Thammasat Review of Economic and Social Policy
Volume 2, Number 1, January - June 2016

Market Expansion, Political Relationship and Geographical Inequality in the Early Rattanakosin Siam: A Theoretical Perspective[*]

Pornthep Benyaapikul
Assistant Professor
Faculty of Economics
Thammasat University
Bangkok, Thailand
pornthep@econ.tu.ac.th

[*] This research was supported by the Thailand Research Fund (TRF) as a part of TRF Senior Research Scholar project: "Spatial Dynamics and the Persistence of Inequality in Thailand", grant no. RT558005. This paper benefited greatly from conversations with Professor Arayah Preechametta, the project leader. Valuable comments and suggestions from Professor Pasuk Phongpaichit, Professor Mingsarn Kaosa-ard, Thorn Pitidol and workshop participants at the faculty of Economics, Thammasat University are gratefully acknowledged.

ABSTRACT

This paper provides a simple theoretical model that explains a mechanism for which market economy might proliferate through various geographical locations in the early Rattanakosin Siam and its implication on locational inequality. The proliferation of market economy is often facilitated by a widespread network of merchants and the elite's profit-maximisation trade incentives. The degree of market expansion in each city depends on elite's benefits from the market and geographical location of the city. The results suggest four factors that contribute to the level of inequality both within and between cities: social structure, geographical location, individual's connection with powerful elites and worker's ability.

Keywords: Geography, inequality, market structure, institutional development, Thailand

JEL Classification: D4, D63, N25, R3

1. Introduction

Exchange is universal. People have traded things for thousands of years: evidence of exchanged artefacts such as shells and other goods over long distances dates back to before any written history (Pomeranz & Topik, 2006). As argued by Adam Smith in 1776, the "*propensity to truck, barter, and exchange*" was inherent in human nature.

One of the central questions about the foundation of market economy in the pre-modern era concerns the role of social structure and geographical location in the transition process from subsistence economy. Historical evidence suggests that social structure played an important role in trade expansion in the economy. The literature identified the protection of property rights and contract enforceability as two important institutional foundations necessary for the evolution of market economy.[1] In the context of pre-modern societies, much of economic transaction is based on coercive relationship between workers/merchants and a ruler/elite who controls specific territory or trade routes and is the monopoly supplier of legitimate coercion. Institutional arrangements that align the interests of the two groups are needed to capture larger benefits from trade (Bates, 2001; Greif, 2008).

For example, in Medieval Europe, before a trading centre was established trade and commerce was obstructed by little security on trade routes and the system of fines and tolls which each landowner collected before letting merchandise pass through his domains. Itinerant traders, or merchant guilds in the "Commercial Revolution of the Middle Ages

[1] The commitment problem occurred when the ruler, after pledging their protection for traders, have an incentive to renege on his promise by using coercive power to abuse their property rights once trade was established. See Greif (2006) for a survey of this literature.

Europe" from the tenth to the eighteenth centuries, that dominated long-distance commerce was the most important institution that facilitated the expansion of trade. Merchant guilds emerged as an efficient institution to allow rulers of trade centres to commit to the security of alien merchants (Greif et al., 1994; Hicks, 1969) contributing to the growth of long-distance trade (Ogilvie, 2011).[2] There have been theoretical explanations on the function of merchant networks in the market economy transition. For example, Greif et al. (1994) highlights that the merchant network as an institution for communication and coordination was important for trade expansion as its helped solve the problem of commercial insecurity. More recent literature focuses on a key function of the merchant network (or guilds) in facilitating collusion between merchants and city rulers in order to restrict trade and maximise joint rent (Dessi & Ogilvie, 2004; Dessi & Piccolo, 2015).

