Introduction to Economics 136 and Chapter 1 of Lazear + Gibbs, Personnel Economics in Practice or older version (Lazear, Personnel Economics for Managers Chapters 1 and 2)

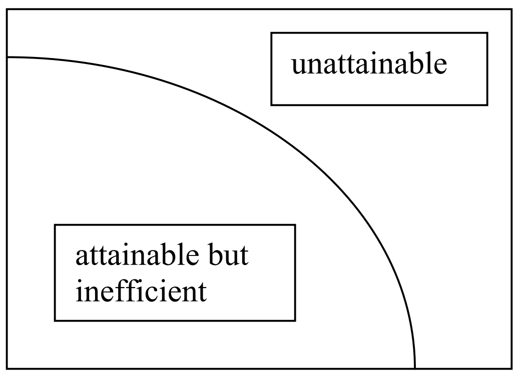
Overview of Economics 136

What this course is about: how should managers hire, set wages and incentives?

Like most of economics, personnel economics at its heart deals with tradeoffs.

You're all familiar with production possibilities frontiers:

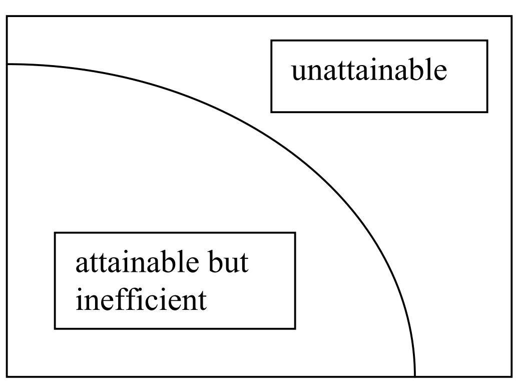
GUNS



BUTTER

A firm must make similar tradeoffs between profits (π) and worker satisfaction (WS):

PROFITS (π)

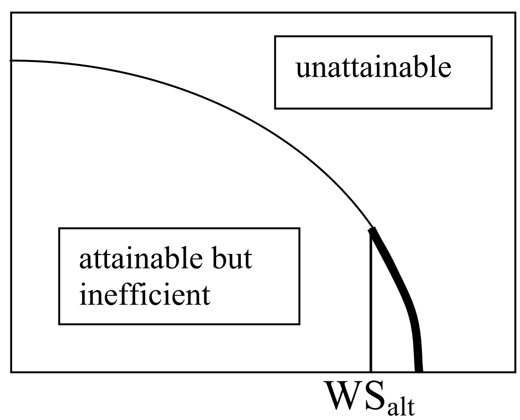


Worker Satisfaction (WS)

Come July, many of you will be working and concerned about the x-axis; in a few years many of you will be thinking more about the y-axis.

Managers should maximize profits, but they have to also consider worker satisfaction. Why? If workers have better alternative, may quit!
If workers could obtain WS_{alt} at alternative employment, then the employer can operate only to the right of this point:

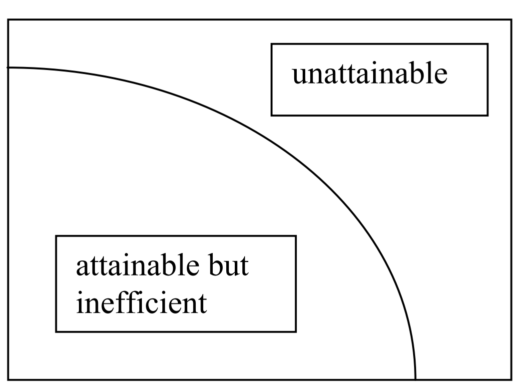
PROFITS
(π)



Worker Satisfaction (WS)

If all firms efficient, then management is simply a tug of war between interests of firm and worker.
In reality, many firms are probably not on the ppf at all. Rather they are at inefficient points below the ppf (such as point A).

π



WS

From point A, could increase π leaving WS constant. Or, could make workers much happier by moving right. Third, could make both firm and workers better off by moving to northeast.

ONE OF PRIME GOALS OF PERSONNEL ECONOMICS IS TO FIND POLICY CHANGES RELATED TO WORKERS THAT LEAD TO MORE PRODUCTIVE FIRM. IN PRINCIPLE, THESE CHANGES CAN MAKE BOTH THE FIRM'S OWNERS AND WORKERS BETTER OFF.

