly in real terms over the two time periods. Although 'low-paid' respondents represent the majority of the working poor, their contribution to overall poverty has increased marginally (by 1.8 per cent) in the $a = 1$ case, whilst actually falling (by 16.6 per cent) when $a = 2$. In contrast, the contribution of the underemployed has increased unequivocally over the two time periods, by 32.2 per cent when $a = 1$ and by 13.7 per cent when $a = 2$.

IV. The Extent of Underemployment and Underpayment

We now investigate the relative contributions of underemployment and underpayment to working poverty in Britain. Underemployment is analysed by estimating a desired hours of work equation whilst underpayment is explored by analysing a wage equation estimated by stochastic frontier techniques.

Underemployment

The supply of labour of a representative individual i is generally measured by modelling the relationship between actual hours worked, h_i , and a vector of explanatory variables:

$$h_i = AX_i + e_i \quad (10)$$

where $e_i \rightarrow N(0, \sigma_e^2)$ is an iid. random error term. Our focus, however, is to measure unconstrained (or desired) hours, h_i^* . Our presumption is that individuals have a minimum hours requirement, m_i , vis. the minimum number of hours necessary to meet their expenditure needs. Hence, we only observe desired hours if actual hours are greater than or equal to the minimum hours requirement.

$$h_i = \begin{cases} h_i^* & \text{if } h_i \geq m_i \\ h_i & \text{otherwise} \end{cases} \quad (11)$$

Given that we do not observe h_i^* for individuals declaring themselves to be underemployed, OLS estimation using h_i is inappropriate since the truncated nature of the dependent variable would lead to biased results. Sample selection techniques are, therefore, appropriate.

Although we do not observe m_i , following Breen (1996), we assume they may be written as:

$$m_i = BZ_i + h_i \quad (12)$$

where Z_i denotes a vector of observed variables which capture labour supply preferences and $h_i \rightarrow N(0, \sigma_h^2)$ is an i.i.d. random error. The probability of observing non-constrained hours is thus:

$$\Pr(h_i \geq h_i^*) = \Pr(h_i - BZ_i \geq h_i) \quad (13)$$

We therefore have an endogenous selection problem, with the observation of non-constrained hours and underemployment reporting determined simultaneously.

To correct for the censored sample, maximum likelihood estimation is used to model non-constrained hours. The likelihood function for this model has two parts. Those reporting underemployment contribute a term related to the probability that the minimum hours requirement exceeds actual hours:

$$\Pr(h_i < m_i) = \Pr(AX_i + e_i < BZ_i + h_i) = \Pr(h_i - e_i > AX_i - BZ_i) \quad (14)$$

The term $h_i - e_i$ is normally distributed with variance:

$$s^2 = s_h^2 + s_e^2 - 2s_{eh} \quad (15)$$

where s_{eh} defines the covariance between e_i and h_i . Thus we can simplify (14) to:

$$\Pr(h_i < m_i) = \Phi\left(\frac{BZ_i - AX_i}{s}\right) \quad (16)$$

where $\Phi(\cdot)$ denotes the univariate standard normal conditional density function. Following Maddala (1992), the contribution of individuals not reporting underemployment to the likelihood is:

$$\sum_{i \in K} \left[\log \frac{1}{\sqrt{2\pi s_e^2}} - \frac{1}{2s_e^2} (h_i^* - AX_i)^2 + \log \Phi(\Theta) \right] \quad (17)$$

where it is assumed that K individuals out of a population of size N report themselves as being either overemployed or satisfied with their hours:

$$\Theta = \frac{s_e^2}{s_h^2 s_e^2 - s_{eh}^2} \left[(h_i^* - BZ_i) - \frac{s_{eh}^2}{s_e^2} (h_i^* - AX_i) \right] \quad (18)$$

The complete log-likelihood for the model is then the sum of (16) for those content with their hours or overemployed, and (17) for those reporting underemployment.

