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THE DEGREE OF MONOPOLY AND THE RELATIVE SHARE OF LABOR

Ryoji SHIMAZU*

Since the famous article of Prof. A. P. Lerner,¹⁾ the measurement of monopoly power and the concept of degree of monopoly—he called it as “the index of degree of monopoly power”—becomes very popular and many articles have followed him.

In this paper, I would like to criticize Dr. Michal Kalecki's famous theory of distribution, which applied the Prof. A. P. Lerner's concept of degree of monopoly to the theory of distribution, and also to suggest some idea to improve his theory.

Dr. Michal Kalecki's contribution to the theory of *The Distribution of the National Income*²⁾ which is to be determined by his degree of monopoly was a fruitful study to provide a way to combine the theory of monopolistic competition and the theory of income distribution.

Many critics³⁾ have been occurred about the hypothesis of his argument and the concept of his degree of monopoly, since his first article, and he himself accordingly have much revised in his later work, *Theory of Economic*

This article was originally, written in the United States, when I was staying at Johns Hopkins University. I am very much grateful for Prof. Fritz Machlup who was very kind to criticize my original paper. But, I am afraid even this paper, though some revisions have been made, would not make satisfy him. Of course, all the faults which might be involved in this paper is my own.

* Assistant Professor of Economics at Kyoto University.

- 1) A. P. Lerner, The Concept of Monopoly and the Measurement of Monopoly Power, *Review of Economic Studies*, June, 1934.
- 2) M. Kalecki, The Distribution of the National Income, first appeared in *Econometrica*, April 1938 and contained as the first chapter of his *Essays in the Theory of Economic Fluctuations*, 1939. and also compiled in *The Readings in the Theory of Income Distribution*.
- 3) J. E. Mead, Book Review, *Essays in the Theory of Economic Fluctuations*, by M. Kalecki, *Econ. Jour.*, June, 1939. J. T. Dunlop, Price Flexibility and the Degree of Monopoly, *Quarterly Jour. of Econ.*, Aug, 1939. Oscar Lange, Book Review, *Essays in the Theory of Economic Fluctuations*, by M. Kalecki, *Jour. of Polit. Econ.*, April, 1941. P. T. Bauer, A Note on Monopoly, *Economica*, May, 1941. R. H. Whitman, A Note on the Concept of Degree of Monopoly, *Econ. Jour.*, July-Sept, 1941. And later, we have many articles, among them important are: F. H. Hahn, The Share of Wages in the National Income, *Oxford Econ. papers*, June, 1951. Fritz Machlup, *Political Economy of Monopoly*, 1954. K. E. Boulding, *A Reconstruction of Economics*, 1950. N. Kaldor, Alternative Theories of Distribution, *Rev. of Econ. stud.*, Feb, 1956. M. W. Reder, Alternative Theories of Labor's Share, in M. Abramovitz, et al., *The Allocation of Economic Resources*, 1959. pp. 180-206.

Dynamics, 1954,¹⁾ but substantially his argument has not been changed, and still now his theory of distribution is based on the assumption of the horizontal prime cost curve which seems to me to be unrealistic, considered as the economy as a whole.

Nevertheless, his theory of distribution has an interesting idea that connects the degree of monopoly and the relative share of manual labor.

In this article, I will examine his hypothesis and concepts of his argument, and I would like to reformulate his ideas, because as we will see later, his concept of degree of monopoly is quite different from that of defined by the ratios of difference between price and marginal cost to price, as long as the prime cost is not constant. And only this later has the relation with the theory of monopolistic competition.

1. The Origin of Dr. Kalecki's Theory

The concept of degree of monopoly has become popular now, but this idea itself was not so fresh. Because, more than one hundred years ago, as early as 1838, Augustin Cournot²⁾ had invented the condition of perfect competition in which the marginal cost equals to the price, and this condition means that in non-perfect condition, there exists some gap between marginal cost and price.

This idea connected with the Marshallian Theory of the firm³⁾ and the cost theory of P. Sraffa⁴⁾ and so forth, have been developed into the theory of monopolistic competition or the theory of imperfect competition of E. Chamberlin⁵⁾ and Joan Robinson⁶⁾ and so forth.⁷⁾

But the measurement of the degree of monopoly was firstly tried by A. P. Lerner.⁸⁾ And his *index of the degree of monopoly power* is properly

1) Concerning this later book, I will argue in section five. Intermediately, Dr. M. Kalecki has published *Studies in Economic Dynamics*, 1943 which is now one of rare books and I could not see it, but it would not matter so much about my argument.

