

Taxation Mechanisms and Growth, in Medieval Paris

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Public finances and their interaction with political institutions have emerged as an important causal factor in recent growth literature. We explore a unique source – the *tailles* levied on Paris by Philip the Fair. The method according to which direct taxation took place in the commune of Paris during the commercial revolution is consistent with a community responsibility system, an institution that facilitated exchange, enhanced the enforcement of property rights and contributed to the cohesive action of the community in the face of attempts of the ruler to infringe on it rights. We model the mechanism used by the city of Paris to collect the *taille* and show it was efficient and effective. We demonstrate that a simple alternative tax collection mechanism can deliver similar results but has certain drawbacks that undermine the commune’s cohesiveness. Quantitative evidence presented here suggests that the mechanism used resulted in de facto progressive taxation. We also show that Paris was a well integrated and cosmopolitan city – the largest in the medieval West and with the highest relative growth rates. .

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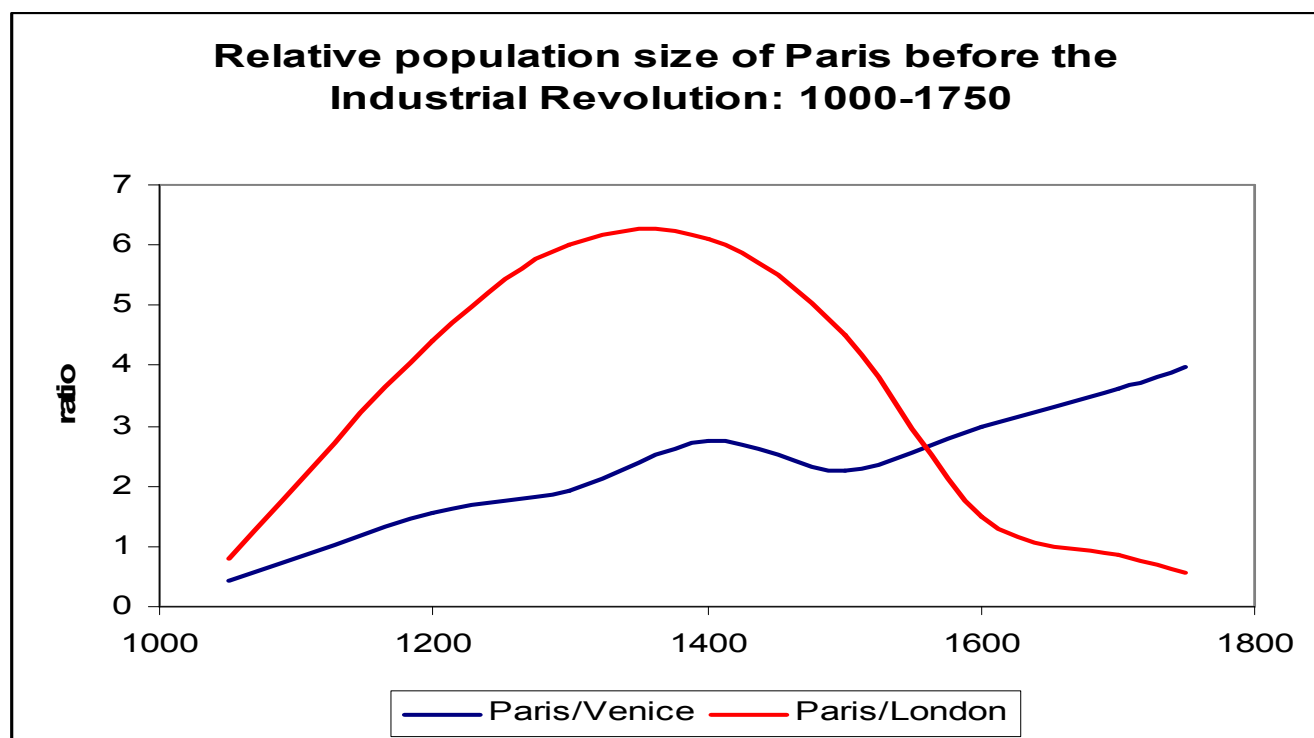
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Introduction

Public finances and their interaction with political institutions have emerged as an important causal factor in recent growth literature. North and Weingast, (1989) stressed the constraints on government that foster commitment and the resulting access to cheaper sovereign borrowing. Epstein, (2000) and O'Brien (2001) put more emphasis on the development of administration and its ability to tax efficiently. In particular, some recent papers have attempted to focus more narrowly on the growth of cities (De Long and Shleifer, 1993 and Stasavage (2007)), suggesting that free cities experienced more growth (borrowed at lower rates) than those cities under princely rule.

Data on population of major European cities (Bairoch et Al, 1988) place Paris at the top of the list in Europe from the thirteenth to the end of the seventeenth century. While a capital of a large kingdom, it was significantly larger than any free Italian city state. Figure 1 shows the relative population size of Paris compared with Venice, the most populous Italian city state and London, its historical rival. One can see that population growth in Paris was much faster than that of London and Venice until 1400. The period of rapid growth lasted from 1000 to 1300 when Paris reached a population size of six times that of London. The annual population growth rates for Paris were 1% until 1200 and 0.6% during the thirteenth century. This remarkable growth can be attributed to some extent to the growth of the king's bureaucracy, however, by 1300, the size of the French court was still very small by later standards.

Figure 1



This remarkable economic expansion of a princely city merits an explanation. In their paper, De Long and Shleifer (1993) classify French cities as free cities¹. They acknowledge that this is a disputable classification, that to some extent helps them derive their desired result that free cities grew faster than those controlled by an absolute monarch. Stasavage (2007) classifies French cities as state controlled cities after 1400, acknowledging that before 1400 representative assemblies had more power in France.

This paper analyzes the institution of the *taille* – a direct tax - in Paris around the turn of the 14th century. At that time, the city of Paris contracted with the king to deliver a set amount of tax revenue per year in return for immunity from royal indirect taxes. The main problem facing the

¹ De Long Shleifer (1993), p. 13.

collection of direct taxes was acquiring information about taxpayers' wealth or income. The small medieval bureaucracies made this a formidable task that was rarely attempted. We construct a formal model of the *taille* and show that it generates a subgame perfect equilibrium where tax payers truthfully report their wealth or income. The mechanism delivers the required tax revenue with certainty and efficiency. The mechanism also has the nice property of deterring collusion between a subset of taxpayers that wish to lower their tax returns. We also show evidence that the tax assessments changed annually, at the city level and at the individual level making ex-post strategic behavior unlikely.

Emerging under an institutional setting which can be classified as a community responsibility system - CRS (Greif 2006), we argue that the mechanism yielded fair and progressive taxation². The system was successful such that the crown introduced it to cities governed by consuls (*consulates*) in the South of France, where confrontations amongst the various classes prevailed and the CRS did not.³ The essential feature of this tax system was the assignment of a fixed amount of tax revenue to be raised. We show that a simple alternative tax mechanism, that has the property of delivering a set tax level, can also yield an equilibrium of truthful reporting of wealth.⁴ However, it may leave some uncertainty regarding the amount collected. Furthermore, it relies on the tax authority providing taxpayers with specific incentives to report any fellow taxpayers who cheat, which is in some contrast to the spirit of CRS. Making use of the tax rolls of the *tailles* levied by Philip the Fair between 1292 and 1300 in order to finance his war in

² By progressive we do not mean that tax rates were progressive, rather that the tax burden was borne mostly by the rich taxpayers.

