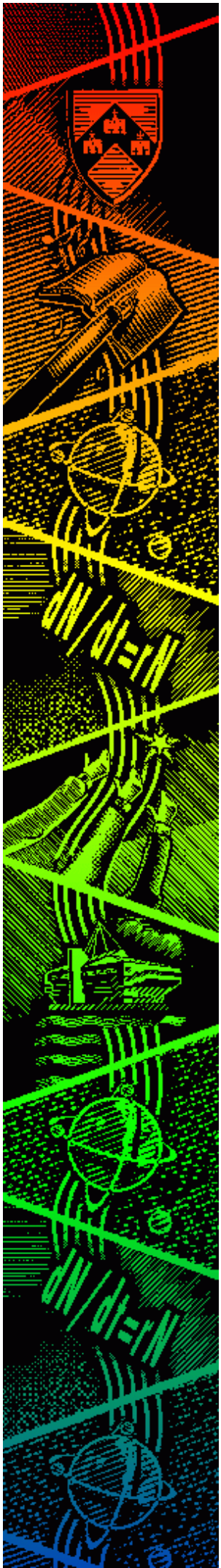

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Preferences and labor supply effects of benefits: the case of income-based Jobseeker's Allowance

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Preferences and labor supply effects of benefits: the case of income-based Jobseeker's Allowance.

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Abstract

The UK income support system offers a guaranteed income level to single adults available for full time work so long as both earnings and hours worked are below a threshold level. In this paper we examine the effects of this on labour supply. We show that the restriction on hours worked is irrelevant to the household choices and will never bind. We then look for conditions on preferences under which it is possible to order households by preferences or the wage in such a way that all claimants are lower in the order. If there is a common wage and preferences satisfy a single crossing condition property there is such an ordering in which the most work averse are claimants. If preferences are common but the wage rates are heterogeneous then if preferences are quasilinear in leisure there is also an ordering with low wage households being claimants. With both wage rate and preferences heterogeneity these restrictions need to be combined to monotonically order the population.

JEL refs: J38, I38, H31
Keywords: unemployments benefit, shirkers, labour supply

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It is widely recognised that fiscal support programs designed to provide a safety net for unemployed or low wage individuals can have incentive effects on labour supply . Programs like means tested lump sum transfers, negative income taxes or workfare programmes can induce nonconvexity or nonsmoothness of the budget set. This can generate poverty trap phenomena where some groups of individuals in a heterogeneous population voluntarily choose to reduce their labor supply in order to just maintain eligibility for benefit. This cannot represent a desirable outcome for a government whose target is to guarantee a minimum income level in the most efficient way. Benefit schemes like these distort the relation between individual marginal rates of substiution for leisure and consumption and the real wage, raising the number of claimants and the fiscal cost of the benefit scheme. A desirable system would also be monotonic in that initially low income individuals (either because they are of low productivity or a low preference for consumption relative to lesiure) should be induced to claim and high ones should not. It is essential from a social welfare point of view to understand how heterogeneous individuals, differing in preferences or wage rates, would behave facing this type of benefit scheme in terms of both the choice of hours for workers and of participation. The importance of the specific utility function in determining the labor supply choice of heterogeneous individuals in this kind of setting has been long recognised, but we know of no attempt to investigate which restrictions on individual preferences are associated with different types of labour supply choices.

The main pupose of this paper is to determine qualitative restrictions on preferences under which a typical income support scheme will be monotonic: the population can be divided into low wage and/or high leisure preference types who claim and high wage and/or high consumption preference types who will not. Earlier work usually used highly specific functional forms for preferences in which there is a single parameter whose value divides up behaviour into different regimes. We use qualitative restrictions on preferences doing the same thing but without the need for specific functional forms.

In this note we consider income-based Job Seeker's Allowance, the principal UK fiscal support measure for the unemployed, which consists of a lumpsum transfer, eligibility for which depends on labour income and on hours worked. We examine the impact of this income support system on labour supply decisions of young single adult households in three scenarios: for a group of individuals with heterogeneous preferences but who all face a common wage; for a group who have common preferences but with heterogeneity in the wage and finally for a group with heterogeneity both in the wage and in preferences. Predictability of which individuals will claim benefit is relevant to social welfare because it determines both the aggregate labour supply response and the cost to the government of the benefit scheme. It also reveals whether the benefit is actually achieving its underlying aim of assisting lower income individuals.

We show that in each case the hours constraint on eligibility for income support is irrelevant to labour market decisions and to the population of claimants since exactly the same people will claim benefit whatever the level of the hours constraint. This raises the question of why the government wishes to use the

system in this form. In the case of preference heterogeneity with a common wage, we show that if individual preferences satisfy a single crossing property there will be a unique critical claimant who is indifferent between claiming or not. This claimant divides preferences of the population into two groups: those who choose hours of work and consumption to be ineligible for the benefit (with flatter preferences and a stronger taste for consumption) and those who choose to be claimants (with steeper preferences and a stronger preference for leisure). The single crossing property could arise for various reasons, it could be that innately individuals differ in their "laziness", it could be that they are in different sociodemographic positions generating different costs of working (e.g. number of children). A common way of modelling preference heterogeneity of the latter kind is to assume that all individuals have a common utility function depending on consumption and leisure in excess of subsistence levels, with the latter varying by individual according to sociodemographic status. This type of preference heterogeneity can also generate single crossing. With wage heterogeneity but common preferences we show that it may not be possible to divide the wage distribution at a single point below which all lower wage individuals are claimants and above which none seek the benefit. However if preferences are quasilinear in leisure or if the threshold level of disregarded income is set to zero then it is possible to predict unambiguously that high wage individuals will be non-claimants and low wage individuals claimants. With both wage and preference heterogeneity we can combine these restrictions on preferences so that if preferences are both quasilinear and satisfy single crossing, assuming lower wage individuals having steeper indifference curves, then claimants will exclusively come from the lower part of the wage distribution.

The presence of capital or nonlabor income brings a further source of individual heterogeneity. Nevertheless data on young sigle households show their level to be too low to significantly affect the analysis.