2) Augustin Cournot, *Recherches sur les Principes Mathématiques de la théorie des richesses*, 1838.

3) Alfred Marshall, *Principles of Economics*, 8th ed., 1920. As for the genesis of the theory of monopolistic competition, see J. A. Schumpeter, *History of Economic Analysis*, 1954, pp. 972-978.

4) P. Sraffa, The Laws of Returns under Competitive Conditions, *Econ. Jour.*, 1926, now contained in *Readings in Price Theory*, ed. by Stigler and Boulding, 1952. pp. 180-197.

5) E. Chamberlin, *Theory of Monopolistic Competition*, 1933.

6) Joan Robinson, *Economics of Imperfect Competition*, 1933.

7) Among others, it may be proper to add: R. F. Harrod, *Doctrines of Imperfect Competition Quarterly Jour. of Econ.*, 1934. And more recently we have: R. Triffin, *Monopolistic Competition and General Equilibrium Theory*, 1940. J. R. Hicks, *Annual Survey of Economic Theory: The Theory of Monopoly*, *Econometrica*, 1935, now in *Readings in the price Theory*. Fritz Machlup, *The Political Economy of monopoly*, 1952. Fritz Machlup, *The Economics of Sellers' Competition; Model Analysis of Sellers' Conduct*, 1952. E. Chamberlin (ed.), *Monopoly and Competition and their Regulation*, 1954.

8) A. P. Lerner, The Concept of Monopoly and the Measurement of Monopoly Power, *Rev. of Econ. Stud.*, June, 1934.

defined within the firm, not in the economy as a whole.¹⁾

In my understanding, the concept of degree of monopoly has been neatly used to analyze the working of the economy as a whole, by Prof. R. F. Harrod²⁾ by the name of "elasticity of demand" which is the reciprocal of the degree of monopoly defined as the ratio of difference between price and marginal cost to price, as long as profit is maximum—i. e. marginal cost is equal to marginal revenue. Prof. Harrod's "*Law of Diminishing Elasticity of Demand*" along with his "*plasticity of prime cost*" and his "*law of diminishing returns*" are jointly thought to be the stabilizers of price changes.³⁾

In this context, I suppose that the three principal concepts of Harrod's 'law of diminishing elasticity of demand', 'plasticity of prime costs', and 'law of diminishing returns' are each corresponding to Kalecki's 'degree of monopoly', 'constancy of prime costs', and 'changes in the raw material costs', when these are used to explain the working of the whole economy.

Using these preceding heritage, Dr. Kalecki could solve the difficult problem (said J. M. Keynes in his article⁴⁾) in an elegant way, concerning fairly stableness of relative share of manual labor over the long time of period.

According to the Keynes' article,⁵⁾ Keynes posed the question about why the relative share of labor in the national income in every year is so much alike during the long year, observing the statistical data given by A. R. Bowley and Colin Clark, and among the students, Dr. Kalecki could succeed to solve it to some extent.

But this question itself, which was put by Lord Keynes, was wrong, and was worse still, because Dr. Kalecki and some others have stuck to it, using always this constancy of the relative share of labor as a base of their arguments.

It seems to me, this so-called constancy of relative share of labor is not so much important as is often supposed, nor even so stable.

Because, even the slightest changes in the relative share are the effects of various kinds of factors, so that we cannot be satisfied with the fairly stableness of relative share.⁶⁾

Anyway, Dr. Kalecki's argument is begun with and based on this constancy of the relative share.

1) The distinction of the concept of degree of monopoly from that of degree of monopoly power is given in Fritz Machlup, *The Political Economy of Monopoly*, 1952, p. 471.

2) R. F. Harrod, *The Trade Cycle*, 1936.

3) R. F. Harrod, *Ibid* pp. 76-87.

4) J. M. Keynes, Relative Movements of Real Wages and Output, *Econ. Jour.*, March, 1939, p. 49.

5) J. M. Keynes, *Ibid.*, pp. 34-49.

6) More elegant statistical explanation can be seen in R. M. Solow, The Constancy of Relative Shares, *The American Econ. Rev.*, Sept., 1958.