SPECIFIC EXAMPLES:
1) MIX OF WORKERS TO HIRE (CH. 1)
2) SETTING PAY AND HIRING PROCEDURES TO GET BEST PEOPLE (CH. 2)
3) SETTING PROPER INCENTIVES FOR WORKERS (CHS. 4, 8, 10-12)

Chapter 1 – Setting Hiring Standards

Note: You are responsible for the appendix to Chapter 1.
Who to hire? High skill, low skill?
A: It depends on tradeoffs between marginal costs and benefits of each type of worker.
Example from 1998 text (similar example in Table 1.2 in new text):

Type of worker	Average annual sales	Real hourly wage 1978	Real hourly wage 1990
High school grad	1.475 million	7.05	6.82
College grad	1.8333 million	9.49	10.25
RATIOS	1.24	1.35	1.50

In either year, which type of worker should be hired?
A: Hire high school grads. Reason: college grads 24% more productive but cost 35-50% more.

GENERAL RULE: HIRE WORKERS WITH LOWEST RATIO OF COST TO OUTPUT:
EX. IN 1990 RATIO OF COST/OUTPUT BETWEEN SKILLED/UNSKILLED IS

so high school grads give more bang for buck. Hire them.

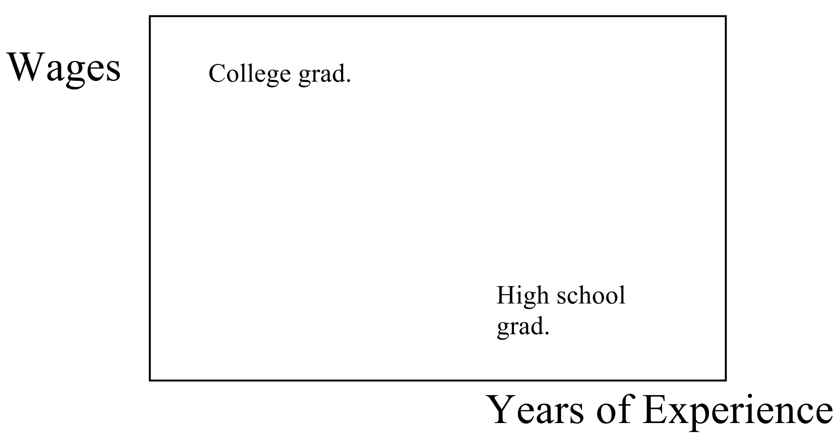
LESSONS:
Firms should not automatically hire the most skilled workers. Conversely, low-wage labor can sometimes be quite expensive.
Don't look at wages but at ratios of wages to output.
EXAMPLES

-- MAQUILADORAS: Factories south of the border. They employ Mexicans who typically earn lower wages than Americans but who also produce less than American workers. They are lower cost/output workers.

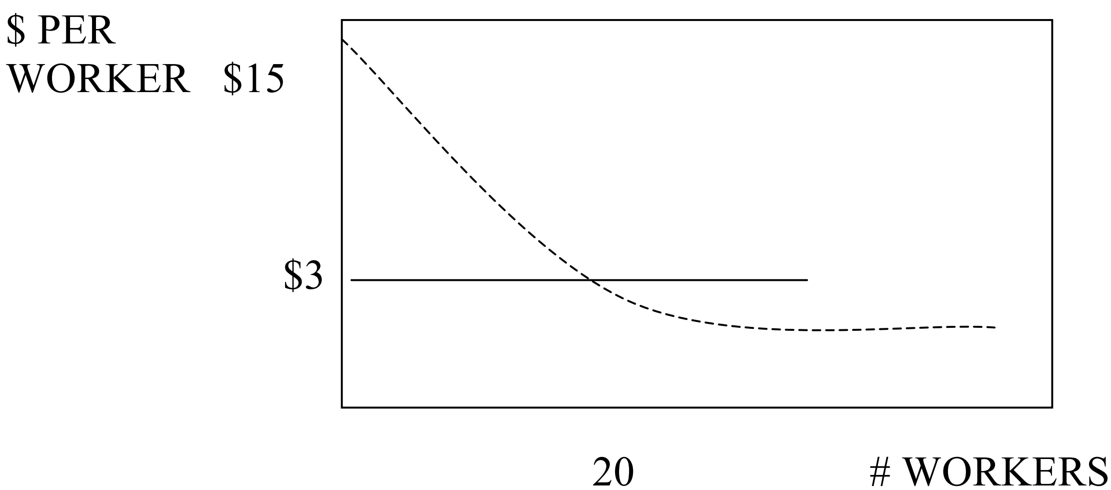
Counterexample: See Table 1.3: American workers appear to be lower cost per $ of GDP than South African workers even though Americans' annual salary in manufacturing is almost 5 times as high as South Africans'. Lessons: Jobs don't automatically go to lower wage countries: it depends on the ratio of production costs per $ of GDP.

