

Administrative organization and state formation.

Siena in the 14th century

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Abstract

This paper investigates the institutional process that characterized political change and state capacity in the late medieval independent commune of Siena. After the mid-14th century demographic crisis, Italian city-states were either turning to oligarchic forms of power or they were losing independence under the pressure of external threats. Siena, instead, developed an institutional framework based on extended participation of social groups to administrative and political power. In the following two centuries the city remained independent and preserved its capacity to collect and use financial resources. Combining historical and theoretical analysis, the paper underlines the mechanisms through which reforms of administrative organization were selecting and supporting coalitional governments with high popular representation. The use of data from original registers will show that increased cooperation maintained the capacity of the commune to collect resources from the community and to provide public services to the city and the controlled territory.

Keywords: State Formation, State Capacity, Administration, Oligarchy, Coalition.

JEL Classification Numbers: D02, N43, P48.

1 Introduction

This paper investigates factors that caused the formation of modern political organizations, affected their capability to limit within-states conflict, to resist to external threats and to mobilize resources for the provision of public services.

The unit of analysis is the history of late medieval Italian commune of Siena: this choice relies on its emblematic political and economic trajectory among the other northern and central Italian independent city-states. Since the beginning of the 12th century throughout all the first half of the 14th century, these urban centers knew a common political path. While experiencing great commercial and manufacturing expansion, they also became important independent political entities. City-states were headed by consular governments representing the leading economic sectors of the communities and developed sophisticated political and administrative organizations. A large urban and economic expansion was accompanied with an innovative way of organizing the political life of society¹.

In 1348 almost all Italian city-states were dramatically affected by the *Black Death*, a bubonic plague that struck most of the European regions. The pestilence strongly reduced population of Italian urban centers and had relevant consequences on trade networks, agricultural production and manufacturing activities². After the shock, those cities followed one main political trajectory. Many communes aggregated in larger regional states led by oligarchic governments. Most of the smaller independent urban centers, which had flourished in the previous centuries, lost their independence and became peripheral parts of those regional states³.

The commune of Siena had a different fortune.

The city, which was led by an oligarchy of merchants and bankers since the first half of the 14th century, after the *Black Death* and a following brief oligarchy of popular factions, preserved its independence for the next two centuries through political coalitions where all main social groups were represented⁴.

What do we learn from the way in which the Tuscan city survived to its mid-14th century crisis and remained independent in the following two centuries? Why did social groups

¹A general study of Italian independent medieval urban centers is in [62]. For an historical analysis of industrial and trade development of Italian communes in late Middle Age see [45]. See [58] for a comprehensive analysis of their political changes. Among the many economic history analyses of medieval city-states see [44], where the correlations between political change, urban growth and economic expansion is analyzed. In [34] a theoretical analysis of the mechanisms underlining internal political change in the medieval Genoa are presented.

²A full analysis of causes, effects and consequences of the bubonic plague on European economic system are in [1] and [39]. In [22] a complete statistical analysis of the impact of *Black Death* on Italian demography is provided. In [59] an analytical explanation of the long run effects of the 1348 bubonic disease on European growth has been provided.

³After the mid-14th century crisis, cities as Venice and Florence extended their territorial domain conquering nearby independent communes, see [15] and [8] for the history of Florence. Venice after the *Black Death* has been studied in [52] and [42]. Other large and small towns as Genoa, Pisa and Lucca, either lost their independence under the pressure of regional states or developed forms of political oligarchies, see [47] and [27].

⁴A long run history of the medieval Siena is in [26], [56] and [29].

cooperate rather than conflict? What does this historical case show about the mechanisms through which a political organization emerges from a society? What were the effects of these changes on the capacity of the Commune to raise financial resources and use them for public services?

This paper shows that, after the mid-14th century crisis, the city of Siena developed an organization of administrative functions that allowed social groups of the city to cooperate in political power. These reforms, in addition, facilitated the maintenance of the capacity to raise resources in order to resist external conflicts and continue to provide public services to the community.

This hypothesis introduces a novel explanation about state formation, the role of administration and its consequences on state capacity. Recent approaches in social sciences to the process of formation of European modern political organizations, present characteristics that do not allow to fully comprehend the particular historical pattern of Siena. In [2] as well as in more recent developments of this approach⁵, the role of franchise extension and its impact on economic inequality have been deeply analyzed in the political evolution of modern England. In addition, the history of British constitution and the extension of political rights, have been studied in [51]. Both the approaches, introducing mechanisms of credible commitment as the basis of state formation, have the characteristic to model political institutions as the rules of interactions between social groups determining certain political outcomes. In these models, one group extend part of its power to the others (or a fraction of them) with the objective to credibly commit to a less unequal distribution of rents from state activities. Institutional changes occur when *élites* consider threats of revolts of *non-élites* serious and potentially destroying their rents. Therefore, leading social classes change institutions in order to redistribute a part of rents with the objective to reduce the threat of revolts. In these frameworks, however, insurrections do not occur and institutions, interpreted as rules of the game, change as an unilateral decision of the *élites* to prevent social turmoils.

