

**Personnel Economics**  
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**Problem Set 1**  
**Due: 9 August 2000**

**Important:**

**In order to receive full marks, you must show all of your work and explain your answer. Simply stating an answer is not sufficient.**

**Problem 1: Hiring**

You must decide whether to hire another secretary, whose output is easily measured, or merely to install Voice Processor, which is a new and extremely reliable voice recognition software and employ existing secretaries.

A new secretary costs \$800.00 per month and Voice Processor, which can only be rented, costs \$500.00 per month. Voice Processor yields 6,000 pages of output per year. The firm is only planning to be in business for one more year.

- (a) If a new secretary produces twice as much output (correctly typed pages) as Voice Processor, should the firm hire the secretary or rent Voice Processor? **WHY?**
- (b) Now suppose that half the secretaries are twice as productive as Voice Processor, the other half are only equally productive. Productivity can be ascertained only after a four-month period. Neither firms nor secretaries know the productivity before work begins. What should the firm do now? **WHY?**
- (c) How many months long must the observation period be before the firm is indifferent between hiring a new secretary and renting a Voice Processor?

**Problem 2: Screening Workers**

You are the personnel director for Pampered Pets Inc. which is a small manufacturing firm that makes and sells exercise equipment for pets. Pampered Pets Inc has two divisions: Manufacturing and Sales.

When a new worker is hired neither he nor his supervisor know his ability for making or selling pet exercisers. Given this, Pampered Pets Inc. has adopted a probationary period during which managers can closely supervise workers in order to learn about their ability for making and selling pet exercisers. The costs associated with the probationary period in Manufacturing are \$10,000 while the costs associated with the probationary period in Sales are \$30,000.

Suppose you have the following information about the chances that any random worker will be successful in Manufacturing and Sales.

	<b>Successful in Manufacturing?</b>		
	<b>Yes</b>	<b>No</b>	
<b>Successful in Sales?</b>	<b>Yes</b>	$\frac{1}{4}$	$\frac{1}{4}$
	<b>No</b>	$\frac{1}{4}$	$\frac{3}{4}$
	$\frac{1}{2}$	$\frac{1}{2}$	

Overall,  $\frac{1}{2}$  of workers can manufacture pet exercisers and  $\frac{1}{2}$  cannot. Only  $\frac{1}{4}$  of workers can sell pet exercisers, however. Everyone who can sell pet exercisers can also manufacture pet exercisers, but of workers who can manufacture pet exercisers only  $\frac{1}{2}$  can also sell them.

Workers are hired into the firm on a probationary basis and are fired if they turn out not to be successful.

- (a) Suppose that Pampered Pets Inc wants to find **one** worker capable of **selling** pet exercisers, how many workers should the firm need to hire on average into the firm? Is it better for the firm to hire directly into Sales or rather hire into Manufacturing and promote successful workers into Sales? **WHY?**
- (b) Suppose that Pampered Pets Inc wants to find **one** worker capable of **making** pet exercisers, how many workers should the firm need to hire on average into the firm? Is it better for the firm to hire directly into Sales and promote to Manufacturing or to hire directly into Manufacturing? **WHY?**
- (c) Suppose that Pampered Pets Inc has a policy of only hiring new workers directly into Manufacturing. Those who are successful in Manufacturing are then promoted into Sales. Some of those workers promoted into Sales, however, ultimately prove to be unable to sell pet exercisers and so they are fired from the company. Is this the most sensible policy or should Pampered Pets Inc return those workers who are not successful in Sales back to Manufacturing? **WHY or WHY NOT?**
- (d) Suppose a new computerized monitoring system for sales is developed. As a result, the monitoring costs associated with the probationary period in Sales fall from \$30,000 to \$8,000. How would this affect your answers to parts (a) and (b)?

### Problem 3: The Decision to Invest in Training

You are the personnel director for a large bank. Your bank employs three types of workers; tellers, loan officers, and account managers. Individuals may work as tellers with no training, but have the opportunity (if they wish) to instead train for jobs as loan officers or account managers. Training for loan officers and account managers lasts two years and the bank may decide to limit the number of workers it trains.

The following table provides information about the earnings profiles. **The table gives hourly wage rates.** Assume that each worker will work for 5 years before retiring and that each worker works full-time which is 2000 hours per year. The interest rate is 5%.

Year	Teller	Loan Officer	Account Manager
Year 1	10.00	5.00	0
Year 2	10.00	5.00	0
Year 3	11.00	15.00	20.00
Year 4	11.00	15.00	25.00
Year 5	15.00	15.00	30.00

Account manager training is general training so the worker pays the costs. There are no direct costs for account manager training (i.e., there are no fees) but the worker doesn't earn a wage in the first two years because they are producing nothing.

Loan officer training is specific training so the worker and the bank share the cost. Even though the worker is producing nothing during the two years of training, the bank still pays a wage of \$5.00.

- (a) Will workers choose to train as loan officers or account managers or will they prefer to remain tellers? **WHY?**
- (b) Suppose that the bank has begun to adopt ATMs (automatic teller machines) which means that it no longer is interested in employing tellers full-time. Loan officers and account managers will, however, continue to work full-time (2000 hours). What is the minimum number of hours that the bank must allow tellers to work in order for them to be indifferent between remaining a teller and becoming a loan officer? **Note:** To make this easier assume that they don't value the extra leisure from only working part-time.

The bank has found that too many people want to be trained as account managers and not enough people want to be trained as loan officers. You propose the following:

- The bank should charge workers choosing account manager training a fixed annual fee for each year of training; and
  - The bank should raise the hourly wage per year during the time that workers are training to be loan officers.
- (c) What is the largest fee the bank can charge for account manager training and leave workers indifferent between getting trained as account managers and remaining as tellers?
- (d) If bank tellers continue to work 2000 hours per year, what is the smallest wage increase the bank can give to those workers choosing loan officer training and keep workers indifferent between getting loan officer training and remaining as tellers?

#### **Problem 4: Financing Investment in Formal Education**

##### **Background:**

The Government of your country is concerned about the small number of students enrolled in higher education. It knows that individual students compare the **private** costs and benefits of education when making their decisions about how much education to get. However, the Government believes that there are positive externalities associated with higher education. As a result, it is concerned that students (who ignore the **social benefits** of their education) will get less than the **socially optimal** amount of education.

Given this, the Government is interested in increasing the number of students enrolled in higher education and it has come to you for advice about how to accomplish this. Based on your market research you discover that one of the major barriers to higher education is financing. Specifically, you discover that the interest rate that banks charge for human capital investments is much higher than the rate they charge for investments in physical assets (for example, houses, computers, etc.).

Based on this observation your advice to the Government is that the Government should provide loans to students at a low interest rate. As a result, the Government is considering two schemes:

- Offer low cost loans to students based on their ability, i.e., give loans to the most able students
- Offer low cost loans to students based on their need, i.e., give loans to those students with the least income

You have been hired to prepare a short 2 – 3 page **typed** report outlining the important issues involved in financing higher education investments. In your report you will want to include address the following issues:

- What kind of positive externalities do you think higher education might have for society? Why does this lead to less than the **socially optimal** amount of education being chosen by students?
- Why do you think the interest rates banks charge for human capital investments is higher than the rate for physical capital?
- How would you expect each of the Government's proposals to affect the proportion of students going on to higher education? How would each of these proposals affect the average ability of students going on to higher education? Do you think firms would be more or less likely to use education as a screen for ability?
- Anything else you think is relevant.