
THE KAUTILYAN MARKET TAX

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- Introduction
- The trader's optimization problem
- Additional provisions for the market tax
- Composition of the text
- Conclusion

INTRODUCTION I

- 2000 years ago (Olivelle (2013: 29) argues for “sometime between 50 and 125 C.E.”), Kauṭilya wrote a manual on ‘wise kingship’, the *Arthaśāstra*.
- KAŚ deals with taxation, diplomacy, warfare, and the management of spies.
- Here: a small part of book 2 which is about the activities of superintendents. In particular, chapters 21 and 22 treat the superintendent of customs and the operation of customs.
- Custom authorities collect both “customs duty” (*śulka*) and the “increase in price” (*mūlyavṛddhi*).
- Kauṭilya:

¹The Superintendent of Customs should set up the customs house along with the flag facing the east or the north near the main gate ... ⁷The traders should announce the quantity and the price of a commodity that has reached the foot of the flag: “Who will buy this commodity at this price for this quantity?” ⁸After it has been proclaimed aloud three times, he should give it to the bidders. ⁹If there is competition among buyers, the increase in price along with the customs duty goes to the treasury.

INTRODUCTION II

- Ascending or descending auction?
- In ascending auctions (also called English auctions), the auctioneer raises the price starting with some minimum price. The last bidder still upholding his wish to buy, gets the object.
- In a descending auction (Dutch auction), the auctioneer lowers the price starting with some maximum price. As soon as one bidder is prepared to pay the price announced, he obtains the object.
- Of course, “the increase in price” clearly points to the ascending auction.

INTRODUCTION III

Assume: one unit of a good is to be imported and sold.

- V : call price = the value declared by the trader)
- P : sale price = highest bid
- C : the trader's cost of buying, or producing, the good

Example: $V = 5$ paṇas, $p = 9$ (paṇas).

Market tax: $9 - 5 = 4$

Reducing the tax by indicating a higher value:

Example: $V = 7$, $p = 9$

Market tax: $9 - 7 = 2$

But: risk of overestimating the bidders' eagerness to obtain the object:

Example: $V = 12$, $p = 9$

No sale, no market tax → **No comment by Kauṭilya**

INTRODUCTION IV

Would the trader be allowed to successively reduce V ?

$V=12, V=11, V=10$: no buyer

$V=9$: The most eager bidder would be prepared to pay 9.

Market tax: $p - V = 9 - 9 = 0$

But: Kauṭilya would not have proposed a tax that can easily be avoided.

Or a descending auction, for the same reason.

INTRODUCTION V

Main idea of the paper:

- On the basis of an ascending auction, we assume that the trader who has not found a bidder (because his value was too high) cannot, without cost, simply try again, with a lower value. In practical terms,
 - the unsuccessful trader may have to pay duty once again or
 - may have to leave the market and incur transportation cost in order to try at another market place.
market entry cost $F \neq$ cost of production C
- The market tax presents the trader with an optimization problem:
 - he would like to choose a relatively high valuation V in order to evade the market tax
 - a high valuation carries the risk of not selling the good and incurring duty and transportation cost F once again.

THE TRADER'S OPTIMIZATION PROBLEM I

Two cases:

- First, the buyers' competition for the good drives up the highest bid p above V .
 - price p
 - Tax $p - V$
 - trader's revenue $p - (p - V) = V$
 - trader's profit $V - C$ minus, eventually, duty and/or transportation cost.

A very “honest” trader might try $V := C$.

$V - C$ can be called producer's rent. Sihag: Kauṭilya already knew about this concept.

- Second, the highest bid obtainable is below V .
 - taxes and revenue are zero, and
 - the trader suffers cost F for trying again at a later time.

THE TRADER'S OPTIMIZATION PROBLEM II

- Probability assessment of the highest bid.
- Any highest bid p between 0 and 10 is equally likely.
Probability for a bid between 5 and 6 equals $1/10$ and the probability for a bid above 5 equals $1/2$.
- The trader's decision problem: choose the valuation (or call price) V .
 - For example, $V=2$ implies that a bidder will be found with probability $8/10$.
 - The optimal V depends on the cost C (let us assume $C=4$) and
 - the cost F of market entry (duty and/or transportation cost). Let us assume $C=4$.
- The trader chooses the valuation V so as to maximize his expected profit.
“Expected” means the profit he can expect on average, given the probability information about the highest bids.
- The trader will not choose a valuation V
 - below $C=4$: he would risk to find a buyer and obtain a negative profit $V-C$.
 - above 10.: he could be certain not to find a buyer and would have spent his market-entry cost in vain.

