# Land Reform as a Pareto-Improving Contract

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*The purpose of this paper is to refute the argument that sharecropping is Pareto-optimal. The author theoretically deduces the conditions under which sharecropping will demise and provides a foundation for the implementation of a Pareto-improving land reform program. The main theme is that traditional sharecropping, though efficient in an imperfect world, is so far from Pareto-optimality that Pareto-improving policy measures can be effective. The proposition implied in this paper is that industrialization will undermine the sharecropping system favoring landlords but marketization together with mechanization will then revive a new share tenancy system to allocate resources more efficiently. Land reform programs can play a key role at this transition.*

**Keywords**: *land reform, pareto-improving, share contracts, transaction costs*

## 1. Introduction

During the postwar period governments in many countries have enacted land reform policies to reduce income inequality. Although it is commonly argued that land reform is inefficient, in some countries, land reform poli-

cies have improved agricultural efficiency. According to Coase (1960), the attainment of a Pareto-efficient allocation is independent of the assignment of property rights. The distribution of income, however, does depend on the allocation of property rights. As argued earlier by Schickele (1955), the market mechanism will operate within different institutional arrangements in such a way as to improve income distribution as well as production efficiency.[1] Davis and North (1971) pointed out that when an institution is incapable of fully exploiting beneficial opportunities, it is time for a change. However, to evaluate the effectiveness and net welfare gain of an institutional reform, one must examine the effects on the accomplishments of the entire program rather than on just one policy measure of it.

Governmental programs attempting to alter the distribution of income have aimed at redistributing land property rights from a few large landlords to many small self-tillers. Many economists including Cheung (1968, 1969a) and Hsiao (1975), argue that land reform programs, rent reduction especially, are inefficient.[2] On the one hand, Cheung (1968 and 1969a) debates against the Marshallian view and argues that the share contract is as efficient as other forms of contracts, given zero transaction costs and no uncertainty. Moreover, with positive transaction costs and contracting parties' risk-averting behavior, share contracting seems to be a result of natural selection which leaves no room for government intervention. On the other hand, Hsiao (1975) explains that the share contract is designed for solving the inherent transaction cost problem and claims that the share contract is as stable as a wage or rental contract.

This paper examines the appropriateness of applying Cheung's and Hsiao's theses to land reform programs, especially rent restriction, and establishes an argument for efficiency-improving land reform policy. In a

market free from any transaction costs, Cheung's arguments are correct and consistent with the Coase Theorem (Coase, 1937 and 1960). Given zero transaction costs, it is futile to argue about which form of production organization is more efficient than others. In the real world, we observe different forms of production organization existing at the same time. We also observe that diversified incentives bring resource owners together to cooperate with each other. Then, given positive transaction costs, the situation provokes a research question: why is it that government-supported institutions or laws are unable to invoke the least transaction cost arrangement? In this paper, I argue that land reform policies may create a new form of contract which replaces other types of institutions, such as share contracting, under traditional land tenure systems.

The paper provides a theoretical justification for the implementation of land reform programs. It does not consider any further restrictive or protective policies on agriculture. In particular, it investigates the effects of reform on agricultural production. Section 2 reviews the main arguments pertaining to the sources of inefficiency in land tenure systems. It analyzes the logical problems of arguing for or against the efficiency of share-cropping and explains why share-cropping is not Pareto-optimal. Section 3 establishes the conditions under which share contracts demise. Section 4, then, argues for the potential possibility of improving welfare through implementation of land reform. The functions of land reform in Taiwan are also explained in Section 4, and a summary of theoretical implications for improvements in allocative efficiency with land reform is presented. Section 5 provides the conclusion and implications for countries wanting to reform their land tenure systems.

## 2. A Critical Review of the Literature

Traditional types of land tenure contracts generally include wage, share, and rental contracts.[3] Most analyses of farming efficiency focus on whether a share contract is as efficient as a wage or rental contract. Treating them as equally efficient, Cheung (1968, 1969a, 1969b) and Hsiao (1975) argued that any policy such as a rent reduction program (under which the rent share is fixed) may fail to achieve efficiency. However, Ip and Stahl (1978) and Chao (1983) countered that Cheung and Hsiao failed to consider the consequences for farming of changing government policies on manufacturing; namely, that farming will be affected because capital, labor, and entrepreneurs are mobile. Furthermore, Koo (1974) and Thorbecke (1979) argued that the land reform policy itself increased economic efficiency.

In an agricultural society, concentration of land ownership characterizes the monopolistic power of a landlord. This characteristic is compatible with the structure-conduct-performance paradigm of the theory of industrial organization. In principle, rulers' granting monopoly power generally creates distortions in the market which create high transaction costs. For this reason, it is not acceptable to consider the land market a free market where the transaction costs are assumed to be zero. Specifically, in an underdeveloped rural economy, geographical distance and relatively high transportation costs make market information costly and hence asymmetrically available to landlords and tenants. Low levels of literacy and lack of non-farm job opportunities usually impede poor landless peasants' ability to bargain and to get a good contract to use land. The implication is that improvements in transportation, education, farming technology, and property rights will

expand farmers' choice sets and improve market efficiency (Koo, 1974).

Again, the land market (land being a factor of production) is hardly a perfectly competitive market as land is owned by a few wealthy people who have at least certain monopoly power to sell the land or its use (Koo, 1977). In addition to the landlord's monopoly power, crop or land taxes levied by the feudal and local government generally distort the market price of land. Thus, the rental price of land is, in the neoclassical sense, not competitively determined and hence is subject to a degree of distortion (Jaynes, 1982 and 1983). Lucas (1979), in a general equilibrium analysis, points out two types of distortions, namely, monitoring costs and a share "tax." A tax-like share creates disincentives to the tenants' marginal effort decision. Competition among tenants once entered into contracts does not remove the disincentive (Alchian and Demsetz, 1972). This is because efforts by the hired worker must be subject to monitoring, and monitoring is costly. So, it is necessary for the landlords to incur costs monitoring farm work. The implication is that the initial assignment of land rights creates constraints prohibiting Pareto-optimal contracts.

At this juncture, what Cheung (1968) means by a free market requires some explanation. Cheung's analysis is based on a monopolist landlord maximizing wealth subject to the constraints of private property rights in a free market. First, Cheung states that tenants have their free choice, that is to choose to work as a tenant farmer or instead as a wage worker outside the farming area. Non-farm job opportunities reduce a landlord's monopsonist power to purchase labor. However, a competitive labor market does not necessarily imply a competitive land market. The reverse is also true. Cheung did not assume a monopolistic landlord, neither did he assume that land rent is determined competitively. Rather, he assumes that land

rent and labor intensity (and other contract terms) are stipulated by the landlord. In order to set up his model, Cheung deliberately endogenizes the rental share, the size of plot rented, and the tenant's effort under the guise of supposing the rental cost of land is already determined in the land market.

