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Long-term unemployment as a screening device and its consequences for active labour market policies

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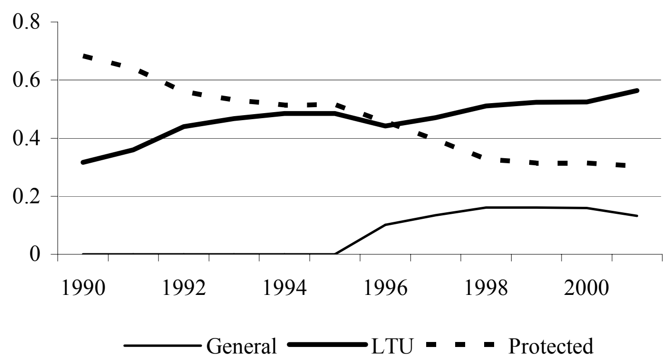
1 Introduction

During the last ten years, active labour market policies (ALMPs) constituted a substantial part of the efforts governments put into fighting long-term unemployment. Employment subsidies – *i.e.* firms get a subsidy whenever they take on long-term unemployed – comprise a considerable part of ALMP. Figure 1 shows that their share increased from 32 per cent in 1990 of expenditures on active labour market policies in the Netherlands to 56 per cent in 2001. Bearing in mind that the expenditures on ALMP increased from two to six billion euros in the same period, shows the magnitude of these programs (SZW 2001). But why would a government want to subsidize employment for jobseekers that firms do not want to hire? From an economic point of view, this can only be justified whenever there are market failures.

Figure 1 Share of employment subsidies in total expenditures on ALMP, the Netherlands 1990-2001



Source: SZW (2001). General employment subsidies comprise tax exemptions employers receive for all employees they employ at a wage at or just above the minimum wage (for example SPAK). LTU employment subsidy schemes are targeted at long term unemployed only. Part of the money is spent on job creation in the public sector. The rest is available for employers in the private sector who hire long term unemployed (WIW, I/D, VLW). Protected unemployment aims at creating jobs for disabled unemployed who will not find a non subsidized job (WSW).

In our view market failures can arise since firms cannot observe ability levels of jobseekers without a cost, due to asymmetric information. In order to minimize hiring costs firms use screening devices. However, the use of such devices leads employers to disregard some jobseekers with sufficient ability levels. This constitutes a market failure, and government intervention by means of employment subsidies can be justified.

The Dutch economy experienced some considerable changes during the last decade. In the early nineties, the unemployment rate fluctuated around 6 to 7%, but at the end of the decade it declined to around 3% (CBS, 2001). The tightening of the labour market has consequences for the screening standards used by firms. Firms can be less choosy, which means that long-term unemployed, who were fallaciously disregarded in an easy labour market, will be taken into consideration when the labour market tightens. Moreover the tightening of the labour market has encouraged a more tailor-made approach to employment subsidies. We analyze how both the tightening of the labour market and the policy change affect the success of employment subsidies.

2 Modeling hiring behavior using screening devices

Weiss (1980) was one of the first to model firm hiring behaviour under information asymmetry. According to Weiss, productivity differences between jobseekers can be attributed to costless observable and costly observable characteristics. Costless observable characteristics are for example the attained education level of workers, whereas costly observable characteristics are for instance innate abilities. Both characteristics together determine total abilities and hence productivity. Employers are looking for the most productive jobseekers and therefore need to get grip on these costly observable characteristics. One way to be able to select highly productive workers is to offer high wages. Weiss points at the fact that workers having high productivity levels will also have high reservation wages. Hence offering high wages will increase the share of highly productive workers amongst the applicants.

Guasch and Weiss (1980) propose a second approach to solve information asymmetries. They introduce ability tests, which enable firms to locate the most productive workers (tests on a pass/fail basis). Guasch and Weiss argue that the most productive workers will be most confident of passing the test and hence are more likely to do the test. They show that there might be a testing equilibrium in which at least part of the higher productivity workers are screened.[1]

Greenwald (1986) proposed a third route to solve the problem of asymmetrical information. Greenwald argues that employers introduce probationary contracts. During such a probationary period, the employer observes the otherwise ‘hidden’ abilities of workers. At the end of this period the employer decides whether to continue the employment relation or not, based on the abilities of the worker. By doing so, employers categorize the unemployment pool. Workers that lose their job at the end of the probationary period and return to the unemployment pool inadvertently

[1] See also Guasch and Weiss (1981).

"signal" to other employers that they do not have high 'hidden' abilities.[2] Consequently their chances on reemployment diminish. The categorization of workers also reflects in the wage. During the probationary period, the employer pays wages equal to the average marginal product of all workers concerned. At the end of the period, the employer picks out workers having high abilities and pays them accordingly, whereas the fired workers find themselves in a "second hand" labour market where below probationary period wages prevail.

These three models have in common that they rely on self-selection among jobseekers. "Entry barriers" like a probationary period, ability tests and to a lesser extent offering high wages deter unqualified. That is, it is not the employer who selects potential employees, it is the employees who self-select. The existence of self-selection leads the authors to ignore to a certain degree the actual hiring process – starting from posting a vacancy to actually filling it – firms undertake. Although we do not want to underestimate the importance of self-selection, the substantial expenditures firms devote to human resource management point at the difficulties firms face when trying to fill a vacancy (see for example Hale (1998)). Therefore we focus on the hiring decision process firms undergo to fill a vacancy.

Information asymmetry induces screening devices

We assume a competitive labour market in which there are I identical firms. Next to these firms there are J jobseekers, who differ with respect to their ability level α_j. Firms want to secure a certain minimum productivity level p^h. However, information asymmetry prevents firms from observing the ability of an applicant and hence her productivity. Only during a thorough and costly assessment procedure firms can determine the true ability level of a jobseeker.

Figure 2 represents the hiring procedure, which starts when the firm posts a vacancy. This announcement will yield a rate of contacts of applicants. Since the firm is not able to assess the abilities of applicants right away, it will screen applicants using some easy obtainable device t.

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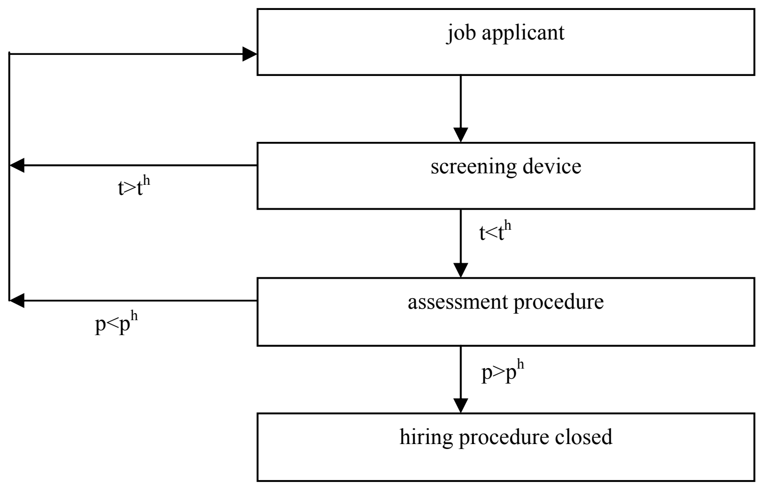
[2] Waldman (1984) notes that firms not only use the post-period 1 job match results at other firms to infer the abilities of workers, but also the pre-period 1 job assignments at other firms. Here we discard this possibility.

