Tax Administration and Compliance: Evidence from Medieval Paris

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Motivation

- Public finance institutions matter for resource allocation and growth.
- Tax evasion and avoidance are an age old problem.
- Solving this problem is crucial especially for lesser developed economies because:
 - Non-compliance affects the government's ability to pursue it goals and can undermine its ability to rule.
 - non-compliance that is unevenly distributed across social classes,
 professions or income levels can lead to social unrest if not violence.

Our contribution

- Study an historical tax institution the medieval Parisian *taille*.
- The *taille* resolved efficiently the tax compliance problem in the context of an economy that resembles modern lesser developed economies.
- Model the mechanism of assessing and collection of the *Taille*.
- Analyze historical data to show its success.

The source: *Tallies* of Philip the Fair

- Lump sum tax on the city paid in equal 10,000 *livres* installments.
- Self administered.
- Years covered: 1292, 1296-1300,1313
- Historians utilized the roll of 1292 (Geraud 1837, recently Herlihy 1991, also 1313).
- Variables: Name, address, occupation, origin, tax assessment.

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Known features the Parisian *taille*

- Lump sum tax levied on the city as an outcome of negotiations with the crown.
- All citizens had to pay. Exemptions: nobility, clergy, students and faculty.
- No direct evidence on the details of taxation method or rates.
- A share of the lump sum was allocated to each parish (ward).

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What we know from other sources

- Bargaining at the city council level for the shares allocated to parishes.
- Deciding on the taxation schedule: No evidence to the actual tax schedule used.
- From other *tailles*:
 - 1. The poor paid a poll tax.
 - The very wealthy above wealth of 100 *livres* paid a percentage of their wealth.
 - 3. In between: a percentage of revenue.

Historical background of the *Taille*.

- Emerged in Northern France in rural and urban communities.
- The *taille* became a popular public finance institution in the kingdom of France.
- Prevailed in Savoy but not in Burgundy or England.
- French kings, in the middle ages, interested in urban development imposing best practice institutions.
- Imposed by the king in Languedoc where town ruled by Consuls – in hope of improving tax revenues and lowering civil strife – did not work out well.

The essential historical features of the *Taille* :

- A lump sum tax a zero-sum tax allocation game .
- The allocation principle: "*Le fort portent le faible*." Progressive?
- Royal documents reveal that the two principles were perceived to lower civic conflicts and produce truthful reporting for efficient tax collection and assessment.
- Information extraction and public disclosure of tax assessments.

Methodology

- Use historical data to infer about the details of the implementation of the tax scheme.
- Use economic theory to understand the implications of the features of the tax mechanism.
- Use the data to assess the outcome of implementing the tax mechanism.

Modelling the Taille

Modelling the *Taille* -strategy

- Model the *taille* as fixed sum game with:
 - Asymmetric information between taxpayers and tax collectors.
 - Full information game between some taxpayers.
- Developing a mechanism that produces a subgame perfect equilibrium where agents truthfully report their income.
- The mechanism: two stage game essential ingredient.
 - First stage: agents report their income. Reports are made public
 - Second stage: agents can challenge other agents' reports.
 - A challenge triggers an audit and true income is revealed.

Modeling the *Taille - continued*

- Because of the fixed-sum game property, agents have an incentive to challenge their neighbors reports as it reduces their tax burden.
- The model and the data suggest that the tax rate was endogenous rather than fixed.
- There exist a fine (not necessarily monetary) for frivolous challenges.

Modelling the *Taille* – assumptions:

- There exist citizens who have information about other citizens' wealth that is superior to that of the authorities.
- Tax liabilities are in the first instance based on self-reported wealth.
- Citizens have the option to claim to the tax authorities that a fellow parishioner has misreported their wealth; only such a challenge will trigger a costly audit of the citizen about whom the claim was made.

A theoretical model of parish tax collection

Information:

- Parishoners: *N*={*1*,*2*,...,*n*}
- parishioner's wealth: $w_i \sim f_i$, defined on $[a_i, b_i]$
- $(f_i, [a_i, b_i])$ all common knowledge
- Subsets of parishoners knows the true wealth. *Ni*\{*i*} is non-empty for each *i* assessors may belong to *Ni*.