Second, Cheung assumes exclusive and transferrable resource rights for each contracting party; each party is free to accept or reject the negotiated contract terms. Clearly, this does not necessarily imply that the tenant has equal bargaining power relative to the landlord. Assuming zero transaction costs, the landlord maximizes his wealth subject to the constraint in which the tenants' opportunity earnings equals the prevailing market wage. Given the landlord's exclusive rights, he is free to decide his own optimal share (r), number of plots (m) with plot size (h), and to stipulate the optimal labor intensity (t). These are supposedly not initiated by the tenants. The landlord may adjust those decision variables to make a land contract more attractive to a tenant if he has some knowledge of the tenant's superior ability or other potential contributions (e.g. the tenant's innate and acquired skills, capital, tools, etc.) to production. This might mean competition for better tenants. But a skilled tenant is not necessarily a skilled factory worker. In a populated area, we often see adverse selection —— the less-skilled workers drive away the skilled workers. When more tenants compete to contract for land-tilling, skilled versus less-skilled tenants may not be easily identified. Competition may drive down the rental or wage rates. Furthermore, if there is competition for land, a tenant's bargaining power on a share contract is weak relative to that of a landlord who exclusively owns some fixed amount of scarce lands. If the landlord does try to select better tenants, he must have incurred some information or screening costs. The costs incurred may

or may not be a substitute for monitoring costs.

Implicitly, Cheung assumes constant returns to scale technology, and the output level (q) is determined by two inputs, labor effort (t) and the quality of the assigned plot of land (h). Let $q_t$ and $q_h$ stand for marginal productivities of labor and land respectively. Diagram 1 summarizes the debate of Cheung (1968) and also Hsiao (1975) and explains how these two arguments contradict each other regarding share contracts. AW is the market wage rate; CT plots the marginal product, $q_t$, at different values of tenant effort, t; and BT is the tenant's share, $(1-r)q_t$, of the marginal output. The Marshallian view holds that the tenant has incentive to work only up to effort level $T_1$ and not $T_2$. Therefore, the landlord must stipulate $T_2$ in the contract. Cheung argues that the marginal condition of $(1-r)q_t = W$ at Point G leaves extra income of Triangle ABG which is not consistent with equilibrium. Because, if a tenant works only up to $T_1$, the share income of area $OBGT_1$ exceeds opportunity cost $Wt_1$ by ABG. According to the traditional view, a stable and efficient equilibrium should allow the tenant to work up to $T_2$, corresponding to the point where $q_t = W$. But, in the sense of Cheung, that is simply a landlord-determined equilibrium based on the landlord's incentive to balance ABG to GEF such that the tenant's income is maintained at the wage-, share-, or utility-equivalent level. It is emphasized that the landlord has an incentive to urge the tenant to work up to $T_2$ where the marginal product of labor equals the market wage rate. The area of GEF can be defined as the tenant's opportunity loss due to taking the share contract rather than taking a wage contract elsewhere to extend his work from $T_1$ to $T_2$. In this sense, the tenant's incentive is totally neglected in Cheung's model. Thus Jaynes (1982) suggests that Cheung's model is *ad hoc* because the land market equilibrium is supply-determined and the labor

service is a choice variable for the demander but not for the supplier.

Hsiao claims that allocation G is unstable because of the competition among landlords. Landlords will compete by offering bribes of GEF to induce the tenant to work up to $T_2$. The landlord receives an extra gain, output DEG; and the stable equilibrium is allocation E.

Cheung's and Hsiao's arguments are not only inconsistent but also contradict each other. The facts in the historical record do not support Hsiao's argument. If, following Hsiao, we turn Cheung's model into a landlord-competitive model with off-farm opportunities, it is postulated that the tenant will allocate his work time between farm and non-farm work such that he maximizes his income equaling $OAGT_1 + T_1GET_2$. So, with the landlord's compensation of GEF to the tenant, the income received by the landlord will be the area of BCEG which is inconsistent with the share rq. An efficient allocation of resources for landlords may not be efficient for tenants. The resolution of the incentive problem depends on private income transfer and is subject to negotiation between the landlord and tenants.

The similarity of Cheung's equilibrium to a true competitive equilibrium is based on the assumption that the earnings offered in farming are equal to the market wage. However, Cheung's analysis implies that the law assigns the landlord rights to stimulate his tenants' labor efforts as well as to get a share of produce as rent from each tenant. In fact, this situation forces a tenant to choose between an off-farm job and a farming work, i.e., should he choose to enter the share contract, he cannot participate in work outside of farming.[4] Second, tenants may be compelled to enter into contractual bargaining and, hence, weaken their bargaining power.[5] If we allow that the constraint on the tenant's opportunity earnings equals the tenant's share plus some off-farm job earnings, then it becomes more feasible for him to choose
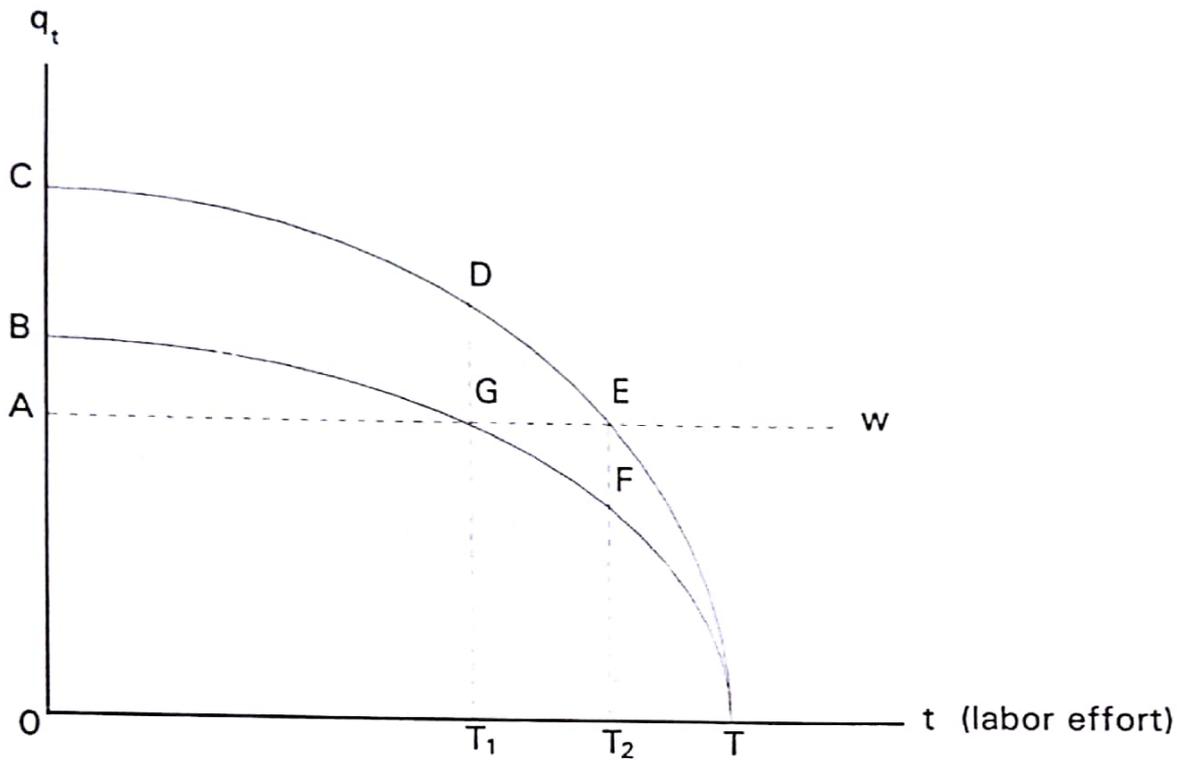
Diagram 1. Stability in Share Contract Equilibrium

among different jobs. This formulation implies that the job choices are "mutually exclusive." And, only if the land rent is competitively determined in a land market and is a parameter of the landlord will the constraint of $Wt = (1-r)q$ imply the efficient solution of t at $(1-r)q_t = W$, and of h at $q_h = r$, while Euler's theorem holds. This holds as a fundamental basis on which the classical (Marshallian) inefficiency argument lies. There is a market demand for land, which hinges on the tenant maximizing utility subject to his time allocation. If the efficiency of both landlords and tenants is neglected, the condition of Pareto optimality will not be satisfied.

