

FEDEA/IZA Conference: Dual Labor Markets and the Single Contract

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A Real Options Analysis of Dual Labor Markets and the Single Labor Contract

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Motivation

- ▶ We study the firing/hiring decisions of a firm under two labor regulations:
 - ▶ Single Contract
 - ▶ Dual Labor
- ▶ Focus on the different incentives provided. Especially the option value
- ▶ The decision to fire is like the decision to exercise an American option

Summary of Results

- ▶ The Single Contract increases rate of conversion of temporary contracts into permanent (except in bad economic times)
- ▶ It reduces volatility of employment to economic shocks and for low enough initial costs, it creates more jobs
- ▶ However, it transfers incentive to fire to fresh hires. Especially with large economic uncertainty

Model

- ▶ Partial equilibrium model of labor demand of a firm
- ▶ The firm can employ a worker or stay idle
- ▶ If it employs a worker: exogenous profits net of wages

$$y_{t+1} = y_t + \mu \Delta + \sigma \varepsilon_{t+1} \sqrt{\Delta}$$

- ▶ Profits can be positive or negative.
- ▶ If it stays idle: zero profits

- ▶ The firm can fire the worker paying firing costs (inability to fire: infinite cost).
- ▶ The firm can hire a worker paying a constant hiring cost.
- ▶ Hence firm's profits are

$$\pi_t = y_t I_t \quad I_t = \begin{cases} 1 & \text{if } \text{employs} \\ 0 & \text{if } \text{does not employ} \end{cases}$$

- ▶ Two firing costs structures:

Dual Labor

$$q(\tau_t) = q^D(\tau_t) = \begin{cases} \bar{q} & \text{if } \tau_t \geq \bar{T} \\ \underline{q} & \text{if } \tau_t < \bar{T} \end{cases}$$

$$\text{with } \bar{q} > \underline{q} > 0$$

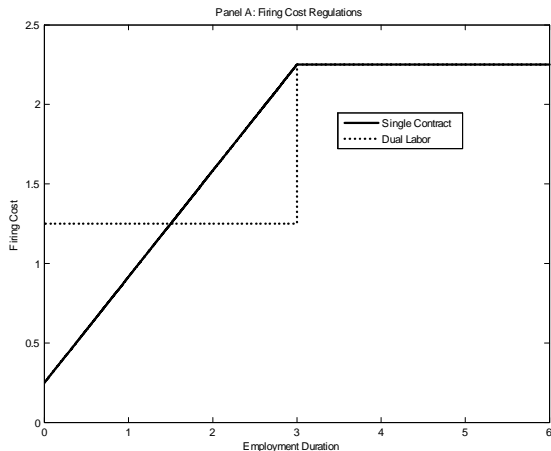
Single Contract

$$q(\tau_t) = \begin{cases} q^U(\tau_t) = q_0 + \mu_q \tau_t & \text{if } \tau_t \leq T_u \\ \bar{q}^U = q_0 + \mu_q T_u & \text{if } \tau_t > T_u \end{cases}$$

$$\mu_q > 0, q_0 > 0$$

- ▶ τ_t denotes employment duration at time t .

Graphically



Assumption: same permanent costs and average cost in the temporary phase:

$$\bar{q} = \bar{q}^U \text{ and } \underline{q} = \frac{1}{T} \int_0^T q^U(\tau_t) d\tau$$

Firm's problem

- ▶ The firm maximizes its value by timing the firing and hiring decisions.
- ▶ It maximizes expected discounted profits, net of discounted costs for laying-off and hiring:

$$V(I_t, y, \tau_t) = \max_{\{I_t\}_{t=1}^{\infty}} E \left[\sum_{t=1}^{\infty} e^{-rt} \pi_t dt \right] - \sum_{t=1}^{\infty} E \left[e^{-rt} I_{t-1} (1 - I_t) q(\tau_t) + (1 - I_{t-1}) I_t c \right]$$

s.t. dynamics of π_t , y_t and

$$q(\tau_t) = \begin{cases} \text{as in "single labor contract"} \\ \text{or as in "dual labor market"} \end{cases}$$

$I_t, t = 1, 2, \dots$ employment status at each period.