In early Rattanakosin Siam (1782-1855), the patron-client relationship between the princes or the noble aristocrat class (*munnai*) and the commoner (*phrai*) class was the important institutional foundation of legitimate coercive power.[3] There are two basic kinds of *phrai*: the *phrai som* belonged to the nobles or the prince and free from

---

[2] For an extensive survey and discussion of the role of guilds as an economic institution, see Ogilvie (2014).

[3] Scott (1972) defines patron-client relationship as an

> exchange relationship between roles . . . involving a largely instrumental friendship in which an individual of higher socioeconomic status (patron) uses his own influence and resources to provide protection or benefits, or both, for a person of lower status (client) who, for his part, reciprocates by offering general support and assistance, including personal services, to the patron.

government corvée labour, the *phrai luang* belonged to the king and were subject to government corvée labour for 4 months every year. Commoners must be registered under a prince or an aristocrat, from whom they are provided with aid, protection from government exaction (Rabibhadana, 1969) and social insurance of a powerful leader (Scott &Kerkvliet, 1973). A noble and prince had certain power over his commoners in the form of corvée labour and movement restriction; they were not allowed to migrate between towns or leaders. This was because of the shortage of labour during this period, thus controlling labour was an essential key to power. Territorial control was not important.

Corvée labour service and movement restriction limit workers market access. Trading and commerce between towns in the kingdom were operated by the widespread network of Chinese merchants that established patron-client relationships with the nobles and princes of small towns (Eoseewong, 2012). Trading activities were concentrated among these elites and Chinese merchants while foreign trade, which drove domestic trade, was monopolised by the king.

Even though an elite can force his commoners to work for him, corvée labour suffers from the moral hazard problem and is productively inefficient. Workers have no incentive to exert effort and are likely to slack (Nartsupha & Manarangsarn,1984; Preechametta, 2014). As trading activities increase, workers have better work opportunity and return from the market. It became more profitable for the elites to allow commoners to avoid corvée by paying an exemption fee.[4] However, granting workers market access

[4] Historical evidence shows that during the King Rama III period, more and more workers would want to pay fee to avoid corvée burden (Hong, 1981 cited in Eoseewong, 2012)

was implemented in a limited and controlled manner. The *phrai* system was not entirely abolished as corvée labour still benefits the elites (Eoseewong, 2012).

This study aims to provide game-theoretical foundation that explains a mechanism for which market economy can proliferate through various geographical locations within a state and how factors such as social structure, geographical location and labour productivity gave rise to inequality in a pre-modern society like early Rattanakosin Siam. To formulate a simple model, it is assumed that allocation of resources is controlled by the elites. Workers' participation in the market is jointly determined by elite's decision to grant market access and the network connection with the elite that the workers are invested in.

The paper is organised as follows: Section 2 sets up and describes the basic model. Section 3 characterises equilibrium of the model and discusses comparative static results. Finally, Section 4 concludes.

2. The Model

In this section, we describe the environment. We start with the social structure that is characterised by the coercive relationship between an elite and workers in each city. We then describe the structure of the game before analysing equilibrium in the next section.

2.1 Social Structure

A kingdom is populated by $J > 0$ localities or cities. The cities are indexed by $j \in \{1,2,\ldots,J\}$ which also represents a rank of a city's distance from the capital in an ascending order. In each city, there is a continuum of identical workers of mass equal one with Von-Neumann-Morgenstern-type utility function. Workers' output can be high or low depending on the effort they put on work. Each worker i has potential productivity of $1 + x_i \geq 1$ per unit of time. It is assumed that x_i is privately known only by worker i but it is common knowledge that x_i is drawn uniformly from interval [0,1]. When a worker chooses effort level $a \in [0,1]$ at private cost $\omega(a)$, output $1 + x_i$ is realised with probability a and 1 with probability $1 - a$. We assume that $\omega(0) = 0$ and that $\omega(\cdot)$ is strictly increasing, strictly convex and twice differentiable, with derivative denoted by ω' that also satisfies $\lim_{g \to 1} \omega'(g) = \infty$.[5] In any given period, all workers are forced to spend a part of their time working for the elite and, depending upon being selected (see Section 2.2 below), participate in the market.

