ISSN 0819-2642
ISBN 0 7340 2542 4

THE UNIVERSITY OF MELBOURNE

DEPARTMENT OF ECONOMICS

RESEARCH PAPER NUMBER 886

NOVEMBER 2003

CHOOSING TO BECOME A 'LOST CAUSE': THE PERVERSE EFFECTS OF BENEFIT PRECONDITIONS

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Choosing to become a 'lost cause': the perverse effects of benefit preconditions.

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August 15, 2003

Abstract

This paper argues that preconditions for welfare benefit entitlements based on labour market prospects can be counterproductive when they create an incentive for individuals to abstain from any investment earlier in life that could improve future prospects. Benefit entitlements based partly on investments made prior to labour market entry are then Pareto-improving.

Keywords: Benefits, job search, irreversible investments
JEL classification: J20, J60
Acknowledgements: We acknowledge financial support from the ANU. Thanks go to, Jaap Abbring, Aico van Vuuren and Rob Alessie for helpful comments on earlier versions of the paper.

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1 Introduction

Whilst few would disagree with the principle of providing welfare payments to those out of work or unable to work, much debate centers on the correct design of benefit systems. Most countries adopt a means-tested benefits approach despite the potential disincentive effects. The biggest disadvantage of means-tested benefits is the way they change behaviour through altering work incentives. They discourage individuals from increasing their income and individuals at the margin of benefit and work often get stuck in the benefit trap, where the returns to paid employment do not compensate for the loss of benefit entitlement. The recent generation of in-work transfer programs have been designed to address this issue, (such as the Earned Income Tax Credit, in the US and the Working Families' Tax Credit, in the UK). These programs allow those in work, but on low incomes, to retain some benefit rights. Whist such schemes can tackle this incentive problem it can be argued that the system remain flawed in that it judges an individuals benefit entitlement according to their current income rather then their earnings potential. Further, means-tested benefits are both inefficient and inequitable in that they can not sort individuals according to their labour market potential.

It can be argued that what is important in judging entitlements to benefits is not an individuals current income and wealth but their potential to earn and be successful in the labour market. As a result, in many OECD countries in the last few decades there has been a tendency to make benefits more contingent on low potential (rather then current means). Blundell and McCurdy (1999) for instance mention that in many US states, total welfare payments (including food stamps, child benefits and housing support) are substantially higher for lone mothers with children than for single men in unemployment. In Holland, unemployed individuals are ranked according to the ease with which they would be able to find a job (*i.e.* their labour market potential) and those with low labour market potential are not required to search for jobs, effectively making them entitled to higher net benefits. Similar arrangements hold in many EU-countries. Sorting individuals according to earnings power allows governments to more accurately target benefits at the most needy and allow for greater equity and efficiency in the allocation of benefits.

However, when we also consider choices that are made before the labour market and that are furthermore irreversible (such as schooling or fertility), the reliance on indicators of having a very low potential for obtaining and maintaining good jobs can be counter productive. Faced with benefits that are contingent on having no opportunities in the labour market, individuals on the 'margin' of the talent distribution face a stark choice earlier in their lives. They can make investments that will give them some chance of good future jobs, but that will cost them entitlement to welfare benefits, or they can abstain from any such productive investment altogether in favour of irreversible choices that actually make their future job market prospects bleak.

Looking forward, they may choose to become a 'lost cause' in order to be eligible for welfare payments. This essentially puts them on a career path of welfare dependance.

In this paper the possibility that irreversible choices earlier in life may be negatively affected by benefits contingent on low potential is examined in further detail. The focus on choices made before entering the labour market sets the analysis apart from current models which highlight the distortionary effect of benefits, such as that by Ljungqvist and Sargent (1998) or the papers discussed in Blanchard and Wolfers (1999), where unemployment benefits only have an effect on the characteristics of the individuals *after* entering the labour market.

2 Background

The basic argument for basing benefits on potential are in order to avoid moral hazard problems associated with means tested benefits (Akerlof 1978). Restricting benefit entitlements according to labour market earnings potential can reduce the number of people in the benefit trap, *i.e.* the number of individuals for whom looking for work pays less than remaining on benefits. Such poverty traps resulting from benefit systems are well-illustrated by Harris (1993, page 456-457) who argues that many households in US inner-cities regard benefits as a career-choice. Having stringent benefit conditions reduces the number of individuals that can do this. This moral hazard aspect of unemployment benefit has been extensively studied in the literature (e.g.

Hopenhayn and Nicollini, 1997).

