Thammasat Review of Economic and Social Policy
Volume 5, Number 2, July – December 2019

Received: 17 February 2019
Revised: 6 May 2019
Accepted: 14 May 2019

Contests for Power: The Cases of Siam and Tonkin in the Seventeenth Century

Arayah Preechametta
Professor
Faculty of Economics
Thammasat University
Bangkok, Thailand
arayah@econ.tu.ac.th

Minh-Tam T. Bui
Assistant Professor
Faculty of Economics
Srinakharinwirot University
Bangkok, Thailand
buithiminh@swu.ac.th

ABSTRACT

We extend a model of contests for power in Myerson (2008) by adding a random adverse public signal into the model. Our analysis indicates that an absolute, or a weak court, leader may have more difficulty in raising the income stream that he needs to credibly promise to his supporters. In addition, this leader is more likely to voluntarily accept a lower bound for the fraction of revenue that he needs to pay his supporters, a lower bound of a number of his supporters, and a lower bound of suppression against him. For a weak court leader, he may also gain lower net benefit from reorganizing his supporters into a strong court, as compared to the case of Myerson (2008). Finally, a weak court leader may face more restrictions of getting enough supporters to fight for a negotiation-proof equilibrium. We then apply these new findings, in search of a more insightful and logical explanation, to some historic contests for state power episodes during seventeenth century Siam and Tonkin.

Keywords: Contests for Power, Negotiation-Proof Equilibrium, Moral Hazard, Public Signal.

JEL Classification: C71, C78, D74, N45

1. Introduction

In the past, a few centralized states with open economies in Asia were able to transform themselves into newly reformed states with specialization as complex as their counterparts in the West. The arrival of Western fire-arms into Southeast Asia during the fifteenth century helped to increase the power of absolute rulers in Siam (1448-88) and Vietnam (1460-97). Many more centralized states emerged during the seventeenth century and were controlled by even more absolute rulers (Reid, 1990).

These absolute rulers of Pre-Modern Siam and Vietnam were often forced into violence traps. For example, King Prasat Thong's usurpation of the throne in 1629 was successfully executed by declaring that King Athittayawong was incompetent. King Narai (1633-1688), who was the second son of King Prasat Thong, ascended to the throne by first helping his uncle, Somdet Phra Sri Suthamaratcha, to execute his own brother, Somdet Chao Fa Chai. He then quickly undertook another coup to replace his uncle as King. King Narai had maintained absolute political control and monopolistic power in external trade. External trade was administrated by the treasury minister on behalf of the King. Early in King Narai's reign, he appointed a few Persian and Moors in many high ranking positions. However, they were later replaced by Constantine Phaulkon's network. King Narai's strategic move was exercised to weaken existing powerful elites. However, after the visit of the second French embassy headed by Simon de La Loubère, a violent coup erupted in 1688 (Love, 1999).

For the case of Tonkin (a part of Vietnam), It was the civil wars between the Trinh and their Nguyen rivals in the early seventeenth century, leading to the political separation of Tonkin (Dang ngoai in the North) and Quinam (Cochinchina

– Dang trong in the central and the south). The civil war and separation of the country reversed the attitude of both rivals toward foreign trade. Both sides found a crucial source of supply of weapons and money to prosecute their rivalry and ambitions for territorial expansion.

2. Literature Review

Myerson (2008) pointed out that the central moral-hazard problem in politics was the political leaders' temptation of denying their costly political debts to past supporters. However, for an absolute leader to win state power and hold on to it, he must be able to make a credible commitment to his supporters. The constitutional government is needed in this case to ensure supporters that their absolute rulers are subjected to third-party judgments. Otherwise, the absolute ruler would be unable to credibly motivate any supporters to fight for his original bid for power. Myerson explained that an absolute ruler, in the past, were then willing to create an institution such as the courts to serve as a forum to guarantee that all his major supporters were able to learn about his failure to properly reward any one of them. Under this communication game introduced by Myerson, many different types of equilibrium are possible. For example, (i) a distrustful equilibrium is the situation where a leader does not have any supporters; (ii) a negotiation-proof equilibrium is the outcome of a competition for power where a viable leader needs a strong court that could remove him from power; (iii) an oligarchic equilibrium is the situation where the collective culture could be tacitly formed and become more favorable to supporters. Multiple equilibria may exist under this case, and oligarchs may prefer to form a smaller coalition than would be optimal for the monarch; and (iv) a focal coordination among multiple equilibria is the case where a leader can make a focal selection or suggestion among the equilibria while each supporter found that his expected payoff is maximized by following the leader's suggestion. Therefore, the trust in political leaders, according to Myerson (2008) can fundamentally determine the political survival of an absolute ruler through his credible incentives that he promised to reward his supporters. Myerson's findings can be applied to the case of usurpation too. If a strong subordinate captain enjoys disproportionately larger trust than his leader, he then will be more likely to fight against his leader for power. The leader's failure in adopting a constitutional government may cause the state to fall into a violent contest over political power as commonly seen in many developing countries.

Powell (2012) argued for a potential link between the shifts in the distribution of power and the phenomenon of persistent fighting among political groups. The paper also pointed out that fighting occurs when the distribution of power is shifting rapidly. The factions avoid fighting and try to negotiate for a deal when the distribution of power is shifting slowly. Thus, peaceful development becomes more likely when political power is stably distributed. The findings of Powell (2012) and Cox, North and Weingast (2015) together imply that a state with stable distribution of power not only reduces its members' perceived risk of conflict, but also increases the likelihood of a peaceful development process for complex specialized economies.

3. The Model

We extend a model of contests for power in Myerson (2008) by adding a random adverse public signal into the model. We assume an island where a political ruler has income R from a flow of taxes and rents per unit time. To become the ruler of this island, the leader must first defeat the previous ruler in battle. Then, to stay in power, this leader must defeat challengers who arrives at a Poisson process[1] with an expected rate λ. We follow Powell (2012) in formulizing the probabilities of the different ways that the game can end in terms of the occurrence of an unfavorable public signal and the chances that the leader will win if there is a public signal. Specifically, let d be the probability of an occurrence of a public signal, ε, when his rival arrives. This randomized public signal takes the value unity if an unfavorable event occurs, $\varepsilon = \varepsilon_1 = 1$ and zero, $\varepsilon = \varepsilon_0 = 0$, otherwise. In addition, let p and $1 - p$ be the conditional probabilities that the leader, and his rival, win respectively, given a public signal. Hence, (d, p) determines the leader's payoff in fighting. For the case of Powell (2012), he pointed out that the formalization is equivalent to working with the unconditional probabilities that the leader and his rival prevail and the residual probability of a stalemate. However, we can lessen the drawback of such unrealistic stalemate outcomes by allowing for a more endogenous force of stalemate, such as the case of negotiation-proof equilibria in Myerson (2008). The model, thus, allows us to study the leader's decision on recruiting his supporters as a move which results in a lottery where the payoffs and the probability of winning are determined by both the cost of fighting and a random public signal. In addition, this model with a random public signal has the merit of being extended to problems with multiple equilibria implications, for instance.

