Quasi-Fixed Costs

Econ 3470 Lecture 3

Labor Economics

2015-2016 Term 1

Outline

Background

So far we have assumed that

- Labor is a variable cost of production.
- Labor, as measured by manhours, is homogeneous factor of production. i.e., Firms are indifferent between old and new workers.

Reality

These assumptions are often oversimplifications, because

- There are often costs associated with the employment of labor that is not flexible, i.e. not proportional to the hours worked by each worker.
  - Fixed costs of employment are incurred when the employment of a worker involves costs which are not proportional to his hours of work.
  - Many non-wage costs are cost per worker instead, e.g. hiring and training costs, life and medical insurance.
- Labor input is not homogeneous. An hour of work by different workers may not yield the same product.

Classification of Fixed Costs of Labor

1. Fringe benefits - not proportional to man-hours, and do not depend on how long you hire the worker.

e.g. sick leave, maternity leave, pension, subsidized meals, even nice office and secretaries.

Classification of Fixed Costs of Labor

Employee Benefits as a Percentage of Total Compensation, 2013 (Average Hourly Cost in Parentheses)

Legally required payments	**7.8**	**($2.41)**
Social Security	5.6	($1.74)
Workers' compensation	1.4	($0.42)
[a]Unemployment insurance and other	0.8	($0.25)
Retirement	**4.7**	**($1.47)**
[a]Employment costs based on benefit formulas (defined benefit plans)	2.9	($0.90)
Employer costs proportional to earnings (defined contribution plans)	1.8	($0.57)
[a]**Insurance** (medical, life)	**9.0**	**($2.81)**
[a]**Paid vacations, holidays, sick leave**	**7.0**	**($2.17)**
Other	**2.4**	**($0.73)**
Total	**30.9**	**($9.59)**

[a]Category of costs believed by authors to be largely quasi-fixed (see discussion in the text).

Source: U.S. Labor Department, Bureau of Labor Statistics, "Employer Costs for Employee Compensation—March 2013," Table 1, news release USDL: 13-1140 (June 12, 2013).

Classification of Fixed Costs of Labor

2. Hiring costs - cost in finding the right person. e.g. short list applicants, written test, interview.

3. Training costs - including explicit costs of employing trainers, opportunity costs of trainee's time, as well as reduced productivity during training on the part of both the trainer and the trainee.

aimed at improving the productivity of the workers.

classified as general training and firm-specific training.

Classification of Fixed Costs of Labor

Activity	Average Hours
Hours of formal instruction by training personnel	19
Hours spent by management in orientation, informal training, extra supervision	59
Hours spent by coworkers in informal training	34
Hours spent by new worker watching others do work	41
Total	153

Source: John Bishop, "The Incidence of and Payoff to Employer Training," Cornell University Center for Advanced Human Resource Studies Working Paper 94–17, July 1994, 11.

Classification of Fixed Costs of Labor

Existence of these fixed costs of labor

- cannot treat labor input as a total flexible factor
- wage payment is indeed largely variable and depends on the number of manhours worked, but the fixed costs of labor is not
- labor is a **quasi-fixed** factor, defined as a factor whose total employment cost is partially variable and partially fixed

Classification of Fixed Costs of Labor

- With no fixed costs of employment
  - DPV of the stream of wages = DPV of the stream of marginal product
  - If labor market is perfectly competitive, no worker will accept a wage below his marginal product in each period.
- With fixed costs of employment
  - present value of marginal product $>$ present value of wage payment
  - the fixed costs incurred at the beginning of tenure must somehow be recouped by reducing wage below marginal product.

Employment Decision

Employment decision depends on

- current demand conditions
- firm's expectation of future productivity of the worker and product demand

For existing workers, fixed costs is sunk $\Rightarrow$ irrelevant in the SR marginal condition.

In deciding whether to keep a worker

- the firm compares the expected VMP_L to wage payments in the future
- will not fire the worker as long as the former exceeds the latter

Employment Decision

These fixed costs act as a buffer between the wage and VMP_L that protects the employment level from small changes in demand conditions.