The move to preconditions for welfare benefit entitlements based on labour market prospects solves this problem and as such many governments are opting for such systems. However, whilst solving the incentive problems for those already of working age such systems introduce perverse incentives for those about to enter the labour force (*i.e.* school leavers). When benefit entitlement becomes contingent on having low labour market opportunities, individuals on the 'margin' of the talent/ability distribution face the choice of making investments that will give them some chance of good future jobs, but that will cost them entitlement to welfare benefits, or abstaining from any such productive investment altogether in favour of (possibly irreversible) choices that actually make the future job market prospects poor. Thus optimally choosing to become a 'lost cause' in order to secure eligibility for welfare payments.

The study of Harris (1993) also highlights this downside. Harris tries to make plausible that the US inner city phenomenon of households with several generations of child-rearing women without husbands can be partially attributed to the fact that benefits are withdrawn if husbands are present. A similar forward-looking mechanism is implicit in studies that look at the effect of welfare benefits on fertility choices of teenagers. That is, the decision to be a young lone mother may be an endogenous response to low educational expectations. Rosenzweig (1999) finds a positive response of out-of-marriage fertility of women as a result of increases in benefit entitlements to the AFDC program. Clarke and Strauss (1998) find elasticities of illegitimacy with respect to levels of welfare payments of around 1.5. Looking at the relationship between various human capital investments in the NLSY, Klepinger et al. (1999), find that low fertility and low formal education and low work experience all correlate positively with one another and reduce future work opportunities. Havemann and Wolfe (2001) find further indications that US youngsters do anticipate the effect of their actions on future received benefits and change their fertility choices accordingly. Reviewing the empirical evidence for the US based on state variation in benefits, they find strong positive effects on fertility when the difference between benefits for those without children and the benefits for those with children is greater.

Taken to its extreme, this would suggest that effort exerted whilst still at school becomes the screening tool in the benefit system rather than earnings potential at the time the individual wishes to take up their benefit entitlement. Possible policy instruments for such 'school effort' preconditioned benefit entitlements might be an individual's truancy rates or home work records, whilst at school, or the presence of a teenage pregnancy *etc.*

Here these issues are address by developing a simple equilibrium model where individuals in the labour market choose a search effort that is unobservable. This search effort is combined with labour market potential to produce a job-finding probability. Given a level of labour market potential, we get the standard finding that unemployment benefits reduce the incentives for finding jobs and reduce search effort.

This standard set-up is then extended with a first, pre-labour market, period in which individuals who differ in initial talent have to spend effort to increase their future labour market potential. Governments are assumed to give a benefit entitlement to all those with a labour market potential below a certain cut-off point. The fact that benefits are only received if the individuals labour market potential is sufficiently low enough, has the effect that very high talented individuals behave as if there were no benefits at all, whereas very low talent individuals behave as if they were certain of benefit entitlement. Individuals with talents in a certain middle range will however make less effort to improve their labour market potential than they would have done if there were no benefits or if there was a universal benefit. This reduces the average labour market potential and increases actual unemployment rates. This effect also leads to the possibility of multiple equilibria of poverty levels at constant levels of the government budget: in equilibria with stringent benefit entitlement requirements, these stringent requirements can lead to very low levels of prior investments, which leads to high unemployment and poverty later. In equilibria with less stringent benefit entitlement requirements, individuals invest more effort in previous periods and subsequent unemployment and poverty are lower.

Governments can improve the outcome by conditioning benefits not only on actual labour market potential, but also on invested effort, such as school attendance. Under quite general conditions, making benefit entitlements conditional on minimum effort requirements is Pareto-improving. The higher the labour market potential, the higher the minimum effort requirements. Equivalently, given a certain level of labour market potential, the higher the reward for having low initial talents, which is an argument for positive discrimination (Coate and Lowry 1993).

Then the optimal allocation of benefits under welfare maximization is considered. The finding there, is that under most search technologies, benefits should increase with previous effort in order to give individuals incentives to increase their labour market potential. Only when previous effort and search effort are perfect substitutes, any conditioning on earlier effort is ineffective because individuals will then substitute later search effort for previous effort without altering their job-finding probabilities. As a final exercise, the results of the simple two-period model are generalised to an infinite horizon dynamic environment, which is not found to qualitatively alter the previous results.

Our model, whilst addressing the questions relating specifically to benefits raised above, also contributes to the existing theoretical literature on moral hazard and benefits more generally. Heckman et al. (1998) propose one of many models that explicitly looks at the relation between human capital formation and later uncertainty. However, in their model uncertainty is homogeneous and not subject to choice. Niccolini and Hopenhayn (1997), in a much simpler framework, already provide a model with which one can calculate one-shot optimal benefit paths that take account of current moral hazard. This model was extended by Zhao (2000) to allow for benefits to depend on full labour market histories, including earlier effort that affected both employment risks and income risks. Although Zhao's model is only solved analytically for the very restrictive case that there are only two possible effort level choices, it can in principle be extended quite easily to be able to compute optimal benefits for any parameterization of the model in this paper also. Hence, this papers important contribution is that it analytically solves the problem of the effect of benefits conditional on low labour market potential when effort levels are continuous. Contrary to any of the mentioned papers, this paper additionally analyses what pareto-improvements are possible under current circumstances, quite apart from what would be optimal in a more abstract welfare maximizing sense.

