Original Article

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Share Contract Revisited: A New Transaction Cost Approach

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Abstract: The purpose of this paper is to explore how sharecropping contracts are chosen over fixed-rent contracts. There are two concerning issues. First, theoretical explanation has been criticized for not providing a satisfactory answer to the question as to why share contracts are chosen. Second, among the existing empirical studies, there are great controversies about the impact of variance of output. Inspired by the latest insights from (Cheung, S. N. S. 2014. *Economic Explanation*. Hong Kong: Arcadia Press.), this paper not only provides an explanation for the choice of share contract that is suitable for empirical testing, but also solves the puzzle over variance of output.

Keywords: choice of contract, sharecropping, transaction cost, new institutional economics

JEL Classification: B5, D8, L2

1 Introduction

Modern contract theory, which is rooted in the research on agricultural reform in Taiwan by Cheung (1969), involves two major components: the efficiency of different contractual arrangements and the choice of contracts. Although the two topics are interrelated in certain ways, this paper restricts its focus on the second to provide an economic explanation for the choice of contracts in a free market.¹

¹ One question about the studies of Allen and Lueck (1992, 1999) is that their sample comes from the US, which is a highly regulated market for agriculture.

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There are two concerning issues in the choice of contracts. First, theoretical explanations often can hardly be tested empirically. Currently, there are two major approaches for the choice of contract in terms of sharecropping versus fixed-rent contracts: the principal-agent approach and the transaction cost approach. However, neither approaches provides a suitable model for empirical testing. The fundamental problem is that concepts in these explanations can hardly be observed and empirically tested. The direct consequence is that, although there are a large number of theoretical works on contract choice developed in the past 30 years, empirical works remain scarce (Salanié 2003), not to mention the lack of supporting evidence for these complicated theoretical models (Prendergast 1999).

Second, within the limited number of empirical studies, there are contradicting results about the relationship between output variance and the use of share contract. Cheung (1969) find that a rise in the variance of output in agriculture is associated with an increase in the possibility of adopting sharecropping contract in China and Malaya, respectively. Nevertheless, using data from India and America, Rao (1971) and Allen and Lueck (1992, 1999) find rejecting results about the variance of output. Therefore, it remains unclear whether variance of output is a decisive factor to influence the use of share contract.

This study addresses the question of how a share contract is chosen over a fixed-rent contract based on Cheung's new explanation. We argue that the information cost of the quantity of the output before production (measured by the variance of output) and the monitoring cost of the output after harvest would affect the decision of sharecropping contract.

This research makes the following two contributions. First, it provides a testable explanation for the choice of sharecropping contract. Second, by identifying the key variables in influencing the choice of share contract, we also solve the puzzle related to the impact of the variance of output.

As discussed earlier, there involves two transaction costs, i.e. endogenous variables in explaining the decision of two contracts. Hence, it implies that, to examine the effect of one transaction cost, another one must be roughly constant in the sample. Specifically, there are three logical consequences of our explanation.

1. Holding the monitoring cost roughly constant, the higher the information cost of the quantity of the future output (measured by the historical output variance), the more likely for the share contract to be employed, and vice versa.
2. Holding the information cost roughly constant, the lower the monitoring cost of the harvest output, the more likely for the share contract to be employed, and vice versa.
3. If both transaction costs change, the outcome will be unpredictable.

The findings of this study are consistent with our theoretical predictions. First, we confirm the importance of information cost of knowing the quantity of the future output in determining the choice between sharecropping contract and fixed-payment contract. The original example used by Cheung (1969) shows that the variance of production for wheat is much higher than that for rice, and that the sharecropping contract is more often used where wheat is planted. An important issue often neglected by scholars is that, both crops in this example are staple crops, which would have similar monitoring cost. Huang (1973) finds that, among the four provinces in Malaya, share contract is only popular in an eastern coastal state, where the variance of rice production is high. In this case, the same kind of plant enables us to presume monitoring cost of the harvested output is roughly stable. Second, we summarize the results of existing studies and confirm that the monitoring cost is another factor in determining the choice of sharecropping. One example is the distance between the landlord's residence and his or her property affects monitoring cost. Hoffman (1984) discovers that the further a landlord lives from his property in the sixteenth century in France, the more likely fixed rent contract would have been used. Third, by clarifying the endogenous variables, this study explains some seemingly contradicting results. Rao (1971) claims that he has found evidences that refute the effect of variance in the choice of sharecropping contracts. However, he has compared staple plants with crops with high economic value, such as tobacco. The latter have a much higher monitoring cost and this comparison violates the assumption of *ceteris paribus*. Similarly, Allen and Lueck (1992, 1999) claim that they have found evidence rejecting the importance of variance of output on the use of sharecropping contract. The problem with their conclusion is that the data they adopt comes from America, where government heavily intervenes into the agricultural industry. These farm policies greatly reduce the monitoring cost of the output, which in turn, affect the choice of contract.