³ The system prevailed in other cities in Northern France and in rural areas. The *taille* was instituted by the count of Toulouse, Alphonse of Poitiers in the Midi between 1260 and 1270 in an attempt to curb civil strife in towns, run on a basis of the 'consulate' - an oligarchy similar in style to that of Italian cities. These towns relied on indirect taxes that weighed heavily in the poor. Unlike Paris, where the town voluntarily converted an indirect tax to a direct one, the *taille* had to be enforced by the Count and then by the kings of France to the dismay of the urban elites. (see Wolff, 1956)

⁴ A system of direct taxes on wealth based on fixed rates was instituted in England, Spain and Burgundy.

Flanders, we show that despite very high inequality, Paris was a well integrated prosperous city with little civil strife and unrest. The evidence is consistent with a well functioning commune, an achievement that became quite rare at that time in the more famous cities of Tuscany and Flanders (Greif 2006).

A number of previous studies have made use of tax assessment data to make inferences about income or wealth distribution in early modern Europe. The most important study is of the famous Florentine *catasto* of 1427. (Herlihy (1967) and Herlihy Klapisch (1978)), which is available in machine readable form. French data have been, on the other hand, little explored. Favier (1970), has utilized tax rolls from Paris for the years 1421, 1423 and 1438 to provide a comprehensive analysis of occupations and wealth. The data include only the wealthy citizens comprising in total about 2,400 people. The tax rolls analyzed in this paper have been studied by Bourlet (1992) mainly for the purpose of an antroponomic study and Herlihy (1995) who analyzed the 1292 and 1313 tax rolls and briefly addressed issues related to migration, occupations and gender differences. However, probably owing to his premature death, Herlihy did not provide more than few summary statistics and did not computerize the data set. (cite Wolfe, etc.)

The paper is organized as follows: we begin, in Section II by describing the data source used in this paper, in section III we describe the taxation principle and its relations to the community responsibility system. Section IV provides a formal model of the Parisian *taille* mechanism. Section V provides main summary statistics that provide a glimpse into of the society and economy of Paris and relates them to the method of taxation. Section VI concludes.

II. The Parisian *Tailles* of Philip the Fair – the source.

Our data is extracted from the tax rolls of the *Taille* imposed by Philip the Fair on Paris in 1292. There are seven existing rolls: 1292, 1296,7,8,9, 1300 and 1313. The first six correspond to the same imposition totaling 100,000 *livres parisis* to be paid in installments. The last tax roll, of 1313, was earmarked to pay for the knighting of the prince, the future king Louis X. The tax was levied on the citizens of Paris and excluded the privileged tax exempt classes of the nobility, clergy, students and professors. Who was classified a citizen – 'burgher' is open to debate. According to Duby only those that enjoyed the privileges of citizens that were related to residency requirements paid these taxes. The tax rolls differ in coverage, (Table 1) the first - 1292 - being the largest, including all segments of the taxable population: The rich (*gros*) the poor (*menus*), the Jews (who were expelled in 1305) and the *Lombards* (Italians). The tax roll of 1296 is missing the tax roll of the poor. All the subsequent tax rolls did not include some of the neighborhoods outside the city walls. The tax roll of 1313, which records fewest tax payers, has fewer parishes included in it than the previous tax rolls.

The tax rolls are essentially a list of taxpayers recorded according to residency. Besides the tax payer's name we often find information about his or her occupation and place of origin. Separate lists were drawn for Jews, Italian bankers (*Lombards*) and the dead. Sometimes the poor appeared in a separate list, again according to place of residence. The tax rolls of 1292 (Geraud, 1837) , 1296, 1297 and 1313 (Michaelsson, 1951, 1958 and 1962) were extracted from the archives and are available in printed form. The remaining rolls – those of 1298, 1299 and 1300 are available only in their original manuscript form and are in the process of being entered manually into the database.

Table 1

Number of tax payers in Parisian tax rolls

Year	Number of taxpayers
1292	14566
1296	5703
1297	9930
1313	6352
Total	36551

III. The Parisian *Tailles* of Philip the Fair – the method of taxation

The institutional details of the *tailles* studied in this paper are unfortunately shrouded in secrecy. The documents provide some indirect clues as to the taxation method, but no direct explicit evidence. The reason for the lack of information on the taxation procedure is in itself evidence of the autonomy of the city's public finances. According to Descimon (1989), who analyzed a similar Parisian tax roll of 1571, the Parisian city government kept these tax rolls secret from the crown and carefully guarded the detailed information about their tax payers. Descimon suggests that tax rolls were burnt after the taxes were delivered.

Nevertheless, from tax rolls that survived in other cities over the early modern period – scholars have been able to generalize the principles of this tax. The following account is based on the summary provided by Wolfe(1972) in appendix G to his book. The *tailles* were taxes raised by

the cities of France in response from demands from the king. According to the history of the *tailles* studied here, it was the city of Paris that chose to commute a sales tax (*aide*) into the *taille*. The city negotiated with the crown on the amount to be delivered and the crown left it to the city's government to assess and collect the tax.

It appears that this taxation mechanism was mutually advantageous for the bourgeoisie and the crown. The crown was assured a given tax revenue which reduced fiscal uncertainty and minimized on collection costs, whereas the city maintained its public finance independence. In 1382, an attempt to collect taxes from the city directly by the king's agents resulted in violent riots. The small scale of the king's bureaucracy and his limited political and military powers resulted in a preference for farming out tax collection – the *taille* was no exception. The main difference between the tax farm and the *taille*, was in the motivation: the city opted for this arrangement to protect its independence, rather than to maximize profit⁵. Moreover, the ability of the city to deliver taxes at a low cost to the crown turned the *taille* into a coercion constraining institution (CCI – Greif, 2005). It limited the power of the crown by deterring it from abusing the city's property rights, because the city's retaliation (not delivering the *taille*) would be very costly to a crown with limited tax collection capacity.

On the downside, from a macroeconomic point of view – the *taille* was an unfavorable pro-cyclical fiscal mechanism: during an economic recession, in order to deliver the pre-agreed tax payment, tax rates had to be increased, whereas during an economic boom, tax rates were lowered.

⁵ One potentially profitable motive was to use fiscal independence to issue low interest debt in the form of rents – Luchaire (1911).

The *tailles* in France were divided into two sorts – the *taille reele* and the *taille personnelle*. The former was a property tax often called '*fougae*' - hearth tax - and was levied mainly in the *midi* and the south of France. The latter was a tax on personal wealth that included also moveable wealth and income, it was levied in the north of France. The Paris *tailles* were therefore, a tax on all wealth and income from labor and capital.