Table IV : Estimated Desired Hours Equations

Variable	Period One				Period Two			
	OLS		Corrected		OLS		Corrected	
	Coef.	T-Stat	Coef.	T-Stat	Coef.	T-Stat	Coef.	T-Stat
Constant	38.461	16.298	43.483	16.890	36.375	14.662	39.670	15.099
Log NetWage	-5.687	-11.891	-5.730	-13.571	-4.743	-11.503	-5.249	-14.709
Non Labour Income	-1.850	-7.098	-1.748	-8.201	-1.507	-6.935	-1.547	-10.898
Age	0.921	6.980	0.725	5.321	0.803	6.003	0.737	5.386
Age Squared	-0.012	-7.221	-0.010	-5.869	-0.010	-6.095	-0.009	-5.643
Married	2.112	3.653	2.183	3.962	1.409	3.023	1.344	2.824
Union	-2.426	-5.691	-2.017	-4.457	-0.796	-1.926	-0.480	-1.054
s	-	-	8.729	75.937	-	-	8.722	100.51
$r = s_{eh}/s_e s_h$	-	-	-0.773	-11.646	-	-	-0.570	-5.785
R-Squared	0.123				0.088			
Standard Deviation	8.672				8.701			

Note: The net wage measure is adjusted for marginal rates of income taxes and personal allowances whilst non labour income is proxied by subtracting the respondent's earnings from household income.

Table IV presents the results obtained by employing the estimation procedure outlined above. The underlying sample selection probit analysis is set out in the Appendix. Two sets of estimates are presented for comparison purposes for each time period – OLS estimates and estimates corrected for sample selection bias.

The results across the two time periods are reasonably robust with the estimated coefficients for period one being generally somewhat larger in magnitude. The results support an inverse relationship between desired hours and both netwages and non labour income and as such would

suggest the presence of a dominant income effect. There is a concave relationship between age and desired hours whilst being married (member of a trade union) exerts a positive (negative) influence on desired hours.

Underpayment

Labour markets are typically characterised by imperfect information as regards both the availability of job opportunities and the time needed to successfully form an employer-employee match. Such frictions would suggest that workers adopt reservation wage strategies, whereby only wage offers exceeding the reservation wage are accepted [see, for example, Mortensen (1986) and Lippman and McCall (1976)]. The reservation wage is determined by equating the marginal benefits and marginal costs associated with further increments to the reservation wage. The potential reward for a higher reservation wage is increased lifetime earnings once employment is secured. A higher reservation wage, however, compels the searcher to higher foregone earnings and search costs associated with the higher expected duration of unemployment. One implication of this dynamic monopsony situation is that employees will be paid a wage below the maximum (vis. potential) wage, \hat{w} , implied by their human capital attributes.

Although these \hat{w} are unobserved, we may derive an estimate of them via stochastic frontier techniques. Hedonic wage equations, relating earnings to human capital characteristics, are commonly estimated using the following form at:

$$\ln w_i = \sum_{j=1}^J a_j x_{ij} + m_i = ax_i + m_i \quad (19)$$

where $ax_i = \sum_{j=1}^J a_j x_{ij}$, $i=1,2,\dots,n$, x_{ij} is the value of human capital characteristic j for individual i , w_i is the wage of individual i and $m_i \rightarrow N(0, \sigma_m^2)$ is an i.i.d. random error term. Estimation of this stochastic relationship yields an estimate of the expected value of the dependent variable, w_i , for a given level of the independent variable x_i . The stochastic frontier technique, however, provides a method of obtaining the maximum rather than mean value of the dependent value for individual i . This maximum is established by adjusting (19) such that:

$$\ln w_i = \sum_{j=1}^J a_j x_{ij} + c_i + f_i \quad (20)$$

$c_i \rightarrow N(0, \sigma_c^2)$ is an i.i.d. random error term and $f_i \leq 0$ is a one-sided error term with variance, σ_f^2 . The stochastic wage frontier for individual i can, then, be written as:

$$\ln w_i^s = \sum_{j=0}^m a_j x_{ij} + c_i \quad (21)$$

where the two-sided error term, c_i , reflects an individual's unobserved characteristics. For instance, c_i will be negative for workers who place a relatively high value on non-pecuniary job characteristics such as good work conditions.

