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Learned Helplessness, Discouraged Workers, and Multiple Unemployment Equilibria in a Search Model

Abstract:
Unemployment varies strongly between countries with comparable economic structure. Some economists have tried to explain these differences with institutional differences in the labour market. Instead, this paper focuses on a model with multiple equilibria so that the same socioeconomic structure can give rise to different levels of unemployment. Unemployed workers' search efficiency are modelled within an *equilibrium search model* and lay behind these results. In the model *learned helplessness* causes a pro-cyclical behavior of the aggregate search efficiency, also known as the *discouraged worker effect*. The model can distinguish between locally stable and unstable labour market equilibria. The analysis shows that if a shock in an antecedent variable brings unemployment above the unstable equilibrium, the economy will eventually stabilize in a state with an even higher level of unemployment. However, a shock that brings the variable back at its initial level will not be enough to bring unemployment back at the lower equilibrium. Hence, the model also offers an explanation of why unemployment seems to move more easily up than down.

Keywords: Learned helplessness, discouraged workers, multiple unemployment equilibria, search effectiveness, long term unemployment

JEL classification: J64, E24

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1 Introduction[1]

This paper introduces an *equilibrium search model*[2] where unemployed workers are faced with individual *motivation costs*. Knowledge from the social psychology literature of how unemployed workers escape the trauma of unemployment motivates the model specification. Consistent with the theory of *learned helplessness*[3] motivation costs are assumed to increase as the prospects of reemployment diminishes. Since individual motivation costs decrease with aggregate search effectiveness there are positive externalities attached to individual search intensity[4]. This opens for *multiple unemployment equilibria*[5]. At low levels of equilibrium unemployment aggregate search effectiveness is high. At high levels of unemployment many unemployed workers are discouraged and withdrawn from the search process. The pro-cyclical behavior of the average search effectiveness implied by the model is consistent with an empirical regularity known as *the discouraged worker effect*[6]. Another feature of the model is that there may exist locally unstable equilibria. This implies that if a negative shock in an antecedent variable increases unemployment above this level, unemployment will increase further until an even higher equilibrium is reached. However, a shock that brings the variable back at its initial level will not be enough to bring unemployment back at the lower equilibrium. Hence, the model may explain why unemployment seems to move more easily up than down.

In 1936, the US Supreme Court asserted that unemployment sapped morale, broke up existing families and delayed the formation of new ones, reduced physical well-being, depressed the birth rate, and led to crime, suicide and vagrancy[7]. That joblessness may affect physical and psychological health is well known from the social psychology literature, and has been in psychologists' attention at least since the great depression in the 1930's, see Jahoda et al. (1933), Eisenberg and Lazarsfeld (1938) and Ginzberg (1942)[8]. However, economists have in general been

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[1]This paper will be presented at the 56th European Meeting of the Econometric Society in August, 2001, in Lausanne, Switzerland, and at the European Association of Labour Economists Annual conference, in September, 2001, in Jyväskylä, Finland. Discussions with and comments from Ådne Cappelen, Ragnar Nymoen, John Dagsvik and others have been very helpful.

[2]See Pissarides (1979, 1990) , Bean and Layard (1989) and Mortensen and Pissarides (1999).

[3]See Seligman (1975).

[4]The issue of externalities is frequently addressed in these class of models, see e.g. Diamond (1982), Mortensen (1982, 1989) , Pissarides (1990) and Coles and Masters (2000).

[5]The idea that there may exist multiple unemployment equilibria has occupied several economists the last decades. See for example the famous work of Weitzman (1982), see also Diamond (1982), Drazen (1987), Manning (1990, 1992) and Saint-Paul (1995).

[6]Solow (1995) gives this issue much attention. He believes that prolonged unemployment leads to resignation and aimlessness and that this is an important explanation for how a labour market can be at rest even in the presence of unemployment. See also Darity and Goldsmith (1993) for a discussion on the relationship between unemployment, social psychology and the discouraged worker effect. For empirical documentation see Clark and Summers (1979) and Benati (2001) for example.

[7]Bellemare and Poulin-Simon (1983)

[8]The much cited work by Jahoda et al. (1933) was pioneering in social field investigation and was an early documentation of the social and psychological effects of unemployment. For more

reluctant to incorporate social and psychological costs of unemployment, but there are exceptions. The discouraged worker effect is for example well known among economists. Economists have also shown some interest in unemployed workers' psychological well-being because of its importance for productivity, or as Sen (1997) formulates it, 'just as people "learn by doing," they also "unlearn" by "not doing"'. He discusses the broader view of the costs of unemployment with special attention to the high unemployment rates in Europe the last decades. Furthermore, Darity and Goldsmith (1996) merge the effects of unemployment on psychological well-being into a model of the macroeconomy. They focus on macro effects of the consequences of unemployed workers' feeling of helplessness, as discussed in Darity and Goldsmith (1993). They argue that increased unemployment "damages the cognitive, motivational and emotional status of those laid off, ultimately leading to a deterioration in the psychological state of the labor force". This leads to a contraction of workforce productivity as personal productivity of both those laid off and the "survivors", who witness the trauma of their coworkers, is expected to decline.