3 The Model

3.1 The second period

Consider a continuum of individuals with an observable labour market potential $\alpha > 0$ which has a cumulative probability distribution function $A(\alpha)$. Individuals search for jobs and have a probability of finding a production site equal to $1 > g(\alpha, s) > 0$, where $s > 0$ can be seen as the effort put into search in the second period. The standard search assumptions apply: $g(0,0) = 0$, $g(\infty, \infty) = 1$, $g_\alpha, g_s \geq 0$, $g_{ss}, g_{\alpha\alpha} < 0$. Throughout, s will be regarded as unobservable and is the source of a moral hazard problem. If individuals find a production facility, they produce and receive an income net of taxes equal to P.[1] Jobs are homogeneous, which means we abstract from any productivity-increasing effect that benefits may have when jobs are not homogeneous and benefits improve incentives for looking for the right jobs (such as in Acemoglu and Shimer 1999, 2000, or Marimon and Zillibotti, 1999).

Individuals maximize:

$$\begin{aligned} U(y,e,s) &= u(y) - s - e \\ e, s &\geq 0 \end{aligned} \tag{1}$$

where $u(y)$, "financial utility", is strictly concave, increasing and with $u(0) < 0$; y denotes monetary income; e denotes an effort level made earlier in life and is for now taken constant and unobservable. As in Gruber (1997) and Acemoglu and Shimer (1999, 2000), we assume that the basic motivation behind benefits is risk-aversion on the part of individuals. Here, this is labelled as poverty relief: the government has a fixed budget M to spend on poverty relief that can be spent on entitlements to unemployment benefits b. Poverty is defined as having a financial utility less than a fixed level, say 0. Minimizing poverty then means that benefits are such that those on benefits are

[1] An important alternative to this type of economy with production sites (such as the island analogy of Galor and Lach, 1990), is to have a search model in the vein of Pissarides (1990). In those latter models, search frictions also matter for wages and individual behaviour has macro-economic spillover effects through matching. Hence such a set-up creates two extra market distortions, namely wage distortions and search externalities. Wanting to focus on moral hazard as the main source of market imperfection, we abstract from these other distortions, as is also done by for instance Moen (1997).

exactly on a financial utility of 0. Hence b solves $u(b) = 0$. For the optimal level of search intensity of an individual it has to hold that:

$$[u(P) - u(b * B(\alpha))]g_s - 1 = 0 \tag{2}$$

where $B(.)$ is 1 if an individual is entitled to benefits and 0 otherwise. From this condition it directly follows that search intensity will be lower when an individual is entitled to benefits.

We assume the policy is to give benefit entitlements first to individuals with the lowest labour market potential and upwards until the available budget runs out, which occurs at α^*, which has to solve,

$$\alpha^* = \arg\{b \int_0^{A(\alpha^*)} [1 - g(\alpha, s(\alpha))] dA(\alpha) = M\}. \tag{3}$$

Hence $B(\alpha) = I_{\alpha^* > \alpha}$. Whether this actually minimizes the number of individuals living in poverty for a given distribution of α is unknown[2] but the level of α^* is common knowledge and individuals can take account of this in a previous period.

[2] In the appendix it is shown that this policy minimizes the number of people in poverty only for specific forms of g : it is only poverty minimizing if $0 \geq \frac{d\{g(\alpha,s|B=0)-g(\alpha,s|B=1)\}}{d\alpha}$ which will be the case iff $0 \geq \frac{d\frac{\partial g(\alpha,s(\alpha,b))}{\partial b}}{d\alpha}$ which is the case iff $g_{\alpha s} \geq g_s \frac{g_{ss\alpha}}{g_{ss}}$ which for instance arises when α and s are perfect substitutes. When they are complements, $\frac{d\frac{\partial g(\alpha,s(\alpha,b))}{\partial b}}{d\alpha} > 0$ and it would actually be poverty minimizing to give benefit entitlements to those with high potential. Then the justification for giving benefits to those with lower α would have to depend on other considerations, such as valuing equal *expected* utility.