The degree of underpayment is captured by the one-sided error term, f_i , so that the individual receives his potential wage if f_i equals zero. For workers that terminate job search before they are offered their potential wage, the wage frontier can be expressed as:

$$w_i = \exp\left(\sum_{j=0}^m a_j x_{ij}\right) \cdot \exp(c_i) \cdot \exp(f_i) \quad (22)$$

Assuming f_i is exponentially distributed, the expected ratio of actual wage to potential wage for any group with given characteristics can be expressed as:

$$E\left(\frac{w_i}{w_i^s}\right) = E[\exp(f)] = \frac{1}{(1 + m_f)} \quad (23)$$

where m_f represents the sample mean of f .

Dynamic monopsony theory assumes that firms post wage offers and workers react by freely moving among employers in response to the permanent wage offer differentials. It is unlikely that the wage characteristics of unionised sectors, where wages are determined by a bargaining process, will mimic the non-unionised search firm work. Further, unions may be able to directly provide information regarding the reservation wages of their members. This information can alter the equilibrium wage conditions that result from search theory. The analysis is therefore conducted for both a non-union member sample and a sample of all workers for purposes of comparison. The results from the stochastic frontier analysis are presented in Table V below.

Table V: Stochastic Frontier Analysis of Underpayment

Period One

Period Two

Variable	Non-Union Workers		All Workers		Non-Union Workers		All Workers	
	Coeff	T-Ratio	Coeff	T-Ratio	Coeff	T-Ratio	Coeff	T-Ratio
Constant	-0.008	-0.060	0.224	2.436	0.145	0.848	0.411	3.245
Years of Education	0.069	10.046	0.061	12.361	0.071	8.365	0.063	9.990
Experience	0.029	7.500	0.027	9.786	0.029	6.668	0.033	9.864
Experience Squared	-4.4 _{E-4}	-5.740	-4.3 _{E-4}	-7.888	-4.3 _{E-4}	-5.216	-5.4 _{E-4}	-8.224
Spouse	0.185	5.091	0.184	7.748	0.098	3.432	0.077	3.392
Children	0.005	0.343	0.005	0.537	0.000	0.025	0.000	-0.006
Asian	-0.177	-1.654	-0.261	-4.193	-0.266	-3.434	-0.242	-3.885
Afro-Caribbean	-0.109	-1.388	-0.119	-2.127	-0.182	-1.591	-0.234	-2.774
Other	-0.022	-0.138	-0.016	-0.142	-0.129	-1.348	-0.098	-1.130
Professional	0.427	9.659	0.378	12.253	0.518	12.426	0.532	16.513
Clerical	0.285	5.482	0.224	6.175	0.210	4.307	0.202	5.030
Skilled Manual	0.168	3.880	0.147	5.032	0.184	4.237	0.215	6.836
Semi-Skill Manual	0.040	0.718	0.000	-0.013	0.035	0.709	0.035	0.987
Scotland	-0.111	-2.138	-0.104	-2.906	-0.093	-1.607	-0.116	-2.745
North East	-0.162	-2.611	-0.112	-2.876	-0.083	-1.247	-0.118	-2.394
North West	-0.258	-3.990	-0.194	-5.655	-0.170	-3.032	-0.137	-3.275
Yorks/Humber/Seaside	-0.217	-3.448	-0.175	-4.729	-0.152	-2.688	-0.154	-3.603
West Midlands	-0.192	-3.939	-0.202	-6.101	-0.139	-2.555	-0.124	-2.899
East Midlands	-0.170	-2.611	-0.188	-4.920	-0.114	-1.951	-0.078	-1.819
East Anglia	-0.125	-2.063	-0.179	-4.026	-0.095	-1.316	-0.032	-0.576
South West	-0.251	-4.703	-0.226	-6.343	-0.078	-1.482	-0.096	-2.226
South East	-0.086	-2.030	-0.089	-3.102	0.023	0.526	0.016	0.445
Wales	-0.224	-3.410	-0.230	-5.309	-0.231	-2.872	-0.208	-3.422
1989	0.171	5.442	0.135	6.597	-	-	-	-
1990	0.230	7.139	0.166	7.749	-	-	-	-
1994	-	-	-	-	0.015	0.435	0.010	0.399
1996	-	-	-	-	0.168	5.266	0.138	5.703
Union Member	-	-	0.064	3.698	-	-	0.126	6.049
Ratio ¹	84.20		85.28		78.76		80.86	
N	882		1710		1072		1871	