-- Days Inn page 12: managers realized that could hire retired workers to make reservations for only bit more than young workers, and the greater prod'y of retired workers more than compensated.

Q: What if firm is losing money? Does this matter?
A: No, same rule. Compare ratios of cost to output.
Q: How to measure workers' productivity before hire them?
A: Education and years of experience the two most important measures of productivity. Typically can explain about 20% of variation in wages:



Q: HOW MANY WORKERS TO HIRE?
A: KEEP HIRING UNTIL ADDITIONAL PROFIT JUST EQUALS WAGE PAID. THAT IS, HIRE MORE UNTILVALUE MARGINAL PRODUCT = MARGINAL COST or VMP=MC. (Value marginal product = price of good*MP of labor).



NOTE: $12 PROFIT FOR FIRST WORKER. Keep hiring more until get to 20th worker.

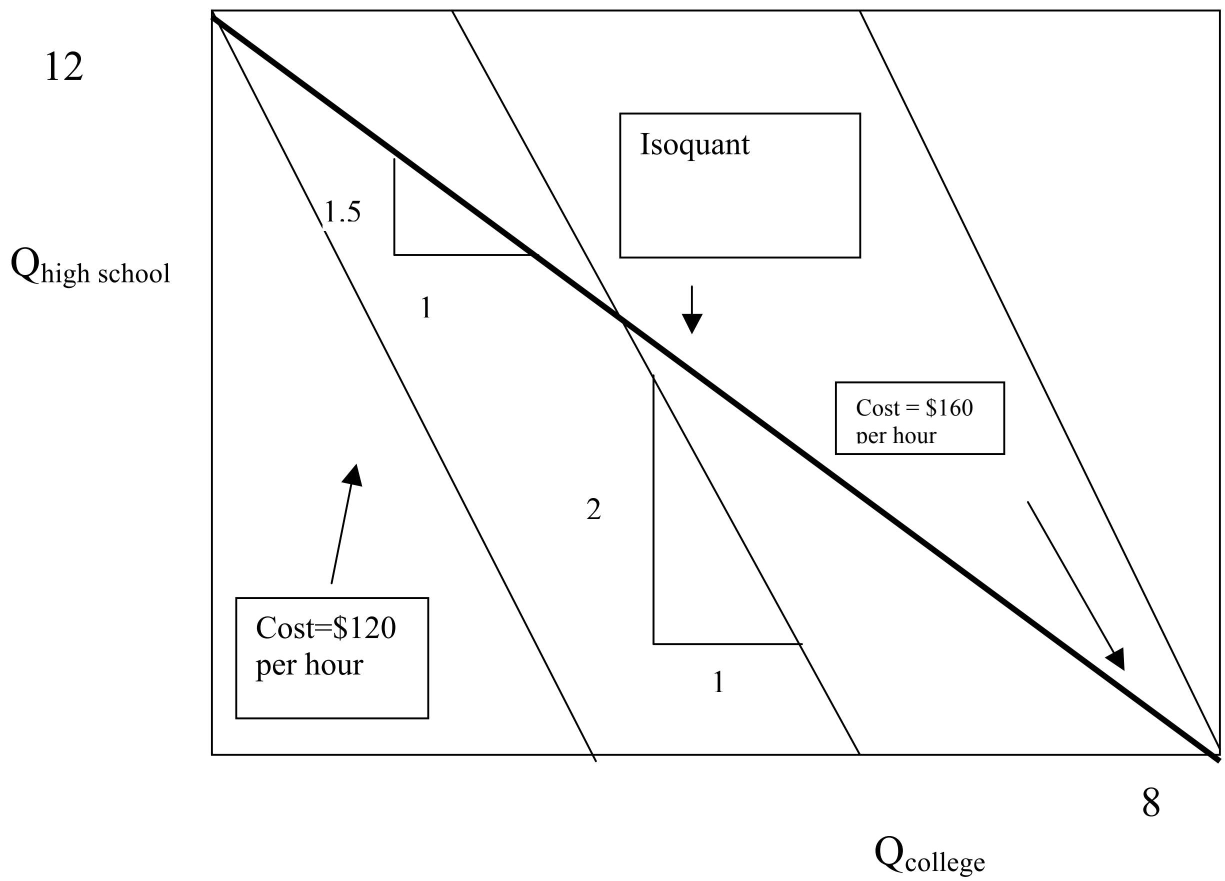
The Production Function: Describing how workers of different types and capital affect the marginal product of each