There are especially two reasons for why economists tend to ignore social and psychological costs of joblessness. First, there have been methodical difficulties in documenting causality between unemployment and social and psychological pathologies. Most of the early studies merely pointed at a correlation between unemployment and some measurable indicators of social and psychological pathologies. Second, particularly psychological costs, but also social costs, have been hard to quantify. However, these problems have been vanquished in several studies. Brenner (1976, 1984) , for example, are able to document a systematic causal relationship between unemployment and social pathology[9]. He also translates the cumulative five-year effect on suicide, hospital admissions, imprisonment, death due to cirrhosis and cardiovascular diseases of a 1.4 percentage point increase in unemployment over the 1970 rate into a loss of nearly $7 billion to the American economy. Furthermore, he estimates that three events in 1973-74 – the 0.7 percentage point increase in the US unemployment rate, the 3 percent drop in per capita income and the 200 per cent rise in the annual American business bankruptcy rate – had increased overall cost to US health and justice systems by a cumulative total of over $24 billion by 1980.

In the next section I set up the model to determine transition in and out of unemployment in equilibrium. Then, in section 3 I comment on what the model can tell us about unemployment dynamics outside equilibrium. Section 4 gives some concluding comments.

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recent documentation see for example Brenner (1973), Liem and Liem (1988), Kessler et al. (1988), Platt (1984), Clark and Oswald (1994) and Blanchflower et al. (1993). See also Feather (1990) and Jin et al. (1995) for a review of the literature.

[9] Some of his results are that a 10% increase in US unemployment rates leads to a 1.2% increase in overall mortality, a 1.3% increase in mortality due to cirrhosis, a 1.7% increase in mortality due to cardiovascular disease, a 0.7% increase in suicide rate, and a 3.4% increase in the incidence of economic crimes. Furthermore, he estimates that a 10% increase in the proportion of unemployed youth between 16 and 24 years of age leads to a 6% increase in the overall number of incarcerations and a 1.9% increase in the overall homicide rate.

2 The model

In this section I set up a Mortensen-Pissarides equilibrium search model[10]. In these class of models unemployed workers weigh a set of search costs against the net value of having a job and the expected success of their search. Hence, the less attractive unemployment seems the stronger is their reaction[11]. This is consistent with Rotter's *the expectancy-value theory* where motivation depends on *beliefs* that effort will lead to the desired outcome, that the desired outcome will be rewarded and that the reward contribute to self realization[12]. However, search models have not yet fully incorporated the evidence from the social psychology literature, namely that low prospects of success and repeated failure damage an individual's perception of self and tend to passivate rather than activate. This is labeled *learned helplessness* by Seligman (1975). Seligman uses this term as the response of giving up in order to distance oneself from events that provoke trauma when no voluntary action is expected to affect the outcome. Unemployment can be a major causal factor predisposing people to learned helplessness. Schokkaert and VanOotegem (1990), for example, have in a study documented that the loss of freedom is seen as a crucial deprivation by many unemployed Belgian workers. Furthermore, Patton and Noller (1984) document causality between unemployment and learned helplessness and Goldsmith et al. (1996a) found that joblessness damages an individual's perception of self.

Here, I embody learned helplessness into the search model by letting individual motivation costs increase with time spent out of work and with labour market slackness. This is supported by evidence in the social psychology literature. Feather and Davenport (1981) for example, found that positive motivation to seek employment among unemployed youth is related to the multiplicative combination of *expectation* of success and the perceived net attractiveness of employment. Furthermore, ratings of confidence to get a job, effort to seek employment and need to get a job tended to be lower for the present situation when compared with the situation on first leaving school. They conclude that this is consistent with their assumption that repeated failure to get a job will lead to decreasing expectations of success and decreasing levels of motivation. Furthermore, Baum et al. (1986) found that unemployed workers response biphasicly with reactance manifested at early stages of control loss and learned helplessness at later stages. The results in Mallinckrodt and Fretz (1988) indicate that unemployment duration, self esteem and internal locus of control are all negatively correlated to job seeking behavior. Hill (1977) summarizes the results of a field work consisting of 150 interviews with unemployed workers. A typical

[10] See Pissarides (1979, 1990) , Bean and Layard (1989) and Mortensen and Pissarides (1999).