It is further assumed that a leader needs active supporters to fight against new rivals. Let $p = p(n|m)$ denote the winning probability of a leader who has n supporters called captains while his rival has m captains. Assuming that there is some positive constant s such that

[1] See the Lemma in Myerson (2008) for more detail.

$$p(n|m) = n^s/(n^s + m^s)\,, \;\; for \;\; 1 \leq s \leq 2$$

In order to extend Myerson's model, Let c be the cost of a captain in supporting his leader in a battle, with $c > 0$. The cost of a captain is a positive constant term, but its value can significantly jump up higher when a captain's leader is targeted by some unfavorable randomized public signals. The leaders and captains are risk neutral and have the same discount rate δ. Each captain is promised some positive income, y, as long as the leader retains power on the island. Let $U(n, y|m, \varepsilon_0)$ denote a captain's expected discounted payoff value at any point in time when there is no challenger. Then, we can write the following recursive equation.

$$\begin{aligned} U(n, y|m, \varepsilon_0) = d & \left[\frac{y}{\delta + \lambda} \right. \\ & \left. + \left[\frac{\lambda}{\delta + \lambda}\right] [p(n|m)U(n, y|m, \varepsilon_1) - c]\right] \\ & + (1 - d)\left[\frac{y}{\delta + \lambda} \right. \\ & \left. + \left[\frac{\lambda}{\delta + \lambda}\right] [p(n|m)U(n, y|m, \varepsilon_0) - c]\right] \end{aligned} \tag{1}$$

This recursive equation can be rearranged into,

$$U(n, y|m, \varepsilon_0) = \left[\frac{y + \lambda[d[p(n|m)][U(n, y|m, \varepsilon_1)] - c]}{\delta + \lambda - [1 - d]\lambda[p(n|m)]}\right] \tag{2}$$

The captain's expected rewards if his leader wins is $p(n|m)U(n, y|m, \varepsilon_0)$, but he has to pay an immediate cost of

c for going into the battle. This captain's net expected payoff can be described as,

$$p(n|m)U(n,y|m,\varepsilon_0) - c = \frac{p(n|m)y - c(\delta+\lambda) + [\lambda p(n|m)d][p(n|m)U(n,y|m,\varepsilon_1) - c]}{\delta+\lambda-[1-d]\lambda p(n|m)} \tag{3}$$

In the case that this captain decides not to join the battle, his expected payoff is zero. Thus, a captain is willing to fight only if the following condition is satisfied.

$$\bar{y} \geq Y(n|m,\varepsilon_0) = \frac{c(\delta+\lambda)}{p(n|m)} - [\lambda d][p(n|m)U(n,y|m,\varepsilon_1) - c] \tag{4}$$

where $Y(n|m,\varepsilon_0)$ is the smallest income stream that the leader can promise to his captains when his rival has m supporters.

It should be noted that for $d = 0$, equation (4) becomes,

$$\hat{y} \geq Y(n|m,\varepsilon_0) = \frac{c(\delta+\lambda)}{p(n|m)} \tag{5}$$

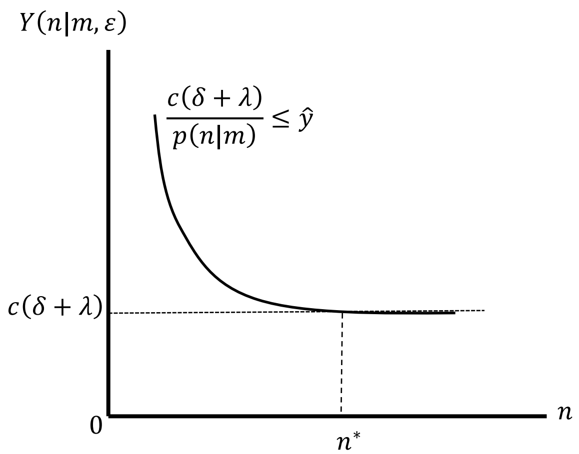
One can clearly observe that equation (5) is the same result as obtained by Myerson (2008). Therefore, the value of the smallest income stream, $\frac{c(\delta+\lambda)}{p(n|m)}$, that the leader can promise to his n captains is a negative function of n before converging to a constant as shown in Figure 1.

For simplicity, in the case of $d \in (0,1)$, we assume a zero value of $U(n,y|m,\varepsilon_1)$ for all n. Then the smallest income stream that the leader can promise becomes,

$$\bar{y} \geq Y(n|m, \varepsilon_0) = \frac{c(\delta + \lambda)}{p(n|m)} + \lambda dc$$

(6)

Figure 1. The smallest income stream for $\hat{y}$ that the leader can promise



From equation (6), the value of the smallest income stream, $\frac{c(\delta+\lambda)}{p(n|m)} + c\lambda d$, that the leader can promise to his *n* captains is a negative function of n before converging to a constant as shown in Figure 2. The difference between the smallest income streams from equation (6) and equation (5) has a positive value of $c\lambda d$. Therefore, in the case of a random unfavorable public signal, the leader has to offer a higher minimum income stream that the leader can promise to his *n* captains.