Behavior

- parishioner *i* makes a *report*, denoted as *r_i*, of their wealth,
 w_i,: *ρ_i(r_i|w_i)* which is a probability distribution over [*a_i*, *b_i*], for each realization of *w_i*.
- Parishioner *i* also has a *challenge strategy*, $c_i = (c_1^i, c_2^i, ..., c_n^i)$. $c_j^i = 1 \ i$ is challenging *j*'s report, $c_j^i = 0$ is no challenge
- c_j^i could be randomized and $c_i = (c_i^1, c_i^2, ..., c_i^n)$ the list of *n* probabilities that parishioner *i* is challenged by each parishioner.

The taille Mechanism

$$T_i = \frac{s_i(w_i, r_i, c_i)P}{\sum_j s_j(w_j, r_j, c_j)}, \text{ where:}$$

$$s_{i}(w_{i}, r_{i}, c_{i}) = \eta^{i}(c_{i}) \max\{w_{i}, r_{i}\} + (1 - \eta^{i}(c_{i}))r_{i},$$
$$\eta^{i}(c_{i}) = \max_{j}\{c_{i}^{j}\}, \text{ and }$$

P is the fixed amount of tax to be collected.

- *The taxpayer maximizes:*
- $V_i(w_i, r, c, P) = w_i T_i(w_i, r, c, P),$

Prefect Bayesian Equilibrium

- **Proposition 1:** The limit of the set of PBE of the tailles game as the under-reporting and improper challenge costs go to zero all have the following properties:
- a) at Stage 2, for any set of Stage 1 reports r, we have that:
- - *if* r_i <*wi then at least one citizen j that knows* w_i *challenges* r_i *for certain*
- - *if* $r_i = w_i$ *then no citizen j challenges i.*
- - no citizen challenges the report of another citizen whose w_i they do not know.
- b) in Stage 1, all i report $r_i = w_i$.

The Tau Mechanism

Tax assessment: *Tau Definitions:*

 τ – *tax rate*

Each individual pays:

Total tax collected:

$$Tr_i$$

$$T = \tau \sum_{i} s_i(r_i, w_i, c_{-i})$$

Individual maximizes: $V_i^{\tau}(w_i, r_i, c_i) = w_i - \tau s_i(w_i, r_i, c_i)$

In this mechanism parishioners have an incentive to under-report. Could be augmented with providing payments to those who turn in fellow parishioners.

The *Tau* Mechanism: equilibrium

- Proposition 2: If the payoff functions in the tailles game are replaced with the functions V^τ_i above, then there is a limit PBE of the resulting game with the following properties:
- *a) At Stage 2, no citizen challenges any other citizen's report.*
- b) At Stage 1 every citizen reports the minimal value of the support of f_i

Equilibrium of a single stage game

Proposition 3: The one-shot tailles game has no limit Bayes-Nash Equilibrium in pure strategies. In particular, in any BNE, all citizens under-report with positive probability, while honest reports are challenged with positive probability and underreports are challenged with probability less than one.

Evidence from the *taille* records

Information gathering: use of well informed assessors

- Tax collection by well informed unpaid assessors.
- The assessors represented the more populous parishes.
- The assessors belonged to the economic elite.
- Assessors were experienced but also replaced between

the tailles.