After a brief literature review, the plan of the paper is to outline the detail of the income based JSA system in Section 1, show irrelevance of the hours constraint in Section 2 and then to analyse its effects on labour supply and consumption with preference heterogeneity (Section 3), wage heterogeneity (Section3) or both (Section 4).

1 Literature review

Connections between the welfare system and the labour supply of the population potentially affected by such programs have been widely researched (Moffitt 1992, Dazinger Haveman and Plotnick 1981). The main issue concerns incentive effects of the tax-benefit system on labour market participation (extensive margin) and on hours worked (intensive margin) with special focus on low income individuals (Heckman 1993, AER). The reason for a joint approach to labour market behaviour and participation in welfare transfer programs is that when dealing with means tested benefits, eligibility ultimately depends on personal

resources including labor earnings. Individuals can alter their labour market behaviour in order to become eligible for government transfers. In a basic static framework of labour supply, the presence of a tax-benefit system alters the standard budget constraint introducing nonlinearities, due to progressive earnings taxation, and nonconvexities, due to government transfers or allowances. When indifference curves are continuous and convex, convexity of the budget set guarantees the existence of a unique optimum labor choice and continuity of the labor supply function, even though it may not be differentiable at kink points in the budget constraint. In a non-convex budget constraint framework, the optimal labor decision need not to be unique and multiple tangencies can occur, raising the need for an explicit consideration of the underlying utility function (Hausmann1985). In fact, since the reservation wage theory cannot be employed, utility maximization has to be perfomed for each of the budget constraint segments in order to find local solutions; the maxima maximorum is then obtained by comparison of the indirect utility function for each of the local solutions . Moreover, as long as indifference curves are convex, there exist neighbourhoods in the nonconvex part of the budget set which never contain a global optimum (Burtless and Hausmann 1978) whose size and location depend also on the underlying utility function. Individuals optimal choices are expected to be driven to more extreme positions tending to "convexify" the budget set (Moffitt 2002).

Another related issue regards the chance of non take-up of benefit when pecuniary (information, reporting, application) and non pecuniary (stigma) costs act as deterrents to welfare participation for eligible individuals (Ashenfelter 1983). It has been recognised that actual take up of benefit by eleigible individuals should be determined endogenously, jointly with the labour supply response of the target population (Moffitt 1983; Moffitt and Keane 1998) . When individuals are not indifferent between private and welfare income, two distinct kinds of nonparticipants arise: those preferring an amount of earnings too high to pass the means-test and those who are eligible but who nevertheless prefer not to participate. In such a case an individual initially ineligible will drop below the means test only when the gain in utility from extra leisure outweighs both the potential income loss and the participation costs.

Further extensions of the basic static model have included dynamic considerations concerning the life-cycle (Blundell and MaCurdy 1999), human capital (Kesselman 1976, Moffitt 2001a) and time limits on welfare receipts(Moffitt 1985).

Alternative transfer program schemes are unlikely to bring unambiguously desirable labour supply effects and a social welfare function has to be defined in order to discuss normative issues related to the optimal welfare program design. There are relatively few optimal taxation models with endogenous labor participation (Diamond 1980; Mirrlees 1982), but with this approach optimal schemes can be derived according to the shape of the income distribution, behavioural elasticities of individuals and government tastes for redistribution (Belsey and Coates 1994, Saez 2000).

Estimation in the presence of nonconvex budget sets is complicated by the

presence of multiple net wages each applying to a particular budget constraint segment and has been discussed in the context of structural approaches (Hausmann1985). The estimation relies on the retrievability of the indirect utility function from the uncompensated labour supply. Observed labour supply, through Roy's identity, allows derivation of an indirect utility function consistent with both the actual data and the assumption of utility maximizing behaviour. A functional form for the labour supply needs to be specified, properly describing the data. The estimation of the unknown parameters of the indirect utility function permits estimation of the labour supply behavioural response to changes in welfare programmes. The structural approach allows comparison of different transfer schemes. As to the sources of stochastic disturbances, both the difference between actual and desired hours worked and randomness in preferences between individuals have been jointly modelled. The statistical specification allows differences in tastes across individuals to be reflected in differences in the values of utility parameters . For example the income elasticity (Burtless and Hausmann 1978, Hausmann and Wise 1980) can be allowed to vary in the population describing different preferences for leisure in such a way that increasing values of the parameter along a continuum are associated with monotonic changes in the labour supply. Using maximum likelihood techniques, this structural methodology has been implemented both in continuum and discrete choice frameworks (Moffit and Keane 1998, Hoynes 1996, Hagstrom 1996, Meyer and Rosembaum 2001), to estimate labor supply elasticities for different welfare programmes or reforms.

More recently, the use of reduced-form models to describe the impacts of policy variations has become more popular both in the US (Blank, Card, Robins 1999, Meyer 2002) and the UK (Bingley and Walker 1997) to support the policy debate(Fortin, Truchon and Beausejour 1993) about alternative schemes like NIT(Tobin 1965, Friedman 1962) or "in-work" programs, paying particular attention to programs targeted on the income support of lone mothers or families with dependent children (Brewer 2001, Blundell and Hoynes 2001, Levy 1979). In the UK context, some recent empirical literature analyses the behavioural impact of recently introduced in-work credit schemes on labour supply (Blundell Duncan McCrae Costas Meghir 2000).

2 The UK Income Support System for Single Adults Households

Income based Jobseekers Allowance is a means tested and non contributory benefit designed to support unemployed people's income. It is intended for people of working age, actually looking for a job and available to start working.

According to the income based JSA rules for single households, in order to be eligible the claimant has to be aged 18 or over, not working more than an hours threshold e set to 16 hours a week and not in full time education. Moreover claimants' capital must be lower than a fixed upper limit. If capital

exceeds this upper threshold, eligibility is lost anyway; if capital is below a lower treshold,it is disregarded for eligibility and the entitlement calculation; if capital is between these two levels it, is tranformed into "tariff income" to be summed up to earnings in the means calculation. The scheme works by topping income up to a guaranteed level G, known as the "applicable amount", set by the Government to guarantee basic living needs depending on personal circumstances. The awarded amount is then the difference, if positive, between assessable income (calculated from the claimant's earnings wh, other incomes and capital) and needs, as reflected by the applicable amount. In addition, a threshold amount t of earnings can be disregarded in the means assessment.