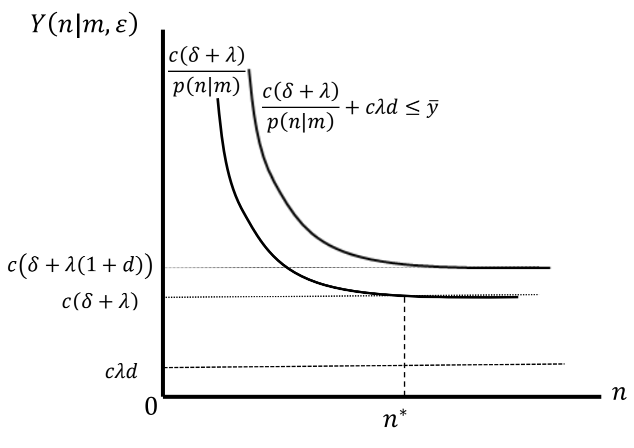
The expected payoff of the leader, on this island at any point in time, must satisfy the following recursive equation.

$$V(n,\bar{y}|m,\varepsilon_0) \ = \ d\left[\frac{R-n\bar{y}}{\delta+\lambda}+\left[\frac{\lambda}{\delta+\lambda}\right]p(n|m)V(n,\bar{y}|m,\varepsilon_1)\right] +(1-d)\left[\frac{R-n\bar{y}}{\delta+\lambda}+\left[\frac{\lambda}{\delta+\lambda}\right]p(n|m)V(n,\bar{y}|m,\varepsilon_0)\right] \tag{7}$$

where $V(n,\bar{y}|m,\varepsilon_1)$ is the expected pay of the leader with the occurrence of an unfavorable public signal, $\varepsilon_1 = 1$. For simplicity and without much loss of generality, we choose to assume that $V(n,\bar{y}|m,\varepsilon_1) = 0$ for all *n*. Then, equation (7) can be written as

$$V(n,\bar{y}|m,\varepsilon_0) = \frac{R-n\bar{y}}{\delta+\lambda-(1-d)\lambda p(n|m)} \tag{8}$$

Figure 2. The smallest income stream for $\bar{y}$ that the leader can promise



Next, at the battle time, the leader's expected discounted payoff is

$$W(n,\bar{y}|m,\varepsilon_0) = p(n|m)V(n,\bar{y}|m,\varepsilon_0) \tag{9}$$

and,

$$W(n,\bar{y}|m,\varepsilon_0) = p(n|m)\left[\frac{R - n\bar{y}}{\delta + \lambda - (1-d)\lambda p(n|m)}\right] \tag{10}$$

It should also be noted that for the case $d = 0$, equation (8) and (10) becomes, respectively,

$$V(n,\hat{y}|m,\varepsilon_0) = \frac{R - n\hat{y}}{\delta + \lambda - \lambda p(n|m)} \tag{11}$$

and,

$$W(n,\hat{y}|m,\varepsilon_0) = p(n|m)\left[\frac{R - n\hat{y}}{\delta + \lambda - \lambda p(n|m)}\right] \tag{12}$$

Once again, one can clearly observe that equation (11) and (12) are the same results obtained by Myerson (2008). It remains true in our case, as Myerson (2008) pointed out, that the critical question is whether the leader's promises to pay his captains are credible. For the case of an absolute monarch with a weak court, a force of n captains is feasible for an absolute monarch if and only if there exists some wage rate $\bar{y}$ such that

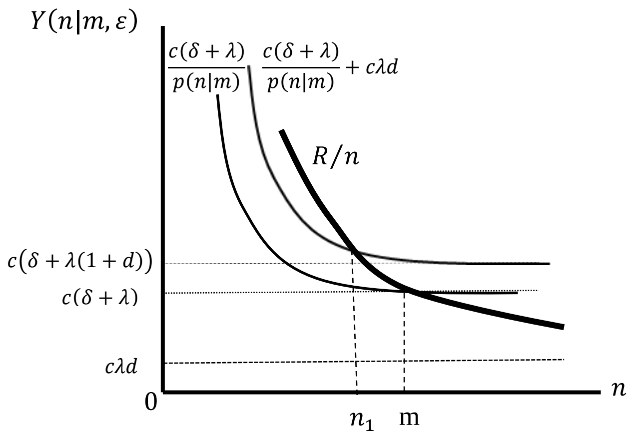
(i) $\bar{y} \geq \frac{c(\delta+\lambda)}{p(n|m)} + c\lambda d$, and

(ii) $V(n,\bar{y}|m,\varepsilon_0) \geq V(k,\bar{y}|m,\varepsilon_0) \quad \forall k \in [0,n]$

The first inequality (i) is the captains' participation constraint and the second inequality (ii) is the absolute monarch's moral hazard constraint.

The first inequality, or the captain's participation constraint, in our model can generate a higher requirement for minimum income stream that the leader has to promise his captains as a consequence of an unfavorable public signal, Figure 3. The hypothetical result as shown in Figure 3 indicates that, given the maximum amount of income per head, $\frac{R}{n}$, that the leader can pay, the number of supporters, n_1, can be lower than his rival's supporters, m. Hence, the previous negotiation-proof equilibria of Myerson (2008) are less likely to be feasible under this case of a higher required minimum income stream resulting from an unfavorable public signal, other things being equal.

Figure 3. The participation constraint gives $n_1 < m$



The second inequality, or the leader's moral-hazard constraint, stated that in order to satisfy this inequality, a reduction in the leader's probability of defeating future challenges, $p(k|m)$, must be large enough to make the leader wants to retain all his n captains at the cost $\bar{y}$ as specified in equation (6).

Next, we use the following Proposition 1, which is extended from Myerson (2008), to assert that an absolute leader in this model is likely to retain a larger number of captains than he can credibly maintain under absolutism. All proofs are in the appendix.

Proposition 1. If the number of captains is $n > 0$ and the captains' wage rate $\bar{y}$ satisfy the feasibility conditions (i), $\bar{y} \geq Y(n|m, \varepsilon_0)$ for an absolute leader against forces of size m and a random public signal, and $V(n, \bar{y}|m, \varepsilon_0) \geq V(k, \bar{y}|m, \varepsilon_0)\ \forall k \in [0, n]$ for an absolute leader against m, then there exists $k > n$ such that $v(k|m, \varepsilon_0) \equiv V(k, Y(k|m, \varepsilon_0)|m, \varepsilon_0) > V(n, \bar{y}|m, \varepsilon_0)$ and $w(k|m, \varepsilon_0) \equiv W(k, Y(k|m, \varepsilon_0)|m, \varepsilon_0) > W(n, \bar{y}|m, \varepsilon_0)$, so that the leader would be better off with k captains who are paid the required wage $Y(k|m)$.

The above extended Proposition 1 shows that an absolute leader would prefer to partially withdraw his absolutism in order to create an institution by which he can commit to a larger group of supporters, such as a weak court. The weak court guarantees that the leader who has cheated his captains will get no support when the next rival arrives. The leader with a weak court is then likely to offer a credible promise to all his captains to avoid falling into a distrustful equilibrium where he loses most of his supporters. Our new outcome in this Proposition 1 indicates that, with a random unfavorable public signal, the leader has to offer a higher value of minimum income stream than the leader needed to promise to all his captains as shown in Figure 2 above.