The most important feature of *taille personnelle* was what Wolfe terms an "impot de repartition." Recall that the city negotiated a lump sum tax to be delivered to the king – it therefore turned the tax allocation and collection process into a zero-sum game, whereby a tax payer who evaded taxation by either falsely declaring his taxable wealth and/or income, or by not paying his assessed tax, fell as a burden on other tax payers. Unlike modern taxes, where the government sets tax rates and is therefore, the residual claimant of the tax assessment and collection process, the medieval monarchy made sure that taxpayers internalize the costs of tax evasion⁶. In Burgundy, however, the princely city of Dijon was subject to a wealth tax which was administered by the Duke's men and was based on a fixed rate of 2% of the assessed wealth. Tax revenues, therefore, fluctuated from one tax assessment to the next (Dubois, 1984).

The zero-sum game property of this taxation scheme, is consistent with a self reinforcing community responsibility system (CRS) which characterized many medieval institutions (Greif (2005)). Extending Greif's analysis from merchants to the city's citizens at large, the CRS enabled merchants (citizens) to learn the communal and personal identities of their (otherwise unknown) partners in taxation. Indeed, an important feature of the tax rolls was the detailed collection of personal information on tax payers by their peers. Greif (2006) argues that CRS

⁶⁶ The mode of repartition – the division of a lump sum tax between tax payers was common in small rural communities.. This became the norm in Burgundy after 1376 (Leguai 1970)

would be hard to enforce in large cities, such as Genoa or Venice. However the division of the city of Paris into smaller tax units based on the parish church made it possible to rely on this mechanism in a city that may have totaled 200,000 people. The nature of the *taille* instituted a measure of joint liability of all the citizens to fulfill the contract with the crown. The community, through its courts, would enforce the contract and discipline those that attempted to violate it.

The *taille* system, then, provided an institutional dynamism that according to Greif (2005) is likely to contribute to economic growth. It prevented the crown from acquiring coercive power which it might then have used to abuse the city's property rights and it solidified the community by fostering a CRS which increased the level of solidarity and community responsibility of the city's merchants. This situation was different than in the 'free' cities of northern Italy – in those cities, the merchant elites controlled the city and contract enforcement through impersonal exchange emerged and dominated. CRS mechanisms, there, were less effective (Greif 2006) and remained, at best, at the guild level bringing about, perhaps, less solidarity than in French cities.

An essential feature of CRS highlighted by Greif (1993), is the social underpinning of these institutions. In the by now classic example of the Maghribi traders, the religious and family relationships provided the glue that bonded the institution, which was otherwise based on economic incentives. In a similar way, the zero-sum game property of the *taille*, made the use of a CRS natural from an economic point of view. However, to lower the costs of creating and maintaining this CRS – the commune adopted a number of measures that made compliance with the contract (with the crown), information gathering and enforcement much cheaper or self-enforcing. This was done by adopting two principles; the first, highlighted by Wolfe (1972) was the principle that in taxes based on repartition "Le fort portent le faible." – the wealthy must

carry the poor. Because the total tax to be delivered to the crown was fixed, any shortfall, due to negative income shocks to the taxpayer, was borne by those more fortunate. This principle may be characterized as a 'progressive' taxation scheme and helped to solidify the community at large. Since most of the tax burden was effectively borne by a smaller group of the more wealthy, it made it easier to enforce.

The second principle was that all citizens had to pay (participate) in this game. Everyone had to pay – the city elites, the poor and the dead. The records of the Paris *taille* show that in 1297 – 1350 poor taxpayers paid less than five percent of the total tax. Imagine the costs of assessing and collecting taxes from these poor individuals. The wealthy taxpayers could have easily absorbed their share at a relatively low cost. At the other end – we found that all the Parisian political elite (*prevot de marchands, echevins, elus*, etc...) are all accounted for in the tax rolls – they did not exempt themselves or their families. Indeed, Bouve (2004) in his study of the wealthy elites in Paris, compared the tax assessments of the wealthy individuals and families before and after assumption of political power and shows that privilege did not favor tax assessments: the assessments did not decline with taking office.

Finally, the adoption of a wealth and income tax, with some progressive provisions in itself helped solidify the community. After all, the elites could have issued debt (to themselves) to pay the crown and choose to levy and collect indirect taxes to pay for the loans. These regressive measures were taken in Florence, for example and in other Italian city states. While no doubt contributing to the development of financial markets, they served to polarize the communes and may have, Greif (2005), negatively affected long term growth.

The successful implementation of the principles outlined above depended on the city government's ability to a) allocate the tax burden in a way consistent with the progressive principle, b) to extract the information necessary on each taxpayer and c) to enforce the collection of the tax. After negotiating with the King on the total amount the city should deliver to him, the city government proceeded in the following sequence: The first stage involved the setting of tax rates to ensure the city can provide the requested lump sum tax within the taxation principles. The second stage involved dividing the city into smaller fiscal units to minimize information and collection costs.

We know very little about the first stage and the information historians have is derived from a few rare examples which survived – none from Paris. The actual tax schedules used in these tax rolls are unknown and could have varied between the various years. Similar *tailles* were usually levied according to the following principle: the very poor paid a poll tax, the very wealthy, above a certain (variable) cutoff paid a proportional wealth tax that normally ranged from one to ten percent. Most tax payers paid a proportional income tax⁷. As we show later, it is reasonable to deduce from the data that taxation of the poor was indeed a poll tax and for higher incomes it was proportional to wealth or capital. For the purpose of the analysis of inequality the medieval principle of proportionality is accepted throughout this paper.

The extraction of information and enforcement of collection was achieved by dividing the city into parishes (some parishes further divided into wards). To ensure that the principles that operated at the city level would also carry through at lower levels, in particular the invocation of a CRS, the lump sum levied on the city was divided into quotas for each parish. Once an

⁷ Boutaric (1861) p. 261. Desportes (1977)

allocation was arrived at – each Parish was faced with the task of assessing individuals and collecting the tax.⁸

The fact the rolls are constructed according to residence – by the taxpayer's address - alludes to the way the assessment was conducted; through a house to house search. Since the property of the zero sum game prevailed for every parish and ward, it was in the best interest of neighbors to make sure that assessors had as much information as could possibly be obtained (given that the assessed knew that, they had an incentive to truthfully report their wealth and income). In the congested living conditions of the medieval city there was little opportunity to hide. Moreover, given the density of population in the city it was unlikely that a subset of parishioners collude to lower their tax return. It was impossible for entire Paris to collude because they had to deliver a given quota to the city government. Any subset of parishioners that wanted to collude will face the possibility that the remaining parishioners, who now would have pay more, would report them to the tax assessors.

The inclusion of the lists of dead taxpayers in the rolls highlights the nature of the process: Since the planning of the tax assessment was based on living taxpayers, a taxpayer that died during the tax year could not be readily absolved. If the dead taxpayers were to be dropped from the list, their burden would have to have been picked up by surviving ones. Since death rates were not very low – a provision for collecting taxes from the survivors of deceased taxpayers had to be formulated.

