The Relation between Goods Market and Labour Market

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I　Introduction

The purpose of this paper is to discuss the relation between goods market and labor market. The neoclassical economic model cannot explain the real economic situation, such as overwork death or unpaid overwork. Our economic model can explain these economic phenomena.

This paper is organized as follows. In section two, we explain the neoclassical economic model briefly and points out its problems. In section three, we present an alternative model in perfect competition briefly and point out its problems. In section four, we present our new economic model. In section five, we offer concluding remarks.

II　Neoclassical economic model and its problems

Though microeconomics usually discusses goods market and labor market separately, we can discuss the relation between two markets as follows.

We assume production function is as follows,

$$X = F(N), \qquad F' > 0, \qquad F'' < 0 \tag{1}$$

where X is the amount of production, and N is the amount of labor.

We assume a firm determines the demand for labor to maximize its profit π.

$$\pi = P X - w N = P F (N) - w N \tag{2}$$

where P is price, and w is wage rate. If we differentiate π with respect

to N, we get equation（3）. That is the first-order condition of profit maximization.

$$\frac{w}{P} = F'(N) \tag{3}$$

A household determines labour supply to maximize utility,

$$U = U(C,N) \tag{4}$$

under the budget constraint,

$$C = \frac{w}{P}N, \tag{5}$$

where C is the amount of consumption.

We get downward demand curve for labour from equation（3）, and we get upward labour supply function from（4）and（5）.

We get downward demand curve for goods（6）from utility maximization under budget constraint.

$$P = P \ (X) \tag{6}$$

We assume the cost is only labour and we set the inverse function of production function（1）as（7）.

$$N = g \ (X) \tag{7}$$

We can write cost as equation（8）.

$$w \ N = w \ g \ (X) \tag{8}$$

Marginal cost MC is equation（9）.

$$MC = wg'(X) \tag{9}$$

Equation（9）is the goods supply curve.

A firm in perfect competitive market determines the amount of production as equation（10）.

$$P = wg'(X) \tag{10}$$

Equation（10）is essentially equal to equation（3）.

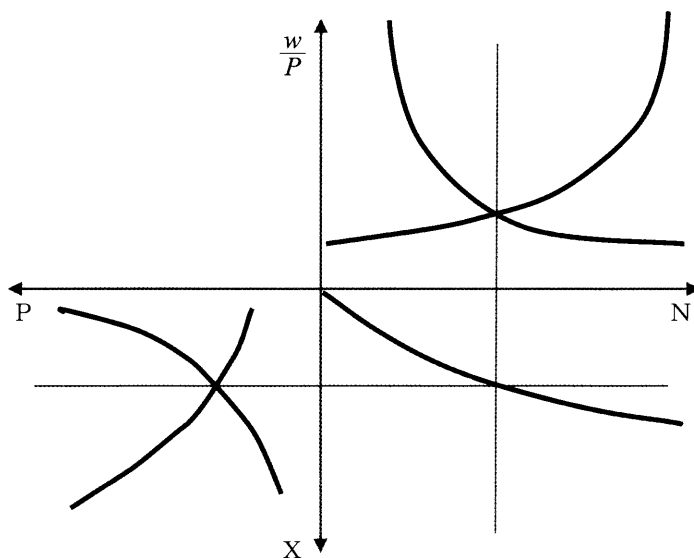Figure 1 shows the relation among goods market, labour market and

Figure 1

production function.

The first quadrant shows labour demand curve and labour supply curve. At the intersection real wage rate and the volume of employment are determined.

The third quadrant shows demand curve for goods and supply curve of goods.

The fourth quadrant shows production function. It shows the relation between the amount of production and the volume of employment.

Demand equals to supply in goods market and labour market because of the flexibility of price and nominal wage rate.

Next we analyze the effect of the shift of demand curve in goods market. Neoclassical economics assumes that the labour market plays the central role in all markets, so it doesn't analyze the effect of the shift of

demand curve for goods. But we dare analyze that.