- $\uparrow$ fixed costs $\Rightarrow\uparrow$ buffer
- Workers with low fixed costs are less protected from layoff. In the extreme, when fixed costs are zero, the firm will layoff the workers as soon as the demand conditions declines.
- If a firm is composed of different level of skills, who loses job first?
- Occupations with more specific training have more stable employment.

Implications on Hiring and Over-time Decisions

Employment vs. Hours tradeoff

- hire an additional worker?
- make existing worker work extra hours?

Compare non-wage labor costs with overtime wage premium.

Implications on Hiring and Over-time Decisions

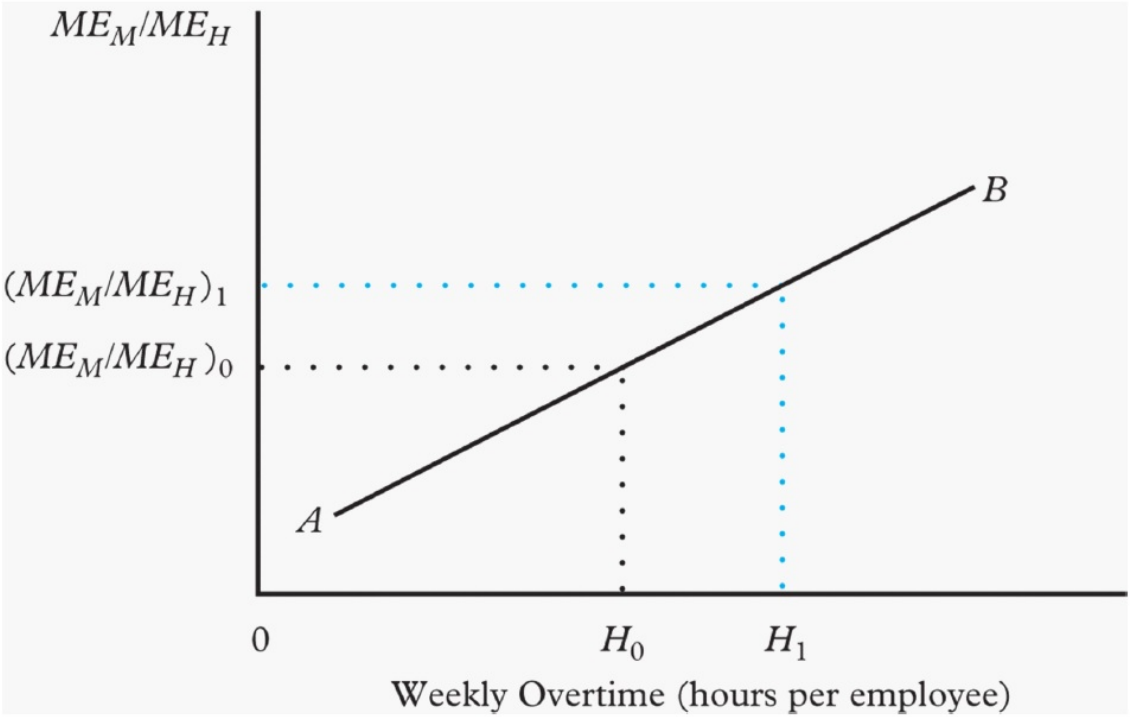
Max profit when

$$\frac{ME_M}{MP_M} = \frac{ME_H}{MP_H}$$

where M is number of workers and H is hours work in average.

- ME is the marginal expense
- MP_M is added output associated with added worker holding capital and average hours per worker constant.
- MP_H is added output generated by increasing average hours per worker, holding capital and number of employees constant.

Implications on Hiring and Over-time Decisions



If $ME_M \uparrow$ relative to $ME_H \Rightarrow$ firm substitute hours for workers by hiring fewer employees but work more hours.
If $ME_H \uparrow$ relative to $ME_M \Rightarrow$ firm increase ratio of workers to average hours per worker.