Some of the features of the Parisian *taille* system can be inferred from its adoption in the Midi. Wolff (1956) argues that in Toulouse and other town in the Midi, the Count of Toulouse

⁸ See discussions in Farr (1989) and Desportes(1977) for Dijon and Reims respectively.

introduced in 1270, the Northern version of the *taille* to the consulates of the South. Later on, Charles VI, the king of France, issued in 1390 specific ordinances on the procedure of the *taille*, to these Southern towns. According to the documents studied by Wolff, the aim of switching from indirect taxes to direct ones was to attenuate civil tensions that were widespread in the Southern consulates. The conflicts were a result of the regressive nature of indirect taxation and resentment of the city oligarchies by the lower classes. This provides indirect evidence that these institutions worked well in the Northern communes, such that the crown sought to transplant them to the South. However, in the case of Toulouse, because the initiative came from the ruler, the crown directed the city assessors as to how to value the various types of wealth and required the city to provide him with the actual assessments made. Moreover, from the ordinance we know that each assessed person had to testify in front of a subset of his wealthy neighbors about his wealth. According to Wolff, given the repartition principle, his neighbors had an incentive to make sure the testament was correct. We also know that the penalty for lying was confiscation of the misreported items.

In the following section we model formally the *taille* mechanism and contrast it with an alternative simple mechanism that can achieve similar objectives, such as truthful reporting and non collusion. However, the alternative mechanism does not rely on the principle of the CRS and can not remove the uncertainty that the *taille* mechanism removes. Moreover, it could be more costly to implement and assuming some reasonable behavioral assumptions, may not produce the desired results.

IV. A formal model

1. A mechanism implementing the *taille*

We analyze the use of the *taille* in a particular parish, and start from the point at which an amount P has been assessed on the parish, and the task at hand is to collect that. Although it is outside the scope of this analysis, note that the allocation of the total amount of tax to be collected among the parishes is also a step in the process at which the general progressivity of the *taille* can be influenced. Parishes with relatively wealthy residents can be assessed relatively higher P values; the distribution of P values across parishes need not track the distribution of wealth across parishes.

Here we assume for clarity that the parish consists of two individuals; the generalization to more than two parishioners is straightforward. The informational assumptions are key, however. It is assumed that each parishioner's wealth is a random variable w_i drawn from a distribution f_i , with support $[a_i, b_i]$. The information $(f_i, [a_i, b_i])$ for each i is common knowledge, but only parishioner i and one other parishioner know the realization of w_i , the tax collector does not. Given our assumption of two parishioners, this means that parishioner knows both w_i realizations; it will be apparent in the analysis below that in an n -parishioner world, the weaker assumption just stated is all that is necessary. What we will call the *tailles* mechanism operates in two stages. In Stage I, each parishioner reports his wealth, and we denote that report as r_i . These reports are then made public, and at stage II, each parishioner makes a further report c_i , which takes a value of 0 or 1. A report of $c_i=0$ is interpreted as 'silence', whereas a report of 1 indicates that the parishioner is *challenging* the income report of the other parishioner. (In a multi-person parish, each parishioner i would choose a *list* of reports c_{ij} on every other parishioner.) It is assumed that any report of 1, which we henceforth refer to as a *challenge*, triggers a thorough and costly audit of the challenged parishioner's wealth, which reveals the actual realization of his w_i . The impact of such an audit is reflected in the payoffs given below.

The parishioners' choices of reports and challenges determine each parishioner's tax liability as:

$$T_i = \frac{s_i P}{\sum_j s_j}$$

where s_j is the value of j 's wealth used by the tax collector: this is r_j , if j 's report goes unchallenged, and w_j if there is a challenge and an audit.

Formally, we can define:

$$s_i(r_i, w_i, c_j) = c_j \max\{w_i, r_i\} + (1 - c_j)r_i, \text{ for } i=1,2 \text{ and } j=\{1,2\} \setminus i$$

The first important property of this tax assessment is that it is always true that the sum of the individual assessments results in exactly P being collected. The second key property is that any reduction in the s_i of parishioner i reduces i 's tax burden, but increases the tax burden of every other parishioner. This second property implies that the *tailles* has a built-in incentive for any parishioner who knows that another parishioner is under-reporting his wealth to challenge that report. The mechanism needs to be complicated slightly beyond this, however, in order to insure two further properties:

- i) that a parishioner who is found in an audit to have under-reported suffers some cost sufficient to dissuade such behavior, allowing the tax collector to avoid costly audits, and
- ii) that a parishioner who challenges the report of a parishioner who is found to have been truthful also incurs a cost sufficient to dissuade such behavior, for the same reason.

Thus, the full *tailles mechanism* is specified by saying that the payoff to each parishioner is as follows:

$$V^T_i = w_i - T_i(r, c | w, P) + c_{-i}h(w_i - r_i) + c_i f(w_{-i} - r_{-i})$$

Where

$$T_i(r, c | w, P) = \frac{s_i(r_i, w_i, c_{-i})P}{\sum_j s_j(r_j, w_j, c_{-j})},$$

with the functions $s_i()$ as defined above, and $-j$ ($-i$) referring to any parishioner other than $j(i)$.

The functions h and f accomplish the two tasks mentioned above. They are defined by

$h(a)=0$, if $a \leq 0$, and $h(a)=d<0$, if $a>0$.

and,

$f(a)=0$ if $a < 0$, and $f(a)=b<0$, if $a \geq 0$;

The function h inflicts a cost of $d<0$ on i only if his report is challenged and he has in fact under-reported, while the function f inflicts a cost of $b<0$ on i only if he challenges another parishioner's report and the ensuing audit reveals that parishioner was in fact honest. The costs d, b can be either financial or a loss in utility (as from a loss of face, say), and they can be arbitrarily small.

The meaning of the claim that the *taille* 'works' is given by the following result, a proof of which can be found in the Appendix.

Proposition 1: *The unique sub-game perfect equilibrium of the game in which parishioners simultaneously choose reports r_i at Stage I, observe these reports and then simultaneously choose challenges c_i at Stage II, and have the payoff functions V_i^T specified above, has each parishioner choose $r_i=w_i$ at Stage I, and at Stage II uses the strategy: $c_i=1$ if and only if $r_{-i}<w_{-i}$.*

An immediate implication of this result is that in equilibrium the amount P is collected from the parish, and parishioner i 's tax payment is as if he is paying the proportion $\frac{P}{\sum_j w_j}$ of his

wealth in taxes; this is the effective tax rate on parishioners. A further important feature of the *taille* mechanism is its sequential nature, which reflects the reality of the way information was disseminated in actual implementation of the *taille*. That is, it is important that parishioners were told the assessments of their fellow parishioners and had the opportunity to challenge them (even

if they didn't do so) before the final tax burdens were determined. The importance of this feature is revealed by the following further result.

