The Low Skill Trap

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Abstract

Recently, it has become popular to argue that certain workers have fallen into a trap in which they have poor skills, few job opportunities and a low return on training, while others have not. This paper demonstrates how such a trap can occur within a simple matching model with rent sharing. Rent sharing diminishes the worker's incentive to acquire skills; however, since firms also benefit from training, rent sharing likewise induces job creation. The subsequent improved matching prospects may offset the initial disincentive to invest. However, for this mechanism to be effective, firms and workers must coordinate their actions. If they do not, the trap occurs.

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There is considerable empirical evidence demonstrating that wages are positively correlated with profitability.[1] Moreover, recent studies suggest strongly that such rent sharing leads to higher profitability from more skilled workers. Using a matched panel to control for worker as well as firm heterogeneity, Abowd, Kramartz and Margolis (1999) demonstrate that high skill workers are paid more (a familiar result) and that profitability is higher for firms with more skilled workers. Similarly, from a survey of union workers, Heyes and Stuart (1998) find that nearly two thirds of all workers expect training to improve pay and or promotion prospects. Approximately one half of these workers also admit that they felt encouraged to acquire training while two thirds felt that their employer viewed training as important.[2]

It is not all together surprising that both the worker and firm gain as the worker acquires skills: outside the perfectly competitive framework, most (if not all) theories of rent sharing predict that the profit flow from hiring a trained worker is greater than from hiring an untrained worker. In numerous variations on the bargaining theme, the outcome of wage negotiations implies that both parties obtain a strictly positive share of the extra productivity associated with more skilled workers. They share the extra rents thereby generating higher profits for firms as well as higher wages for more skilled workers. Further, within the context of wage posting firms, Burdett and Mortensen (1998) and Manning (1992) show that more productive workers yield a greater net profit to firms.

At first, it would appear that workers who do not obtain the entire return to skill acquisition will under-invest in training: rent sharing diminishes the worker's incentive to acquire skills. However, the greater profitability generated by skilled workers mitigates, at least to some extent, this disincentive. As firms receive a portion of the benefits to training, this greater profit induces a higher rate of job creation.

[1]See Blanchflower, Oswald and Sanfey (1996), Christofides and Oswald (1992), Denny and Machin (1991), Hildreth and Oswald (1997), Holmlund and Zetterberg (1991), Nickell and Wadhwani, (1990) and Van Reenen (1996) for direct evidence. It has also been shown that industry wage differentials correlate with profitability (see Dickens and Katz, 1987, Katz and Summers, 1989).

[2]Related findings further support the view that firms prefer skilled workers. Hammermesh and Pfann (1996) report that firms spend more searching for more skilled workers indicating that they are willing to devote more resources to locate presumably more profitable workers. Likewise, it is well known that firms layoff unskilled workers before skilled workers, a phenomenon consistent with skilled workers being more profitable.

The subsequent improved matching prospects potentially offset the initial pressure on workers to under-invest.

This simple logic creates a coordination problem that can lead to two equilibrium outcomes. If workers invest in skills, firms receive a higher profit per worker. The higher return to hiring a trained worker leads to an increase in the number of vacancies. As workers acquire jobs more quickly, the return to skill accrual increases, thereby justifying the decision to become trained. On the other hand, if workers fail to invest, profit per worker is low. With little incentive to post vacancies, jobs become relatively scarce. As workers take longer to find a job, the return to skill acquisition diminishes and there is no incentive to invest in training. This latter outcome corresponds to what is referred to here as a low skill trap.

The purpose of this paper is to illustrate this logic and its consequences using a simple matching framework in which workers invest in skills by training. Matching models offer a convenient setting in which

- greater profit per worker as skills increase, and
- firm entry driven by profit per worker

arise naturally.[3] The basic reasoning, however, is likely to apply more generally provided that these elements are present.