Bellman equations

Active (employing) firm value:

$$\begin{aligned} V(1, y, \tau) = & \max_I (1 - I) (y - q(\tau) + e^{-r\Delta} \mathbb{E} [V(0, y', 0)]) \\ & + I (y + e^{-r\Delta} \mathbb{E} [V(1, y', \tau + \Delta)]) \end{aligned}$$

Idle (non employing) firm.

$$\begin{aligned} V(0, y, 0) = & \max_I (1 - I) (e^{-r\Delta} \mathbb{E} [V(0, y', 0)]) + \\ & I (e^{-r\Delta} \mathbb{E} [V(1, y', 0)] - c). \end{aligned}$$

y' :next period profit. $q(\tau)$: either Single Contract or Dual Labor firing cost.

Firing and Hiring Boundaries

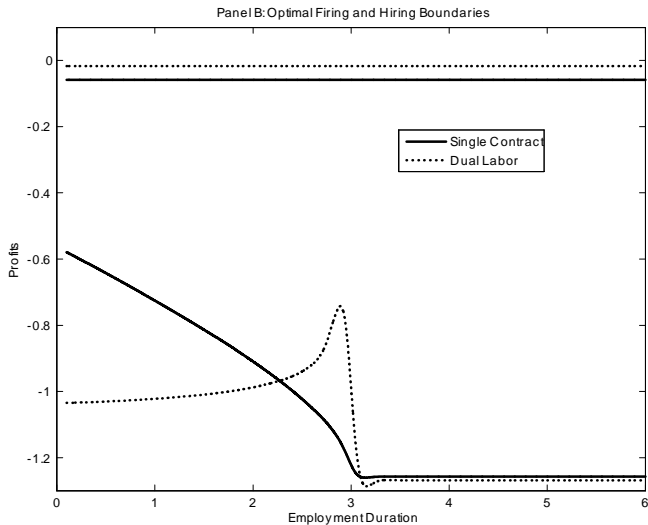
The *firing boundary*: smallest profit for which the firm does not fire:

$$\underline{y}(\tau) := \left\{ \inf y : \begin{array}{l} (y - q(\tau) + e^{-r\Delta} \mathbb{E}[V(0, y', 0)]) < \\ (y + e^{-r\Delta} \mathbb{E}[V(1, y', \tau + \Delta)]) \end{array} \right\}.$$

Hiring boundary: Largest profit for which the idle firm does not hire:

$$\bar{y} := \left\{ \sup y : e^{-r\Delta} \mathbb{E}[V(0, y', 0)] > (e^{-r\Delta} \mathbb{E}[V(1, y', 0)] - c) \right\}.$$

Results



Firing Boundary \uparrow : + Firing

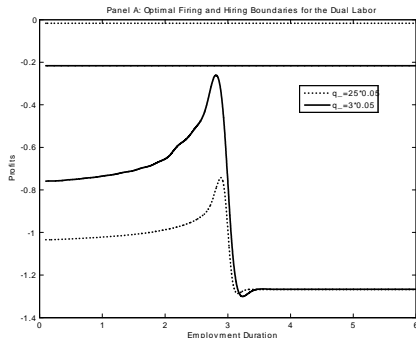
Hiring Boundary \downarrow : + Hiring

Dual Labor

- ▶ Firing boundary increasing in employment duration:
 - ▶ Higher incentive to fire as worker reaches end of temporary phase T
 - ▶ "Keep alive" the option to fire at low cost
 - ▶ Close to expiration, this pushes for renewal of the cheap option: incentive to substitute with younger worker
- ▶ In model with no option, firing boundary is flat

Dual Labor (cont.)

