

Glazer, Amihai; Kanninen, Vesa

Working Paper

The Effects of Employment Protection on the Choice of Risky Projects

CESifo Working Paper, No. 689

Provided in Cooperation with:

Ifo Institute – Leibniz Institute for Economic Research at the University of Munich

Suggested Citation: Glazer, Amihai; Kanninen, Vesa (2002) : The Effects of Employment Protection on the Choice of Risky Projects, CESifo Working Paper, No. 689, Center for Economic Studies and Ifo Institute (CESifo), Munich

This Version is available at:

<https://hdl.handle.net/10419/75924>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



Working Papers

THE EFFECTS OF EMPLOYMENT PROTECTION ON THE CHOICE OF RISKY PROJECTS

Amihai Glazer
Vesa Kannianen

CESifo Working Paper No. 689 (4)

March 2002

Category 4: Labour Markets

CESifo
Center for Economic Studies & Ifo Institute for Economic Research
Poschingerstr. 5, 81679 Munich, Germany
Phone: +49 (89) 9224-1410 - Fax: +49 (89) 9224-1409
e-mail: office@CESifo.de
ISSN 1617-9595



An electronic version of the paper may be downloaded

- from the SSRN website: www.SSRN.com
- from the CESifo website: www.CESifo.de

THE EFFECTS OF EMPLOYMENT PROTECTION ON THE CHOICE OF RISKY PROJECTS

Abstract

We consider a firm that is subject to employment protection laws that limit the firm's ability to fire labor. In particular, we suppose that though a firm which shuts down can fire all its workers, it may fire no fewer. Compared to a firm that is subject to no employment protection, a firm constrained in firing will prefer a risk-free project over a risky one, but may prefer the riskier of two risky projects.

JEL Classification: M13, J23.

Keywords: project choice, labor protection.

*Amihai Glazer
Department of Economics
University of California, Irvine
Irvine, California 92697
U.S.A.*

*Vesa Kanninen
Department of Economics
P.O.Box 54
Fin-00014 University of Helsinki
Finland
vesa.kanninen@helsinki.*

The Effects of Employment Protection on the Choice of Risky Projects

1 Introduction

Much of the recent growth in rich countries appears in risky, entrepreneurial, industries. Flexible labor markets and high job mobility appear necessary to succeed in such industries, and indeed the better economic performance of the United States in the 1990s than performance in Japan or in western Europe

has been attributed to the combination of entrepreneurship and flexible labor markets in the United States.

Workers, however, may fear the loss of jobs, and demand laws that protect them. Employment protection laws, common in western Europe, increase the costs to a firm of firing workers. The effects of such laws are extensively studied, largely focusing on how employment protection affects unemployment rates. Though such measures cannot affect employment in perfect markets, they do matter otherwise. Theoretical works (notably Lindbeck and Snower (1986)), Bertola (1990), and Risager and Sorensen (1997)) suggest that firing restrictions stabilize labor markets, as firms which anticipate firing less in bad times tend to hire less in good times. The effect on trend employment appears to be small, somewhat sensitive to demand elasticity under endogenous capital formation (Risager and Sorensen (1997)), and sensitive to the persistence of shocks (Bentolila and Saint-Paul (1994)).

Scarbetta (1996) finds that regulations protecting jobs raise equilibrium unemployment and slow labor market adjustment. Similarly, Nickel (1997) finds that regulations protecting jobs reduce short-term unemployment but increase long-term unemployment. Though Lazear (1990) finds that mandatory severance pay reduces employment, more recent work casts doubt on that result (see Addison, Teixeira and Grosso (2000)). For an excellent summary of the theoretical and empirical literature, see Bertola, Boeri, and Cazes (1999).

The studies described necessarily abstracted from some important issues, including choices among projects with different degrees of risk. For example, if employment protection induces firms to engage in non-risky activities, then firms may care little, income equality may be high, but the economy may suffer from sluggish growth. Our paper accordingly asks how restrictions on a firm's ability to fire workers affects its choice among risky projects. We thus offer a different approach to understanding the effects of employment protection. The existing literature has not addressed this question.¹

We shall contrast the behavior of a firm which chooses between risky and risk-free projects in conditions where it is and is not constrained in its labor decisions ex post. The firm encounters uncertainty because labor must be hired and trained before demand is revealed. The initial hiring and project

¹Saint-Paul (1996) in studying international product cycles comes closest to our approach, concluding that a country with rigid labor markets will tend to produce relatively secure goods.

choices therefore depend on uncertainty of demand.