If the demand curve for goods shifts to the right side as shown in figure 2, the price of goods goes down. If the nominal wage rate is constant at this time, labour supply curve becomes horizontal, real wage rate goes up and it generates unemployment.
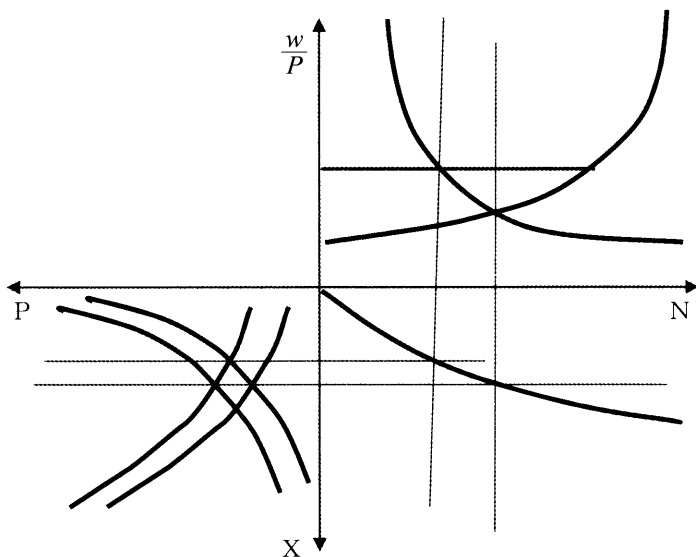

Figure 2

If the nominal wage rate decreases at this time, marginal cost curve, that is the supply curve of goods shifts downwards, real wage rate goes down, and it generates full employment.

If this theory is correct, the volume of employment increases under the flexibility of price and nominal wage rate in two cases. One case is the shift of labour supply curve to the right side in the first quadrant in figure 1. Another case is the shift of the labour demand curve to the right side.

When labour supply curve shifts to the right side, real wage rate decreases. When the volume of employment increases in cyclical upturn, real wage rate goes up usually. So this theory cannot explain this phenomenon.

When the labour demand curve shifts to the right side, real wage rate goes up. What is the reason why the labour demand curve shifts to the right side? Because the demand for labour is determined by the equation （3）, if the demand curve for labour shifts, production function must shift. The shift of production function means the change of production equipment. It is difficult to think that production equipment changes whenever the volume of employment increases. It cannot explain the increase of employment because of the rise of operation rate of production equipment.

And this theory cannot explain overwork death or unpaid overwork.

As mentioned above, this theory has problems. Keynes denied the second postulate in classical school that is the labour supply function. But we think that we should deny the first postulate in classical school that is the labour demand function.

The labour demand function and the supply function of goods are two sides of coin. The key point of profit maximization is the production function whose marginal productivity of labour gradually decrease.

Ⅲ　Alternative economic model of perfect competition

We present alternative economic model of perfect competition.

Actual firm doesn't seem to make production under increasing average cost and marginal cost. There are problems of overwork and unpaid overtime in Japan. But we have never heard the story that a firm stopped increasing the production because of the increasing of wage rate.

We assume the relation between the volume of employee and the amount of production is as (11).

$$N = n X \tag{11}$$

So the profit is as (12).

$$\pi = P X - w N = P X - w n X = (P - w n) X \tag{12}$$

Equation (12) means that the more a firm produces, the more the profit increases. A firm produces in full production. If prices and wage rate are given, the following assumption is more realistic. There are many firms whose production capacity is same but productivity is different. If demand for goods increases, low productive firms can make a production. But low productive firms cannot make a production, when the demand for goods decreases. The cost does not determine the amount of production, but demand determines the amount of production.

We assume that each firm produces in full production if (12) is positive, and each form doesn't produce if (12) is negative.