3.2 The first period: endogenous α

Suppose individuals live two periods. The second period is as described above. In the first period, labour market potential is produced, i.e. $\alpha = q * e$. Here q denotes an non-negative innate talent or quality q which is drawn from a cumulative distribution Q with $Q(0) = 0$. In this first period individuals must choose their effort level e, which can be interpreted as school attendance, time spent making homework, making sure to use contraceptives, *etc.*

We find the rational expectations equilibrium by solving individual behaviour for a given α^*. In equilibrium, the outcome of these choices, *i.e.* $A(\alpha|\alpha^*)$, must solve (3). Such an α^* is termed a feasible α^*.

Given α^*, individuals have to take account of the fact that when they choose an e that is very high, they may become ineligible for benefits the second period. If benefits were not dependent on α, the envelope theorem tells us that individuals would set e such that,

$$\begin{aligned} qFg_\alpha &= 1 \\ s.t.\ \mathrm{e} &\geq 0 \end{aligned} \tag{4}$$

with $F = u(P) - u(b)$. Denote the resulting level of α by $\alpha_F(q)$ whereby the subscript denotes that this is the level of α when the utility difference between work and unemployment is F. The level of α when the utility difference between work and unemployment without benefits is $E = u(P) - u(0)$ is likewise denoted by $\alpha_E(q)$. Because $g_{\alpha\alpha} < 0$, in an interior solution there holds $\alpha_F(q) < \alpha_E(q)$.

Now, for the range of q for which it holds that $\alpha^* \geq \alpha_F(q)$, the optimal level of effort is obviously given by (4). Since $\alpha_F(q)$ is increasing in q, there is a unique level of q at which $\alpha_F(q) = \alpha^*$ which we denote by q_0. For individuals with $q > q_0$, it holds that $\alpha_F(q) > \alpha^*$. For these individuals, the option of reducing effort in order to remain eligible for benefits is relevant. For individuals with $q > q_0$ who decide to reduce their effort such that they remain eligible for benefits, it is immediately obvious that their optimal level of effort will be to obtain exactly α^*. For those individuals that decide to have an effort level such that they become ineligible for benefits, optimal α and e are given by $\alpha = \alpha_E(q)$ and $e = \arg_e\{qEg_\alpha = 1\}$. Individuals with $q > q_0$ will take this latter option if and only if,

$$\begin{aligned} W(E,q) &\equiv u(0) + g(\alpha_E(q), s(\alpha_E(q))) * (u(P) - u(0)) - s(\alpha_E(q)) - \arg_e\{qEg_\alpha = 1\} \geq \\ W(F,q) &\equiv u(0) + g(\alpha^*(q), s(\alpha^*(q))) * (u(P) - u(0)) - s(\alpha^*) - \arg_e\{qe = \alpha^*\}. \end{aligned} \tag{5}$$

Given that $\frac{\partial W(E,q)}{\partial q} > \frac{\partial W(F,q)}{\partial q}$ holds, there is a unique quality level q_1 above which individual behaviour leads to an $\alpha > \alpha^*$. This point q_1 solves,

$$q_1 = \arg_q[W(E|q > q_0) = W(F|q > q_0)]. \tag{6}$$

The behaviour of the individuals with $q > q_1$ is in effect the same with and without the existence of benefits contingent on $\alpha^* \geq \alpha$.

Individuals with a quality between q_0 and q_1 will choose their effort levels such that $eq = \alpha^*$. From this, it follows that those with higher quality levels, but with quality levels still below q_1, have to reduce their effort more than those with lower quality level as a result of the dependence of benefit entitlement on a level of labour market potential. This is the perverse effect of allocating benefits only to those with low labour market potential.

An anticipated minimum labour market potential level of α^* hence leads to an endogenous distribution of α that will have a mass-point at α^*. One question is now whether there is only one feasible α^*. We can look at this issue by looking at the change in the number of individuals receiving unemployment benefits as a result of a change in α^*. If this change is always positive, there can be only one α^* that exactly uses up the available budget for poverty relief and that is hence feasible. It now holds that:

$$
\begin{aligned}
d\frac{\int_0^{A(\alpha^*)}(1-g(\alpha,s^1))dA(\alpha|\alpha^*)}{d\alpha^*} &= -[Q(q_1)-Q(q_0)] * [\frac{dg(\alpha^*,s^1(\alpha^*))}{d\alpha^*}] \\
&\quad + \frac{dQ(q_1)}{dq}\frac{dq_1}{d\alpha^*} * (1-g(\alpha^*,s^1)) \\
&= -[Q(q_1)-Q(q_0)] * [g_{\alpha^*} - g_s\frac{g_{\alpha s}}{g_{ss}}] \\
&\quad + \frac{dQ(q_1)}{dq}\frac{dq_1}{d\alpha^*} * (1-g(\alpha^*,s^1)). \qquad (7)
\end{aligned}
$$