For our analysis it is important to consider how the costs of firing vary with the number of workers hired. Many west European countries constrain both individual layoffs and collective layoffs, with formal rules which impose additional costs on collective layoffs. But the effective differentials may be the opposite of the formal ones. For example, France consider an individual dismissal "fair" if made for such economic reasons as economic difficulty, reorganization or technological change. Thus, a firm which adopts a risky project which clearly failed may hire workers with greater ease than would a firm whose difficulties were less obvious, as employees could claim that the dismissal was unfair. In the United States, collective dismissals are mildly regulated by the Worker Adjustment and Retraining Notification Act (WARN) of 1988, requiring covered firms to provide employees with sixty days' advance notice of plant closures and large-scale layoffs. But more importantly, in the United States the tax a firm pays for unemployment insurance increases with the number of workers it had hired, subject to a maximum rate. Thus, firms which dismissed many workers incur no increased liability for the unemployment insurance tax if they lay off additional workers.

Other conditions also make collective dismissal easier than individual dismissal. For example, tenure at a university normally means that all the faculty in a Department can be hired if the Department is closed, but otherwise firing any one faculty member can be most difficult. Anti-discrimination laws may also lead to such behavior. A firm which hires only some workers may face charges of discrimination; but shutting down a whole unit makes proofs of discrimination difficult. In hiring individual workers the firm faces the danger that they may engage in sabotage, as by stealing documents, speaking ill of the firm, and so on. But if the unit is shut down, the damage from such sabotage is smaller.

Since our focus is on risk-taking, we shall consider employment protection laws which impose lower marginal costs on the firm the greater the number of dismissals it makes. The opposite assumption clearly leads to reduced risk-taking: if following failure the firm cannot hire workers, and thus incurs high costs, then the firm will avoid risky projects. If, however, extreme failure allows the firm to hire workers while moderate failure does not, then the firm may prefer risky projects. Whether, how, and when this intuition holds is examined below. Moreover, our analysis may lead to better design of employment protections rules, since it shows that for a given average level of protection for workers, different rules on marginal costs of firing can lead

to different results.

For analytical simplicity, we shall first make the extreme assumption that a firm may hire either all or none of its workers. Of course, our assumption on hiring restriction is an extreme one, which we introduce to derive some sharp results. We then relax this assumption by allowing any amount of hiring at finite hiring cost. Our first result suggests that compared to a firm is not subject to employment protection, a firm constrained in hiring will always prefer a risk-free project over a risky one. We then consider a firm which has a shut-down option under employment protection.² Our other main result suggests that a firm which has no access to any risk-free project but which can shut down may prefer the riskier of two risky projects. One implication is that labor market institutions are relevant for risk taking.

2 Assumptions

2.1 Hiring

We consider a single firm over two-periods. Production follows a constant returns technology, with output equal to labor employed. In period 1 the firm hires labor, in the quantity L_1 . In period 2 demand is realized; the firm then produces and sells the good.

The amount of labor used in period 2 is L_2 . The firm cannot hire labor in period 2: labor must be trained and experienced to be productive, or there may be lags in hiring. Thus, in period 2 the firm can use at most L_1 workers, or $L_2 \leq L_1$. In period 2 an unconstrained firm can hire any number of workers. A constrained firm must hire all or none of its workers. So for a constrained firm either $L_2 = L_1$ or else $L_2 = 0$.

2.2 Prices

The firm pays labor in both periods. The wage rate per worker per period is exogenously set at w .³ The firm sells the good at the reservation price, r , of

²A bankruptcy option for a firm with debt can effectively transform share ownership into a call option, and so create an incentive for choosing risky projects. This mechanism, known as asset substitution, is analyzed by Jensen and Meckling (1976). We consider an all-equity firm instead.