3 Descriptive statistics

Based on a 5% sample of all JSA claimants, the Department for Work and Pensions estimates that in 2004 the number of income based JSA beneficiaries, including partners and dependents, was around 3.432 . The income based version of JSA makes up 78.96% of all JSA claims. Singles without dependents represent the vast majority of income based JSA claimants (83.33%), with 72.90% of them being men. Approximately one third of all claimants are aged below 25. These estimates seem to indicate that singles without dependents are definitely the most relevant and numerous group of benefit receipients and that the subgroup of those aged less than 25 years old represents an important component of it.

The Family Resources Survey data for 2003/2004 show quite a similar picture: the income based claims form 81.96% of all JSA claims. The category of singles without any dependents is still the major group of income based JSA claimants, being 64.54%. 43.66% of this group is aged under 25 years old and 70.68% are men. The FRS data confirms that the group of singles without children and aged below 25 claimants represents a significant portion of income based JSA claimants. Focusing on this category, the following tables show some statistics for the subgroup receiving income based JSA, the subgroup not receiving it and for both of them jointly.

	claimants		**non-claimants**	
	mean	std. dev	mean	std.dev.
JSA last amount	41.52	6.94	-	-
weeks in receipts	28.94	30.55	-	-
earned income	2.15	13.12	136.42	134.89
means tested benefits	53.33	24.52	2.33	18.23
non means tested benefits	0.10	1.27	2.45	15.75
other benefits	53.43	24.97	2.53	18.61
total income	58.35	30.33	171.28	127.83
total capital	125.911	499.07	1442.59	11529.05
weekly hours of work	9.5	4.88	32.64	11.97
gross hourly wage	4.50	2.48	5.79	2.95

Claimants total income derives mainly from means-tested benefits, their capital being definitely lower than the amount of £3,000 that can be disregarded in the means test. Non-claimants had significantly higher capital but still at a level that on average is below the threshold affecting JSA. This suggests that in the group considered the presence of capital only affects the level and not the shape of the budget constraint.

The gross hourly wage is lower for claimants and the occupational distribution seems to confirm that claimants are more likely to belong to low-wage occupations, especially elementary occupations not requiring any specific training or education, as shown in the following table.

occupational classification %		
	claimants	non claimants
managers&senior officials	1.61	3.12
professional	-	4.27
associate prof&technical	3.23	8.98
admin&secretarial	8.06	15.03
skilled trades	8.06	13.56
personal service	6.45	9.57
sales and customer service	24.19	18.58
process, plants,machines operatives	9.68	6.05
elementary occupations	38.71	20.84

The lower amount of weekly hours of work for claimants reflects the JSA eligibility rule which allows a maximum of 16 hours of work a week. The ethnic distribution appears quite stable in the three cases. A difference is instead evident in education: claimants look less likely to have received any educational qualification and if so, they look less likely to have it at the degree level or above.

%	**claimants**	**non claimants**
white	89.39	88.14
any asian	6.07	7.32
any black	3.8	2.56
any other	0.76	1.98
male	68.15	56.11
total capital lower than 3000	100	88.74
any education qualification	64.97	87.52
highest qual. degree or above	11.82	14.92

From these statistics, the "representative" claimant appears to be young, single, unskilled and in the unlikely case of working, on low wage jobs.

4 Irrelevance of the Hours Constraint

We consider a population of S households composed by single adult and assume that any financial assets owned are below the level at which the benefit is affected although since the benefit is aimed at low earners the assumption is relatively unimportant. The single adult has a time endowment of T which can be used for hours of work h or leisure l. The sth adult faces an hourly wage of w_s and the household has preferences defined over consumption c_s and leisure l_s represented by the function $u_s(c_s, l_s)$. Preferences are strictly quasi concave and strictly increasing in consumption and leisure and we take $u()$ to be smooth. The price of consumption is unity and for the sake of convenience no household has nonlabour income. Both the hours constraint and the means test affect the budget constraint shape, which varies also according to w, as shown in Fig 4. Note that concentrating on a sample of young single individuals reduces the risk that there are additional time constraints that we have neglected such as the need for childcare or care for elderly family members.

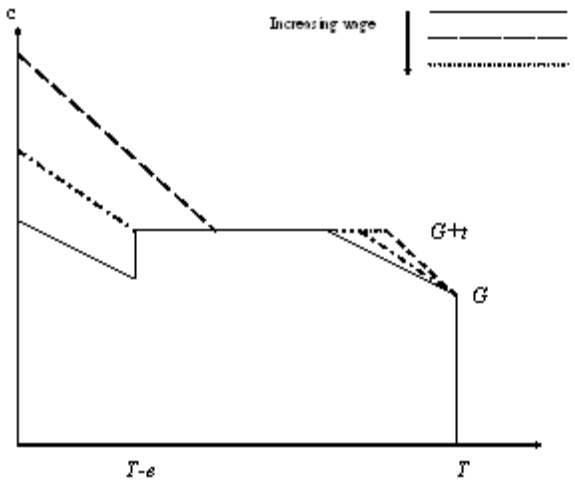


Figure 1

For $w < (G + t)/e$ the hours constraint binds first and at $T - e$ eligibility is lost and C jumps down to $we < G + t$ as shown by the continuous line. For $w = (G + t)/e$ both constraints bind at $T - e$ but consumption increases as $h > T - e$, as shown by the dotted-dashed line . For $w > (G + t)/e$ the means test constraint binds first with $h < e$ and consumption increases above $G + t$ as $h > (G + t)/w$ as shown by the dashed line.