Assessors drawn from economic elite

Table 2

Professions of Assessors compared with professions of taxpayers

| | Data from tax | x roll | Data from Assessor list | | |
|------------------------|---------------|-----------|-------------------------|-----------|--|
| | Taxpayers' | | Assessor's | | |
| profession | Average tax | Taxpayers | Average tax | Assessors | |
| changer | 6.11 | 37 | 8 | 6 | |
| draper | 5.49 | 94 | 11 | 6 | |
| spice merchant | 3.31 | 79 | 4 | 2 | |
| firewood merchant | 3.22 | 53 | | | |
| tanner | 3.00 | 31 | 1 | 1 | |
| wholeseller | 2.29 | 159 | 6 | 4 | |
| saddler | 1.99 | 67 | 4 | 1 | |
| hotelier | 1.80 | 111 | 1 | 1 | |
| butcher | 1.46 | 79 | 4 | 5 | |
| tavernier | 1.30 | 678 | 2 | 1 | |
| goldsmith | 1.27 | 271 | 7 | 3 | |
| Merchant | 1.12 | 24 | 6 | 7 | |
| Grain merchant | 1.06 | 18 | 3 | 1 | |
| boot maker | 1.00 | 53 | | | |
| baker | 1.00 | 144 | 4 | 4 | |
| fishmonger | 0.92 | 102 | 7 | 2 | |
| seaman | 0.85 | 49 | | | |
| harness maker | 0.82 | 51 | | | |
| Sargent | 0.62 | 237 | | | |
| used clothes merchant | 0.60 | 191 | 1 | 4 | |
| weaver | 0.60 | 368 | 2 | 5 | |
| candle maker | 0.60 | 71 | | | |
| skinner | 0.59 | 368 | 9 | 2 | |
| agent | 0.56 | 65 | | | |
| crate maker | 0.56 | 56 | 1 | 1 | |
| belt maker | 0.53 | 161 | 2 | 2 | |
| tailor | 0.51 | 157 | | | |
| barber | 0.44 | 121 | | | |
| barrel maker | 0.44 | 96 | | | |
| pastry maker | 0.44 | 58 | | | |
| buckle maker | 0.44 | 77 | 2 | 2 | |
| shoe maker | 0.43 | 284 | 1 | 3 | |
| carpenter | 0.38 | 116 | | _ | |
| builder | 0.36 | 138 | | | |
| fuller | 0.34 | 85 | | | |
| oven guard | 0.34 | 83 | | | |
| wine merchant | 0.27 | 81 | | | |
| food merchant | 0.27 | 267 | | | |
| porter | 0.26 | 119 | | | |
| longshoremen | 0.20 | 50 | | | |
| footwear | 0.18 | 179 | | | |
| tailor women's clothes | 0.17 | 149 | | | |
| which sciotics | 0.17 | 147 | | | |

Assessors were experienced and rotated

Table 3Time frame of known economic activity of tax assessors

| Years of | Number of |
|-----------|-----------|
| Activity | Assessors |
| 1292 - 13 | 8 |
| 1296 - 13 | 7 |
| 1292-9 | 1 |
| 1292-00 | 31 |
| 1292 | 1 |
| 1296-00 | 1 |
| 1292 - 7 | 7 |
| 1297-00 | 1 |
| 1298-00 | 1 |
| 1300 | 2 |
| 1308-13 | 1 |
| 1313 | 3 |
| unknown | 2 |
| Total | 66 |

Assessors drawn mainly from top decile of incomes

Table 4Rank of assessors in the tax distribution

| Rank in tax | Number of |
|--------------|-----------|
| distribution | Assessors |
| 0.5% | 3 |
| 1.0 - 0.5% | 6 |
| 5-1% | 27 |
| 10 - 5% | 8 |
| 20 - 10% | 15 |
| 30 - 20% | 1 |

Assessors mainly assigned from the populous parishes

Table 5 Distribution of taxpayers and tax payments and assessors by Parish – Paris 1292

| | Tax | Number of | Number of | Share of | Share of | Number of |
|--------|-----------|--------------|-----------|-----------|--------------|--------------|
| Parish | collected | taxpayer | elite | elite | elite in tax | assessors |
| number | (pounds) | s | taxpayers | taxpayers | collected | * |
| 1 | 2420 | 2474 | 377 | 0.15 | 0.70 | 13 |
| 10 | 1497 | 1445 | 236 | 0.16 | 0.73 | 20 |
| 2 | 1167 | 1335 | 182 | 0.14 | 0.64 | 9 |
| 14 | 998 | 1222 | 141 | 0.12 | 0.63 | 4 |
| 12 | 878 | 836 | 87 | 0.1 | 0.75 | 1 |
| 9 | 755 | 1455 | 94 | 0.06 | 0.53 | 7 |
| 11 | 669 | 964 | 100 | 0.10 | 0.62 | 7 |
| 8 | 381 | 848 | 34 | 0.04 | 0.39 | 2 |
| 13 | 363 | 924 | 45 | 0.05 | 0.40 | 2 |
| 15 | 330 | 674 | 45 | 0.07 | 0.46 | 2 |
| 24 | 214 | 384 | 27 | 0.07 | 0.37 | |
| 4 | 194 | 440 | 26 | 0.06 | 0.54 | |
| 21 | 171 | 408 | 20 | 0.05 | 0.33 | |
| 18 | 159 | 225 | 25 | 0.11 | 0.63 | |
| 6 | 79 | 214 | 8 | 0.04 | 0.27 | |
| 3 | 70 | 231 | 5 | 0.02 | 0.16 | 1 |
| 5 | 54 | 85 | 8 | 0.09 | 0.48 | 2 |
| 16 | 48 | 149 | 5 | 0.03 | 0.32 | 1 |
| 23 | 45 | 234 | 5 | 0.02 | 0.20 | |
| 7 | 43 | 73 | 6 | 0.08 | 0.41 | |
| 17 | 23 | 62 | 4 | 0.06 | 0.36 | |
| 20 | 22 | 79 | 2 | 0.03 | 0.22 | |
| 22 | 17 | 62 | 1 | 0.02 | 0.12 | |
| 19 | 8 | 21 | 0 | 0 | 0 | |
| Total | 10606 | 14844 | 1483 | 0.1 | 0.62 | |