To exclude the situation where forces have decreasing returns to scale $(0 < s < 0.5)$, the following Proposition 2 offers three lower bounds: (i) a lower bound for the fraction of revenue that the weak court leader needs to pay to supporters, (ii) a lower bound for the number of supporters, and (iii) a lower bound of the size of rivals' forces under the case of a random public signal. All these lower bounds are relatively lower than the case of Myerson (2008) as a result of the random public signal. Hence, Proposition 2 confirms the result as shown in Figure 3 above. In addition, our model with random public signal creates a lower bound of suppression against weak court.

Proposition 2. Suppose that a force size n is feasible for a leader with a weak court against rivals of size m, and given the probability of a random public signal as $d \in (0,1)$. Then the fraction of revenue that the weak court leader pays to supporters is bounded by the inequality $\frac{nY(n|m)}{R} \leq \frac{(1-d)\lambda p(n|m)}{\delta+\lambda}$ and the number of supporters is bounded by the inequality $n \leq \frac{(1-d)\lambda p^2 R}{c(\delta+\lambda)^2+(\delta+\lambda)cd\lambda p}$. If $n > 0,\ s > 0.5$ then the size of rivals' forces is bounded (or the bound of suppression against weak court) by $m \leq M_0$, where

$$M_0 = \frac{(1-d)\lambda R(2s-1)^{2-\frac{1}{s}}}{4s^2c(\delta+\lambda)^2 + 2s(2s-1)(\delta+\lambda)cd\lambda}$$

The next proposition shows that with a random public signal, it needs additional conditions than the case of Myerson (2008) to induce a weak court leader to switch to a strong court that could remove him from power in exchange for improving his winning prospects.

Proposition 3. Suppose that $s \geq \frac{2}{3}$, $p \leq \frac{1}{2}$, $d = 0.535$ and $\frac{[s(2.151\delta+1.326\lambda)-\lambda][0.456\delta+0.767\lambda]R}{c\lambda[\delta+\lambda][\delta+1.267\lambda]} > 0.535$, If a force n is feasible against m for a leader with a weak court and $0 < n \leq m$ then $w'(n|m) > 0$. So if m is globally feasible for leaders with weak courts then $argmax_{k\geq 0} w(k|m) > m$. (i.e., on the eve of battle any leader would prefer to be committed to force size k that is larger than m)

The additional condition that is required by our Proposition 3 is

$$\frac{[s(2.151\delta + 1.326\lambda) - \lambda][0.456\delta + 0.767\lambda]R}{c\lambda[\delta + \lambda][\delta + 1.267\lambda]} > 0.535$$

This additional condition comes from the fact that the leader's pre-battle expected payoff with a random public signal is lower than the case of no random public signal. (See the proof in the appendix) Therefore, the random adverse public signal can reduce some of the benefits of switching from a weak court leader to a strong court leader.

The last proposition below describes the negotiation-proof equilibrium[2] of our model with a random adverse public signal.

Proposition 4. When $s \leq 2$, $p = 0.5$, $d = 0.535$, the negotiation-proof equilibrium is

$$m_1 = \frac{Rs}{c(4\delta + 3.07\lambda + s\lambda)}$$

In this equilibrium, the fraction of the revenue *R* that is paid to supporters is

[2] See Myerson (2008) for its original definition.

$$\frac{m_1 Y(m_1|m_1)}{R} = \frac{2s(\delta + \lambda) + 0.268c\lambda}{(4\delta + 3.07\lambda + s\lambda)}$$

When $s \geq 0.609$, this equilibrium m_1 is greater than the bound M_0 from proposition 2, and so an absolutist or a weak court could not get any support against this equilibrium.

Proposition 4 confirms that with a random adverse public signal, we have a lower upper bound $s = 0.609$ as compared to 0.763 of Myerson (2008). This outcome clearly states that an absolutist or a weak court, with a random adverse public signal, is even more restricted from getting support against a negotiation-proof equilibrium.

4. Analysis and Result

Myerson proposed that an absolute leader may need to initiate a court or a constitutional government, which allows other third-party members the chance to remove him from power. This is the condition needed to rule out any moral hazard problems so that the leader has to keep his promise in rewarding his supporters. Our model obtains a more restricted result against a weak court leader, as a result of adding a random adverse public signal. We then attempt to use those propositions in the previous section to systematically analyze the potential constraints of absolute leaders of Siam and Vietnam in the past.

The case of Siam during the reign of King Narai in the seventeenth century may fit rather well with the model for contests for power that we used. The role of King Narai who maintained his absolute power both in politics and external trade also fits well with the role of an absolute leader in the model. The more absolute a state Siam became, the higher the economic rents the king could capture. In order to avoid political disruption, those captured rents must be proportionately distributed among key subordinates, or his captains. These key subordinates included, for example, the defense minister. However, the rapid rise to Barcalon by a prominent foreign expert of King Narai named Constantine Phaulkon helped to generate large financial gains from trade for the king and the state as a whole. The new economic gains for Ayutthaya also changed the balance of political power between the department of defense and the department of trade. The new gains from external trade, however, broke the rule of proportionality principal of rents allocation designed to maintain peaceful negotiation between political factions, or supporters of the absolute leader, which were led by the defense minister and Phaulkon. The rule of proportionality principal of rents allocation that was designed to maintain peaceful negotiation among political factions in this case is equivalent to the fraction of revenue that the absolute, or the weak court, leader needed to promise to pay his supporters as stated in Proposition 3. The major potential large military rival of King Narai was clearly the Dutch East India Company (VOC) since The VOC had much larger military forces as compared to the forces of the leader of Siam, King Narai, at that time. The outcome of this event is also consistent with the conjecture of Proposition 3, that is, an absolute, or weak court, leader would prefer a force size k to force size m, where m is the force size of the VOC and $k \geq m$. Under that situation, the leader would be willing to organize his supporters into a strong court that could remove him from power. This conjecture from Proposition 3 also happens to be consistent with the strategic move of King Narai in establishing a trade and diplomatic relation with Louis XIV of France. Although the ship *Soleil d'Orient* which brought the first Siamese envoy of diplomatic mission to France sunk near the coast of Madagascar in 1681 before arriving in France, there was, later, the first French embassy, led by chevalier de Chaumont, to arrive at Siam in 1685. However, this first official visit sparked wide discontent among local people for fear that their king might embrace the Catholic faith. This widespread discontent was a clear example of an adverse random public signal that represented an anti-foreign sentiment that directly went against King Narai. This random adverse public signal happened to play a critical role against King Narai during the visit of the second French envoy. That second envoy was led by Simon de La Loubère and was followed by 636 French soldiers who arrived in Siam in 1687. Okphra Phetracha, who was admired by the VOC, had gained enough supporters due to the growing anti-foreign sentiment in Ayutthaya. This wide discontent finally sparked a violent revolution in 1688. That revolution terminated Franco-Siamese relations for the next century and a half. This historical incident confirms that our model of contests for power with a random public signal has merit for being applied to the contest for state power during the period of King Narai.

