Risk-Averse Firms and Employment Dynamics

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Quote

The governor of Bank of England said in the context of 2008 credit-crisis that “Banks have come to realise in the recent crisis that they are paying the price for having designed compensation packages which provide incentives (i.e. excessive risk-taking) that are not, in the long-run, in the interests of the banks themselves, and I would like to think that would change” (The Guardian 30/ 04/ 2008)

Quote

The CBI chief argued, commenting on the 2008 credit-crisis that “bonuses rewarded success but did not penalise failure, and that if bankers had been taking their own capital might not have taken such big risks…this pattern of behaviour has been exacerbated by a remuneration structure which has encouraged some employees to take spectacular short-term risks” (The Guardian 24/ 04/ 2008)

Motivation

Table1a . Summary Statistics on Options and Unemployment

	1984	1994
CEO's Holding Options (%)	69	88
Share of Options in Compensation (%)	25	48
Avg. Value of Options ($)	258,402	1,213,180
Elasticity of Wealth to Risk†	0.02	0.141

Source: Hall and Liebman (1998); †Cohen et al. (2000).

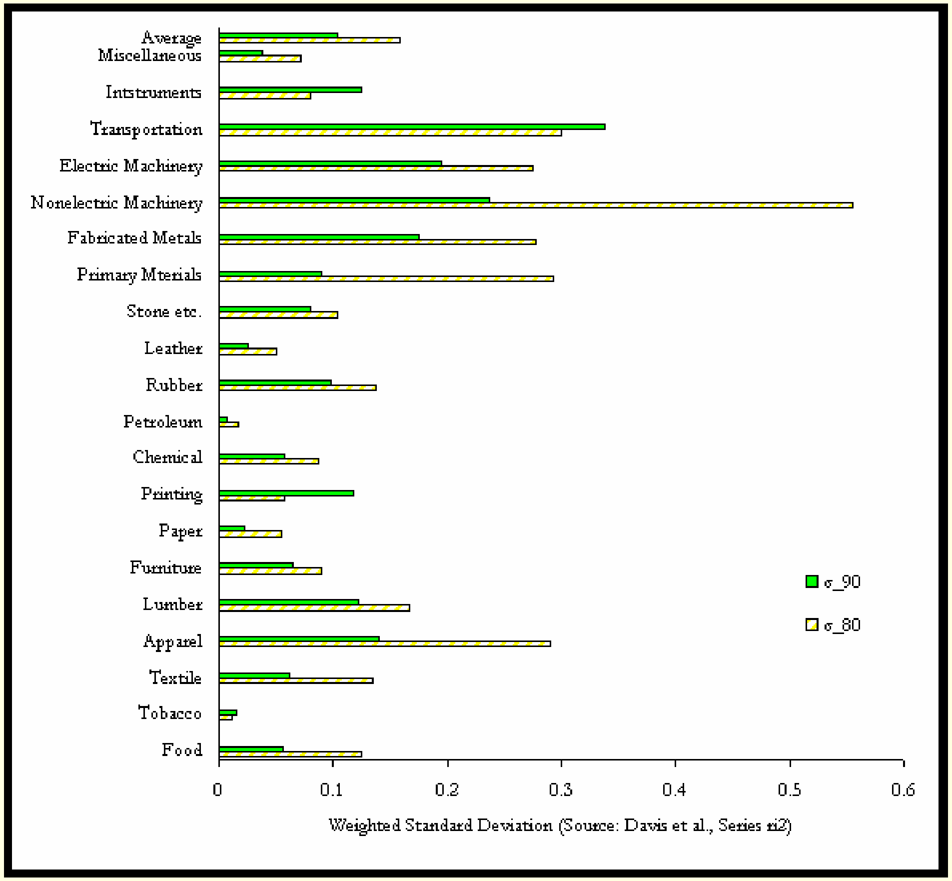
Table 1b.	1980-1990	1991-2000
Avg. % of Longterm Unemployment	8%	9%
CV* of Job Creation ‡	22.5	10.1
CV* of Worker Flow to Employment♮	5.3	4.7
Wage Flexibility§ (Author's Calculation)	0.31	0.32

Source: ‡Baldwin et., al.(1998) availability 1980-1993; WDI;

♮Bleakley et al. (1999). *Coefficient of variation.

§ Based on the CV of %△average US manufacturing wage (Source: OECD).

