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On an Inefficiency of Adjustment Mechanisms in Centralized Economies

Ken Morita

As is well known nowadays, overall bad economic performances for fairly a long time in centralized economies have mainly resulted from inefficiency closely connected with economic systems. From the viewpoint of this paper, at least partially, inefficiency should be interpreted as incomplete adjustment of disequilibrium caused by uncontrollable factors.

The purpose of this paper, consequently, is to examine an issue of adjustment mechanism in centralized economies within a framework of futures market functions.

This paper is divided into four parts. In section I, we examine the identity of functions against uncertainty in centralized systems and forward trading, basically with a contribution by J. R. Hicks. In Section II, we consider devices to eliminate income variance caused by uncontrollable factors mainly with a work by R. McKinnon. In section III, we investigate efficiency of spot market adjustment in commodity exchanges and in the last section IV we have a short conclusion to this paper.

I Forward Trading and Centralized Systems

Four possible causes of disequilibrium were suggested by J. R. Hicks.¹ Here the term disequilibrium means divergence between expected and realized prices, and the divergence comes out from inaccurate foresight (which means existence of uncertainty) and makes malinvestment, waste and imperfect efficiency of production.

According to Hicks, one cause (he said this was perhaps the least important) is produced when different people's price-expectations are inconsistent. Even if all buyers and sellers expect the same price, the total quantity all buyers plan to buy may not equal the total quantity all sellers plan to sell. This is the second cause of disequilibrium, and Hicks said it was perhaps the most interesting cause of all four. Moreover, even if both price-expectations and plans are consistent, people may not predict their own wants correctly, or make wrong estimates of the results of technical processes of production. If this arises, they will find that they are unwilling or unable to buy or sell those quantities they had planned to buy or sell. Therefore, realized prices will be different from expected prices. And this is the third cause of disequilibrium due to unforeseen changes in tastes, unforeseen results of technical processes, imperfect foresight of harvest fluctuations and unforeseen political upheavals, etc.

And moreover, even if no disequilibrium in any of the above mentioned three senses exists, nevertheless the most perfect adjustment of resources to

wants may not be reached. Because when risk and uncertainty exist, people will generally act not on the price that they expect as most probable, but as if that price had been slightly shifted in an unfavourable direction. In this way the efficiency of the system may be seriously damaged, and this is the fourth cause of disequilibrium (also called Imperfect Equilibrium).

Those divergences between expected and realized prices due to uncertainties are, in several ways, tried to be eliminated in order to improve efficiency of economic system. However, as Hicks correctly indicated, the third and fourth sources of disequilibrium must be found in every economic system, centralized economies or market economies, and even the most perfectly organized economic system cannot throw out the causes like harvest fluctuations, inventions, or political upheavals.

The first and second sources are tried to be eliminated in different ways in any economic system. In a completely centralized system the two sources would be removed. (But, as Hicks mentioned, a completely centralized system is a mere figment of the imagination). And within market economies, a device in which price-expectations and plans can be (at least partially) consistent exists. In market economies, we could have a device for eliminating or reducing the first and second sources of disequilibrium, that is, the device of forward trading. Hicks included, and we also include in this paper, not only futures market operations, but also dealings given in advance, and all long-term contracts.

Thus, we could say, as economic devices to eliminate the first and second sources of disequilibrium, there are centralized system in Socialism on the one hand, and forward trading in Capitalism on the other hand. If no sources classified as the third and fourth kinds exist, then, with device of perfectly centralized system or forward trading, price-expectations and plans will be consistent, and there will be no waste and there will be perfect efficiency of production. However, as the third and fourth sources could not be eliminated, disequilibrium caused by them does exist.

In this section, we would like to carry out the above argument by J. R. Hicks within a little wider perspective of devices to reduce uncertainty. As Hicks mentioned, in the device of forward trading, dealings given in advance and all long-term contracts were included. In those tradings between sellers and buyers, all the terms like trading period, quantities and prices are concluded. As a typical device, we could say that quantities and prices are fixed in advance and are actually traded at each delivery day. The long-term contract, in market economies, is concluded voluntarily between private enterprises. And we usually observe the same device in centralized economies in which centralized authority decides quantities and prices traded in advance, and state enterprises actually transact each delivery day.

In cases of the long-term contracts, they need to be mutually reciprocal. Thus, they need time for adjustment to reach mutual reciprocity, and there may be some cases² with risk of bargaining stalemates and cost of repeated recontracting and also risk of price fluctuations. The above mentioned cases

with risk and cost should be treated as an issue of tension management to reach a long-term contract. In cases where benefits with long-term contracts for stabilization could not cover costs for tension management, there may be possibilities for the buyer and the seller to be vertically integrated. The vertical integration seems to be a typical case. Through integration of the buyer and the seller, several resources are redistributed within the organization, and better information flow could make much less uncertainty. The vertical integration could be observed in market economies with rational reasons. In centralized economies, the same type of transaction could usually be observed between state enterprises under directions by planning authority, and it makes several resources redistributed and makes uncertainty much less.