The first term on the right hand side denotes the reduction in the benefit take-up resulting from the fact that the group of individuals with $q_0 < q < q_1$ are going to increase their effort levels such that they are at the new minimum level of α^*. Although this group may reduce search levels if α

and s are substitutes (then $g_{\alpha s} < 0$) which partially offsets the effect of the increase in effort, the first term as a whole cannot be positive (if not, the original behaviour could not have been optimal). The second term denotes the increase in benefit take-up as a result of the fact that q_1 increases and that there are hence now more individuals entitled to benefits. These two counteracting effects imply that if we make no further assumptions, there can be more than one rational expectations feasible α^*.[3]

Given the strategy of giving benefits to those with lowest labour market potential, the optimal poverty relief policy is obviously to take the highest feasible α^*. The possibility of many feasible α^* however means that a government that does not have all the information necessary to calculate all the feasible α^* and that for instance uses trial-and-error to see if α^* turns out to be feasible in practice may be stuck at a higher level of unemployment and poverty than necessary under the same budget.

3.3 Can the outcome be improved upon?

We take here the most informative case of the model, *i.e.* an interior solution where $0 < \alpha^*$ and $0 < q_0 < q_1$. The question is now whether we can improve upon the outcome of the model. In order to maximize the generality of the result, we look solely at Pareto-improvements with benefit preconditions

[3] Examples of more than one feasible α^* can be generated by noting that the behaviour of anyone with $q < q_1$ will be unaltered if we would have a different quality distribution for $q > q_1$. Hence, for any given distribution below q_1 and a given feasible solution α^*, we can pick a $\frac{dQ(q)}{dq}|^{q_1}$ such that $d\frac{\int_0^{A(\alpha^*)}(1-\alpha s^1)dA(\alpha|\alpha^*)}{d\alpha^*} = 0$ in which case we have a continuum of feasible α^*.

as the policy tool. We look at what could be done with information on e, which denotes the irreversible investments made earlier in life. When there is information on α and e, we indirectly also know q.

Withdrawing benefit entitlements or having extra benefit pre-conditions on those that are already entitled is obviously not a Pareto-improvement. Only relaxations of preconditions can be Pareto-improving. Relaxing benefit pre-conditions for the individuals with $q < q_0$ will have no behavioural effect. Only the relaxation of preconditions for benefit entitlements for individuals with $q_0 < q$ will have behavioural effects. A Pareto-improvement for the group with quality levels in the range $q_0 < q < q_1$ is to give these individuals entitlements to benefits without demanding that their labour market potential is below α^*. These individuals will then increase their labour market potential to $\alpha_F(q) > \alpha^*$ which reduces unemployment and increases welfare. Because q is only indirectly observable through α and e, this means that individuals with an α above α^* can be given benefit entitlement if they have higher levels of effort e than the individuals with α^*. The more above α^* an individual is, the higher e should be to be entitled. The intuition is that individuals with higher labour market potential than α^* have to prove to nevertheless be of low quality ($q < q_1$) by having made high investments in the past.

With the money that is freed by relaxing the entitlements to benefits, an infinitude of welfare Pareto-improvements are possible. The money can for instance be used to give more individuals benefit entitlements which gives us

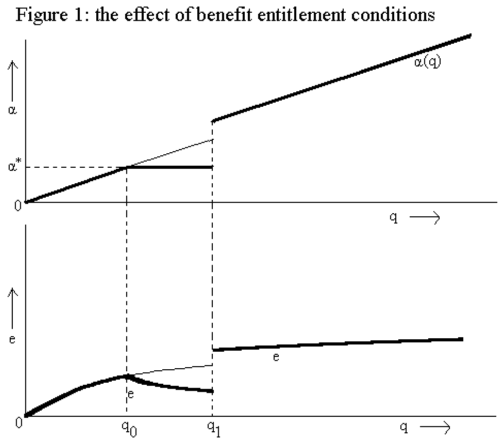

Figure 1: The relation between q, e, α, and α^*.

a minimum quality level q^* below which individuals are entitled to benefits,

$$q^* = \arg_q\{b\int_0^{Q(q^*)}[1 - g(e(q)q, s^1(e(q)q))]dQ(q) = M\} > q_1. \qquad (8)$$

Whether this is actually the poverty minimizing level depends on whether the distortionary effect of benefits on the job-finding rates is actually lower for those with low quality. Conditioning benefit entitlement on q through conditioning it on the observed α and e, Pareto improves the current outcome under very general circumstances however. The results of this model sofar can be summarized in Figure 1. The thick lines denote a hypothetical correspondence between quality and α and e respectively. In this figure, a government interested in minimizing poverty sets a minimum labour market potential level α^* above which individuals are not entitled to benefits in order to give them maximum incentives to search. Individuals with $q < q_0$ had such a low potential that they are unaffected by the minimum labour market potential as they were not going to reach that level anyway. Individuals in a quality range $q \in [q_0, q_1]$ will reduce their effort earlier such that their labour market potential is exactly α^* in order to remain entitled to benefits. They choose to become 'hopeless'. Individuals with $q > q_1$ are going to supply effort in both periods as if there was no benefit system at all. Hence, at q_1 both effort and α make a discontinuous jump.

