A Theory of Ambiguous Property Rights in Transition Economics: The case of the Chinese Non-State Sector

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Notation

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
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<tbody>
<tr>
<td>$E$</td>
<td>one agent (she), which can be any economic agent involved in a project or a firm, is the entrepreneur in the Chinese non-state sector scenario</td>
</tr>
<tr>
<td>$G$</td>
<td>the other agent (he), which can also be any economic agent, is the government in the Chinese scenario</td>
</tr>
<tr>
<td>$p$</td>
<td>the probability of the white state and the black state has probability of $1 - p$. $p$ and $\theta$ have independent distributions</td>
</tr>
<tr>
<td>$k_E$</td>
<td>the initial investment that agent $E$ makes in a profitable project or firm</td>
</tr>
<tr>
<td>$C(k_E)$</td>
<td>the cost function, $C(0) = 0$, $C'(k_E) &gt; 0$, and $C''(k_E) &gt; 0$</td>
</tr>
<tr>
<td>$\theta$</td>
<td>the profitability that at time 1, $\theta \sim Uniform[0,1]$</td>
</tr>
<tr>
<td>$a_E$</td>
<td>the effort level of $E$</td>
</tr>
<tr>
<td>$q_E$</td>
<td>the productivity of $E$ in the white state</td>
</tr>
<tr>
<td>$\pi_W$</td>
<td>the profit in the white state, using Cobb-Douglas production function, $\pi_W = \theta q_E a_E^{\alpha} \theta_F^{\beta}$, $0 &lt; \alpha, \beta &lt; 1$</td>
</tr>
<tr>
<td>$\pi_B$</td>
<td>the profit in the black state with help of $k_G$, $\pi_B = \theta k_E$</td>
</tr>
<tr>
<td>$U(a_E)$</td>
<td>the disutility of effort of $E$, $U(0) = 0$, $U'(a_E) &gt; 0$, and $U''(a_E) &gt; 0$</td>
</tr>
<tr>
<td>$k_G$</td>
<td>the effort from $G$, which can be in the form of additional capital investment</td>
</tr>
<tr>
<td>$r_0$</td>
<td>the opportunity cost rate of $k_G$ to $G$, thus $G$’s opportunity cost is $r_0 k_G$</td>
</tr>
<tr>
<td>$r$</td>
<td>the rate that $G$ charges for $k_G$</td>
</tr>
<tr>
<td>$\delta_E$</td>
<td>$E$’s relative bargaining power in the case of ambiguous ownership</td>
</tr>
<tr>
<td>$y$</td>
<td>the payoff function</td>
</tr>
<tr>
<td>$Y_E$</td>
<td>the expected payoff to $E$ after investing $k_E$</td>
</tr>
<tr>
<td>$T$</td>
<td>the lump sum tax on $E$ that $G$ takes away from the total payoff</td>
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1 Introduction

Conventional economic wisdom tells us well defined property rights lead to prosperity in a free market. This conventional wisdom is intuitive. If an individual is guaranteed the benefits of his labor on a plot of land, one would expect that individual to work harder on that plot than if the benefits of his labor had a serious possibility of being taken from him. Microeconomics tells us that the lower probability of benefit resulting from ambiguous property rights should lower marginal effort as compared to well defined property rights.

Clearly defined property rights guarantee the owner control in virtually all situations (with the exclusion of those specified beforehand in the contract). Ambiguous property rights provide no guarantee, and forces a party to fight for control whenever that party desires control.

If ambiguous property rights limit productivity, then no country wielding ambiguous property rights could be acting optimally. China provides a striking example of a country wielding ambiguous property rights. Even with private firms, ambiguous property rights are commonplace and rarely protected (Li 2). Studies from Svejnar, Weitzman and Xu show that firm ownership form does not impact productive efficiency in China (Li 2). How can we explain the existence of ambiguous property rights in the prosperous Chinese non-state sector?