THE TRADER'S OPTIMIZATION PROBLEM III

The trader's expected profit at one specific market place

$$\Pi = -F + \frac{10-V}{10}(V-C) + \frac{V}{10}\Pi$$

- Whenever the trader enters the market, he has to pay the market-entry cost F .
- With probability $(10-V)/10$, the highest bid lies above V . The higher V , the lower this probability. In that case, the trader obtains the revenue after tax $V-C$.
- With probability $V/10$, the trader is not successful in finding a bidder who is prepared to pay V or more. Then, the trader has to try again at a later time where he obtains the expected profit Π .

THE TRADER'S OPTIMIZATION PROBLEM IV

Solving for Π , one obtains

$$\Pi = V - C - \frac{1}{10 - V} F$$

- The first term is the trader's gain (after tax) for zero market-entry cost. The trader keeps on trying to find a buyer and will finally be successful.
- However, he has to bear the market-entry cost in each attempt. This negative term gets very large if the probability for finding a buyer is low, i.e., if V is close to 10.

THE TRADER'S OPTIMIZATION PROBLEM V

Proposition:

Assuming $F \leq 9/10$, the trader maximizes his expected profit by choosing

$$V^* = 10 - \sqrt{10F}$$

- If the unsuccessful trader does not try again in the kingdom at hand, the expected tax payment is

$$\frac{1}{2}F$$

- Otherwise (if the trader keeps on trying at the current market), expected tax payments are

$$\frac{1}{2}\sqrt{10F}$$

THE TRADER'S OPTIMIZATION PROBLEM VI

Proposition:

Assuming $F \leq 9/10$, the trader maximizes his expected profit by choosing

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- If the market-entry cost is not too high, the trader maximizes his expected profit by choosing some V^* that balances the two effects just described.
- Assume market cost $F=0$ (no market-entry cost). In that extreme case, waiting for the next period has no cost. Indeed, we then find $V^*=10$ (or, indeed, a value just below 10) and the trader will try again and again until he is lucky and encounters a very high bid. In that case, the tax payment is zero.

ADDITIONAL PROVISIONS FOR THE MARKET TAX I

We now argue that Kauṭilya was aware of these conflicting interests and also of the unwillingness of traders to pay duties. His further provisions are to ensure that traders quote “correct” values:

¹⁰When a man, fearing customs duty, declares a lower quantity or price, the king shall confiscate the amount in excess of that; ¹¹or he should pay eight times the customs duty.

¹³Or, when a man, fearing competing buyers, increases the price beyond the normal price of a commodity, the king shall confiscate the increase in price or assess twice the customs duty .

- The first provision (10, 11) deals with dutiable goods. These duties also depended on the value and amount to about one fifth of the value, in kind or in currency. This gave the trader (if he were to sell dutiable goods) an incentive to state a low V . According to Kauṭilya, a fine of “eight times the customs duty” should give him a proper disincentive.
- The second quotation above (“or ... fearing competing buyers”) has caused some puzzlement.

ADDITIONAL PROVISIONS FOR THE MARKET TAX II

- *pratikreṭṛ bhayād vā*
“or ... fearing competing buyers”.
- Kangle does not see any real difference between “competition among buyers” and “fearing competing buyers”.
- In terms of our model,
 - “competition among buyers” is about price increases above a given V
 - “fearing competing buyers” is concerned with incentives to increase V above the correct level.
- Olivelle: “complex and unclear”:
 - Maybe *pratikreṭṛ* stands for competing traders who “may sell their goods at a higher price than he”?
A trader may be jealous of other traders who are more successful in obtaining a high price.
 - However, interpretation not very plausible:
 - If a trader thinks that other traders will compete with him, he will typically (for reasons of expected-profit maximization) reduce his price.
 - In contrast, it is the absence of competitors that allows a trader to increase his price.
- While the usual expression for selling is *vi-krī*, Olivelle (2013:555) points out that *pratikreṭṛ* is a very unusual word.

ADDITIONAL PROVISIONS FOR THE MARKET TAX III

Alternative interpretation of “fear”

- If the trader expects many eager bidders, it would be in his interest to drive up V .
- Inversely, if he has chosen a low V , he may indeed fear many bidders that would make him regret his decision.

Analogy:

You take an umbrella with you, but “fear” it might not rain after all (in that case you would have taken the umbrella without good cause).

- “fearing good weather” shorthand for “fearing the regret of having carried an umbrella which was unnecessary because it happened not to rain”
- “fearing competing buyers” short for “fearing the regret of having chosen a relatively low V in case of many competing buyers”.

COMPOSITION OF THE TEXT I

<i>sūtras</i> in chapter 21	content matter	specific reference to
7-9	market tax $p-V$	market tax (for given valuation)
10-12	penalty for avoiding duty	duty (incentives for fixing valuation)
13-14	penalty for avoiding market tax	market tax (incentives for fixing valuation)

COMPOSITION OF THE TEXT II

- Why is the market tax is treated twice and why duty is also treated twice (in chapters 21 and 22).

- Duty:

mentioned in passing: ⁹ If there is competition among buyers, the increase in price **along with the customs duty** goes to the treasury.