The remainder of the paper is organized as follows. Section 2 provides a review of the mainstream contract theory including the principal-agent theory and the current transaction cost theory. Section 3 introduces a new theoretical transaction-cost explanation and tests the model with existing evidences. Section 4 draws conclusions on major findings of this research.

2 Critical Review of Existing Theoretical Explanations

As discussed in the introduction, there are two approaches to analyzing the choice of contract. One is the principal-agent approach, and the other is the transaction

cost approach. In this section, we review the development of these two approaches and conduct a critique on their problems respectively.

2.1 The Principal-Agent Approach

The topic of contractual arrangement was studied by the father of economics, Smith 1776, in his book, *An Inquiry into the Nature and Causes of the Wealth of Nations*. The first question that arises is the efficiency of different contractual arrangements. Smith compared the fixed-rent contract system in Britain with the sharecropping system in the continental Europe and concluded that the sharecropping contract lacks efficiency. Alfred Marshall and subsequent economists further conduct graphical analysis and show that a sharecropping contract yields less than a fixed-payment contract (Marshall 1920). This proposition that productivities differ under various contractual arrangements was later challenged by Cheung (1969), who argued that the efficiency of sharecropping contracts is equal to fixed-rent contracts since the rental percentages can be adjusted. Cheung (1969) showed mathematically and graphically that the productivity of sharecropping contracts is equal to those of other forms of contract, under a zero-transaction cost assumption. Chapter 3 of Cheung's thesis presents real world evidence (with transaction cost), showing that the efficiency of fixed-rent and share contracts are also approximately the same (1969, pp. 59–60).² The second question is related to why people choose different forms of contracts, such as fixed-rent and share contracts. Cheung (1969) finds that the variance of production for wheat is much higher than that for rice, and that the sharecropping contract is more often used where wheat is planted. Cheung then argues that tenants and landlords adopt sharecropping contracts in order to reduce risk from high variance.

Such risk-sharing explanation later evolves into the principal-agent approach, which postulates that an efficient contract is a balance of risk-sharing and moral hazard incentives. However, the principal-agent model concludes that the share

² The result of Cheung (1969), including many other studies, have controlled the land quality, show the productivities are roughly the same for these two contractual arrangements. Federico (2006) shows that the results of productivity studies are rather mixed, and therefore it infers that contract type in a free market does not affect outputs. If we accept that the choice of share contract depends on variance of output as Cheung (1969) suggested, it explains why compensation of Chief Executive Officer is more likely to use share contract than office clerks. At the same time, mas-seuses often use share payment contracts. Comparing these three professions, we can see clearly that there is no clear order between the type of contract used and the productivity of the related profession. However, such pattern between productivity and the choice of contract may exist in agriculture as a special case, because the quality of and or plants could affect the output variance.

contract is an inefficient contractual arrangement as moral hazard (a kind of information cost) is so large and distinct from the ‘first-best’ solutions that would exist in a world with perfect information. Hence, it is the second-best option (Stiglitz 1974).³ Most of the existing theoretical studies are based on the principal-agent approach, which has been applied to a range of contractual arrangements, including executive compensation (Garen 1994), leasing (Leland 1978), and insurance (Townsend 1994). There are two major problems with the principal-agent approach: its unrealistic assumptions and testability.

2.1.1 Unrealistic Assumptions

Friedman further (1962) argues that theory with unrealistic assumptions could be ‘right’ for a special case but could not be applied more generally. In a metaphorical example, theoretical model functions like a map. The more information about the roads and buildings the map contains, the more useful it is to its user. However, if the tourist has a wrong map, he or she might be able to find a road or an area that fit his map, but obviously, such a map has very limited application.