The thin lines in Figure 1 denote the possible Pareto-improvement. For e and α, the Pareto-improvement of conditioning on e has the same effect on the individuals in the range $q \in [q_0, q_1]$ as unconditional benefit entitlement. This increases their job-finding probabilities, their utility levels, and decreases the amount of money needed to finance this system of unemployment benefits. Note though, that even after the Pareto-improvement, there is a discontinuous jump in α and e at q_1, because individuals with $q > q_1$ do not have benefit entitlement and hence provide more effort than those with entitlement.

3.4 Welfare maximizing benefits if α and e are observable

Poverty minimization bounds benefits from below at the poverty-avoiding level. Welfare maximization does not impose this constraint and does not have to neglect the utility effect of effort. The question is hence, what would $b(q, e)$ be under social welfare maximization?

If we denote the Lagrangian multiplier of the budget constraint by λ, in a welfare optimizing program $\frac{dU(b,q,e)}{db}$ has to be constant for all combinations of q and e. Using the envelope theorem, we have,

$$\begin{aligned} \frac{dU(b,q,e)}{db} &= (1-g(\alpha,s))u'(b) - \lambda * \{(1-g(\alpha,s)) - b\frac{\partial s}{\partial b} * \frac{\partial g(\alpha,s)}{\partial s}\} \\ &\equiv 0, \end{aligned} \tag{9}$$

where the term with λ denotes the externality of individual behaviour on the budget constraint. We can hence write $\lambda = \frac{(1-g(\alpha,s))u'(b)}{(1-g)-b*\frac{g_s^2 u'(b)}{g_{ss}F}} < u'(b)$ which will pin down the absolute level of benefits when a budget is given. Manipulating the general equation, we find,

$$0 = (1-g(\alpha,s))[u'(b)-\lambda] + \lambda b * \frac{g_s^2 u'(b)}{g_{ss}F}. \tag{10}$$

From this we can see that the relation between optimal benefits and earlier life efforts will be determined by two effects: the first is the direct effect of higher effort on unemployment probabilities through the term $(1-g(\alpha,s))[u'(b)-\lambda]$. The second effect is the effect of benefits on search distortions through the term $\lambda b\frac{\partial s}{\partial b}g_s = \lambda b * \frac{g_s^2 u'(b)}{g_{ss}F}$. Now, we can find the optimal benefit profile by calculating $\frac{db}{de}$ and $\frac{db}{dq}$ which are found by total differentiation, manipulation and rearranging:

$$\frac{db}{de} = \lambda bqu'(b)g_s \frac{(g_\alpha - g_s\frac{g_{\alpha s}}{g_{ss}})\frac{g_s}{1-g} - \{g_{\alpha s} - g_s\frac{g_{ss\alpha}}{g_{ss}}\}}{g_{ss}F(1-g)u''(b) + \lambda bg_s^2u''(b) + \lambda g_s^2u'(b) + \lambda b\frac{g_s^2u'(b)^2}{F}}$$

$$\frac{db}{dq} = \frac{e}{q}\frac{db}{de}. \tag{11}$$

We may note that because in an optimal welfare program $\frac{d^2U}{d^2b} < 0$, the numerator of $\frac{db}{de}$ has to be positive. If not, then the benefit profile could not be optimal because a welfare-improvement would have been possible by reducing benefits at that point. The sign of $\frac{db}{de}$ therefore equals the sign of $(g_\alpha - g_s\frac{g_{\alpha s}}{g_{ss}})\frac{g_s}{1-g} - \{g_{\alpha s} - g_s\frac{g_{ss\alpha}}{g_{ss}}\}$. The first part of this term is the positive effect of higher earlier effort on employment rates. This makes benefits increasing in effort in order to give individuals an incentive to avoid unemployment. The second part ($= -\{g_{\alpha s} - g_s\frac{g_{ss\alpha}}{g_{ss}}\}$) relates to the change in search distortions due to benefit entitlements when e increases. This term is also usually positive (see appendix), mainly because search has the greatest marginal effect when earlier effort is low: the distortions at low earlier effort levels are relatively large, making it optimal to reduce benefits more when individuals have low earlier effort levels.