The relevance of screening in hiring decisions has lead to an ongoing debate in the empirical literature: the screening versus human capital debate. The general consensus now is that screening plays a role in hiring decisions – see for example Taubman and Wales (1973), Wolpin (1977), Albrecht (1981), Miller and Volker (1984) and Lang and Kropp (1986). However, these authors refer to the level of education as a screening device. Lynch (1985), Lynch (1989), Van den Berg and Ours (1996) and especially Omori (1997) show that firms also use unemployment duration as a screening device. In our view this is a relevant practice, which we will further analyse.

Figure 2 Overview of the hiring procedure



An applicant who does not meet the screening device standard t^h (for instance "no more than one year unemployed") will be rejected immediately; otherwise the applicant enters the assessment procedure. In the latter case the applicant will be assessed thoroughly and her true ability level will be revealed. When her ability level is sufficient and hence productivity exceeds p^h, the applicant will be accepted for the job and the hiring procedure closes. Otherwise the applicant will not be accepted and hence the firm has to start the hiring procedure all over again with another applicant.[3]

To function as a useful screening device, there needs to be a high correlation between the screening device and the unobservable characteristic. From a theoretical point of

[3] The possibility that a worker meets t^h but not p^h shows that the screening device is no perfect indicator of ability/productivity. If it would be, there would be no asymmetric information anymore.

view, there are at least two reasons why unemployment duration and productivity levels are negatively correlated. Firstly, the duration dependence argument explains why there is a negative relation between productivity and unemployment duration. Non-use of skills during unemployment spells leads to atrophy of skills and hence to productivity loss. Secondly, heterogeneity explains this negative relationship. The most productive workers will find a job quickly, leaving the less productive workers in the unemployment pool, whose share in the total jobseekers pool therefore increases as unemployment duration increases.

In our analysis we will not include heterogeneity effects as including them would lead to complicating the model without enriching it. The negative relationship between unemployment duration and productivity therefore solely stems from atrophy.

Productivity declines with unemployment duration

Firms want to secure a certain minimum productivity level p^h. Although, they cannot observe the productivity of a worker, p_j, nor her innate ability, α_j, the employer knows the distribution of abilities over all workers. The ability of a worker only corresponds to her productivity when she has not been unemployed. During unemployment the potential productivity depreciates at a rate ω. Hence we assume the following link between ability and productivity for worker j:

(1) $$p_j = \left[1 - \omega(t_j, \alpha_j)\right] \ \alpha_j \ and \ \omega(0,\alpha) = 0, \omega_t > 0, \omega_\alpha > 0, \omega_{tt} < 0, \omega_{t\alpha} < 0$$

We briefly elaborate on the properties of the depreciation of abilities, since they condition the results of the rest of the paper.

The first property, $\omega_t > 0$, indicates the positive relation between productivity depreciation and unemployment duration. Skills get outdated following non-use and hence productivity declines. The empirical literature on post intermittence wage declines confirms this – see for example Mincer and Ofek (1982), Mincer and Polachek (1978), Kim and Polachek (1984) and Albrecht *et al.* (1998). But not only economists find this negative relationship, also psychologists do (Arthur *et al.*, 1998).

The second property, $\omega_\alpha > 0$, assures a positive relation between productivity depreciation and ability level. High ability workers face a higher productivity depreciation rate than low ability workers following a given spell of unemployment.

Albrecht *et al.* (1998) and Neumann and Weiss (1995) find empirical support for this hypothesis.[4]

The third property, $\omega_{tt} < 0$, implies a diminishing increase in productivity loss as unemployment duration continues. The rationale behind this feature follows from the second property, which intuitively says: the more productive you are, the more there is to lose.

The fourth and final property, $\omega_{\alpha t} < 0$, opens the possibility to model the productivity loss process in such a way that individuals having high abilities remain more productive than individuals having low abilities for a given t.

Every unemployed has a personal combination of α_j and t_j, which together determine her productivity p_j. We assume that employers can observe the duration of unemployment of applicants. Since they also know the distribution of abilities of workers, they can infer from that the distribution over workers with respect to productivity and duration, $x(p, t)$.[5]

Figure 3 presents the evolution of productivity loss following non-use of skills. At unemployment duration $t=0$, we observe the productivity level of individuals who were fired in the current period. As firing is assumed to be a random process,[6] these individuals are a representation of the productivity distribution of employees. Their productivity ranges from $p_{min}(0)$ to $p_{max}(0)$.

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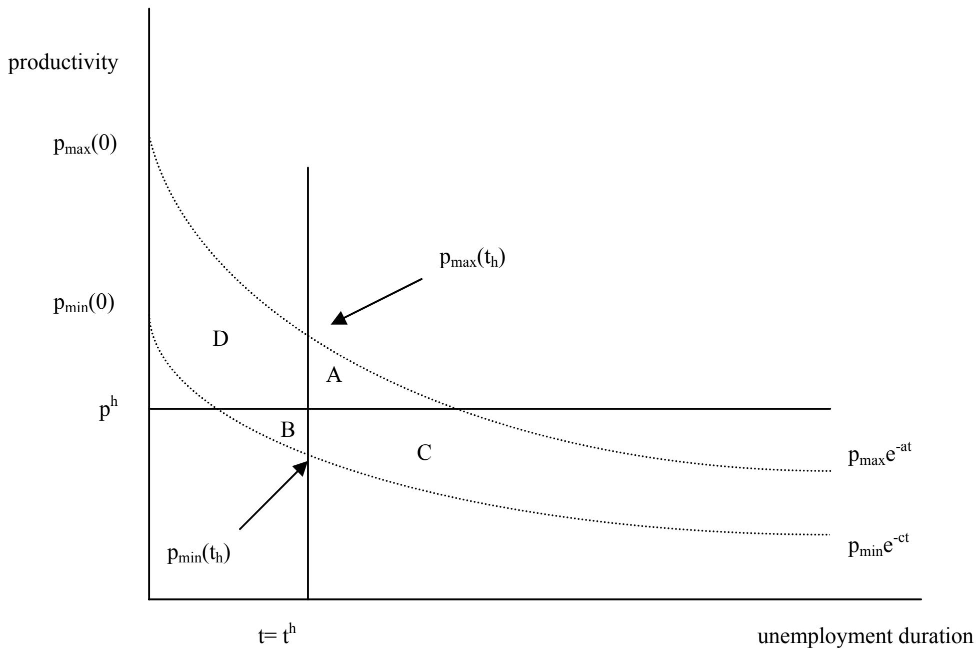
[4] We abstract in this paper from unemployment spells originating from earlier completed spells of unemployment.

[5] Note that not only individuals having the same ability level and unemployment duration face the same productivity level. If person A has an ability surplus over person B, this surplus (in productivity terms) could be wiped out by a longer spell of unemployment.

[6] Job separation follows job-specific idiosyncratic shocks, which make the job not productive anymore and hence the job breaks down, regardless the (innate) ability level of the employee carrying out the job. These shocks occur at probability λ.

