

Asymmetric Learning Model of Resume Building With Wage Rigidity and Costly Firings

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Introduction

Current Asymmetric Learning Models

- ▶ Asymmetric Learning seems to match intuition for labor market
- ▶ Current models' set up seems odd
- ▶ Schönberg (2007)
 - ▶ Employer learns workers true ability
 - ▶ Outside firms receive noisy signal about each specific workers ability

Model Environment

My Model

- ▶ Workers have ability $\theta \in [0, 1]$
 - ▶ Produce θ per period
- ▶ Workers supply labor inelastically
- ▶ Employers receive a good signal g w.p. θ and a bad signal b w.p. $1 - \theta$
- ▶ Employers offer wages each period (no long term contracts).
- ▶ Outside firms see length of employment (resume)
 - ▶ i.e. receive a signal e or f
- ▶ There are many identical firms
 - ▶ Zero profit condition
- ▶ Downward wage rigidity
- ▶ Fixed cost to fire employee

Variable Definitions

Variable	Meaning
θ	Ability
g	Good Signal
b	Bad Signal
e	Employed Signal
f	Fired Signal
F_C	Fixed Cost to Firing
w_1	Period 1 Wage
w_g	Wage After Good Signal
w_b	Wage After Bad Signal
w_f	Wage for Fired Worker
π	Profits

Time Line

- ▶ period 1 wage offers
- ▶ Workers produce output
- ▶ Workers send signal of ability
- ▶ Employers decide who to fire
- ▶ Employers offer period 2 wages conditional on signals
- ▶ Outside Firms offer wages conditional on resume
- ▶ Workers take the best offer and work for one more period
- ▶ Workers retire

Outline

- ▶ Start simple and build up model
- ▶ First consider two period model with flexible wages
- ▶ Second, add in wage rigidity, but with high fixed costs to firing
- ▶ Finally, solve the complete model with wage rigidity and moderate firing costs

Two Period Flexible Wage Model

Optimal Second Period Wage Offers

- ▶ With flexible wages there is no reason to fire workers
- ▶ Outside firms will not offer more than expected output given 1 year of employment $E[\theta|e] = p(g)E[\theta|g] + p(b)E[\theta|b] = E[\theta]$
 - ▶ Employers can pay their good signal employees $w_g = E[\theta]$
- ▶ An outside offer below w_g would only attract bad signal employees
 - ▶ Employer can offer $w_b = E[\theta|b]$
- ▶ In equilibrium workers stay where they are

Two Period Flexible Wage Model

Optimal First Period Wage Offers

- ▶ Zero profit condition means that first period wages should give expected profit of zero
- ▶ In other words, pay period 1 worker their expected profits

$$w_1 = E[\theta] + p(g)(E[\theta|g] - w_g) + p(b)(E[\theta|b] - w_b)$$

or

$$w_1 = E[\theta] + p(g)(E[\theta|g] - E[\theta])$$

Two Period Flexible Wage Model

Result

- ▶ $w_1 > w_g > w_b$
- ▶ Employers pay a premium for period 1 workers so that they can earn a profit with inside knowledge in period 2.
- ▶ This does not seem to reflect reality

Two Period Sticky Wage, High Firing Cost

- ▶ Next introduce wage rigidity
- ▶ For now, assume the fixed cost of firing is so high it is never optimal to fire

Two Period Sticky Wage, High Firing Cost

Lemma 1

Lemma 1: With sticky wages $w_1 \in (E[\theta|b], E[\theta|g])$

Proof: If $w_1 \geq E[\theta|g]$ employers will make negative profits. If $w_1 \leq E[\theta|b]$ employers make positive profits.