[11] Brehm (1966) posited that one's response to loss of control is likely to be one of reactance. He claimed that people who have recently lost control over an aspect of their life are likely to make vigorous and repeated attempts at regaining that control. For example, the trauma of being unemployed may induce unemployed workers to try harder to get work. The results in Kessler et al. (1989) support this theory. They found that the unemployed workers experiencing the highest levels of anxiety and depression had the greatest probabilities of reemployment over the subsequent year. Wortman and Brehm (1975) suggested that reactance occurs early in the process and learned helplessness follows as length of exposure to trauma increases.

[12] See Rotter (1954), Vroom (1964) and (Feather, 1990, chapter 4). See also Arkes and Garske (1982) and Beck (1978) for reviews of the literature on motivation.

unemployed worker reported that as time goes on he feels less confident in searching for work and also less employable. After nine months to a year out of work the individual tends to settle down to a life of unemployment. Finally the person has lost the belief in his own capacity to rescue himself[13].

Let $C_{i,s}$ be motivation costs measured in labour units for individual i who has been out of work for s periods. The motivation costs are specified in the following way:

$$C_{i,s} = \Gamma\left(\frac{u}{v}\right)(K_i + \beta\ s), \quad \Gamma' > 0. \tag{1}$$

u and v are unemployment and vacancies respectively, both measured as shares of the labour force. The unemployment vacancy ratio is a measure of labour market tightness. β is a parameter that transforms time spent out of work to motivation costs. K_i reflects individual preferences for searching compared to the value of home production. Home production is assumed to be relinguished when searching for work.

Unemployment evolves according to the following dynamic equation:

$$\Delta u_{t+1} = \sigma_t\,(1 - u_t) - \chi_t v_t^{\alpha} u_t^{1-\alpha}, \qquad 0 < \alpha < 1, \tag{2}$$

where total labour force is set to unity so that employment is given by $(1 - u_t)$. Δ indicates that the variable is measured in first differences. Job-worker pairs are assumed to separate at the rate σ_t. The last term in (2) is commonly referred to as either *the matching function* or *the hiring function*. I have assumed a Cobb-Douglas specification of the matching function with constant returns to scale. This functional form is widely accepted in the theoretic literature, and not rejected in a vast number of empirical studies[14]. As aggregate recruiting intensity is assumed to be proportional to the vacancy rate, α is the elasticity of matching with respect to aggregate recruiting intensity. χ_t transforms $V_t^{\alpha} U_t^{1-\alpha}$ into matching units, hence, χ_t may be interpreted as aggregate search efficiency. The subscript t is for time period.

In equilibrium, defined as where $\Delta u_{t+1} = 0$, at a constant separation and participation rate and at constant search efficiency, (2) shows the relationship between the vacancy rate and the unemployment rate. This relationship is better known as the Beveridge curve[15]. While the unemployment rate has risen substantially over the last twenty years in many countries, the vacancy rate is relatively unchanged, hence the Beveridge-curve has shifted. Explanations for this seems to lie with the unemployed, their search effectiveness has declined, i.e. χ_t has shifted[16]. My objective is to explain such shifts by modelling search effectiveness as an endogenous variable. For this purpose I treat the vacancy rate and the separation rate as exogenous. While the separation rate is usually assumed to be exogenous in the literature, vacancies are generally modelled endogenously. However, Pissarides (1990, Chapter 4) shows that modelling vacancies as endogenous only plays a minor role in this

[13] See also Goldsmith et al. (1996b).

[14] See for example Jackman et al. (1990), Blanchard and Diamond (1989) and Petrongolo (1999).

[15] See Blanchard and Diamond (1989) for theoretical foundation and empirical relevance of the Beveridge curve.

[16] See Johnson and Layard (1986) and Layard et al. (1991) for empirical evidence.

class of models. Since I will only consider dynamics in and out of unemployment in equilibrium I suppress the notation for time period in the following.

I follow Pissarides (1979) and split matches into employment agency matches and private matches, denoted A and P respectively. I have chosen the Cobb-Douglas specification with constant returns to scale and identical elasticity of matching with respect to recruiting intensity in both matching functions, so that χ in (2) is defined as:

$$\chi = \chi_A + \chi_P \ a, \tag{3}$$

where χ_A is employment agency search effectiveness and χ_P is a parameter that transforms unemployed workers' private search participation, a, into efficiency units. Employment agency search effectiveness is assumed to be exogenous. This particular specification implies that search participation may be seen as Hicks' neutral technical change in the technology of job matching.