2. Summary of Dr. Kalecki's Theory

Until section five of this paper, I will be concerned with the first article of his 'The Distribution of National Income' in *Essays in the Theory of Economic Fluctuations*, 1939 and the relation of his later argument in *Theory of Economic Dynamics*, 1954, which is substantially the same with the former, will be shown in the subsequent sections.

Therefore, I think it would be convenient at the beginning to show the notations and their relations used by him in his first article.

A			.....	Gross National Income	: $A = E + O + W$ (1)
E	e_a		.....	Entrepreneurial Income	
O	o_a	o_m	.....	Overhead Cost	
W	w_a	w_m	.....	Wages	
R	r_a	r_m	.....	Raw Material Cost	
T			.....	Aggregate Turnover	: $T = E + O + W + R$ (2)
	p		.....	Price per Unit of Product	: $p = e_a + o_a + w_a + r_a$ (3)
		m	.....	Marginal Cost	: $m = o_m + w_m + r_m$ (4)
	a		.....	Average Prime Cost	: $a = w_a + r_a$ (5)
			.....	Marginal Concepts	
			.....	Average Concepts	
			.....	Aggregate Concepts	

To simplify his argument, I would like to use the explanation given by Oscar Lange¹⁾ and J. E. Mead²⁾ in their book review articles with regard to his *Essays in the Theory of Economic Fluctuations*, 1939.

Dr. Kalecki's argument is based on the assumption that he treats his whole argument within the range of horizontal prime cost curve—marginal cost m is always equal to average prime cost a , and marginal cost for overhead cost o_m is zero.

Then he defines the degree of monopoly μ (in the Cournot's sense) as,

$$\mu = \frac{p - m}{p} \dots\dots\dots (6)$$

According to his assumption, $m = a$, and from the relation of (3) and (5), this (6) becomes,

$$\mu = \frac{p - m}{p} = \frac{p - a}{p} = \frac{e_a - o_a}{p}$$

From this relation, he defines the socially weighted average degree of monopoly $\bar{\mu}$ (in Kalecki's sense) as follows:

$$\bar{\mu} = \frac{E + O}{T} \dots\dots\dots (7)$$

It is important that μ is equal to $\bar{\mu}$, only when $m = a$, and o_m is zero.

1) Oscar Lange, *Ibid.*, pp. 281-282.

2) J. E. Mead, *Ibid.*, p. 301.

And this $\bar{\mu}$ also becomes as follows, according to the notations above and from the relation of (1),

$$\bar{\mu} = \frac{E+O}{T} = \frac{A-W}{T} = \frac{A-W}{A} \cdot \frac{A}{T} = \left(1 - \frac{W}{A}\right) \frac{A}{T}$$

$$\therefore \frac{W}{A} = 1 - \bar{\mu} \cdot \frac{T}{A} \dots\dots\dots (8)$$

This (8) is the formula given by J. E. Mead¹⁾ and this also can be rewritten as

$$\frac{W}{A} = 1 - \bar{\mu} \left(1 + \frac{R}{A}\right) \dots\dots\dots (9)$$

This formula (9) is better than Kalecki's own formula²⁾ $\frac{W}{A} = \frac{1}{1 + \bar{\mu} \cdot \frac{T}{W}}$

when we say that the relative share of manual labor depends partly on the changes in the degree of monopoly and also depends on the changes in the raw material cost. And this is the main point which Dr. Kalecki wanted to prove.

His theory can be summarized as have been shown above. But here is one question which has been suggested by Prof. Fritz Machlup when he criticized my original paper in 1959. Prof. Machlup said, "Why not the other way around $\bar{\mu}$ is determined by $\frac{W}{A}$?" I would like to express my gratitude to him on this account. Indeed, Prof. Machlup's criticism is quite true, and we must also consider the "Monopolistic Wage Determination as a Part of the General Problem of Monopoly".³⁾

Moreover, it is unfortunate that Dr. Kalecki's theory has been accepted by some writers as a matter of course, regardless to its assumption.

For instance, Dr. Maurice Dobb says in his *Wages*,⁴⁾ 1956, as follows.

«Some writers have laid emphasis on the degree of monopoly in the economic system...as the main determinant of the distribution of income between different income-classes in the modern world: and have suggested that the tendency for a growing degree of monopoly in the economic system at large to reduce the share of labor may have been offset by the action of other factors (partly fortuitous factors), the influence of which has been in the opposite direction.»