The history of Siena, instead, shows different factors affecting state formation. First, it introduces the importance of successful collective actions in changing the *status quo*. As it will be shown, during the second half of the 14th century several revolts, made both by the *élites* and *non-élites*, occurred and substantially changed political equilibrium. Second, it reveals the importance of administrative organization as a fundamental component of the interaction between groups. For these reasons, it is adopted the approach in [35], where a fundamental distinction between political and administrative phases of social life organization is presented. The former identifies the set of interactions between social actors on public policies, goods and services to be undertaken in the interest of relevant groups in society. Administration, instead, entails all the organizations, offices and individuals devoted to the actual implementation of political decisions⁶.

⁵See for example [43].

⁶A first example of application of this method for the history of Venice has been provided in [33].

The adoption of this point of view also distinguishes the present paper from recent economic, political and sociological analyses on this issue. In works as [41] or [28], administration is identified with the bureaucratic apparatus, formed by a social group distinguished by those participating to political representation and acting as an agent employed by the rulers who, in turns, are the principal. This approach does not allow to capture the historical pattern of Siena, where the same social groups were participating or excluded to both political and administrative phases.

Finally, the investigation on the effect of administrative and political changes on public finance of the city, also provides a contribution in a recent debate on the evolution of state capacity in Early modern Europe. Especially, in [57], a wide analysis on the evolution of public credit in European national and city-states has been proposed. There, the main argument is that smaller geographic dimensions and the presence of oligarchies of wealthy *élites*, allowed city-states to have better access to public credit than other small political entities ruled by popular factions or larger national states whose dimension did not allow for an efficient control on the use of resources. Large state capacity was, therefore, possible in small political entities only when the wealthy social classes strictly control power and the way in which resources were used. Once they would have lost power, the community would have lost resources. Other important contributions, such as [23, 24] or [25], have focused on European public finance in more recent times and have shown the importance of political changes, such as the introduction of centralized and limited governments, for improvements in the capacity of states in collecting and expending resources.

The analysis of Siena shows a different story. Through the empirical study of a novel dataset on the medieval public finance of the city, it is shown that a small scale state could have been able to maintain its state capacity in a period of external crisis, also without an oligarchy of wealthy citizens. What mattered, in fact, were organizational changes, such as the extension of representation in public administration, which facilitated a change in the way in which resources were raised.

The structure of the paper is the following. In Section 2 a detailed analysis of the history of late medieval Siena is given, with a focus on the administrative and political organization of the city. Section 3 provides an analytical framework for the understanding of key factors in the political evolution of the city. Section 4 presents new evidences on state capacity. Section 5 concludes.

2 The history of late medieval Siena

2.1 The oligarchic phase

Since its foundation in early 12th century until the end of the 13th century, the independent commune of Siena grew its economic prosperity around trade and banking activities. The favorable position on the *Francigena*, one of the main Medieval European route, made Sienese bankers the most important creditors of the Pope and fostered their trade expan-

sion in northern Europe. During that period the city was head by a consular government composed by representatives of economic *élites* of the city and popular factions⁷. In 1287, after several internal and external conflicts, an oligarchy of nine representative of merchants and bankers took full control of the city formally excluding from power aristocracy, whose political participation had been always associated with continuous internal turmoils⁸.

The new *élites* were at the centre of any decision concerning political life of the city. The nine governors were selected through a strictly regulated procedure guaranteeing continuity in their policies⁹ and exerted their power concentrating in their hand both political and administrative control in economic, judicial and fiscal issues.

Economic decisions pertained to both internal and external problems. Nine directly decided about prices and salaries in all the productive sectors in the city, while members of other productive sectors had no participation in political bodies and were subjected to decisions taken by merchants and bankers. Implementation was made by one economic corporation, the Guild of Merchants. Once decisions were taken by governors, they were transmitted to the Guild, whose leaders determined times and methods of implementation and sanctions for transgressors¹⁰. Foreign policies were addressed in order to foster Sieneese trade. During almost all their government, the *élites* formed alliances with all surrounding city-states in order to protect merchants¹¹.

Judicial issues, e.g. the maintenance of internal order, were formally managed by the *Podestá*¹². In practice, power was held by the Nine. Implementation of such decisions, the execution of sentences and the practical regulation of every-day legal disputes among citizens were, instead, left to judges and notaries, a social group distinct from merchants and bankers, whose increasing public importance was limited through their exclusion from political representation and the appointment of a strict set of rules¹³.

Extraction of financial resources from the city and the controlled territories was concentrated in the hands of the Nine. They decided who had to pay and how to collect resources. Fiscal policies implementation, in turn, was left to two communal offices: the *Biccherna* and the *General Gabella*. The *Biccherna* had control of any revenue and expenditure of the

⁷The foundation of the independent commune of Siena is conventionally dated in year 1125, when the bishop left the power to a secular government. For the early history of the commune and the consular period see [29].

⁸For a detailed description of the political facts in the last decades of 13th century see [48].

⁹In order to guarantee continuity in the political representation, the governors, before terminating their mandate, used to name the group of citizens who could be elected for the following tenure. See [11].

¹⁰The role of the guild of merchants during the Regime of Nine is deeply analyzed in [11]. For the following centuries see [55] and [3].