Cheung argues that the landlord is free to accept or reject the terms raised in negotiations by the tenant. If the number of tenants is large and

no coalition among them is possible (reflecting high transaction costs), it is unlikely that a tenant will turn a contract down even if the contracting terms are not particularly attractive. Again, according to Koo (1973 and 1977), market distortion will eventually make the terms of trade unfavorable to the tenants because they have to compete for limited contracts since tenants are contract-takers or followers and landlords are contract-leaders. The idea can be shown in the following Edgeworth-Bowley box diagram, Diagram 2, where the landlord maximizes his utility by making an offer along his offer curve subject to the tenant's initial utility level (which may be a subsistence level) being fulfilled. It is quite different from the usual general competitive equilibrium analysis in which the landlord maximizes utility subject to the tenant's utility or the other way around, such that the equilibrium is jointly determined by both parties' offer curves. If we consider the landlord's rights, Cheung's contracting solution definitely deviates from the contract curve, and hence, from any Pareto-optimal solution.

In Diagram 2, I show the welfare loss in the situation congruous to the landlord's maximizing behavior as in Cheung's model described above. In Cheung's model, $O^T$ represents the offer curve of the tenant; $U^T$ and $U^L$ represent the utility levels of a tenant and a landlord, based on the amount of outputs shared by each party; and, the subscripts 1 and 2 represent level of utility at initial endowment point E and after setting up the contract, respectively.

The landlord's equilibrium point, $E^L$, is the tangency point between the tenant's offer curve and the landlord's indifference curve, not the tangency point of two new indifference curves. Inefficiency is implied here because the landlord is acting just like a Stackelberg leader.[6] In a Stackelberg-leader share contract, the relative bargaining strength of a landlord and a tenant

Labor                                                Tenant



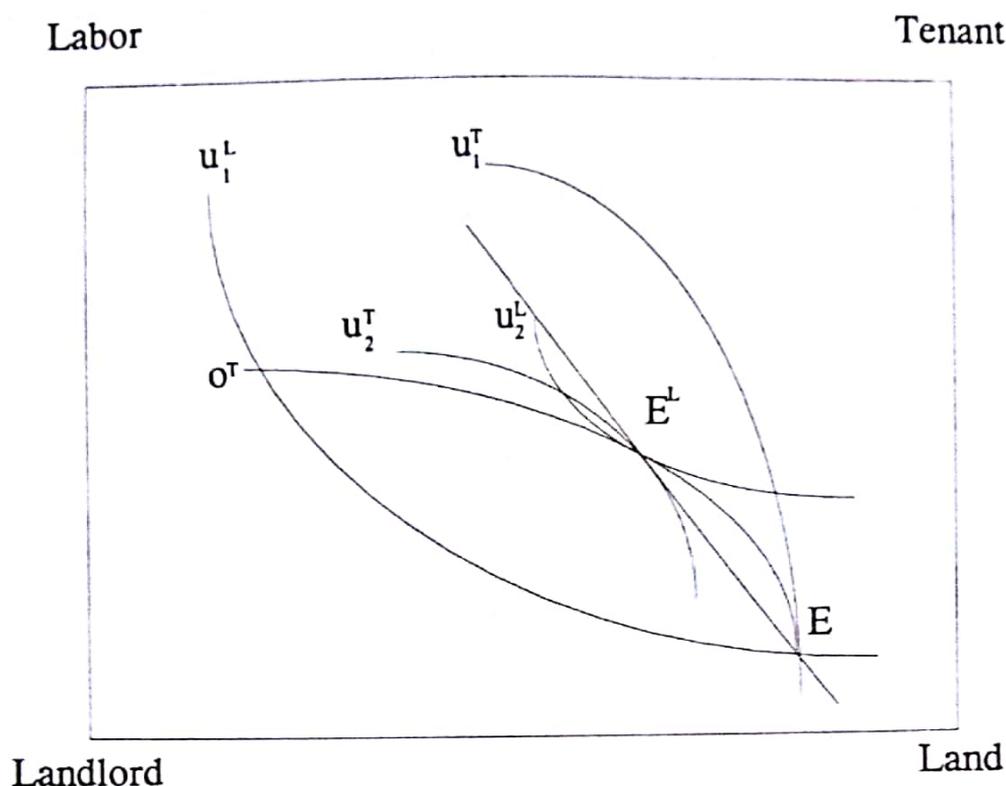Landlord                                             Land

Diagram 2. Welfare Loss under Imperfectly Competitive Tenure System

is not as symmetric as in a perfectly competitive market. The contractual arrangement will not stay on the contract curve formed by contracting parties with equally distributed bargaining power. The solution in Diagram 2 is not Pareto-optimal and is just an illustration to show a monopolistic behavior based on Diagram 1. Apparently, there is still some room for improving efficiency by correcting market distortions, but this remains unreached. Even without appealing to a policy for equalization of income distribution, the imbalance shows that there is room for Pareto improvement.

Cheung (1968 and 1969a) admitted that his standard theory alone could not explain the existence of share contracts. Although he mentioned the role of market wage in the choice of rental share, he suppressed it in his model. Instead, he introduced a risk-sharing argument as an explanation

(Cheung, 1969a and 1969b). Other than the risk-sharing explanation, Reid (1977), Hallagan (1978), Allen (1982), and Keijiro and Hayami (1988) all pointed out that the entire tenure system is an "agricultural tenure ladder" for screening the ability of the tenants. This type of argument claims that the tenurial ladder is an efficient device for discerning tenants' managerial ability. At the same time, it reveals the very high information cost involved with identifying good-quality labor. Chao and Chen (1982) also hold that the share-contracting arrangement in Chinese history served as a transitional form to allow an agricultural worker to climb up the ladder from a wage contractor to share-contractor, fixed-renter, and even to an owner-cultivator.[7]

It is true that when the competitive wage is low, a worker may have an incentive to gain managerial ability, especially when owning a piece of land provides one with a strong sense of security. As will be argued later, in a modern society, when human capital can be relatively easily recognized, division of labor and specialization breaks down the ladder and in turn creates a more flexible tenure system. Chao (1983) conceded that a state of general equilibrium may not be perceivable in the short run, by a static analysis, because of the low mobility of farmers and some other institutional restrictions. The implication is that in order for a farmhand to become an owner-cultivator, he must undergo a long period of struggle.

Day (1967) claims that labor-saving technical progress, such as large-scale mechanization, may lead to the demise of sharecropping. Bardhan and Srinivasan (1971) see the demise of sharecropping as a consequence of land-augmenting technical change. Lucas (1979) believes that labor-saving technical progress reduces the incidence of sharecropping. Alston (1981) goes further and hypothesizes that mechanization reduces total costs of labor and monitoring such that share contracts may be replaced by wage contracts.