³The assumption of a fixed wage is made for simplicity. More generally, we would expect that the higher a worker's risk of dismissal, the greater is his reservation wage. If

consumers. We assume that $2w < r$.

3 Project choice

3.1 Risk-free project

It is simplest to begin with deterministic demand, \bar{q} . Then the firm will employ $L_1 = \bar{q}$ workers in period 1, and employ $L_2 = \bar{q}$ workers in period 2. In such a market, a constrained and an unconstrained firm would make the same choices and earn the same profits. Profits are

$$\pi(\bar{q}) = \sum_i wL_1 + (r - \sum_i w)L_2; \text{ with } L_2 = \bar{q}; L_2 = L_1; \quad (1)$$

This is a two-period optimization problem where L_1 is given when L_2 is chosen. A rational firm hires no excess labor; labor in period 2 is therefore $L_2 = L_1$. The condition for entry, or for non-negative profits, when demand is risk-free is

$$r - \sum_i 2w > 0; \quad (2)$$

which holds by assumption. Optimal hiring satisfies $L_1 = \bar{q}$. Expected and realized profits are therefore

$$\pi^0 = (r - \sum_i 2w)\bar{q}; \quad (3)$$

3.2 Risky project

Suppose next that the firm can choose between a risk-free project and a risky project. The risky project is subject to uncertain demand in period 2. Demand can be either High (indicated by H) or Low (indicated by L). The number of consumers willing to pay the reservation price r in state i is q^i , with $q^H > q^L$. Demand is High with probability μ , and Low with probability $1 - \mu$.

If a constrained and an unconstrained firm hired the same number of workers in period 1, L_1 , then under High demand in period 2 each would sell $\min(L_1, q^H)$. But were demand Low, their employments and outputs could differ. An unconstrained firm would employ $L_2^u = q^L \cdot L_1$ workers.

risky jobs demand a premium, the firm would have greater incentive to adopt a risk-free project.

The constrained firm would either use L_1 workers, or else hire all its workers in period 2 and produce nothing. One natural interpretation is that a firm shuts down. Under Low demand a constrained firm could not earn more than an unconstrained firm.

A constrained firm, facing restrictions on hiring in period 2, adjusts its hiring of labor in period 1 in anticipation of the restrictions becoming binding. Intuitively, we would expect it to hire fewer workers than does an unconstrained firm. Moreover, the restrictions on hiring can induce the firm to choose a different project than would an unconstrained firm. Perhaps surprisingly, the constrained firm may choose the riskier of two risky projects. Though a constrained firm suffers a larger fall in profits when demand is Low than would a constrained firm, the relevant comparison is the difference in marginal incentives. If a firm faces Low demand so that it would hire all workers, then any lower demand would not further reduce profits, and so the firm can bear the added risk at low or no additional cost.

3.2.1 Unconstrained firm

The firm's problem involves two-stage maximization. In period 2, the firm chooses its state-dependent employments L_2^H or L_2^L . Anticipating that decision, it hires labor in period 1, L_1 . The unconstrained firm maximizes expected profit

$$\max_{L_1; L_2^H; L_2^L} \pi^u = (1 - \mu)wL_1 + \mu(r - w)L_2^H + (1 - \mu)(r - w)L_2^L \quad (4)$$

subject to $L_2^H = \min(L_1; q^H)$, and $L_2^L = \min(L_1; q^L)$. Under High demand the firm sets $L_2 = L_1$; the firm would therefore always set $L_1 \leq q^H$. To find optimal hiring, note that if the firm considers High demand likely, then it will hire many workers.