Next, we continue to analyze the historical evidence of Tonkin (a part of Vietnam). The political crisis and conflicts during the 16th to 17th centuries forced absolute leaders in Vietnam to thaw their frigid attitude towards overseas trade and encouraged them to contact foreign merchants in their quest for military support to fight the civil war. This incidence of civil war was consistent with the prediction provided by the model of contests for power in the sense that, each absolute, or weak court, leader needed to have sufficient resources to credibly promise to pay all his supporters. Therefore, each leader had to contact foreign merchants for military supply and the gains from trade. Under the condition that there is little difference between the force sizes of each political faction, then each absolute leader was able to reorganize his power structure to a more open domestic economy as a result of the larger foreign trade sector. Therefore, each leader had the tendency to finally reach the same level of feasible maximum force size required for a negotiation-proof equilibrium as shown in Proposition 4 of Myerson (2008). Therefore, the civil war, or Tonkin-Quinam conflicts, was eventually terminated in a ceasefire in 1672. The 1672 ceasefire offered each side a free hand to focus on their own territorial affairs.

5. Conclusion

The model allows us to study a leader's decision on recruiting his supporters as a move which results in a lottery where the payoffs and the probability of winning are determined by both the cost of fighting and a random public signal. By comparing our results to the findings of Myerson (2008), we obtain the following conclusions: (i) a leader in the model with random adverse public signal must offer a higher minimum income stream that is needed to credibly promise to all his captains, (ii) the leader in a model with random adverse public signal has a lower bound for the fraction of revenue that he needs to pay his supporters, has a lower bound for the number of his supporters, and has a lower bound of suppression against him, (iii) a leader in a model with random public signal has lower benefits from becoming a strong court leader, and (iv) the absolute, or the weak court, leader faces a more restrictive constraint of getting enough supporters to fight for a negotiation-proof equilibrium. We then apply these new findings, in search of a more insightful and logical explanation, to some historic contests for state power episodes during seventeenth century Siam and Tonkin.

For future study, this model with a random public signal has the merit of being extended to problems with multiple equilibria implications.

References

Cox, G., North, D., & Weingast, B. (2015). The Violence Trap: A Political-Economic Approach to the Problems of Development. Available at SSRN: https://ssrn.com/abstract=2370622

Love, R. (1999). Monarchs, Merchants, and Missionaries in Early Modern Asia: The Missions Étrangères in Siam, 1662-1668. *The International History Review, 24*(1), 1-27.

Myerson, R. (2008). The Autocrat's Credibility Problem and Foundations of the Constitutional State. *The American Political Science Review*, *102*(1), 125-139.

Powell, R. (2012). Persistent Fighting and Shifting Power. *American Journal of Political Science*, *56*(3), 620-637.

Reid, A. (1990). The Seventeenth-Century Crisis in Southeast Asia. *Modern Asian Studies, 24*(2), 639-659.

Appendix

Proposition 1. If $n > 0$ and $\bar{y}$ satisfy the feasibility conditions, $\bar{y} \geq Y(n|m,\varepsilon_0)$ and $V(n,\bar{y}|m,\varepsilon_0) \geq V(k,\bar{y}|m,\varepsilon_0)\ \forall k \in [0,n]$ for an absolute leader against m, then there exists $k > n$ such that $v(k|m,\varepsilon_0) \equiv V(k,Y(k|m,\varepsilon_0)|m,\varepsilon_0) > V(n,\bar{y}|m,\varepsilon_0)$ and $w(k|m,\varepsilon_0) \equiv W(k,Y(k|m,\varepsilon_0)|m,\varepsilon_0) > W(n,\bar{y}|m,\varepsilon_0)$.

Proof. This proof extends the proof of Proposition 1 in Myerson (2008). The feasibility conditions imply that $\frac{\partial V(n,\bar{y}|m,\varepsilon)}{\partial n} = V'(n,\bar{y}|m,\varepsilon) \geq 0\ \forall \varepsilon$. Otherwise, the leader could gain from a small decrease of n, holding the wage $\bar{y}$ fixed for $\varepsilon = \varepsilon_0 = 0$ and $\varepsilon = \varepsilon_1 = 1$.

If $\bar{y} > Y(n|m,\varepsilon_0)$, then a leader will gain from decreasing the wage to $Y(n|m,\varepsilon_0)$ and choose k close enough n to maintain the strict inequality. Next, for $\bar{y} = Y(n|m,\varepsilon_0)$, so that $v(n|m,\varepsilon_0) = V(n,\bar{y}|m,\varepsilon_0)$. Notice that $Y'(n|m,\varepsilon_0) < 0$, because $Y(n|m,\varepsilon_0) = \frac{c(\delta+\lambda)}{p(n|m)} + c\lambda d$ and the probability of winning $p(n|m)$ is increasing in n.

The total derivative of $v(n|m,\varepsilon_0)$ with respect to n is

$$v'(n|m,\varepsilon_0) = V'(n,\bar{y}|m,\varepsilon_0)\left[1 - \frac{nY'(n|m,\varepsilon_0) + d\lambda[p'(n|m)V(n,\bar{y}|m,\varepsilon_1) + p(n|m)V'(n,\bar{y}|m,\varepsilon_1)]}{\delta+\lambda-(1-d)\lambda p(n|m)}\right] > 0$$

Thus, any small increase of n to $k>n$ will increase the expected leader's payoff v when there is no immediately challenge. When there is a challenge, the leader's expected payoff w is

$$w'(n|m,\varepsilon_0) = p(n|m)v'(n|m,\varepsilon_0) + p'(n|m)v'(n|m,\varepsilon_0) > 0$$

Proposition 2. Suppose that n is feasible for a leader with a weak court against m and $d \in (0,1)$ Then $\frac{nY(n|m)}{R} \leq \frac{(1-d)\lambda p(n|m)}{\delta+\lambda} + \frac{[\lambda pd][V(n,Y|m,\varepsilon_1)]}{R}$ and $n \leq \frac{(1-d)\lambda p^2 R}{c(\delta+\lambda)^2 + (\delta+\lambda)cd\lambda p} + \frac{[\lambda dp^2][V(n,Y|m,\varepsilon_1)]}{c(\delta+\lambda)+cd\lambda p}$. If $n > 0, s > 0.5$ then $m \leq M_0$, where $M_0 = \frac{(1-d)\lambda R(2s-1)^{2-\frac{1}{s}}}{4s^2c(\delta+\lambda)^2 + 2s(2s-1)(\delta+\lambda)cd\lambda}$.