Other Implications

Why are firms less likely to employ women or older workers in some skilled or career tracked positions?

On average, women have lower job attachment than men, while older workers have fewer years left in their career.
In both cases, the horizon for recouping the returns to any specific investment will be shorter, so that the per period cost involved in hiring these workers is relatively high.

Labor as Quasi-fixed Factor Model

Assumptions:

- H: hiring cost, K: training cost
- M_t: marginal product of untrained worker
- dM_t: effect of training, increment to marginal value product. $dM_t = g(K), g' > 0, g(0) = 0$.
- $T + 1$ period tenure

Labor as Quasi-fixed Factor Model

Total discounted cost of hiring an additional worker over T periods is

$$C = H + K + \sum_{t=0}^{T} \frac{W_t}{(1+r)^t}$$

Total discounted benefit of hiring an additional worker over T periods is

$$Y = \sum_{t=0}^{T} \frac{P_t(M_t + dM_t)}{(1+r)^t}$$

Labor as Quasi-fixed Factor Model

Firm's objective is to maximize profit such that

$$C = Y$$

$$H + K + \sum_{t=0}^{T} \frac{W_t}{(1+r)^t} = \sum_{t=0}^{T} \frac{P_t(M_t + dM_t)}{(1+r)^t}$$

$$H + K = \sum_{t=0}^{T} \frac{P_t(M_t + dM_t(K)) - W_t}{(1+r)^t}$$

Labor as Quasi-fixed Factor Model

If $H + K = 0, dM_t = 0$

$$0 = \sum_{t=0}^{T} \frac{P_t M_t - W_t}{(1+r)^t}$$

i.e.

$$\sum_{t=0}^{T} \frac{P_t M_t}{(1+r)^t} = \sum_{t=0}^{T} \frac{W_t}{(1+r)^t}$$

given perfect competition $W_t = P_t M_t$.

Labor as Quasi-fixed Factor Model

$$H + K = [P(M + dM) - W] \sum_{t=0}^{T} \frac{1}{(1+r)^t}$$

$$P(M + dM) = W^* + \frac{H + K}{\sum_{t=0}^{T} \frac{1}{(1+r)^t}}$$

- $VMP_L = P(M + dM)$
- W^*: variable costs
- $\frac{H+K}{\sum_{t=0}^{T} \frac{1}{(1+r)^t}}$: fixed costs during each period
  - The fixed cost is also called the **periodic rent** for human capital (R).
  - surplus earned by each worker in order to write off the initial fixed employment cost.