Figure 3 shows this situation. Demand curve is as the usual microeconomic theory. Supply curve is marginal cost curve. But it is not as usual microeconomic theory. Usually supply curve is derived by adding each firm's marginal cost curve. But this supply curve means each firm's marginal cost. The left side is low productive firm's marginal cost, and right side is high productive firm's marginal cost.
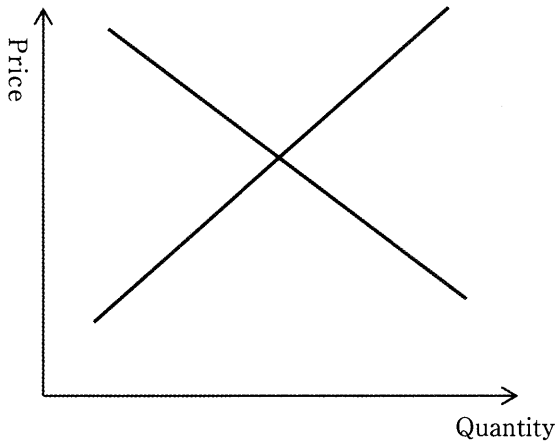
Figure 3

The price and the amount of production are determined at the intersection of demand curve and supply curve. The firm which makes a production at the intersection makes zero profit. The more productive a firm is, the more a firm makes a profit. When the demand curve shifts upwards, the price goes up. More firms start to produce, and the amount of production increases. If the demand curve shifts downwards, the price goes down, and low productive firms cannot make a profit.

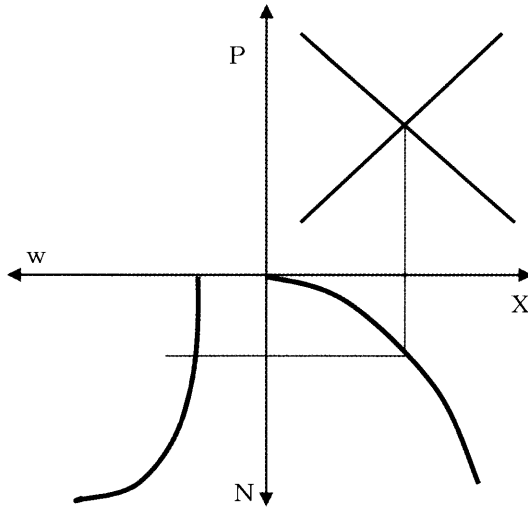Figure 4 shows the relation between goods market and labour market.

Figure 4

The first quadrant shows goods demand curve and goods supply curve. The price and the amount of production are determined at the intersection of demand curve and supply curve.

The third quadrant shows labour demand curve and labour supply curve. Nominal wage rate and the amount of labour are determined at the intersection of two curves.

The fourth quadrant shows the relation between the volume of employment and the amount of employment. When the amount of production increases, low productive firms begin to produce. Therefore, the volume of employment gradually increases when the amount of production increases.

A firm wants to employ labour at lowest cost, and wants to make them work longer. That was the problem in the beginning of capitalist economy, and that is also the problem of black company nowadays. Neoclassical

economics cannot explain this phenomenon, but this economic model can easily explain the situation that a firm try to produce as much goods as possible and make labour work as long time as possible. However, according to this economic model, nominal wage rate can become higher as the labour supply curve shift upwards. This is not realistic.

Ⅳ　Economic model with goods demand constraint

We present more realistic economic model which explains real economic phenomena. There are few firms who behave as a price taker. We assume that a firm faces a downward-sloping demand curve like (13). The objective demand curve doesn't exist. This is a notional one.

$$P = A - a X \tag{13}$$

First we think how the firm determines the planned price and the planned amount of production.

We assume a firm needs only labour for production and aims to maximize the amount of value added. Value added VA is written as (14) considering (13).

$$V A = P X = (A - a X) X \tag{14}$$

From the first condition of maximization, price is determined as (15) and the planned amount of production is determined as (16).

$$X = \frac{A}{2a} \tag{15}$$

$$P = \frac{A}{2} \tag{16}$$

We assume the demand for labour N is as (11).

We assume a firm pays some portion of value added as wage. The ratio of wage to value added is equation (17).

$$\frac{wN}{PX} = \mu \tag{17}$$

We can write the relation between price and nominal wage rate as (18) considering (11) and (17).

$$P = \frac{n}{\mu}w \tag{18}$$

Next we think about the labour supply.