Li explains the ambiguous property rights as a response to high transaction costs and high uncertainties in the market. He characterizes the Chinese market as a gray market. In the Chinese market, the government is always a threat to block actions of the firm. This provides incentive for firms to team up with the government under ambiguous property rights, so that if a firm needs the services of the government to make a transaction possible, government services are at the firm’s disposal. This luxury comes at the cost of the uncertainty of obtaining control after the government enables the transaction, and also the negotiating costs plus the monetary cost of buying control back from the government. A black market is the state where a firm needs the government’s help, while a white market is the state where the government’s help is not needed. Thus a gray market occurs when a firm is unsure whether a white or black state will occur. Ambiguous property rights can only be optimal in the cases of gray markets, where firms never know when they will need the governments help to pass a transaction. Gray markets are a form of market imperfection.

Li has two purposes for this paper. First, he strives to define ambiguous property rights from cases in the past regarding transition economies. Next he proposes a theory based on an intuitive model. The model starts with agent E, who finds a project he deems profitable and invests $k_E$ in the project. In a later period, depending on whether a black or white state occurs, either the effort of E (white state) or the effort of another party G (black state) is needed for completion. E is unable to enter contingent contracts, and must decide whether to be the sole owner of the project or to bring G in as an ambiguous owner. Bringing in G as an ambiguous owner is only beneficial in the black state, where E will need G to complete the project; but with ambiguous ownership, E is forced to fight G for control in the next period. As a sole owner, E keeps all rewards in the white state, but at the expense of not being able to receive any profits in the black state.
without negotiating with G. These negotiations are assumed to be more costly than in the case with ambiguous ownership, and there is a real possibility that E is not able to obtain G’s services (thus receiving zero profit). Li summarizes the choice of ownership succinctly, as “the choice of ownership form is dependent on how likely G is to be productive and how E and G negotiate when G is not an ambiguous owner (Li 3).”

Notice the generality of the model proposed by Li. The model does not require E and G to be the firm and the government; instead, the possibilities of what these two parties can be are limitless. Li extends the model by mentioning a case where G is a lawyer who negotiates deals with other economic institutions. Some other extensions of Li’s model include athletes (E) and agents (G), workers (E) and unions (G), and civilians (E) and the local mafia (G).

The assumption that negotiations are more costly without ambiguous property rights stems from Li’s assumption that property rights’ arrangements affect information flows. Li assumes that the rights’ holder has superior information on the project, which can lead to inefficient negotiations between the rights’ holder and an outsider. This assumption is similar to the arguments made by Wihamson (1985) and Holmstrom and Tirole (1989), and provide a crucial distinction between Li and the theory of ownership proposed by Grossman and Hart (1986), and Moore (1990). The next section will provide a more in-depth background of the situation in China, followed by the theory.

2 The Case of The Chinese Non-State Sector

2.1 Ambiguous Property Rights in China

China’s Non-State Sector

— all firms except traditional state-owned enterprises
  1. Purely Private Enterprises: 13%
  2. Collective Enterprises: 74%
     — rural enterprises, township and village enterprises (TVEs), etc.
  3. Other kinds of Non-Private Firms

China’s Miracle

— Highly successful non-state sector: over 20% growth rate of Chinese non-state sector over a period of 15 years with different kinds of ambiguous property rights arrangements

China’s Paradox

— A firm’s registered ownership form does not cause differences in the firm’s productive efficiency
China’s Ambiguous Property Rights

Ambiguous Property Rights: property owners have to fight for the actual control right in all circumstances, mainly decision-making rights in three different areas:

1. Decisions about daily operations
   60%: subject to local government interference
2. Decisions about profit disposition
   Tax collection process: no clear rule, bargaining and negotiation
   After-tax-profit disposal: e.g. Collective Accumulation Fund – all collective firms, now usually rural collective firms
3. Decisions about investment
   not fully liberalized capital markets
   55.6%: decided by government
   21.2%: decided by enterprise, approved by government
   23.2%: decided by enterprise

2.2 Gray Market: Benefits and Costs

Gray Market

— A market in which transactions may be blocked due to residual government regulations, uncertain between white and black states

White state: normal market environment, the firm can be productive without the government’s help