Alternative explanations for suboptimal training (with and without multiple equilibria) exist in the literature. Some explanations rely on rigidities such as imperfect capital markets; others depend upon increasing returns in the production technology but do not specify the underlying justification for such a phenomena (Lucas, 1988, Azariadis and Drazen, 1990).[4] In this paper, human capital externalities arise naturally from the costs of finding a partner in the labor market. Match specific rents

[3] A large body of empirical work suggests that worker and firm search is extensive. Job seekers are readily observed incurring substantial time costs along with monetary expenditures when acquiring information about job opportunities. For firms, Hammermesh and Pfann (1996) discuss evidence of large direct costs of hiring, a perspective upheld by Barron, Bishop and Dunkelberg (1989).

[4] This technological black box approach is limited. For example, as Acemoglu (1996) points out, it is ambiguous whether it is the total or average level of human capital that is relevant for production in this approach. If a worker with below average training is added to a highly skilled workforce, the effect on production differs in the two specifications. Confusion regarding the empirical implications and appropriate policy recommendations follows.

are larger for more productive high skilled workers. The sharing of these rents create spillovers between acquiring skills and matching in the labor market which may or may not lead to a low skill trap with under-investment in human capital.[5] Focusing in this way on the microfoundations of trade leads to a clearer understanding of the mechanism driving the low skill trap and hence its properties.

1 The Framework

We consider a highly stylized labor market model where time is divided into periods. Let U_t denote the number of unemployed workers and V_t the number of employers posting a vacancy at the start of period t. We start by briefly describing the flows of workers into and out of the market.

Just before the start of any period t, suppose that g new workers are *born* - independent of market factors. Before these workers seek job opportunities they must choose how much training to acquire as more cannot be purchased later by assumption. Training is assumed to make workers at a particular job more efficient rather than changing the work done. For example, firms can hire either secretaries with varying word processing capabilities. After each acquires the amount of training desired, they enter the labor market as unemployed workers at the start of period t. A worker with training e generates revenue per period Xe while working for any employer.

In each period t, there is a positive probability that an unemployed worker contacts an employer with a vacancy. This probability is the same for all unemployed workers. By assumption, no more than one employer is contacted in a period. The total number of worker-employer contacts per period depends on the number of unemployed workers and the number of employers with a vacancy. In particular, let $m(V_t, U_t)$ denote the number of contacts generated in period t given V_t and U_t. Much has been written about the matching function and its properties in recent years (see, for example, Blanchard and Diamond, 1990, Pissarides, 1990, Coles and Smith, 1998). Here, we only require that it is increasing in both its arguments.

[5] Although significantly different than the model presented here, Snower (1996) utilizes the matching framework to consider the abundance of low skilled workers and low skilled jobs.

Suppose an employer and an unemployed worker with training e make contact in period t. They must decide whether to form a partnership or not, and what per period wage the worker will receive if they do. As training is assumed to be observable, both know revenue per period Xe is generated if they form a match. If they decide on a partnership, i.e., the employer hires the worker, they both leave the market for good. If they do not form a match, the worker continues to search and the employer contemplates whether to post a vacancy next period. Thus, the stock of unemployed at the start of period t, U_t, equals the stock at the start of $t-1$ minus those that found a job, plus those that entered the market.

Workers may differ by how costly it is for them to acquire training. In particular, associated with a worker is a parameter $k > 0$, which indicates how costly it is for him or her to acquire training. Focussing on essentials, assume the cost of purchasing training e to a worker associated with parameter k is $e^2/2k$. The essential element of this formulation is that the marginal cost of purchasing any amount of training, e, is a strictly monotonic (in this case decreasing) function of k. Let $F(\tilde{k})$ denote the proportion born in any period with an associated $k \leq \tilde{k}$ and let $G_t(\tilde{e})$ denote the proportion of the unemployed in period t with training no greater than $\tilde{e}$.

At cost c an employer can post a vacancy for a period. The number of employers who post a vacancy is driven by profits. In particular, employers continue to enter the market at the start of period t until the expected discounted lifetime profit of an employer, Π_t, equals zero. If an employer posts a vacancy, then there is a positive probability an unemployed worker is contacted. Keeping things as simple as possible, assume both workers and firms live forever and discount at rate $r > 0$.