Figure 3 Link between unemployment duration and productivity



As the unemployment spell increases, skill atrophy causes productivity to decline, which is represented by the two downward sloping dotted curves. The upper dotted curve represents the productivity depreciation of the highest ability worker:

(2) $$p_{\max}(t) = \alpha_{\max} e^{-at}$$

Hence *a* is the per period depreciation rate of the highest ability worker and for a given unemployment duration *t* it produces the highest productivity level available. The lower dotted curve represents productivity depreciation of the lowest ability worker:

(3) $$p_{\min}(t) = \alpha_{\min} e^{-ct} \qquad and \qquad a > c$$

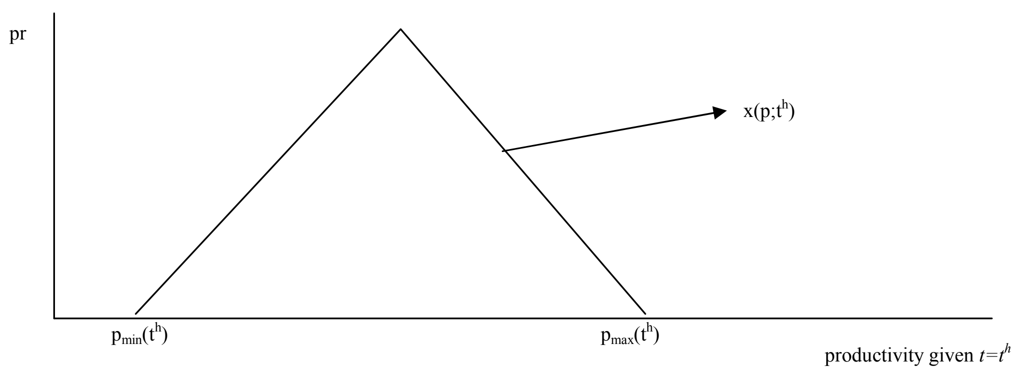
For a given *t*, this function delivers the lowest possible productivity level. Since high ability workers experience more productivity deterioration following non-use of skills than low ability workers, $\omega_{\alpha} > 0$ in equation (1), *a* must be larger than *c*.

The productivity distribution

The maximum and minimum productivity level given unemployment duration define the boundaries of *x(p,t)*, the distribution of workers in the unemployment pool over productivity. The highest productivity level that can be found in the unemployment pool is $p_{max}(0)$, which is an unemployed having the maximum ability level, α_{max}, and no unemployment record. The lowest possible productivity level in the unemployment pool must be $p_{min}(T)$, where T is the maximum duration of unemployment.

We assume the intelligence distribution over the population to be a Bell curve, which empirically appears to be close to a normal distribution – *cf* Herrnstein and Murray (1994). Since we assume entry into unemployment to be random, each cross section of $x(p,t)$ in Figure 3 at a particular unemployment duration will be Bell-shaped.[7] Figure 4 presents the productivity distribution of unemployed experiencing t^h periods of unemployment, $x(p;t^h)$, as a simplified version of the Bell curve. It is obvious that the mode productivity level of $x(p;t^h)$ is decreasing in t^h, as productivity depreciation follows non-use of skills.

Figure 4 Productivity distribution given t



Unemployment duration as a screening device

The longer unemployment spells last, the lower the productivity level on average becomes. Therefore using unemployment duration as a screening device increases the probability that a firm meets a qualified job applicant. In the absence of using a screening device the probability to immediately find a qualified worker is $1/[1 + (B + C)/(A + D)]$ – *cf* Figure 3, where A, B, C and D represent the surfaces of four different areas. Setting a screening device standard t^h increases this probability to $1/[1 + B/D]$. Crucial in this respect is that this probability will only be higher when $B/D < (B +$

[7] Here we make the assumption that there is a close link between intelligence and innate ability, which enables us to present $x(p;t)$ as a (simplified) normal distribution, too.

C)/(A + D). This is the case whenever the reduction of "type 1 error" costs (retaining unqualified jobseekers in the selection process) outweighs the increasing costs of generating "type 2 errors" (excluding qualified jobseekers from the selection process).

By imposing a screening device standard t^h, only unemployed experiencing t^h or less than t^h periods of unemployment remain relevant for a job (those to the left of t^h in Figure 3). Hence decreasing t^h, increases the share of qualified unemployed in the unscreened pool. Let the function *s* of *t* be the distribution of unemployment duration of the jobseekers pool, *i.e.*:

$$(4) \qquad s(t) = \int_{p_{\min}(t)}^{p_{\max}(t)} x(p,t)dp$$

Then the share of unemployed eligible to be screened, *i.e.* the screening survival rate, equals:

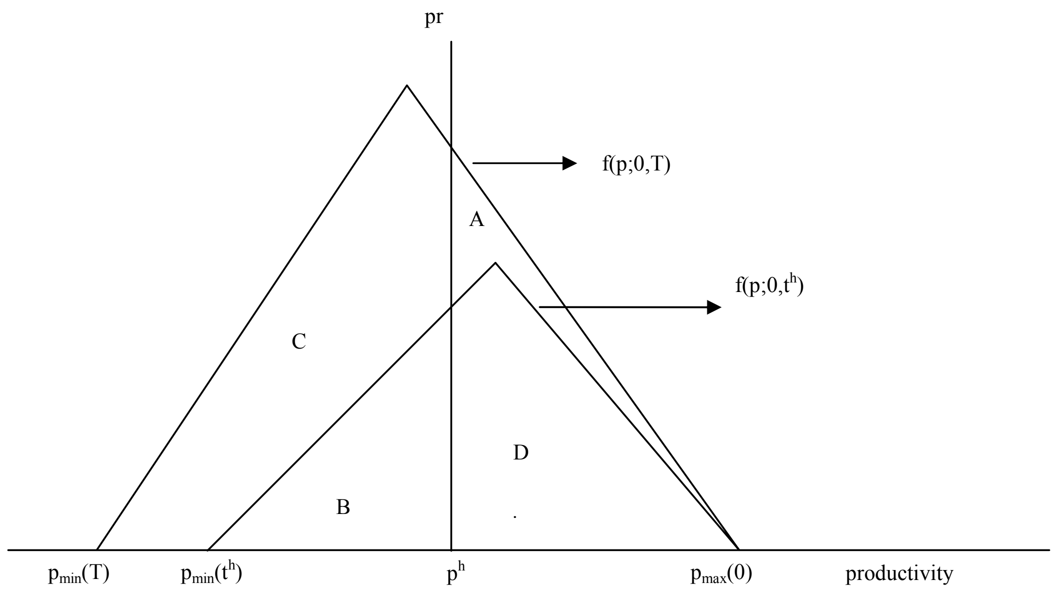
$$(5) \qquad S(t^h) = \int_{t=0}^{t=t^h} s(t)dt = \int_{t=0}^{t=t^h} \left[\int_{p_{\min}(t)}^{p_{\max}(t)} x(p,t)dp \right] dt$$

Figure 5 shows this process in a different way, using a cumulative distribution of productivity of all job seekers:

$$(6) \qquad f(p;0,t^h) = \int_0^{t^h} x(p,t)dt$$

The productivity distribution ranges from $p_{min}(T)$ to $p_{max}(0)$. And the probability of finding a qualified applicant is *1/[1 + (B + C)/(A + D)]*. When the hiring standard t^h is introduced, the cumulative distribution is reduced. The maximum productivity level remains $p_{max}(0)$. However, the minimum productivity level increases due to the use of the screening device to $p_{min}(t^h)$ – this is elaborated in the annex to the paper. As a consequence, the probability to find a qualified applicant increases to *1/[1 + B/D]*. In this case the condition *B/D < (B + C)/(A + D)* follows from the shift of the distribution to the right.

Figure 5 Introducing a screening device



Hiring costs and optimal screening

The firm will encounter two types of hiring costs; the costs of carrying out an assessment k and per period foregone productivity z.[8] The latter costs refer to the productivity loss of a vacancy.[9] Total hiring costs equal the average cost per assessment times the average number of assessments needed to find a qualified jobseeker.

Since labour market tightness might cause vacancies difficult to fill when a strict screening device is used, an applicant might not be available in every period the firm has a vacancy. Therefore total z costs do not have to be in line with the number of assessments carried out.