A household selects job as discussed in Umada (2010). We assume that a household makes a mapping like figure 5 to select his/ her job.
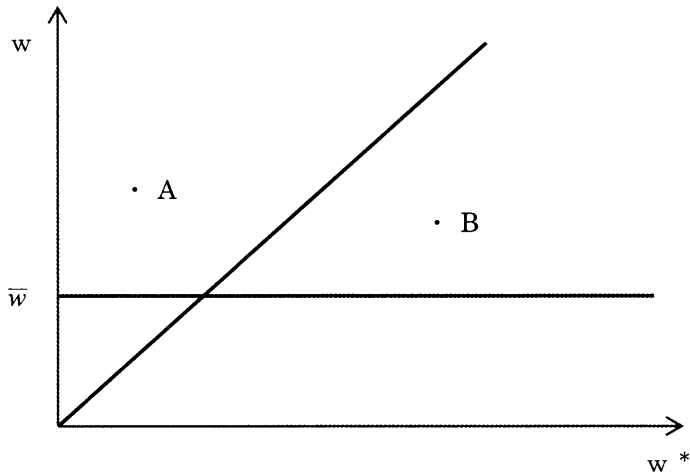

Figure 5

The vertical axis is nominal wage rate a firm offers. The horizontal axis is desired nominal wage. That means that a household wants that amount of nominal wage rate if he/ she does the job. When there are jobs like A and B in figure 5, a household never selects job B. Because desired nominal wage rate is less than the wage rate a firm offers. And $\bar{w}$ is the minimum desired nominal wage rate. So a household selects a job in the area which is above $\bar{w}$ line and above 45 degree line.

We also assume that a household needs minimum wage $\bar{W}$. When $\bar{W}$ is given, there is an inverse proportion relation between nominal wage rate and the amount of labour like figure 6.
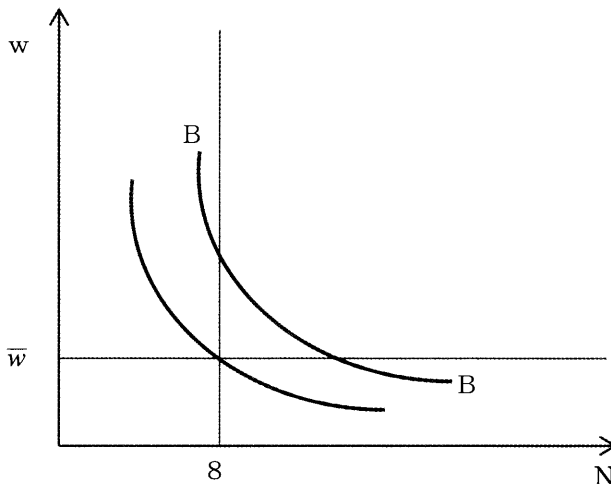

Figure 6

Usually a household works 8 hours per day, so the nominal wage rate at the intersection between 8 line and inverse proportion line corresponds to the desired nominal wage rate in figure 5. The nominal wage rate of selected job usually exceeds minimum desired nominal wage rate, so

selected inverse proportion curve like B-B line is above the minimum inverse proportion curve.

Next we consider the labour supply curve. According to a labour contract, a household usually works 8 hours per day. So the labour curve is flat until 8 hours. If labor hours exceed 8 hours per day, a company must pay extra wage rate as labor standards law says. And workers are tired after eight-hour working time, they wouldn't want to work without getting extra wage rate. And one day has 24 hours and workers need rest to recover from their tired body, so there is a maximum limitation for working time. From explanation above we can draw a labor supply curve as in figure 7.
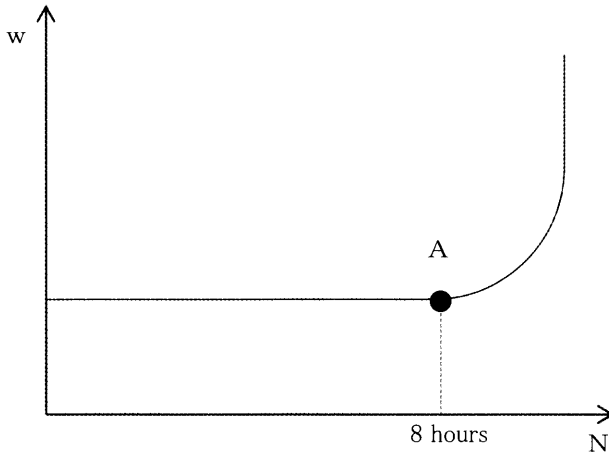