In what follows we focus on steady-state behavior. In a steady-state the number of participating workers and firms with a vacancy remain constant through time as well as the distribution of training among workers, i.e., $V_t = V$, $U_t = U$, and $G_t(.) = G(.)$ for all t. The objective is to consider if there exists a steady-state $(U^*, V^*, G^*(.))$ that is generated when all agents maximize their expected discounted returns given they have correct beliefs about market conditions in the future. This we term a steady-state equilibrium.

2 Steady-State Analysis

Given we are in a steady state, the arrival probabilities will remain constant through time. Let α_w indicate the probability any given unemployed worker contacts an employer with a vacancy and α_f the probability an employer encounters a worker. Further, as we assume random matching, let $\alpha_f G(\tilde{e})$ denote the probability an employer who posted a vacancy contacts a worker with training no greater than $\tilde{e}$.

Suppose any employer pays a wage $w(e)$ per period if it hires a worker with training e. The details of the wage formation process are discussed later. For the present all we assume is that $Xe - w(e) > 0$ and $w(e) > 0$ for all $e > 0$. As both workers and employers live forever, it follows that the payoff to a worker with training e from accepting employment is $w(e)/r$, whereas the expected discounted lifetime income to an employer who employs this worker is $(Xe - w(e))/r$. Of course, given the situation faced, the worker and/or employer may prefer not to form a match. Let $\lambda(e)$ indicate the probability a worker with training e is hired by an employer if they make contact (i.e., both agree to the match).

Given the above, the expected discounted lifetime income of an employer with a vacancy in a steady-state, Π, can be written as

$$\Pi = \frac{1}{1+r}\left\{\alpha_f \int_{e'}^{e''} \left[\lambda(\xi)\frac{X\xi - w(\xi)}{r} + (1-\lambda(\xi))\Pi\right] dG(\xi) + (1-\alpha_f)\Pi - c\right\}$$

where skills lie in the range $[e', e'']$ with $e' > 0$. As $\Pi = 0$, and $Xe - w(e) > 0$ for all e, by assumption, an employer will hire any worker it contacts (if the worker is willing) and therefore

$$c = \alpha_f \int_{e'}^{e''} \lambda(\xi)\frac{X\xi - w(\xi)}{r} dG(\xi) \tag{1}$$

Of course, it is possible that the return from hiring worker is low and or workers are difficult to contact (i.e., α_f is small). In this case, the cost of posting a vacancy may exceed the return and therefore no employer posts a vacancy. We shall return to this difficulty later.

Now we consider the problem faced by unemployed workers. Let $N(e)$ denote the expected discounted lifetime income of an unemployed worker with training e. It follows that

$$N(e) = \frac{1}{1+r}\left[\alpha_w \lambda(e) w(e)/r + (1-\lambda(e))\alpha_w N(e)\right] \tag{2}$$

Given the restriction placed on the wage function ($Xe - w(e) > 0$ and $w(e) > 0$ for all e), workers as well as employers accept the first opportunity they receive, i.e., $\lambda(e) = 1$ for all e. This implies (**??**) and (**??**) can be written as

$$N(e) = \frac{\alpha_w}{r(r+\alpha_w)} w(e) \tag{3}$$

and

$$c = \alpha_f \int_{e'}^{e''} \frac{X\xi - w(\xi)}{r} dG(\xi) \tag{4}$$

Further, given workers acquire training until the marginal cost equals the marginal benefit, it follows from (**??**) that

$$\frac{\alpha_w}{r\,(r+\alpha_w)} w'(e) = e/k \tag{5}$$

determines the amount of training a worker associated with parameter k will acquire. We now turn to the wage formation process.

2.1 Wage Determination

An unemployed worker does not immediately find a potential match when entering the labor market. Likewise for a firm with vacancy. As a result, when a job and a worker are paired, there is a positive value associated with the match and this surplus or quasi-rent must somehow be divided between the two. The bilateral nature of the problem suggests that the firm and the worker bargain in some way over wages.