Each city is overseen by an elite whose powers have been delegated by the king. The elite can force workers to devote a fraction α of their time working for him. For now, we assume that α is exogenously set by the king and, therefore, fixed. In return, workers receive constant wage $\underline{w}$. We assume that the elite can sell these output at price P^E. It is straightforward to see that forced workers maximise their utility by choosing effort $a = 0$ when working for the elite.

2.2 Market economy

Apart from coercive relationship between the elite and the workers, the cities may benefit from trade by visiting merchants. We assume that market activities are controlled by the elite. Workers can participate in the market only if the elite opens up the city for merchants to trade and allows workers to access the market. We also assume that

[5] This assumption follows Acemoglu and Wolitzky (2011) while Chwe (1990) assumed the effort cost to have form $\omega(a) = f(-\log(1-a))$.

merchants' valuations for the product in city j are identical and can be given by $P_j = P(Q, j)$ where $Q = \sum_i q_i + \alpha$ is the aggregate output available for trade, $P(\cdot)$ is strictly positive, decreasing in both Q and j, and continuously differentiable (in Q) demand schedule. This captures the idea that greater output will reduce price and demand for trade is lower in a more remote city. If no worker in city j is allowed to participate in the market, the elite becomes a monopolist in which he sells his output at price $P^E = P_j(\alpha, j) = P_j^M$. If the elite allow workers to trade, the elite receives benefits from trade by taxing merchants at an exogenous rate τ per unit of output traded.

To open up the city for trade, the ruling elite of the city provides trade facilitating public goods at cost γ_j. These public goods could be interpreted as physical markets where trades actually take place, transportation routes or protection to merchants. However, in this paper, we will refer to this as an elite's 'network' to reflect historical records that the proliferation of market economies, for example in medieval Europe or during early Rattanakosin period, Thailand, might be hindered by workers' limited access to the market. This limited access is caused by many factors such as availability of money, distance from trading centres, transportation difficulties or information availability. Opportunity of accessing and participating in the market for each worker may be provided by the 'profit-maximising' elite and this depends partly on their informal network or relationship. The parameter $\gamma_j > 0$ corresponds to the cost of trade facilitating public goods to the elite which is determined by city specific factors such as geographical location.

Workers need to invest in order to get into an elite's network circle. We assume that each worker chooses whether to invest in network formation with the elite or not. The cost of network investment is fixed at η. Only workers with network connection with the elite are granted a market access. The workers then devote their remaining $(1-\alpha)$ unit of time producing output. Each worker is then matched with a merchant. The pair then bargains over term of trade. We assume Nash bargaining solution to this process. Workers without market access is assumed to receive utility $\underline{u}$ per unit of time.

The timing of the game is as follows:

1. All workers spend a fraction α of their time working for the elite. The elite decides whether to open city for trade.
2. Workers with market access choose effort level to produce output.
3. If the trade is allowed, merchant valuation P_j is determined. The elite sells output at P_j. Each worker is matched with a merchant. Both parties bargain over the trading price. The elite receives trading tax.

3. Equilibrium

To find an equilibrium, the subgames are solved backward. We begin with the bargaining subgame between market-participating workers and merchants where trading price will be determined. Workers' and elite's problems are then analysed.

3.1 Workers vs Merchants Bargaining Subgame

In the bargaining subgame between a worker and a merchant, worker i with output q_i meets a merchant to trade and negotiate over the price P_w. Once a buyer meets a seller, they negotiate a price to trade. For simplicity, suppose one of the two, chosen at random, announces a take-it-or-leave-it price offer. If trade occurs the merchant receives $V_m = \left(P_j(Q) - P_w - \tau\right)q_i$ while the worker receives $V_w = P_w q_i$. If both parties cannot agree to trade, the merchant receive zero utility from this match; this means the disagreement outcome for the merchant is $d_m = 0$. On the contrary, if workers refuse to trade with the matched merchant, they have to pay search cost s per unit of output to match with the new merchant and start the bargaining process over again. This bargaining protocol is equivalent to the Nash solution.