Note, $\frac{db}{de} = 0$ only in the extreme case of perfect substitutability when $g(\alpha, s) = g(\alpha + s)$. Then any higher earlier effort e is perfectly compensated by lower later search effort s. With perfect substitutability all that would happen if benefits would increase with earlier effort is that individuals would choose a lower later search effort, making the conditioning on earlier effort useless. Without perfect substitution, optimal benefits increase in earlier effort, *i.e.* $\frac{db}{de} > 0$.

For these findings to be applicable in any practical scheme however, we would need detailed information on $u(.)$ and g, of which at least $u(.)$ is considered immeasurable by many economists. This severely reduces the empirical usefulness of the welfare maximizing benefit scheme. For the Pareto-improvement above to be implemented, all that is needed is information on α and e.

4 A dynamic model

So far, employment was taken to be a one-shot game. Here we briefly examine whether the qualitative findings of the previous model carry over when individuals live infinite periods in which they can search, maintain and loose jobs in continuous time.

Employed individuals become unemployed at an exogenous separation rate δ. Individuals choose an e in the first period and, from the second period till infinity onwards, search in continuous time for jobs while unemployed. We do not allow for individual income smoothing because one of unemployment benefits' main role is to help individuals to smooth income (see Gruber, 1997). The value of a job and of unemployment are denoted as V^J and V^U respectively. Taking a discount rate of ρ, these values equal,

$$
\begin{aligned}
(\rho+\delta)V^J &= u(P)+\delta V^U \\
(\rho+g(\alpha,s))V^U &= u(b)+g(\alpha,s)V^J-s.
\end{aligned}
\tag{12}
$$

Substituting V^J in the equation for V^U and re-arranging leads to:

$$
\rho V^U = \frac{g(\alpha,s)}{(\rho+\delta+g(\alpha,s))}u(p)+(1-\frac{g(\alpha,s)}{(\rho+\delta+g(\alpha,s))})u(b)-\frac{(\rho+\delta)}{(\rho+\delta+g(\alpha,s))}s.
\tag{13}
$$

Now, if we define $s^* = \frac{(\rho+\delta)}{(\rho+\delta+g(\alpha,s))}s$ and $g^* = \frac{s^* g(\alpha,s)}{(\rho+\delta)}$, we have,

$$
\rho V^U = g^*(\alpha,s^*)u(p)+(1-g^*(\alpha,s^*))u(b)-s^*.
\tag{14}
$$

Since at any optimal solution it has to hold that$\frac{\partial g^*}{\partial s^*} > 0$ and $\frac{\partial^2 g^*}{\partial^2 s^*} < 0$, the maximization of ρV^U with respect to s^* has the same properties in equilibrium as the maximization of utility with respect to s in the previous section. If there is again an initial period in which individuals choose e and if a government conditions benefit entitlement on low α, then the same Pareto-improvement as in the two-period model is possible in the infinite period case also. Optimal benefits can be calculated analogue to (10).

5 Conclusions and discussion

Benefits for individuals who are not self-sufficient generate two moral hazard problems. The first moral hazard problem is that it reduces incentives to search for jobs while on the labour market. A second moral hazard problem generated by welfare benefits is that it decreases the incentives to make an effort earlier in life to have a high labour market potential later in life. This second moral hazard problem interacts with the first and leads to the possibility that preconditioning benefit entitlement on being unable to find a job may help create a group of individuals who really are unable to find a job and who would still have low job-finding-probabilities (at least to well-paying jobs) if benefits would be withdrawn at that moment.

An efficiency increasing change for a future generation is to condition not only on labour market possibilities, but to condition on investments made earlier in life also. Conditioning future benefits on school attendance and 'school effort' is one policy option to give incentives to make investments earlier in life, whilst still allowing for the possibility that even school attendance does not guarantee good labour market opportunities because of heterogeneous talents.

Whether it is wise to condition (the height of) benefits on things like prior school attendance and school effort depends on several so far unmentioned effects of such conditioning. For one, conditioning future benefits on prior school attendance will increase the leverage that schools have on their students. It will furthermore crowd out the activities that non-attending students currently perform. Whether the net effect is welfare improving depends on a valuation of these effects also.

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Appendix: implication of specific functional forms for g.