Black state: difficult market environment, can arise due to legal disputes with another firm, obstacles from intervention of the central government, or difficulties in obtaining extra capital, in which the firm can only be productive with the government’s help

Ambiguous Property Rights: Benefits and Costs

Benefits:

— Due to market imperfection in China’s transition economy, a government bureaucrat or agency can help the firm properly walk around the obstacles and make the transaction possible in a black state

1. High Transaction Costs
   factor markets, some product markets, capital markets, etc.
   e.g. collect capital
2. Contractual Relations
a) not fully established infrastructure to support contract systems
e.g. resolve contract disputes
b) bureaucratic intervention into the execution of contracts
e.g. obtain business licenses or import/export permits

**Costs:**
— Conflict due to the discrepancy in two objective functions of the firm and the government
  1. *Profit Sharing*
  2. *Operation Distortion*

### 3 A Theory Of Ambiguous Property Rights

**Assumptions**

Assumption 1: $C(0)=0$, $C'(k_E)>0$, and $C''(k_E)>0$

Assumption 1 tells us that costs increase with E’s original investment, and that the cost function is convex.

Assumption 2: At time 1, it is common knowledge that $\theta \sim \text{Uniform } [0, 1]$

At time 1, as a result of Li’s assumption regarding ownership’s effects on information flows, it is difficult for outsiders to access the profitability of the firm. Let profitability be measured by $\theta$. This assumption serves to simplify the model.

We suppose it is common knowledge at time 0 that the white state has probability $p$ and the black state has probability $1-p$. This distribution of states is independent of the distribution $\theta$.

Assumption 3: $\pi_W=\theta q_E a_E^\alpha k_E^\beta$, $0<\alpha, \beta<1$

Assumption 3 tells us that profit in the white state ($\pi_W$) depends on $\theta$, productivity of E in the white state ($q_E$), E’s effort level ($a_E$), and E’s investment in period 1 ($k_E^\beta$). This assumption also tells us the profit function is Cobb-Douglas. Assume the disutility of effort is $U(a_E)$.

Assumption 4: $U(0)=0$, $U'(a_E)>0$, $U''(a_E)>0$

Assumption 4 simply tells us that disutility increases as effort increases and that the disutility of effort function is convex.

In the black state, E cannot profit without the help of G. Assume G’s effort comes in an amount of fixed capital $k_G$. If G is to help the firm, G’s effort must be $k_G$ and $k_G$ can only be provided by G. The opportunity cost of $k_G$ is $r_0 k_G$.

Assumption 5: $\pi_B=\theta k_G$

Assumption 5 assumes that E can negotiate with G to get G to provide $k_G$. If negotiations break down, then $\pi_B=0$.

For simplicity purposes, Li avoids the issue of how E and G bargain for profit. When they bargain with symmetric information, assume E’s relative bargaining power in the Nash bargaining sense is $\delta_E$. 

5
Assumption 6: In the case of ambiguous ownership, when E and G bargain under perfect knowledge of \( \theta \), E gets \( \delta_E > 0 \) proportion of the total surplus.

With symmetric information, E gets a proportion of total surplus equal to his bargaining power. The bargaining power of E only comes into play under ambiguous property rights.

Assumption 7: With private property rights, when E and G bargain in the market, the uninformed G acts like a monopolist.

Information asymmetry, which results from Li’s assumption regarding ownership’s effects on information flows, can lead to the breakdown of bargaining and inefficiency. Acting as a monopolist, the price set by G is so high that sometimes E cannot reach a deal with G.

Sequences of information

1. Unambiguous Property Rights
   \( t_0: \delta_E, q, p, r_0, k_G, \theta \sim \text{Uniform}[0,1] \) are common knowledge
   \( t_1: k_E \) is chosen by E
   \( t_2: r \) is chosen by G
   \( t_3: \theta \) and the White/Black State are realized
   \( t_4: \) White State: \( a_E \) is chosen by E; Black State: G’s service \( k_G \) is bought at \( r \) or not

2. Ambiguous Property Rights
   \( t_0: \delta_E, q, p, r_0, k_G, \theta \sim \text{Uniform}[0,1] \) are common knowledge
   \( t_1: k_E \) is invested
   \( t_2: \theta \) and the White/Black State are realized
   \( t_3: \) White State: \( a_E \) is chosen by E; Black State: G’s service \( k_G \) is invested at \( r_0 \)

3.1 Unambiguous property rights case

For the unambiguous property rights case, the E doesn’t know the private information of the firm, so he can’t share the profit of the firm. Thus E owns all the profit it makes in the white states. And E have to buy the “service” from G for helping it in the black state.