Considering the actual UK tax benefit system, the budget constaint drawn in Fig 1 applies to singles aged less than 25 and without any dependents. The same system applied to singles without dependents, regardless of their age before the

introduction of Work Tax Credit in April 2003. To these categories no workfare benefit applies. For other groups like lone parents or singles aged more than 25 the presence of in-work benefit adds other nonconvexities in the budget set further complicating the analysis.

The presence of capital or non labour income brings a new sorce of individual heterogeneity in the considered static framework. As long as capital stays below the lower limit, only the level and not the shape of the budget line is affected with an upward shift of consumption for every leisure level. If the capital amount is above the upper limit, eligibility is lost anyway and the budget constraint goes back to the standard linear case. When the capital amount is between these two limits, a tariff income is considered in the means test and the budget line shape is altered in that the income constraint will bind at a lower hours of work level. Anyway as shown by the data for young singles without dependents the capital level is so low as to be quite unlikely to significantly affect the analysis.

For a single person s with no dependents (who after April 2003 is under 25) the budget constraint has the form

$$\begin{aligned} c_s &= w_s H_s \qquad \text{if } H_s > e \\ &= w_s H_s + G \qquad \text{if } H_s < e \qquad \text{and} \qquad w_s H_s < t \\ &= G + t \qquad \text{if } H_s < e \qquad \text{and} \qquad t < w_s H_s < t + G \\ &= w_s H_s \qquad \text{if } H_s < e \qquad \text{and} \qquad w_s H_s > t + G \end{aligned}$$

Some examples in which the hours constraint binds are shown in Figs 2 and 4, and the same with the hours limit removed are shown in Figs 3 and 5:

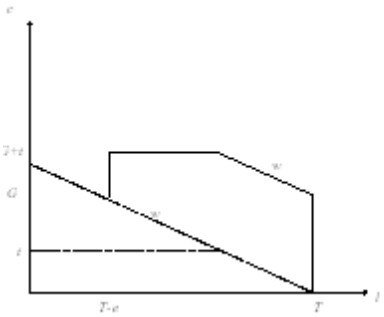


Figure 2

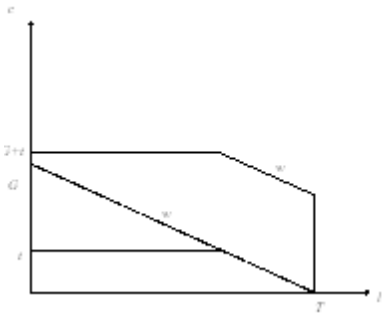


Figure 3

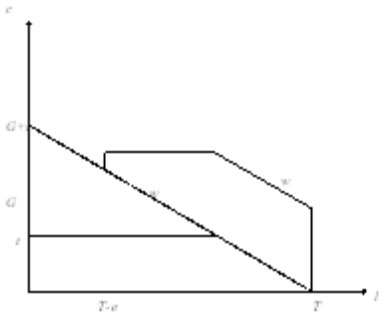


Figure 4

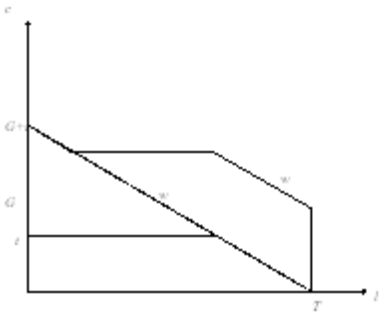


Figure 5

The hours constraint binds when $l = T - e$. For low wage rates the system has a built in poverty trap where the hours constraint just binds so that a claimant consuming $G + t$ would resist increasing hours even if there were an exogenous marginal increase in the wage since they would lose benefit and have a discontinuous downward jump in consumption. However since $G > 0$, there will always be a horizontal section to the budget constraint and so long as $t > 0$ a small amount of work which generates income which can be directly consumed. Hence the horizontal section of the budget constraint also always imposes a nonconvexity in the constraint. Since utility is increasing in both leisure and consumption, for any wage and any preferences the optimum can never involve claiming and choosing hours of work equal to $T - e$. When hours are $T - e$ low wage individuals can move to a point with higher leisure and the same consumption by moving rightwards along the horizontal section, whilst high wage individuals can move to a point involving the same leisure and higher consumption by ceasing to be a claimant. Hence just by nonsatiation the hours constraint will never bind at an optimal choice and individual behaviour in Fig 2 or Fig 3 is indistinguishable, as well as in Figs 4 or 5

Looking at Fig 6 it is clear that there can be one of five configurations for optimal choices-preferences and the wage and benefit parameters are such that:

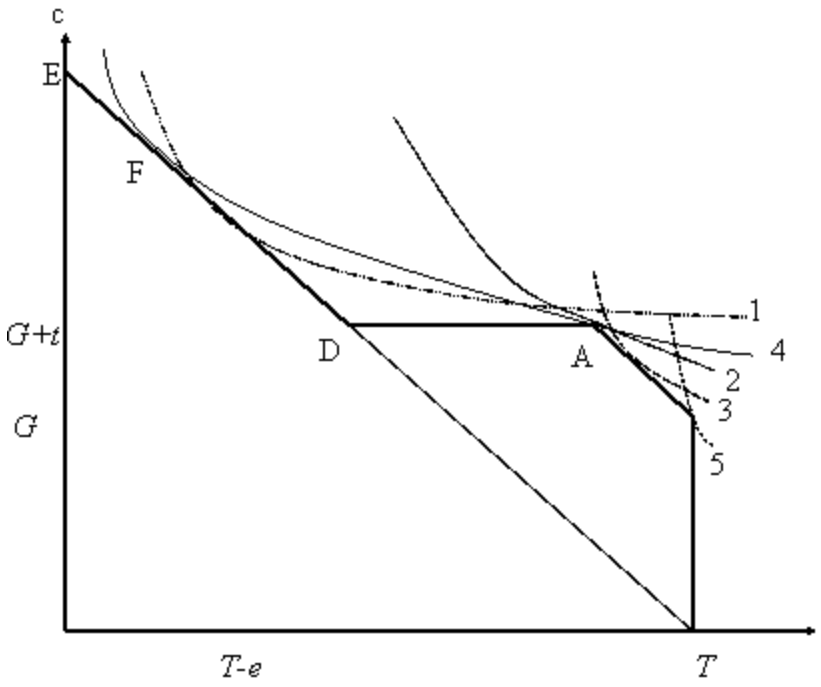


Figure 6

1. the individual chooses not to be a claimant and equates the mrs to the real wage or otherwise takes zero leisure and the mrs is below the wage. Whether this case occurs depends on global properties of preferences and the constraint. For tangency to occur it must be true that the mrs is steeper than the wage at zero leisure but below the wage at an earnings level leading to the loss of eligibility for the benefit. In addition the individual must be better off at a tangency as a nonclaimant than claiming at A.