We here look at optimal poverty policy in further detail. To begin note that,

$$\frac{d\frac{\partial g(\alpha,s(\alpha,b))}{\partial b}}{d\alpha} = \frac{d(g_s\frac{ds}{db})}{d\alpha} = \frac{2g_s g_{\alpha s}u'(b)}{g_{ss}F} + \frac{(g_s)^2 u'(b)}{(g_{ss}F)^2}g_{ss\alpha}F \tag{15}$$
$$-\frac{g_{s\alpha}F}{g_{ss}F}[\frac{2g_s g_{ss}u'(b)}{g_{ss}F} + \frac{(g_s)^2 u'(b)}{(g_{ss}F)^2}g_{sss}F]$$
$$= \frac{u'(b)g_s}{g_{ss}F}\{g_{\alpha s} - g_s\frac{g_{ss\alpha}}{g_{ss}}\}.$$

We first look at possible $g(.)$ for a single index-function $g(x(\alpha, s))$ where, because of the boundedness of g, there has to hold $g''' > 0$ and $g'g''' = (g'')^2$. We can then look at some cases with complementarity and substitutability between α and s :

- Complementarity with $g_{\alpha\alpha} < 0$: $x(\alpha, s) = \alpha s$. Then $g_{s\alpha} = g' + \alpha s g''$ and $g_{ss\alpha} = \alpha(s\alpha g''' + 2g'')$. Then $g_{\alpha s} - g_s\frac{g_{ss\alpha}}{g_{ss}} = -g' < 0$. For $g(x) = 1 - e^{-bx}$ for instance, this means that $g_{\alpha s} - g_s\frac{g_{ss\alpha}}{g_{ss}} = -be^{-bx} < 0$ and $\frac{d\frac{\partial g(\alpha,s(\alpha,b))}{\partial b}}{d\alpha} > 0$.

  For $g(x) = 1 - \frac{1}{1+bx}$, we have $g_{\alpha s} - g_s\frac{g_{ss\alpha}}{g_{ss}} = \frac{-b}{(1+bx)^2} < 0$. Hence $\frac{d\frac{\partial g(\alpha,s(\alpha,b))}{\partial b}}{d\alpha} > 0$.

- Complementarity with $g_{\alpha\alpha} <> 0$: $x(\alpha, s) = f(\alpha)s$ with $f' > 0$ and

$f'' > 0$. Then $g_{s\alpha} = f'g' + sff'g''$ and $g_{ss\alpha} = 2ff'g'' + sf'f^2g'''$. Then $g_{\alpha s} - g_s \frac{g_{ss\alpha}}{g_{ss}} = -f'g' < 0$. Hence $\frac{d\frac{\partial g(\alpha,s(\alpha,b))}{\partial b}}{d\alpha} > 0$.

- Substitutability: $x(\alpha, s) = \alpha + s$. Then, $g_{s\alpha} = g'' < 0$ and $g_{ss\alpha} = g'''$. Also, $g_{\alpha s} - g_s \frac{g_{ss\alpha}}{g_{ss}} = 0$. Hence $\frac{d\frac{\partial g(\alpha,s(\alpha,b))}{\partial b}}{d\alpha} = 0$.

For none-single index function we find different results.

- Additive substitutability: $g(.) = f(\alpha) + h(s)$ with $f, h, h', f' > 0$, $f'', h'' < 0$ and $0 < g < 1$. Then $g_{s\alpha} = g_{ss\alpha} = 0$ and $\frac{d\frac{\partial g(\alpha,s(\alpha,b))}{\partial b}}{d\alpha} = 0$.

- Multiplicative complementarity: $g(.) = f(\alpha)h(s)$ with f and h as above. Then $g_{s\alpha} = h'f'$ and $g_{ss\alpha} = f'h''$. Also, $g_{\alpha s} - g_s \frac{g_{ss\alpha}}{g_{ss}} = 0$ and $\frac{d\frac{\partial g(\alpha,s(\alpha,b))}{\partial b}}{d\alpha} = 0$.

We can hence get $\frac{d\frac{\partial g(\alpha,s(\alpha,b))}{\partial b}}{d\alpha} > 0$ with single-index functions without perfect substitution. For many cases where s and α are complements, $\frac{d\frac{\partial g(\alpha,s(\alpha,b))}{\partial b}}{d\alpha} = 0$. There are hence no general results on $\frac{d\frac{\partial g(\alpha,s(\alpha,b))}{\partial b}}{d\alpha}$.

Calculations on $D = (g_\alpha - g_s \frac{g_{\alpha s}}{g_{ss}}) \frac{g_s}{1-g} - \{g_{\alpha s} - g_s \frac{g_{ss\alpha}}{g_{ss}}\}$:

- $g = g(\alpha s)$. Then $D = g' > 0$.

- $g = g(\alpha + s)$. Then $D = 0$.

- $g = g(f(\alpha)s)$. then $D = f'g' - \frac{(g')^3 f'}{g''(1-g)} > 0$

- $g(.) = f(\alpha) + h(s)$. Then $D = \frac{f'h'}{(1-g)} > 0$.
- $g(.) = f(\alpha)h(s)$. Then $D = (f'h - h'f\frac{h'f'}{fh''})\frac{h'f}{1-fh} > 0$.

We hence find in these examples that $D > 0$ unless there is perfect substitution, in which case $D = 0$.