Labor as Quasi-fixed Factor Model

measure of fixity: f

$$f = \frac{R}{W + R}$$

where $W + R$ is the total employment cost

- if $f = 0$, completely variable
- if $f = 1$, completely fixed

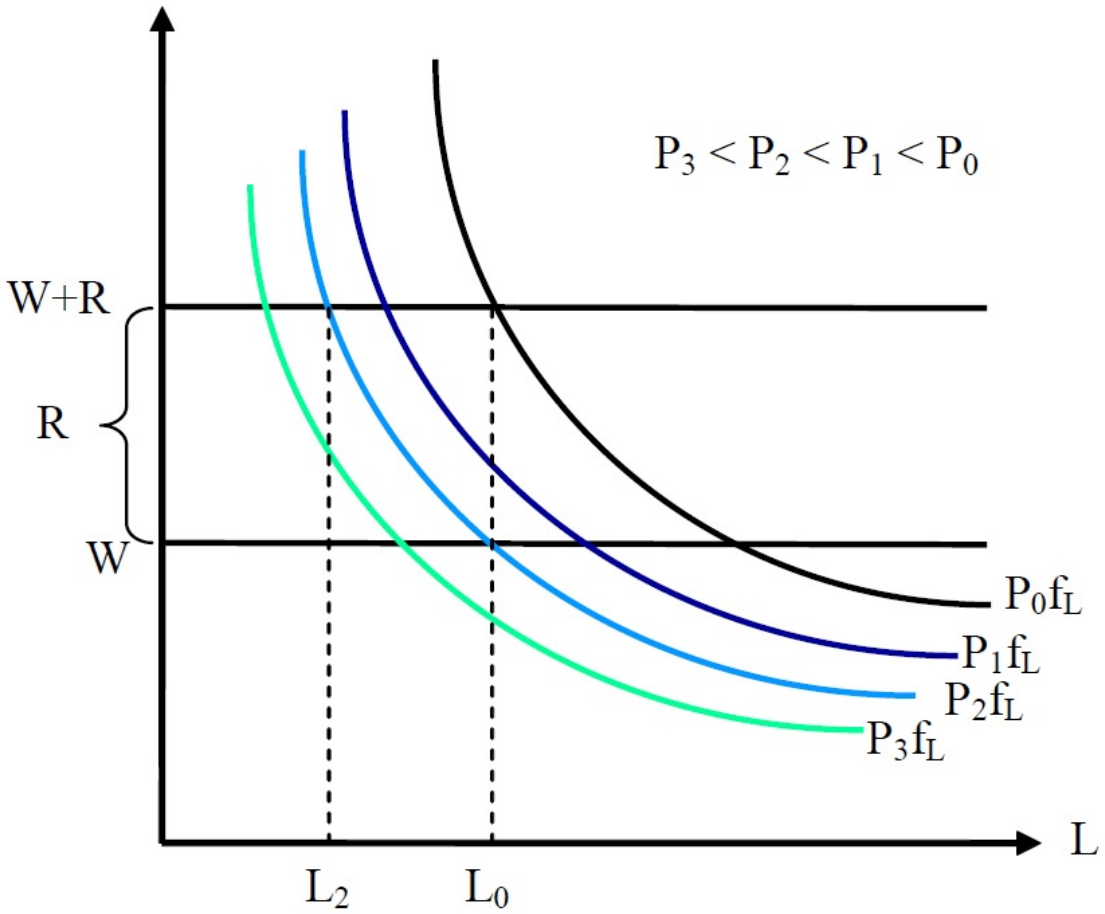
Labor as Quasi-fixed Factor Model

$$P(M + dM) = W^* + R$$

when there is a decrease in product demand

- $\downarrow P$
- shift VMP_L left

Labor as Quasi-fixed Factor Model



Labor as Quasi-fixed Factor Model

- When demand for output decrease a bit (from P_0 to P_1), labor demand shift inwards but the firm will not layoff workers and still hire L_0 workers, since $P_1 f_L > W$.
- When price decrease further to $P_2(P_2 f_L = W)$, the firm starts to layoff workers.
- Only with big shift in demand will employment level be changed $\Rightarrow$ employment level have certain stability.

Labor as Quasi-fixed Factor Model

Amount of money invested per new employee

Costs	Common Labor	Two-Year Progressive Student	Four-Year Apprentice
Hiring costs:			
Recruiting	$ 4.33	$ 86.38	.....
Hiring	13.23	29.08	$ 28.89
Orientation	1.56	1.56	1.56
Terminating	3.77	3.77	3.77
Laying off	1.21	1.21	1.21
Recalling	1.30	1.30	1.30
Total	25.40	123.30	36.73
Training costs:			
Training	9.08	11,850.00	18,503.00
Tools and materials	.....	.....	164.76
Unfilled requisitions	14.92	.....	.....
Intrawork transfers	3.50	.....	.....
Total	27.50	11,850.00	18,667.76
Unemployment compensation	73.52	73.52	73.52
Total fixed employment cost	126.42	12,046.82	18,778.01

Source: International Harvester Company, *op. cit.*

Unskilled labor R small $\Rightarrow$ employment more unstable

Labor as Quasi-fixed Factor Model

$$R = \frac{H + K}{\sum_{t=0}^{T} \frac{1}{(1+r)^t}}$$

For female or older workers, $T \downarrow \Rightarrow \uparrow R \Rightarrow$ employment stable