Agents contact each other according to a Poisson process where the probabilities of matching privately, q_P, and through the employment agency, q_A, are given by the matching functions consistent with (2) and (3) in the following way:

$$q_P = \frac{\chi_P \ a \ v^{\alpha} \ u^{1-\alpha}}{a \ u} = \chi_P \ \left(\frac{v}{u}\right)^{\alpha}, \tag{4}$$

and

$$q_A = \frac{\chi_A \ v^{\alpha} \ u^{1-\alpha}}{u} = \chi_A \ \left(\frac{v}{u}\right)^{\alpha}. \tag{5}$$

All workers are assumed to have equal qualifications and skills, receive identical remuneration and are not discriminated by employers, so there is no search on the job, no quitting, no rejection of job offers, and no involuntary separations. However, heterogeneity in motivation costs implies that unemployed workers choose different search strategies. Consider an unemployed person i. If he is active in job searching, the probability of getting a job during the period is $q_P + q_A$. I assume that the probabilities are known with complete certainty and that all agents have infinite horizons and discount future incomes with the discount factor $1/(1+r)$, where r is the real interest rate. Then, the individual will be active in search for work if the motivation costs do not exceed the expected future money gain of being active, i.e.

$$C_{i,s} \leq \frac{q_P \ (V_i - U_i)}{1+r}, \tag{6}$$

where V_i and U_i are the present values of having a job and being unemployed respectively.

The present values of having a job and being unemployed are

$$V_i = 1 + \left[\frac{(1-\sigma)\, V_i + \sigma U_i}{1+r}\right], \tag{7}$$

and

$$U_i = \theta + \frac{(1-q_A)\, U_i + q_A V_i}{1+r} + \max\left[\frac{q_P\,(V_i - U_i)}{1+r} - C_{i,s}, 0\right], \tag{8}$$

respectively. The present value of having a job is the market wage (set exogenously to unity) plus the expected present value in the next period, discounted. The individual takes into account that with a probability equal to the separation rate, σ, he will become unemployed in the next period. Similarly, the present value of being unemployed is the unemployment benefit, θ, plus the expected present value in the next period. However, the probability of getting a job depends on whether the person is active or passive in his search for work. This is captured by the last term in equation (8).

An unemployed worker who chooses to be active will also be active in future periods, i.e. the first term in the brackets in (8) is non-negative. Then, by subtracting (8) from (7) we get

$$V_i - U_i = (1+r)\left(\frac{(1-\theta)+C_{i,s}}{r+\sigma+q_A+q_P}\right), \tag{9}$$

and by inserting (9) into (6) using equations (1), (4), and (5) we get the following condition for the unemployed person i to be active in search for work:

$$K_i \leq \frac{\chi_P \ \left(\frac{v}{u}\right)^{\alpha}(1-\theta)}{\Gamma\left(\frac{u}{v}\right)\left(r+\sigma+\chi_A \ \left(\frac{v}{u}\right)^{\alpha}\right)} - \beta s \equiv \overline{K}_s. \tag{10}$$

The value of K_i that make (10) hold with equality depends on s and is defined as $\overline{K}_s$. Hence, motivation costs, captured by time spent out of work, labour market tightness and individual preferences, K_i, determine the net attractiveness of being active in search for work. Being active is less attractive if the probability of becoming unemployed again is high, if the probability of getting work through the employment agency is high, and if the compensation rate, θ, is high. Furthermore, less value is put on the future income gain if the interest rate is high.

Suppose that each individual is associated with a level of K_i which are distributed among the employed workers with a cumulative density equal to $F(-)$. Then K_i among those recently unemployed have an identical distribution since separations are drawn randomly from those employed. Consequently, $F(\overline{K}_0)$ is the share of the $\sigma(1-u)$ recently unemployed workers who have a value of K_i lower than $\overline{K}_0$. Moreover, in general, since private matches are drawn randomly from the pool of active job-searchers, $a_s = F(\overline{K}_s)$ is the share of the $\sigma(1-u)\left(1-q_A-q_P\right)^s$ unemployed workers who have been unemployed for s periods and who have a value of K_i lower than $\overline{K}_s$[17], i.e. from (10):

$$a_s = F\left(\frac{\chi_P \ \left(\frac{v}{u}\right)^{\alpha}(1-\theta)}{\Gamma\left(\frac{u}{v}\right)\left(r+\sigma+\chi_A \ \left(\frac{v}{u}\right)^{\alpha}\right)} - \beta s\right), \quad F' > 0. \tag{11}$$

Notice that the share of discouraged workers are increasing with time spent unemployed. Furthermore, it can be shown that a_s is decreasing in unemployment, how fast depends on the functional forms of F and Γ. The effect is large if the distribution of K_i is compressed and if the effects on motivation costs are high.

[17] Notice that there are more unemployed workers who have been out of work for s periods than $\sigma(1-u)\left(1-q_A-q_P\right)^s$, but these are previously discouraged.