Evaluating the expected profit over the two periods under the two hiring strategies, $\pi^u(L_1 = q^H)$ and $\pi^u(L_1 = q^L)$, gives

Lemma 1 Hiring by an unconstrained firm satisfies

$$L_1 = q^H \text{ if } \mu \geq \min \left(\frac{w}{r - w}; \frac{wq^H - (r - w)q^L}{(r - w)(q^H - q^L)} \right); \quad (5)$$

$$L_1 = q^L \text{ if } 0 < \mu < \frac{w}{r - w} \text{ and } r - 2w \geq 0 \quad (6)$$

$$L_1 = 0 \text{ if } r_i - 2w < 0: \quad (7)$$

Corresponding to these three choices of L_1 are the following expected profits:

$$L_1 = q^H : \pi^u = [\mu(r_i - (1 + \mu)w)q^H + (1 - \mu)(r_i - w)q^L]$$

$$L_1 = q^L : \pi^u = [r_i - 2w]q^L$$

$$L_1 = 0 : \pi^u = 0.$$

We denote the realized profits in states $j = H; L$ under hiring strategies $i = q^H; q^L$ by π_{ij}^u . If the future state is correctly anticipated, realized returns on the risky project are positive, as $\pi_{HH}^u = q^H(r_i - 2w) > 0$ and $\pi_{LL}^u = q^L(r_i - 2w) > 0$. We assume, however, that an unconstrained firm makes a loss if it hires much when demand becomes Low: $\pi_{HL}^u = q^L[r_i - w(1 + q^H/q^L)] < 0$.

3.2.2 Constrained firm: Produces under High and Low demand

Consider a constrained firm which is forbidden to hire only some of its workers in period 2: it must either shut down or else maintain its labor force. For a given risky project it hires fewer workers than would an unconstrained firm. If the constrained firm produces when realized demand is Low, its ex ante objective is

$$\max_{L_1; L_2^H; L_2^L} \pi^c = (1 - \mu)L_1 + \mu(r_i - w)L_2^H + (1 - \mu)(r_i - w)L_2^L \quad (8)$$

subject to $L_2^H = L_2^L = L_1$ and $L_2^H \leq q^H$. Evaluating the expected profits over the two periods under the two hiring strategies, $\pi^c(L_1 = q^H)$ and $\pi^c(L_1 = q^L)$, gives

Lemma 2 Hiring by a constrained firm which produces under both High and Low demand satisfies

$$L_1 = q^H \text{ if } \mu \geq \min \left(\frac{2w}{r_i}, \frac{2q^H w_i q^L r_i}{(q^H - q^L)r_i} \right) \quad (9)$$

$$L_1 = q^L \text{ if } 0 < \mu < \frac{2w}{r_i} \text{ and } q^L > 0 \quad (10)$$

$$L_1 = 0 \text{ otherwise.} \quad (11)$$

The constrained firm's expected profits are

$$L_1 = q^H : \pi^c = [\mu r - w]q^H + r(1 - \mu)q^L$$

$$L_1 = q^L : \pi^c = [r - w]q^L$$

$$L_1 = 0 : \pi^c = 0.$$

Thus, even a constrained firm may hire q^H workers in period 1. It will do so, however, for a narrower set of parameters than would an unconstrained firm. To see the difference, consider the conditions $\frac{w}{r - w}$ in (5) and $\frac{2w}{r}$ in (9). Now $\frac{w}{r - w} = \frac{2w}{r + (r - 2w)} < \frac{2w}{r}$, which proves the claim. Another way to see this is to notice that even if both the unconstrained and constrained firms earn the same positive profit under High demand and with the hiring q^H , the realized losses under Low demand differ, as $\pi_{HL}^c = -wq^H + (rq^L - wq^H) = q^L[r - w\frac{2q^H}{q^L}] < q^L[r - w(1 + \frac{q^H}{q^L})] = \pi_{HL}^u < 0$:

3.2.3 Constrained firm with shut-down option: Produces only under High demand

A constrained firm may choose to shut down rather than produce when realized demand is Low. It aims to

$$\max_{L_1; L_2^H; L_2^L} \pi^c = -wL_1 + \mu(r - w)L_2^H \quad (12)$$

subject to $L_2^H \leq q^H$ and $L_2^H = L_1$. We then have

Lemma 3 Hiring by a constrained firm which shuts down under Low demand is

$$L_1 = q^H \text{ if } \mu > \max \left(\frac{w}{r - w}; \frac{q^H w}{(r - w)q^H} \right) \quad (13)$$

$$L_1 = 0 \text{ otherwise.} \quad (14)$$

Proof. The result is obtained by comparing the expected profits over two periods under different hiring strategies, $L_1 = (q^H; q^L)$. The choice $L_1 = q^L$ maximizes expected profits only if

$$\frac{w}{r - w} < \mu < \frac{w}{r - w}; \quad (15)$$

which can never hold. Hence, $L_1 = q^L$ is suboptimal.