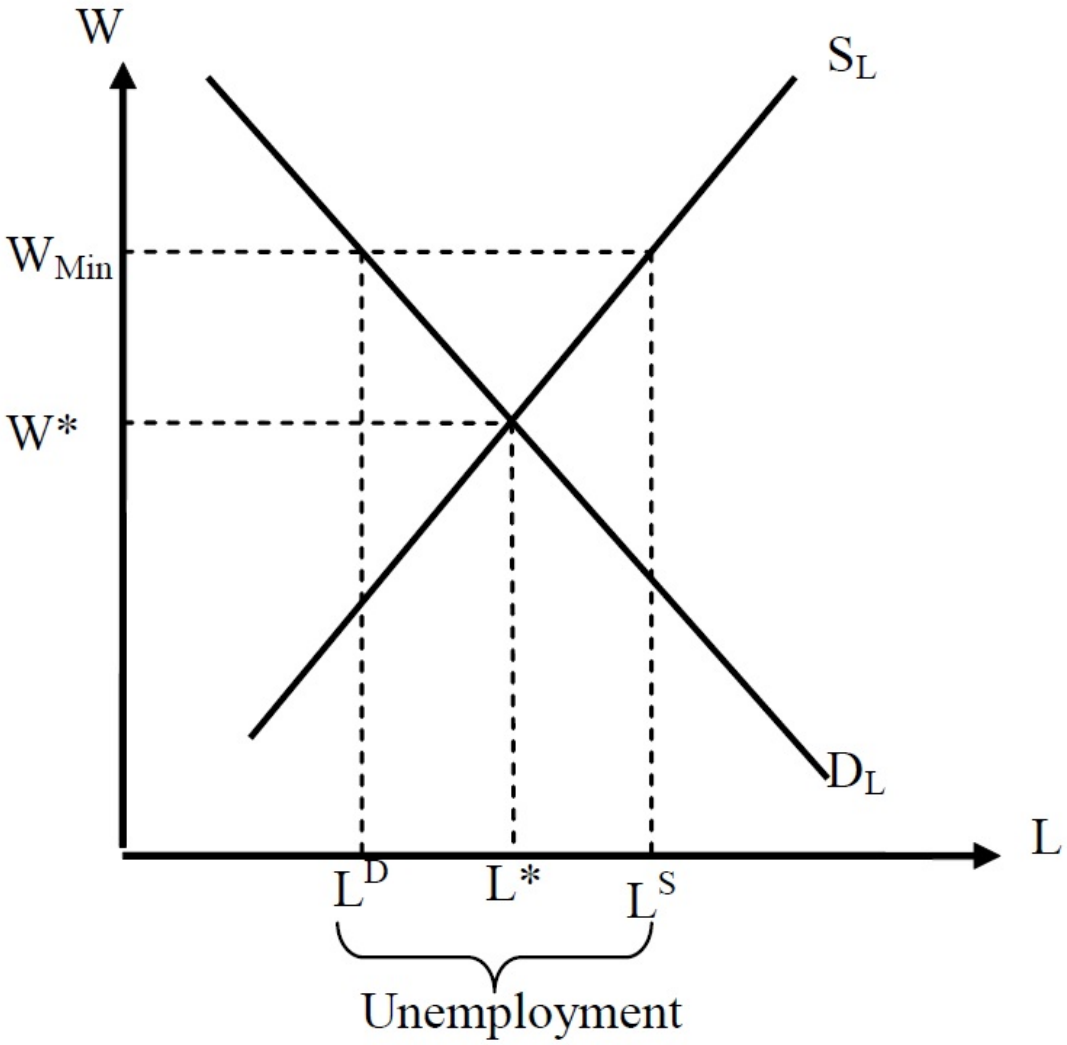
Minimum Wage Law

- What is it?
- When is it good? When is it bad?
- Side-effects?