If we return to the principal-agent theory, a typical theoretical study nowadays involves long mathematical proofs with various assumptions. Each of these models often can only be applied to a specific situation and should be classified as *ad hoc* theory. It is noted that the principal-agent model fails to explain the most basic phenomenon in contract theory: the existence of sharecropping contract (Newbery and Stiglitz 1977), as the principal-agent theory suggests that such contract is inefficient. Thus, this lack of explanatory power of the principal-agent model indicates that the key assumptions for this mainstream contract theory are unrealistic. In a metaphorical sense, it is like a tourist holding a map of Beijing in his or her hand, but is in Tokyo. His or her map can only ‘explain’ a street in Tokyo, which implies that there is over-abundant, irrelevant and unrealistic information in his or her map. We will discuss the assumption of ‘hidden action’ and risk-preference respectively.

One key component of the principal-agent analysis is the so-called ‘hidden action’, which in essence is a problem of information asymmetry. Spence (1973) and Arrow (1972) argue that information asymmetry between the principal and the

³ In a sense, transaction cost is like friction in physics. Physicists ignore friction in some analyses, in case friction is trivial. However, if friction plays an important part, then physicists would incorporate friction into the study. Thus, it is ridiculous for a physicist or an economist who does not like friction or transaction costs, claims a world with friction or transaction costs is “second-best”, as the “first-best” never exist.

agent⁴ leads to inefficient outcomes and Stiglitz (1983) further argues that moral hazard is the unique risk that cannot be solved by the private market. However, Barzel (1977) shows that an alternative contract arrangement can easily get around the information asymmetry issue within a specific contract. Thus, information asymmetry does not necessarily lead to inefficient outcome. From this perspective, one of the key problems with moral hazard models is that it ignores the alternative forms of contracts to reduce information cost.

In the case of sharecropping contract, Cheung (1969) has pointed out that the landlord does not need to know the details of farming effort him-or her-self. Zero profit indicates that different investments should yield the same return for the investors and is equal to the interest rate. If the landlord finds out that his or her return is lower than the interest rate or other investments, he or she will then terminate the contract with the tenant or change his or her contract arrangement to a fixed rent contract. With the comparison of productivity growth in the same region and same period, it is not as hard as Stiglitz (1983) suggests, to find out whether the farmer has put enough input into the land. If the effect of 'hidden action' has been exaggerated, it also explains why mainstream contract theories cannot be used to explain the existence of share contracts.

Another key assumption of the principal-agent model is the risk-preferences under various contractual arrangements. The risk-preference of an individual is assumed by the principal-agent model to match with reality. Anyone that can accept an uncertain amount of income is assumed to be risk-neutral; and the risk-preference of an individual who receives a fixed amount of income was presumed to be risk-averse. Therefore, the choice of contracts then becomes a matrix of risk-preferences. A fixed-rent contract is between a risk-averse landlord and risk-neutral tenant. A fixed-wage contract is between a risk-averse employee and risk-neutral employer. Sharecropping contract is between a risk-averse landlord and a risk-averse tenant. One question never being raised is that individual could easily be involved in these three contracts simultaneously. What is the risk-preference of such individual? Sometime risk-averse and sometime risk-neutral?

Additionally, the risk preference of a fixed-rent tenant may not be neutral as the payment is not really fixed in reality. Cheung (1969) mentions a special contractual arrangement, called the 'escape clause' in the fixed rent contract in Chinese agriculture. According to a survey conducted by Nanking University in China in 1935, it is found that escape clauses were used in 83% of fixed crop rent contracts and 63% of fixed cash rent contracts, and none in share contracts. In the

⁴ In the terminology of transaction cost approach, information asymmetry is the monitoring cost of the output quantity produced.

fixed-rent contracts sample Cheung provided, the contracts explicitly clarify that, ‘in a famine year, rental payment shall be adjusted (downward) according to local custom’ and ‘the (aforementioned) rental rate is subject to adjustment according to local’. He then argues that with multiple ‘escape clauses’ for tenants, fixed rent contract is no longer ‘fixed’. Allen and Lueck (1992) find similar clauses in agriculture in the US.

According to Cheung (2014, p. 283), a share contract can be seen as fixed payment with countless ‘escape clauses. From this perspective, the difference between share contract and fixed-payment contract, essentially is the difference in the frequency of income adjustment: discrete or continuous. Li (2020) presents a case study of the choice of wage contract by one of her students. The student’s family has a clothing business. The student interviews his parents about the wage contracts for salesmen used in their store and the neighboring store in the same industry. He finds that his family uses a fixed salary. On the other hand, the neighboring store uses a share payment contract. The total salary for workers in his family store and the neighboring store are roughly the same, which is evidence of the zero-profit principle. In addition, the so-called fixed wage contract is not really ‘fixed’. ‘Red packet’ will be handed to workers in the peak season by his parents, to adjust the ‘fixed wage’ towards the market price. This is similar to the ‘escape clause’ in the fixed rent contract in Chinese agriculture, noticed by Cheung (1969, p.74). The existence of these adjustments is important evidence that the wage earners of fixed wages and tenants of fixed rents, do not have to bear the risk of unchangeable payment.