2. the individual chooses to be a claimant at A working the number of hours just yielding the threshold income and consuming $G + t$.This case occurs if the mrs at A is steeper than the slope of the line linking the zero leisure-maximal consumption point and the point A. However it may also occur if this does not hold but the individual is nevertheless better off at A than from not being a claimant.

3. The individual equates the mrs to the real wage and does not earn enough to meet the threshold income so consumption is just labour earnings plus

G.This case occurs iff the mrs at A is steeper than the wage but at zero hours is flatter than the wage

4. There are two possible optimal modes of behaviour, one of each of the forms (1) and (2) above.

5. The individual does not work and consumes G.This occurs iff the mrs at zero hours is steeper than the wage and is the normal reservation wage for a linear budget constraint.

5 Preference Heterogeneity

With preference heterogeneity but common wages different individuals could be in any of these five types of solution. Also as the wage varies or details of the benefit system vary, individuals may switch in arbitrary ways between these types of solution. Imposing some structure on the preference heterogeneity allows us to predict the distribution of individuals between types of solution.

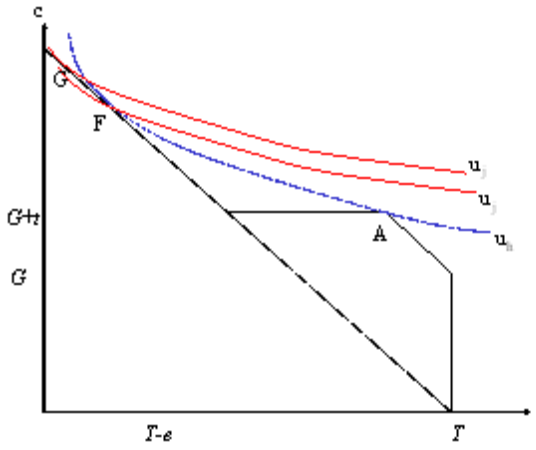


Figure 7

Take a given benefit system of the form of Fig 7. There are S indifference maps u_s in all, through any point there is an indifference curve from each of these maps. If the different indifference maps satisfy the single crossing property i.e. any pair of indifference curves from different maps cross at most once and are never tangential, then there is at most one individual whose optimal choices is indifferently at A or F . To see this take the tangency at F for the indifference curve from map h and consider any flatter indifference curve from map j passing through F. Then the tangency on DE for map j must involve more work and

consumption than F at say point G . But due to single crossing the indifference curve from map j cannot again cross the indifference curve from h at A but must lie above A. Thus any individual j whose preferences are steeper than those of h will have a unique best choice at G being a nonclaimant. Similarly in Fig 8 take any indifference curve through F that is steeper than that of h. This cannot again cross $h's$ indifference curve at A and so must pass below A. Hence any individual with a steeper indifference curve through F than h will be a claimant. Thus the steepness of the indifference curves through any point give a unique ordering of the consumers: if there is a critical consumer indifferent between claiming or not, then all lazier consumers will claim, all consumers with a stronger leisure preference than the critical one will not claim.

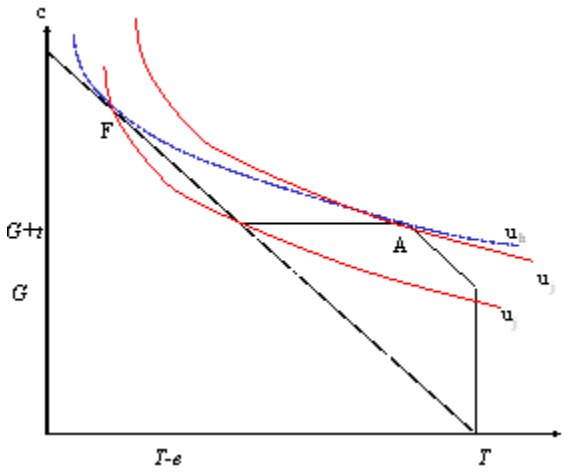


Figure 8

Similarly the claimants divide up according to bands of the mrs through any point. There will be ranges of mrs's for which the unique optimum is at A, ranges where the unique optimum involves earning less than the threshold and ranges where the optimum has zero hours. Any of these ranges may be empty if for example there is no preference map with an optimum of form (2). Of course these ranges depend on the common wage and on the parameters of the benefit system.

The single crossing property is close to a necessary condition for an ordering of individuals according to the mrs at any point such that there is a critical individual whose mrs divides the population into claimants and nonclaimants. Suppose we have three individuals $1, 2, 3$ and that the first and third individuals have particular indifference curves that cross twice but that all other individuals have indifference curves that only cross once. With a continuum of individuals with differing mrs at any point we can find a benefit system under which individual 2 has a steeper mrs than individual 1 at all points, individuals 1 and 3 have

particular indifference curves that cross twice and individual 1 is a nonclaimant whilst individual 2 and 3 are claimants-see Fig 9.