Proposition 2: *Consider a game in which all parishioners simultaneously choose a pair (r_i, c_i) , but have the same payoffs as in Proposition 1. This game has no Nash Equilibrium in pure strategies.*

This simultaneous-move game certainly has Nash Equilibria, but Proposition 2 implies that they must all involve mixed strategies; parishioners necessarily randomize between truthful and untruthful wealth reports as well as over whether to challenge others reports. This implies that with positive probability there will be audits (some of which reveal under-reporting, and some of which necessarily - and wastefully - do not) in equilibrium, along with unchallenged under-reporting of wealth. Thus, although this simultaneous-move version of the *taille* would still collect the required P , the collectors would have to incur the costs of these audits, and it seems likely that the collection would be seen as less legitimate, as some parishioners would be known, ex-post, to have gotten away with under-reporting their wealth, and some others who had reported truthfully would find themselves being audited, nonetheless.

A further point of note is that the tax collector for each parish was typically a member of the parish, and subject to the tax, also. This doesn't affect the working of the *taille* mechanism, so long as the collector must also make a public report, *and* there is someone in the parish who knows the collector's true w_i . Of course, this assumes that the tax collector cannot, by virtue of his position, intimidate any parishioners who know his true w into not challenging him. More generally, this mechanism works only if (i.e., the proof of Prop. 1 assumes) there are no 'bullies' – parishioners who can intimidate their fellow parishioners into not challenging their reports.

Granting that, it is apparent that the informational assumption made, that at least one other parishioner knows the true w_i of each parishioner, is sufficient for this result to hold for a parish

of n people. Any parishioner has an incentive to challenge the report of a parishioner who's w_i she knows if and only the parishioner has under-reported. Furthermore, the presence of the f function – the punishment for challenging an honest fellow parishioner – insures that no parishioner i wishes to challenge the report of any fellow parishioner whose true w_j she does *not* know, so long as she also knows that *some* other parishioner does know the realization of w_j .

Finally, recall that in the actual implementation of the *tailles*, the very poor were either assessed a fixed, very small amount, independent of their income, or were not assessed at all. This clearly leaves the results above unaffected; the amount to be collected from those who are *not* poor using the *tailles* mechanism is simply changed to $P-p$, where p is the amount (possibly zero) which is collected from the very poor.

2. An alternative mechanism

These results do not imply that the *taille* is in any sense optimal, of course, and we make no attempt here to argue that it is. However, it is reasonable to ask whether there isn't some other tax collection mechanism that would also collect the negotiated amount of taxes under the same informational assumptions, but which does not have the property which we have argued is key to the success of the *taille*; the built in incentive to challenge an under-reporting parishioner. So, here we consider another taxation mechanism which is rather more similar to modern taxation systems than is the *tailles*.

Suppose then that after concluding negotiations with the Crown, the city leaders assessed a proportional tax on each citizen at some pre-determined rate, τ . A Parisian's tax burden would then be τw_i in principle, and the task at hand is the same as that faced by the tax-collection arm

of any modern state: to apply a given tax system to the reported tax base, and to deter under-reporting.

Before analyzing this system, note the following:

1. City leaders must have a good estimate of the total tax base to which τ is applied in Paris in order to determine a value for τ that will collect the funds agreed upon with the Crown. (The greater is the variance on this estimate of the tax base, the greater is the probability that even if the intended proportion τ of total wealth is collected, this amount is either too little to satisfy the contract with the Crown, or too much, in which case the system fails to minimize the cost to the city as a whole of carrying out the contract.

2. It is possible to set a different value for τ in each parish, if this serves some larger purpose. The city leaders could use this to influence the overall progressivity of the tax, for example. Doing this requires good estimates of the ‘tax base’ in each parish, however, and would in any case presumably emerge as part of the bargaining among parishes over the split of the tax burden. In this the *tau* is no different than the *tailles*, as the allocation of the P values across parishes has the same impact in the latter mechanism.

These observations aside, we concern ourselves here only with the application of this type of taxation system at the parish level, where the task at hand is again to discern the w_i for each parishioner to which the agreed-upon τ is applied.

This mechanism, which we will refer to as the *tau* mechanism, is intended to collect taxes of

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

from the parish, with the s_i functions defined as before, if again parishioners are allowed to challenge the reports of other parishioners. However, it is immediate that the individual tax burden of $\tau s_i()$ does not depend in any way on the reports of other parishioners, but rather only

on one's own report and on whether it is challenged. There is, therefore, no built-in incentive for i to challenge the report of $-i$ even if i knows $-i$ is under-reporting, so any such incentives must be otherwise built into the mechanism. There are surely many ways to do this, and we demonstrate here one possibility for doing so.

Specify the payoff to parishioner i as:

$$V_i^\tau = w_i - \pi_i - c_j \sigma [w_i - r_i] + c_i [\sigma - \tau] [w_j - r_j] + c_i f(w_j - r_j)$$

where the function f is as defined previously, and plays the same role as in the *tailles* mechanism. The variable σ is a 'penalty tax rate' which must satisfy $\sigma > \tau$. The two new features in this mechanism are to be found in the third and fourth terms of this payoff function.

The third imposes a financial penalty on parishioner i , in the amount $\sigma(w_i - r_i)$, in the event he under-reports, and is challenged. This is in the mechanism because – as formalized in the fourth term of the payoff function – a parishioner who challenges another parishioner's under-report is compensated with part of this penalty tax collection, and this in turn is necessary because the method of taxation itself provides no incentive to make such a challenge. In this formulation of the *tau* mechanism, this is the use to which is put the penalty collected from the under-reporter.⁹

(Note that the presence of the penalty tax rate on unreported income provides an incentive not to under-report, thus eliminating the need for an analog to the $h()$ function in the *taille* mechanism.)

This 'tau' mechanism works, in the same sense as does the *taille*, as indicated by the following result.

Proposition 3: *The unique sub-game perfect equilibrium of the game in which parishioners simultaneously choose reports r_i at Stage I, observe these reports and then simultaneously choose challenges c_i at Stage II, and have the payoff functions V_i^τ specified above, has each parishioner choose $r_i = w_i$ at Stage I, and at Stage II uses the strategy: $c_i = 1$ if and only if $r_{-i} < w_{-i}$.*

⁹ The particular division of the penalty proceeds used here is not necessary for the Proposition to be true, of course. In particular, some portion could go to defray the cost of the audit. What is necessary is that a parishioner found under-reporting pays more than if he had been truthful, and that a correct challenger be compensated.

This result implies that use of this mechanism results in equilibrium parish tax collections of

$\tau \sum_j w_j$, with no audits and no misreporting.

A further question one can raise with regard to both these mechanisms is their vulnerability to collusion among parishioners to lower their tax payments. An obvious form of collusion would be for a set of taxpayers to under-report their wealth and agree not to challenge one another. In either mechanism, this would require that the set of colluding taxpayers be *informationally self-contained*: there must be no parishioner outside the group who knows the truth about anyone in the group. However, even if this can be arranged, it remains true that the sequential nature of the mechanisms makes such collusion unlikely, since once the reports are filed, it is still in the interests of every member of the colluding group to challenge the false low reports of other members, as that will lower their own tax bill (in the *tailles*) or earn them a reward (in the *tau*). A second possibility for collusion arises from a taxpayer who under-reports and offers a bribe to other taxpayers which is payable only if they do not challenge. There is an immediate difficulty in enforcing such an illegal agreement, if indeed no reports are filed. Looking beyond this issue, however, it can be shown that a sufficiently high value for σ will make such an agreement unprofitable in the *tau* mechanism; the difficulty here lies in the fact that how high the penalty rate must be depends in a complicated way on the number of taxpayers any one parishioner would have to bribe. In the *tailles* mechanism, such agreements can be profitable; provided the parishioner who wishes to under-report can be sure he has successfully bribed all other parishioners who know the truth about his wealth.

