

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 its 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.

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.
 2. 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.
- Prevalled 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:

- Parishioners: $N = \{1, 2, \dots, n\}$
- 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 parishioners know the true wealth. $N_i \setminus \{i\}$ is non-empty for each i assessors may belong to N_i .

Behavior

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

Perfect Bayesian Equilibrium

- **Proposition 1:** *The limit of the set of PBE of the tattles 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 $r_i < w_i$ 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.*
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- *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: τr_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_i^τ 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 taitles 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 under-reports 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

profession	Data from tax roll		Data from Assessor list	
	Taxpayers' Average tax	Taxpayers	Assessor's 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	0.24	59		
footwear	0.18	179		
tailor women's clothes	0.17	149		

Assessors were experienced and rotated

Table 3
Time frame of known economic activity of tax assessors

Years of Activity	Number of 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 4
Rank of assessors in the tax distribution

Rank in tax distribution	Number of 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

Parish number	Tax collected (pounds)	Number of taxpayers	Number of elite taxpayers	Share of elite taxpayers	Share of elite in tax collected	Number of assessors *
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

Year	Number of taxpayers	Tax to be collected (<i>livres parisis</i>)	Tax collected (<i>livres parisis</i>)	Share of top decile in tax revenues
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%

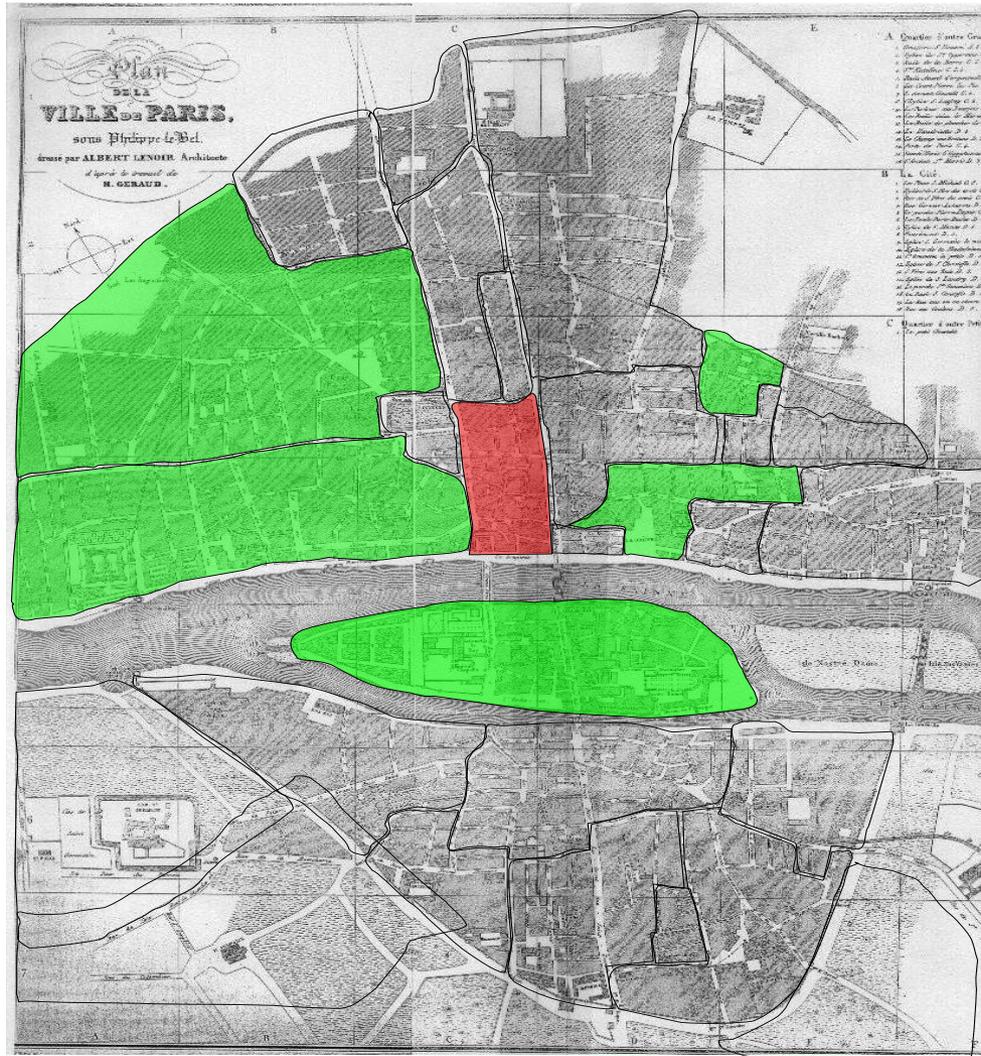
Source: A.N. KK 283, Michaelsson (1951, 1958, 1952)

High Inequality

Comparative inequality measures: 1292-1750

City	Year	Number of taxpayers	Gini coefficient	Top 1%	Top 5%
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	?	?