The implication is that the changing wage rates characterizing the onset of mechanization (or industrialization) may play an important role in the disapperence of share contracts.

## 3. Further Discussion of the Demise of Share Contracts

The important role of market wage rate has been neglected in the existing literature. This motivates an exploration of how wage rate changes affect the existence of share contracts, and hence affect the implementing of the land reform policy. In this section, the Cheung model is conceptually modified (as shown in the appendix) by making the market wage rate an exogeneous and changing variable, while in Cheung's model, the wage rate is a constant.

The three major equations below, (1)~(3), are exactly the same as in Cheung's model. Respectively, they correspond to equations [A6]~[A8] in the attached appendix A. In the appendix, a rigorously extended derivation of the comparative statics is presented, with some testable implications.

(1) $q_t = W$

(2) $q_h = \dfrac{rq}{h} \left( i.e., \; r = \dfrac{hq_h}{q} \right)$

(3) $r = 1 - \dfrac{Wt}{q}$

Since the only exogenous variable is the wage rate,[8] the qualitative responsiveness of the endogenous variables with respect to changes in wage are accordingly, $r_W < 0$, $m_W > 0$, and $t_W < 0$.

The comparative statics can be illustrated graphically by Diagram 3, based

on the derived conditions also shown in appendix A. This figure exhibits the general equilibrium solution in a four-quadrant diagram. To summarize, the wage rate is an exogenous variable competitively determined in the labor market, and the other three choice variables (r, m, and t) are determined in the model with the assumption of zero transaction costs. The comparative statics show simultaneous decreases in rent share, increases in number of plots, and decreases in desired tenant's effort as the market wage rises. The intensity of labor relative to land (t/h) falls when wage increases, as shown in the second quadrant, and falls in relation to increased output per unit of land. Subscript 1 indicates the initial situation and subscript 2 indicates the situation after a change in the wage rate.

The demand for labor curve in relation to current wage rate, as equation [1], is shown in the third quadrant of Diagram 3. It determines the stipulated labor input of the tenant. The wage-rental relationship represented by equation [3], indicating a share constraint stipulated by the landlord, is shown in the fourth quadrant of Diagram 3. Curves in the third and fourth quadrants shift inward as wage rate increases. This has another explanation, too. Cheung (1968, 1969a) shows the changes in the marginal product of land curve. Here, unlike Cheung's presentation, this is converted into a marginal product of labor curve. Then, Diagram 3 presents the general competitive equilibrium framework asserted by Cheung (1968, 1969a). Under this framework, supply of land in terms of the size of the plot rented is upward-sloping and is adjusted by the landlord with equations [2] and [3] subject to the changes in wage rate. The land market equilibrium is shown to be supply-determined. In this model, the landlord determines the price of using land and the quantity of the rented land. In Cheung's theory, the landlord is definitely not a price taker. Rather, he is a price searcher. So,

this general equilibrium solution is not Pareto-optimal, in the sense that the marginal conditions are not equated at the margin.

When the rental share or the rental cost of using land is competitively determined in the land market, it is treated as a parameter by the landlord. The Cheung model becomes a really competitive model in which the landlord is also a price taker in the land market. If landlords have only rights to choose the number of the plots, m, and treat the rent share as a parameter, production efficiency will be achieved in a competitive market as suggested by Bardhan and Srinivasan (1971) in a short run case or by Chao (1983) in a long run case. Unfortunately, this is not the situation. Since the rent share is (partly) determined by the landlord, decision cost is incurred. And, the cost will be shared by the weaker party in the contract. This is the source of inefficiency.

Since the markets are neither free nor perfectly competitive, the economic outcome is not unconstrained Pareto-optimal, given the above-mentioned share institution. By consideration of Pareto-improving policy measures, it is possible to address some of the fallacious arguments often advanced to support the efficiency and Pareto-optimality of the share contract.

First of all, strongly implied by Diagram 3 is that as the wage rate continues to rise, the share contract tends to disappear in the long run, as will be explained using Diagram 4.[9] This point is neglected by Cheung. In essence, with an imperfect land market, as long as the wage rate is somehow maintained at a low level (perhaps a subsistence level as is the case in many underdeveloped economies), the share contract will prevail, rendering it needless to introduce the risk-sharing argument (Cheung, 1969a and 1969b) which is Cheung's initial research motive. Moreover, he argues: if a share contract is not efficient, why does this type of contractual arrangement persist
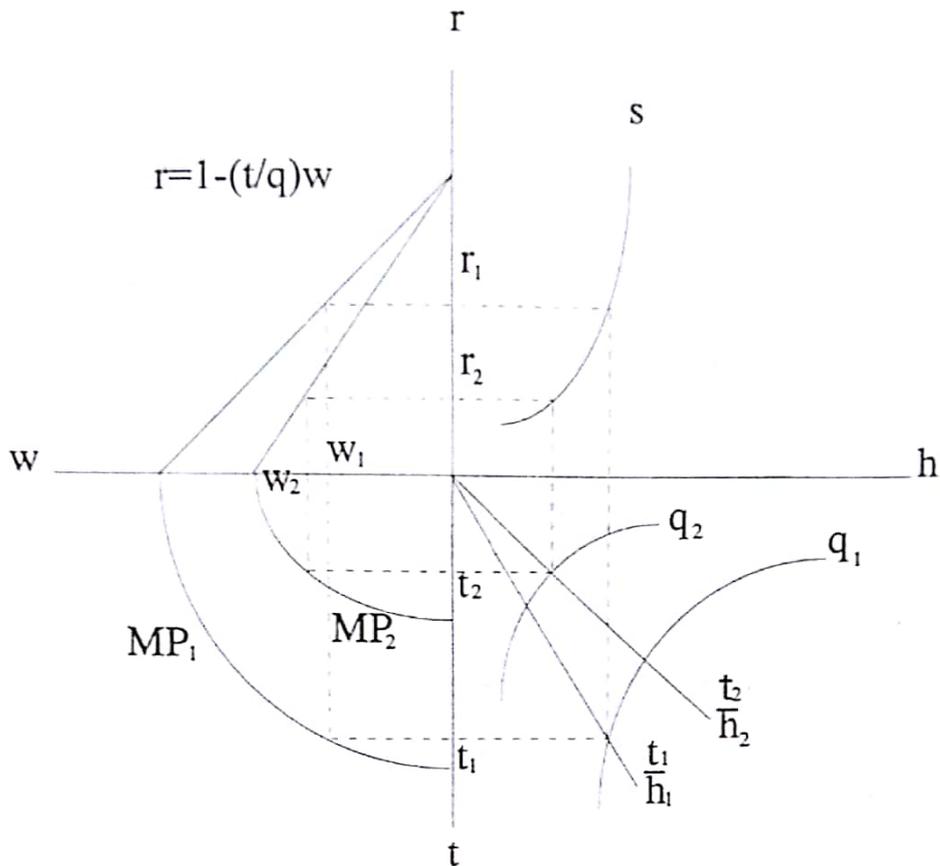
Diagram 3. Is The Landlord's Equilibrium in Cheung's
Model A Pareto-Optimal?

for so long a time in history.[10] Apparently, Cheung overlooked the answer
inherent in his model, although he nevertheless tried very hard to explain
the efficiency of the share contract in terms of risk-sharing.