The average search participation is found by adding the length-specific participation rates properly weighed:

$$a = \sum_{j=0}^{\infty} a_j \frac{\sigma(1-u)\left(1-q_A-q_P\right)^j}{u}. \tag{12}$$

The search participation rate, a, is now uniquely determined by unemployment and the exogenous variables, χ_A, θ, r, σ and v. Hence, by inserting (4), (5) and (11) into (12) we may write average search participation, a, in the following way:

$$a = a\left(\underset{-}{u};\ \underset{-}{\chi_A},\ \underset{-}{\theta},\ \underset{-}{r},\ \underset{+}{\sigma},\ \underset{+}{v}\right). \tag{13}$$

The sign of the partial derivatives are indicated below the variables. Increased employment agency efficiency, χ_A, increased compensation, θ, and increased discounting rate, r, all make it less attractive to be active in search for work. An increase in the separation rate, σ, also makes it less favorable to be active, but since it also raises the share of recently unemployed workers, and since these have a higher participation rate, the net effect is an increase in average search participation. Increased number of vacancies, v, tightens the labour market which contributes to increased search participation, similar to the effects of a lower unemployment rate. Lower unemployment increases search participation and thus aggregate search efficiency in three ways. First, it decreases the average unemployment duration. Since search participation is lower among those who have been out of work for a long time, this increases average search participation. Second, motivation costs decrease because of a tighter labour market. Finally, decreased unemployment increases the probability of finding work, consequently, the incentives to search for work improves. These effects are all positive externalities in this model; increased search participation by one agent lowers unemployment and increases search participation by another agent, or reversely, increased unemployment generates positive externalities that increases unemployment further. In this respect the model is analogue to the model in Diamond (1982). Diamond focuses on positive externalities of trading to show that there may be multiple equilibria in unemployment. Several other authors also address the issue of positive externalities generating multiple equilibria in search models. While Mortensen (1989) and Mortensen (1999), for example, point at increasing returns in production, Coles and Masters (2000) focus on declining worker skills while unemployed.

Equilibrium unemployment is determined by inserting (3) and (13) into (2) (keeping in mind that we have suppressed the notation for time and that $\Delta u_{t+1} = 0$ in equilibrium):

$$\sigma\ (1-u) = \left(\chi_A + a\left(u;\chi_A,\theta,r,\sigma,v\right)\chi_P\right)\ v^{\alpha}\ u^{1-\alpha}. \tag{14}$$

Separations are decreasing and agency matches are increasing in unemployment. However, how private matches respond to increased unemployment is ambiguous. The average search efficiency is decreasing in unemployment since search participation falls, however, there are more unemployed workers to choose from which make matching easier. If the distribution of individual motivation costs are sufficiently compressed, if the elasticity of motivation costs with respect to the labour market

