

Factor Markets and Income Distribution

October 10 2006

Reading: Chapter 12, with appendix

In this topic we examine factor markets to understand how the demand-supply model can be used to understand how the prices of factors of production are determined, and how that in turn can be used to understand how income is determined. We will also examine some problems with that theory, called the marginal productivity theory of distribution.

1

Factor Markets and Income Distribution

- Factors of production
- Income distribution
- Marginal productivity and factor demand
- Marginal productivity theory of income distribution
- Problems with marginal productivity theory
- Labor supply

2

Factors of production

A **factor of production** is any resource that is used by firms to produce goods and services.

All inputs are not factors. There are intermediate inputs which are used up in production. Factors of production and their owners receive income over and over again.

Economists usually classify factors of production into four main types:

- *Land*
- *Labor*
- *Physical capital* - consists of manufactured resources such as buildings and machines. Sometimes referred to as capital
- *Human capital* - improvement in labor created by education and knowledge embodied in workers.

3

Factors of production Factor markets

- Factors of production are bought and sold in **factor markets**.
- Prices of factors of production are known as **factor prices**. Wage, rent, rental on capital.
- Factor markets work like goods and service markets in some ways:
 - They can be analyzed using supply and demand analysis
 - Factor prices allocate resources among producers
- Factor markets are different from goods and service markets because:
 - Their demand is a derived demand – derived from firm's output choices and the demand for goods and services
 - Most of our income is received from them; factor markets determine distribution of income

4

Income Distribution

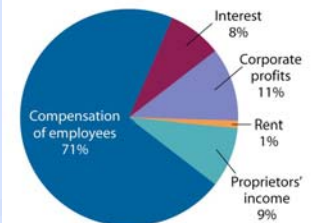
- **Income distribution**: distribution of total income among different segments of the economy.
- Economists examine **two main types** of income distribution:
 - **Personal income distribution**: distribution of income among different people or income groups
 - **Factor distribution of income**: distribution of income among different factors of production, like labor, land and capital
- If we are interested in personal distribution of income we can examine factor income distribution and then examine how much of factor income goes to different people.
- To know who gets how much income we can examine who owns what factors and the price of each factor. Examples:
 - A disabled person who cannot work will get no labor income
 - A person who owns land will receive a large income if land rent is high

5

Income Distribution

Factor Distribution of Income, US, 2003

- **Labor** receives bulk—more than 70 percent—of the income in the modern U.S. economy and most other economies.
- **Rent** income is low proportion of income in modern economies because of the declining importance of agriculture
- Although exact share not directly measurable, much of what is called compensation of employees is a return to **human capital**.
- Compensation to employees includes **salaries** of highly-paid executives.
- **Proprietor's income** is income of people who own their own businesses. A part can be considered labor income.



Marginal Productivity and Factor Demand Firm's employment decision

What determines how much of a factor a firm will employ. Assume **perfect competition** and look at labor; same principle applies to other factors.

We can examine how much **output** firm produces as before and use the production function to find labor employed. Here we examine the choice more directly.

Firm examines **marginal benefit and marginal cost of hiring one more worker**.

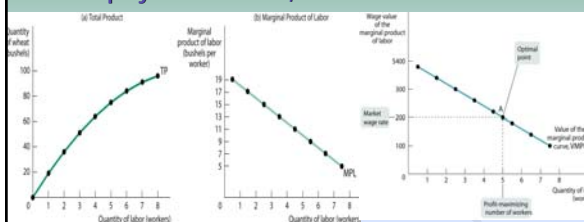
Marginal cost is the worker's wage, W .

Marginal benefit is the value of the additional amount that the firm produces with the additional worker, **value of marginal product of labor** = marginal product of labor \times price of the good produced.

$$VMPL = MPL \times P$$

7

Marginal Productivity and Factor Demand Firm's employment decision, cont.



From total product find marginal product of labor. For level of employment multiply marginal product of labor by the price of the product to find value of marginal product of labor. Price is given because firm is a price taker.