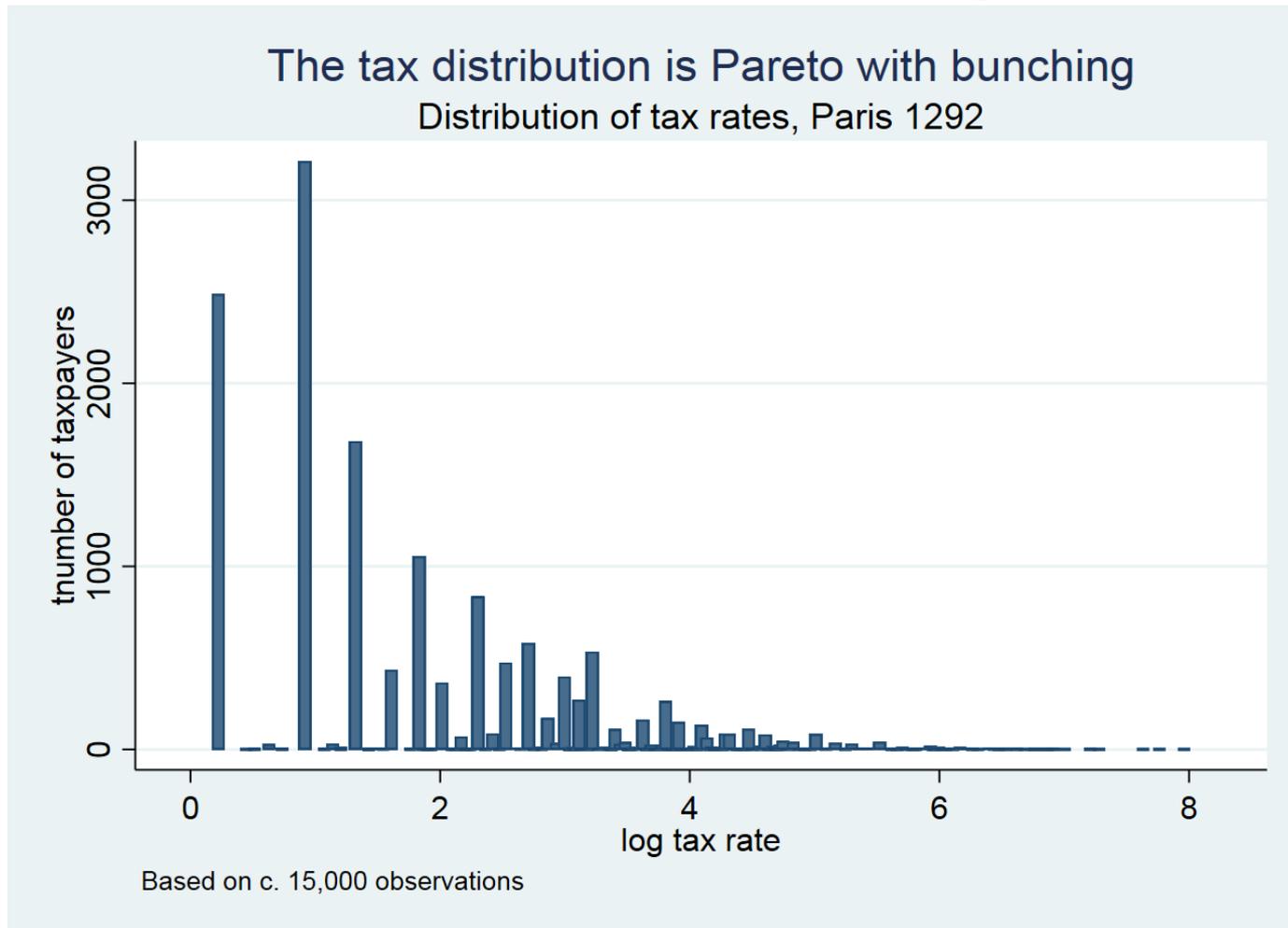
Parisian neighborhoods – wealth distribution