Case 1: No capital; production independent across workers

Results identical to above.

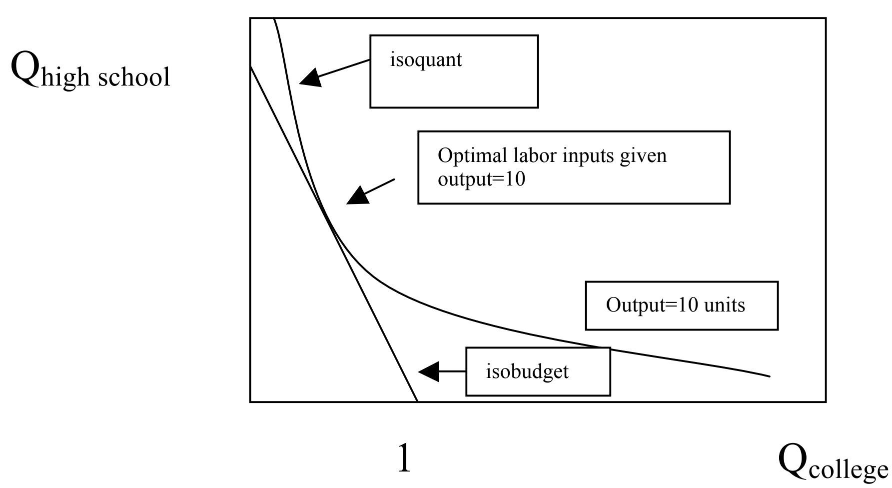
Graphical illustration using isobudget line and isoquant
Isobudget or isocost: if $W_{college}$ = \$20 and $W_{high\ school}$ = \$10 then an 'isobudget line' showing combinations of the two types of workers that cost the same amount is given by
$W_{college}*Q_{college} + W_{high\ school}*Q_{high\ school}=COST$
Example: for total cost of \$20 per hour the combinations are given by
$20*Q_{college} + 10*Q_{high\ school}=20$
If we graphed $Q_{high\ school}$ against $Q_{college}$ equation would be:

Suppose that 12 high school graduates can produce 120 units of output per hour, and that college educated workers produce 50% more units of output per hour. ISOQUANT shows all combinations of workers that produce the same output. We could produce 120 units of output using 12 HS grads, or 8 college grads, or any combination of workers given by the following linear equation



Case 2: No capital; productivity depends on the skills of other workers

Results: In general best to have mix of both low and high skill workers as the presence of one makes the other type of worker more productive.



Also, in general good to have higher quality workers as they will teach more to other workers.

Case 3: Production independent across workers but workers' productivity depends on amount of capital

ASSUME: More skilled workers increase productivity of capital more than less skilled workers do.
RESULT: When firm increases amount or quality of capital, it should hire more relatively more skilled workers.
(Shown to be true in real world.)