Suppose that, in equilibrium, bargaining is successfully concluded with probability φ which the worker receives equilibrium bargaining payoff. Workers' disagreement outcome is given by

$$\begin{aligned} d_{w_i} &= \phi V_{w_i}^* - sq_i + (1-\phi)\left(d_{w_i}\right) \\ &= \phi V_{w_i}^* - sq_i \sum_{i=0}^{\infty}(1-\phi)^i \\ &= \frac{\phi V_{w_i}^* - sq_i}{\phi} \end{aligned} \tag{3.1}$$

where $V_{w_i}^*$ is the equilibrium bargaining payoff for the worker.

We use Nash bargaining solution (Nash, 1950) as a solution concept for this bargaining problem. The outcome of the bargaining is given by the following Proposition

Proposition 3.1 *The Nash bargaining solution between a worker with output* q_i *and a merchant involves* $P_w^* = \bar{P} - \tau - s$.

Proof. First, notice that the Nash bargaining solution must be Pareto-efficient. Therefore, in equilibrium, the bargaining involves no delay or $\varphi = 1$. This means the disagreement outcome for a worker reduces to $d_w = V_w^* - sq$. The Nash bargaining solution is the optimal solution of the following problem

$$\max_{V_m, V_w} [V_m - d_m][V_w - d_w]$$
$$\leftrightarrow \max_{P_w} [\left(P_j - P_w - \tau\right) q_i][P_w q_i - (V_w^* - sq)]$$

By the first-order optimality conditions, we have

$$P_w^* = \frac{P_j - \tau}{2} - \frac{V_w^* - sq_i}{2q_i}$$

Since $V_w^* = P_w^* q_i$, we have

$$P_w^*(Q, j, \tau, s) = P_j(Q) - \tau - s$$

3.2 Workers' problem

3.2.1 Worker's efforts

Upon being granted market access, the workers allocate their remaining $(1 - \alpha)$ unit of their time for market production. As described above in Section 2.1, the level of output produced is uncertain and depends on worker's efforts. We assume that workers without market access receive utility $(1 - \alpha)\underline{u}$. We also assume that $\underline{u}$ is sufficiently small. In particular,

$$\underline{u} < P_w^e \tag{3.2}$$

where P_w^e is workers' expected selling price to ensure that, ceteris paribus, being in the market is always better than staying out.[6]

Workers with market access choose effort a to solve the following problem:

$$V(x_i) = \max_{a\in[0,1]} a[P_w^*(1-\alpha)(1+x_i)] + (1-a)[P_w^*(1-\alpha)] - (1-\alpha)\omega(a)$$

$$= \max_{a\in[0,1]} (1-\alpha)[P_w^*(1+ax_i) - \omega(a)] \qquad (3.3)$$

The optimal level of efforts, a^*, is given by the first order condition:

$$P_w^* x_i = w'(a^*) \qquad (3.4)$$

Since $\omega'(\cdot)$ is increasing in a, optimal efforts are increasing in output price P_j and productivity x_i and decreasing in trading tax, τ and decreasing in search cost, s. The following lemma summarises this.

Lemma 3.2 *Worker's optimal efforts, a^* is increasing in both productivity (x_i) and market price (P_j) and decreasing in both trading tax (τ) and search cost (s)*

Proof. The proof is a straightforward application of the Implicit Function Theorem on equation 3.4 using Proposition 3.1 and hence omitted. ■

---

[6] The condition 3.2 implies that workers' expected utility received when in the market but exerting no effort $(a = 0)$, $P_w^e(1-\alpha)$, is higher than being out of the market.