2.1.2 Testability

The second issue, as mentioned earlier, is the testability of mainstream contract theory. The variables in the principle-agent framework often include the preferences of people, which cannot be observed and measured directly (Allen and Lueck 1995). Moreover, even if we take the variance of production as risk for sharecropping contract, how to measure risk in other fields, however, remains unclear. Thus, Allen and Lueck (1995) argue convincingly that the principal-agent approach cannot be tested empirically and instead they propose that the transaction cost approach should be used to explain the choice between various contracts.

As a consequence, Federico (2006, p. 272) comments on the development of empirical studies on contract choice as ‘meagre’ and ‘mixed and somewhat ambiguous’. The empirical evidences based on the risk-sharing approach inherit at least two major problems. The first one is that empirical studies using regression tools can always locate a correlation between the choice of contract with a certain

variable. However, others can hardly repeat the study with another dataset, another time period, or even another regression technique. Federico (2006, p. 271) studies the relationship between contract type and productivity and provides a summary of the current empirical study on contract choice: ‘The lack of suitable micro-economic data-bases has led many authors to pursue an econometric short-cut ... However, this approach is also a bit too simplistic to be really conclusive’. Without the guidance and restriction of solid theoretical analysis, regression analysis inevitably becomes data mining, which restricts the accumulation of knowledge. Carmona and James (2012) use case study from France and argue that the size of farm offered by owner and non-cash payment would affect the choice of sharecropping contracts. Gebregziabher and Holden (2011) find that, in Ethiopia, poor households experiencing random shocks are more likely to choose fixed-rent contracts. Akerberg and Botticini (2000) claims that lack of capital market is a cause of adopting sharecropping using evidence from Tuscany in the Renaissance period. Ofuoku (2015) studies whether sharecropping contracts increase the stress level of tenants in Nigeria. Lahiri-Dutt and Adhikari (2015) study the gender effect on the choice of contract in rural South Asia.

The second problem is the practical difficulties in testing unobservable variables in models. Federico (2006, p. 271) describes the situation as that, ‘Suitable micro-economic samples are hard to find and, most notably, the two key variables, risk-aversion and monitoring costs, are hardly measurable’. He further demonstrates how researchers ‘solve’ this issue of observability. ‘Authors have thus to resort to proxies, that is, substitute variables which are indirectly related to the feature of interest. Risk aversion is routinely assumed to be negatively related to wealth (a better off tenant can afford to risk more), while the demand for supervision is proxied with the presence of monitoring-intensive products, such as truck crops (vegetables) or tree-crops (vines, olive trees)’. However, Federico (2006, p. 271) admits that, ‘In a more general vein, all these tests assume that the explicative variables, such as wealth or crop mix, are exogenous - that is, they are not affected by the dependent variable (the type of contract). This assumption, which is crucial for econometric analysis, is by no means warranted’.

2.2 A Transaction Cost Explanation: The ‘Land Exploitation’ Argument

Fixed-rent contract co-exists with share contract in the same area, which indicates that the efficiency of two contractual arrangements are similar. Buck (1937) uses index and confirms that the productivities of different contracts are roughly the

same.⁵ Share contract involves monitoring cost of the total output produced. Logically, there must be a specific cost (transaction cost) associated with the fixed-rent contract. The key question is what cost and what variables to look for.

Allen and Lueck (1992, 1999) makes two points in their research. Firstly, they find evidence that the output variance does not positively correlate with the number of sharecropping contracts. They claim that such evidence rejects the risk-sharing explanation. However, in latter section, we point out that their data from the US has been affected by government farm policy. Thus, it renders their results unreliable.

Second, they further establish a theory to explain the use of share contract, which argue that the use of sharecropping contract is a decision between two transaction costs, the mismanagement of land and the division cost between landlord and tenant. Allen and Lueck (1999, p. 724–25) have following predictions:

As a result, share contracts may be chosen when the costs of dividing and measuring shared assets are low and the margins for moral hazard are large and many.