   In the white state, E has all the profit
   \[
   y_W = \theta q_E a_E^\alpha k_E^\beta - U(a_E) \tag{1}
   \]

   In the black state, E will be unproductive. So if it doesn’t buy the “service” from the G in advance, it will have zero profit. On the other hand, E has the choice to buy the “service” from G to be helped in advance, and the effort must be \( k_G \).
On G’s side, as this service can only be provided by G, G has monopoly power and it can set the service price, \( r \), in order to maximize its expected payoff. So E has to pay \( r k_G \) in total to buy the service. Thus By assumption 5, in the black states with help from G, we have \( \pi_B = \theta k_E \). So E will buy the service from G as long as \( \theta k_E - r k_G \geq 0 \), that is, only for \( \theta : \theta \geq r \frac{k_G}{k_E} \) (2)

So G’s problem is:

\[
\begin{align*}
\text{MAX } \ & \ r E \left[ r k_G - r k_G  \theta \geq \frac{k_G}{k_E} \right] \\
= \ & \int_{\theta \geq r \frac{k_G}{k_E}} (r k_G - r k_G) d\theta \\
= \ & \left( r k_G - r k_G \right) \left( 1 - r \frac{k_G}{k_E} \right)  \text{(5)}
\end{align*}
\]

The first order condition is

\[
r = \frac{k_E + k_G r_0}{2k_G} \text{ (6)}
\]

Back to E’s side, if E belongs to the types which will buy the service, its expected payoff in the black state will be:

\[
y_B = E \left[ \theta k_E - r k_G  \theta \geq \frac{k_G}{k_E}, r = \frac{k_E + k_G r_0}{2k_G} \right] \\
= \int_{\theta \geq r \frac{k_G}{k_E}} \left( \theta k_E - \frac{k_E + k_G r_0}{2k_G} \right) d\theta \\
= \frac{\theta^2 k_E}{2} - \frac{\theta (k_E + k_G r_0)}{2} \left( \frac{1}{k_G} \frac{k_E + k_G r_0}{2k_G} \right) \\
= \left( 1 - \frac{k_E + r_0 k_G}{2k_E} \right) \frac{k_E - r_0 k_G}{4} \text{ (7)}
\]

As the probability of the white state is \( p \) and the probability of the black state is \( 1 - p \), E’s problem will be:

\[
\begin{align*}
\text{MAX } \ & \ p E \theta \left[ \theta q_E a_E^{\alpha_E} k_E^3 - U (a_E) \right] + (1 - p) \left( 1 - \frac{k_E + r_0 k_G}{2k_E} \right) \frac{k_E - r_0 k_G}{4} - C (k_E)  \text{(8)}
\end{align*}
\]

The first order condition is

\[
a_E : \ \theta \alpha q_E a_E^{\alpha_E - 1} k_E^3 - U' (a_E) = 0 \text{ (9)}
\]
\[ k_E : \ pE \theta \left[ \theta q_E \beta a^\alpha_E k_E^{\beta - 1} \right] \ + \ (1 - p) \left[ \frac{1}{8} \left( 1 - \frac{r_0^2 k_G^2}{k_E^2} \right) \right] = C'(k_E) \] 

(10)

3.2 Ambiguous property rights case

For the ambiguous property rights case, E and G will bargain for the actual control in each state. In the white state, only E is productive; while in the black state, only G is productive. E and G cooperate with each other so that G lets E have all the control in the white state, while E lets G have all the control in the black state. And no matter which state it will be, G gets \(1 - \delta_E\) of the profit and E gets \(\delta_E\) of the profit.