3.2.2 Network investment

Only workers in the elite's network could be chosen to participate in the market. Workers who want to gain access to the market must invest in (political) networks in order to have 'connections' with the elite. We assume that the worker must choose whether to spend η on network investment. Apart from building a social network, η is a completely wasteful investment. We assume that the network investment cost is not prohibitively high such that no worker will ever invest in network and participate in the market. In particular, $\eta < V(x_i = 1) - (1-\alpha)\underline{u}$. Those who invest receive equal probability of market access. Since the worker's expected benefits from investing on the network depend both his own and other workers' privately known types (level of productivity), this network investment game is a Bayesian game. We will look for the symmetric Bayesian Nash equilibria in monotone (i.e. weakly increasing) strategies. The following proposition describes this.

Proposition 3.3 *A symmetric Bayesian Nash equilibrium in monotone strategies of the network investment game has a cut-off value $\hat{x}$ satisfying*

$$\eta = \left[V(\hat{x}) - (1-\alpha)\underline{u}\right] \tag{3.5}$$

such that equilibrium monotone strategy of worker i, $s^*(x_i)$, is

$$s^*(x_i) = \quad invest \quad if \;\; x_i \geq \hat{x}$$

$$= not\ invest \;\; if \;\; x_i < \hat{x}$$

Proof. We show that no worker has an incentive to deviate from the equilibrium strategy. Notice that the payoff from investment is

$$U_i(invest, s^*_{-i}|x_i) = V(x_i) - \eta$$

Payoff from "not invest" is simply $(1-\alpha)\underline{u}$. The payoff-difference between "invest" and "not invest" is therefore

$$\Delta U_i(x_i) = U_i(invest, s^*_{-i}|x_i) - U_i(not\ invest, s^*_{-i}|x_i)$$

$$= [V(x_i) - (1-\alpha)\underline{u}] - \eta$$

By the Envelope Theorem, $V'(x_i)$ is 3.3, $\Delta U_i(x_i)$ also increases with x_i. Considering $x_i = \hat{x}$.

$$\Delta U_i(\hat{x}) = \left[V(\hat{x}) - (1-\alpha)\underline{u}\right] - \eta \qquad (3.6)$$

Plugging $\eta = [V(\hat{x}) - (1-\alpha)\underline{u}]$ into 3.6 gives $\Delta U_i(\hat{x}) = 0$. This means that when $x_i \geq \hat{x}$, according to s^*, player i invests at x_i. Since $\Delta U_i(\hat{x}) \geq = 0$, "invest" is the optimal action and the workers do not have an incentive to deviate from "invest" to "not invest". Similarly, when $x_i < \hat{x}$, according to s^*, player i does not invest. Since $\Delta U_i(\hat{x}) < 0$, "not invest" is the optimal action and the workers do not have an incentive to deviate from "not invest" to "invest".

■

According to Proposition 3.3, in a pure strategy Bayesian Nash equilibrium, the size of workers participating in networking activities $(1 - \hat{x})$ decreases in cost of building political network with the elite (η) and the relative payoff between being in and out of the market.[7] The total expenditure on networking activity by the workers in city j is $\eta(1 - \hat{x}_j) = [V(\hat{x}_j) - (1-\alpha)\underline{u}](1-\hat{x}_j)$. We can analyse the implication of trading tax (τ), search cost (s) and city's geographical location (j) on workers' networking expenditure. This can be done by analysing the effects of the aforementioned variables on the cut-off value $\hat{x}_j$.

Corollary 3.4 *The fraction of workers investing in the network,* $1 - \hat{x}$*, increases in worker's selling price,* P_w^**.*

Proof. We show that $\hat{x}$ is decreasing in P_w^*. Define $F = V(\hat{x}) - (1-\alpha)\underline{u} - \eta = (1-\alpha)[P_w^*(1 + a^*\hat{x}) - \omega(a^*)] = 0$. Using the Implicit Function Theorem

$$\frac{\partial \hat{x}}{\partial P_w^*} = -\frac{F_{p_w^*}}{F_{\hat{x}}}$$

$$= -\frac{(1 + a^*\hat{x})}{P_w^* a^*}$$

which is negative.