In addition to the above, even under market economies, devices to reduce uncertainty through government intervention could exist. When disequilibrium under uncertainty has serious effects against stabilization for global economy, especially against economies in less developed primary commodity producing countries, both producing and consuming countries may contribute to establish a fund to stabilize price fluctuations, to stabilize producer's earnings and to secure consumer's imports. They are perhaps very important goals for centralized authority to stabilize producer's earnings, materials for consumers and prices. In other words, such intergovernmental agreement concluded under market economies is a trial to stabilize, even if a market mechanism is partially distorted. The goals in such agreement could be similar with policy goals in centralized economies.

Consequently, the essential frame that Hicks called forward trading means the fairly strict device in which quantities and prices would be predetermined in advance in uncertain situations in order to have coordinated price-expectations and plans. And under the frame, in each day for actual delivery, transactions can be liquidated. Such a frame can be commonly observed both in market economies with private enterprises and in centralized economies with planning authorities.

We recognize the difference between the above mentioned two systems. Since the third and fourth sources of disequilibrium could not be eliminated, both of them should have adjustment schemes to reach equilibrium. The adjustment schemes are not the same in the two systems. To analyse the difference is the main purpose of this paper, and it will be treated in the section III.

In this section, hereinafter, we would like to make Hicks' classification simply embedded in the much wider theoretical framework developed by K. Polanyi³ and N. Smelser,⁴ from the viewpoints of anthropology and sociology, in order to correctly arrange economic devices (forward trading and centralized system) in a wider perspective.

Polanyi classified several types of economies into ascendant patterns of integration, which mean movement patterns of economic goods and service. According to Polanyi, there could be three ascendant patterns of integration,

which are (1) exchange, (2) reciprocity and (3) redistribution. And in each of the three, there are these four characteristics, which are forms of trade, uses of money, market elements and types of social structure. Among them, we here focus upon forms of trade from the viewpoint of this paper. Polanyi mentioned that forms of trade could be also classified into three types of trade, which are market trade, gift trade and administered trade. According to him, these types of trade are closely linked respectively with the three ascendant patterns of integration. It means that market trade links with exchange, gift trade connects with reciprocity, and administered trade relates with redistribution.

Their simple characteristics are as follows. Market trade means transactions done voluntarily between each economic agent, with market prices as a signal. Gift trade implies transactions based upon reciprocal relations in which economic agents share their value-systems, and with which economic agents can eliminate costs coming out from negotiations. Administered trade means transactions done by government intervention in order to achieve public goals.

In addition to Polanyi's anthropological approach, Smelser analysed the same problems from a sociological point of view. From the purpose of this paper, here we focus upon only the most adequate portion in the Smelser's paper. Smelser raised an interesting question about correspondence between patterns of integration and forms of trade. One of his arguments, especially, was focused upon the link between the categories of administered trade and redistribution.

Although we have no space to examine Smelser's argument against Polanyi, only one point that should be mentioned here is his careful consideration about features of administered trade in comparison with redistribution leads us to the additional fourth ascendant pattern of integration. Smelser's point of discussion is that redistribution only means for the government to collect wealth and to redistribute it with any changes. The term redistribution, therefore, means just only direction of movement of wealth, not any function of that movement. In administered trade, however, according to Smelser, any collective social goals like war do exist, and public authority mobilizes resources to achieve those goals. In regard to this aspect Smelser can add the fourth pattern of integration, which is called mobilization.

Instead of a pattern of integration, we would prefer to call it an exchange system, as Smelser did. The four exchange systems (exchange, reciprocity, redistribution and mobilization) are embedded into social structures. Consequently, the devices to reduce uncertainty and disequilibrium that are focused upon in this paper could vary in accordance with the social structures into which ascendant exchange systems are embedded. One of the most excellent points in Smelser's analysis is that he was successful in finding a correspondence between the four types of exchange and the AGIL scheme by T. Parsons and his associates.⁵ With the linkage, we can have a clear idea

that each ascendant exchange system comes out from the functional ascendancy of the society concerned.⁶ Therefore, for instance, when a society puts the functional ascendancy into completing some social policy goals, mobilization becomes an ascendant system of exchange.

Here in this section, we have the following concluding remarks in our argument.

(I) Concerning the devices to reduce uncertainty and to adjust disequilibrium, both in market economies and in centralized economies, we could recognize the same function in order to co-ordinate price-expectations and plans.