Given the wage the firm employs labor up to where wage equals value of marginal product

For different levels of the wage we get the firm's demand curve for labor – relation between wage and the demand for labor

Employment (number of workers)	Quantity of labor (workers)	Marginal product of labor (bushels per worker)
0	0	0
1	1	18
2	2	15
3	3	12
4	4	9
5	5	6
6	6	3
7	7	0
8	8	0

Marginal Productivity and Factor Demand Factor demand curve

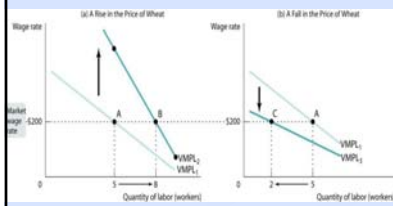
The **factor demand curve** shows the quantity demanded of a factor for different levels of the price of the factor.

Example: **Demand curve for labor**.

A change in the wage shows a **movement along** the labor demand curve.

The labor demand curve **shifts** due to the following changes:

1. Change in the **price of the good**
2. Change in the amount of **other factors** used – example capital
3. **Technological change**: improvements in technology can shift the demand curve up or down.



Marginal productivity theory of income distribution

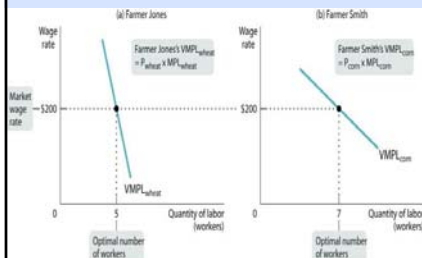
- In equilibrium **all factors of production are paid the value of their marginal product**.
- Holds with **perfect competition**.
- True for **all factors**, including capital and land. For instance, capital is employed up to the point at which the marginal product of capital is equal to the rental rate of capital (the cost, explicit or implicit, of using capital for a given period of time).
- If labor is **homogeneous**, all workers will receive the same wage, the value of marginal product of labor for the last worker hired. Each worker is not paid the value of marginal product of labor of hiring him or her – all get the same wage.
- If labor is not homogeneous, for instance, because different workers have different levels of **human capital** due to education, they will receive a wage equal to the value of their marginal product which is higher for more skilled and educated workers.

10

Marginal productivity theory of income distribution Labor demand

Illustrate with labor market.

All producers face the same wage. Since each producer sets wage equal to value of marginal product of labor, the VMPL is the same for all producers.

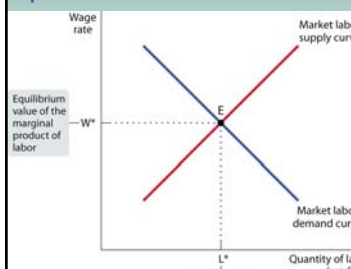


The market demand curve for labor is the horizontal sum of all individual producer labor demand curves.

Can be for an industry or for all industries.

11

Marginal Productivity Theory of Distribution Equilibrium in the Labor Market



Assume that the supply curve of labor, showing how much labor is supply for each wage, is positively sloped. Return to it later.

Equilibrium wage rate is W^* , the equilibrium employment level is L^* , and every producer hires labor up to the point at which $VMPL = W^*$.

Labor is paid its equilibrium value of the marginal product, the value of the marginal product of the last worker hired in the labor market as a whole.

Problems with Marginal Productivity Theory

How **valid** is marginal productivity theory? Several arguments against it:

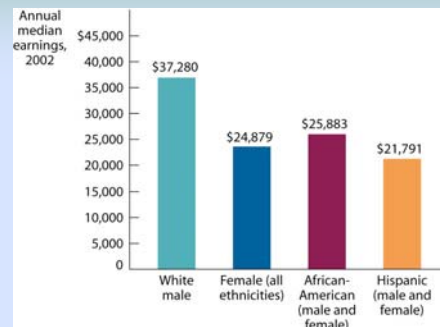
1. In real world **large differences between prices of factors** which seem to have same value of marginal product – like people of different races, sexes who get different wages.
2. In the real world some resources are not fully employed and seem to have **prices higher than their value of marginal product or their market clearing levels.**
3. It leads to the belief that the existing distribution of income is **fair**, that is, factors are paid according to what they contribute to society.

The last point arises from an erroneous belief. Even if marginal productivity theory of distribution is true in reality, it has no moral implication of fairness. For instance, if some people have property which they obtained unfairly, they would obtain income from it, without any implication that the distribution is fair. Consider first two objections.

13

Problems with Marginal Productivity Theory Wage Disparities in Practice

Large disparities in wages and salaries exist. Large differences in wages between races and gender.