Corollary 3.4 is intuitive; higher market price increases workers' expected return from participating in the market. This provides incentive to less productive workers to invest in network to connect with the elite. In addition, since $P_w^* = \bar{P} - \tau - s$, comparative static analysis for these variables is

[7] This is not the only Nash equilibrium for this subgame. There are also mixed equlibria; for example, a symmetric mixed strategy Nash equilibrium where all workers choose to invest on networking with the elite with equal probability$\sigma = \frac{1}{\eta}(V(\hat{x}) - (1-\alpha)\underline{u})$

straightforward. Higher trading tax (τ) and search cost (s) reduces selling price inducing less workers to participate in the market while stronger demand provides opposite effects. Corollary 3.5 summarises this.

Corollary 3.5 *The fraction of workers investing in the network,* $1-\hat{x}$*, increases in merchant's valuation* ($\bar{P}$) *and decreases in trading tax* (τ) *and search cost* (s)

The effect of geographical location on networking activities can also easily analysed. Since cities are indexed according to their distance to the capital in an ascending order and the farther city has weaker demand, network activity is, therefore, decreasing in j.

Corollary 3.6 *The fraction of workers investing in the network,* $1-\hat{x}$*, decreases in* j.

3.3 Elite's problem

In this simple model, trading tax rate and the proportion of time workers are forced to work for the elite is assumed to be fixed. The elite only needs to decide whether the workers are allowed to participate in market economy or not. If he chooses not to open the city for merchant trade, he becomes the monopolist selling α unit of output at price $P_j(\alpha)=P_j^M$ and receives profit $\pi_0=\alpha P_j^M$. If the elite allows workers to participate in the market, the elite receives profit of

$$\pi_1=\alpha P_j(Q)+\tau\mathrm{E}[q|x_i\geq\hat{x}]-\gamma_j \tag{3.7}$$

which consists of two sources of revenues. The first term on the right-hand side (RHS) of equation (3.7) is revenues from output α sold at the market price. The second term is expected tax revenues collected from every output traded when a fraction $(1-\hat{x})$ of workers participating in market activities. The elite pay cost γ_j for opening up city j for trade. The term $\mathrm{E}[q|x_i \geq \hat{x}_j]$ is the expected total output produced by workers for the market when only workers with productivity $x_i \geq \hat{x}$ participated.

That is,

$$\mathrm{E}\left[q\middle|x_i \geq \hat{x}_j\right] = \mathrm{E}_q\left[\int_{\hat{x}_j}^{1} q_i dx_i\right]$$
$$= \int_{\hat{x}_j}^{1} \mathrm{E}(q_i) dx_i$$
$$= \int_{\hat{x}_j}^{1} (1-\alpha)(1+a^* x_i) dx_i$$
$$= (1-\alpha)(1-\hat{x}_j)\left(1+\frac{a^*(1+\hat{x}_j)}{2}\right)$$

Then, equation (3.7) can be written as

$$\pi_1 = \alpha P_j(Q) + \tau(1-\alpha)\left(1-\hat{x}_j\right)\left(1+\frac{a^*\left(1+\hat{x}_j\right)}{2}\right) - \gamma_j \quad (3.8)$$

with $= \alpha + (1-\alpha)\left(1-\hat{x}_j\right)\left(1+\frac{a^*\left(1+\hat{x}_j\right)}{2}\right)$.