Second, even if Hsiao's argument (outlined in the second section) tends
to result in a solution which is closer to the competitive one, it fails to explain
the existence of the share contract in the long run. The existence of the
share contract relies on the existence of lower wages in traditional agricultural
systems. Diagram 3 together with Diagram 4 express the expectation that
the share contract will become extinct with continuous increases in wage
rates. As the wage rates continue to rise, Cheung's model predicts that the
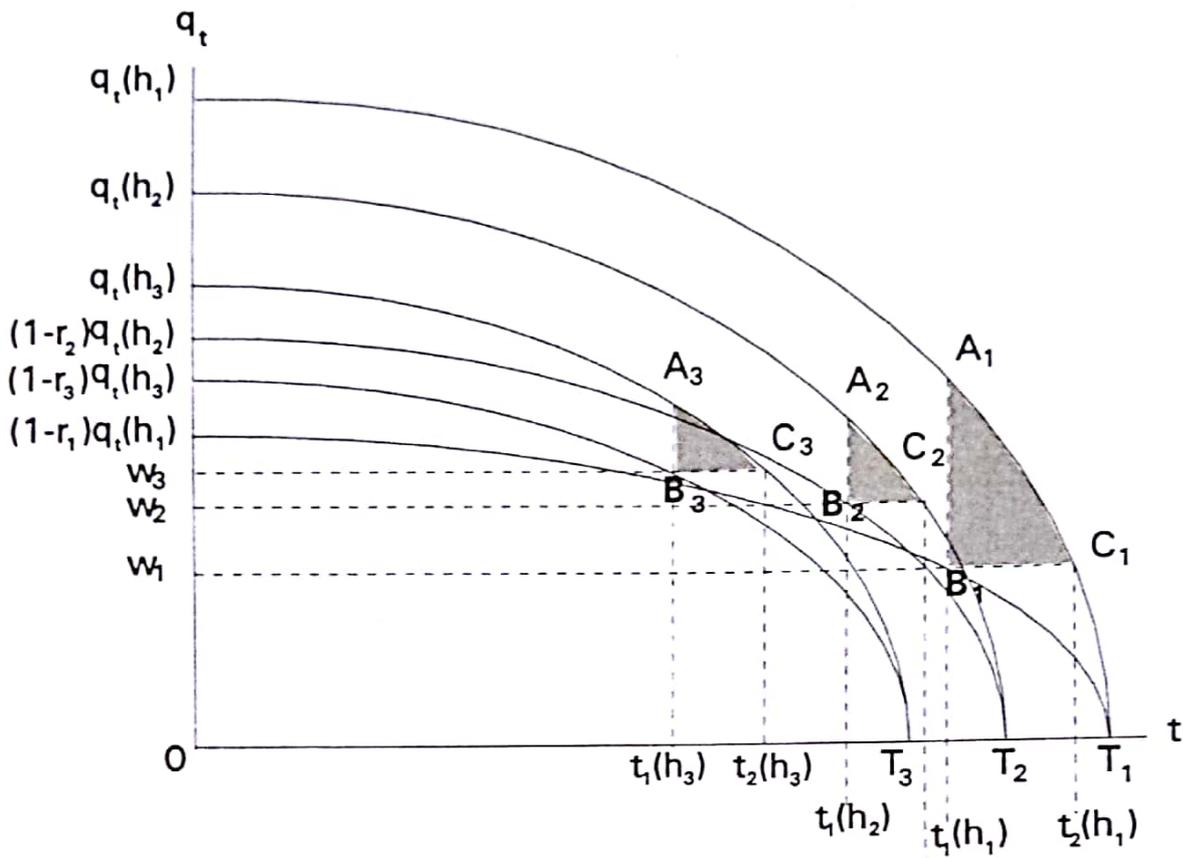
Diagram 4. The Demise of Share-contracting

landlord will have to provide smaller plots for each tenant and ask for a lower share. The $q_t$ curve will shrink with smaller T and the $(1-r)q_t$ curve will become steeper, corresponding to a decrease in share rent and plot size.

As Diagram 4 shows: $q_t^1$ shrinks to $q_t^2$, and then to $q_t^3$ while the corresponding marginal product curves to the tenant are $(1-r)q_t^1$, $(1-r)q_t^2$ and $(1-r)q_t^3$. As a result, the net gain for the landlord (after bribing the tenant) shown by the triangle ABC will become smaller and smaller as from $A_1B_1C_1$ to $A_2B_2C_2$, and to $A_3B_3C_3$. Again, a continuous increase in wage will cause the landlord to reduce the size of rented plots to increase their number, stipulate a lower labor intensity and a lower rent, decrease the net gain as shown in areas ABC (with subscripts 1, 2, and 3 respectively) and finally

result in the demise of the share contract. The implication for this point is: a long-lasting low wage rate keeps the share contract in practice which suffices to explain its existence.

Third, the incentive problem between the landlord and tenant, if unresolved, may invoke other types of contractual arrangement, such as a wage or fixed rent contract. If an agreement cannot be reached by both parties, either the landlord will prefer to make a wage contract or the tenant will prefer to contract for a fixed rent. In fact, all three forms of contract existed in traditional Chinese agriculture as in some other economies.

If in fact, (referring back to Diagram 1) a tenant does work up to $T_1$ tilling a rented farm plot and working at another place to earn wage income equal to $W(T_2 - T_1)$, then he will gain extra income of area ABG, the part that exceeds his wage income of $Wt = (1-r)q$. Thus, he has efficiently utilized his time to maximize his income. So, it is efficient to use the tenant's labor for farming up to $T_1$ but not $T_2$. Under the agricultural ladder hypothesis, extra income makes possible a transformation of a laborer from a farm-hand to a share tenant, a fixed-renter, and finally an owner-cultivator. Gradually, he can accumulate wealth by accumulating experience and managerial knowledge including a sense of risk-management.

Cheung (1968 and 1969a) conceptually uses general equilibrium theory to derive a competitive solution. But in his model the only maximizer is the landlord. In theory, it is not impossible to derive a general equilibrium solution for a maximizer under a monopolistic competitive structure. In view of this, should Cheung admit that his theory of the share contract is deduced from a landlord-dominated model of the general equilibrium framework, it would not be difficult to argue that sharecropping is quasi-optimal in the sense of Baumol (1979) due to the existence of uncertainty and transactions

costs. If Cheung had done this, the inconsistency in his work criticized by Jaynes (1983) would not occur. My surmise is that, in order to argue against the classical view of share-tax for sharecropping to be efficient, he unavoidably fell into the trap of assuming perfect competition which by nature does not exist. Admittedly, his model realistically describes the fact that some landlords do have certain monopolistic power. In practice, share tenancy or the agricultural ladder is an efficient device to allocate resources in imperfect land and labor markets.

As has been pointed out, the share contract may eventually disappear with continuous increase in wages, whether there is land reform or not. However, as long as the wage rate continues to be at a subsistence level, a landless peasant may stay poor forever. If that is true, then the essential problem regarding efficient allocation of resources is nothing but the choice of the institution through which industrialization and inceasing wage can be made possible. More exactly, it is important to find out under what kind of ownership system the resources may be allocated most efficiently. Land reform problems actually belong to this category.