Motivation


Average
Miscellaneous
Intstruments
Transportation
Electric Machinery
Nonelectric Machinery
Fabricated Metals
Primary Mterials
Stone etc.
Leather
Rubber
Petroleum
Chemical
Printing
Paper
Furniture
Lumber
Apparel
Textile
Tobacco
Food
0
0.1
0.2
0.3
0.4
0.5
0.6
Weighted Standard Deviation (Source: Davis et al., Series ri2)
σ_90
σ_80

Motivation

- In the 1990's there appears to be less dynamism in the labour-market when compared with the 1980's.
- There were more schemes for managers that encouraged risk-taking in 1990's when compared with the 1980's.
- In sum, a dynamic labour market is associated with a more <u>risk-averse</u> behaviour on the firm-side.
- Yes, this sounds surprising and how do you explain this.

Objective

- The purpose of this paper is to explain these facts in a theoretical model.
- We propose the turnover-training model of Phelps (1968, 1992 and 1994).
- In the model firms use efficiency wages to reduce turnover costs leading to involuntary unemployment. Indeed, as workers quit the firm looses not only trained employees but also has to invest on hiring/training new workers.
- However, we take into consideration that firms might be risk-averse. This is an important departure from main-stream economics.

Why Should Firms be Risk-averse?

- Generally, because some risks can not be diversified:
  - Imperfect Information in the financial markets Greenwald and Stiglitz (1990, 1993);
  - Contrasting tax-treatment Gollier and Schlesinger(1997);
  - Uncertain employment dynamics and productivity shocks Both, Chen and Zoega (2001), Booth and Zoega (1999), Chen and Funke (2004) and Orszag and Zoega (1995, 1996).
- In the training-turnover model because:
  - Firm can't insure against employee turnover she can affect the probability of quitting through wages;
  - Firms risk loosing trained employees.

The Model

- Two equations by Phelps and so much trouble!

$$V(t) = \int_{t_0}^{\infty} e^{-r(t-t_0)} u(\pi(t)) dt$$
$$\pi = (\Lambda - w - T(H))E, \quad T(0) = 0,\ T', T'' > 0.$$

The firm maximizes the present discounted value of the "utility" so that $p^{\varrho-1}/(\varrho-1)$ from future stream of profits.

$$\dot{E} = \left[H - q\left(\frac{W}{w}\right) \right] E;\ q' > 0,\ q'' \geq 0 \qquad (2)$$

But there are employment dynamics that have to be taken into consideration. Employment changes due to hiring and quitting. The latter depends of firms wage rate (*w*) relative to an average wage (W).

First Order Conditions

Using the Pontryagin's Maximum Principle, the first-order conditions are:

$$H \quad : \quad T'(H)u'(\pi) = \lambda \tag{4}$$

$$w \quad : \quad u'(\pi) = \frac{\lambda W}{w^2} q'(\frac{W}{w}) \tag{5}$$

$$\dot{\lambda} \quad = \quad -u'(\pi)\left[f'(E) - w - T(H)\right] - \lambda[h - q(\frac{W}{w})] + r\lambda \tag{6}$$

$$\dot{E} \quad = \quad \left[H - q\left(\frac{W}{w}\right)\right] E \tag{7}$$

$$\text{Terminal} \quad : \quad \lim_{t\to\infty} [e^{-rt}\lambda(t)E(t)] = 0 \tag{8}$$

First Order Conditions

- The choice variables are the wage rate and hiring.
- Notice how now various values depend on the level of profits.
- To complete the model we use the Calvo-Salop indicator that W=*w* E where W is wages elsewhere and *w* is firm's own wage. Total workforce is suppressed to unity so that '1-E' denotes the unemployment rate.
- Using this equation at various places in the first- order conditions we get two differential equations in employment and the shadow-value of a worker.

Dynamics

$$\dot{E} = [h(E,\lambda) - q(E)]\,E \equiv F(E,\lambda) \tag{13}$$

$$\dot{\lambda} = \left[r - h(E,\lambda) + q(E) + \frac{1}{T'(h(E,\lambda))}(\Lambda w(E,\lambda) - T(h(E,\lambda))\right] \equiv G(E,\lambda) \tag{14}$$

Steady-State

- The steady-state is free from risk-aversion and there exists a unique steady state.