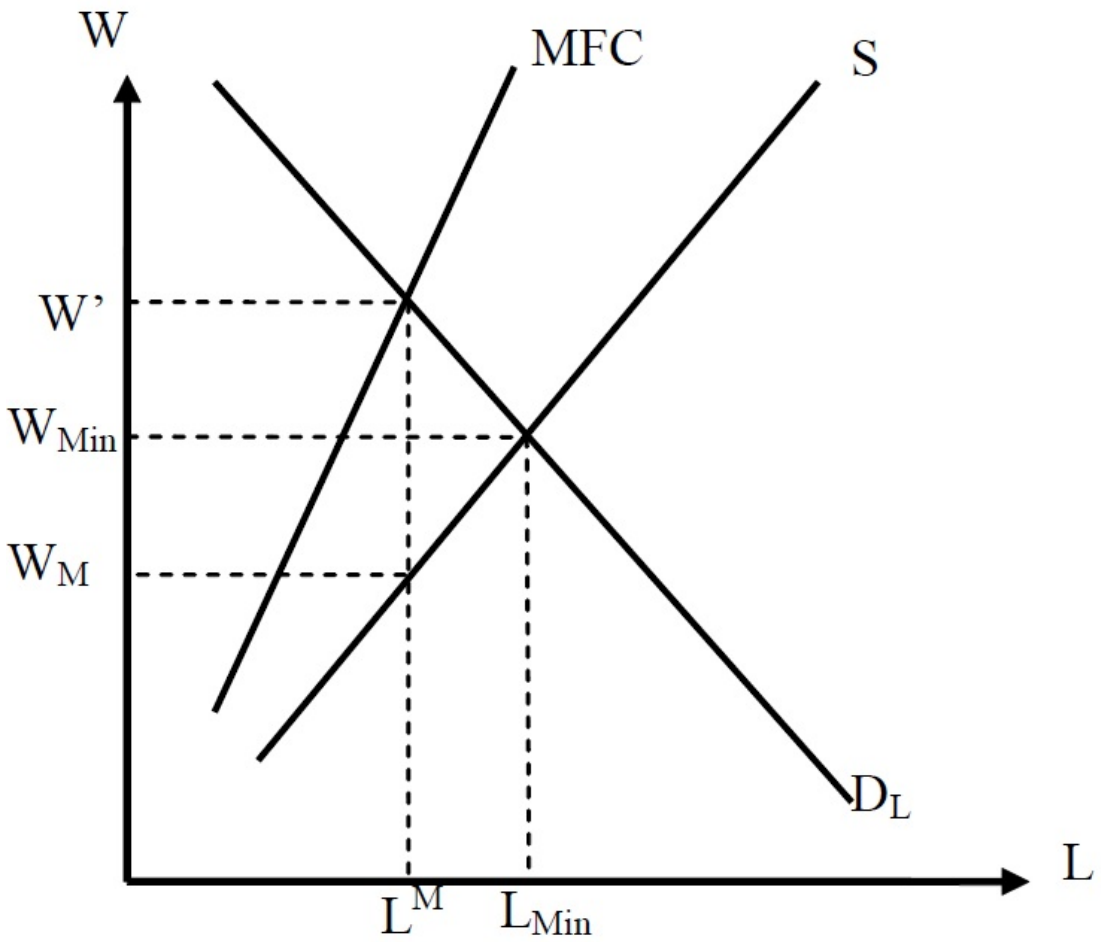
Minimum Wage Law

- Hong Kong: With effect from 1 May 2015, the minimum wage rate is raised from $30 HKD per hour to $32.5 HKD per hour.
- Shenzhen: $18.5 RMB per hour, $2030 RMB per month.
- Los Angeles: The nations second-largest city voted on May 19, 2015 to increase its minimum wage from $9 USD an hour to $15 USD an hour by 2020.

Minimum Wage Law



Minimum Wage Law



Minimum Wage Law

Pay wage above competitive wage $\rightarrow$ increase unemployment?