On the other hand, fixed payment contracts may emerge when measurement costs are high and moral hazard margins are small and few.

The division cost or measuring cost in their terminology, is equivalent to the monitoring cost in our explanation, which we fully agree with. What we disagree about is their ‘land exploitation’ explanation. In their model, they predict that the farmers under fixed rent contract would overuse the land, and the word ‘exploitation’ is often mentioned. The ambiguity of the word, ‘exploitation’, provides too much freedom for these authors to interpret the data in ways they want and fails to establish a connection to associate ‘land exploitation’ with a particular variable.

The consequence of such ambiguity in their explanation is that, few empirical works have been conducted, and the limited results are rather poor. Allen and Lueck (1992, p. 407–08) admit that the incentive of a farmer to exploit the land is not directly observable. Indeed, this unobservable variable create great difficulty for empirical testing. Even though they claim there are ‘clear instances ... and when the ability to exploit the soil is great’. Allen and Lueck (1992) did argue and find evidence that no-till practice would reduce the exploitation of farmland, which in turn, increase the use of fixed rent contract. However, using more updated data, Janssen et al. (2002) find that the correlation between tillage levels and contract types is insignificant. Akerberg and Botticini (2000) follow the work of Allen and Lueck (1992) and predict that ‘if long-lived assets, namely, perennial

⁵ Cheung (1969) suggests the minor difference in productivity between the two contracts is due to land quality.

crops, are planted on a land plot, there should be a lower likelihood of observing fixed-rent contracts (versus share contracts). Fixed-rent contracts *might* induce overproduction that could damage these assets and thus future production' (p. 245). This later explanation is very farfetched and their finding can merely be viewed as a correlation. It is not surprising that few subsequent researches have been conducted.

3 A New Explanation of Contract Choice

3.1 A New Transaction Cost Explanation

Cheung (1969) finds that fixed rent contracts are more popular in the rice producing regions, whereas sharecropping tenancy contracts are more dominating in the wheat producing regions. The variance of wheat production is significantly larger than that of rice. Cheung then argues that even if *the share contract involves higher transaction costs (monitoring cost)*, the arrangement is a method intended to diverge and reduce risk. He further assumes both parties are risk-averse. Therefore, tenant and landlord who share the total output with a fixed percentage, would lower the variance of their return.

Later, according to Cheung (2014), the words highlighted in the previous paragraph are not accurate and provide a misleading instruction for mainstream contract theorists. The misleading statement in Cheung's original paper that the sharecropping contract involves higher transaction costs is rejected by the co-existence of shared and fixed rent contracts. Imagine there are two different contract forms as choices for the transacting parties, the returns for both contracts should be the same under the zero-transaction cost situation. With the zero-profit principle, if one contract involves less transaction cost than the other, then logic dictates that there will be a monopoly of contract. Therefore, Cheung (2020) argues that, the co-existence of different forms of contracts in a competitive market suggests that the marginal transaction cost for both contracts must be equal.

Different from the explanation of Allen and Lueck (1992), Cheung (2014, p. 285) proposes that the large variance in wheat production should be seen as an increase in information cost for tenants and landlords to reach an agreement on a specific amount of fixed rent, or negotiation cost. He argues that both information cost or negotiation cost *ex ante*, and the monitoring cost *ex post*, are the causes of the choice of sharecropping contract. This new insight provides a clearer picture of the current debate.

The high variance of production, traditionally treated as risk, can be viewed as one type of transaction cost. On the other hand, the 'hidden action' can be viewed

as another transaction cost, such as monitoring cost. If the tenant and landlord choose a fixed rent contract, the landlord does not have to supervise the total outcome of the tenant, but the related parties have to bear the transaction cost of product fluctuation. If they choose a sharecropping contract, extra transaction costs to monitor the output must be paid. At the margin, by definition, the two types of transaction costs associated with their related contracts should be roughly equaled. Two hypotheses were produced:

- Hypothesis 1: Holding the monitoring cost roughly constant, the larger the variance of output, the more likely for the share contract to be employed, and vice versa.
- Hypothesis 2: Holding the negotiation cost roughly constant, the lower the monitoring cost, the more likely for the share contract to be employed, and vice versa.

In addition, it is noted that both transaction costs are endogenous variables, which can affect the outcome of the prediction. Thus, it leads to the third hypothesis:

- Hypothesis 3: If both transaction costs change, the outcome will be unpredictable.