There are, of course, no universal bargaining rules or generally accepted method for describing wage formation. Indeed, the threat of holding up negotiations, the value of outside options, and the timing of offers all vary substantially across different bargaining situations. An extensive literature exists describing the way in which different arrangements affect the outcome of negotiations. (See Osborne and Rubinstein, 1990, for a survey.) For concreteness, we assume the worker and the firm reach the axiomatic Nash bargaining solution.

The Nash bargained wage satisfies

$$\max_{w(e)} \left(\frac{w(e)}{r} - N(e)\right)^{\theta} \left(\frac{Xe - w(e)}{r} - \Pi\right)^{(1-\theta)}$$

The parameter θ $(0 < \theta < 1)$ is associated with bargaining power, where $\theta = 1/2$ represents equal bargaining power. $N(e)$ and Π, corresponding to the disagreement points for the worker and firm, are constants in the bargaining process although endogenous in the economy.

As $\Pi = 0$ while $N(e)$ satisfies (**??**), the Nash wage can be written as

$$w(e) = \frac{\theta(r + \alpha_w)}{r + \theta\alpha_w} X e \tag{6}$$

Note that with Nash bargaining wages are proportional to the output generated. Further, they imply $Xe - w(e) > 0$ and $w(e) > 0$ for all $e > 0$, so that the assumptions made about wages in the previous section hold.

3 Equilibrium

Given the wage formation process described above, (**??**) implies (**??**) can be written as

$$c = \frac{\alpha_f(1-\theta)}{(r + \theta\alpha_w)} X \int_{e'}^{e''} \xi dG(\xi) = \frac{\alpha_f(1-\theta)}{(r + \theta\alpha_w)} X \overline{e} \tag{7}$$

where $\overline{e}$ is the mean amount of training unemployed workers acquire in a steady state. Further, substituting (**??**) into (**??**) yields $e > 0$ for all k :

$$e = \frac{\alpha_w \theta X}{r\,(r + \theta\alpha_w)} k \tag{8}$$

This implies that the average amount of training among the unemployed, $\overline{e}$, is proportional to the average k among the unemployed, $\overline{k}$, i.e.,

$$\overline{e} = \frac{\alpha_w \theta X}{r\,(r + \theta\alpha_w)} \overline{k} \tag{9}$$

The matching function, $m(.,.)$, the flow of workers into the market, g, and the fact that all contacts generate a match imply that in any steady state we must have

$$m(V, U) = g = \alpha_w U = \alpha_f V \tag{10}$$

Substituting (**??**) and (**??**) into (**??**) implies that in any steady state equilibrium the number of vacancies can be expressed as a function of the number unemployed and $\overline{k}$. In particular,

$$V(\overline{k}, U) = \frac{g^2(1-\theta)\theta X^2 \overline{k}}{rc} \frac{U}{(rU + \theta g)^2} \tag{11}$$

which is strictly positive for all $U > 0$. Note as well that $V(\bar{k}, U)$ depends on only the mean of k and not other characteristics of its distribution, for example the variance of k.

In a steady-state equilibrium, V^* and U^* must satisfy both (**??**) and (**??**). As $m(.,.)$ is assumed to be increasing in both its arguments, from (**??**) we can implicitly define a downward sloping iso-matching function in $U - V$ space as illustrated in Figure 1. On the other hand, note that $V(\overline{k},.)$ in (**??**) is hump shaped with slope

$$\frac{\partial V}{\partial U} = \frac{g^2(1-\theta)\theta X^2 \overline{k}}{rc(rU+\theta g)^3}(g\theta - rU)$$

as illustrated in Figure 1.