Example similar to page 15 of text: Firm hires either low-skill or high-skill workers to produce shirts. Each worker requires a sewing machine, which costs $5 per day to rent. Low-skill labor makes $5 per hour, for an 8 hour day, while high-skill labor makes $8 an hour. **Output per day is 4 shirts for low-skill workers and 6 shirts for high-skill workers.** The sewing machine company says that it will rent us a machine that will double output per worker, but the better machines cost $11 a day to rent. I have two questions. First, should I rent the new machines? Second, what kind of labor should I hire?

Solution Method #1: Calculate the Cost/Output ratio for each of the 4 possibilities.

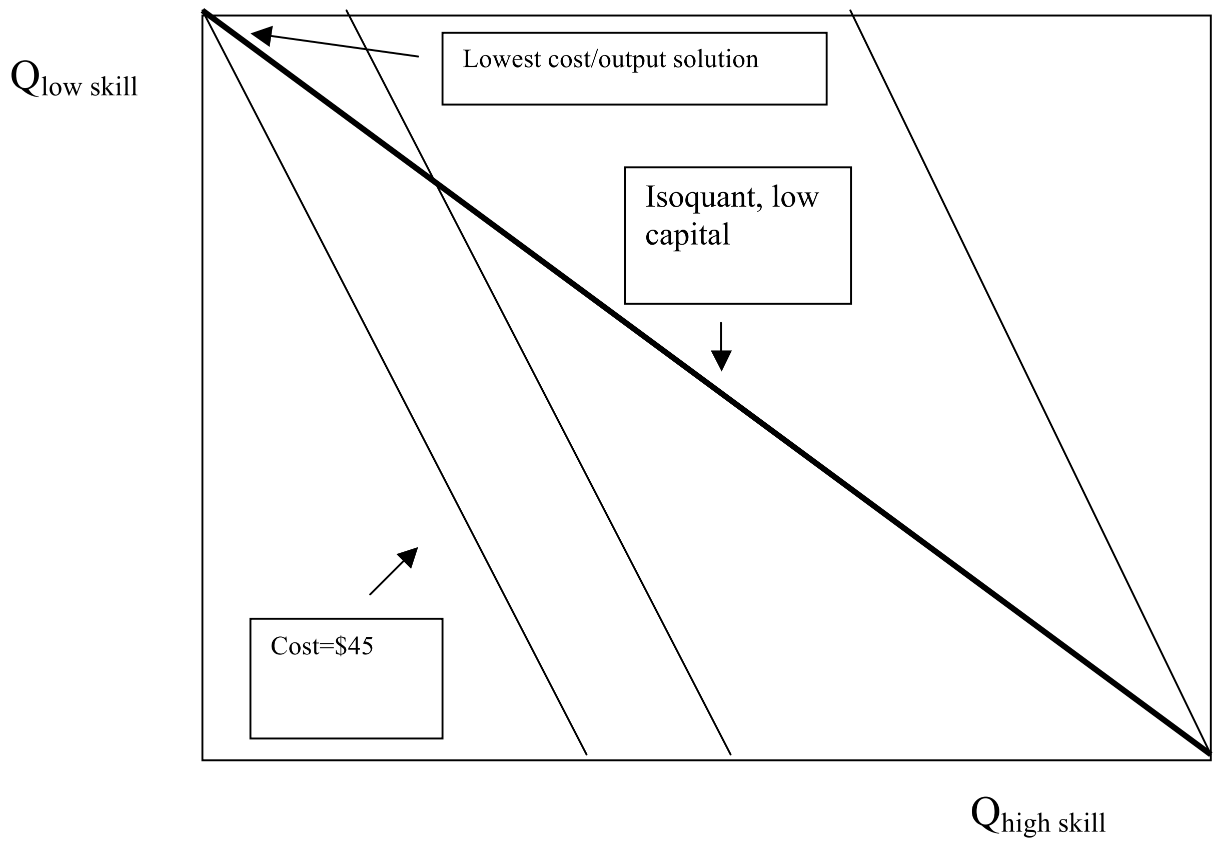
	Output	Labor Cost	Capital Cost	Total Cost	Cost/Output
Old Machines					
Low-skilled	4	$40	$5	$45	$11.25
High-skilled	6	$64	$5	$69	$11.50
New Machines					
Low-skilled	8	$40	$11	$51	$6.38
High-skilled	12	$64	$11	$75	**$6.25**

Solution Method #2: Calculate equations for representative isoquants and isobudget lines and graph to figure out which "corner solution" the firm should end up at.