$$\bar{H} = q(\bar{E}) \tag{15}$$

$$\bar{w} = \bar{E}q'(\bar{E})T'(\bar{H}) = \bar{E}q'(\bar{E})T'(q(\bar{E})) \tag{16}$$

$$r = \frac{1}{T'(\bar{H})}\left(\Lambda - \bar{w} - T(\bar{H})\right) \tag{17}$$

$$\bar{\lambda} = u'(\bar{\pi})T'(\bar{H}) \tag{18}$$

The Steady-State Figure

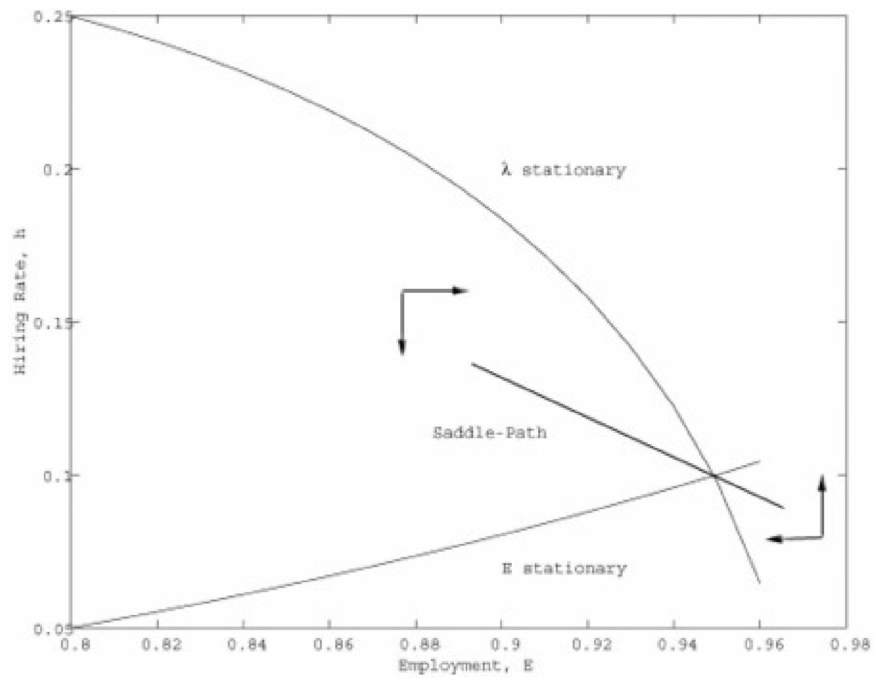


Figure 3: The Steady-State in H-E Space

The Dynamic Analysis

- In order to analyse the system in the vacinity of the steady-state we need to evaluate the Jocobian of the dynamic system (13) and (14).

$$\begin{bmatrix} dE \\ d\lambda \end{bmatrix} = \begin{bmatrix} F_E & F_\lambda \\ G_E & G_\lambda \end{bmatrix} \begin{bmatrix} E \\ \lambda \end{bmatrix} dt \qquad (24)$$

- The eigenvalues of the Jacobian will determine the stability of the system and its size will determine the adjustment speed.

Propositions

- It can be shown that (i) the dynamic path is saddle-path stable and (ii) that the stable eigenvalue after much algebraic manipulation is given by:

$$\mu_1 = \frac{F_E + G_\lambda - \sqrt{(F_E + G_\lambda)^2 - 4\Theta}}{2} \tag{30}$$

Functional Forms

- Using functional forms for the quit rates, the hiring rate and constant coefficient of relative-risk-aversion profit function we get that the negative eigenvalue is given:

$$F_E = \frac{(T')^2(r - E(Eq'' + q'))}{\frac{rT''T'}{\rho} - T'(Eq'T'' + T')} - \beta\bar{q} \qquad (42)$$

- This value gets bigger when as ρ rises and as long as *r< E(q``+Eq`)*. The system adjusts quicker to the steady-state.

- *In fact, we can write down a general condition that for r <* ρ*q the system will revert to the steady-state quicker and* ρ *rises.*

Intuition

- The intuition comes from looking closely at the negative eigenvalue. Suppose we need to hire more people.
- When risk-aversion 'ρ' is higher the firm values less the loss associated with training new employees. Similarly, with low enough interest rates the wage loss associated with hiring more staff matters less.
- Overall the firm trades-off a fraction of current profits to obtain future smooth profits when it is relatively more risk-averse, i.e., aversion to changes in profits at steady-states is disliked.