The specific duty payments are listed in chapter 22.

- Distinguish carefully:

- Duty and market tax are described on the basis of a given valuation (2.22 and 2.21.7-9, respectively).
- The incentives for fixing the valuation with respect to duty and market tax are spelled out (2.21.10-12 and 2.21.13-14, respectively).

In fact, *sūtras* 10-12 (penalty for avoiding duty) are clearly set in opposition to *sūtras* 13-14 by the conjunction *vā* (meaning “or”): *sūtra* 10 begins with *śulkaḥ bhayāt* (“fearing customs duty”) while 13 starts with *pratikreṭṭ bhayād vā* (“or, fearing competing buyers”).

CONCLUSION I

- Kauṭilya's market tax is very unusual in basing the tax payments on a price or value declared by the seller.
- Our model shows that the tax “works” in the sense of giving the trader an incentive to quote a valuation V^* that leads to positive expected tax payments.
- The practical implementation of this tax should prove difficult.
 - The seller and the final buyer have a very clear motivation to report a lower bid to the tax authorities, for some side payment from the buyer to the seller.
 - While this problem holds for many taxes, it is very serious for the market tax because the trader's profit does not depend on p as long as p is at least as high as V .
 - However, if the sale is to be effected near the “foot of the flag”, supervision of both seller and buyer may not be too difficult.
- The overall incentives to fix the value in a strategic manner may be weak because
 - duty payment presents a reason to offer a low estimate of the value while
 - the market tax makes the trader exaggerate the value.

The very clever Kauṭilya may have foreseen this effect.

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CONCLUSION II

- An ongoing debate on Kauṭilya's *Arthaśāstra* dwells on the question of whether it should be seen as a historical document (telling us a lot about actual diplomacy, spying and taxing etc.) or, rather, as a teaching manual on statecraft.
 - Olivelle: *Arthaśāstra* may be quite accurate with respect to the material culture
 - Current paper: Kauṭilya's market tax (if ever applied) was unique in human history. In any case, a suchlike tax has not been reported by tax historians.
- Kauṭilya, it seems, had no belief in market mechanisms and wanted traders of all goods (not just natural monopolies) to quote the correct or normal value. However, the requirement that prices are to be set according to “weight, measure, or number” is not operational. Presumably, implementation rules were necessary to tell the customs officers how to proceed in practice.
- Nowadays, electronic trading platforms like ebay do not encounter these supervision problems since p is readily available for these market makers. Therefore, Kauṭilya's market tax (without punishment for too low or too high valuations) may still await realization in modern times.

The market tax: sūtras 1, 7-9

- (१) शुल्काध्यक्षः शुल्कशालां ध्वजं च
प्राङ्मुखम् उदङ्मुखं वा महाद्वाराभ्यशे निवेशयेत् ।
- (७) ध्वजमूलोपस्थितस्य प्रमाणमर्घं च
वैदेहकाः पण्यस्य ब्रूयुः
एतत्प्रमाणेनार्घेण पण्यमिदं कः क्रेतेति ।
- (८) त्रिरुद्घोषितमर्थिभ्यो दद्यात् ।
- (९) क्रेतृसंघर्षे मूल्यवृद्धिः सशुल्का कोशं गच्चेत्

Further provisions: sūtras 10, 11, 13

- (१०) शुल्कभयात्पण्यप्रमाणं मूल्यं वा हीनं
ब्रुवतस्तदतिरिक्तं राजा हरेत् ।
- (११) शुल्कमष्टगुणं वा दद्यात् ।
- (१३) प्रतिक्रेतृभयाद्वा पण्यमूल्यादुपरि मूल्यं बर्धयतो
मूल्यवृद्धिं राजा हरेत् । द्विगुणं वा शुल्कं कुर्यात् ।

The market tax: sūtras 1, 7-9

- (1) śulkādhyakṣaḥ śulkaśālāṃ dvajaṃ ca
prāṇmukhaṃ udāṇmukhaṃ vā mahādvārābhyaśe niveśayet
- (7) dhvajamūlopasthitasya pramāṇam arghaṃ ca
vaidehakāḥ paṇyasya brūyuh
etat pramāṇenārgheṇa paṇyam idaṃ kaḥ kreteti
- (8) trir udghoṣitam artibhyo dadyāt
- (9) kreṭṣaṃgharṣe mūlyavṛddhiḥ saśulkā kośaṃ gacchet

Further provisions: sūtras 10-11, 13

- (१०) śulkabhayāt paṇyapramāṇaṃ mūlyaṃ vā hīnaṃ
bruvatas tadatiriktaṃ rājā haret
- (११) śulkam aṣṭagaṇaṃ vā dadyāt
- (१३) pratikreṭṛbhayād vā paṇyamūlyād upari mūlyaṃ vardhayato
mūlyavṛddhiṃ rājā haret | dvigaṇaṃ vā śulkaṃ kuryāt