As the parameters of the matching function $m(.,.)$ are unrelated to the parameters of $V(\overline{k}, U)$, multiple equilibria are clearly possible. Figure 1(a) illustrates the situation where there are two equilibria: (V_1^*, U_1^*) and (V_2^*, U_2^*). With (V_1^*, U_1^*) there are more steady state unemployed workers and fewer vacancies than with (V_2^*, U_2^*). Further, (**??**) and (**??**) imply the average amount of training among unemployed workers in a steady state can be written as

$$\overline{e} = \frac{g\theta X}{r(rU+\theta g)}\overline{k} \tag{12}$$

It then follows that the greater the steady state level of unemployment the smaller the average level of training. Hence, associated with equilibrium (V_1^*, U_1^*) is a lower average level of training than with (V_2^*, U_2^*). Indeed, given the exogenous distribution of training costs, $F(.)$, (**??**) implies the steady-state equilibrium distribution of training among the unemployed with (V_1^*, U_1^*) and (V_2^*, U_2^*) can be written as

$$G_i^*(e) = F\left(\frac{r(rU_i^*+\theta g)e}{g\theta X}\right)$$

for $i = 1, 2$. Hence, the (V_1^*, U_1^*) equilibrium describes what we term the low skill trap. In this case unemployment is higher but the average amount of training and the number of vacancies is lower than with (V_2^*, U_2^*).

Multiple equilibria exist for the same parameter values and their characterization corresponds to the features of a low skills trap. More productive workers are more profitable. Therefore, as a larger number of workers become trained, more jobs become available. This job creation response generates increasing social returns to training and provides the mechanism driving the low skill trap. Of course, $V(.)$ and the iso-matching function may not intersect at all as shown in Figure 2. This will happen if the cost of posting a vacancy is great enough that no employer posts a vacancy, i.e., (**??**) is not satisfied. This, of course, implies no worker purchases training and the market degenerates to a state where no firms post a vacancy and all workers are untrained.

3.1 An Example

Here we consider a special case which reveals, perhaps more clearly, the nature of the low skill trap. The model used is the same as before with the exception that a worker is now faced with a dichotomous choice - to be either trained or untrained. Any trained worker generates per period revenue X_1 while working for any employer, whereas an untrained worker generates revenue per period X_2, where $X_1 > X_2 > 0$. Further, we assume any worker entering the market can be trained at the same cost k.

It is straightforward to check that in this case the steady-state Nash equilibrium wages can be written as

$$w_j = \frac{\theta(r+\alpha_w)}{r+\theta\alpha_w} X_j \tag{13}$$

$j = 1, 2$. Hence, the per period wage for trained workers is greater than that for untrained workers ($w_1 > w_2$). Further, the per period profit from hiring a trained worker is greater than the per period profit from hiring an untrained worker ($X_1 - w_1 > X_2 - w_2 > 0$). Nevertheless, as employing either a trained or an untrained worker is more profitable than continued search, an employer will hire any worker it contacts.

A simple modification of (**??**) implies the cost of posting a vacancy, c, can be written as

$$c = \alpha_f \left[\beta \frac{X_1 - w_1}{r} + (1-\beta) \frac{X_2 - w_2}{r} \right] \tag{14}$$

where β ($0 \leq \beta \leq 1$) represents the steady state a proportion of unemployed workers who are trained. Substituting (**??**) into (**??**) yields

$$c = \frac{\alpha_f(1-\theta)}{(r+\theta\alpha_w)} \left[\beta X_1 + (1-\beta) X_2 \right] \tag{15}$$

where $\alpha_f \beta$ denotes the probability in any period an employer contacts a trained worker.