In the white state, the whole profit E can make is

\[ y_W = \theta q_E a^\alpha_E k_E^\beta - U(a_E) \]

E is going to get

\[ y_{EW} = \delta_E \left[ \theta q_E a^\alpha_E k_E^\beta - U(a_E) \right] \]

In the black state, as G has the whole control of the firm now, G will choose to invest \(k_G\) only if the type of E satisfies:

\[ \theta > r_0 \frac{k_G}{k_E} \] 

(11)

So the whole profit G can make is

\[
\begin{align*}
    y_B &= E \left[ \theta k_E - r_0 k_G | \theta > r_0 \frac{k_G}{k_E} \right] \\
    &= \int_{\theta > r_0 \frac{k_G}{k_E}} (\theta k_E - r_0 k_G) \, d\theta \\
    &= \frac{\theta^2 k_E}{2} - \theta r_0 k_G \bigg|_{r_0 \frac{k_G}{k_E}}^{1} \\
    &= \frac{1}{2} \left( 1 - r_0 \frac{k_G}{k_E} \right) \left( k_E - r_0 k_G \right)
\end{align*}
\]

E is going to get

\[ y_{BW} = \delta_E \frac{1}{2} \left( 1 - r_0 \frac{k_G}{k_E} \right) \left( k_E - r_0 k_G \right) \]

As the probability of the white state is \(p\) and the probability of the black state is \(1 - p\), E’s problem will be:
\[
MAX_{a_E, k_E} p \delta_E \theta \left[ \theta q_E a_E^\alpha k_E^\beta - U(a_E) \right] + (1 - p) \delta_E \frac{1}{2} \left( 1 - r_0 \frac{k_E}{k_E} \right) (k_E - r_0 k_G) - C(k_E)
\] (12)

The first order condition is

\[
a_E : \theta q_E a_E^{\alpha - 1} k_E^\beta - U'(a_E) = 0
\] (13)

\[
k_E : p \delta_E \theta \left[ \theta q_E a_E^\alpha k_E^\beta - U(a_E) \right] + (1 - p) \delta_E \frac{1}{2} \left( 1 - r_0 \frac{k_E}{k_E} \right) = C'(k_E)
\] (14)

### 3.3 Property Rights and the Market Environment

**LEMMA 1**

The first-best outcome can be achieved when E obtains unambiguous control rights all the time and when E can have access to \(k_G\) at the price of \(r_0\).

We can determine the optimal level of investment in the first-best outcome as follows. In a white state, only E is productive, so social welfare is given by the profit to E minus the cost to E:

\[
\theta q_E a_E^\alpha k_E^\beta - U(a_E)
\] (15)

This expression means that E gets the full return to its investment and does not have to bargain with G to split rents.

In a black state, only G is productive, but invests only if the return to doing so is greater than the associated opportunity cost, \(\theta k_E \geq r_0 k_G\). Then social welfare in a black state is given by:

\[
E(\theta k_E - r_0 k_G | \theta k_E > r_0 k_G) = \frac{1}{2} \left( 1 - r_0 \frac{k_E}{k_E} \right) (k_E - r_0 k_G)
\] (16)

In the first-best case G invests \(k_G\) at the cost of \(r_0\), and E retains the full surplus of the project because it is the one making the entire investment.

To find the total expected social welfare, account for the probability \(p\) of realizing a white state, and the probability \(1 - p\) of realizing a black state:

\[
(p) E_\theta \left[ \theta q_E a_E^\alpha k_E^\beta - U(a_E) \right] + (1 - p) \frac{1}{2} \left( 1 - r_0 \frac{k_E}{k_E} \right) (k_E - r_0 k_G) - C(k_E)
\] (17)

---

\(^1\)Do not confuse with equation (3) in the paper, \(\theta k_E \geq r k_G\), which gives the condition under which firm E in an unambiguous, black state can afford to be rescued by G at the monopolist price \(r\).
Differentiating with respect to $k_E$ gives the FOC for the first-best case optimal investment of $k_E$:

$$pE_{\theta} \left[ \theta q_{E} \beta a_{E}^{\alpha} k_{E}^{\beta - 1} \right] + (1 - p) \frac{1}{2} \left( 1 - \frac{r_{0}^{2}k_{G}^{2}}{k_{E}^{2}} \right) = C'(k_E) \quad (18)$$

The LHS of the expression is the marginal social benefit of investing $k_E$ in a project, and the RHS marginal social cost of investing.