(II) However, since ascendant exchange systems vary, we could mention that mobilization (central planning) has been employed in centralized economies and exchange (forward trading) has been employed in market economies.

(III) Consequently, regarding the devices concerned here, we should be careful to recognize that the exchange systems are respectively different, but the function is identical.

II Uncertainty and Adjustment Mechanisms

The purpose of this section is to mention that, in case of including the third (and fourth) unavoidable sources of disequilibrium, both forward trading and centralized system could not eliminate perfectly those sources, and also to examine that, when the third (and fourth) sources could not be eliminated through forward trading or a centralized system, they should have an optimum combination of forward trading (or centralized system) and another device, mainly with argument by R. McKinnon.⁷

Although there are lots of factors in the third sources of disequilibrium, we consider here harvest fluctuations and also suppose an individual farmer as a typical economic agent facing uncertainty. And we assume that income variance is a reasonable measure of risk and uncertainty,⁸ and the farmer attempts to minimize income variance.

And we consider, with McKinnon, to keep the analysis as simple as possible, an individual farmer's planting decision is made exogenously and he has a fixed production opportunity. And the farmer's output (X) at harvest time can be viewed at planting time as a random variable, and also at planting time, he knows the mean (μ_x) and variance (σ_x^2), which are both fixed. And the actual spot price (P) at harvest time can be viewed at planting time as a random variable with a known mean (μ_p) and variance (σ_p^2). We also assume that X and P have a bivariate normal distribution.

We consider that the farmer sells X_f bushels forward for future delivery at the price P_f in order to reduce his income variance. And we assume that the period over which the farmer can sell forward spans the period over which the major price fluctuations occur. We also suppose that the expected value of P is the future price, that is, $E(P) = P_f$, that means no normal backwardation

exists. And finally, for simplicity, we assume that transactions in the futures market is costless.

This farmer's income at harvest time is shown as the revenue by adding the futures market transaction to spot market transaction, that is,

$$Y = P_f X_f + P(X - X_f) = PX + X_f (P_f - P). \quad (1)$$

As his expected income is dependent upon the uncontrolled random variables X and P ,

$$E(Y) = E(PX). \quad (2)$$

The farmer chooses the optimal value of X_f in order to minimize the variance of his income. Under the assumption of bivariate normality, we have,

$$\begin{aligned} \sigma_Y^2 &= E(Y^2) - [E(PX)]^2 \\ &= P_f^2 \sigma_x^2 + \mu_x^2 \sigma_p^2 + 2P_f \mu_x \rho \sigma_x \sigma_p \\ &\quad + (1 + \rho^2) \sigma_x^2 \sigma_p^2 - 2X_f P_f \rho \sigma_x \sigma_p \\ &\quad - 2X_f \mu_x \sigma_p^2 + X_f^2 \sigma_p^2, \end{aligned} \quad (3)$$

where, needless to say, ρ is the coefficient of correlation between X and P .

Differentiating (3) with respect to X_f and equating to zero, we can have X_f^* , the optimal value of the forward sale of X_f ,

$$X_f^* = \rho P_f \frac{\sigma_x}{\sigma_p} + \mu_p. \quad (4)$$

We can also obtain the minimum income variance σ_Y^{*2} by substituting X_f^* for X_f in (3),

$$\sigma_Y^{*2} = (1 - \rho^2) P_f^2 \sigma_x^2 + (1 + \rho^2) \sigma_x^2 \sigma_p^2. \quad (5)$$

In equation(5), the term $P_f^2 \sigma_x^2$ means the pure effect of output fluctuations, and $\sigma_x^2 \sigma_p^2$ represents the interaction effect between output and price variations. The terms imply that, even if the farmer has the optimal hedge through forward sale X_f^* , a residual income variance still exists, because output fluctuations, which is caused by the third sources of disequilibrium by Hicks, cannot be eliminated. And, in case of $\rho = 0$, we have,

$$\sigma_Y^{*2} = \sigma_x^2 (\sigma_p^2 + P_f^2). \quad (6)$$

As is shown in the previous section, the third (and fourth) sources like harvest fluctuations cannot be eliminated even in the most perfectly organized economic system. That is clearly represented by non-zero σ_Y^{*2} . Consequently, in order to eliminate income variance (which means to eliminate output fluctuations σ_x^2), we should have other devices combined to forward trading or centralized planning.

Concerning devices to eliminate output fluctuations, McKinnon examined the combined operation of buffer stock. If actual output becomes less than expected (and average) value, then the difference will be covered by selling from the buffer stock. Conversely, if actual output becomes more than expected (and average) value, then the difference will be eliminated by storing into the buffer stock. With this combination of buffer stock operation, the farmer's output supplied to the market could be completely equalized to the mean value.