Note: 1. Average percentage of actual to potential wage.

In general, our results accord with a priori expectations – hence we will only comment on them briefly. A cross both time periods and across both sets of specifications, education is positively associated with wages. Labour market experience impacts concavely on wages. In addition, occupational status appears to be a key determinant of wages. Finally, there are only very marginal differences between the estimates calculated for the ‘all worker’ and ‘non-union worker’ samples.

IV. Underemployment, Underpayment and Working Poverty

We now use the regression estimates obtained in Section III to simulate the effects of eliminating underpayment and underemployment on working poverty in Britain.

Table VI below sets out actual and simulated poverty rates for periods one and two. The actual poverty rates are those reported in Section II (i.e. with poverty defined as 'equivalised' income below two-thirds of median overall equivalised income). The simulated rates are calculated using the actual income distribution for scenarios under which respondents are paid their capacity wage or are free to work their desired number of hours.⁸

Table VI: Actual and Predicted Working Poverty Rates

	Period One	Period Two
Working Poverty Rate (WPR)	6.0	11.3
WPR with Underpayment Elimination ($w_i = w_i^s$)	4.3	8.5
WPR with Underemployment Elimination ($h_i = h_i^*$)	5.4	10.4

The results suggest that eliminating underpayment has a more substantial impact on the reduction of estimated working poverty. Eliminating underpayment (underemployment) reduces the average poverty gap in periods one and two by 28.3 (10.0) and 24.8 (8.0) per cent respectively. These differences are perhaps not altogether surprising – the relatively low incidence of underemployment means that few people will benefit from its elimination.

Table VII extends our analysis to investigate the effects of eliminating underemployment and underpayment on the poverty gap, and on the contributions to the working poverty rate (WPR) of those respondents initially deemed to be 'low paid' or 'underemployed'.

Table VII: The Poverty Gap

	Period One		Period Two	
	a = 1	a = 2	a = 1	a = 2
Raw Data ¹				
Average Poverty Gap (£)		1203		3136
Contribution of 'low paid' to WPR (%) ²	51.0	61.3	51.9	51.1
Contribution of 'underemployed' to WPR (%) ²	11.8	13.9	15.6	15.8
Elimination of Underpayment ($w_i = w_i^s$)				
Average Poverty Gap (£)		1084		3159

⁸ Desired hours are derived from the regression results, corrected for sample selection bias, set out in Table IV. The potential wage is based on the 'all worker' stochastic frontier estimates set out in Table V. We assume that workers supply the same number of hours (receive the same wage) when they are paid their potential wage (allowed to work their desired hours). Moreover, no reference has been made to other earners in the household. For example, if working spouses are also underpaid, correction for this is likely to further reduce the poverty rate.

Contribution of 'low paid' to WPR (%)	61.6	68.9	58.5	55.3
Elimination of Underemployment ($h_1 = h_1^*$)				
Average Poverty Gap (£)	1171		3238	
Contribution of 'underemployed' to WPR (%)	4.1	4.2	10.1	14.2

Notes:

1. Raw Data taken from Table III.
2. 'Low paid' ('underemployed') workers are those respondents originally designated as such in Section II.

The results are now somewhat more esoteric. The elimination of underpayment (underemployment) reduces the average poverty gap in period one by 9.9 (2.7) per cent. In period two, however, the elimination of both underpayment and underemployment raise the gap – by 0.7 and 3.3 per cent respectively.