This is similar to the concept of contingent property rights (see the bottom of page 2). In a white state, E retains full control and receives the full return to its investment; in a black state G intervenes and receives the returns to the project.

**LEMMA 2**

So long as a gray market exists, $p < 1$, both private and ambiguous property rights result in too little investment $k_E$, relative to the first-best property rights arrangement.

Neither of the two property rights structures that the paper proposes give rise to a level of investment that is as high as the first-best case. If firm E retains full control, then in the event of a black state, G will charge a monopoly price $r$ to intervene. If both E and G share ambiguous rights, then the inefficiency arises in a white state - firm E cannot get the full return to it’s investment because the firms must negotiate over rents in $t_2$, resulting in a fraction $\delta_E$ for E.

This result can be shown by comparing the Docs for the optimal levels of investment by E in each state:

(I) Optimal investment in the first-best case

$$pE_{\theta} \left[ \theta q_{E} \beta a_{E}^{\alpha} k_{E}^{\beta - 1} \right] + (1 - p) \frac{1}{2} \left( 1 - \frac{r_{0}^{2}k_{G}^{2}}{k_{E}^{2}} \right) = C'(k_E) \quad (19)$$

(II) Optimal investment under private ownership by E [expression (10) in the handout, obtained by maximizing expression (8) in the paper]

$$pE_{\theta} \left[ \theta q_{E} \beta a_{E}^{\alpha} k_{E}^{\beta - 1} \right] + (1 - p) \frac{1}{8} \left( 1 - \frac{r_{0}^{2}k_{G}^{2}}{k_{E}^{2}} \right) = C'(k_E) \quad (20)$$

Clearly,

$$pE_{\theta} \left[ \theta q_{E} \beta a_{E}^{\alpha} k_{E}^{\beta - 1} \right] + (1 - p) \frac{1}{2} \left( 1 - \frac{r_{0}^{2}k_{G}^{2}}{k_{E}^{2}} \right) > pE_{\theta} \left[ \theta q_{E} \beta a_{E}^{\alpha} k_{E}^{\beta - 1} \right] + (1 - p) \frac{1}{8} \left( 1 - \frac{r_{0}^{2}k_{G}^{2}}{k_{E}^{2}} \right) \quad (21)$$

This means that firm E will invest less if it is the sole owner of property rights as compared to the first best case.

(III) Ambiguous ownership between E and G [expression (14) in the handout, obtained by
maximizing expression (12) in the paper]

\[
\delta_E \left\{ pE_\theta \left[ \theta qE_\beta a_E^{\alpha} k_E^{\beta-1} \right] + (1 - p) \frac{1}{2} \left( 1 - \frac{r_0^2 k_G^2}{k_E^2} \right) \right\} = C'(k_E)
\]  

(22)

Note that now the expression includes the term \( \delta_E \), which is defined as E’s Nash bargaining power.

Again the optimal investment by firm E is below the first best level of investment:

\[
pE_\theta \left[ \theta qE_\beta a_E^{\alpha} k_E^{\beta-1} \right] + (1 - p) \frac{1}{2} \left( 1 - \frac{r_0^2 k_G^2}{k_E^2} \right) > \delta_E \left\{ pE_\theta \left[ \theta qE_\beta a_E^{\alpha} k_E^{\beta-1} \right] + (1 - p) \frac{1}{2} \left( 1 - \frac{r_0^2 k_G^2}{k_E^2} \right) \right\}
\]

(23)

PROPOSITION 1

Given \( q_E, r_0, k_G, \) and \( \delta_E > 1/4 \), there exists a \( \bar{p} > 0 \) such that when \( p < \bar{p} \), a firm with ambiguous property rights is more efficient than a firm solely owned by E.