Expected profits of the constrained firm which shuts down under Low demand are

If $L_1 = q^H$ then $\frac{1}{4}^c = (\mu r - (1 + \mu)w)q^H$

If $L_1 = 0$ then $\frac{1}{4}^c = 0$.

The shut-down option is valuable under some, but not all, conditions. Define $r = w$. When realized demand is Low and the firm shuts down, its loss is $\frac{1}{4}_{HL}^c = -wq^H$. The condition for the loss of a constrained firm with no shut-down option to be larger than takes a simple form, $r < q^H = q^L$. When the shut-down option has value, the firm with such an option will, for some parameter values, hire q^H workers, whereas a firm which cannot shut down will not hire q^H . We see this by noting that $\frac{w}{r - w} = \frac{2w}{r + (r - 2w)} < \frac{2w}{r}$ in (13) and (9).

Having determined a firm's hiring strategy under risk-free and risky projects, we can now address the problem of project choice.

4 Optimal choice between projects

Consider first a risky project as a Rothschild-Stiglitz transformation of a risk-free project with known demand, \bar{q} . This transformation takes the form of a mean-preserving spread, $q^L < \bar{q} < q^H$. It is convenient to assume that $q^H - \bar{q} = \bar{q} - q^L$. The payoffs when demand is uncertain are summarized in Table 1.

Table 1. Expected Profits Under Risky Project

	L_1	Expected profits
Unconstrained firm	q^H	$[\mu r - (1 + \mu)w]q^H + (1 - \mu)(r - w)q^L$
	q^L	$[r - 2w]q^L$
Constrained firm, with no shut down	q^H	$[\mu r - 2w]q^H + r(1 - \mu)q^L$
	q^L	$[r - 2w]q^L$
Constrained firm, with shut-down option	q^H	$(\mu r - (1 + \mu)w)q^H$
	0	0

Recall that profits under the risk-free project are $(r - 2w)\bar{q}$. Depending on the probabilities of High and Low demand, both a constrained and an unconstrained firm may prefer the risky project. We can show, however, that if the constrained firm prefers the risky project then the unconstrained firm does also. For intuition, observe that under the risk-free project, the constrained and the unconstrained firm earn the same profits. Under the risky project then, the unconstrained firm earns higher expected profits than does the constrained firm: $\frac{1}{4}^u > \frac{1}{4}^c$; in the worst case the constrained firm just mimics the unconstrained one. So if the constrained firm prefers the

risky over the riskless project, then the unconstrained firm also prefers the risky project. In corroboration, note that the fifth line in Table 1 shows that the constrained firm with a shut-down option chooses the risky project when $(\mu r_i - (1 + \mu)w)q^H > (r_i - 2w)\bar{q}$, in which case it hires $L_1 = q^H$ workers. An unconstrained firm would then also choose the risky project (cf. the first line).

A mean-preserving spread in consumer demands on a risky project, however, makes it less attractive to a constrained firm with no shut-down option:

Proposition 1 A firm subject to employment protection and which may not shut down always prefers a risk-free project over a risky project which has the same expected demand.

Proof. Assuming that $q^H_i \bar{q} = \bar{q}_i q^L$, the expected profit of the constrained firm is $[\mu r_i - 2w]q^H + r_i(1 - \mu)q^L = [r_i - 2w]\bar{q}_i (\bar{q}_i - q^L)[r_i - 2w] < [r_i - 2w]\bar{q}$.

The shut-down option, however, may make a constrained firm choose the risky project. It will under two conditions. First, the probability, μ , of High demand may be sufficiently large. Second, the level of demand, q^H , may be sufficiently large. Algebraically, the conditions is that $(\mu r_i - (1 + \mu)w)q^H > (r_i - 2w)\bar{q}$.