In terms of the relative contributions to working poverty the results are even less clear. The elimination of underemployment reduces the contribution of those respondents originally deemed to be underemployed in both periods, acutely so in period one – by 65.3 ($a = 1$) and 69.8 percent ($a = 2$) in period one, and by 35.3 ($a = 1$) and 10.1 percent ($a = 2$) in period two.

In contrast, the elimination of underpayment actually raises the contribution of those respondents originally deemed to be 'low paid' in both periods – in period one by 20.8 ($a = 1$) and 9.9 percent ($a = 2$), and in period two by 12.7 ($a = 1$) and 8.2 percent ($a = 2$). The non 'low paid' working poor will also benefit from the elimination of underpayment, and it is quite possible that their contribution to working poverty will be reduced by more than that of their 'low paid' counterparts. Indeed, 'low paid' workers will include individuals with severe poverty gaps, and the elimination of underpayment may be insufficient for any of these to escape poverty.

Such findings raise concern as to the effectiveness of the minimum wage as a poverty alleviation device. Proponents of the minimum wage argue that labour market frictions and underpayment are sufficiently endemic to immunise the economy from any undue unemployment effects that might result from the instigation of such a wage. Our results suggest that underpayment is perhaps not as widespread or as deep rooted as previously envisaged and cast some doubt on the ability of the minimum wage to alleviate poverty.

V. Final Comments

In this paper we have explored the implications of labour demand constraints on the propensity to experience poverty. Since these constraints can manifest themselves in terms of both prices and

quantities, we have focused particularly on the relative contributions of underemployment and underpayment.

Our analysis suggests that there has been a significant increase in working poverty in Britain over the period 1985–1996, the majority of which can be attributed to underpayment. Underemployment, however, is seen to represent a significant, and increasing, constraint on the ability of employees to escape poverty.

In terms of policy, the hypothetical elimination of underpayment and / or underemployment is seen to reduce the working poverty rate over this period. Their elimination also reduces the average poverty gap in the early part of this period (1985, 1987, 1990) whilst increasing it in the latter part (1993, 1994, 1996). In terms of the effects on those respondents within our sample originally deemed to be 'low paid' or 'underemployed', it is seen that perhaps the elimination of underemployment is preferable. Particularly in the early part of our study, allowing those respondents deemed to be supply constrained to work their preferred hours (whilst earning the same wage rate) reduces their contribution to the working poverty rate by approximately 67 per cent. In contrast, allowing those respondents deemed to be 'low paid' to earn their potential (i.e. stochastic frontier) wage (whilst supplying the same number of hours) actually raises their contribution to the working poverty rate. Such findings may imply that the extent of underpayment within the UK labour market is not as widespread as previously envisaged, and may cast some doubt on the ability of the minimum wage to alleviate poverty.

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Appendix

Table A I
 Probit Results
 Dependent Variable = Work Desired Hours

Variable	Period One		Period Two	
	Coefficient	T statistic	Coefficient	T statistic
Constant	-1.363	-3.176	-0.956	-2.572
Non-working spouse	-0.324	-1.747	-0.317	-1.817
Working spouse	0.052	0.293	0.016	0.094
Age	0.018	2.988	0.021	3.683
W age perceived to be low	-0.280	-2.196	-0.404	-3.381
Expected income growth	0.007	0.054	-0.082	-0.621
Expected firm size reduction	-0.034	-0.225	-0.092	-0.690
Divorced	0.172	0.383	-0.395	-2.112
Union member	0.151	1.123	0.03	0.300
Professional	0.791	4.204	0.625	3.903
Clerical	0.369	1.662	0.336	1.649
Skilled Manufacturing	0.051	0.338	0.080	0.538
Hours	0.057	6.284	0.051	6.688
Log-Likelihood	-232.690		-265.389	
Restricted Log-Likelihood	-282.720		-327.326	
Chi Squared Statistic	100.604		123.873	
Pseudo R-Squared	0.392		0.383	
Number of Observations	1710		1871	