.....

«It [the whole question of the connection between money-wages and

1) J. E. Mead, *Ibid.*, p. 301.

2) M. Kalecki *Ibid.*, p. 29.

3) Fritz Machlup, "Monopolistic Wage Determination as a Part of the General Problem of Monopoly", in Chamber of Commerce of the United States, *Wage Determination and the Economics of Liberalism*, 1947. Now, this can be seen in *Readings in Economics*, edited by P. A. Samuelson, R. L. Bishop, and J. R. Coleman, third edition, 1958, pp. 271-277.

4) Maurice Dobb, *Wages*, 1956, p. 21 and p. 27, footnote.

real wages] is also likely to be affected by changes in the degree of monopoly and by simultaneous changes in the prices of imported foodstuffs and raw materials.》¹⁾

But the degree of monopoly has its meaning only if the prime cost curve is constant, otherwise, it would be reduced to a kind of average rate of profit, which does not always reflect the degree of *monopoly*.

3. The Hypothesis of Horizontal Cost Curve

The crucial points of Dr. Kalecki's theory are two points, one is the assumption of the horizontal prime cost curve, and the other is his description that the degree of monopoly determines the relative share of manual labor.²⁾

It might be convenient to assume that the prime cost curve is horizontal, in order to simplify the formula (7), (8) or (9).

But this assumption would not be true, if we consider it in the economy as a whole, because cost curves in each firms and in each industries are quite different and the aggregate cost curve may be up-ward or down-ward according to its economic structure and to its degree of operation, but it has very rare possibility to become horizontal.

Moreover, he says, all the firms in the society operate under the excess capacity within the range before the cost curves are rising.³⁾

But this description means that the situation of the firms is in the case of group equilibrium or in the case of the equilibrium of industry and in this case, according to the Kahn's Theorem, the average cost curve must be decreasing—this matter would be contradictory to the assumption of the constancy of the cost curve.

In the later book, *Theory of Economic Dynamics*, Dr. Kalecki says as follows,

《In fact unit prime cost fall somewhat in many instances as output increase. We abstract from this complication which is of no major importance.》⁴⁾

Unfortunately, this is said without any proof and this tendency of somewhat falling cost curve is considered by him not of major significance.

Another reason why he sticks to the assumption of the horizontal cost curve is that he wishes to maintain that 《in a closed system real wages, after the elimination of secular trend, would show relatively small changes

1) When we sum up socially all " r_a "s (raw material costs) in each firm, home-produced " r_a "s are compensated with each other, because one firm's raw material is the another firm's products. And on the balance, only imported raw materials are remained as "R." See J. M. Keynes. *Ibid.*, pp. 49-50.

2) M. Kalecki, *Ibid.*, p. 24.

3) M. Kalecki, *Ibid.*, p. 23.

4) M. Kalecki, *Theory of Economic Dynamics*, 1954, p. 12 foot-note.

which would not be likely to have any strong (positive or negative correlation) with the level of employment.»¹⁾—and this thinking is derived from the constancy of share of labor and from the constancy of the prime cost in the economy as a whole.

4. The Degree of Monopoly as a Determinant

Another difficulty involved in his theory is that, he says,²⁾ «the distribution of the product of industry is at every moment determined by the degree of monopoly».

But his formula shows only the equality and does not contain causality, just like Irving Fisher's equation of exchange.

As Oscar Lange said,³⁾ if we want to see the degree of monopoly as a determinant, there would be three ways of thinking.

- (a) *In the case of the degree of monopoly is equal to the reciprocal of the elasticity of demand.* If we suppose that the firms in the whole economy are making effort to maximize their profit, and the cost curves, on the whole, are horizontal, then the degree of monopoly $\bar{\mu}$ is equal to the degree of monopoly μ and this later becomes the reciprocal of the elasticity of demand. But the elasticity of the demand itself cannot be a determinant, but rather it is determined by various kinds of factors.
- (b) *In the case of the kinked demand curve.* In this case, with the same assumption of profit maximum principle and the horizontal cost curve, $\bar{\mu} = \mu$ = the reciprocal of the average of the whole elasticity of demand can determine the output, therefore, it can also determine the distribution of products.
- (c) *In the case of full cost principle being prevailed.* If we give up profit maximum principle, the degree of monopoly is no more equal to the reciprocal of the elasticity of demand. But in this case, also with the assumption of constant cost curve, we have

$$\bar{\mu} = \mu = \frac{p-m}{p} = \frac{p-a}{p} = \frac{ar}{a(1+r)} = \frac{r}{1+r} \dots \dots \dots (10)$$

where r is the rate of mark-up, p is the unit price, m is the marginal cost, and a is the average cost.