Finally, one might wonder whether either mechanism might have an advantage in being less likely to induce Parisians to engage in other tax-avoidance behavior. One obvious possibility here is mobility. In the *tailles*, it is pretty much unavoidable that one's tax burden will depend not only on one's realization of w_i , but also on which parish one lives in. During the period 1292-1300, the *tailles* occurred every year and the overall tax burden for the city was the same. Hence, parishioners would have a good idea of how the values of P varied across parishes, and this might provide them with an incentive to move. On the other hand, it was also true that the parish boundaries were re-drawn from time to time, which rendered the change in tax-liability from moving uncertain, which would attenuate this incentive. None the less, it is also true that if the city had used the more modern-looking *tau* system, then so long as the tax rates levied were the same for all parishes, there would be no tax-reduction incentive for Parisians to move.

This suggests the *tau* (or any uniform tax system) would have had this further advantage over the *tailles* that was actually used, further suggesting that the advantages we find for the *tailles* must have been substantial.

To answer the question: why did the Leaders of Paris choose the *tailles* mechanism over the *tau*, one might turn to informational considerations. It has been assumed here that the city leaders know the realization of aggregate income in each parish before they set the fixed tax rate τ , so as to be sure of collecting the agreed-on sum for the crown. In reality the city leaders could be expected to know only the distributions from which the incomes are drawn. Therefore, there is a positive probability of collecting insufficient funds and not meeting the tax targets, and this uncertainty can only be relieved by setting a tax rate τ so high that the tax target is fulfilled with virtual certainty; doing this necessarily also implies collecting more taxes than required with high probability, negatively affecting the welfare of the tax payers.

An additional consideration is that the *tau* mechanism relies on taxpayers' willingness to turn in their misreporting neighbors in return for a monetary reward. From a behavioral standpoint, our model assumed that people are indifferent between turning in a neighbor for a reward and turning in a neighbor that inflicted a direct cost on them. Anecdotal evidence suggests that social norms do favor the former and sanction the latter.

V. Inequality and integration in medieval Paris¹⁰.

1. Parishes, wealth and taxpayers

The 1292 tax roll was used by Geraud (1837) to construct a map of Paris during the reign of Philip the Fair (Map 1).

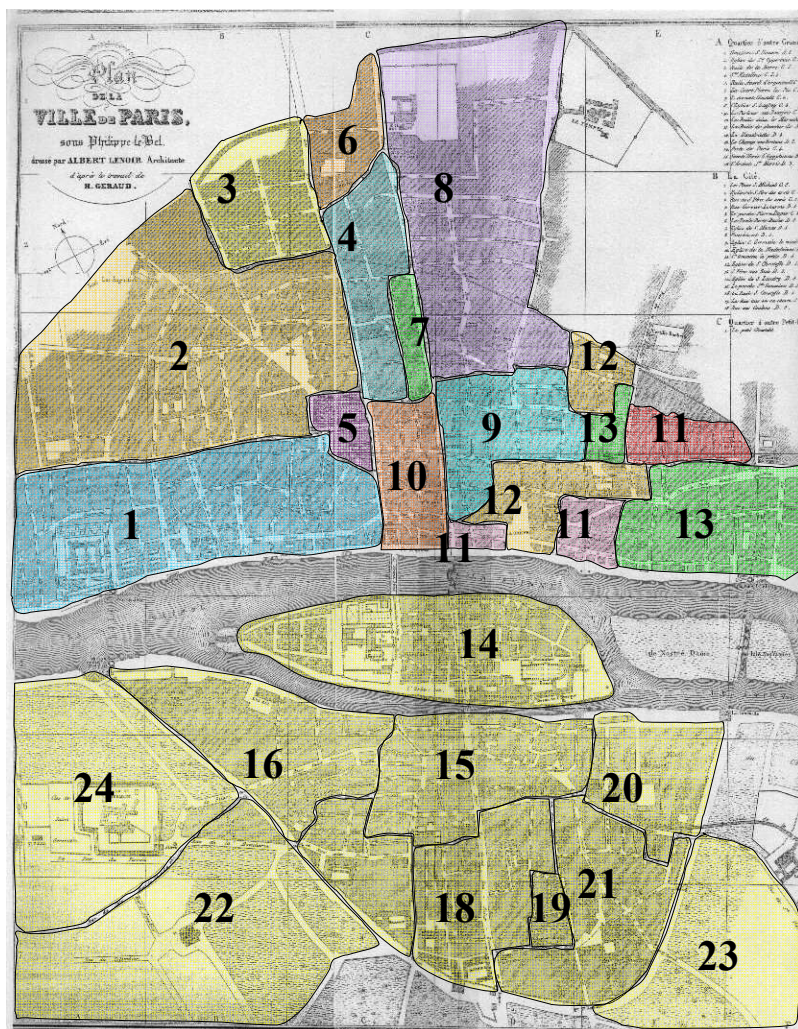
For the mechanism we described to function smoothly and equitably, the Parisian taxpayers had to be assessed annually. Evidence from wealth taxes in Italy suggests that assessments were costly and were done every decade or so in small communes (totaling less than 1000) taxpayers.

The City of Florence attempted to assess its taxpayers in the famous catasto of 1427 – not to be repeated for decades. For Toulouse, we know that one assessment was done in 1335 (1163 taxpayers) and four assessments were carried out in 1284, 1391, 1394 and 1405 (Biraben, 1964).

It is therefore tempting to suggest that the tax assessors used some pre-prepared matrix of taxpayers to facilitate their work. This was not the case. Each tax role contains numerous variations in taxpayers accounting for their demographics and their economic fortune. The tax assessed for individuals varied from year to consecutive year.¹¹

¹⁰ This section builds on Sussman (2006).

¹¹ To be tabulated when data processing is complete



Map 1

Paris during the reign of Philip the Fair – division to parishes based on the records of the *Taille*

Legend:

1. St. Germain L'auxerrois 2. St. Eustache 3. St. Sauver 4. St. Leu – St Gille
5. St Innocent – St, Opportune 6. St. Laurent 7. St. Josse 8. St. Nicolas des champ 9. St. Merri
10. St. Jacques de la boucherie 11. St. Gervais 12. St. Jean 13. St. Pol 14. La Cite 15. St. Séverin
16. St. André des arts 17. St. Cosme 18. St. Benoît 19. St. Hilaire 20. St. Nicolas de Chardonnay 21.
- Ste Geneviève 22. Notre Dame des champs 23. St. Marcel 24. St. Germain des Prés

Since the tax was repartitioned in each parish, it would have made sense for rich taxpayers to move with other rich taxpayers to lower their tax burden. However, it seems that at the city level, tax units were constantly reevaluated: new tax units were created, others merged into larger ones in one case a tax unit of goldsmiths residing in 3 neighboring parishes was created and added to one of the larger parishes. Yet in other cases streets were transferred from one parish to the next. The constant fine tuning we observe: annual assessment of individuals and annual consideration of the tax units made it impossible for agents to benefit from strategically reallocating themselves for tax purposes. Indeed for the years 1292, 6 and 7 – we found that only a single wealthy taxpayer actually moved.