To model the arrival rate of applicants we use a stochastic job model (Pissarides, 2000). After the firm has posted a vacancy, jobseekers start contacting the firm. The contact rate q is by definition the number of contacts $m.l$ over the number of vacancies

[8] We abstract from other costs like the costs related to posting the vacancy, as their contribution to total hiring costs is small. Implicit to our reasoning is that we assume that posting a vacancy will eventually lead to filling it. However, the time span between opening and filling the vacancy remains unknown.

[9] Which we define to be a fraction, κ, of p^h. Since p^h is no endogenous variable in our model, z is neither.

v.l.[10] Using the notion of a matching function, the rate of contacts q depends negatively on labour market tightness θ, which is defined as v/u:[11]

$$(7) \qquad \frac{ml}{vl} = m(\frac{ul}{vl}, \frac{vl}{vl}) = m(\frac{u}{v}, 1) = q(\underset{-}{\theta})$$

However, since the firm uses unemployment duration as a screening device – *cf* equation (5) – the product of the screening survival rate $S(t^h)$ and the arrival rate $q(\theta)$, gives the final arrival rate:

$$(8) \qquad S(t^h)q(\theta)$$

The average total costs incurred during an assessment then are:

$$(9) \qquad k + \frac{z}{S(t^h)q(\theta)}$$

A more stringent screening device standard leads to a smaller final arrival rate which leads to more forgone productivity and hence to higher per assessment costs: a typical type 2 error.

The firm is interested in keeping the number of assessments it has to complete to find a qualified worker ($p>p^h$) low. Therefore, the success rate of assessments needs to be high – *i.e.* the probability that an applicant who enters the assessment procedure indeed meets the productivity standard, which is a reduction in type 1 errors. The success rate of a firm setting $t= t^h$ follows from equation (6):

$$(10) \qquad \int_{p^h}^{p_{\max}} f(p;0,t^h)dp = 1 - F^{0,t^h}(p^h)$$

As the average number of assessments needed to find a qualified worker is the inverse of the success rate of the assessment procedure, total hiring costs $H(t^h)$ are defined by:

$$H(t^h) = \frac{1}{1 - F^{0,t^h}(p^h)} \left[k + \frac{z}{S(t^h)q(\theta)} \right] \qquad (11)$$

[10] Where m is the number of jobseekers that apply for the job as a fraction of the labour force l and v is the number of vacant jobs as a fraction of l.

[11] We exclude "on the job search", which means that all jobseekers experience positive unemployment spells.

The right-hand side of the equation indicates the trade-off, which the firm faces. A higher hiring standard increases the success rate (reduces type 1 errors) but at the same time increases the per assessment costs (higher type 2 errors). The firm will choose its optimal screening standard, t^{h*}, such that hiring costs are minimised. In the Annex we show that t^{h*} will increase when the labour market becomes tighter. In that case it is optimal for firms to relax their screening standards.

Wage determination and market failures

Given the screening standard, t^{h*}, the wage level is determined in a Nash bargain between employers and employees. Depending on the bargaining strength of both parties, the wage will be a weighted average of on the one side the outside option and on the other side the productivity level of the employee plus the hiring costs the firm incurred. If the employers have full bargaining strength, the wage equals the outside option. If the employees have full bargaining strength, the wage equals productivity plus hiring costs – since the firm has to incur hiring costs again if wage negotiations break down.

Actually, the hiring standard t^h might influence the wage outcome, since it defines the relevant share of the unemployment pool and it also influences the outside option. However, these are aggregate effects and it seems reasonable to assume that individual firms will not take these into account. Figure 6 shows how the optimal screening device standard, t^{h*}, defines the fraction of all unemployed which are taken into consideration. This means that the labour supply curve is cut off at E^0, and a wage w^0 results as the outcome of the bargaining process.[12]

Although t^{h*} is optimal from the firm's point of view, it is socially not. Unemployed who do not meet t^{h*}, but who do meet p^h, are excluded from the hiring procedure. These unemployed pay a price for the inaccuracy of the screening device. But since the firm does not face the externalities (*i.e.* unemployment benefits) of this type 1 error, it does not take these costs into consideration when setting t^h. Hence, we are dealing with a market failure.

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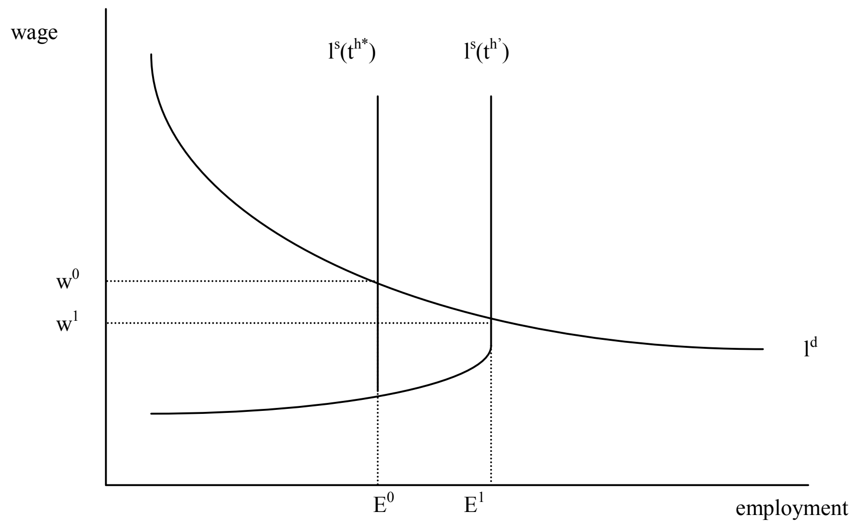
[12] For expositional simplicity we have drawn vertical lines in the figure, of course these should be increasing, depending on the bargaining strength of employees.

Figure 6 The effects of the screening device standard on the employment outcome



To internalise the market failure, the government has to induce the firm to increase t^h to say $t^{h'}$. As hiring costs are higher after t^{h*}, the only option to induce firms to increase t^h is to subsidize the increase in the hiring costs. Following subsidization, the firm will increase t^h and subsequently take (part of) the unemployed in area *A* (see Figure 3) into consideration for the job. In Figure 6 this means that labour supply increases to $l^s(t^{h'})$, which leads to a wage reduction and hence an increase in employment. This increase in employment and consequently decrease in government expenditures on unemployment benefits could be used to finance the subsidy.[13]

3 Employment subsidies to correct market failures

Employment subsidies can encourage firms to recruit from long-term unemployed for different reasons. We discuss two forms of subsidies: compensation for increased hiring costs, and schooling or training subsidies. In both cases a temporary or once and for all subsidy can lead to permanent job creation.

Compensation for increased hiring costs

The objective of the government is to persuade firms to recruit from unemployed in area *A* of Figure 3. Recruiting from jobseekers experiencing more than t^h periods of unemployment leads to increasing hiring costs for the firm. Therefore the government

[13] We do not elaborate the optimal size of $t^{h'}$ here.

needs to allocate a subsidy to firms who take on unemployed experiencing unemployment spells ranging from t^h to say $t^r > t^h$ – the subsidy range then covers the area *A*. Introducing a subsidy for employers who take on unemployed out of the range t^h to t^r, can be seen as a shift of the screening device standard – *cf* the shift from t^h to t^r in Figure 7. Therefore the additional hiring costs of firms who have to recruit from the complete subsidy range t^h to t^r equal $H(t^r) - H(t^h)$, *cf* equation (11).

As hiring costs keep on increasing to the right of t^h, the subsidy has to depend on unemployment duration positively, to ensure that firms take into consideration all unemployed experiencing unemployment spells ranging from t^h to t^r.[14]

Finally, since the subsidy leads to the selection of persons whose productivity meets the standard p^h, the worker occupies a permanent job.