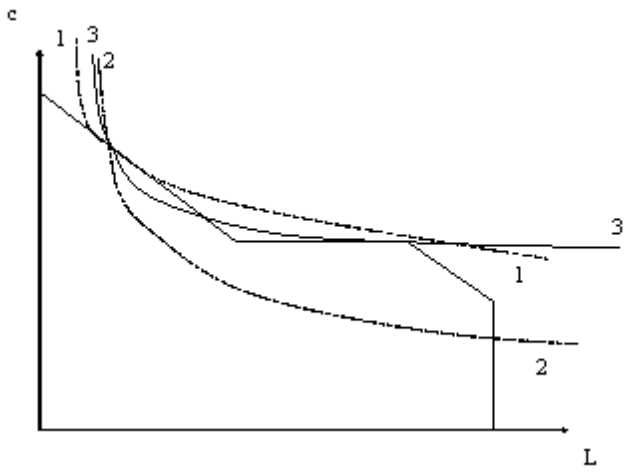


Figure 9

If preferences do have the single crossing structure it is practically useful for the government allowing prediction of the effects of changes in the wage or the benefit parameters on the number of claimants. The government needs only to identify the critical individual indifferent in claiming or not, instead of knowing the global details of all individuals. Also the government knows that, given the common wage assumption, it is those with most work aversion who are claimants. How labour supply varies with the common exogenous wage or with parameters of the benefit system is also predictable. An increase in the G level will increase the number of claimants and so the governments financial burden whilst a decrease in the G level will shift the number of claims in the opposite direction decreasing consequently the government expenses. As to common wage shocks, if the population is divided in claimants and the ineligible by a "swing" household who is indifferent between claiming or not, the overall number of claimants can be shown to shift according to the way the "swing" household reacts to the wage change, which cannot be predicted without further restriction on his preferences. If he becomes ineligible, the overall labour supply is increased since all the households previously ineligible will confirm or increase their labour supply and further previous claimants might shift to ineligibility raising their labour supply. If the level of wealth in the same way for all individuals, again the overall shift in labour supply, claiming and government burden varies according to the "swing" household's choice.

The single crossing property can arise for many reasons, individuals differ in their needs for consumption and leisure. For example there are the demographic

effects of young children or elderly infirm relatives in the household requiring care so that the need for nonwork time by the potential worker is higher. Or a household may have high income needs because there of contractual commitments such as housing rent. One way of modelling this is through using a single utility function whose origin shifts with individual, thus

$$u_h = U(c - \overline{c}_h, l - \overline{l}_h)$$

where $U()$ is strictly quasiconcave and increasing, and the preferences of h are defined for non-negative arguments. Suppose that the subsistence levels $\overline{c}_h, \overline{l}_h$ are ordered so that if $\overline{c}_h > \overline{c}_k$ then $\overline{l}_h < \overline{l}_k$. Then at any point c, l where both preferences are defined if

$$\partial mrs/\partial c > 0$$

individual h has a lower mrs than individual k. As $\overline{l}_h < \overline{l}_k$ and there is diminishing mrs, h has a lower mrs at c, l on these grounds. But since $\overline{c}_h > \overline{c}_k$, h has lower effective consumption than k and so this reinforces the effects of the individuals different leisure needs on the mrs. Similarly if the ordering is such that $\overline{c}_h > \overline{c}_k$ implies $\overline{l}_h > \overline{l}_k$ then if

$$\partial mrs/\partial c < 0$$

then at a point c, l, the lower effective consumption of h reinforces the impact of lower effective leisure, both serving to raise the mrs of h as compared with k.

Households may also differ in the efficiency with which consumption or leisure are transformed into utility. One might expect that an individual who is more efficient at transforming lesiure into utility would have a lower marginal need for lesiure and hence a lower mrs. If we model this by

$$u_h = U(c_h, b_h l_h)$$

then for individual h

$$mrs_h = b_h \frac{\partial U(c_h, b_h l_h)/\partial l}{\partial U(c_h, b_h l_h)/\partial c}$$

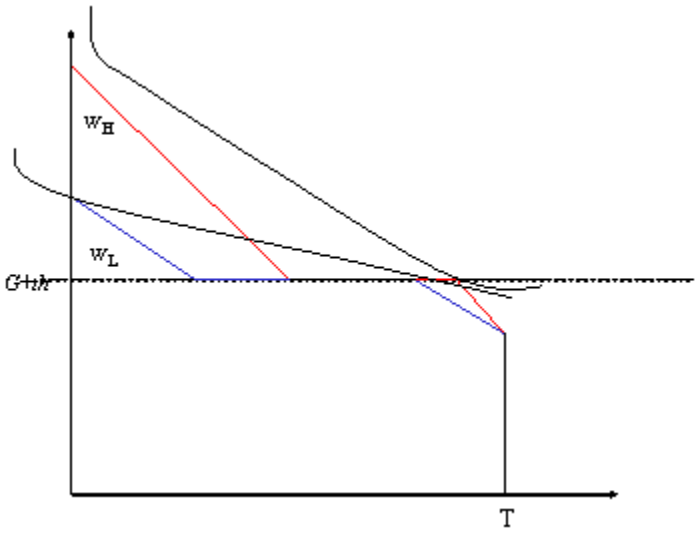
and

$$\frac{\partial mrs_h}{\partial b_h} = mrs_h(1 + \varepsilon_h b_h), \qquad \varepsilon_h = \frac{\partial \ln(mrs_h)}{\partial \ln(b_h l_h)}$$

where $\varepsilon_h < 0$ is the elasticity of the mrs wrt leisure measured in efficiency units. If $(1 + \varepsilon_h b_h)$ is single signed everywhere then this is indeed the case. For example with a linear expenditure system $U_h = \alpha \ln(c_h - A) + \beta \ln(b_h l_h - B)$, $\varepsilon_h = -\beta B(c_h - A)/[\alpha(b_h l_h - B)^2] < 0$.