Efficiency Wage Model

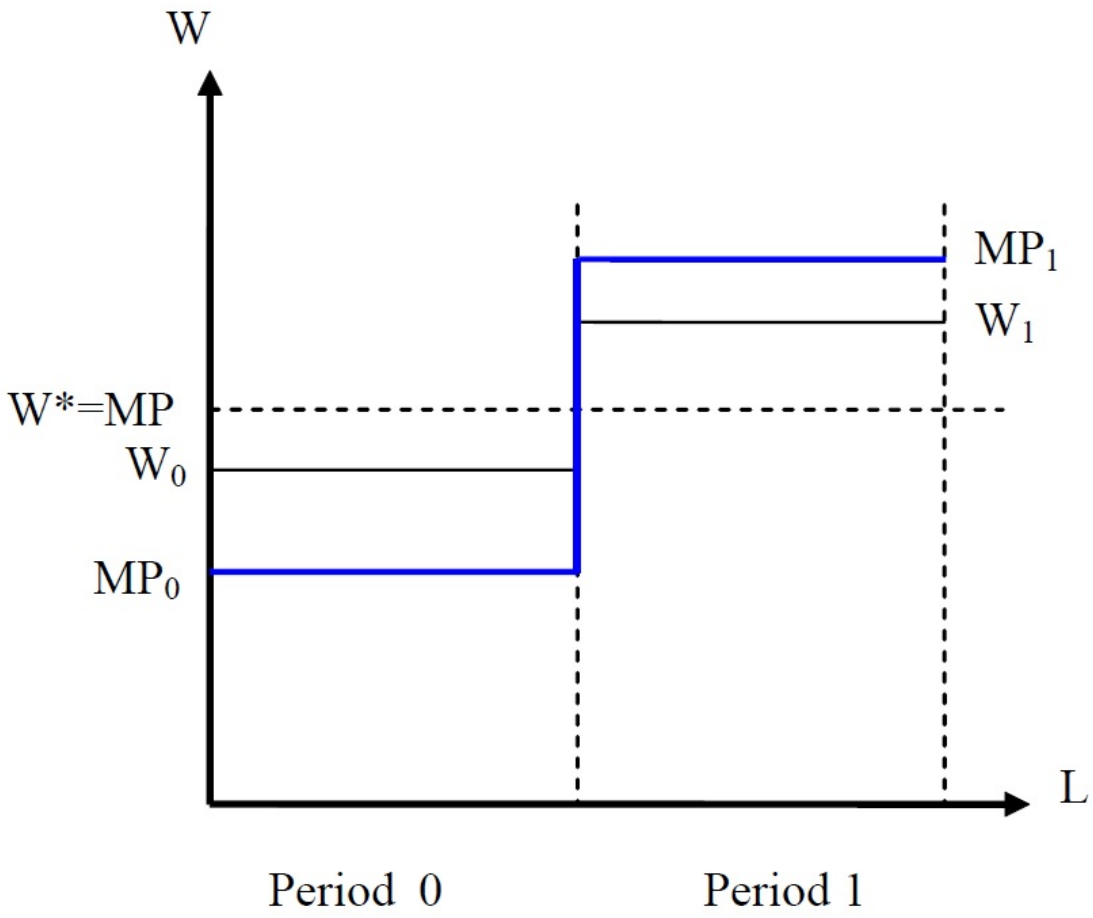
- better motivated worker, avoid shirking
- less labor force turnover
- selection

Training

- General training - training which increases a worker's productivity in all firms.
- Specific training - training which increases a worker's productivity to the particular firm where the training was acquired without affecting his productivity in alternative employments.

Who should pay for it?

Training



Training

If no training

- MP in period 0 and period 1 $\Rightarrow$ pay W^* in both periods

If training

- General: MP_0 in period 0, MP_1 in period 1 $\Rightarrow$ pay MP_0 and MP_1
- Specific: productivity MP_0 and MP_1 but pay W^* in both periods
- In reality there are both general and specific training: pay wage W_0 and W_1 instead

Reference

- Ehrenberg and Smith (2015) *Modern Labor Economics: Theory and Public Policy, Chapter 1 and 2*
- Qi, Walter Y. (1962) *Labor as Quasi-Fixed Factor, Journal of Political Economy, Vol. 70, No. 6, pp. 538-555.*