Now some pictures: Eigenvalue

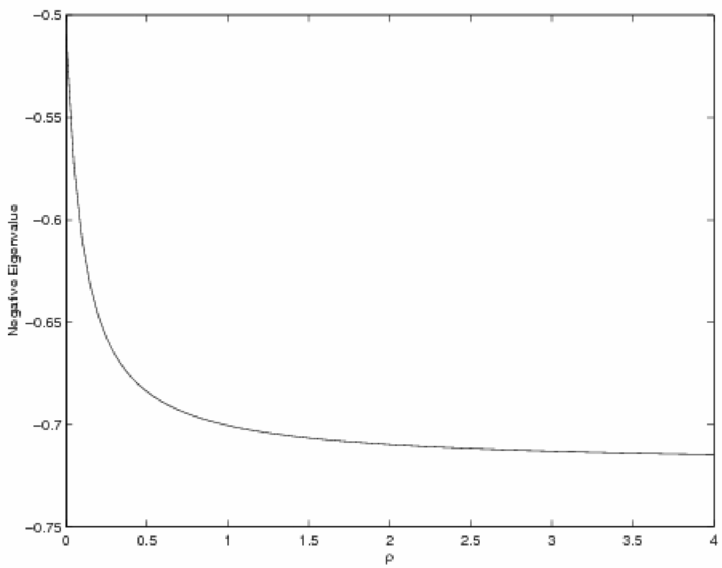


Figure 8: The Negative Eigenvalue As ρ changes

More Pics: Wages and Hiring

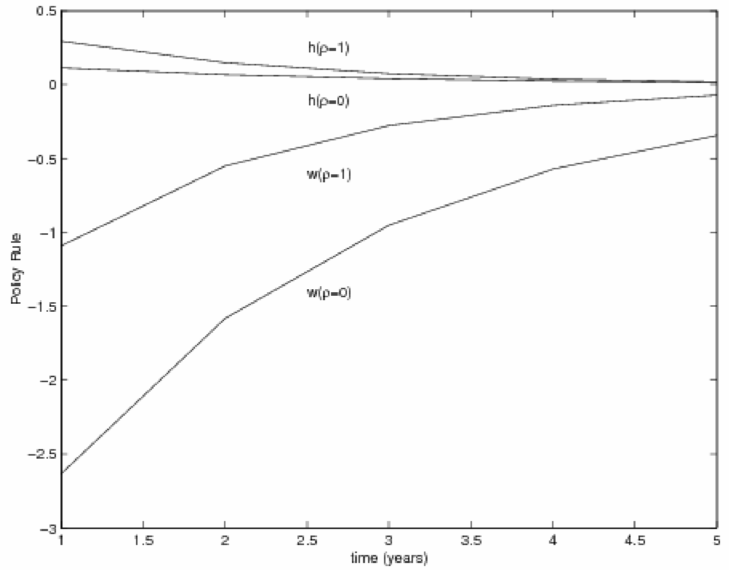


Figure 9: Hiring and Wage Trajectories as ρ changes

Employment Dynamics

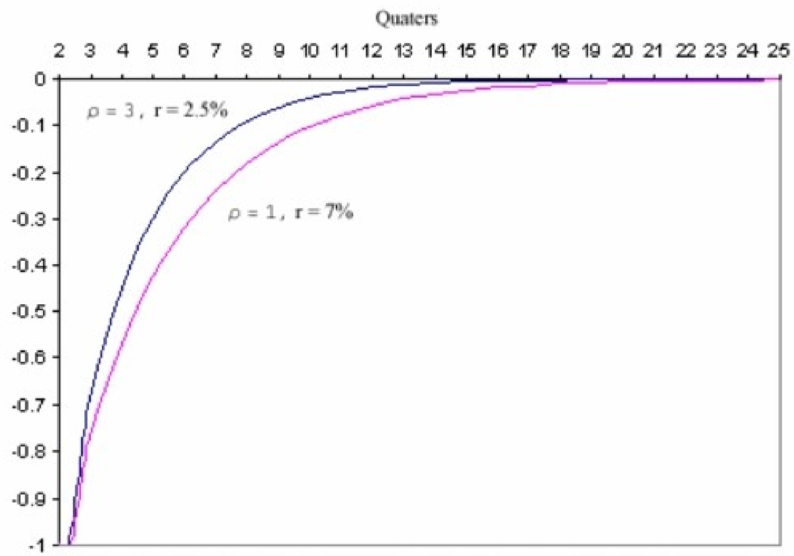


Figure 5: Employment Dynamics for $E(t) < \bar{E}$

Conclusion

- In this paper we revisit the firm risk-neutrality assumption and show that it plays an important part of the dynamic analysis.
- Risk-aversion behaviour of firms may change due to corporate culture.
- In sum firms more willingly trade-off costs associated with employment adjustment when discount rate are low (low opportunity cost) and risk-aversion is high.