Subsidy to school unemployed workers

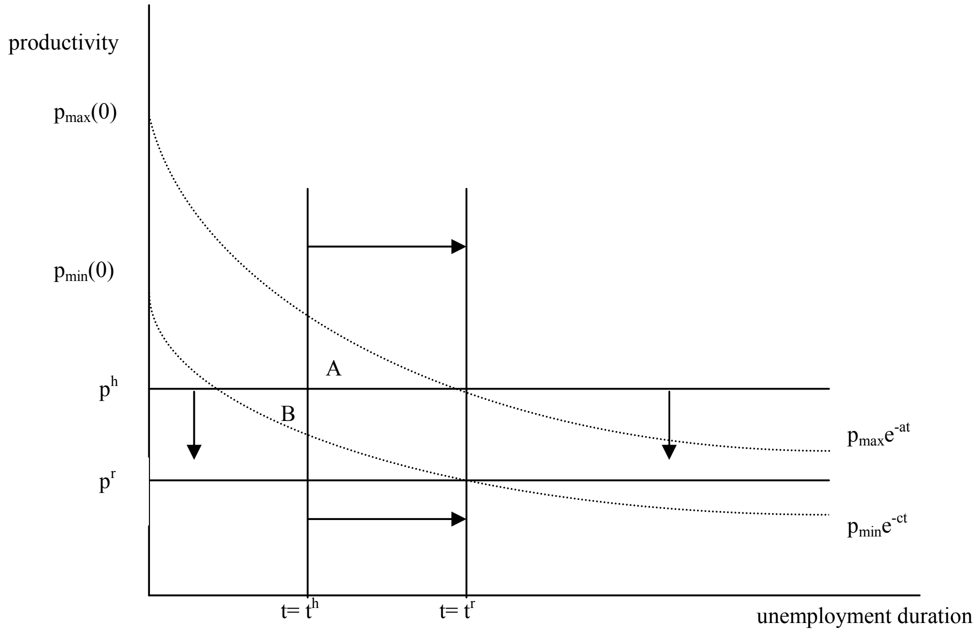
Besides extending the search process for a qualified worker, the firm can also decrease the productivity standard and use the subsidy to upgrade the productivity of the hired jobseeker to the originally required productivity level. Figure 7 illustrates that decreasing required productivity from p^h to p^r, means that the firm takes more unemployed $(t^r\text{-}t^h)$ into consideration. Hence allocating subsidies to firms who use the subsidy to school workers also leads to job opportunities for unemployed who are excluded otherwise. Lowering p^h to p^r, induces the firm to adapt t^h to t^r. That is, the optimal screening device standard shifts to the right. Now the firm finds it optimal to recruit up to t^r, hence the subsidy can be uniform.[15]

Although the design of the subsidy differs between both options, the outcome is the same: by means of the subsidy, employers recruit from long-term unemployed and find qualified personnel within this group. Moreover, in both cases they will continue to employ the workers after the termination of the subsidy as they meet the firm's ability standard.

[14] Moving to the right of t^h means that hiring costs increase as the gains in terms of more arrivals do not outweigh the losses in terms of rejections during assessments.

[15] The level of the subsidy depends on the costs of schooling, which we take for granted here.

Figure 7 The impact of employment subsidies



4 Employment subsidies: the case of the Netherlands

The two oil shocks in the seventies that hit the Dutch economy, caused unemployment rates to increase to levels unprecedented in the post war period. Although the unemployment rate decreased gradually, it did not fall back to pre oil shock levels. Consequently, long-term unemployment increased rapidly and remained high throughout the nineties. The use of employment status as a screening device is probably one of the driving forces behind this long-term inactivity.

The Dutch authorities observed the problem unemployed faced and increased the use of ALMP (both in financial terms as in terms of volumes). Prime objective of ALMP was mobilizing long-term unemployed. A typical example of ALMP was the so-called Melkert1 project, which aimed at 40,000 subsidised jobs for long-term unemployed in the public sector. The objective of this program was to meet the needs of both unemployed and society (the subsidized jobs were created in socially valuable sectors short of personnel). The government justified the use of ALMP to help long-term unemployed escape social isolation and grant their right to work. We will entitle this by “equity justification”.[16]

[16] As opposed to efficiency justification, which refers to using ALMP to repair market failures.

The emphasis on equity arguments also appeared from the design of the programs. The subsidy period was often unlimited, which assured that long-term unemployed did not fall back in isolation, but it did not help as an outflow stimulus. The subsidy projects were mainly created in the public sector, which indeed led to socially valuable work, but the work to be done, contributed little to increasing the productivity level of participants which would be useful in finding a non-subsidized job. Hence it was no surprise that the results in terms of outflow to unsubsidised employment were disappointing – *cf* Welters (1998). However, as this was no primary objective of ALMP, low outflow rates were no major concern to policymakers.

This justification should be compared to the "efficiency justification", which primarily focuses on the unemployed in area *A* of Figure 3, *i.e.* aims at reducing errors of type 2. An example of the latter is the Melkert2-project. This program provides temporary subsidies for taking on long-term unemployed to employers in the private sector only. This programme was a reaction to the tightening of the labour market in the nineties. We show that deadweight losses are a serious problem here.

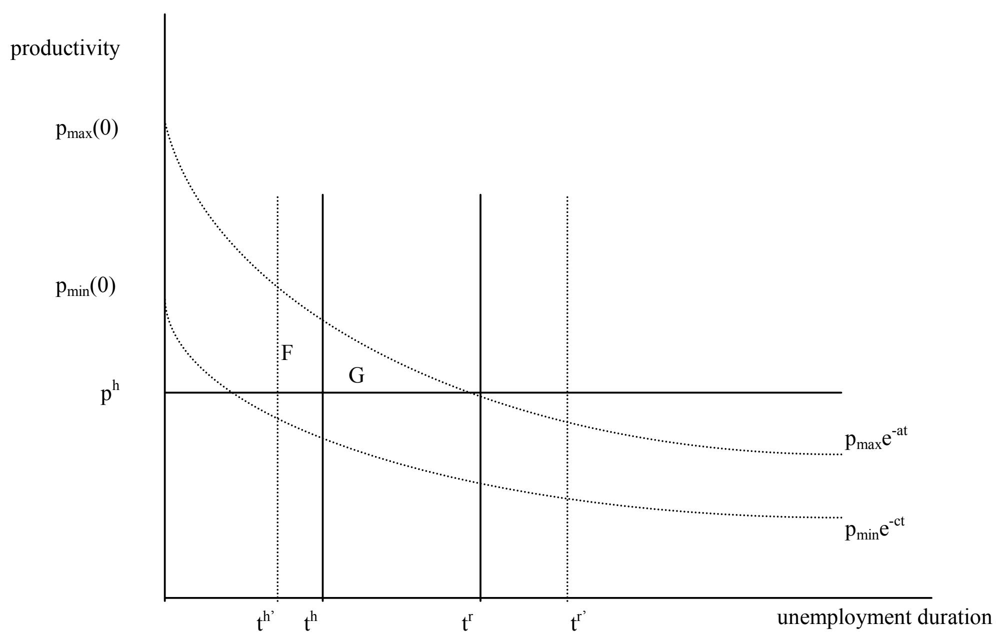
Finally the Dutch government has changed it policy towards profiling, *i.e.* targeting the unemployed. This policy primarily aims at reducing the type 1 errors. We show that this policy is highly successful in principle, but that deadweight loss might become a serious problem again.