Corollary $w_b = w_1$ because w_b will be "stuck"

Two Period Sticky Wage, High Firing Cost

Equilibrium wages

- ▶ Given Lemma 1, $w_b = w_1$
- ▶ By the same logic as in the flexible model we get $w_g = E[\theta|e] = E[\theta]$
- ▶ The period one wage to give zero profits is $w_1 = E[\theta] + p(g)(E[\theta|g] - E[\theta]) + p(b)(E[\theta|b] - w_1)$
- ▶ Solving this gives $w_1 = E[\theta]$
- ▶ $w_1 = w_g = w_b = E[\theta]$

Two Period Sticky Wages

Not firing is not an equilibrium

- ▶ Let the fixed cost $F_C < E[\theta] - E[\theta|b]$
- ▶ NOT firing workers is NOT an equilibrium.
- ▶ If a firm unilaterally deviates and fires workers after a bad signal they receive positive profits

$$\pi = p(g)(E[\theta|g] - E[\theta]) - p(b)F_C$$

$$> p(g)(E[\theta|g] - E[\theta]) + p(b)(E[\theta|b] - E[\theta]) = 0$$

- ▶ Given this, all firms have an incentive to deviate and fire bad signal employees

Two Period Sticky Wages

When is firing bad workers an equilibrium

- ▶ If all firms are firing, I could try to unilaterally deviate and keep bad signal employees
- ▶ Need to pay them at least w_1
- ▶ Bad signal workers accept w_1 since leaving to another firm would expose them as bad signal worker
- ▶ Unilaterally keeping low wage workers would change profits by

$$\Delta\pi = p(b)(F_C + E[\theta|b] - w_1)$$

- ▶ If $F_C < w_1 - E[\theta|b]$ firing bad signal employees is an equilibrium outcome

Two Period Sticky Wages

Equilibrium Wages

- ▶ Assume $F_C < w_1 - E[\theta|b]$ so all employers fire low signal workers
- ▶ Since only good signal workers are employed
 $w_g = E[\theta|e] = E[\theta|g]$
- ▶ Need to offer a period one wage to get zero profits

$$w_1 = E[\theta] + p(g)(E[\theta|g] - E[\theta|g]) - p(b)F_C$$

or

$$= E[\theta] - p(b)F_C$$

- ▶ Fired workers are identified as low signal so they get re-hired for $w_f = E[\theta|b]$
- ▶ So we get $w_f < w_1 < E[\theta] < w_g$

Two Period Sticky Wages

Equilibria

- ▶ If $F_C > E[\theta] - E[\theta|b]$
 - ▶ No one is fired
- ▶ If $F_C < E[\theta] - p(b)F_C - E[\theta|b] \implies F_C < \frac{E[\theta] - E[\theta|b]}{1+p(b)}$
 - ▶ Bad signal employees are fired
- ▶ If $F_C \in \left(\frac{E[\theta] - E[\theta|b]}{1+p(b)}, E[\theta] - E[\theta|b] \right)$
 - ▶ I believe there will be a mixed equilibrium where some bad signal workers are fired.
 - ▶ Not proven yet

Numerical Example

- ▶ $\theta \in \{0, \frac{1}{3}, \frac{2}{3}, 1\}$ with equal probability
- ▶ $F_C = 0.1$
- ▶ $E[\theta] = \frac{1}{2}$
- ▶ $E[\theta|g] = \frac{7}{9}$
- ▶ $E[\theta|b] = \frac{2}{9}$
- ▶ Flexible wages
 - ▶ $w_1 = 0.6388$
 - ▶ $w_b = \frac{2}{9}$
 - ▶ $w_g = \frac{1}{2}$
- ▶ Sticky wages
 - ▶ $w_1 = 0.407$
 - ▶ $w_f = \frac{2}{9}$
 - ▶ $w_g = \frac{7}{9}$

What Next

- ▶ Three period version
- ▶ Promotions
- ▶ Initial education signal correlated with ability
- ▶ Exogenous separations
- ▶ An Acemoglu and Pischke type utility shock

Questions and Concerns

- ▶ How to apply model to data?
- ▶ What aspects of labor market should it explain?
- ▶ Are the assumptions reasonable?
- ▶ Is game theory approach useful?