4.1 Comparison of two risky projects

Assume now that a firm must choose between two risky projects, and that it has not access to a risk-free project. We shall compare the effects of a mean-preserving spread of consumer demands under a risky project for the constrained and unconstrained firm.

To describe a mean-preserving spread, let $\mu q^L + (1 - \mu)q^H$ equal some constant, say M . Let μ be fixed, but let q^L and q^H change. The condition $\mu q^L + (1 - \mu)q^H = M$ yields $\frac{\partial q^L}{\partial q^H} = \frac{\mu - 1}{\mu}$.

Consider an unconstrained firm for which $\mu > \min \frac{w}{r_i - w}, \frac{wq^H_i (r_i - w)q^L}{(r_i - w)(q^H_i - q^L)}$. Then $L_1 = q^H$ and expected profits are $\pi^u = (\mu r_i - (1 + \mu)w)q^H + (1 - \mu)(r_i - w)q^L$. The derivative of the unconstrained firm's expected profits with respect to q^H under a mean-preserving spread is

$$\frac{\partial \pi^u}{\partial q^H} = (\mu r_i - (1 + \mu)w) + (1 - \mu)(r_i - w)\frac{\mu - 1}{\mu} \quad (16)$$

Consider a constrained firm with a shut-down option for which $\mu > \max \frac{w}{r_i w}; \frac{q^H w}{(r_i w)q^H}$. The firm sets $L_1 = q^H$ and expects profits $\pi^c = (\mu r_i - (1 + \mu)w)q^H$. The derivative of the constrained firm's expected profits with respect to q^H under a mean-preserving spread is

$$\frac{\partial \pi^c}{\partial q^H} = \mu r_i - (1 + \mu)w \quad (17)$$

Suppose that $\mu r_i - (1 + \mu)w$ is positive, so that for the constrained firm the derivative of profits with respect to q^H under a mean-preserving spread is positive. Suppose also that $\mu r_i - (1 + \mu)w$ is small, so that for the unconstrained firm the derivative of profits with respect to q^H under a mean-preserving spread is approximately $(1 - \mu)(r_i - w)(\mu - 1) = \mu$, which is negative.

Here a mean-preserving spread increases the expected profits of the constrained firm but reduces the expected profits of the unconstrained firm. The mean-preserving spread of demand can thus make the constrained firm prefer the riskier project, whereas the unconstrained firm does not. In our model, this will occur when market uncertainty μ satisfies⁴

$$\frac{1}{1 - \mu} < \mu < \frac{1 - \mu}{2 - \mu} \quad (18)$$

where $1 - \mu < r = w$. Such probabilities can easily be found, for example for any $1 - \mu > 2/3$. If firms are just indifferent between risk-free and risky projects initially, then increased uncertainty makes the unconstrained firm with a shut-down option choose the less risky project whereas the constrained firm chooses the riskier one:

Proposition 2 When $1 - \mu < \mu < (1 - \mu)/(2 - \mu)$, the constrained firm which may shut-down prefers the riskier of two risky projects, while the unconstrained firm does not.

5 Costly Hiring

Consider an intermediate case, where the firm can hire any number, $L_1 \leq L_2$, of workers at a finite cost $\phi(L_1 - L_2)$, with $\phi > 0$. The firm's objective is

⁴To derive the right-hand inequality, we need to recognize that $2\mu - 3 > 0$. The inequality is satisfied because $2\mu = 2(r = w) > 4 > 3$.

$$\max_{L_1; L_2^H; L_2^L} \mathcal{W}^c = (1-\mu)L_1 + \mu(r_1 - w)L_2^H + (1-\mu)(r_1 - w)L_2^L - \phi(1-\mu)(L_1 + L_2^L): \quad (19)$$