In this formula, the degree of monopoly is reduced to a function of r (the rate of mark-up), which is determined by the discipline of the industry or the degree of co-ordination among the firms in the industry.

1) M. Kalecki, *Ibid.*, p. 81.

2) M. Kalecki, *Ibid.*, p. 24.

3) Oscar Lange, *Ibid.*, pp. 281-282.

In the later book, Dr. Kalecki proceeds in this third line suggested by Oscar Lange.

I would like to comment on these lines of thoughts. As for in the case of (b), the kinked demand curve would be imaginary and subjective curve in the minds of the entrepreneurs.

Furthermore, every commodities have some degree of substitutability with each other, therefore, any kinked demand curve cannot be remaining stable, especially we observe them in the economy as a whole.

My comment concerning (c) is that it is not quite clear by what and how is the rate of mark-up is determined. And the full cost principle is the theory of price only applicable to the price formation of a single firm within a short period, and this is not the price theory of a whole economy over a long period. We may say this principle was the theory of price before Adam Smith when people did not know the mechanism of price formation, and people were seeking the 'just' price in vain.

Unfortunately, even today we may find these cases in some price policies.

Anyway, Dr. Kalecki himself, in my understanding, have revised his concept of degree of monopoly into some index which reflects the rate of mark-up or the degree of co-ordination with other firms in the industry—these are hinted by Oscar Lange.

And Dr. Kalecki believes that his newly invented index of degree of monopoly will determine the relative share of labor in the national income, because his theory is now based on the full cost principle, not on the profit maximum principle.

5. Dr. Kalecki's Revised Theory

Using the relation of (1), (2), and (7), We can get :

$$\frac{W}{A} = \frac{W}{W + \left(\frac{T}{W+R} - 1 \right) (W+R)}, \text{ and } \frac{T}{W+R} = \frac{1}{1-\bar{\mu}}$$

$$\therefore \frac{W}{A} = \frac{W}{W + \left\{ \left(\frac{1}{1-\bar{\mu}} \right) - 1 \right\} (W+R)} = \frac{1}{1 + \left\{ \left(\frac{1}{1-\bar{\mu}} \right) - 1 \right\} \left(1 + \frac{R}{W} \right)} \dots\dots (11)$$

If we denote $\frac{W}{A} \equiv w'$, $\frac{1}{1-\bar{\mu}} \equiv k'$, and $\frac{R}{W} \equiv j'$, we obtain :

$$w' = \frac{1}{1 + (k' - 1)(j' + 1)} \dots\dots\dots (12)^{1)}$$

These (11) and (12) are the quite same thing and these are also same with (9) above, in their meanings.

1) M. Kalecki, *Theory of Economic Dynamics*, 1954, p. 29.

The difference between those formulas is only formal.

Now, I think I must explain why Dr. Kalecki has changed his formula, even though the meaning involved is not changed.

This is only due to his revised notion of the degree of monopoly.

In the former article, Dr. Kalecki defined the degree of monopoly as

$$\mu = \frac{p-m}{p} \dots\dots\dots (6)$$

and this means that the larger is the value of μ , the more the slope of the individual demand curve for the firm becomes down-ward, and the firm is seemed to be the more monopolistic.

But now, he prefers $\frac{r}{\mu}$ as a parameter which reflects the degree of monopoly, to μ .

I would like to show the notations to be used here and also to show the difference of notations between Dr. Kalecki's and mine, because I think it is better not to change the notations throughout the argument, but Dr. Kalecki did change them.

	mine	Dr. Kalecki's
Average prime cost	a	u
Rate of mark-up	r	m
Degree of co-ordination	$1-\mu$	n

In his new index $\frac{r}{\mu}$, r is considered to represent the rate of mark-up, and μ is to reflect the degree of co-ordination with other firms in the industry.