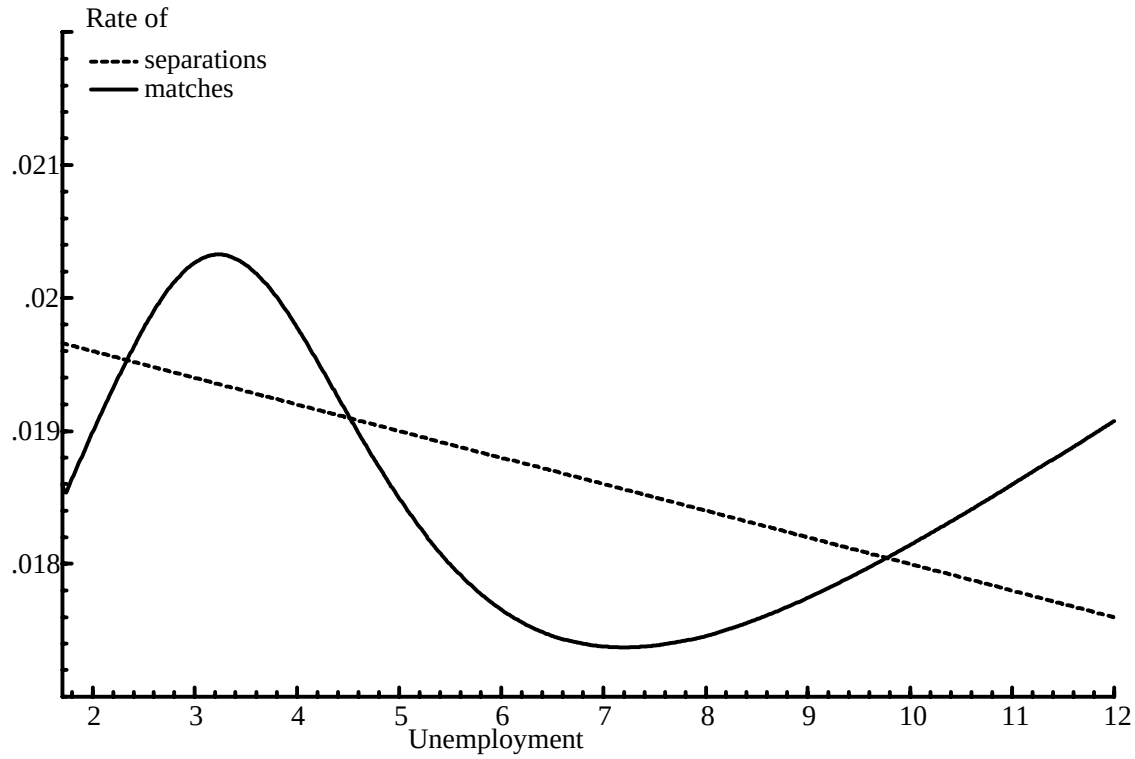

Figure 1: A numerical example of separations and matches in steady state equilibria.

tightness is sufficiently high, or if the duration-dependant motivation costs increase sufficiently, total matches are decreasing in unemployment at some level of unemployment. Hence, if these conditions are fulfilled at a relevant unemployment level there may exist multiple equilibria. The numerical example in figure 1 illustrates such a situation. In this particular example there are three equilibria levels of unemployment, at 2.3%, 4.5% and 9.8%, respectively. The underlying assumptions on parameter values, explicit functional forms and exogenous variables are given in the appendix.

3 Unemployment dynamics

Since search models only describe transition in and out of unemployment in equilibrium it is not possible to determine unemployment dynamics within the model presented in previous section. However, by looking closer at the equilibria we can determine whether any of the equilibria are locally stable[18].

A possible relationship between matches and separations in equilibrium, similar to the numerical example in figure 1, is shown in the top diagram of figure 2. The three equilibria are labeled u_{1*}, u_{2*} and u_{3*} respectively. The curves are invalid outside the equilibria, however, the slope of the curves in equilibrium are valid. Hence, u_{1*} and u_{3*} are both locally stable. u_{2*}, on the other hand, is locally

[18] An equilibrium is locally stable if a small deviation from the equilibrium leads to a conversion back to the equilibrium.

unstable because a small deviation brings the economy away from u_{2*}. This can easily be illustrated as in the second diagram where three curves are depicted, one for three possible separation rates. The horizontal axis shows lagged unemployment and the vertical axis shows current unemployment. Unemployment decreases when the curve is below the 45^o-line. Next period we move down and to the left on that same curve. This continues until we hit the 45^o-line in equilibrium. If there are more separations than matches we move up and to the right until a new equilibrium is reached.

The equilibrium analysis shows that an increase in the separation rate may remove the two lower equilibria, leaving the upper equilibrium. Figure 2 illustrates how unemployment may evolve after a shift in the separation rate. In the bottom diagram the separation rate is shown on the vertical axis. Suppose that the economy is at lower equilibrium with a separation rate equal to σ_0, point A in the middle and the bottom diagrams. As long as the separation rate does not exceed σ_H unemployment will remain at a relatively low level, between points A and B. However, if the separation rate exceeds σ_H there is only one equilibrium, the upper one, above point C. Unemployment will rise until the (upper) equilibrium is reached. Then, at this high level of unemployment, a reduction in the separation rate to its initial level will not reduce unemployment worth mentioning, unemployment is stuck at the upper equilibrium level. The separation rate must be brought down to below σ_L for unemployment to reach a lower equilibrium. Unemployment will then eventually stabilize at or below point D. Hence, a negative shift in an antecedent variable may shift the equilibrium unemployment to a high state. However, a shift in the variable back at its initial level is not sufficient for unemployment to return to the lower equilibrium. This may explain why unemployment seems to move more easy up than down.

4 Concluding comments

In this paper I set up a *Mortensen-Pissarides search model* with individually distributed *motivation costs* that are increasing in unemployment duration and in labour market slackness. This model incorporates an important contribution to research on unemployment from the social psychology literature known as *learned helplessness*. According to this theory withdrawal and discouragement are likely consequences of the adverse effects of unemployment, especially when joblessness is expected to be prolonged. The model introduced here offers a common ground for economists who focus mainly on economic incentives and psychologist who feel that there are emotional factors that are just as important to explain the *discouraged worker effect*. Another feature of the model is that there may exist *multiple unemployment equilibria* of which some are locally unstable. This implies that if a negative shock in an antecedent variable, for example, increases unemployment above the unstable equilibrium, unemployment will increase further until an even higher equilibrium is reached. A shock that brings the variable back at its initial level will not be enough to bring unemployment back at the lower equilibrium. Hence, the model may explain why unemployment seems to move more easily up than down.