The equity justification: low deadweight loss

The success rate of employment subsidies depends, amongst other factors, on the type of jobseekers that enter the program. If the government requires firms to select from long-term unemployed close to the right of t^h, the success rate will be higher than firms having to recruit from unemployed experiencing unemployment spells considerably larger than t^h (for example the subsidy range from t^r to $t^{r'}$ in Figure 8). The more the subsidy range shifts to the right, the higher the subsidy has to be to induce firms to participate, as hiring costs increase. Something, which is typically not found in reality. In the present example of Figure 8, there would not be a subsidy level high enough to induce firms to recruit from the range t^r to $t^{r'}$, since there are no unemployed in this range that meet the productivity standard. This is probably one of the reasons why Melkert1 jobs were created in the public sector.[17]

When the unemployed close to t^h are targeted, efficiency arguments come to the fore and one should beware of the deadweight loss. Deadweight loss equals the share of participants in employment subsidies that would have found a job without the subsidy. However, the risk of provoking deadweight loss by subsidizing the Melkert1 unemployed is low. In particular when the government really succeeds in targeting the range t^r to $t^{r'}$ in Figure 8, and thus also can correctly identify t^r. It is obvious that this is not always the case. In particular the improved situation on the labour market in the 1990s and the increased dynamics made it more difficult for the government to determine the subsidy range and increased the deadweight loss risk. Moreover, the increased labour market tightness caused a change from an equity to an efficiency justification of active labour market policies.

Figure 8 Targeting unemployed and deadweight loss



The efficiency justification: deadweight loss

During the late nineties the labour market became much tighter. As a result of falling unemployment rates the share of long-term unemployed in total unemployment

[17] An alternative would of course be to provide schooling subsidies.

started to decline, though at a slow rate. Besides equity arguments to help long-term unemployed, a second argument arose: employers are in need of personnel. Tightness on the labour market meant that firms could not easily fill their vacancies, though at the same time there was a core group of unemployed. Government policy changed from the Melkert1-project to the Melkert2-project, which was focused on the private sector and intended to match long-term unemployed to vacancies. The merits of this type of ALMP come much closer to the ALMP as we discussed in section 3. However, deadweight loss then becomes a serious problem.

Minimizing deadweight loss is important, as it constitutes a waste of subsidy transfers. A government that uses employment subsidies should not only care about maximizing the success rate but it should at the same time try to minimize deadweight loss. Figure 8 shows that with respect to the latter the ideal situation would be, a government knowing t^h and setting the subsidy range from t^h to for instance t^r. If it does so, no unemployed would find a subsidized job she would have found in the absence of the subsidy, hence no deadweight loss. However, if the government does not know t^h and accidentally sets the subsidy range from $t^{h'}$ to t^r, deadweight loss equals $F/(F+G)$.

A factor, which is often overlooked in the policy discussion, is that the increased labour market tightness induced employers to relax their selection standards for unemployed. In the Netherlands policymakers hardly adapted the subsidy range to increasing tightness. The entrance criterion remained "one year out of unemployment" throughout the nineties. This has increased the apparent success rates of the subsidies, but at the expense of deadweight loss.

In the Annex we show how indeed increased labour market tightness will lead to an increase in the optimal screening device standard t^{h*} for the employers. This rightward shift of t^{h*} following an increase in tightness affects the success of employment subsidies, as firms are more willing to participate. However, this increased interest of firms to participate stems from the fact that they receive subsidies for unemployed they would have taken on without the subsidy.

Figure 8 also illustrates the deadweight loss as labour market tightness increases. Government starts the subsidy range at $t^{h'}$, which coincides with the initial value of t^{h*}. Hence initially there is no deadweight loss. However, as labour market tightness increases, t^{h*} shifts to the right to for example t^{h}. A government that now does not shift the subsidy range accordingly, will induce the development of deadweight loss, which amounts *F/(F+G)*.

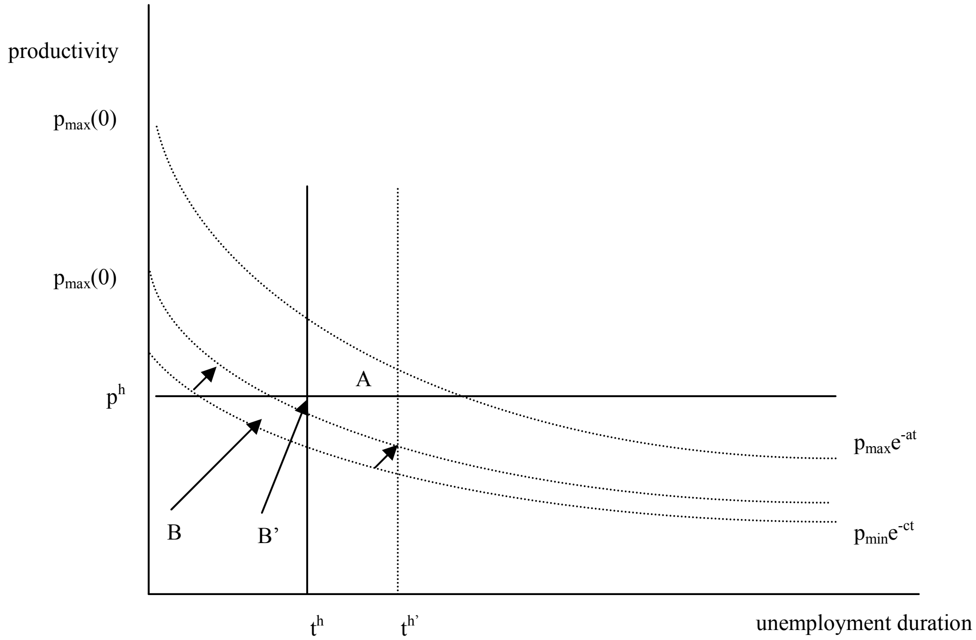
Profiling unemployed: more successful

Although, the Dutch authorities did not change the subsidy range following the changing stance of the labour market, they implemented other measures to adapt to the changing environment. The allocation of long-term unemployed towards the various programs became more structured. Employment Offices set up profiles of unemployed ("fasering"), which provide the distance unemployed face to the labour market. These profiles determine the reemployment probabilities of long-term unemployed, based on individual characteristics (education level, occupation, age etc.). Profiling enables policymakers to allocate unemployed to the program that suits them best – see for example Kooreman (1999). That is, if the outcome is that unemployed face severe difficulties to find employment, programs like the Melkert1-project (the name changed into "In-/Doorstroom banen") are still available. But if these difficulties appear to be less severe other alternatives are available, ranging from temporary employment subsidies at private sector firms to re-schooling possibilities.

Profiling offers unemployed a tailor-made solution, but not only unemployed will benefit from successful profiling. Also employers will benefit from profiling as profiles offer employers a clear indication of what to expect from unemployed.

In our model, profiling plays the role of decreasing the uncertainty margin of the screening device if Employment Offices succeed in filtering out the most promising long-term unemployed. In our analysis this means that the lower bound of the uncertainty margin shifts up, following the provision of additional information about the qualities of long-term unemployed. Less uncertainty, means less failures during the assessment procedures and hence total assessment costs go down, for a given screening device standard. Figure 9 illustrates that the additional information reduces area *B* to area *B'*. However, as a result of reduced risk, firms shift the screening device standard to the right, from t^{h} to $t^{h'}$, thereby taking more unemployed into consideration. This shift causes deadweight loss to arise, if the government does not adapt the subsidy range. Hence not only targeting needs to be done cautiously, the government also needs to monitor external labour market developments.