## 4. The Potential Gains from Land Reform

Economic theory predicts that, in an imperfect world, powerful resource owners maximize their own utility and not necessarily total economic welfare. Pareto-optimality as a benchmark devised by economists is never reached. Based on the above analysis, it is appropriate, now, to discuss the role of land reform in improving efficiency. An imperfect economy can seek some ways to improve efficiency leading to a Pareto optimality. In the following, the functions of land reform in Taiwan in its three stages —— rent reduction, sale

of public lands, and private ownership by farmer tenants —— are explained.[11]

1. Rent reduction. Among the options for a government seeking to make Pareto improvements are (1) correcting the distortion in the land market, and (2) regulating the negotiated contracting terms. To regulate or control share rents is easier for the government to do, but harder to monitor if the landlords retain the right to make contracts with any potential tenant. Who will get the right to till the land for the landlord? The answer under rent control will depend on a non-price-like mechanism: those who pay the highest amount of something different from the output to bribe to the landlord will get the rights to till the rented land. This is similar to the argument Hsiao (1975) uses in supporting Cheung's efficient share contract argument by which the landlord has an incentive to bribe the tenant to work until the marginal productivity of labor equals the market wage rate. Under rent restriction, the tenant may have incentive to bribe the landlord for the right to till the land. In both cases, they are not efficient in the sense that the other cost (the bribery) is never zero, and hence, the prices observed in the market do not reflect opportunity costs of resources. In this sense, a rent reduction program alone cannot be Pareto-efficient because one distortion is corrected by introducing another.[12] This bribery as part of costs is of course not observed by the classical economists who also argue that the share contract is an excise-tax equivalent and is inefficient. After all, a single program of rent control plays no role on efficiency improvement. Then, why does rent reduction exist?

Koo (1977) applies Harberger's (1972) theoretical model in a numerical example to show the effect of rent reduction on income redistribution. It appears that under rent reduction, income of the small competitive landlords (who are the owner-cultivators) increases at the expense of the large mo-

nopolist landlords, leaving wage workers' income unaffected. This implies that the purpose of the rent reduction program is to create an incentive for farmers to till their own land and an incentive for landlords to own less land. So, under owner-cultivation, the true economic effect of rent reduction is to reduce internal transaction costs to zero and help accelerate the implementation of a land-to-the-tiller program. Even more important, not only are there more self-tillers, but also the farmers find it more beneficial to make investment in both land improvement and farming machines.

2. Sale of public lands. The problem that should be solved is this: when a progressively greater number of farmers is willing to cultivate and own their own lands, or when more tenants are willing to become owner-cultivators, can the government supply enough land for those who wish to till their own lands but do not have any? A second program of land reform, i.e., the sale of public lands, is to sell public lands directly to the tillers. But in Taiwan's case, there was not enough land for sale due to the very strong demand. The demand for land was to some extent the effect of the rent reduction program. Land sales must involve reassignment of private lands.

Can the government simply expropriate land from large, monopolistic landholders to become itself the largest owner of land and then make contracts with all farmers? This point ought to be considered in light of the theory of just compensation and reasonable compensation, and cost-benefit-analysis. Suppose the government simply takes over the monopoly power from landlords and asserts a comparative advantage; the action may well pose several problems. The cost of taking over and the transaction costs involved with all contracts, especially the very high supervision and monitoring cost for all those nationalized farm-workers must be considered.[13] Moreover, such action might not even be efficient in resource reallocation. Also, the

extremely high transaction costs caused by having no private property rights may well come into play.

A government is able to use subsidy programs to encourge farmers to invest in research and development, to promote agricultural extension together with education, and to achieve economies of scale by implementing projects such as water control, dam construction, irrigation system improvement, and rural electrification. Even if these services are demanded from the government by its citizens, mostly because of high private user's cost or free-riding problems, there is limit to how much the government can provide. As a result, it is obvious that a government take-over of land is not beneficial. Because it is commonly recognized that positive changes can be stimulated by a rent reduction program, it is not hard to carry land reform toward its last step. That is, to promote a land-to-the-tiller program in which farmers are assigned land rights.

3. Private ownership of land by farmers. In the land-to-the-tiller program, we witness the benefits of self-tillers owning their own lands. Past experience clearly suggests that such resource allocation is the most efficient, with tillers cultivating their own lands after the government has redistributed land to farming families.[14] By "contracting" with every farm household, the government is able to assign private property rights to farmers who are now free to make contracts in a competitive market. The land market distortion is thus corrected because land prices will be competitively determined. In sum, production by free market contracts is likely to be efficient, because the transaction costs of the land-renting system can be largely reduced. In addition, government tax revenues are likely to rise, as demonstrated in countries with successful land reform programs. Tax collection was a serious problem in traditional China because there was extensive tax evasion under

share contracting arrangements (Chao and Chen, 1982). By its nature, a land reform program can be considered a new kind of contract (actually a convention) between the government and farmers, similar to the terms in a constitution. This type of contract maximizes the social welfare and is Pareto-improving.

Furthermore, the government's purchase of privately owned lands from the large landowners not only compensates the landowners for the loss of their lands but also can have the effect of directing the lower use value of the managerial ability of those landlords to a higher use value if they turn to helping to promote industrialization. Also, when people are in the highest position of the job-ladder, they have acquired the managerial skills which are in common use elsewhere. In a general equilibrium framework, land reform may further speed up the change in economic structure and generate higher economy-wide income. Ip and Stahl (1978) suggested that land reform measures can improve intrasectoral as well as intersectoral resource allocation. Proper compensation to landowners is financed by the sale of various government bonds and stock in public enterprises, the purchases of which are often made by landowners themselves who were already well-off. Consequently, the new owner-cultivators and the old landlords all become better off. The entire institutional arrangement created through land reform can be said to be Pareto-preferred in the sense of Hirshleifer.[15] The land reform has achieved its target of making the owner-tillers better off while the landlords are at least as well off as before.

Once a land reform program has been completely implemented, its effects on efficiency can be justified. Using Diagram 5, I present a conceptual modification of the idea in Diagram 2 by incorporating the human capital and physical capital into one factor of production category called capital,

Captial

Tenant

$u_1^T$

$u_2^T$

$E^n$

P

$o^L$

$u_2^t$

$o^T$

$E^0$

$u_1^t$

Landlord

Land

Diagram 5. Pareto-improving Land Redistribution and Compensation

for simplicity. Land is kept as another production factor category. In the beginning of land reform, farmers are endowed with some experience in farming and other physical assets. The government is endowed with only capital assets. Landlords are endowed mainly with land and some physical assets. The endowment point $E^0$ is the initial situation before land reform. The land reform measures then change the endowment point to be $E^n$.

Note that the vertical change in capital does not mean a reduction in capital assets to farmers. It simply represents the transfer of assets from the government sector to the landlords as compensation for their land. The horizontal distance measured in terms of land represents the transfer of land from landlords to tenants. The utility level of landlords is kept the same or slightly improved, whereas the utility level of tenants is increased. With the

new endowment point, landlords no longer have monopoly power and rent can be determined and contracted without distortion. Only then can rent restriction be said to be redundant or harmful.

Under a tenancy system of owner-cultivation, owner-tillers have the greatest incentive to exert themselves to accumulate wealth. In this case, the overall improvement of efficiency through the land rights reform contract can be said to be Pareto-improving. I conclude this section by providing some testable implications.

1.   Tillers can freely determine which crops they want to plant in whichever piece of land they own. After they have paid the land price in full, they may freely sell their land to other farmers who wish to expand their land holdings.