Figure 7

We can get a labor supply curve in an economy by adding individual labor supply curve to horizontal direction as usual. Some workers' minimum desired nominal wage rate can be same or different. For simplicity we assume all individuals' labor supply curves are same. The slope of aggregated labor supply curve is gentler than that of individual's labor supply curve by such assumption. But the shapes of the two curves are almost same.

We define the unemployment such that there is a worker who doesn't have a job at the minimum desired nominal wage rate. There is unemployment if a labor demand curve intersect at the flat part of labor supply curve in figure 7.

Figure 8 shows the relation between labor market and goods market and the relation between a price and a nominal wage rate.
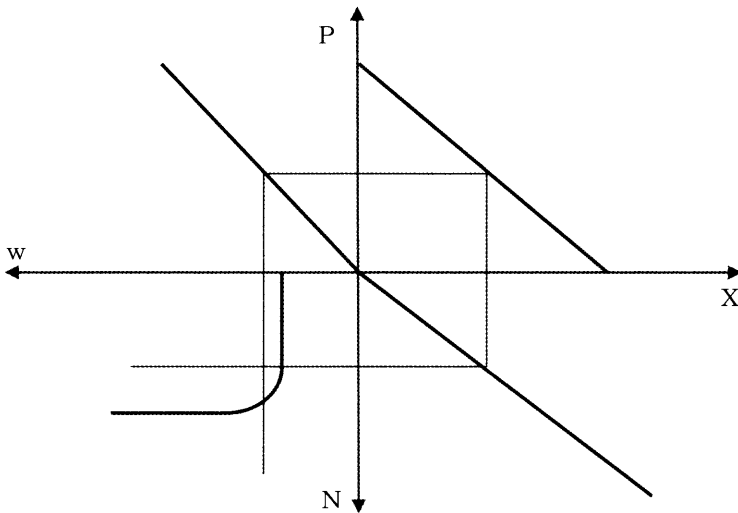

Figure 8

The first quadrant shows goods market. A price and a planned amount of production are determined on the basis of assumed demand curve for goods.

The second quadrant shows the relation between a price and a nominal wage rates. The offered nominal wage rate is calculated from the price.

The fourth quadrant shows the relation between the amount of production and the labor demand. The demand for labor is determined form the amount of labor on the assumption that labor productivity is constant.

The third quadrant shows labor market. In this case, all workers work for 8 hours. The labor demand curve intersects at the edge of the flat part of the labor supply function. The offered nominal wage rate is more than the minimum desired wage rate, so there is no problem from the view of nominal wage rate. And the labor work is less than maximum labor work. So there is no problem from the view of labor work.

Next we analyze what happens when the real demand for goods exceeds the planned amount of production.
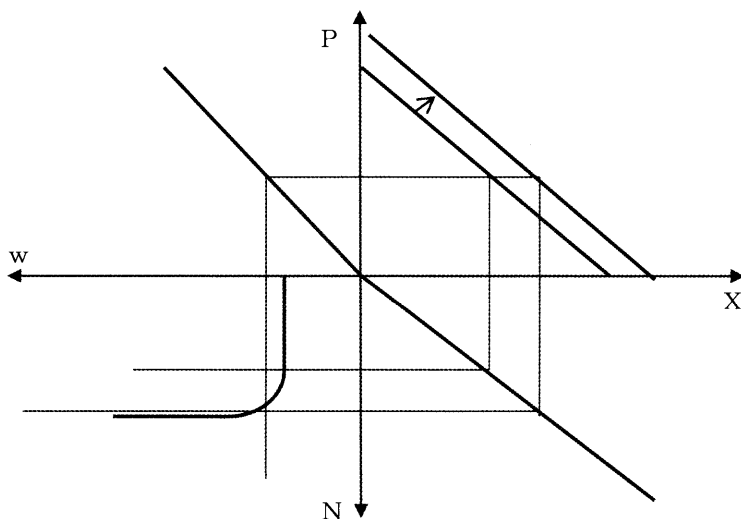
Figure 9