3.2 Consistency of the New Theory with Empirical Evidence

One might believe a regression analysis between the choice of contract and its potential cause, such as variance of production by a random collection of plants would be sufficient to test the hypothesis in the previous section. Sadly, it does not work in that way. From the analysis above, the two key variables determining contract choice are the two transaction costs: negotiation and monitoring. Thus, to examine the influence of one of them, the other variable must be kept constant. In econometric analysis, omitted essential variable in a regression model would lead to biased results, which is a point that we will demonstrate later.

- Evidence for Hypothesis 1

3.2.1 Rice vs. Wheat in China

Table 1 from Cheung (1969), summarizes the mean and the variance of wheat and rice production in the period 1901–1950 in Taiwan (unit: kilogram). As Table 1 shows, the variance in wheat production in the period 1941–1950 is significantly larger than rice, whether in absolute amount or relative terms. In the case of Cheung (1969), the two plants are both staple crops plantation. Staple crops share the property of homogeneous quality, large quantity, and low profit margin per

Table 1: Variance between rice and wheat.

Physical output/ year		1901– 1910	1911– 1920	1921– 1930	1931– 1940	1941– 1950
Mean	Wheat	880	710	759	1058	625
	Rice	1318	1379	1588	1927	1648
Variance	Wheat	291	118	375	1180	1158
	Rice	31	32	46	62	180

Source: Cheung (1969) computed from data in Sino-American Joint Commission for Rural Reconstruction. Taiwan Agricultural Statistics, 1901–1955 (Taipei: 1956), pp. 20 and 24.

acre. These similarities between rice and wheat enables Cheung (1969) to control the monitoring cost roughly constant and compare the variance of production to examine the negotiation cost alone.

3.2.2 Rice in Different Regions in Malaysia

Huang (1973) uses the data from Malayan paddy land and finds the use of share contract is only common in Kelantan, a state on the eastern coast, where productivity is low and variance is high. Due to poor weather conditions, lack of government facilities, and the damage of pests, the productivity in Kelantan is 50 percent lower than the other four states on the western coast. The output fluctuation is also larger in Kelantan, as often much of the harvest is lost. The exact figure is shown in Tables 2 and 3 below. This evidence is consistent with Cheung's prediction. Again, the comparison using one crop alone eliminates the influence of monitoring cost difference.

Table 2: Paddy area classified by tenure, 1957 (Percentage).

State	Owner farm	Fixed rent in paddy	Fixed rent in cash	Lease (cash)	Sharecropping
Perlis	53.2	38.3	0.7	2.0	5.8
Kedah	44.0	41.6	7.7	6.2	0.4
Province Wellsley	38.0	57.3	0.6	3.8	0.3
Perak	56.7	34.9	5.4	1.5	1.0
Kelantan	50.9	1.8	0.1	...	47.0

Source: Wilson (1958).

Table 3: Average paddy yields by state, 1960–68.

State	Average yield*	Range ⁷	Standard deviation	Coefficient of variation
Perlis	486	417–560	48.22	9.92%
Kedah	486	367–531	57.19	11.76%
Province Wellsley	461	402–550	53.33	11.56%
Perak	369	325–422	35.66	9.66%
Kelantan	261	116–375	92.70	35.51%

Source: Calculated from data supplied by the Malaysian Ministry of Agriculture and Cooperatives.* Yields (output per acre) are measured in gantangs per acre, with 400 gantangs 1 = ton. The average yield is the average of eight annual yield figures for each state. 7: The range is the lowest and highest yields obtained during 1960–68 for each state.

3.2.3 The Second and Third Stylized Facts by Newbery and Stiglitz (1977)

Newbery and Stiglitz (1977) summarized four phenomena that needed to be explained.⁶ The second of the identified phenomena is the decline of sharecropping in the modern era around the world. Singh and Byerlee (1990) examine the coefficients of variation of wheat production in 57 nations in the period 1951 to 1986, and find a consistent decline in field variability. Particularly, they find the wheat yield variability in state, district and national level data of India all confirm the decline. Wheat, among other cereals, experienced the most significant technological improvement in the 1980s. In addition, Singh and Byerlee (1990) find technological change reduces, instead of increases coefficients of variation for wheat production. Anderson and Hazell (1989) confirm the pattern of decline in the variability in grain yields, including rice and wheat. Such a decrease in variance can be viewed as a reduction in negotiation cost to reach an agreement for tenants and landlords for a specific amount of rental payment. This overall decrease in variance of production explains the drop in the number of sharecropping contracts around the world, especially underdeveloped nations.