In a steady state, the flow in of workers, g, must equal the flow out: $\alpha_f V = \alpha_w U = m(U,V) = g$ as in (??). Substituting (??) into (??) it follows that at any equilibrium the steady state number of vacancies can be written as a function of steady state unemployment and the proportion trained, i.e.

$$V(\beta, U) = \frac{g(1-\theta)U}{c(rU+\theta g)}\left[\beta X_1 + (1-\beta)X_2\right]$$

Clearly, $V(\beta,U)$ is increasing in β and

$$V(1,U) = \frac{g(1-\theta)U}{c(rU+\theta g)}X_1 > \frac{g(1-\theta)U}{c(rU+\theta g)]}X_2 = V(0,U)$$

As illustrated in Figure 3, define U^1 and U^0 by where $V(1,U)$ and $V(0,U)$ intersect the iso-matching curve:

$$g = m(U^1, V(1,U^1)) \qquad \text{and} \qquad g = m(U^0, V(0,U^0))$$

U^1 and U^0 represent steady state levels of unemployment when all workers are trained and untrained respectively. Since $V(\beta,U)$ is strictly increasing in U, $U^0 > U^1$ while $V(1,U^1) > V(0,U^0)$.

Let N_1 and N_2 denote the expected discounted lifetime income to a trained and untrained worker respectively. It can be shown that in a steady state both types of workers will accept employment at any employer offering the Nash wage. By virtue of (??), N_j can be written as

$$N_j = \frac{\alpha_w}{r(r+\alpha_w)}w_j \tag{16}$$

$j = 1,2$. Using (??) and (??), the return to training can be written as

$$N_1 - N_2 = \frac{\theta\alpha_w}{r+\theta\alpha_w}(X_1 - X_2) \tag{17}$$

which after substituting in (??), can be re-written as a decreasing function of steady state unemployment

$$\eta(U) = N_1 - N_2 = \frac{\theta g}{rU+\theta g}\left[X_1 - X_2\right] \tag{18}$$

Suppose for now that this return equals the cost of training for a level of unemployment between U^1 and U^0: $\eta(U^*) = k$ for some $U^* \in [U^0, U^1]$, as illustrated in Figure 3.

It is simple to check there are three equilibria in this case - one where all workers are trained, i.e., $\beta = 1$; one where no workers are trained, i.e., $\beta = 0$; and another where a proportion β^* ($0 < \beta^* < 1$) are trained. First consider the case where $\beta = 1$. With only trained (and profitable) workers available, firms create more jobs for a given level of unemployment. ($V(\beta, U)$ is increasing in β.) With vacancies plentiful, workers match quickly leading to a low steady state level of unemployment, $U^1 < U^*$. It then follows from (**??**) that the return to training exceeds its cost, $\eta(U^1) > k$. Therefore all workers strictly prefer to be trained and there exists an equilibrium with all workers trained, a relatively low number of unemployed workers, U^1 and a high number of vacancies posted $V(1, U^1)$.

Now suppose there are only untrained workers, i.e., $\beta = 0$. A similar reasoning implies that the steady state level of unemployment is high and vacancies are few. Poor matching prospects for workers generate a return to training below cost: $\eta(U^0) < k$. Workers prefer not to be trained and there exists a second equilibrium corresponding to a low skill trap. There are fewer vacancies per unemployed worker posted relative to the situation where $\beta = 1$ as employers obtain less profit from hiring untrained workers. If there are fewer vacancies posted per unemployed worker, however, the return to training is reduced as it takes longer to find a job.

Finally, as $\eta(U^*) = k$, by construction in Figure 3, workers are indifferent to whether they are trained or not when steady state unemployment is U^*. However, if β^* are trained ($0 < \beta^* < 1$), where $g = m(U^*, V(\beta^*, U^*))$, we have a steady state equilibrium. Of course, this is a somewhat unsatisfactory equilibrium. Not only is it Pareto dominated by the equilibrium where all are trained, under the standard "naive" dynamics it is unstable. Note, for example, a reduction in the cost of training costs leads to an interior steady-state equilibrium with a smaller number trained than before.

Of course, if the cost of training is high enough, or low enough, we have a unique steady-state equilibrium. Suppose that $\eta(U) > k$ for all $U \in [U^0, U^1]$. In this case the cost of training is so low all workers being trained is the unique equilibrium. On the other hand, if the cost of training is so great that $\eta(U) < k$ for all $U \in [U^0, U^1]$, then the unique steady-state equilibrium is where all workers are untrained.