We could go to the next step of this discussion, that is, an efficiency of the adjustment devices to eliminate income variance.

McKinnon compared opportunity costs of the buffer stock operation with the buffer fund program, both of which are non-market devices. Anyway, in order to have mean value of the farmer's income⁹ $P_f \mu_x$ in every period, McKinnon insisted that a joint buffer stock-forward sale hedge was more efficient than a joint buffer fund-forward sale hedge. He showed this the following very simple probability model. He supposed that the random variables X and P can be assumed only two values respectively, X_1 and X_2 , where $X_1 < X_2$ and both are equally probable, P_1 and P_2 , where $P_1 < P_2$ and both are equally probable. And suppose the two variables, X and P are independently distributed ($\rho = 0$), thus the events (X_1, P_1) , (X_2, P_1) , (X_1, P_2) and (X_2, P_2) are all equally likely with probability one-fourth. For the farmer, (X_1, P_1) is the least favourable situation, and (X_2, P_2) is the most favourable situation.

The goal of this stabilizing operation is to maintain the following average income in every period, that is ,

$$\frac{(X_1 + X_2)}{2} \times \frac{(P_1 + P_2)}{2} = \mu_p \mu_x = P_f \mu_x .$$

The problem we face now is to examine the cost of capital investment in order to maintain the average income. And to do this, let us investigate the amount of capital needed in the situation of the worst possible case, just the same as McKinnon did.

In the device of buffer stock, we assume the farmer would rationally behave as he sells his crop $X_f (= \mu_x)$ forward at the price P_f . However, his actual harvest is in the least favourable situation X_1 , which is less than μ_x . Then this farmer have to draw $(\mu_x - X_1)$ units of commodity from the stock at the price P_f . Consequently, the amount that have to be the capital invested in the form of the buffer stock is,

$$P_f (\mu_x - X_1).$$

And in the case of buffer fund, the value of output in the worst possible case is simply $P_1 X_1$. However, the farmer sells his crop $X_f (= \mu_x)$ forward at the price P_f . Thus the amount of capital that need be drawn from the buffer fund to maintain the average income is,

$$\mu_x P_f - P_1 X_1.$$

Since $P_f X_1 > P_1 X_1$, as is easily shown,

$$\mu_x P_f - P_1 X_1 > P_f (\mu_x - X_1).$$

Therefore, McKinnon clearly concluded¹⁰ that,

... capital invested in the buffer stock need be less than capital invested in a buffer fund ...

Needless to say, the opportunity costs of the both cases are interest charge on the value of the buffer stock and the buffer fund. Thus, the opportunity costs compared should be,

$$a(\mu_x P_f - P_1 X_1) > a P_f (\mu_x - X_1),$$

where a is the rate of interest.

Figures 1 and 2 graphically show the difference. In each figure, quantity of the output is measured with the vertical axis, and price level with the horizontal axis. As is mentioned previously, there are four possible events with equal possibility of one-fourth each, which are shown as points in the figures. The question that McKinnon proposed and we also examine here is to compare the amounts of opportunity costs in order to maintain the average income $P_f\mu_x$ when the farmer is in the least favourable situation, with P_1X_1 value of his output. The opportunity costs are shown as the areas shadowed in each figure. Figure 1 is the case of buffer stock, and Figure 2 is the case of buffer fund. The area shown as the opportunity cost in the buffer stock case is less than the buffer fund case.¹¹

Here in this section, we have the following concluding remarks.

(I) Both forward trading and centralized system are impossible to perfectly eliminate output fluctuations caused by the third and fourth sources of disequilibrium, therefore, income variance could not become zero.

(II) Consequently, in order to make income variance zero, both market economies and centralized economies should have other devices combined with forward trading and centralized planning.

(III) In considering efficiencies of the joint devices concerned here, since joint buffer stock and forward sale operation requires less opportunity cost than joint buffer fund and forward sale operation, we could say that the buffer stock is the device with the greater efficiency.

III Adjustment Mechanisms and Efficiency

In this section, we focus upon the issue raised in the second half of the previous section, that is, efficiencies of adjustment devices to eliminate fluctuations caused by the third (and fourth) sources of disequilibrium in the Hicks' sense. As the income variance is a reasonable measure of risk and uncertainty, to eliminate the variance helps to lessen uncertainty. And the adjustment devices for the economy means devices to eliminate the income variance combined with forward trading or centralized system.

Here we concentrate upon the issue on comparison of opportunity costs to have the average income $P_f\mu_x$ in case of the worst possible situation, in which the revenue from actual output is P_1X_1 .