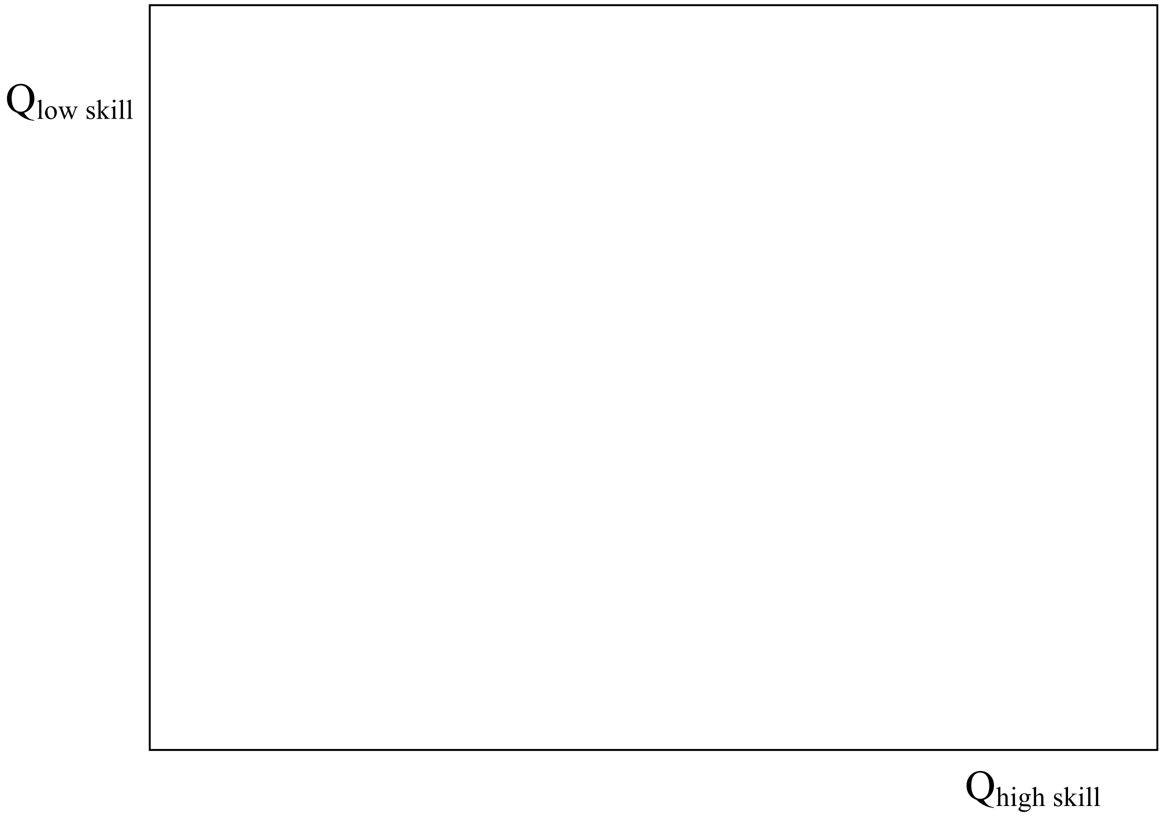
CASE 1: Firm uses old machines
Isoquant:

Isobudget:

Graphically, in the situation with low capital, low skill workers are more productive, and in the graph you can get to the lowest budget by using only low-skill workers:



Exercise: Calculate a representative isoquant and isobudget line for CASE 2, where the firm uses new machines, and then create a graph similar to that above to reveal the solution that minimizes the cost/output ratio.



EXERCISE: Try to solve a similar problem on page 15 of Lazear and Gibbs using both the methods above.

Next, read the appendix and try in particular scenarios 1 and 2, with a linear production function but with diminishing returns, and Cobb-Douglas Production functions. You should have seen constrained optimization in your calculus courses. If you feel rusty, please see pages 5-10 of Professor Machina's math primer, available on the class web site.
Below is part of the appendix from the old Lazear (1998) textbook, which sets up the problem in a more general way than in the new textbook's appendix.