Another puzzle raised by Newbery and Stiglitz (1977) is that sharecropping contracts are often associated with land of lower productivity. Taylor, Payton, and Raun (1999) review 362 wheat research projects of over 2000 wheat experiments and find that there is a significant negative correlation between mean yields and coefficients of variation. Hence, the negotiation cost of a fixed rent contract for low-productive wheat land is higher.

⁶ The first of the stylized facts found by Newbery and Stiglitz (1977) are why sharecropping still exists even risk-sharing theories have proven it is inefficient. As mentioned earlier, the simple answer is their theory has been refuted by facts. The last stylized fact is that existence of 50/50 rental rate. However, this is simply not an important issue. Cheung (1969) only proves the rental rate is changeable and he never denies the existence of 50/50 rental rate contract.

3.2.4 Similar Cases

In a market without interventions, masseuses, legal or otherwise, often adopt share contract with the house.⁷ Similarly, it is common knowledge that real estate agents and salespersons always use share contracts (i.e. commissions) (Jean 2019). It can be understood as the outputs of these professions change dramatically from time to time, person to person, and it is virtually impossible to predict the amount of outputs for each worker beforehand. Hence, without the actual measure of the variance in the outputs, it can be argued that the high negotiation cost prevents the relevant parties from using a fixed payment contract.

- Evidence for Hypothesis 2

3.2.5 Agricultural Examples

There is less disagreement in the field of sharecropping that the monitoring cost on total output affects the choice of contract. Allen and Lueck (1992) found some supporting evidence in the US in the 1980s. The institution Allen and Lueck (1992, p. 408) mentioned is the local elevator, which provides the measuring service for crops sold privately. In their case, the special crop is hay crops: alfalfa, brome, and native hay, which never go to the elevator in their sample. They found that these hay crops which were difficult to measure at harvest were more likely to use fixed rent contracts. According to Allen and Lueck (1992), ‘underreporting may take the form of crop quality as well as quantity. For example, ***a farmer may keep the best hay or the wheat with the fewest weeds for himself***, while not underreporting quantity at all’. Allen and Lueck (1992) further find that land leased for pasture is always cash rented because ‘the costs of detecting quality and weight-gain underreporting for live cattle is prohibitive’ (p. 402).

In a traditional society, distance itself increases the cost of monitoring. An empirical study does find distance between a landlord’s residence and the location of his or her property increase the choice of fixed contract in the sixteenth century, France (Hoffman 1984).

3.2.6 Uber and Taxi

In other area, Tsui (2016) explains that the use of share contracts in the Uber industry is due to high variance of production. It is noticed the target customers of

⁷ Labor market is an area of heavy regulations. Thus, the wage contract for massage therapist used in the western nations, such as US, is often hourly payment, just like other jobs. However, in many other countries masseuses are under share contract with the house.

the taxi and Uber industries are often the same, which are those passengers with random destinations. This characteristic of the taxi industry makes the prediction of outputs for each driver impossible. For example, in China, almost all the taxi drivers must pay a fixed rent to the car owner. In this case, where there is no remarkable difference between the output fluctuation for each taxi and Uber drivers, ‘hidden action’ or the monitoring cost plays a more crucial role in deciding the form of payment contracts. The adoption of share contract in the case of Uber is caused by the invention of the smartphone application, which allows passengers to submit a travel request and the software then organizes the Uber driver in the region to pick up the passengers. The Uber app automatically calculates the fare based on four criteria: base fare, cost per minute, cost per mile and booking fee. This smartphone application greatly reduces the cost of monitoring for the company of Uber to adopt a share payment system.

– Evidence for Hypothesis 3

3.2.7 Rao (1971)

A study by Rao (1971) concludes that the variability of production does not affect the choice of sharecropping. The plants Rao chooses are rice and tobacco. Rao (1971, p. 585) finds that ‘the variance of profit is much lower for rice compared with tobacco’. At the same time, the percentage of leased area under sharecropping for rice is significantly higher than Tobacco, according to Table 4 below.