2. The Rich Carry the Poor - evolution of tax returns over time

The Parisian taille was based on the principle that the rich carry the poor, the tax rolls allow us to verify that this was indeed the case. Table 2 shows the share of tax revenues contributed by the economic elites. It is clear that the principle was not an empty one. The top percentile of the taxpayers paid between 20 and 30 percent of the tax obligations of the city and the top decile accounted for between 60 to 75 percent of the tax. Assuming that thousands of households did not meet the tax threshold and therefore did not pay any tax, the tax burden was indeed paid off almost entirely by the top decile.

Table 2

Share of the elites in the tax collected

Year	Share of top 1% in Tax	Share of top 10% in tax
1292	0.23	0.65
1296	0.22	0.61
1297	0.2	0.58
1313	0.3	0.75

3. Paris a cosmopolitan metropolis – evidence for communal cohesiveness.

It is evident from the tax rolls that the Parisian economy attracted many migrants and foreigners. Unlike the privileges received by foreign nationals in other commercial centers (notably in the East), foreigners residing in Paris were not exempt from the *taille* and our records indicate that a few hundred of foreigners were recorded as having paid the *taille*. Their inclusion in the regular *taille* lists, with the exception of the Jews and Italian Bankers, suggests that they were an integral part of the commune of Paris and benefited from the positive effects of the Parisian community responsibility system – a feature that could have made Paris an attractive destination for foreign migration. Moreover, the tax lists record the name of most foreigners in their French transcription, which can be interpreted as further evidence for their social integration. Conversely it can be argued that the exclusion of the Jews and Lombards from the general tax roll as a signal that they were not part of the CRS, made them, as the historical record shows, more susceptible to abuse by the crown as their abuse was not considered a breach of the implicit contract between the crown and the city.

Table 3

Contributions of foreign born residents to the *tailles*

	Number of foreigners	Share of foreigners in tax receipts	Average tax
1292	884	17%	47.2
1296	419	16%	75.8
1297	591	14%	48.8
1313	357	6%	44.7

In table 3 we can see that foreigners accounted for roughly 6% of the taxpayers and contributed between 14 and 17 percent of total tax receipts until 1313. In 1313 we see a marked decline in the number of foreigners and in their relative tax contributions. Earlier we showed that the smaller tax rolls of 1296 and 1313 are the result of the economic crisis prevailing at those years. In these years, the tax burden shifted to the more affluent. Thus, in 1296 we see that though their numbers drop by more than a half, foreigners contribute, roughly the same share of the *taille* as they did in 1292. However, in 1313 we observe an opposite trend of a decline in numbers *and* wealth of foreigners. Analysis of the tax records indicates that most of the drop can be explained by the expulsion of the Jews in 1305 (though they already disappear from the tax records in 1297) and the large decline in the numbers of wealthy Italians.

It is tempting to attribute the decline in the lure of Paris for foreigners to the general economic decline of the 1310s, which was accompanied by monetary disorders (debasements). This was hardly an attractive economic environment for foreign merchants and bankers. Moreover, Phillip the Fair engaged in campaigns against the Jews and Templars – the bankers and money lenders of the time – which probably frightened Italian bankers out of Paris, as they were potentially the next victims on the crown list. While indirect, this evidence suggests that economic crisis and institutional disorder - infringing on the property rights of minorities and bankers drove some of the wealthiest tax payers out of Paris. By 1313, Paris seems to have lost its lure.¹² This finding supports claims that relative economic decline in Western Europe set in before the Black Death of 1346/8.

¹² Herlihy () shows that not only did foreigners leave Paris, but that immigration to Paris from the south of France also decline by 1313. Tests of these hypotheses will be performed once all the data set is complete.

Where did foreigners reside? Did they concentrate in one or two parishes or were they dispersed between neighborhoods? Table 4 presents the distribution of foreigners in the various parishes, listed in order of declining wealth, compared with the distribution of the native population. With the exception of the Jews, all foreigners were dispersed throughout the various neighborhoods, according to their wealth. However, foreigners tended to concentrate in the more affluent parishes. For example, 9.9 percent of taxpayers lived in the wealthiest parish of St. Jacques de la boucherie, whereas it was home to almost 20 percent of the Italian community of Paris. Almost half of all Italians resided in the three wealthiest parishes. Half of the Flemish and Germans resided in the top four parishes by income and the English and Scots in the top five parishes. This phenomenon is different from the traditional tendency of foreign merchants to live in enclaves or communes such as those that prevailed in the Levant. Paris was indeed a cosmopolitan city where foreigners could reside next door to the local population without the need to resort to living in closed quarters to protect themselves. The exception to this rule was the Jews who congregated in only two parishes¹³. Finally, the large concentration of Italians and Jews in the parish of St. Merri suggests that this Parish was the home of moneylenders.

Table 4

Residences of foreigners in Paris - 1292

Parish	Share of total population	Share of Germans	Share of English	Share of Flemish	Share of Italians	Share of Scots	Share of Jews
St. Jacques de la boucherie	9.9%	15.8%	11.7%	13.5%	19.8%	10.2%	
St. Jean	5.6%	8.8%	4.3%	7.7%	3.6%	1.7%	17.1%
La Cite	8.3%	9.6%	12.7%	4.8%	26.3%	13.6%	
St. Germain L'auxerrois	16.1%	13.2%	11.3%	24.0%	3.6%	20.3%	
St. Eustache	9.0%	8.8%	10.7%	5.8%	9.0%	18.6%	
St. Benoît	1.5%	1.8%	2.3%	1.9%		1.7%	
St. Gervais	6.5%	1.8%	5.3%	6.7%	2.4%	3.4%	

¹³ The heart of the Jewish community is, to date, in the Marais – their place of residence in the middle ages.