Figure 9 The impact of profiling: more success



5 Conclusion

Using a Pissarides stochastic job model, we showed that employers use employment status as a screening device to minimize hiring costs during hiring procedures. The use of this device leads to the exclusion of long-term unemployed in hiring decisions and leads to market failures.

A well-tried policy measure to help long-term unemployed is employment subsidies. There are two independent reasons why firms participate in employment subsidy schemes. Firms use the subsidy as compensation for extended search among long-term unemployed or firms use the subsidy to school long-term unemployed up to the required level. Both applications of the subsidy open job opportunities for long-term unemployed. However, the design of the employment subsidy should be different. When firms extend their search process, the level of the subsidy should depend on unemployment duration whereas when the firm uses it to school workers the subsidy should be uniform.

We discussed three changes that influence the success rate of employment subsidies, using the Dutch experience as an example. One is related to the economy: increased tightness. Increased tightness does lead to more success, but at the expense of deadweight loss if the government does not adapt the subsidy categories. The second and third change, are related to the employment subsidy policy: targeting of unemployed to the right program and profiling job seekers. Targeting leads to an improvement of the ability of the subsidy to help long-term unemployed back to employment. However, targeting leads to the emergence of deadweight loss if targeting is not executed carefully. The effects of profiling are comparable to the effects of increased tightening; they lead to deadweight loss.

Hence not only targeting and profiling need to be implemented cautiously, government also should adapt the design of employment subsidies to changes in labour market tightness.

References

Albrecht, J. (1981), 'A Procedure for Testing the Signalling Hypothesis', *Journal of Public Economics*, 15(1), 23-132.

Albrecht, J., P. Edin, M. Sundström and S. Vroman (1998), 'Career Interruptions and Subsequent Earnings: A Reexamination Using Swedish Data', *Journal of Human Resources*, 34(2), 294-311.

Arthur, W., W. Bennett, P. Stanush and T. McNelly (1998), 'Factors That Influence Skill Decay and Retention: A Quantitative Review and Analysis', *Human Performance*, 11(1), 57-101.

CBS (2001), *Werkloosheid gedaald*, Persbericht, PB01-086, 19 April

Devine, T. and N. Kiefer (1993), 'The empirical status of job search theory', *Labour Economics*, 1(1), 3-24.

Greenwald, B. (1986), 'Adverse Selection in the Labour Market', *Review of Economic Studies*, 53(3), 325-347.

Guasch J. and A. Weiss (1980), 'Wages as Sorting Mechanisms in Competitive Markets with Asymmetric Information: A Theory of Testing', *Review of Economic Studies*, 47(4), 653-664.

Guasch, J. and A. Weiss (1981), 'Self-Selection in the Labour Market', *American Economic Review*, 71(3), 275-284.

Hale, J. (1998), 'Strategic Rewards: Keeping your best talent from walking out the door', *Compensation & Benefits Management*, 14(3), 39-50.

Herrnstein and Murray (1994), *The Bell Curve: Intelligence and class structure in American life*. New York: The Free Press.

Kim, M. and S. Polachek (1994), 'Panel Estimates of Male-Female Earnings Functions', *Journal of Human Resources*, 29(2), 406-428.

Kooreman, A. (1999), De kansmeter: fasering werkzoekenden, *Tijdschrift voor loopbaanadviseurs en –begeleiders*, 4(6), 26-29.

Lang, K. and D. Kropp (1986), 'Human Capital Versus Sorting: The Effects of Compulsory Attendance Laws', *Quarterly Journal of Economics*, 101(3), 609-624.

Layard, R. and G. Psacharopoulos (1974), ‘The Screening Hypothesis and the Returns to Education’, *Journal of Political Economy*, 82(5), 985-998.

Lynch, L. (1985), ‘State Dependency in Youth Unemployment’, *Journal of Econometrics*, 28(1), 71-84.

Lynch, L. (1989), ‘The Youth Labour Market in the Eighties: Determinants of Re-Employment Probabilities for Young Men and Women’, *Review of Economics and Statistics*, 71(1), 37-45.

Miller, P. and P. Volker (1984), ‘The Screening Hypothesis: An Application of the Wiles Test’, *Economic Inquiry*, 22(1), 121-127.

Mincer, J. and H. Opek (1982), ‘Interrupted Work Careers: Depreciation and Restoration of Human Capital’, *Journal of Human Resources*, 17(1), 3-24.

Mincer, J. and S. Polachek (1978), ‘Women’s Earnings Reexamined’, *Journal of Human Resources*, 13(1), 118-134.

Ministerie van Sociale Zaken en Werkgelegenheid (2001), *Aan de slag, eindrapport van de werkgroep Toekomst van het arbeidsmarktbeleid*, Den Haag.

Neumann, S. and A. Weiss (1995), ‘On the effects of schooling vintage on experience-earnings profiles: Theory and evidence’, *European Economic Review*, 39(5), 943-955.

OECD (1998), *What works among active labour market policies: evidence from OECD countries’ experiences, Labour Market and Social Policy*, Occasional Papers No. 35.

Omori, Y. (1997), ‘Stigma Effects of Nonemployment’, *Economic Inquiry*, 35(2), 394-416.

Pissarides, C. (2000), *Equilibrium Unemployment Theory*, 2nd edition, MIT Press.

Taubman, P. and T. Wales (1973), ‘Higher Education, Mental Ability, and Screening’, *Journal of Political Economy*, 81(1), 28-55.

Van den Berg, G. and J. van Ours (1994), ‘Unemployment Dynamics and Duration Dependence in France, The Netherlands and the United Kingdom’, *Economic Journal*, 104(423), 432-443

Waldman, M. (1984), ‘Job assignments, signalling, and efficiency’, *Rand Journal of Economics*, 15(2), 255-267

Weiss, A. (1980), ‘Job Queues and Layoffs in Labour Markets with Flexible Wages’, *Journal of Political Economy*, 88(3), 526-538

Welters, R. (1998), ‘De effectiviteit van het Nederlandse actieve arbeidsmarktbeleid’, *Maandschrift Economie*, 62(8), 257-272.

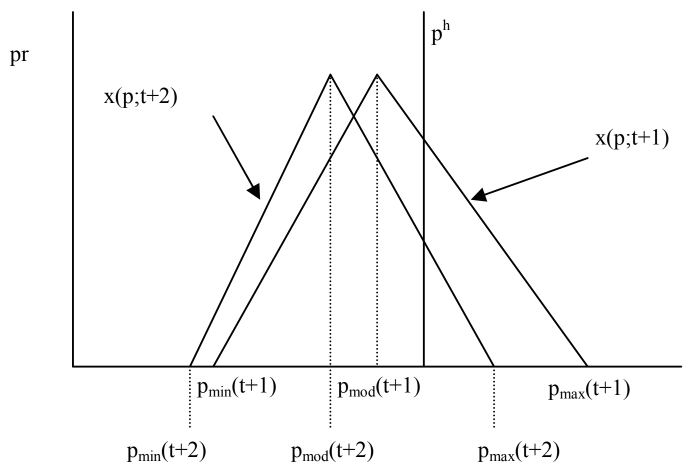
Wiles, P. (1974), ‘The correlation between education and earnings: The external-test-not-content (ETNC) hypothesis’, *Higher Education*, 31, 43-58.

Wolpin, K. (1977), ‘Education and Screening’, *American Economic Review*, 67(6), 949-958.