If the demand curve shits upwards as in figure 9, the company increases the amount of production in the short run. From the equation (18), the relation between the price and the nominal wage rate doesn't change when the amount of production changes. Because of the increase of labor hour, labor hours per one worker increase if the number of worker doesn't increase. And the desired nominal wage rate exceeds the offered nominal wage rate. And if the labor hour per one worker increases and come close to the maximum labor work hour, workers cannot work any more. If the company offers more nominal wage rate, the workers don't complain about the nominal wage rate. But it means the decrease of capital distribution rate. If the company employs more regular workers, the workers don't complain about the labor hour and there is no problem from the view of capital share. But if the increase of the demand for goods is temporary, there is a problem that the company faces when the real demand for

goods is less than the planned amount of production.

Next we analyze what happens when the real demand for goods is less than the planned amount of production.

If the demand curve shifts downwards as shown in figure 10, the company cannot sell all amount of production at the planned price. We assume that the company tries to sell all amount of production. The company sells the product at the planned price at first and decrease the price to sell out the product if the company doesn't have inventory. So the realized value added is less than the planned one. If the company pays nominal wage as it first planned, the capital share is less than the planned one. If the company tries to keep the capital share, the nominal wage rate decreases. If the decrease of nominal wage rate is big, the nominal wage rate becomes less than the desired nominal wage rate. If that happens the incentive for work goes down or the workers quit their jobs.
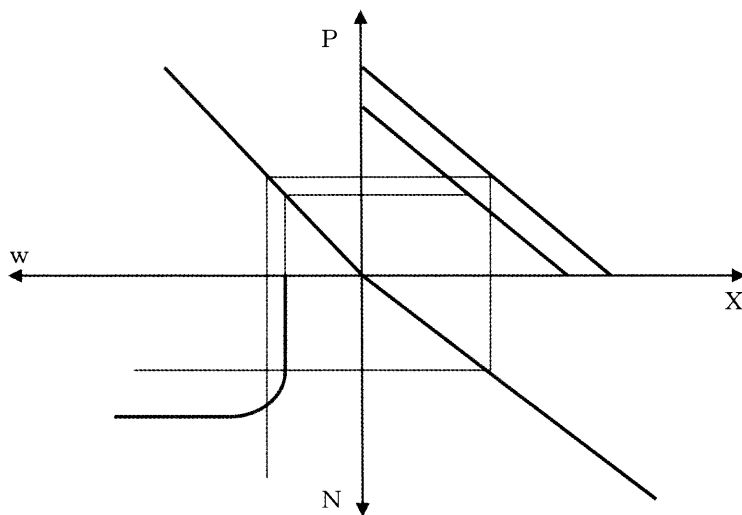

Figure 10

　　Next we analyze the unpaid overtime work. Unpaid overtime work occurs when the real demand for goods exceeds the planned one.

　　We analyze the case that real demand curve is on the upper side of the assumed demand curve, the real amount of production is more than the planned one, the labor work is longer than the planned one and the amount of wage is same as the planned one. The square AODC in figure 11 shows the planned amount of wage. If the real demand for goods is more than the planned one, the real labor hour is longer than the planned one. However, if the number of workers doesn't change, and the extra wage isn't paid, and the amount of wage doesn't change, the amount of wage is shown as square in figure BOFE in figure 11, and nominal wage rate decreases. The value added, profit and capital share increase because the total amount of wage doesn't change. Labor hours increases and nominal wage rate decreases. If the nominal wage rate falls under the desired nominal wage, and labor hours get close to the maximum of labor work, the incentive to work decreases or some workers quit their jobs.
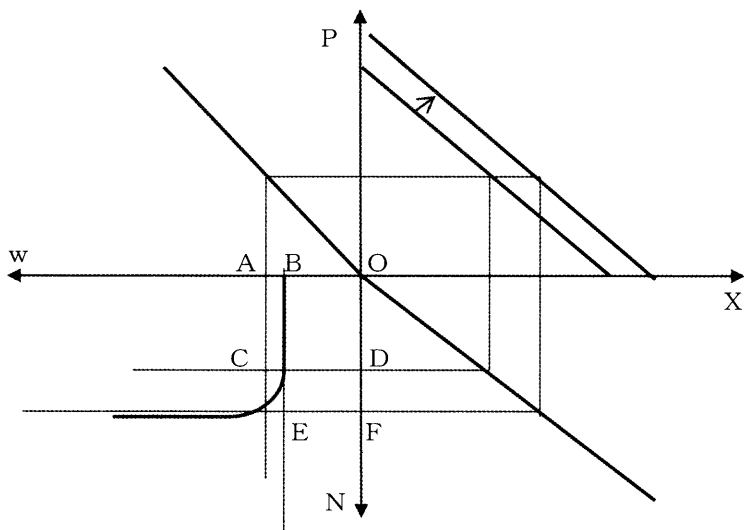
Figure 11