4 Conclusion

Above we have shown how a low skill trap can occur within the context of a simple matching model. As more job seekers become trained, the profitability of creating job opportunities increases and hence more firms enter the labor market. With a greater number of firms offering employment, the matching prospects for the worker improve, thereby raising the private return to training. The higher payoff in turn justifies the decision to acquire training. The converse holds as well. If few workers acquire training, firms have less incentive to create jobs. Poor matching prospects for the worker then reduce the rate of return on skill acquisition.

As a result, a coordination failure with multiple Pareto ranked steady state equilibria occurs, the equilibrium with low skilled workers and high unemployment corresponding to a low skill trap. Cooper and John (1988) provide a general treatment of such coordination failures in which increasing returns arise exogenously as part of production externalities. Here we focus on a specific context - skill acquisition in a labor market with matching frictions - to identify a mechanism for a coordination failure that is not technologically driven.

Matching frictions alone do not generate multiple equilibria: as in Pissarides (1990), this economy without a training decision has a unique (and in general inefficient) equilibrium, even in the presence of increasing returns in the matching technology. Rather, it is the interaction between the human capital and labor markets that causes increasing returns. The low skill trap multiplicity arises as matching frictions feed into the training decision to create increasing returns on the investment in training. Acemoglu (1996) likewise demonstrates that suboptimal training can occur within a job matching framework. He focuses, however, on the interplay between human and physical capital to realize increasing social returns. In contrast, the analysis in this paper highlights the role of job creation to create not just increasing returns to training but also multiple equilibria.

Is there evidence to support the existence of multiple equilibria and a low skill trap? As outlined in the introduction, the basic conditions required for the trap proposed in this paper are plausible. It is nonetheless worthwhile investigating whether this outcome may indeed have occurred. Given that 'skills' make workers in a specific job more productive rather than altering their occupation, broad measures based on education levels in an area are likely to mask underlying skill differences. Rather than manifesting itself geographically, however, the skill trap may be more readily observed in particular sectors within economies. At the industry level, Mason, van Ark and Wagner (1996) report detailed differences in biscuit production between Britain, Germany, France and the Netherlands. Controlling for the mix in product-quality, they find that British workers have fewer skills, less training and consequently lower productively. As compared with their continental counterparts, British firms and workers appear to have adopted a low quality/low skill product strategy, a pattern likewise found in the manufacture of clothing and furniture (Steedman and Wagner 1987, 1989).[6,7]

Multiplicity, should it arise, suggests several potential policy responses to achieve the good equilibrium. The government may simply attempt to legislate the problem away by requiring minimum education (skill) standards. Alternatively, a large training subsidy can be used to guarantee only the good equilibrium exists. A small subsidy may not do the trick as the two equilibria exist for a range of training costs. A proper analysis of these and other policies, however, requires an understanding of market dynamics, of how some economies move toward the high skilled - high vacancy steady state while others tend toward the low skill trap. This selection is not merely a 'matter of chance' but will depend on market institutions, public policy, wage determination, and training costs. However, such an analysis is beyond the scope of this paper. This does not imply that dynamics and policy issues are not interesting and important; they are. Nevertheless, the techniques required for such analysis are relatively complex and would distract from the primary purpose of this study - to illustrate the logic behind a low skill trap.

[6]There is also a large body of evidence indicating that the rate of return on training increases as the stock of trained workers increases: there are social increasing returns but not necessarily multiple equilibria.

[7]Unfortunately, these studies do not consider the availability of work, a key component of the results here. (Reliable figures at the sectoral level are not likely to be available.) Anecdotal evidence on vacancies comes from regional data. For example, it is usually argued (often somewhat informally) that on average workers in the north of England receive less training, earn lower wages and have fewer job opportunities than their counterparts in the south of the country. The British Broadcasting Company News recently (December 6, 1999) used this characterization to describe the north-south divide.

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Figure 1: The Low Skill Trap, Burdett and Smith

Figure 2: The Low Skill Trap, Burdett and Smith

Figure 3: The Low Skill Trap, Burdett and Smith