The tax was collected and paid mainly by elites. Endogenous tax rate

Table 1

Number of taxpayers and tax collected in Parisian tax rolls

| | Number of | Tax to be collected | Tax collected | Share of top decile in tax revenues |
|------|-----------|---------------------|---------------|-------------------------------------|
| Year | taxpayers | (livres | (livres | |
| | | parisis) | parisis) | |
| 1292 | 14,566 | 10,000 | 12,287 | 68% |
| 1296 | 5,703 | 10,000 | 10,024 | 65% |
| 1297 | 9,930 | 10,000 | 10,372 | 61% |
| 1300 | 10,656 | 10,000 | 11,479 | 62% |
| 1313 | 6,352 | 10,000 | 10,394 | 84% |

Source: A.N. KK 283, Michaelsson (1951, 1958, 1952)

High Inequality

| City | Year | Number of | Gini coefficient | Top 1% | Тор 5% |
|---------------------------|------|-----------|------------------|--------|--------|
| | | taxpayers | | _ | |
| Paris | 1292 | 14509 | 0.74 | 26 | 52 |
| Paris (income) | 1292 | 13788 | 0.56 | | |
| Paris | 1296 | 5856 | 0.61 | 20 | 44 |
| Paris (income) no poor | 1296 | 5105 | 0.40 | _ | |
| Paris | 1313 | 6108 | 0.79 | 25 | 55 |
| Paris (income) | 1313 | 5418 | 0.57 | | |
| London | 1292 | 791 | 0.70 | 15 | 43 |
| London | 1319 | 1600 | 0.76 | 34 | 57 |
| Florence | 1427 | 10000 | 0.79 | 27 | 67 |
| Zwolle | 1750 | 2438 | 0.67 | ? | ? |

Comparative inequality measures: 1292-1750

Parisian neighborhoods – wealth distribution



High Average Tax Neighborhoods

Highest Average Tax Neighborhod

Features of the tax distribution function: discrete with bunching



The tax base: Number of tax payers varied between parishes and over time



The tax base: The tax contribution varied between parishes and over time

Distribution of tax burden by parish varied by tax year Distribution of tax burden by parish in the Paris taille: 1292-1297 20 1292 1297 15 percent of tax revenue 10 S 0 1234567 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 30 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 30

Evidence - continued

- The tax was actually collected in an efficient and timely manner.
- More than 10,000 taxpayer enumerated every year.
- No riots (unlike 1388).
- No legal disputes.
- The rich carried most of the burden.

Indirect Evidence of economic efficiency

- In Italian cities wealth, let alone income taxes, rarely collected.
 If so, mainly in smaller towns
- Frequency of collection 5 times in a century
- Complicated audits lots of accountants and notaries
- In Paris handful of notaries and accountants.

Testing for tax evasion: did people move between parishes to evade taxation?

- One way to reduce the tax burden is to move to another parish where the information about the taxpayer is partially lost.
- Another strategic move is to move to a parish where the taxpayer status is lower to minimize the cost of 'carrying the poor.'

Testing for tax evasion: did people move between parishes to evade taxation?