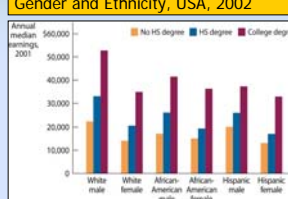
14

Problems with Marginal Productivity Theory Wage Inequality

Marginal productivity theory is **not inconsistent with wage differentials** which can:

1. **compensate for unattractiveness of jobs** due to danger and unpleasantness
2. arise due to **differences in talent**
3. arise due to **differences in human capital** because of education, on-the-job training and experience. See graph – education matters.

Earning Differentials by Education, Gender and Ethnicity, USA, 2002



15

Problems with Marginal Productivity Theory Wage Inequality, cont.

Nevertheless, appear to be many deviations from the theory in practice, leading to wage differentials and higher than market clearing wages:

1. **Market power:** some sectors are unionized and keep wage high and higher than non-unionized sectors because of monopoly power – empirically not very important for US
2. **Efficiency wages:** in some jobs where workers cannot be supervised easily, to get more productivity wages have to be higher – high wages with unemployment; some jobs will pay more
3. **Discrimination:** some workers may be discriminated against because of wrong ethnicity and gender. Some argue that competition will undermine this as those who discriminate will not be able to get good workers who will go to employers don't discriminate and who pay more. But discrimination often persists. Why?
 - When labor markets don't work well, there are unemployed workers, employers can discriminate – better to get some work than not
 - Government can discriminate – apartheid system
 - Discrimination can be profitable – divide and rule, weaken worker bargaining power
 - Discrimination in labor markets can result in low wages for some groups, low expected earnings for people, hence less education, hence continued low wages.

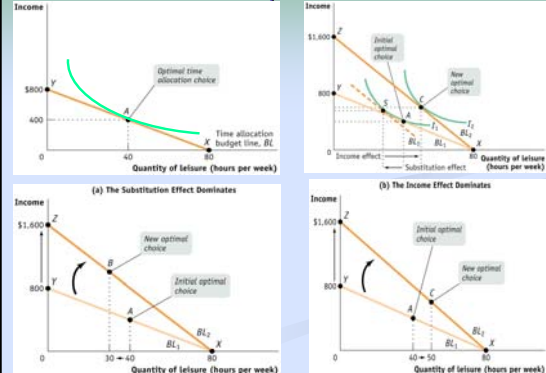
16

Labor Supply Labor-leisure choice

- Decisions about labor supply result from decisions about **time allocation**: how many hours to spend on different activities. Choose between labor or work and leisure.
- **Leisure** is time available for purposes other than working to earn income. Includes time spent with family, friends, doing exercises.
- Like other consumer decisions, people can be seen to compare the marginal utility of additional hour spent on leisure to the wage received from an hour's work. In **equilibrium** the two will be equal.
- What will people do when the **wage increases**?
 - Substitution effect: leisure more expensive – work more hours
 - Income effect: feel richer, have more leisure if it is a normal good – work fewer hours.
- So people can supply more or less labor when the wage is higher
- Doesn't always work like this – people often don't have choice over labor hours.

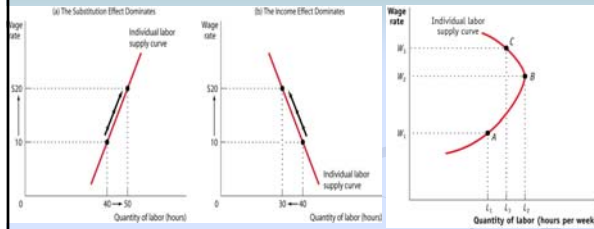
17

Labor Supply Labor-leisure choice, cont.



18

Labor Supply Individual Labor Supply Curve



If the income effect dominates, a rise in the wage rate can actually cause the individual labor supply curve to slope downward. It can also be backward bending.

19

Labor Supply Market labor supply curve

The **market supply curve** for labor is the horizontal sum of all individual supply curves for labor in a market.

Movements along the market supply curve are caused by a change in the wage.

The **market supply curve shifts** because of:

- changes in **preferences** and social norms: women joining labor force shifts supply curve to right
- changes in **population**: larger population (caused by immigration, for instance) shifts supply curve to right
- changes in **opportunities**: new opportunities in other markets shift supply curve to the left; loss of opportunities in other markets shift it to the right.
- changes in **wealth**: reduced labor supply because of higher wealth shifts supply curve to left.

20