2.  There will be more joint-product technology developed or chosen by farmers. As a result, the multiple crop index (MCI)[16] will increase (Koo, 1974). This shows that the self-tiller can improve his income by utilizing his own land more technically and efficiently at his own discretion.

3.  At the same time, an increasing MCI can also represent risk-dispersion behavior, in anticipation of a time when "famine" might occur —— then, not all expected income will lost. In a sense, it is innovative to reduce risk, unlike the case of English open fields.[17] This is especially important when a formal market for insurance is non-existent. Technically speaking, uncertainty can be reduced by diversifying farming products, hence, diversification can be treated as a device for self-insurance. Chao and Chen (1982) have demonstrated that this kind of innovation exists in traditional farming. Diffused private ownership gives more farmers greater discretion to develop this type of technology.

4. The government can still play an active role in providing some public

goods to all cultivators or supplying credit for farmers. In this sense, we may say that the objective function of the government is to maximize the economic welfare of farmers or the net present value of farming production.

The above statements imply the existence of economies of scope, even if the farm size is limited. The hypothesis or testable implications will then be that farmers are making technological choices to achieve economies of scope, as substitutes to other risk-sharing arrangements, such as share-contracting.[18] This also implies the demise of the share contract in terms of technology, similar to the reasoning of Day (1967).

This paper has aimed at making a persuasive case for land reform, showing that through land reform, the land market can be effectively transformed into a free market and the transaction costs can be reduced. A new competitive environment can evolve. If there is any form of a legal agreement between the contracting parties after reform, it can be said to be efficient under this type of the general equilibrium framework, as in Bardhan and Srinivasan (1971) and unlike Cheung (1968 and 1969a). But the choice of contract still depends on negotiation and bargaining costs plus other transactional costs. A bargaining approach like that of Bell and Zusman (1976) may be appealing in this case.

# 5. Conclusions

This paper implicitly takes transaction costs into consideration and infers that land reform is Pareto-improving. Based on the above analysis, it has been demonstrated that the wage rate is a very strong economic variable which stimulates the incentives of farmers to farm. It also implies that there is an important role for industrialization in farm production.

The effect of a land reform program is not independent of the effect of a fast-growing industrial sector. Equal distribution of land becomes a new initial situation previous to industrializing. During the process of economic growth, labor migration from rural areas to industrial centers can be significant, which in turn requires mechanization in rural economy. Human capital accumulation over time appears important in both industrializing and organizing farms. Human capital with specialization may explain the prevailing contractual choice for land better than traditional tenure-ladder hypothesis. Moreover, the use of farming machines may reveal the benefits of scale economies to farmers. This will call for consolidation of farm plots through contractual arrangements. Further research is still required to deal with the problem of different contractual forms to organize farm production. An interesting proposition regarding to share contracts is yet to be examined: before marketization, in a pre-industrialized economy, continuous increase in the wage rate tends to lead to the decline of sharecropping dominated by landlords; whereas after marketization of farm land and production, continuous increase in wage rate tends to revive sharecropping, but this time the arrangement is desired by tenants.

Furthermore, transaction costs involved with contractual analysis so far have not been given sufficient attention, except perhaps by Datta, O'hara and Nugent (1986). Contracting among different resource owners as in the situation described above via a price system alone is not the best institution for resource allocation given the resource constraints, and disregarding the assignment of property (Baumol, 1979). Given a competitive economic environment, a contract can be devised to efficiently utilize productive resources only if the transaction costs can be minimized. Contractual analysis can also help to explain the existence of different types of contractual arrangements

in the modern agricultural economies.

# Footnotes

1. The point is equivalent to the idea of the First Optimality Theorem in a general equilibrium setting, in which perfect markets are implied. See in Rowley and Peacock (1975), Roumasset (1979), and Bromley (1989), chapter 5 and 6.

2. The entire land reform in Taiwan includes three stages: first, the implement of the rent reduction from whatever down to 37.5 percent of annual standard product, starting from 1951; second, the sale of public lands to the tillers, starting from 1954; third, the implement of the land-to-the-tiller program starting in 1953 to cope with the sale of public lands. The third stage lasted for 10 years due to the repayment of land price by the purchaser-tillers to the government.

   According to Thorbecke (1979), characteristics favorable to Taiwan's land reform process include: (1) the land reform program was implemented gradually and effectively, in three stages indicated above; (2) successfully converting the agricultural sector from a tenant- or landlord-dominated agriculture to an cultivator-dominated sector in a very short period; (3) the land redistribution was truly unimodel (meant to be unique and not easy to be copied by other country) in the sense that very few farmers could own more then ten acres, given the total limited amount of land available and the large agricultural population; (4) the previous landlords before the program was implemented received some compensation for giving up their lands, in effect, their asset structures changed from holding mainly lands to holding mainly some government bonds and some

private stocks; (5) some complementary policy measures were implemented through public investment and services such as provision of credit, extension services, irrigation system, and so on. Beside these, transaction costs which would otherwise be involved with share-contracting under traditional share tenancy were largely reduced through the land reform programs.

3. In a wage contract, the landlord, holding land ownership and residual rights, hires and directs farm workers and pay wages. In a share contract, the landlord, holding ownership and managing the farm, contracts with tenants to share the residual rights. In a rental contract, the landlord manages the farm by specifying the crops to be cultivated and providing services such as irrigation and pest control, while a peasant hires land by paying fixed rent, holding no ownership of land but enjoying the residual rights.

4. Supposedly, workers are wage (price) takers, hence wage contract takers. There is no way to bargain over the wage rate in the labor market. Hence is a share contract taker.

5. In this situation, the Euler's theorem holds despite the objective function of the landlord maximizing profit or rent. Also, if the wage rate increases, tenants will adjust their labor effort automatically but not through landlord's stipulation.

6. A similar treatment can be found in Jaynes (1982).

7. A similar job ladder can also be found in modern industry. For example, an autoshop worker as a wage worker becoming a partner sharing profit with the shop owner, then as a fixed-renter for an autoshop, he finally becomes an owner who may hire some hands helping in his autoshop.

8. Elsewhere, the total land size (H) can be shown as an exogeneous variable, see in Cheng (1993). But in this paper and for simplicity, it can be treated

as given without any change.

9. The problem being: how, in a highly populated economy, can the wage rate increase continuously without industrialization as in most western economies. It then leaves the issue to economic growth.

10. In an underdeveloped rural economy with high population density relative to arable land, the option on non farm wage versus tenant wage, share or rent is absent. Mostly, the opportunity cost may equal to a subsistence diet. Then the constraint becomes $(1-r)q(h, t) = q$. Being put into this constraint, a tenant can only struggle for survival even in the long run. No wonder why share contract can last for so long a time in history. But, of course, it is part of the reason.

11. Please refer back to note 2.

12 Lee (1980) offers three requirements for just regulation. Rent reduction is actually a rent regulation or control, serving for the purpose of transferring land rights from previous landlords to new farmer-tillers.

13. This was likely the case of land reform in Mainland China in early 1950s, which turned out to involve high transactional costs (mainly the monitoring cost) to guarantee some level of production.

14. Some criteria determining the amount of land allocated to individuals are understandable, e.g., land fertility, family size, local and regional tax burden, topography, climate, etc.