At the end we analyze the case that the demand curve for goods shifts downwards as shown in figure 12 and that situation continues for a long time. In that case the company calculates the planned price and the planned amount of production under the assumption of the new demand curve for goods again. The new planned price and the new planned amount of production decrease. Assuming the labor share is constant, offered nominal wage rate and planned demand for labor decrease.
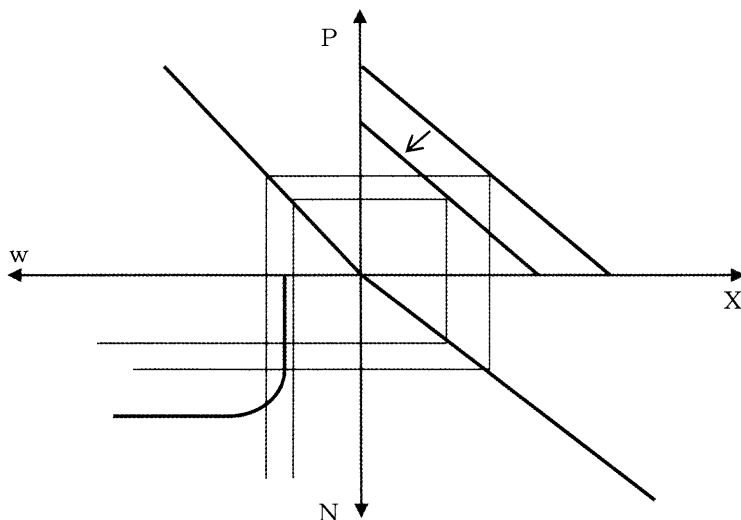
Figure 12

As shown in figure12, the offered nominal wage rate may be less than the minimum desired wage rate and there may be unemployment. The workers face two options. One is to reduce the minimum desired nominal wage rate and continue to work. Another is to quit the job.

When the demand curve shifts downwards, the company usually decreases the planned price and offers lower nominal wage rate. But there is another option. That is to shift the demand curve for goods upwards. The company should take this way. The managers who can take this way are needed.

Ⅴ　Conclusion

Usually the neoclassical economic model deals with goods market and labor market separately. We presented a new neoclassical economic model which deals with the relation between goods market and labor market.

But that economic model cannot explain the phenomena such as overwork death or unpaid overwork. We presented a new economic model which deals with the relation between goods market and labor market and can explain those phenomena.

The neoclassical economic model believes that the company and workers are satisfied with the results that markets determine. But in fact a company and workers are sometimes unsatisfied with the result that markets determine. When the demand curve for goods shifts downwards the situation is severe. The company usually reduces the planned price and planned amount of production and offers lower nominal wage rate. But the company should try to shift the demand curve for goods upwards.

In some European countries, extra wage rate is so high that there is no overtime work. There is no overwork death in those countries. It is very important to make that kind of system in Japan.

References

Umada, T. (2010)"Goods Market and Labor Market-Reconsidered", The YAMAGUCHI-KEIZAIGAKU ZASSHI, Vol. 58, No.6, pp.43-56.