APPENDIX

The formal theory behind our conclusions in this chapter is little more than the standard economic theory of production, reinterpreted slightly. Let us write that firm output, Q, depends on labor (including sales) used in production, and in management, denoted P and M, respectively. Consider two types of labor, high school, denoted by H, and college, denoted by C. Thus, C_P refers to college grads who are assigned to production or sales, H_M refers to high school grads who are assigned to management, and C_M and H_P are defined analogously. In addition to labor, capital, K, is generally required. Thus, output, Q, is given by

(A2.1)
$$Q = f(C_P, H_P, C_M, H_M, K)$$

The firm wants to maximize profits. To do this, the firm must decide how much of each type of labor to hire. This decision can be broken into two subsidiary decisions. First the firm must decide how to produce any given amount of output. Then it must decide how much output to produce.

The first problem requires solving the Lagrangean:

(A2.2)
$$W_C(C_P + C_M) + W_H(H_P + H_M) + \lambda[Q - f(C_P,C_M,H_P,H_M,K)]$$

for C_P,C_M,H_P,H_M

where W_C and W_H are the wage rates of college grads and high school grads, respectively. Let K be given at K_0.

The first-order conditions are:

(A2.3)

a. $W_C - \lambda\frac{\partial f}{\partial C_P} = 0$

b. $W_C - \lambda\frac{\partial f}{\partial C_M} = 0$

c. $W_H - \lambda\frac{\partial f}{\partial H_P} = 0$

d. $W_H - \lambda\frac{\partial f}{\partial H_M} = 0$

e. $Q - f(C_P,C_M,H_P,H_M,K_0) = 0$

The multiplier, λ, reflects the marginal cost of output for a given Q. Once λ has been determined, the firm sets marginal cost equal to price to determine the amount that it wants to sell.

We are more interested in the first problem here—how to produce a given

Q: How to figure out productivity and cost of differently skilled workers?

A: (See pages 18-20)

- The best is to experiment, trying out different combos. But expensive and time consuming. Don't do unless likely to matter a lot.
- Another route: use historical data. Appendix in Lazear (1998) (but not new text) gives an example of running a regression in Excel to estimate relation between inputs and outputs.
- Final route: intelligent guesses may be better than nothing at all.

Hiring Risky Workers: A Good or Bad Idea?

IF can fire workers after learn their productivity, and
IF employment is likely to last beyond the time when firms discover workers' productivity,
then in general firms should prefer to hire risky workers to 'safer bets' who on average are likely to be equally productive.

WHY?
After find out a risky worker's productivity, if low, then fire, and cut your losses. If high productivity, then keep worker on staff, and make profits.

Example: Can hire worker A or B, paying each $100,000 per year, over 40 years. Worker A will bring in $105,000 in revenues per year with probability 1. Worker B will bring in $250,000 with probability 0.1 and will lose the company $100,000 with probability 0.9. Which to hire if learn productivity after one year and
a) by end of one year workers have job guaranteed **OR**
b) can fire worker at any time.

What are the reasons why it may not be easy to fire unproductive workers?

-- Fear of lawsuits over wrongful dismissal/difficulty in documenting low productivity.

-- Collective bargaining agreements or union rules.

a) JOB GUARANTEED

Calculate expected profits over 40 years:

b) WORKERS CAN BE FIRED

Again, calculate expected profit over 40 years. For A, expected π again =$200,000.

For worker B, fire after one year if a dud, otherwise keep on staff for 40 years:

expected π =

HIRE THE RISKY WORKER EVEN THOUGH IN FIRST YEAR FIRM EXPECTS TO EARN LESS FROM HIRING THE RISKY WORKER.

EXERCISE: Redo b) this time under a scenario where you are choosing between two 63 year old workers, both of whom are likely to retire after 2 years. Which is the better bet now?

Other factors:

- If the time it takes to find out productivity is longer, the "safe" worker becomes relatively more attractive to hire.
- If the firm is risk averse and not risk neutral as assumed above, it is more likely that the safe worker will look like the better higher.
- The above model naively assumes that a star, once discovered by your firm, can't signal her value to other employers. If not completely realistic, then you must increase her salary later on to keep her from leaving.