The elite compares profits between the two options. He allows workers to trade if and only if $\pi_1 \geq \pi_0$, or when the cost of opening the city to trade is sufficiently small,

$$\gamma_j \leq -\alpha\left(P_j^M - P_j\right) + \tau(1-\alpha)\left(1-\hat{x}_j\right)\left(1+\frac{a^*\left(1+\hat{x}_j\right)}{2}\right) \quad (3.9)$$

The RHS of (3.9) represents the benefit of market economy to the elite. The first term in RHS is profit loss from allowing workers to trade. The elite gives up his monopoly position and the equilibrium price decreases. The second term represents an additional source of revenue, trading tax income, that the elite collects at rate τ on every output traded.

We impose the following assumption on market demand, $P_j(Q)$:

Assumption 3.7 *$P_j^M - P_j$ is increasing in j*

Assumption 3.7 states that the difference between elite's monopoly price and the competitive price when workers are allowed to trade is larger if the city is located farther. This assumption may seem ad hoc but it reflects the view that markets located farther from the capital get thinner and the elite's output is large relative to the size of the market. If workers are allowed to trade, additional output would drive down the competitive price more steeply in the farther markets resulting in a larger difference between P_j^M and P_j. In contrast, the elite's output is less significant in a nearer, more centrally located market where traders are much more concentrated. Thick markets mean that price will not drop as steeply as in thin markets when the city is opened to trade. Monopoly profit loss to the elite is therefore smaller.

Assumption 3.7 allows us to establish the relationship between geographical location and market proliferation.

Proposition 3.8 *There exists $\bar{\gamma} = -\alpha\left(P_j^M - P_j\right) + \tau(1-\alpha)\left(1-\hat{x}_j\right)\left(1+\frac{a^*\left(1+\hat{x}_j\right)}{2}\right)$ such that all cities with $\gamma_j \leq \bar{\gamma}$ are opened up to trade.*

Proof. The term $-\alpha(P_j^M - P_j)$ is decreasing in j by Assumption 3.7. We will now show that the second term in RHS is also decreasing in j. Since $(1-\alpha)(1-\hat{x}_j)\left(1+\frac{a^*(1+\hat{x}_j)}{2}\right) = \mathrm{E}[q|x_i \geq \hat{x}_j]$ is the expected total output produced by workers in the market and this is decreasing in $\hat{x}_j$ as

$$\frac{\partial \mathrm{E}[q|x_i \geq \hat{x}_j]}{\partial \hat{x}_j} = -(1-\alpha)(1+a^*\hat{x}_j) < 0$$

Also, from Corollary 3.6, the cutoff value, $\hat{x}_j$, is increasing in j. Therefore, $\mathrm{E}[q|x_i \geq \hat{x}_j]$ is decreasing in j. Since both terms in RHS are decreasing in j while γ_j increases in j, there exists the cut-off value $\bar{\gamma} = -\alpha(P_j^M - P_j) + \tau(1-\alpha)(1-\hat{x}_j)\left(1+\frac{a^*(1+\hat{x}_j)}{2}\right)$ where elites in city j with $\gamma_j \leq \bar{\gamma}$ opens up the city to trade and closes otherwise. ■

Proposition 3.8 defines the geographical boundary of the market economy of the kingdom. Only cities with sufficiently large trade demand would allow their workers to participate in the market. The elite in a farther city is reluctant to embrace market economy as the competitive price would drop too large and tax revenue would be too small.

4. Conclusion

This study provides a theoretical model that explains a mechanism for which market economy can proliferate through various geographical locations within a nation in the pre-modern era (early Rattanakosin Siam) and its implication on locational inequality. An economy is characterised by political-power-induced-economic-institution in which resources are controlled and allocated, specifically the hierarchical power and economic relationship between workers (commoners) and elites (the nobles or princes). The elites provide a public good, protection, in exchange for the labor of commoners producing output for them (or working on their lands). The elites can coerce workers to spend time working for them. The workers cannot migrate between cities. Four factors that could contribute to inequality are analysed: social structure, geographical location, political connection and worker's ability.