However, from the viewpoint of this paper, the argument by McKinnon (and W. Poole) is not enough, because they did not use full functions of the futures market as adjustment devices. The purpose of this section is to examine just that issue in order to clarify the divergence in efficiencies of adjustment devices between market economies and centralized economies. The devices proposed by McKinnon (and Poole) to eliminate output fluctuations and to have average income $P_f\mu_x$ in every period are confined to non-market devices, the buffer stock and the buffer fund, though there are more functions in the futures market.

Figure 1 buffer stock case

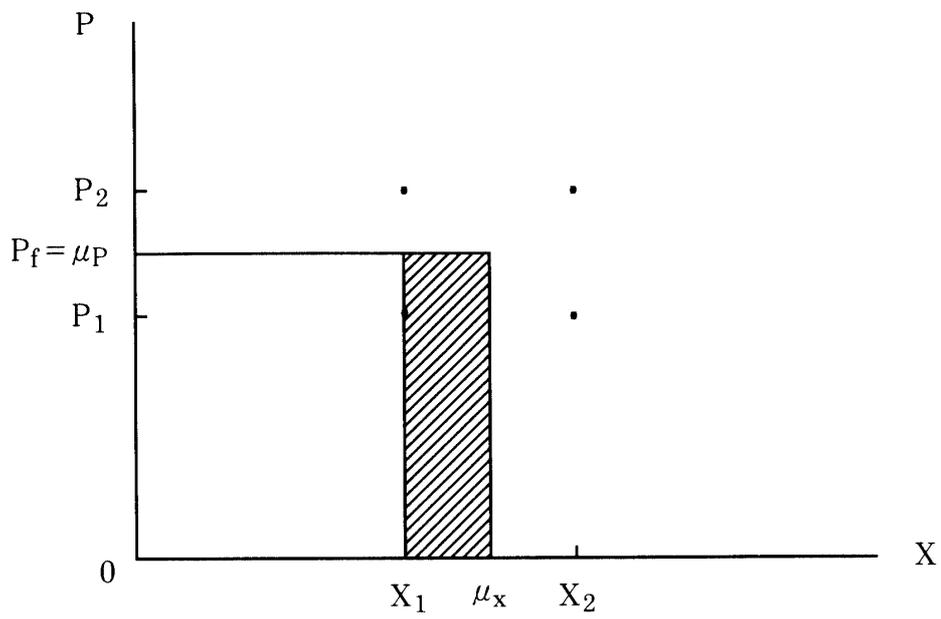
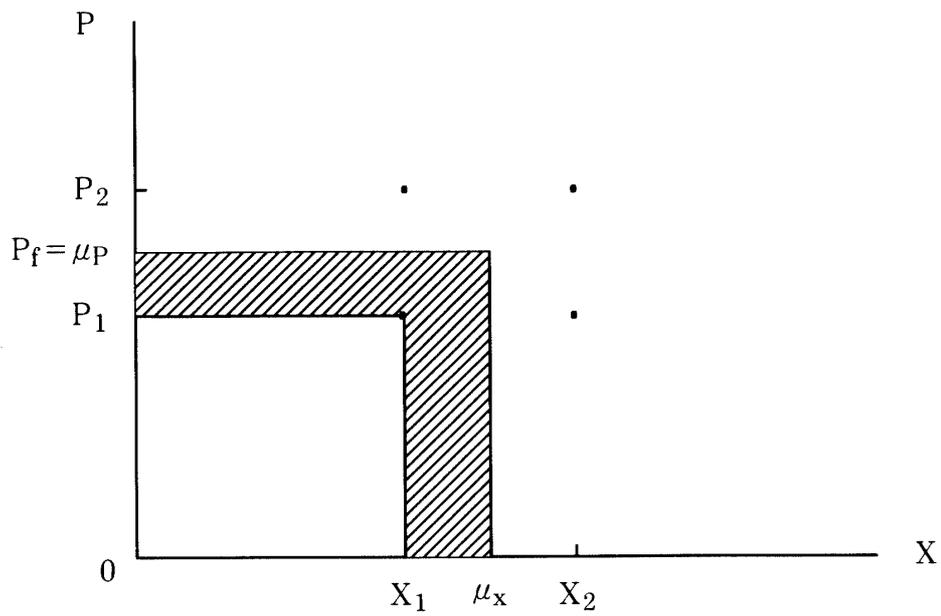


Figure 2 buffer fund case



We assume just the same as in the previous section, the farmer sells his crop X_f forward at the price P_f , and at the harvest time faces he the least favourable situation.

In this situation, the farmer should have liquidity to settle the forward contract. Nevertheless, he does not need any buffer stock.

We would like to propose, hereinafter, three alternative ways to settle the forward contract.

(I) The first way is a case that, in the settlement of forward trading, the farmer buys back the whole amount of the forward sale $P_f\mu_x$ at the futures market and sells the actual crop X_1 at the spot market with the price P_1 .