This means that there exists some threshold value for the likelihood of a white state; for probabilities below this value, if firm E shares ambiguous rights, then it invests a higher level \( k_E \) than it would if it were the sole holder of rights. We can see this by first subtracting the marginal benefit of investing under ambiguous rights from the marginal benefit of investing under unambiguous rights:

\[
pE_\theta \left[ \theta qE_\beta a_E^{\alpha} k_E^{\beta-1} \right] + (1 - p) \frac{1}{8} \left( 1 - \frac{r_0^2 k_G^2}{k_E^2} \right) - \delta_E \left\{ pE_\theta \left[ \theta qE_\beta a_E^{\alpha} k_E^{\beta-1} \right] + (1 - p) \frac{1}{2} \left( 1 - \frac{r_0^2 k_G^2}{k_E^2} \right) \right\}
\]

\[= (1 - \delta_E) pE_\theta[a_E^{\alpha} k_E^{\beta-1}] - (1 - p) \left( \frac{1}{8} - \frac{1}{2} \delta_E \right) \left( 1 - \frac{r_0^2 k_G^2}{k_E^2} \right) = 0 \]

(24)

Solving the expression for \( \bar{p} \),

\[
\bar{p} = \frac{\left( \frac{1}{8} - \frac{1}{2} \delta_E \right) \left( 1 - \frac{r_0^2 k_G^2}{k_E^2} \right)}{\left( \frac{1}{8} - \frac{1}{2} \delta_E \right) \left( 1 - \frac{r_0^2 k_G^2}{k_E^2} \right) + (1 - \delta_E) pE_\theta[\theta qE_\beta a_E^{\alpha} k_E^{\beta-1}]} \]

(25)

For values \( p < \bar{p} \), the probability of a white state is sufficiently low, so firm E is more willing to share ambiguous property rights with G. Note that \( \delta_E > 1/4 \) is a lower bound for ambiguous property rights to be ever chosen; if E’s bargaining power is sufficiently low, it will never share ownership to avoid the possibility of bargaining.
PROPOSITION 2
Ceteris paribus, the lower the $r_0K_G$, the more likely that a firm with ambiguous property rights is more efficient than a privately owned firm.

The expression for $\bar{p}$ is decreasing in the opportunity cost of G’s investment. From the expression for $\bar{p}$, we can see that as $r_0K_G$ decreases, the threshold value of $\bar{p}$ increases, making the range over which ambiguous rights yield a higher level of investment than under unambiguous rights greater. Since $r_0K_G$ is the opportunity cost for G to rescue E in a black state, a lower value means that G is a more efficient co-owner, so E is more likely to share ownership.

PROPOSITION 3
Ceteris paribus, the higher the productivity of E, $q_E$, the more likely that a private firm solely owned by E is more efficient than an ambiguously owned firm between E and G.

The expression for $\bar{p}$ is decreasing in $q_E$, so an increase in the productivity level of firm E means that it tolerates a lower probability of a white state before it becomes willing to share property rights. If firm E is more productive, then it is more likely to hold on to full ownership in order to retain the full returns to its investment.

4 Conclusions and Future Discussion

Ambiguous Property Rights Theory: When transactions in the marketplace are costly, ambiguous property rights may prove to be more efficient than clearly defined property rights.

Contributions:
In an imperfect market of transitional economies, many transactions may incur potential illegitimacy or high transaction costs given grayness and imperfections of the market (for instance, governments may block some kinds of market transactions). Under this circumstance, ambiguous property rights become entrepreneur’s choices because they are comparatively more efficient. Ambiguous property rights can be a market solution to market imperfections in transitional economies.

Shortcomings:
However, this paper doesn’t give out a reasonable explanation for the declination of the Chinese non-state sector after the 1990s. According to the widely held belief in economics, institutions of clearly defined property rights are preconditions for economic prosperity. Once the market gets more transparent, more people would opt for defined property rights, which is a trend in today’s China.