St. Merri	9.8%	5.3%	8.7%	5.8%	16.8%	3.4%	82.9%
St Innocent – St, Opportune	0.6%	1.8%	0.7%				
St. Germain des Près	2.6%		2.0%	2.9%	6.0%		
St. Josse	0.5%		1.3%	1.0%	0.6%		
St. Nicolas des champs	5.8%	1.8%	6.7%	1.9%	5.4%	6.8%	
St. Pol	6.3%	4.4%	7.0%	7.7%	8.4%		
St. Leu – St Gille	3.0%	1.8%	1.7%	2.9%	1.8%	1.7%	
Ste Geneviève	2.8%	3.5%	4.3%	3.8%	0.6%	3.4%	
St. Hilaire	0.1%			1.0%			
St. Cosme	0.4%		0.3%				
St. Laurent	1.5%		1.3%	1.9%			
St. Séverin	4.6%	14.0%	6.0%	5.8%	1.2%	6.8%	
St. André des arts	1.0%	7.0%	1.3%	1.0%			
St. Sauver	1.6%		0.3%		0.6%	8.5%	
St. Nicolas de Chardonnay	0.5%			1.0%			
Notre Dame des champs	0.4%		0.3%				
St. Marcel	1.6%	0.9%	1.7%	1.9%			

4. Community responsibility system and inequality

The findings reported by Van Zanden (1995) point to a very high measure of inequality during the Renaissance and the early modern period. The Parisian tax rolls extend these findings to a much earlier period. Table 5 provides Gini inequality coefficients for the four Parisian *tailles* analyzed in this paper and two, previously unused, contemporary tax lists from London and more recent data on Florence and Zwolle taken from Van Zanden (1995). The similarity of the statistics reported over such a long period suggests that very high inequality prevailed in European cities for centuries. Pre-industrial urban economies were all characterized by high polarity: few very rich citizens, a small affluent middle class and large masses of relatively poor, but nevertheless taxable, citizens.

Table 5
Comparative inequality measures: 1292-1750

City	Year	Number of hearths	Gini coefficient	Top 1%	Top 5%
Paris	1292	14509	0.75	26	52
Paris	1296	5661	0.61	17	38
Paris	1297	9916	0.69	20	44
Paris	1313	6108	0.79	25	55
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	?	?

The finding of very high inequality in Paris, which at the same time maintained a functioning community responsibility system and communal cohesiveness, may seem puzzling given what we know about other cities in Europe at the time (Grief 2006). One reason may be related to the fact that unlike in independent city states, the elites of princely cities benefitted more from the CRS when dealing with the crown than by appropriating wealth from their poorer citizens. Communal solidarity made it costly for the king to abuse the property rights of the Parisian elites – as the riots of 1382 exemplify.

A complimentary explanation may be found by a closer examination of the inequality measures: was the high inequality as captured by the Gini coefficient the outcome of inequality between

social groups or does inequality prevail even within subgroups of the population. Analysis of the data, presented in table 6 shows that any stratification of the tax payers, by place of residence, occupation, skill and capital shows that most of the inequality was within subgroups rather than between subgroups. Therefore, we do not find evidence for location or occupational segregation. The absence of segregation along residence or occupation suggest that no single parish or occupation would benefit from disassociating itself from the communal responsibility system. Thus the very wealthy lived in neighborhoods that were not homogenous and therefore did not stand to gain from deviating from the commune. The members of occupations – the guilds - were also not homogenous in terms of their wealth or income.

Table 6

Between and within inequality measures

	Residence By Parish	Occupation	Skill*	Capital**
Theil's measure of inequality	1.37	0.87	1.18	0.87
With group inequality	1.26	0.84	1.14	0.84
Between group inequality	0.11	0.03	0.04	0.03

* Skill subgroups: artisans, general education, unskilled

** Capital subgroups: circulating, productive, no capital.

5. Social mobility and the community responsibility system.

Greif (2006) argues that the CRS diminishes when the elites can do better resolving their problems in commercial exchanges with one another rather than by forming stable networks. While it is true that Paris was dominated by a few wealthy families (Bove, 2004), the pooling of the data from the various tax rolls reveals that there was a high degree of mobility within the top percentile of the wealth distribution. Table 8 shows the evolution of the very wealthy. From the 166 wealthiest residents of Paris listed in 1292 only 74 (45%) appeared in subsequent rolls, and

only 12 survived the entire period. However, those that survived to 1296 and 1297 were on average wealthier than those that did not survive and were wealthier, on average, than newcomers in 1296 and 1297. Also, the relative standing of the very wealthy changed from 1292 to 1296 and 1297. The Spearman correlation value is low and insignificant which means that there was a lot of wealth mobility in this group of the very rich over the period 1292 – 1296/7. In 1296 over 50% of the very rich were *nouveau riche*, although the new comers had smaller fortunes than incumbents. Moving from 1296 to 1297, the turnover is much smaller – only 25% newcomers. In a year, the ranking among the very rich changed much less than over the four year period from 1292 to 1296. We find a significant, although not very high, Spearman correlation value. Finally, in 1313 the landscape of the elite changed completely – the Italians of course left, but even among the locals, the turnover was high – 80% of the rich were newcomers. To conclude, we can see that the elites (expanding from the 6 or 7 richest families) were very unstable and changed substantially over a generation. This high degree of mobility can also account for the persistence of the CRS system and the particular tax collection mechanism which built upon it.

Table 8

Transition matrix of the wealthy top percentile, Paris 1292-1313
Average tax and maximum tax payment

Year		Transitions	N	Mean	Max	Spearman correlation
1292	Total		166	372	2290	
	One time mention		92	356	1880	
	Repeat mention		74	393	2290	
	Continue to	1296	67	404	2290	0.167
		1297	58	403	2290	0.147
1313		12	286	480	0	
1296	Total		148	360	2850	
	One time mention		40	342	770	
	Repeat mention		108	367	2850	
	New comers		76	294	930	
	From	1292	67	413	2290	0.167
	Continue to	1297	96	359	2850	0.369**
1313		17	256	360	-0.208	
1297	Total		146	348	1090	
	One time mention		43	370	1090	
	Repeat mention		103	340	1090	
	New comers		38	350	1090	
	From	1292	58	363	960	0.147
		1296	96	343	1090	0.369**
	Continue to	1313	20	267	490	0.388
1313	Total		144	535	2308	
	New Comers		120	512	2308	
	From	1292	12	479	1385	0
		1296	17	651	1962	-0.208
1297		20	625	1962	0.388	

Conclusions

In this paper we outlined the mechanism according to which direct taxation took place in the commune of Paris during the commercial revolution. The features of the tax system are consistent with a community responsibility system. According to the theory and qualitative

empirical evidence advanced by Greif (2005), the CRS was an institution that facilitated exchange and enhanced the enforcement of property rights, while also contributing to the cohesive action of the community in the face of attempts by the king to infringe on its rights. Quantitative evidence from the Paris tax rolls lends support to this hypothesis – on the one hand they portray Paris as a well integrated and cosmopolitan city – the largest in the medieval West and with the highest relative growth rates. On the other hand, they show that the system of public finance outlined here actually functioned as predicted – the rich carried the burden of the poor and the assessment of taxes was done in an efficient and fair way. The evidence presented shows that the socioeconomic features of the city population may explain why the CRS was able to persist in Paris whereas they have declined elsewhere.

It is tempting to correlate, in a causal way, the remarkable institutional setting with the economic growth we witness. The tax roll may suggest an explanation for the relative decline of the city. The infringement of the crown on the property rights of the Jews, Templers and Italian bankers – who disappear from the tax rolls in 1313 - may have brought about a decline of the city as a financial center and may have thwarted financial intermediation to the detriment of economic growth. Given that the *taille* system was a coercion constraining institution, the crown preferred to infringe on the property rights of those that could not retaliate.

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