In this first case, (as is previously mentioned, the futures market price equals to P_f , which represents the average level), since the forward sale contract $P_f\mu_x$ is bought back with the quantity μ_x at the price P_f , the forward contract can be settled by the buying-back operation. The farmer needs no more operation. And he has the current income P_1X_1 by selling the actual harvest at the spot market.

Consequently, in order to have the average income $P_f\mu_x$, he must have liquidity amounting to $(P_f\mu_x - P_1X_1)$ in order to prepare against the worst possible case. The amount of opportunity cost in this case is the same as the case of buffer fund mentioned by McKinnon.

Needless to say, the following operation reaches the same result. That is, $(P_f\mu_x - P_1X_1)$ which is prepared in advance in addition to the current income P_1X_1 is paid for buying-back, and the amount $P_f\mu_x$ is received by settling the forward sale contract.

As the result of the above operation, with liquidity $(P_f\mu_x - P_1X_1)$ prepared in advance, the farmer has the average income $P_f\mu_x$.

(II) The second way is a case that, for liquidation of forward contract, the portion of X_1 is settled by the actual delivery, the residual portion of $(\mu_x - X_1)$ is settled by buying-back at the futures market price P_f .

In this second case, since the forward sale contract $P_f(\mu_x - X_1)$ is bought back with the residual units $(\mu_x - X_1)$ at the price P_f , the forward contract can be entirely settled. As the result, the farmer has the amount of income P_fX_1 resulting from the sale of the output X_1 at the price P_f .

In order to have the average income $P_f\mu_x$ in this second case, the farmer must have liquidity amounts to $(P_f\mu_x - P_fX_1) = P_f(\mu_x - X_1)$, to prepare against the least favourable situation. The opportunity cost in this case is the same as the case of buffer stock operation mentioned by McKinnon. Nevertheless, the supplier can settle the forward contract by buying-back for the portion $(\mu_x - X_1)$, which cannot cover by the actual harvest. It does not need to draw from the buffer stock for liquidation as was supposed by McKinnon.

Consequently, as is recognized in the second way, with the spot market adjustment in the commodity exchange, the opportunity cost in case of having liquidity in advance can be just the same as the case of buffer stock-forward sale operation insisted by McKinnon. Thus, McKinnon's (and Poole's)

argument should be considered as an imperfect result obtained by an insufficient investigation about the functions of futures market.

Needless to say, we may also suppose the operation as follows. That is, the farmer pays $P_f(\mu_x - X_1)$ to settle by buying-back, and he receives the amount $P_f(\mu_x - X_1)$ which equals to the amount of forward sale, which subtracts $P_f X_1$ settled by the actual delivery from the contract $P_f \mu_x$. As the result, with preparing the liquidity $P_f(\mu_x - X_1)$, the farmer can have the amount of $P_f \mu_x$ by adding $P_f X_1$ to $P_f(\mu_x - X_1)$.

Here, we can understand why the difference of opportunity costs between the buffer stock case and the buffer fund case comes out, by reference to the difference of the above (I) case from (II) case. In the first case, although the farmer can sell his output X_1 at the price P_f to settle the contract, he actually sells X_1 at the lower price P_1 . In the second case, the farmer sells the actual output X_1 at the higher price P_f as hedged in advance. Consequently, the difference between (I) and (II) does exist. From the viewpoint of this section, the difference reflects the “efficiency” in using the spot market adjustment of the commodity exchange.

Moreover, with just the same assumptions by McKinnon (and Poole), the third way to adjust uncertainty must be possible.

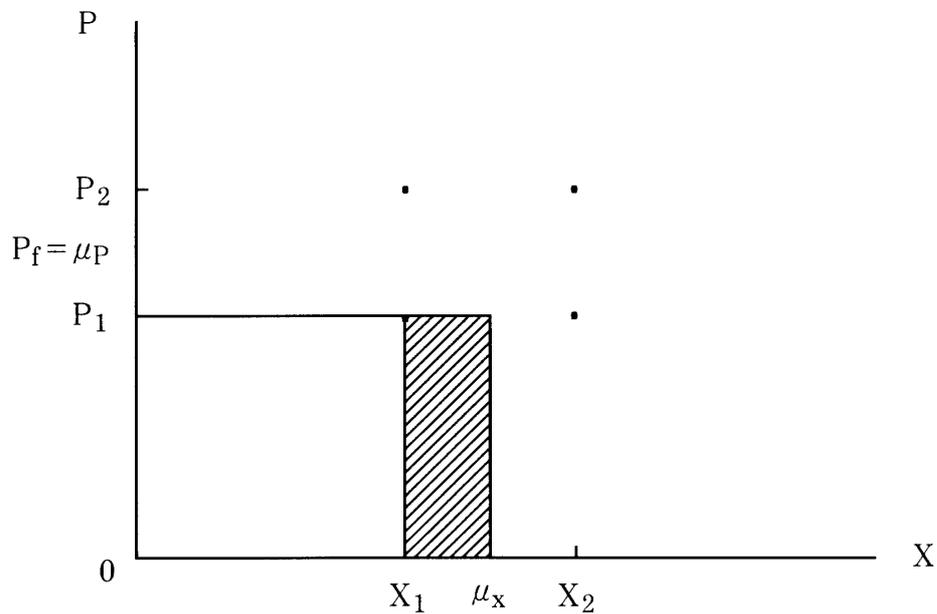
(III) The third way mentioned here is as follows. In the settlement of forward trading, the portion of X_1 is settled by the actual delivery, and the residual portion of $(\mu_x - X_1)$ is settled by buying the crop at the spot market and fulfilling by the additional actual delivery.