We can show

Lemma 4 Optimal hiring by a constrained firm under costly training satisfies

$$L_1 = q^H \text{ if } \phi < \frac{\mu}{1-\mu}(r_1 - w); \text{ and } r_1 - 2w > 0 \quad (20)$$

$$L_1 = q^L \text{ if } \phi > \frac{\mu}{1-\mu}(r_1 - w); \text{ and } r_1 - 2w > 0: \quad (21)$$

$$L_1 = 0 \text{ otherwise:} \quad (22)$$

We note first that a firm subject to training cost is less willing to hire and train many workers than is an unconstrained firm. The constrained firm will hire q^H only if $\mu > (w + \phi)/(r_1 - w)$; the corresponding inequality for an unconstrained firm is $\mu > w/(r_1 - w)$. In a sense, a cost of training turns to a cost of hiring. What appears more striking is that a firm subject to a training cost will hire q^H workers for a narrower set of parameter values than will a firm which can only hire workers by shutting down. The corresponding conditions are $\mu > (w + \phi)/(r_1 - w)$ and $\mu > w/(r_1 - w)$. Intuitively, though a finite training cost allows the firm more flexibility, it is less valuable than the shut-down option.

How does the hiring cost ϕ affect risk-taking? Clearly, a training cost reduces the profitability of a risky project, and so reduces risk-taking. To demonstrate, suppose the unconstrained firm is indifferent between a risky project and risk-free project so that $\mathcal{W}^u(L_1 = q^H) = (r_1 - 2w)\bar{q}$. Then the expected profit of a firm which if chooses the risky project, faces the same market situation but is subject to a training cost is $(r_1 - 2w)\bar{q} - \phi(1-\mu)(q^H + q^L) < 0$. It therefore prefers the risk-free project.

6 Conclusion

One important but neglected effect of employment protection on firms' decisions is on risk taking. We found, as is intuitively plausible, that an increase

in firing costs reduces the expected profits of a risky project while not affecting profits from a risk-free project. More interesting is a comparison of a firm's profits from two risky projects. If a firm which shuts down and fires all labor can earn zero profits, then its maximum loss from a risky project are limited. A firm which faces costs of firing labor may then prefer the riskier of two projects, while a firm which faces no restrictions on firing labor would prefer the project which is less risky. Our results may be testable, since labor market institutions vary across countries, and may lead to a novel policy implication: employment protection may promote risk taking by employers.

References

- [1] Addison, John T., Paulino Teixeira and Jean-Luc Grosse (2000) "The effect of dismissals protection on employment." *Southern Economic Journal*, 67(1): 105-122.
- [2] Bentolila, Samuel and Gilles Saint-Paul (1994) "A model of labor demand with linear adjustment costs." *Labor Economics*, 1: 303-326.
- [3] Bertola, Giuseppe (1990) "Job security, employment and wages." *European Economic Review*, 34: 851-886.
- [4] Bertola, Giuseppe, Tito Boeri, and Sandrine Cazes (1999) "Employment protection and labour market adjustment in OECD countries: Evolving institutions and variable enforcement." *International Labor Organization, Employment and Training Papers*, No. 48.
- [5] Glazer, Amihai and Vesa Kannianen (2000) "Term length and the quality of appointments." mimeo.
- [6] Jensen, Michael C. and William H. Meckling (1976) "Theory of the firm: Managerial behavior, agency costs and ownership structure." *Journal of Financial Economics*, 3: 305-360.
- [7] Lazear, Edward P. (1990) "Job security provisions and employment." *Quarterly Journal of Economics*, 105: 699-726.
- [8] Lindbeck, Assar and Dennis J. Snower (1987) "Efficiency wages versus insiders and outsiders." *European Economic Review*, 31: 407-416.
- [9] Nickell, Stephen (1997) "Unemployment and labor market rigidities: Europe versus North America." *Journal of Economic Perspectives*, 11: 55-74.
- [10] Risager, Ole and Jan Rose Sorensen (1997) "On the effects of firing costs when investment is endogenous: An extension of a model by Bertola." *European Economic Review*, 41: 1343-1353.
- [11] Rothschild, Michael and Joseph E. Stiglitz (1970) "Increasing risk I: A definition." *Journal of Economic Theory*, 2: 225-243.

- [12] Scarbetta, S. (1996) "Assessing the role of labour market policies and institutional settings on unemployment: A cross-country study." OECD Economic Studies, No. 26.
- [13] Saint-Paul, Gilles (1996) "Employment protection, international specialization, and innovation." International Monetary Fund, Research Department, Working Paper No. 96/16.