Now, the reason will be as follows;

$$p = ra + a = ra + \frac{a}{p} \cdot p \dots\dots\dots (13)$$

on the other hand, $m=a$, then,

$$\mu = \frac{p-m}{p} = \frac{p-a}{p} \dots\dots\dots (14)$$

from this we get, $\frac{a}{p} = 1-\mu$, and $p = ra + (1-\mu)p$

In this $p = ra + (1-\mu)p$, Dr. Kalecki thinks that p is determined by the firm through the parameters of r and $(1-\mu)$ in relation to its average cost and the prevailing price.

From (13), we have

$$r = \frac{p-a}{a} \dots\dots\dots (15)$$

From (14) and (15), we have $\frac{r}{\mu} = \frac{p}{a}$

and from (14) we also have $\frac{p}{a} = \frac{1}{1-\mu}$

$$\therefore \frac{r}{\mu} = \frac{1}{1-\mu} \dots\dots\dots (16)$$

This is the relation of two kinds of degree of monopoly, and the newly adopted parameter of degree of monopoly $\frac{r}{\mu}$ is equal to $\frac{1}{1-\mu}$.

Therefore the formal difference is seen in the change from μ to $\frac{1}{1-\mu}$, which include explicitly r in it.

Now it is clear to see the changes of his degree of monopoly, that is,

$$\left. \begin{array}{l} \mu = \frac{p-m}{p} \\ \bar{\mu} = \frac{E+O}{T} \end{array} \right\} \rightarrow \left\{ \begin{array}{l} \frac{r}{\mu} = \frac{1}{1-\mu} = \frac{a}{p} \\ \frac{r}{\bar{\mu}} = \frac{1}{1-\bar{\mu}} = \frac{T}{W+R} \end{array} \right.$$

In spite of his effort to introduce r in the degree of monopoly, his argument is quite same. And the only difference of his argument is that he gives up the profit maximam principle for the full cost principle.

6. Conclusion

I do not think that Kalecki's formula need not to *determine* the relative share of labor.

I only wish to have some relationship between the degree of monopoly and the relative share of labor, but I also would like to have the profit maximum principle rather than the full cost principle, and it seems to me that the assumption of horizontal cost curve is not realistic.

$$\text{I have, then, } \bar{\mu} = \frac{E+O}{T} \pm \frac{\alpha}{T}$$

where α is the difference of social average prime cost and social marginal prime cost. And it may be said that as the raw material cost needs proportionally to the output, this difference of α means the difference between social average labor cost and social marginal labor cost.

When this cost curve is decreasing, α has the positive sign, and when this is increasing, α has the negative sign.

And I will have also:

$$\frac{W}{A} = 1 - \left(1 + \frac{R}{A}\right) \left(\bar{\mu} \mp \frac{\alpha}{T}\right) \dots\dots\dots (17)$$

In this formula, we can say that relative share of labor is larger, when

- (1) $\frac{R}{A}$ is smaller,
- (2) $\bar{\mu}$ is smaller, and

- (3) $\frac{\alpha}{T}$ is positive and larger in its absolute value, and *vice versa*.
- (1) has the meaning of there circumstances, *i. e.*,
- (a) A is larger,
 - (b) R is smaller, and
 - (c) The rate of $\frac{R}{A}$ is smaller.
- (2) has the meaning of two circumstances, *i. e.*,
- (a) The average degree of monopoly is smaller,
 - (b) The elasticity of demand is larger
- (3) has one meaning *i. e.* cost curve is decreasing.

Among those conditions which the formula (17) can tell, the most important condition for the present Japanese economy is that if $\frac{\alpha}{T}$ has the negative sign because of the increasing prime cost due to the high wages and the rapid capital investment which causes also the high ratio of $\frac{R}{A}$ due to the increase of import, $\frac{W}{A}$ becomes necessarily smaller.

By and large, we may say :

- (I) The relative share of labor would be large, if the national income is large, and the elasticity of import to income is small, and the society is fairly competitive or well working competition can be provided in it.
- (II) If the labor union pushes up their wages regardless to their society, there would be a certain limit beyond which cost-push inflation will occur.
- (III) Broadly speaking, when we compare the economy of Japan and the United States, for instance, almost all the items are more favorable to the United States, therefore wage-push labor movement becomes more troublesome in Japan than in the United States.

This is only one example, and according to these criterions, we can compare with each country or the same country of different ages. For instance, we can compare the developed country with the under-developed country and we may have some fundamental causality for the economic progress, and so forth.