6 Wage Heterogeneity

Instead of varying in preferences, households may have common tastes but vary in the wage that they face. Without any restriction on the utility function, it might be possible that higher wage individuals claim benefit while a lower wage



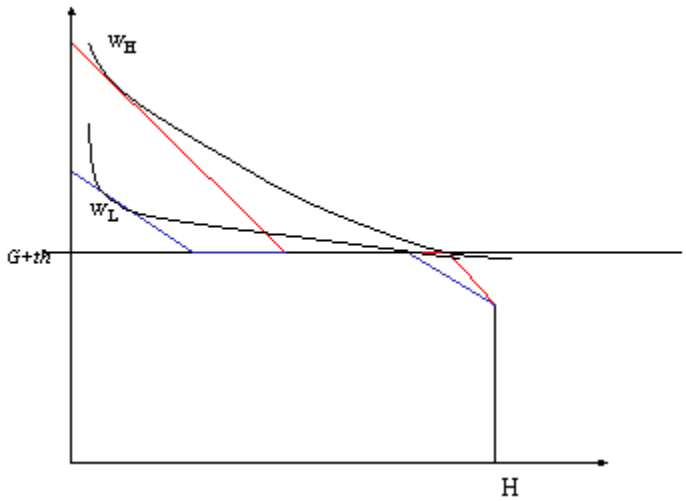
individual does not (as in Fig.10). Also an increase in the wage could induce a nonclaimant to become a claimant. There could also be two individuals with differing wages each of whom is indifferent between claiming or not claiming (Fig 11).

The lack of order arises because as the wage changes not only does this change the market tradeoff between consumption and leisure but also the threshold point A for disregarded income shifts. In terms of the budget constraint the increase in wage raises the amount of leisure it is possible to take when earning exactly the threshold income and hence just maintaining eligibility for the benefit. This gives an incentive for higher wage households to cut work to ensure eligibility. Of as against this the higher wage also gives an incentive to become a nonclaimant. The result depends on which of these is the dominant effect. If the threshold for disregarded earnings were set to zero then there would not be these countervailing incentives.

Formally we can see the two incentive effects as follows. If an individual is a nonclaimant, utility is given by

$$v(w) = \max[u(c, l)|c = w(T - l)]$$

whereas being a claimant utility is $u(G+t, T-t/w)$. Since $v'(w) = (\partial u/\partial c)(T - l) > 0$ and $\partial u(G + t, T - t/w)/\partial w = (\partial u/\partial l)t/w^2$ the difference between the payoffs from claiming or not may be increasing or decreasing in the wage. However if $t = 0$ then the utility from claiming is independent of the wage and so there is an unambiguous incentive to move towards becoming a nonclaimant as the wage rises.



If the common utility function is quasilinear in leisure, so that $u(c,l) = f(c) + al$, some order in the choices as wage rises is obtained. There can be at most a single value of the wage at which the individual is indifferent between claiming or not and it can be shown that for any lower wage the individual will claim and for any higher will not. Under quasilinearity in leisure, the indifference curves are shifted horizontally so that for any two indifference curves at any given level of consumption, the difference in leisure between the two indifference curves is constant (i.e. if $f(c_1)+al_1 = f(c_2)+al_2$) and $f(c_1)+al_3 = f(c_2)+al_4$) then $l_1 - l_2 = l_3 - l_4$). In Fig 12 the budget constraints for two different wage levels $w_H > w_L$ are drawn. The difference AB in the leisure attainable with each wage for the consumption level $G+t$ at the disregarded income treshold is $t(1/w_L - 1/w_H)$. The difference DC in the leisure attainable with each wage for the same consumption level $G+t$ where the income eligibility constraint binds is $G+t(1/w_L - 1/w_H)$. With $G > 0$, $G+t(1/w_L - 1/w_H) > t(1/w_L - 1/w_H)$ that is the distance DC exceeds the distance AB. So once eligibility is lost, at every consumption level the difference in leisure between the two budget constraints is bigger than $t(1/w_L - 1/w_H)$.Consider an individual indifferent between claiming or not at wage w_H reaching utility $U_H = f(G+t)+a(T-t/w_H)$. If the wage is decreased to w_L when claiming he will enjoy a lower utility level $U_L = f(G+t)+ a(T - t/w_L)$ because of nonsatiation and $w_H > w_L$. Anyway it can be shown that at this wage level this is the highest attainable utility. The indifference curve through A has a constant leisure difference of $t(1/w_L - 1/w_H)$ from the indifference curve through B. Since at any consumption level the difference in leisure attainable with w_H is higher than $t(1/w_L - 1/w_H)$ the indifference curve through A at any consumption level will always be to the right of the lower wage constraint. Thus due to nonsatiation, when the wage falls to w_L claiming

is the unique optimal choice.

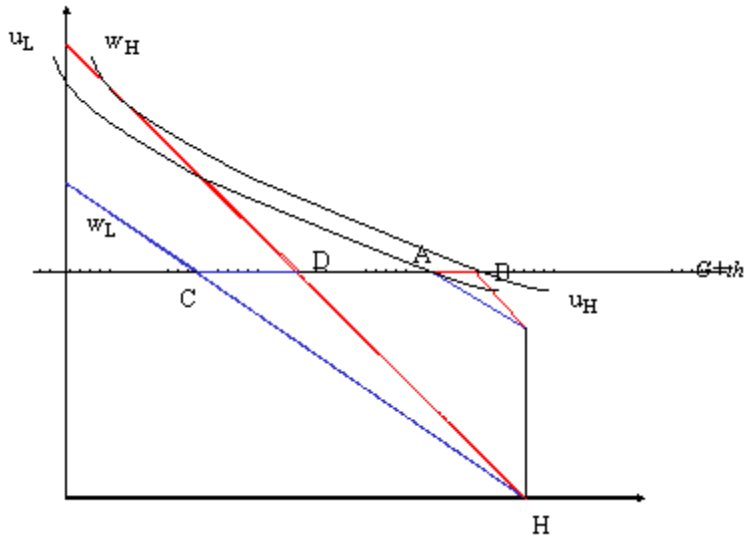


Figure 12

Consider instead an individual indifferent between claiming or not at wage w_L in Fig 13. When the wage is increased to w_H, the indifference curve through B corresponding to the claiming choice is obtained as a parallel rightwards shift of $t(1/w_L - 1/w_H)$ in the leisure level of the indifference curve through A corresponding to the claiming choice with w_L. At any consumption level in the ineligible case the difference in leisure attainable with the two wages is at least equal to $DC = G + t(1/w_L - 1/w_H) > t(1/w_L - 1/w_H) = AB$ .The indifference curve through B will never be tangential to the higher wage ineligible budget constraint and the optimal choice at w_H is to choose ineligibility.