Proof. This proof is extended from the proof of Proposition 2 in Myerson (2008)). Writing $p = p(n|m)$ and $Y = Y(n|m,\varepsilon_0)$ for short, the weak-court inequality becomes $\frac{R-nY+[\lambda pd][V(n,Y|m,\varepsilon_1)]}{\delta+\lambda-(1-d)\lambda p} \geq \frac{R}{\delta+\lambda}$, this is equivalent to

$$\frac{nY}{R} \leq \frac{(1-d)\lambda p}{\delta+\lambda} + \frac{[\lambda pd][V(n,Y|m,\varepsilon_1)]}{R}$$

With $Y = \frac{c(\delta+\lambda)}{p} + cd\lambda$, one has

$$n \leq \frac{(1-d)\lambda p^2 R}{c(\delta+\lambda)^2 + (\delta+\lambda)cd\lambda p} + \frac{[\lambda dp^2][V(n,Y|m,\varepsilon_1)]}{c(\delta+\lambda) + cd\lambda p}$$

Notice $p = \frac{n^s}{(n^s+m^s)}$ implies $n = m\left[\frac{p}{(1-p)}\right]^{\frac{1}{s}}$. So with $n>0$ and $p>0$, we get

$$m \leq \frac{(1-d)\lambda Rp^{2-\frac{1}{s}}(1-p)^{\frac{1}{s}}}{c(\delta+\lambda)^2 + (\delta+\lambda)cd\lambda p} + \frac{(d\lambda)[V(n,Y|m,\varepsilon_1)]p^{2-\frac{1}{s}}(1-p)^{\frac{1}{s}}}{c(\delta+\lambda) + cd\lambda p} \qquad (2.1)$$

For $V(n, Y|m, \varepsilon_1) = 0$, and $s > 0.5$, the right side of this inequality is maximized by the probability $p = \frac{2s-1}{2s}$, and substitute this value of p yields the formula for $M_0 = \frac{(1-d)\lambda R(2s-1)^{2-\frac{1}{s}}}{4s^2 c(\delta+\lambda)^2+2s(2s-1)(\delta+\lambda)cd\lambda}$ in the proposition.

Proposition 3. Suppose that $s \geq \frac{2}{3}$, $p \leq \frac{1}{2}$, $d = 0.535$ and $\frac{[s(2.151\delta+1.326\lambda)-\lambda][0.456\delta+0.767\lambda]R}{c\lambda[\delta+\lambda][\delta+1.267\lambda]} > 0.535$, If a force n is feasible against m for a leader with a weak court and $0 < n \leq m$ then $w'(n|m) > 0$. So if m is globally feasible for leaders with weak courts then $argmax_{k\geq 0} w(k|m) > m$.

Proof. This proof is extended from the proof of Proposition 3 in Myerson (2008)). The derivative with respect to n of the probability $p = p(n|m) = \frac{n^s}{n^s+m^s}$ is

$$p' = p'(n|m) = \frac{sn^{s-1}}{n^s+m^s} - \frac{sn^{2s-1}}{(n^s+m^s)^2} = p(1-p)\frac{s}{n}$$

The leader pre-battle expected payoff is $w(n|m,\varepsilon_0) = \frac{pR-nc(\delta+\lambda)-c\lambda dp}{\delta+\lambda-\lambda(1-d)p}$, and its derivative with respect to n satisfied

$$w'(n|m,\varepsilon_0) = \frac{[(p'R-c(\delta+\lambda)-c\lambda dp')(\delta+\lambda-\lambda(1-d)p)-(pR-nc(\delta+\lambda)-c\lambda dp)(\lambda dp')]}{(\delta+\lambda-\lambda(1-d)p)^2}$$

$$= \frac{[(R-nc\lambda)p'-c(\delta+\lambda-\lambda(1-d)p)](\delta+\lambda)}{(\delta+\lambda-\lambda(1-d)p)^2} - \frac{c\lambda dp'(\delta+\lambda-\lambda p)}{(\delta+\lambda-\lambda(1-d)p)^2}$$

$$= \frac{[(R-nc\lambda)(1-p)ps-nc(\delta+\lambda-\lambda(1-d)p)](\delta+\lambda)}{n(\delta+\lambda-\lambda(1-d)p)^2} - \frac{c\lambda d(1-p)ps(\delta+\lambda-\lambda p)}{n(\delta+\lambda-\lambda(1-d)p)^2}$$

$$= \frac{\left[R(1-p)ps-nc\left[\delta+\lambda(1-(1-d)p)\left(1+\left\{\frac{(1-p)}{(1-(1-d)p)}ps\right\}\right)\right]\right](\delta+\lambda)}{n(\delta+\lambda-\lambda(1-d)p)^2} - \frac{c\lambda d(1-p)ps(\delta+\lambda-\lambda p)}{n(\delta+\lambda-\lambda(1-d)p)^2}$$

$$\geq \frac{\left[R(1-p)ps-\left[\frac{(1-d)R\lambda p^2}{(\delta+\lambda)^2+(\delta+\lambda)d\lambda p}\right]\left[\delta+\lambda(1-(1-d)p)\left(1+\frac{(1-p)}{(1-(1-d)p)}ps\right)\right]\right](\delta+\lambda)}{n(\delta+\lambda-\lambda(1-d)p)^2} - \frac{c\lambda d(1-p)ps(\delta+\lambda)}{n(\delta+\lambda-\lambda(1-d)p)^2}$$

$$= \frac{\left[s[(\delta+\lambda)^2+(\delta+\lambda)d\lambda p]-\lambda p\left[\frac{(1-d)\delta}{1-p}+\lambda(1-(1-d)p)\left(\frac{1}{(1-p)}+\frac{1}{(1-(1-d)p)}ps\right)\right]\right]R(1-p)p}{n(\delta+\lambda-\lambda(1-d)p)^2[(\delta+\lambda)+d\lambda p]} - \frac{c\lambda d(1-p)ps(\delta+\lambda)}{n(\delta+\lambda-\lambda(1-d)p)^2}$$