In this third case, the amount of liquidity needed for adjustment equals to $P_1(\mu_x - X_1)$, which is less than $P_f(\mu_x - X_1)$ and $(P_f \mu_x - P_1 X_1)$. Besides, by that operation the farmer can get an even profit $(P_f - P_1)$ per unit. Because, on the $(\mu_x - X_1)$ units, he buys at the lower price P_1 and sells at the higher price P_f . With the assumptions supposed by McKinnon (and Poole), this third case must be possible. Because, each farmer concerned here can have no effect upon the market price, and also we can assume that the additional demand $(\mu_x - X_1)$ has no effect upon the market price. If the economic agent’s adjustment behaviour at the spot market has an effect on the market price, the price level will become higher immediately, and the least favourable situation will be eliminated and no problem will exist. The opportunity cost is shown as the area shadowed in Figure 3, and is easily compared with areas in the Figure 1 and 2.

The third way can be interpreted as a case that, the commodity exchange that should be thought of as globally functioned exchanges like the London Metal Exchange (LME) works to provide the adjustment function for equilibrium,¹² instead of the buffer stock operation by the farmer.

Anyway, with investigation of the adjustment functions of futures market exhaustively, the opportunity costs of the devices mentioned by McKinnon (and Poole) can be arranged within the framework of spot market adjustments in commodity exchanges, and the additional third device should be examined with just the same assumptions

Figure 3 spot market adjustment case



In this section, we conclude as follows.

- (I) The spot market adjustment through commodity exchange needs less capital than non-market devices like the buffer stock and the buffer fund.
- (II) Thus, we could say that market economies have devices with greater efficiency and flexibility over centralized economies.

IV Conclusion

As is shown in the previous section, in order to eliminate the income variance which comes out from the output variance, it is not necessarily required to have non-market devices like the buffer stock and the buffer fund. We can have all the functions of the devices within the market mechanism in the commodity exchange. Moreover, the adjustment at the spot market in the commodity exchange needs less opportunity cost than the non-market devices.

The purpose of this paper is to examine the difference between the forward trading and the centralized system to adjust disequilibrium caused by the third (and fourth) sources.

The identity of the function of forward trading and centralized system to eliminate the first and second sources of disequilibrium could not reach the spot market adjustment. Undoubtedly, under the centralized system, we could suppose that the planning authority can have a plan to make each farmer's income $P_f \mu_x$ in every period and can have non-market devices for adjustment like the buffer stock and the buffer fund operation. However, the planning authority cannot have adjustment systems in which the farmer flexibly adjusts uncertain cases through buying-back, resales and spot market deals in the commodity exchange. In other words, concerning the function to

co-ordinate price-expectations and to co-ordinate plans, centralized economies have the same functions as market economies. Nevertheless, centralized economies cannot have flexible functions to adjust disequilibrium through the spot market adjustment, because the flexible spot market adjustment cannot exist in centralized economies.

Consequently, we could conclude this paper as follows. Opportunity costs under centralized economies to make each supplier's income the average level in the least favourable situation are, in case of the buffer stock,

$$aP_f(\mu_x - X_1),$$

and in case of the buffer fund,

$$a(P_f\mu_x - P_1X_1).$$

Nevertheless, the opportunity cost

$$aP_1(\mu_x - X_1)$$

can be possible only in case of the spot market adjustment in which functions of the commodity exchange are exhaustively used.

The difference,

$$a(\mu_x - X_1)(P_f - P_1),$$

and

$$a\mu_x(P_f - P_1),$$

can be interpreted to reflect the difference of efficiencies between market economies with the flexible spot market adjustment and centralized economies without the flexible spot market adjustment.