15. See the definition in Jack Hirshleifer (1984, p.476).

16. The multiple crop index is calculated as a total yearly crop area divided by total cultivated area. The crops counted are only the major crops.

17. Farmers cultivate land in numerous, detached plots but not in a consolidated field as a way of averting risk. See in McCloskey (1976).

18. Cheung (1969b) provides some evidence refuting this hypothesis, but it is

in a different situation, i.e., where market wage rate is held constant.

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# Appendix A.
# The Comparative Statics of Cheung's Model and Implications

In Cheung's model, the landlord is assumed to maximize total rent (R), who is endowed with H amount of land divided into m plots with size h. The level of output (q) is technologically determined by land (h) rented to the tenant and the tenant's effort (t). That is, $q = q(h, t)$. The choice variables to the landlord are the rent share, r, m, and t. The market (real) wage rate, W, is exogenously determined. Thus the landlord's objective function is $R = mrq(h, t)$, given H. The tenant is made indifferent between income from rented land and income from any non-farm job implying that $(1 - r)q(h,t) = Wt$.

The Lagrangian is:

[A1] $\underset{m,r,t}{Max} \quad \psi = mrq(h,t) - \lambda(Wt - (1-r)q(h,t))$

Note that h = H/m which implies $dh/dm = -H/m^2 = -h/m$ or $\partial logh/\partial logm = -1$. Let $q_i$ represent the first partial of q with respect to i, and $q_{ij}$ represent the second or cross partials of i and j, where i, j = h, t. With a well defined quasi concave production function, $q_i$ is positive and $q_{ij}$ is positive when $i \neq j$.

The first order conditions are:

[A2] $\psi_m = rq(h,t) + mrq_h(h,t)(-h/m) + \lambda(1-r)q_h(h,t)(-h/m) = 0.$

[A3] $\psi_r = mq(h,t)\lambda q(h,t) = 0.$

[A4] $\psi_t = mrq_t(h,t) - \lambda W + (1-r)q_t(h,t) = 0$

[A5] $\psi_b = -Wt + (1-r)q(h,t) = 0.$

Equation [A3] implies that m $= \lambda$, meaning the number of plots equals the shadow price of the constraint. Equations [A2]~[A5] imply the following three equations:

[A6]　$r = q_h h / q,$ note here that r is a share but not rental cost to land.

[A7]　$W = qt.$

[A8]　$Wt = (1 - r)q(h, t).$

By the implicit function theorem, equations [A6] ~ [A8] imply landlord's three choice functions depending on two parameters, H and W. These three choice functions are:

[A9] $m^* = m(H, W); r^* = r(H, W);$ and $t^* = t(H, W).$

Plug [A9] back to equations [A2], [A4], and [A5], so we are able to do comparative statics. By that, we get the following equations:

[A10] $r(H, W)q(H/m(H, W), t(H, W)) - [H/m(H, W)]q_h(H/m(H, W), t(H, W)) -$

$$[H/m(H, W)](1 - r(H, W))q_h(H/m(H, W) - t(H, W)) = 0.$$

[A11] $m(H, W)r(H, W)q_t(H/m(H, W), t(H, W)) - m(H, W)W$

$$+ \ m(H, W)(1 - r(H, W)q_t(H/m(H, W), t(H, W)) = 0.$$

[A12] $-Wt(H, W) + (1 - r(H, W))q(H/m(H, W), t(H, W)) = 0.$

Comparative statics helps to find out the effects of changing wage on three variables, namely the rental share, the number of plots, and the tenant's labor effort requirement as will be stipulated by the landlords. By taking the first partial derivative of equations [A10]~ [A12] with respect to W, holding total land area H

constant, We now get the following three equations:

[A13]   $r_W q + r(q_h[dh/dm]m_W + q_t t_W) - [dh/dm]m_W \cdot q_h - h(q_{hh}[dh/dm]m_W + q_{ht} t_W)$

$- [dh/dm]m_W(1-r)q_h - (1-r)qh - h(1-r)(q_{hh}[dh/dm]m_W + q_{ht} t_W) = 0.$

[A14]   $m_W r q_h + m r_W q_t + mr(q_{th}[dh/dm]m_W + m r q_{tt} t_W) - m_W W - m + m_W(1-r)q_t$

$- m(1 - rW)q_t - mr(q_{th}[dh/dm]m_W + mr q_{tt} t_W) = 0.$

[A15]   $-t - W t_W + (1 - r_W)q + (1-r)(q_h[dh/dm]m_W + q_t t_W) = 0.$

Simplify equations [A13]~[A15], they become:

[A16]   $-q r_W - (1-r)q_h[h/m]m_W + ((1-r)q_t - W)t_W = t.$

[A17]   $0 r_W - q_{th}[h/m]m_W + q_{tt} t_W = 1.$

[A18]   $-q r_W + (r q_h h/m - q_{hh} h/m)m_W + (q_{ht} - r q_t)t_W = 0.$

Equations [A16]~[A18] can be summarized into equation [A19]. Let A, $X_W$ and B represent the matrices in equation [A19] in their sequence, and $X_W$ represents the first partial of r, m, and t respectively.

[A19]   $\begin{bmatrix} -q & -(1-r)g_h \frac{q}{m} & (1-r)q_1 - W \\ 0 & -q_{th}\frac{h}{m} & q_n \\ -q & (rq_h - q_{hh})\frac{h}{m} & q_{th} - rq_t \end{bmatrix} \begin{bmatrix} r_W \\ m_W \\ t_W \end{bmatrix} = \begin{bmatrix} t \\ 1 \\ 0 \end{bmatrix}$

By matrix operation, we may solve for $X_W$ to get $X_W = A^{-1}B$. Notice that the determinant of matrix A must be negative for the second order condition to hold. We then utilize the Cramer's rule to find out the solution as follows.

[A20]   $\begin{bmatrix} r_W \\ m_W \\ t_W \end{bmatrix} = \begin{bmatrix} \frac{|A_r|}{|A|} \\ \frac{|A_m|}{|A|} \\ \frac{|A_t|}{|A|} \end{bmatrix} = \begin{bmatrix} - \\ + \\ - \end{bmatrix}$

In Equation [A20], the A matrix with subscripts r, m, and t respectively represent

the first, second, and third column of matrix replaced by B matrix.

The results indicate that as the wage rate, W, increases, the landlord maximizing total rent, R, will respond to reduce the rent share (r), increase the number of plots (m), on the other hand, given H, reduce the plot size (h), and stipulate less tenant's labor effort (t) simultaneously. The mathematical results are shown diagrammatically in Diagram 1.

# 釋論土地改革為柏拉圖效率增進契約

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　　本文之目的在揚棄傳統農業分租制為柏拉圖最適之論點，除藉交易成本理論以推導分租契約歸趨消失的條件外，並提供一個執行柏拉圖效率增進之土地改革的理論基礎。傳統分租契約制度因存在於不完全競爭的土地制度之下，其效率非屬柏拉圖最適，故可訴諸於柏拉圖效率增進的政策措施。本文的涵義是：工業化促使有利於傳統農業地主的分租契約消逝，但市場化及機械化則有助於使新租佃制度之復生，進而促進資源的有效配置；土地改革即在此一時期，扮演一種制度性變遷的關鍵角色。

關鍵字：土地改革、柏拉圖效率增進、分租契約、交易成本