At least two interesting questions emerge in light of the model. First, at a high

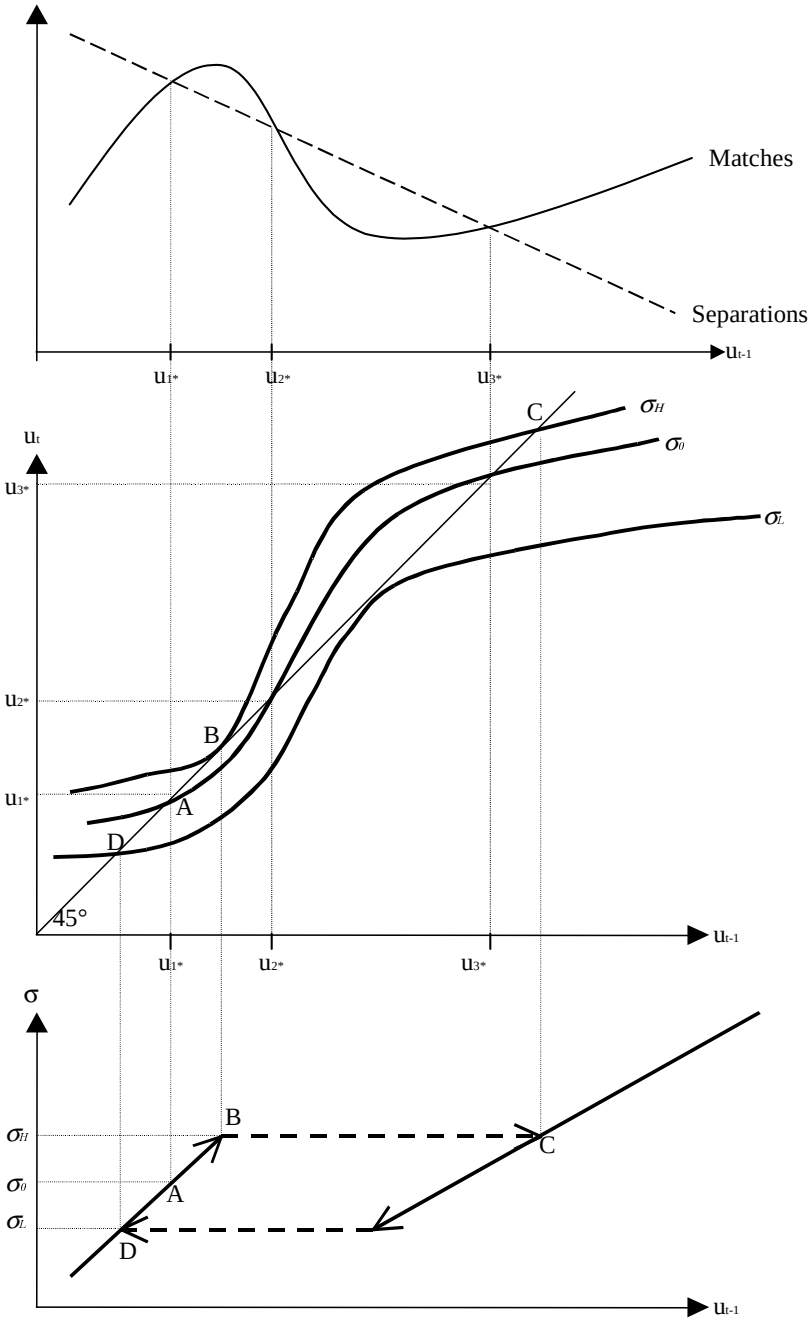

Figure 2: Top: Matches and separations. Middle: Unemployment dynamics. Bottom: Changes in the separation rate.

unemployment level should the government take non-structural actions to bring unemployment down even if this causes inflation to rise? Economists who believe in an unique equilibrium level of unemployment, NAIRU (Non-Accelerating-Inflation Rate of Unemployment), may be divided into two categories. Some, for example OECD (1994, Chapter 2), warn the policymakers against such actions because resources are in their most efficient use and allocation, and marks the "best" outcome possible under the given circumstances. Others, such as Layard and Bean (1989), justifies actions taken to deviate from a short-run NAIRU because of a high degree of persistence. They postulate three "key facts": 1. There is persistence in unemployment; 2. Long-run unemployment is untrended, and a long-run NAIRU exists; 3. Unemployment is often far from the long-run NAIRU without any upwards or downwards pressure on inflation. Economists in both categories agree, though, that structural changes are necessary to lower the long-run NAIRU. However, in many parts of the economy stabilizing forces appear not to operate, instead positive feedbacks magnify the effects of small economic shifts and make for many possible equilibrium points, multiple equilibria[19]. The "key facts" in Layard and Bean (1989) should alert us to suspect the existence of multiple unemployment equilibria. Over time, shocks may move unemployment back and forth between equilibria causing untrended properties in the long-run. In each equilibrium unemployment persists without any pressure on inflation. There is no guarantee that the current equilibrium will be the "best" one. However, theory can guide policymakers in applying the right effort to dislodge locked-in structures and reach the most favorable equilibrium.