- ▶ Slope depends on time until T and cost gap $\bar{q} - \underline{q}$



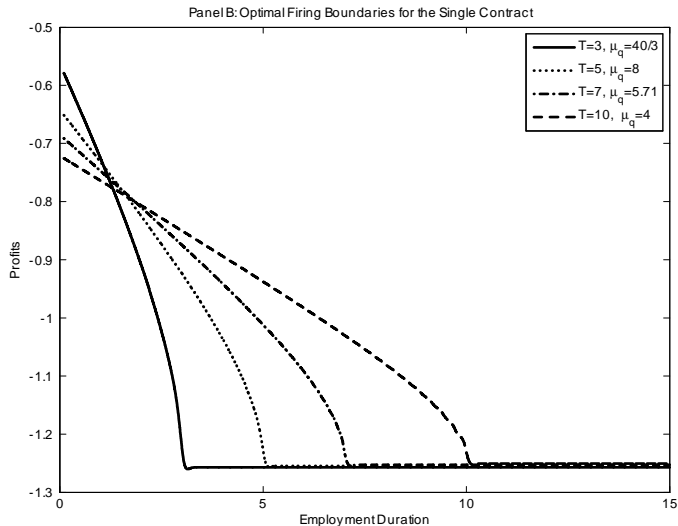
- ▶ Firing and hiring boundary close: fire to hire soon after
- ▶ High gap leads to "churning" effect: replace with a new worker

Single Contract

- ▶ Firing boundary decreasing in employment duration:
 - ▶ Option to fire is depreciating because of higher future costs:
 - ▶ Incentive to anticipate firing before it becomes more expensive (cost increase at rate μ_q)
 - ▶ This incentive is maximal at the beginning when future cost appreciation is largest

Single Contract (cont.)

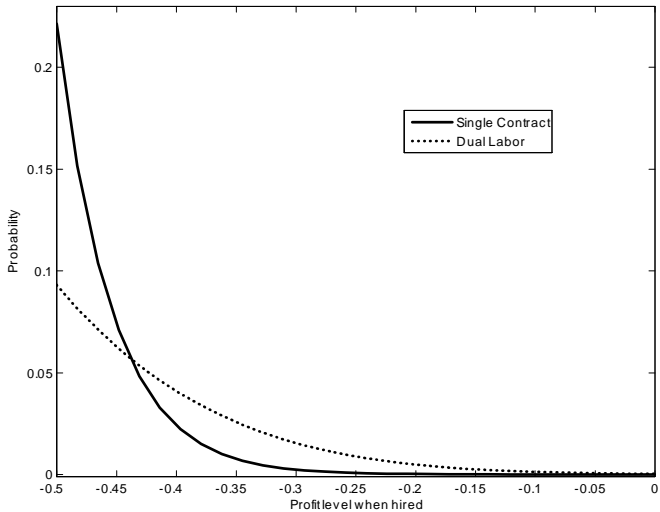
- ▶ Higher anticipation effect and faster decay of this effect for large μ_q and small T .



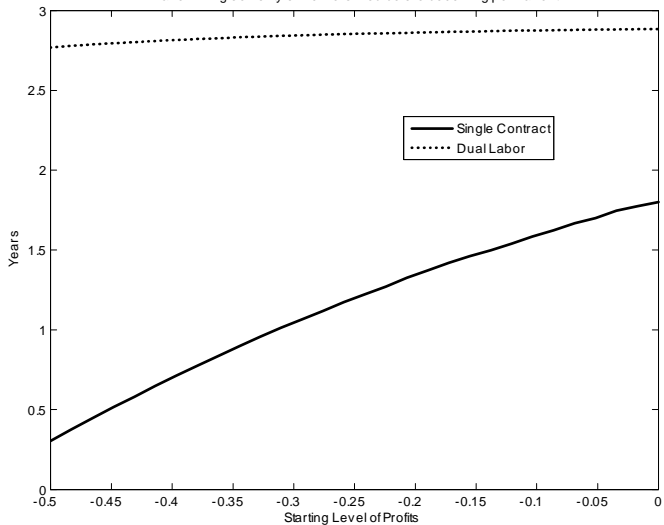
Single Contract vs Dual Contract

- ▶ Single contract "transfers" incentive to fire from the end to beginning of temporary phase.
 - ▶ the extent depends on the rate of cost increase
- ▶ Assuming the same average costs at the end of temporary phase:
 - ▶ Temporary workers fired less likely under the Single Contract except for bad economic times
 - ▶ Workers fired under the Single Contract are fired sooner