In this model, towns differ in their trading potential and the expansions of market economy depends on the elites decision on whether to allow workers participation in market trade. By restricting workers from the market, the elites become the monopolists selling their output to visiting merchants. On the contrary, by allowing workers to trade, the elite enjoys trading tax revenue instead of monopoly profits. We showed that an elite will open his town to trade only when demand for output is sufficiently large.

When worker's opportunity to access the market also depends on their relationship with the elites, workers have to invest to build network or connection with the elites. We showed that the fraction of city's workers investing on network building (and participating in the market) depends not only on tax rate or trading search cost but also geographical location of the city.

Apart from social structure and political networking, workers' ability also contributes to inequality within the city. In equilibrium, only a small fraction of high productivity workers invests and participates in the market, especially in remote cities. Lower productivity workers receive better opportunity to participate in the market if they live closer to the capital.

References

Acemoglu, D. & Wolitzky, A. (2011). “The Economics of Labor Coercion.”, *Econometrica,* 79(2), 555-600.

Bates, R. (2001). *Prosperity and Violence: The Political Economy of Development.*, New York: Norton.

Chwe, M. (1990). “Why Were Workers Whipped? Pain in a Principal-Agent Model.”, *Economic Journal,* 100, 1109-1121.

Dessi, R. & Ogilvie, S. (2004). “The Political Economy of Merchant Guilds: Commitment or Collusion?”, *IDEI Working Paper*, no.278.

Dessi, R. & Piccolo, S. (2015). “Merchant Guilds, Taxation and Social Capital”, *TSE Working Paper*, no.581, Toulouse School of Economics.

Eoseewong, N. (2012). *Quill and Sails*, 4h ed., Bangkok: Sameskybooks Press. (in Thai).

Greif, A. (2006). *Institutions and the Path to the Modern Economy: Lessons from Medieval Trade*, New York: Cambridge University Press.

Greif, A. (2008). “Coercion and Exchange: How Did Markets Evolve?”, Unpublished manuscript.

Greif, A., Milgrom, P. & Weingast, B. (1994). “Coordination, Commitment, and Enforcement: The Case of the Merchant Guild.”, *Journal of Political Economy*, 102(4), 745-776.

Hicks, J. (1969). *A Theory of Economic History*, Oxford UK: Oxford University Press.

Hong, L. (1981). *The Evolution of the Thai Economy in the Early Bangkok Period and Its Historiography*, PhD thesis, The University of Sydney.

Nartsupha, C. & Manarangsarn, S. (1984). *Economic History of Thailand until 1941.*, Bangkok: Thammasat University Press. (in Thai).

Nash, J. (1950). “The Bargaining Problem.”, *Econometrica*, 18(2), 155162.

Ogilvie, S. (2011). *Institutions and European Trade: Merchant Guilds, 1000-1800*, New York: Cambridge University Press.

Ogilvie, S. (2014). “The Economics of Guilds.”, *Journal of Economic Perspectives*, 28(4), 169-192.

Pomeranz, K. & Topik, S. (2006). *The World That Trade Created: Society, Culture, and the World Economy, 1400 to Present*, New York: M.E. Sharpe Inc.

Preechametta, A. (2014). “Spatial Dynamics and the Persistence of Inequality in Siam during 1782-1855”, *Applied Economics Journal*, 21(2), 1-29. (In Thai)

Rabibhadana, A. (1969). *The organization of Thai society in the early Bangkok period, 1782-1783.*, Ithaca, NewYork: Dept. of Asian Studies, Cornell University,

Scott, J. (1972). “Patron-Client Politics and Political Change in Southeast Asia”, *American Political Science Review*, 66, 91-113.

Scott, J. & Kerkvliet, B. (1973). “The Politics of Survival: Peasant Response to ‘Progress’ in Southeast Asia?, *Journal of Southeast Asian Studies*, 4(2), 241-268.

Smith, A. (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations*, Oxford, U.K: Clarendon Press.