$$= \frac{\left[s[(\delta+\lambda)^2+(\delta+\lambda)d\lambda p-\lambda^2p^2]-\lambda\left[\frac{(1-d)\delta p}{1-p}+\lambda p\frac{(1-(1-d)p)}{(1-p)}\right]\right]R(1-p)p}{n(\delta+\lambda-\lambda(1-d)p)^2[(\delta+\lambda)+d\lambda p]} - \frac{c\lambda d(1-p)ps(\delta+\lambda)}{n(\delta+\lambda-\lambda(1-d)p)^2}$$

$$= \frac{\left[s[\delta^2+2\lambda\delta+\lambda^2-\lambda^2p^2+(\delta+\lambda)d\lambda p]-\lambda\left[\frac{(1-d)\delta p}{1-p}+\lambda p\left(\frac{(1-(1-d)p)}{(1-p)}\right)\right]\right]R(1-p)p}{n(\delta+\lambda-\lambda(1-d)p)^2[(\delta+\lambda)+d\lambda p]} - \frac{c\lambda d(1-p)ps(\delta+\lambda)}{n(\delta+\lambda-\lambda(1-d)p)^2}$$

By setting $n \leq m$, we must have $p \leq 0.5$, then for $d \in (0,1)$, say $d = 0.535$.

$$w'(n|m,\varepsilon_0) \geq \frac{[s(\delta^2+2.267\lambda\delta+1.017\lambda^2)-\lambda(0.465\delta+0.767\lambda)]R(1-p)p}{n(\delta+\lambda-\lambda(1-d)p)^2[(\delta+\lambda)+d\lambda p]} - \frac{c\lambda d(1-p)p(\delta+\lambda)}{n(\delta+\lambda-\lambda(1-d)p)^2}$$

$$= \frac{[s(2.151\delta+1.326\lambda)-\lambda][0.465\delta+0.767\lambda]R(1-p)p}{n(\delta+\lambda-\lambda(1-d)p)^2[(\delta+\lambda)+d\lambda p]} - \frac{c\lambda d(1-p)p(\delta+\lambda)}{n(\delta+\lambda-\lambda(1-d)p)^2} > 0,$$

where the final strict inequality uses $s \geq \frac{2}{3} > \frac{\lambda}{(2.151\delta+1.326\lambda)}$, and

$$[[s(2.151\delta + 1.326\lambda) - \lambda][0.465\delta + 0.767\lambda]R] - \left[c\lambda d(\delta + \lambda)[(\delta + \lambda) + d\lambda p]\right] > 0$$

Recall that $> \frac{\lambda}{(2.151\delta + 1.326\lambda)}$, $p \leq 0.5$ and $d = 0.535$, the last condition above is equivalent to

$$\frac{[s(2.151\delta + 1.326\lambda) - \lambda][0.456\delta + 0.767\lambda]R}{c\lambda[\delta + \lambda][\delta + 1.267\lambda]} > 0.535$$

.

If m is globally feasible with weak court, so $(n|m, \varepsilon_0) \geq \frac{R}{(\delta+\lambda)}$. If some $n < m$ had $w(n|m, \varepsilon_0) > w(m|m, \varepsilon_0)$ then, with $p(n|m) < p(m|m)$, we would have

$$v(n|m, \varepsilon_0) = \frac{w(n|m, \varepsilon_0)}{p(n|m)} > \frac{w(m|m, \varepsilon_0)}{p(m|m)}$$

$$= v(m|m, \varepsilon_0) \geq \frac{R}{(\delta + \lambda)}$$

and so n would be weak-court feasible against m. But then $w'(n|m, \varepsilon_0) > 0$, which implies that $n < m$ cannot maximize $w(n|m, \varepsilon_0)$. That is the maximum of $w(n|m, \varepsilon_0)$ over $n \in [0, m]$ must be achieved at the top of the interval, at $n = m$. But $w'(m|m, \varepsilon_0) > 0$, and so some $k > m$ has $w(k|m, \varepsilon_0) > w(m|m, \varepsilon_0)$.

<u>Proposition 4.</u> When $s \leq 2, p = 0.5, d = 0.535$, the negotiation-proof equilibrium is $m_1 = \frac{Rs}{c(4\delta+3.07\lambda+s\lambda)}$. In this equilibrium, $\frac{m_1 Y(m_1|m_1)}{R} = \frac{2s(\delta+\lambda)+0.268c\lambda}{(4\delta+3.07\lambda+s\lambda)}$. When $s \geq 0.609$, this equilibrium m_1 is greater than the bound M_0 from proposition 2.

<u>Proof.</u> This proof is extended from the proof of Proposition 4 in Myerson (2008)). Notice that with $p = p(n|m)$,

$$\frac{d\left(\frac{n}{p}\right)}{dn} = \frac{[p - np']}{p^2} = \frac{[1 - (1 - p)ps]}{p^2} = \frac{[1 - (1 - p)s]}{p}$$

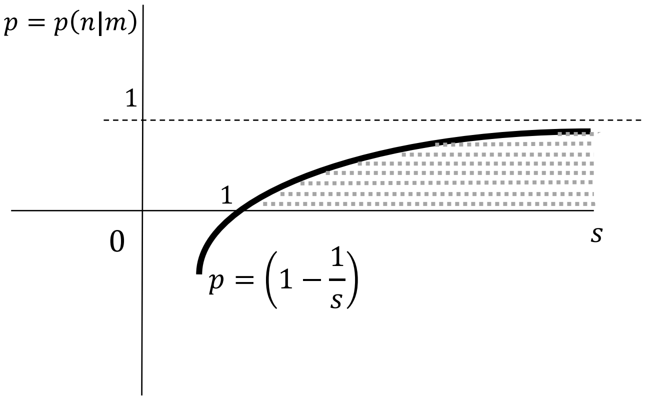
and so $\frac{n}{p}$ is decreasing in *n* when $p < 1 - \frac{1}{s}$, but is increasing in *n* when $p \geq 1 - \frac{1}{s}$.

Then

$$w(n|m, \varepsilon_0) = p(n|m)\left[\frac{R - \frac{n[c(\delta + \lambda) + p(n|m)d\lambda c]}{p(n|m)}}{[\delta + \lambda - \lambda(1 - d)p(n|m)]}\right] \qquad (4.1)$$

would be strictly increasing in *n* near any *n* where $p(n|m) < 1 - \frac{1}{s}$ and $w(n|m, \varepsilon_0) > 0$.
Thus, for any *m*, the maximum of $w(n|m, \varepsilon_0)$ must be achieved either at 0 or at some *n* such that $(n|m) \geq 1 - \frac{1}{s}$.