Panel C: Probability temporary worker fired before becoming permanent



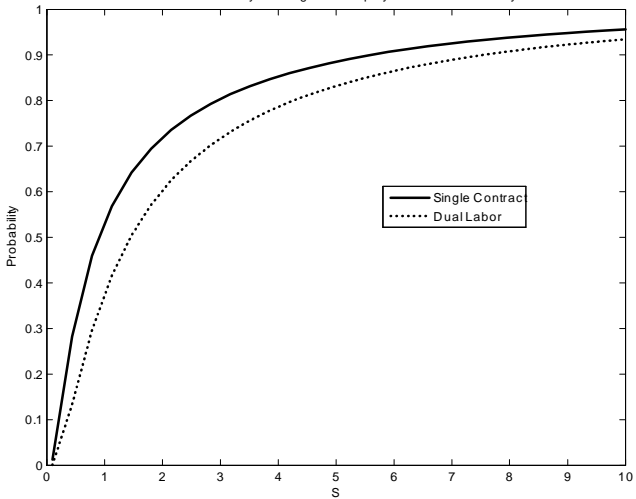
Panel A: Avg seniority of workers fired before becoming permanent



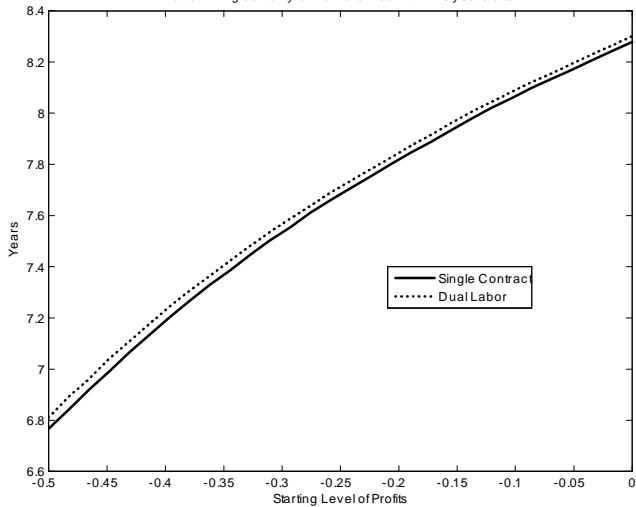
Single Contract vs Dual Contract (cont.)

- ▶ Assuming the same average costs at the end temporary phase:
 - ▶ The Single Contract generates more incentive to hire,
 - ▶ and longer employment durations
 - ▶ However at the expense of higher turnover among permanent workers
 - ▶ Because before T average firing costs are smaller for the Single Contract.

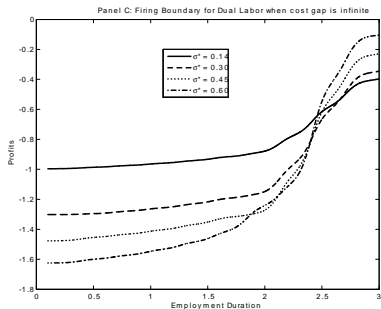
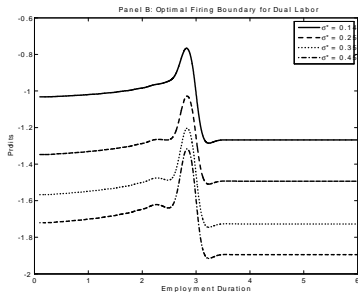
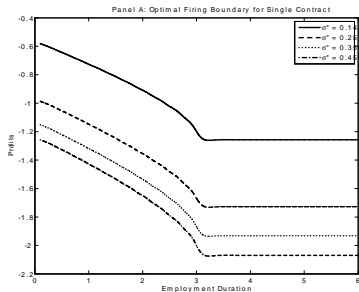
Panel A: Probability of hiring an unemployed worker before S years



Panel B: Avg seniority of workers fired within 10 years after T



Which contract is more sensitive to economic volatility?



Which contract is more sensitive to economic volatility?

- ▶ Same incentive in the Single Contract at the beginning of contract with extreme cost increase, or inability to fire in permanent phase.

- ▶ A truly Single Contract, with a unique phase and firing costs increasing permanently at slow pace would be less sensitive to volatility.

CONCLUSION: The Single Labor Contract...

- ▶ increases rate of job conversion from temporary to permanent
Yes except in very bad times
- ▶ provides incentive to human capital accumulation
Yes because more temporary become permanent
- ▶ reduces volatility of employment to economic shocks
Yes
- ▶ does not prevent job creation (low enough initial costs)
Yes, in fact creates more jobs
- ▶ BUT it transfers incentive to fire to fresh hires
- ▶ AND it is bad for fresh hires with large economic uncertainty