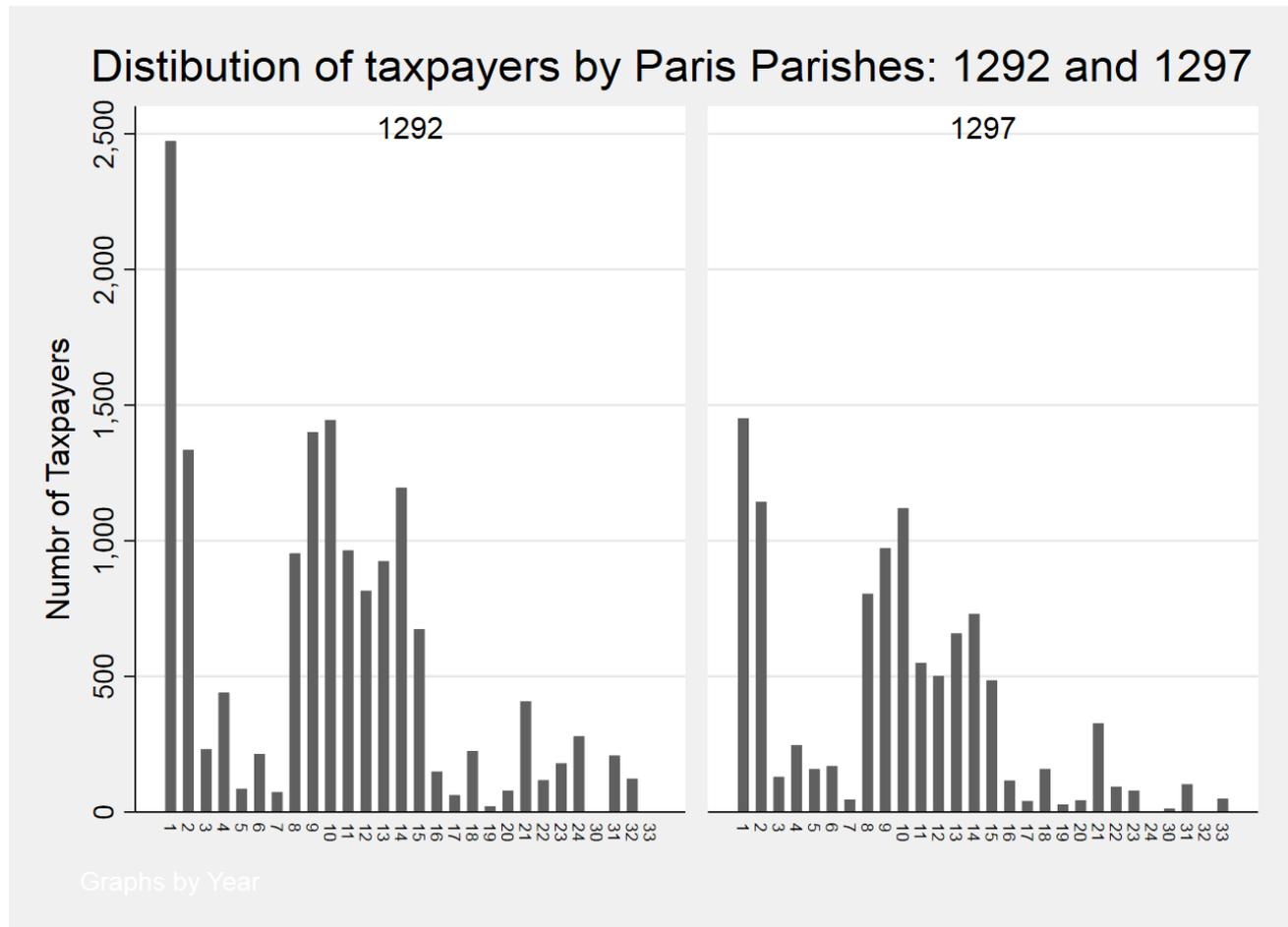
High Average Tax Neighborhoods

Highest Average Tax Neighborhood

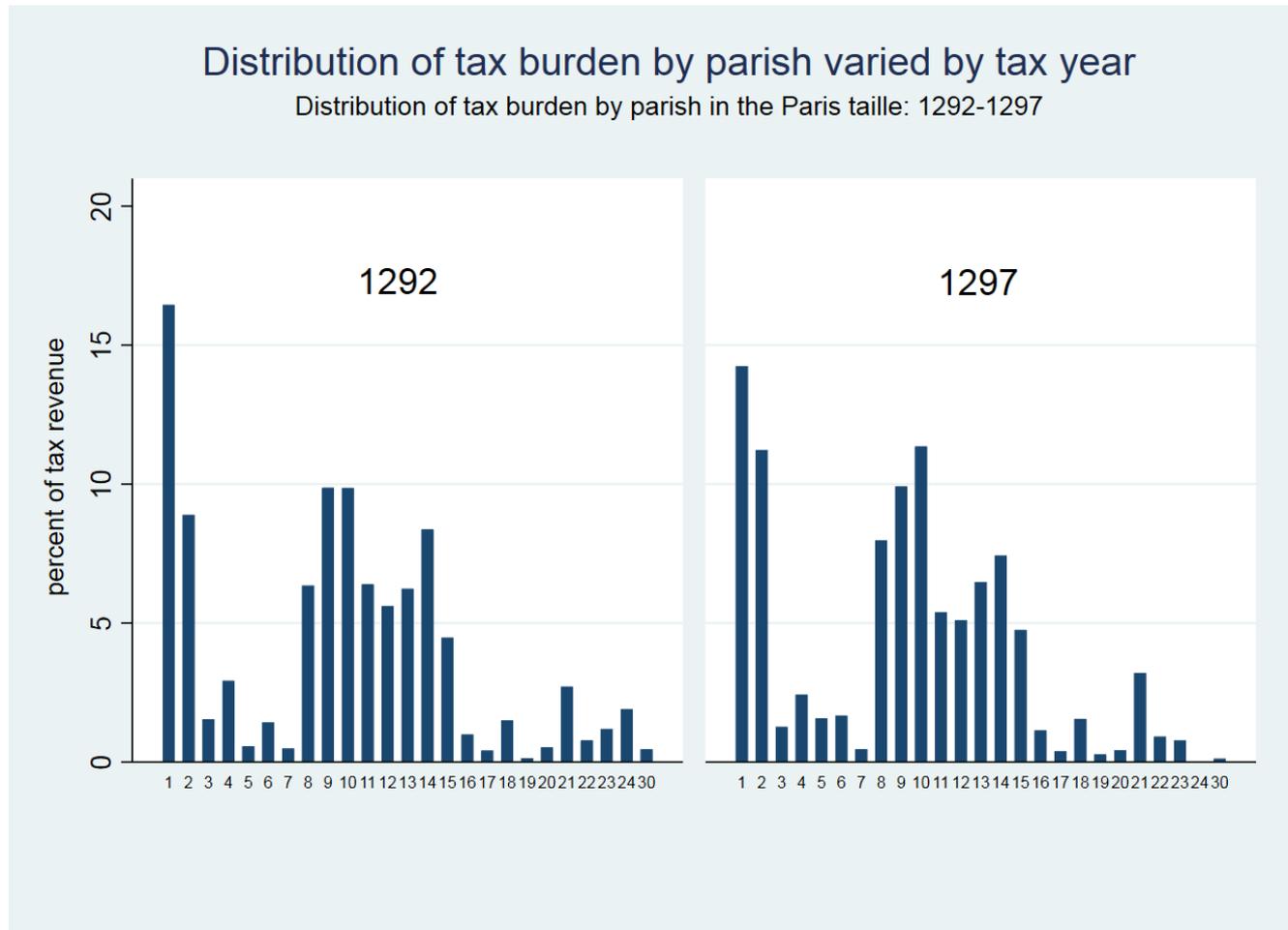
Features of the tax distribution function: discrete with bunching



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



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 6
Distribution of taxpayers that moved, Paris 1292 and 1296

Panel (A)

Moves by type	Year		Total
	1292	1296	
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 parishes	293	105	398
	4%	1%	5%
Total	4,108	4,108	8,216

Panel (B)

Moves by type	Status		Total
	9 deciles	Top decile	
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%

Pearson chi2(3) = 11.7325 Pr = 0.008

Panel (C)

All moves	Status		Total
	9 deciles	Top decile	
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%

Pearson chi2(2) = 2.1535 Pr = 0.341

Panel (D)

Moved parish	Status		Total
	9 deciles	Top decile	
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%

Pearson chi2(2) = 0.5269 Pr = 0.768

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

Table 7

The probability of moving:
panel probit 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	<i>xtprobit</i>	<i>xtprobit</i>	<i>xtprobit</i>	<i>xtprobit</i>	<i>xtprobit</i>

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.