Appendix

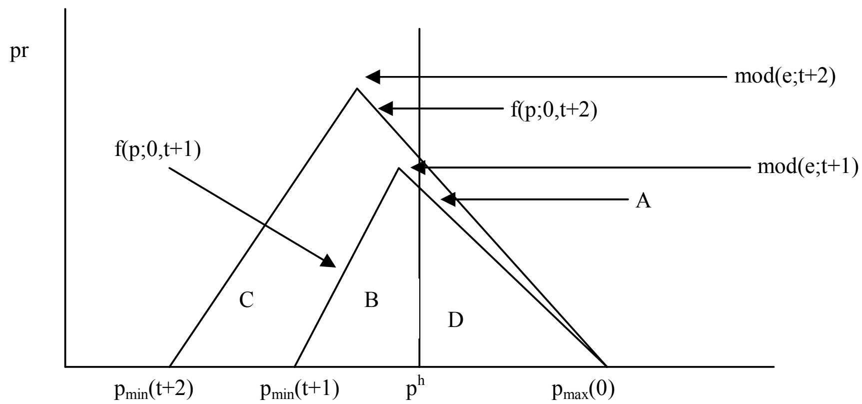
The distribution function *x(p,t)* and *f(p)* have a clear link, which we will explain in this appendix. Figure A1 shows two cross sections of *x(p,t)* namely *x(p;t+1)* and *x(p;t+2)*. Obviously, *x(p;t+2)* is to the left of *x(p;t+1)* as skills deteriorate following an additional period of non-use. The figure also shows that high skilled unemployed suffer more from productivity depreciation than low skilled unemployed. We also included the hiring standard, p^h, in the figure to illustrate that the part of the unemployed in each segment that meets p^h decreases as the unemployment spell prolongs.

Figure A1 Decreasing t^h leads to a shift in x(p;t)



The effects (in terms of increasing the probability to find a qualified jobseeker) of decreasing the hiring standard (from *t+2* to *t+1*) are visualized in Figure A2. Excluding jobseekers experiencing *t+2* periods of unemployment, means that the left tale of *f(p)* shifts to the right as the lowest available productivity level increases from $p_{min}(t+2)$ to $p_{min}(t+1)$. As is apparent from *x(p;t+2)* in Figure A1, the vast majority of jobseekers in this segment does not meet the hiring standard, p^h, only a small fraction does. Hence if a firm excludes this segment from the hiring procedure, unqualified jobseekers are excluded disproportionably, which is the very nature of the screening device. In Figure A2, this means that the peak of *f(p)* shifts to the right.

Figure A2 Excluding segments of x(p,t) leads to a shift in f(p)



To determine the probability to find a qualified jobseeker after imposing a screening device standard, $t^h=t+1$, we need to define $f(p;0,t+1)$.[18] The distribution function $f(p;0,t+1)$ consists of two parts, an upward sloping part and a downward sloping part. We define the upward sloping part as:

$$\text{(A1)} \quad f^u(p;0,t+1) = \frac{p}{\mathrm{mod}(e;t+1) - p_{\min}(t+1)} - \frac{p_{\min}(t+1)}{\mathrm{mod}(e;t+1) - p_{\min}(t+1)}$$

Where *mod(e)* is a function of the modus ability level of the jobseekers who survived the screening device standard. This function depends on the effectiveness (in terms of discriminatory power to distinguish qualified jobseekers from unqualified) of the used screening device. Clearly the stricter t^h is set, the higher the discriminatory power is $(e_{th}>0)$. However, for small values of t^h, $e_{thth}<0$ as firms start making a considerable amount of "type 1 errors": excluding qualified jobseekers.

The downward sloping part is defined as:

$$\text{(A2)} \quad f^d(p;0,t+1) = \frac{p_{\max}(0)}{p_{\max}(0) - \mathrm{mod}(e;t+1)} - \frac{p}{p_{\max}(0) - \mathrm{mod}(e;t+1)}$$

Determining the probability to find a qualified worker after imposing $t^h=t+1$ comes – in the specific case of Figure A2 – down to integrating equation A2 from p^h to $p_{max}(0)$, which is equation (10) in the paper.

[18] If $t^h=t+1$, all jobseekers who experience spells of unemployment of $t>t+1$ are excluded from the hiring procedure.

Our model shows that there are two types of hiring costs, the costs of the assessment procedure *k* and foregone productivity *z*. Increasing tightness does not directly influence costs *k*. However, it has a direct effect on total *z* costs as an increase in tightness leads to a drop in the contact rate, which increases the number of periods needed to fill the vacancy. Hence, the optimal screening device standard is influenced by labour market tightness. To show this mathematically, we first need to define the functions $1\text{-}F^{0,th}(p^h)$ and $S(t^h)$ out of section 2. The former represents the probability to have a successful assessment, which depends negatively on t^h. Therefore we replace it by a function $v(t^h)$. The probability to meet the screening device standard depends positively on t^h (or negatively on sharpening t^h). Therefore we replace the integral $S(t^h)$ by a function $\sigma(t^h)$. For notational convenience we choose some simple representations:

(A3)
$$\begin{aligned} v &= ae^{\gamma t^h} \quad &\wedge \quad \gamma < 0 \\ \sigma_1 &= be^{\eta t^h} \quad &\wedge \quad \eta > 0 \end{aligned}$$

Important to see is that $\gamma<0$, which assures that decreasing (sharpening) the screening device standard leads to an increase of the probability that someone who enters the assessment procedures meets the hiring standard. Moreover, $\eta>0$, which assures that decreasing the screening device standard leads to a reduction of the number of candidates that enter the assessment procedure.

Substituting both equations into equation (11), and maximizing to t^h yields the optimal t^h. Moreover, after some reshuffling, this optimality condition can be represented as a second representation of σ called σ_2.

(A4)
$$\frac{\partial H}{\partial t^h} = 0 : \frac{k\gamma v}{v^2} + \frac{zq\left(\gamma v\sigma + \eta\sigma v\right)}{\left(v\sigma q\right)^2} = 0 \quad \Leftrightarrow \quad \sigma_2 = -\left(1 + \frac{\eta}{\gamma}\right)\frac{z}{kq(\theta)}$$

Now we have two expressions for σ (σ_1 and σ_2). These two equations can then be used to derive $dt^h/d\theta$:

(A5)
$$\begin{aligned} &\frac{\partial\sigma_1}{\partial\theta} = \frac{\partial\sigma_2}{\partial\theta} \quad \Leftrightarrow \quad \frac{\partial\sigma_1}{\partial t^h}\frac{\partial t^h}{\partial\theta} = \frac{\partial\sigma_2}{\partial\theta} \quad \Leftrightarrow \quad \eta\sigma\frac{\partial t^h}{\partial\theta} = -\left(1 + \frac{\eta}{\gamma}\right)\frac{zq'(\theta)}{kq(\theta)^2} \quad \Leftrightarrow \\ &\frac{\partial t^h}{\partial\theta} = -\frac{\eta+\gamma}{\eta\gamma}\frac{z}{\sigma q(\theta)k}\frac{q'(\theta)}{q(\theta)} > 0 \quad \wedge \quad \eta+\gamma > 0 \end{aligned}$$

This derivative is only positive whenever decreasing the hiring standard leads to a bigger decrease in accuracy of the screening device than the increase it provokes in the inflow rate into the hiring procedure, hence $\eta+\gamma>0$. Henceforward in our model, firms will accept a somewhat higher failure rate during the assessment procedure as long as the contact rate increases, which reduces total foregone productivity costs.

This derivative also shows the impact costs z and k have on the relation between tightness and the optimal screening device standard. The per period costs of not filling a vacancy z and the per period costs of assessment procedures $\sigma q(\theta)k$ influence the magnitude of the derivative. The higher costs z in comparison to per period assessment procedure costs, the more a firm will increase its screening device standard as the labour market tightens.