Table 6Distribution of taxpayers that moved, Paris 1292 and 1296

Panel (A)

Panel (B)

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| | Year | | | | | |
|-----------------|-------|-------|-------|--|--|--|
| Moves by type | 1292 | 1296 | Total | | | |
| Stay | 3,318 | 3,858 | 7,176 | | | |
| | 40% | 47% | 87% | | | |
| Within ward | 298 | 80 | 378 | | | |
| | 4% | 1% | 5% | | | |
| Between wards | 199 | 65 | 264 | | | |
| | 2% | 1% | 3% | | | |
| Between parishe | 293 | 105 | 398 | | | |
| | 4% | 1% | 5% | | | |
| Total | 4,108 | 4,108 | 8,216 | | | |

| Status | | | | |
|------------------|-----------|------------|-------|--|
| Moves by type | 9 deciles | Top decile | Total | |
| Stay | 6,015 | 1,161 | 7,176 | |
| | 73% | 14% | 87% | |
| Within ward | 337 | 41 | 378 | |
| | 4% | 1% | 5% | |
| Between wards | 234 | 30 | 264 | |
| | 3% | 0% | 3% | |
| Between parishes | 337 | 61 | 398 | |
| | 4% | 1% | 5% | |
| Total | 6,923 | 1,293 | 8,216 | |
| | 84% | 16% | 100% | |

Panel (C)

Pearson chi2(3) = 11.7325 Pr = 0.008

Panel (D)

| | St | Status | | | |
|------------|-----------|------------|-------|--|--|
| All moves | 9 deciles | Top decile | Total | | |
| moved down | 283 | 45 | 328 | | |
| | 3% | 1% | 4% | | |
| stayed | 6,352 | 1,202 | 7,554 | | |
| | 77% | 15% | 92% | | |
| moved up | 288 | 46 | 334 | | |
| | 4% | 1% | 4% | | |
| Total | 6,923 | 1,293 | 8,216 | | |
| | 84% | 16% | 100% | | |

| Status | | | | | |
|--------------|-----------|------------|-------|--|--|
| Moved parish | 9 deciles | Top decile | Total | | |
| moved down | 171 | 28 | 199 | | |
| | 2% | 0% | 2% | | |
| stayed | 6,586 | 1,232 | 7,818 | | |
| | 80% | 15% | 95% | | |
| moved up | 166 | 33 | 199 | | |
| | 2% | 0% | 2% | | |
| Total | 6,923 | 1,293 | 8,216 | | |
| | 84% | 16% | 100% | | |

Testing for tax evasion: did people move between parishes to evade taxation?

Table 7

| panel proble estimations | | | | | | |
|--------------------------------------|----------------------------------|----------------------------------|----------------------------------|--------------------------------|----------------------------------|--|
| | (1) Move anywhere | (2) Move within ward | (3) Moved ward | (4) Moved parish | (5) Moved down | |
| Contribution to parish tax (percent) | 16.29 (0.76) | 40.46 [*] (1.94) | 0.302 (0.06) | -6.668 (-0.17) | 19.56 (0.68) | |
| Log tax paid | -0.302 ^{***} (-4.40) | -0.253 ^{***} (-3.01) | -0.349 ^{***} (-3.35) | -0.180 [*] (-1.66) | -0.237 ^{***} (-2.60) | |
| Observations | 3832 | 3760 | 3664 | 3781 | 3732 | |
| chi2 | 112.7 | 71.67 | 66.76 | 57.77 | 41.41 | |
| method | xtprobit | xtprobit | xtprobit | xtprobit | xtprobit | |

The probability of moving: panel probit estimations

Controlling for year and parish fixed effects, occupations, human capital, physical capital, gender, foreign status.

Sample excludes taxpayers classified as poor (*menuz*) and parishes that were too small to be partitioned into wards.

z statistics in parentheses

Standard errors clustered by taxpayer

* p < 0.10, ** p < 0.05, *** p < 0.01

Summary

- Efficient tax collection with minimal evasion and collection costs.
- The rich carried the poor.
- No riots.
- Fiscal Independence.
- Mechanism can be used in contemporary situations of cost allocation in the absence of strong central authority.
- The wars with England ended the fiscal independence of the city of Paris.