If we return to these examples above, Cheung (1969) and Anderson and Hazell (1989) study rice and wheat; Huang (1973) was examining rice production in different regions; and Singh and Byerlee (1990) and Taylor, Payton, and Raun (1999) focus on wheat alone. These studies use crops of similar kinds, the same crop in time series, or the same crop in different regions to satisfy the assumption of *ceteris paribus*, and study one transaction cost of these plants alone. In these cases, they examine the coefficient of variance of production, while holding other variables roughly constant, especially these factors affect the monitoring cost.

Table 4: Farm lease contract in West Godavari, India.

	Percentage of tenanted area under:	
	Share lease	Fixed rent
Rice	42	58
Tobacco	14	86

Source: Rao (1971).

It is worthwhile to point out that tobacco and hay are economical plants, which involve higher monitoring cost at harvest. As mentioned earlier, Allen and Lueck (1999) admit that hay plants are exclusively to use fixed rent contract due to monitoring cost. It is noticed that, there are varieties of tobacco. It includes cigarette tobacco, and non-cigarette tobacco. They can be further categorized into a few sub-categories, which differs significantly in value ("Tobacco Production"). These characteristics of tobacco are similar to hay that, we could presume the monitoring cost for these economical plants are significantly higher than staple plants. Thus, it is simply not appropriate to compare the production variance of two plants with associated choice of contracts and concludes variance of output does not affect the choice of share contract. The comparison between a staple crop and an economical crop creates an omitted variable bias in their results, in which they treat one endogenous variable as exogenous. In other words, both endogenous variables are changing in the sample.

3.2.8 Allen and Lueck (1992, 1999)

Allen and Lueck (1992, 1999) use data from the US to examine the choice of contracts. They found evidence that rejects the risk-sharing approach. In this case, it means the variance of output does not positively correlate with the choice of share contracts, holding monitoring cost roughly constant by using one crop alone.

However, there is a critical problem with their data, that is the American farm policy. The data include subsidy based on price or revenue, which they admitted in their paper that the actual influence of these policies remains unclear to them (1992, p. 419). This important issue was not addressed in their paper despite their acknowledgment of the problem, and therefore their empirical results are rendered unreliable. These government interventions provide a safety net for landowners and tenants to overcome potential volatility of price and output quantity. An evidence of the impact of such intervention found by Allen and Lueck (1992) is the 'escape clause' in American farm. They find that, 'these adjustments are always upward; that is, when the crop yield is unusually high, the cash rent is increased' (p. 420). It indicates the farm policy has completely removed the risk of low yield. It is noted that these policies are mainly focus on staple crops such as corn and wheat, the crop studied by Allen and Lueck (1992, 1999). One implication of governmental revenue subsidy is that government must know the actual quantity in order to provide subsidy. Therefore, such policies would greatly reduce the monitoring cost of output, which increase the use of sharecropping. Finally, Higgs (1973) examines the issue with cross-sectional, state-level data of corn and cotton in the southern United States for 1910, a time before government interventions. Higgs (1973) finds the share of sharecropping contract in a state is strongly

associated with the output variability. Therefore, the regression analyses of Allen and Lueck (1992, 1999) must suffer from serious omitting variable bias.

4 Conclusion

This paper provides a critical analysis of the conventional explanations for the choice of sharecropping contract. It demonstrates that narrow application of these theories was due to unrealistic assumptions, such as the over-emphasis on 'hidden action'. Moreover, the theoretical variables, such as preference or 'land exploitation' cannot be directly observed, which makes empirical testing difficult. This paper then establishes a new theoretical analysis which argues that both monitoring cost and information cost of the quantity of the output are determining factors for choosing a share contract. Unlike the prior approaches, theoretical variables in our model can be observed and directly linked to an empirical variable. Hypotheses generated from such a theoretical framework were consistent with existing empirical studies.

Contracts can be viewed as the fiber that glues a society together, but the understanding of contractual arrangements is far from satisfying. This paper proposes a new paradigm for future studies of the choice of contractual arrangement. Researchers can finally perform the necessary, but long-needed empirical studies in the choice of sharecropping contract. An immediate and urgent demand is the re-examination of variability of output in agriculture. By understanding the key variables in influencing the choice of share contract, researchers should avoid comparing economic plants with staple plants, like Rao (1971), or examining an agricultural industry under heavy government interventions, like Allen and Lueck (1992, 1999). Future studies could include fixed rent/fixed wage, piece/hourly wage, direct-sale/franchisee, even government structure. Such knowledge for the choice of contract is extremely crucial as it would significantly reduce the number of inappropriate contract arrangements, which in turn lower the overall transaction cost in the society.

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