Notes

- 1 This section is indebted to John R. Hicks. See John R. Hicks, *Value and Capital : An Inquiry into Some Fundamental Principles of Economic Theory* (London : Oxford University Press, 1939).
- 2 Frederick M. Scherer, *Industrial Market Structure and Economic Performance* (Chicago : Rand McNally College Publishing Company, 1970), p. 248.
- 3 Karl Polanyi, *The Livelihood of Man* (ed. H. W. Pearson) (New York : Academic Press, Inc., 1977). And also see K. Polanyi, C. M. Arensberg, and H. W. Pearson, eds., *Trade and Market in the Early Empires* (The Free Press and The Falcons Wing Press, 1957).
- 4 Neil J. Smelser, "A Comparative View of Exchange Systems," *Economic Development and Cultural Change*, vol. 7, No. 2(1959), pp. 173-182.
- 5 See, for example, Talcott Parsons and N. J. Smelser, *Economy and Society : A Study in the Integration of Economic and Social Theory* (London : Routledge and Kegan Paul Ltd., 1956).
- 6 Concerning an analysis of correspondence of the frameworks in this section, see Ken Morita, "Kokusaishohinkyotei no Keizaishakagaku," (A Sociological Study of the International Commodity Agreement) *Ajia Keizai*, Vol. 21, No. 12 (December 1980), pp. 2-19.

- 7 This section is indebted to Ronald I. McKinnon. See Ronald I. McKinnon, "Futures Markets, Buffer Stocks, and Income Stability for Primary Producers," *Journal of Political Economy*, Vol. 75, No. 6 (December 1967), pp. 844-861.
And regarding economic analysis of futures market, see, for example, Jerome Stein, *The Economics of Futures Markets* (Oxford : Basil Blackwell Ltd., 1986).
- 8 McKinnon did not use the term uncertainty here. And, needless to say, uncertainty and risk are the terms with partly different concepts. Hereinafter, for simplicity, we focus the sharing area of the two terms.
- 9 As McKinnon correctly mentioned, "Once we introduce the possibility of building up or drawing down stocks, one must distinguish cash flow from income. Cash flow minus income is equal to the value of decumulated stocks at current prices." (McKinnon, p. 852.). Hereinafter, for simplicity, we use only the term income.
- 10 McKinnon, p. 854.
- 11 William Poole criticized the McKinnon's paper, and Ronald I. McKinnon replied against Poole. However, we have no space here to mention their argument, because the argument was not so crucial for the purpose of this paper. See William Poole, "McKinnon on Futures Markets and Buffer Stocks," *Journal of Political Economy*, Vol. 78, No. 5 (September/October 1970), pp. 1185-1190. And see Ronald I. McKinnon, "Futures Markets and Buffer Stocks : A Reply to William Poole," *Journal of Political Economy*, Vol. 79, No. 2 (March/April 1971), pp. 351-355. And regarding some comments about the argument, see Ken Morita, "Kanshozaiko to Shotokuhosho no Kikaihiyo ni tsuite," (On Opportunity costs of Income Stabilization Schemes) *Ajia Keizai*, Vol. 22, No. 2 (February 1981), pp. 61-68.
- 12 Readers can easily find such cases, for example, in LME. For instance, in case of international tin trade, Straits Trading Co. Ltd. and Eastern Smelting Co. Ltd. were the main suppliers of tin metal in the Penang Market. And they concluded forward sale contract of tin metal under uncertainty on quantity they could sell. When quantity in forward sale contract was more than quantity they could actually deliver, they settled the contract by buying the value of difference between contract and actual delivery at spot market in the London Metal Exchange. Because LME has a function of spot market adjustment, they could settle the forward sale contract. The above mentioned function like spot market adjustment in LME cannot be expected to be introduced in centralized planning economies. Needless to say, to establish and manage the commodity exchange like LME, they should have some cost. Thus, although it is an open question here, we should analyse another issue to compare the cost and benefit.
Concerning the international tin trade, see Hideyoshi Sakai, "Ichijisanpinkakaku no Tankifuateisei," (Short-run Price Instability of

a Primary Commodity) *Ajia Keizai*, Vol. 20, No. 10 (October 1979), pp. 123-141.

Readers can actually observe a kind of spot market adjustment in USSR and East European countries, which is usually called the “second economy”, although it is not so efficient. Concerning the second economy, see, for example, Ken Morita, “Poland ni okeru Dainikeizai,” (The Second Economy in Poland) *Ajia Keizai*, Vol. 27, No. 2 (February 1986), pp. 2-14; Marek Bednarski i Ryszard Kokoszczyński, “Nieoficjalna gospodarka i jej społeczne następstwa,” *Ekonomista*, Nr. 3-4 (1988), pp. 701-719; and Maria Łoś (ed.), *The Second Economy in Marxist States* (London : MacMillan Press Ltd., 1990).