Figure A.1 The shaded region where (n/p) is decreasing in n given $p < \left(1 - \frac{1}{s}\right)$, and $0 \leq p \leq 1$.



We have from Proposition 3 that

$$w'(n|m,\varepsilon_0) = \frac{\left[R(1-p)ps - nc\left[\delta + \lambda(1-(1-d)p)\left(1 + \left\{\frac{(1-p)}{(1-(1-d)p)}ps\right\}\right)\right]\right](\delta+\lambda)}{n(\delta+\lambda-\lambda(1-d)p)^2[(\delta+\lambda)+d\lambda p]} - \frac{c\lambda d(1-p)ps(\delta+\lambda-\lambda p)}{n(\delta+\lambda-\lambda(1-d)p)^2}$$

$$= \frac{\left[\left[Rs - \left(\frac{n}{p}\right)c\left[\frac{\delta}{(1-p)} + \lambda(1-(1-d)p)\left(\frac{1}{(1-p)} + \left\{\frac{1}{(1-(1-d)p)}ps\right\}\right)\right]\right](\delta+\lambda) - [c\lambda ds(\delta+\lambda-\lambda p)[(\delta+\lambda)+d\lambda p]]\right]p(1-p)}{n(\delta+\lambda-\lambda(1-d)p)^2[(\delta+\lambda)+d\lambda p]}$$

So the sign of $w'(n|m,\varepsilon_0)$ is determined by the expressions

$$\left[Rs - \left(\frac{n}{p}\right)c\left[\frac{\delta}{(1-p)} + \lambda(1-(1-d)p)\left(\frac{1}{(1-p)} + \left\{\frac{1}{(1-(1-d)p)}ps\right\}\right)\right]\right](\delta+\lambda) - [c\lambda ds(\delta+\lambda-\lambda p)[(\delta+\lambda)+d\lambda p]]$$

Over the set of all n such that $p \geq 1 - \frac{1}{s}$. The terms $\frac{n}{p}$ and p are both increasing in n, and so the expression above is decreasing in n and can cross 0 only once, at a value of n that has $w'(n|m,s_0) = 0$ and so maximizes $w(n|m,\varepsilon_0)$ in this set. Thus, if $n = 0$ does not maximize $w(n|m)$, then the maximum of w must be achieved at the unique n such that $p(n|m) \geq 1 - \frac{1}{s}$ and

$$\left[Rs - \left(\frac{n}{p}\right)c\left[\frac{\delta}{(1-p)} + \lambda(1-(1-d)p)\left(\frac{1}{(1-p)} + \left\{\frac{1}{(1-(1-d)p)}ps\right\}\right)\right]\right] = 0 \quad (4.2)$$

For m to be a negotiation-proof equilibrium, we need this equation to be satisfied with $n = m$, and we need $w(m|m) \geq w(0|m) = 0$. But $n = m$ implies $p(n|m) = 0.5$, which satisfies $p \geq 1 - \frac{1}{s}$ as long as $s \leq 2$. So the equilibrium conditions are

(1) For $n = m$, $p(n|m) = 0.5, d = 0.535$, equation (4.2) becomes

$$Rs = 2mc\left[2\delta + 1.535\lambda + \frac{\lambda s}{2}\right] \geq 0$$

This condition is satisfied by m_1 in the proposition.

(2) From equation (4.2) and giving that $n = m,\ p = 0.5$ and $d = 0.535$, the second condition is

$$\frac{\left[\frac{R}{2} - mc(\delta + \lambda) - 0.535c\lambda\right]}{(\delta + 0.232\lambda)} \geq 0$$

Or,

$$m = \frac{R - 1.07c\lambda}{2c(\delta + \lambda)} \qquad (4.3)$$

It is clear that this second condition (equation 4.3) also satisfies the weak-court condition because

$$m = \frac{R - 1.07c\lambda}{2c(\delta + \lambda)} < \frac{R}{[2c(\delta + \lambda)]}$$

With $s \leq 2$, the second condition (equation 4.3) is also satisfied at $m_1 = \frac{Rs}{c[4\delta + 3.07\lambda + s\lambda]} \leq \frac{R}{[2c(\delta+\lambda)]}$. For example, by giving $s = 2$, one has

$$m_1 = \frac{R}{c[2\delta + 2.035\lambda]} < \frac{R}{2c(\delta + \lambda)} \qquad (4.4)$$

Then, by using both equation (4.3) and (4.4), one has

$$\left[m = \frac{R - 1.07c\lambda}{2c(\delta + \lambda)}\right] < \left[m_1 = \frac{R}{c[2\delta + 2.035\lambda]}\right] < \frac{R}{[2c(\delta + \lambda)]}$$

To show that is m_1 is greater than $M_0 = \frac{(1-d)\lambda R(2s-1)^{2-\frac{1}{s}}}{4s^2c(\delta+\lambda)^2 + 2s(2s-1)(\delta+\lambda)cd\lambda}$ in proposition 2, we need

$$\frac{Rs}{c[4\delta + 3.07\lambda + s\lambda]} > \frac{0.465\lambda R(2s-1)^{2-\frac{1}{s}}}{4s^2c(\delta + \lambda)^2 + 2s(2s-1)(\delta + \lambda)(0.535)c\lambda}$$

$$\frac{1}{[4\theta + 3.07 + s]} > \frac{0.465\lambda^2(2s-1)^{2-\frac{1}{s}}}{4s^3(\delta + \lambda)^2 + 2s^2(2s-1)(\delta + \lambda)(0.535)\lambda}$$

$$\frac{1}{[4\theta + 3.07 + s]} > \frac{0.465(2s-1)^{2-\frac{1}{s}}}{4s^3(\theta + 1)^2 + 2s^2(2s-1)(\theta + 1)(0.535)}$$

$$\frac{4s(\theta + 1)^2 + 2(2s-1)(\theta + 1)(0.535)}{0.465[4\theta + 3.07 + s]} > \frac{(2s-1)^{2-\frac{1}{s}}}{s^2}$$

For any s, the left-hand side is minimized over $\theta \geq 0$ by letting $\theta = 0$, and so the inequality hold if

$$4 > \frac{(0.465)(3.07 + s)(2s-1)^{2-\frac{1}{s}}}{s^3} - \frac{(4s-2)(0.535)}{s}$$

Which is true when $s = 0.609$.