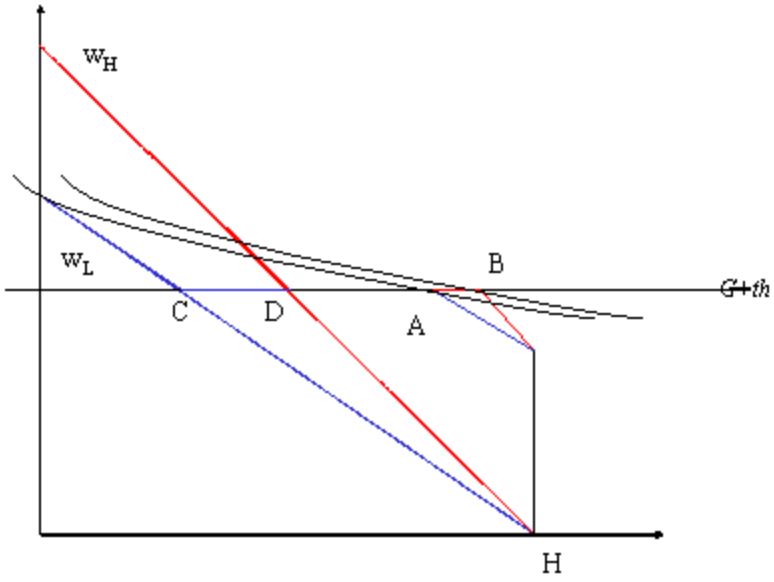


Figure 13

With quasi linearity consumption depends only on the real wage and has a zero income effect. As the wage increases the gain in utility from the increased optimal consumption of a nonclaimant rises faster than the gain from the higher leisure that a claimant can take whilst just earning the threshold income.

7 Mixed Heterogeneity

As shown in the previous sections, with preference heterogeneity if preferences are single crossing across individuals, it is possible to get an unique ordering of choices according to the marginal preference for leisure (this is also close to necessary). With wage heterogeneity if preferences are quasilinear for each individual, a unique ordering of choices is obtained according to wage levels.

If both preferences and wages are allowed to vary in the population, in general high wage, low mrs individuals are expected to prefer non claiming. Single crossing and quasilinearity of preferences in leisure can be combined in such a way that the heterogeneous population is fully described by the wage and the preference steepness distributions. Assuming that individuals have quasi linear preferences differing only for the subsistence level of consumption and/or the preference for leisure so that $U_s = f(c - \overline{c}_s) + a_s l$ with $\overline{c}_s \geq \overline{c}_t \Rightarrow a_s \leq a_t$ (since with quasilinearity the subsistence level on leisure is just a constant with

no effect on choices) then for each wage level, there is a unique "steepness type" c_s indifferent between claiming or not and at that wage level, all those with steeper preferences (individuals t with $c_t < c_s$ and/or $a_t > a_s$) will claim and all those with flatter preferences won't. Also, for each "steepness type", there is a unique wage level making that type indifferent between claiming or not. For a lower wage than this that type will claim and for a higher wage the type will prefer to be ineligible. Strict monotonicity accoring to "steepness type" and wage is obtained as shown in Fig 14 with low wage and "lazier" individuals more likely to claim. Knowing the distribution of wages and preferences across population allows prediction about the set of claimants and the consequent cost to the government of the benefit.

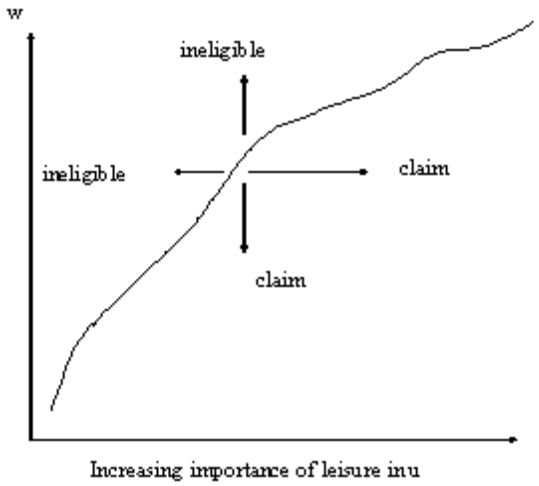


Figure 14

So long as it is the low wage individuals who have steeper preferences then the benefit take up will be targeted on the lower wage individuals. However if the high wage individuals also have the steeper preference for leisure then claimants may be a mix of high and low wage consumers.

8 Conclusions

The rationale for income support schemes is to provide a safety net for unemployed or part-time low wage households. To achieve this goal without altering labor supply choices is such a way to increase the government burden with no corresponding social welfare gain, it is important to be able to predict which households will choose labour supply making them ineligible for the benefit.

It is also evident that a desirable system would be monotonic in that low income individuals are induced to claim and high ones are not. For single adult households we show that the UK system is unnecessarily complex in the sense that the restriction on working hours for eligibility never binds. The role of the threshold on disregarded earnings is problematic in that it can induce both high and low wage households to choose eligibility for benefit. Unless preference are restricted in some way the benefit is not monotonic. We show that if preferences are quasilinear in leisure and, when heterogeneous between individuals, also satisfy a single crossing property, then the impact of the benefit system on labour supply is predictable. In particular if low wage individuals also have a stronger preference for leisure then this group will form the claimants.

Our results may also be of more general interest in providing conditions on preferences under which choice from nonconvex budget constraints is predictable. Earlier work usually uses specific functional forms for preferences in which there is a single parameter whose value divides up behaviour into different regimes. Our qualitative restrictions on preferences do the same thing without the need for specific forms. There is a family resemblance to the results in the asymmetric information literature where for example it is easier to separate say worker types if the high ability workers also have a stronger preference for leisure relative to consumption. Similarly if the main motivation of the benefit programme is to assist individuals with low opportunities, then if there is poitive correlation between the preference for work and the available wage, programmes which target initially low income individuals will benefit the right group.

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