The second question that emerges is: Is unemployment voluntary? One might argue that since unemployed workers are not searching actively for work the relative utility of being unemployed is too high. Consequently, unemployment is voluntary. In search models, unemployed workers choose their behavior to maximize expected pay, so in that sense it is voluntary to be active or passive in their search for work. However, there are massive evidence suggesting that there are huge non-pecuniary costs of unemployment, hence, unemployment cannot be voluntary. According to the analysis in Winkelmann and Winkelmann (1998) for example, the individual costs of unemployment are almost wholly non-pecuniary. They decompose the total well-being costs of unemployment and calculate from two separate partial effects – the effect of unemployment and the effect of family income – that about 88% are non-pecuniary, and that only 12% are pecuniary. This implies that income must be increased by more than 700% to compensate for the adverse effect of unemployment. Clark and Oswald (1994) and Blanchflower and Oswald (2000) contain similar analyses. Clark and Oswald (1994) found no significant pecuniary effects on happiness. Blanchflower and Oswald (2000) examined reported levels of happiness on 100,000 randomly sampled Americans and Britons from 1972–1998. They found that the non-pecuniary variables, such as unemployment, in happiness equations enter with large coefficients, relative to that on income. For US males, for example, income must rise with approximately $60,000 per annum to compensate for unemployment.

Economists usually argue that the adverse effects of unemployment will increase the unemployed workers' effort to seek reemployment. However, it is well

[19] This is called *"the butterfly effect"* and is one of the main concepts in Chaos Theory where the system in focus has extreme dependence on initial conditions, see Lorenz (1964). See also Arthur (1990) for an article on "Positive Feedbacks in the Economy".

documented in the social psychology literature that the adverse effects of unemployment on psychological health evolve to a feeling of helplessness and discourage the unemployed. Withdrawal is a rational response to escape the trauma of prolonged unemployment. This should be taken into account by economists.

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Appendix: A numerical example of the model

Here I assign numerical values to the parameters and the exogenous variables in the model introduced in section 2. For this purpose I need functional forms for the distribution function, F, and the motivation costs function, Γ. I use the following specifications:

$$K \sim N(\ \mu,\ \nu^2),$$

$$\Gamma\left(\frac{u_t}{v}\right) = \left(\frac{u_t}{v}\right)^{\varepsilon},$$

where $\mu,\ \nu,\ \varepsilon > 0$. These functional forms imply that the K's are normally distributed across individuals with a mean equal to μ and with a standard deviation of ν, and that the elasticity of motivation costs with respect to the unemployment vacancy ratio is equal to ε. The model consists of the following parameters and exogenous variables:

σ	=	separation rate
v	=	vacancy rate
θ	=	compensation rate
r	=	discount factor
α	=	elasticity of matching with respect to aggregate recruiting intensity
ε	=	elasticity of motivation costs with respect to the unemployment vacancy ratio
χ_A	=	employment agency matching productivity
χ_P	=	private matching productivity parameter
β	=	parameter determening the effect of unemployment duration on motivation costs
μ	=	mean value of K
ν	=	standard deviation of K

The parameter values are chosen to be consistent with the restrictions imposed by theory and on empirical observations where possible. Where this is not possible, parameter values are restricted such that multiple equilibria are assured. The objective is not to show that there *are* multiple equilibria, but merely to point out that for reasonable parameter values and functional forms there *may be* multiple equilibria.

I follow Blanchard and Diamond (1989) who estimate the aggregate recruiting intensity to be $\alpha = 0.6$ for the US, other studies show similar values for European countries as well. Andolfatto (1996) calculate the US vacancy rate to be 0.095 based on a steady state assumption and on a quarterly separation rate of 0.15. As the European labour market seems to be more rigid, I use a vacancy rate equal to $v = 0.05$ and a monthly separation rate equal to $\sigma = 0.02$. Furthermore, I assume that the compensation rate is equal to $\theta = 0.6$, that employment agency matching productivity is equal to $\chi_A = 0.26$, and that the private productivity parameter is equal to $\chi_P = 0.27$. A real interest rate of $r = 0.003$ per quarter is reasonable. In addition, I have assign the value $\nu = 0.15$ which implies that K has a standard

deviation of 0.15. β is set equal to 0.04. The mean value of K is assumed to be equal to $\mu = 0.3$. An elasticity of motivation costs with respect to the uv-ratio of $\varepsilon = 1$ implies that motivation costs relative to the wage level for the individual with a mean value of K who has been unemployed for 8 months are 0.3 and 1.2 in lower and upper equilibrium respectively.

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