¹¹According to [11], at least 47 out of 70 of merchants' oligarchy were characterized by trading deals with the close cities of Florence, Lucca, Arezzo and Perugia

¹²As almost all the other main Italian city-states, since the beginning of the 13th century Siena had a *Podestá*, a foreign magistrate for the administration of the political life of the city. Formally, he was guaranteeing impartiality in the disputes between different factions. Practically, its importance was overcome by government offices. See [11].

¹³In 1310, governors commissioned the realization of a constitution, with the objective to clarify relationships between rulers, administrators and citizens. It was deliberately written in vulgar, the language of merchants, with the aim to force judges and notaries to abandon latin as the field of disputes See [4].

commune. In addition, they had the power to set and enforce sanctions for those delaying or missing tax payment and to select people for the contribution through voluntary loans¹⁴. Every semester, the incoming new officials of the *Biccherna* had to guarantee with personal finances the correct functioning of the office. They used to pay the unsolved duties of the outstanding administration and receive, at the end of their mandate, the sum advanced. With this mechanism, only wealthy citizens could access to the head of the office. The *General Gabella*, instead, was devoted to the collection of indirect taxes (the so-called *gabelle*). After the Nine had decided how much the commune would have obtained from an indirect tax, the officials of the *General Gabella* selected those to whom to sell the right for the extraction of the imposition. During the first half of the century, however, only bankers were entitled with this right¹⁵. Nine, therefore, kept full control on public finance. They took decisions and controlled administration selecting officials from their group or among aristocratic clans. This extension, in turns, while guaranteed to the Commune the presence of officials with sufficient wealth to directly finance public expenditure, also remunerated clans for their exclusion from political representation¹⁶.

The organization of public finance had two main consequences. First, it guaranteed an high capacity for the city-state to provide public services to the society and to find the necessary resources to finance them. For example, an efficient system of water provision was appointed in all the main areas of the city, streets and fortifications were continuously renewed or repaired both in the urban and rural areas and indigents were weekly assisted. The most important public service furnished by the city was, however, the defense of the territory: during the Regime of Nine, Siena faced at least 12 years of military campaigns that forced the commune to require large amounts of resources to the city¹⁷. Second, leading groups largely financed state expenditure with their resources and obtained, in turns, large returns from policies implemented and from the financing itself. Lower social groups accepted their exclusion from politics and administration in change of a low contribution to communal expenditures and the provision of public service. As a consequence, revolts during the first half of the century were rare¹⁸.

¹⁴The use of requiring loans from citizens to finance communal expenditures became common for Italian city states since the second half of the 13th century. Loans were of two types: forced, which were imposed on citizens who had usually to pay an amount set on the basis of the tax assessment and voluntary, which were instead given by wealthy citizens. Both types granted the payment of an interest to creditors. See [30] for debt financing in late medieval Tuscan cities.

¹⁵See [10].

¹⁶The hypothesis that aristocratic clans accepted exclusion from power as a form of mutual deterrence which would have prevented any of the clans to prevail on the others is stated in [11]. An example reinforces the validity of the thesis. In 1318 a rebellion of aristocratic clans and members of guilds excluded from power, motivated governors to advance in the General Council, the political assembly of the city, the proposal to extend political participation. Members of the most important clans renounced the opportunity in order to not reciprocally reinforce each other. The hypothesis of exclusion of main clans from direct political power as a form of mutual deterrence as also been treated in [34], where the solution for aristocratic contrasts in Genoa was, in this case, the creation of the *Podestà*.

¹⁷The years of war are counted from [11] and [54].

¹⁸During the 1287-1348 period only two relevant revolts are reported. Both were made by a very limited part of excluded from power and were easily repressed by the Nine. See [11].

The described institutional equilibrium was based on the concentration of power, for both decisional and implementation phases, in the hands of the leading economic group of the city. Excluded wealthy groups, as the aristocratic clans, were rewarded through gains from financial administration. Members of other guilds as well as wage workers were not entitled of any political rights and accepted every decision taken by governors.

2.2 The *Black Death*

From May to June 1348 the Black Death dramatically affected social and political condition of the city: the disease reduced population from almost 50,000 inhabitants to about 15,000 in the urban area¹⁹.

Among the main economic consequences were food shortage and related increase in its price, the shut down of silver mines in the southern countryside and, above all, a striking decrease in labor supply. In the following months, workers reduction in the countryside was faced by special laws appointed to favor the employment at fixed salaries of farmers from outside Siena. In the city, instead, the decrease in the number of craftsmen, judges and notaries resulted in an increase of their contractual power²⁰.

These facts had severe consequences on the political equilibrium.

Control of merchants on economic administration was no more effective. Although governors tried to cap salaries of craftsmen in the city, the continuous threats of strikes vanished these attempts. The Guild of Merchant was no more capable to enforce economic rules and to effectively set wages and prices for all the other guilds. The increasing power of judges and notaries reduced the Nines capability to control their activity.

The plague had also a strong impact on public finances. Especially, the risen contractual power of previously excluded social classes increased their capability to finance the commune and to demand, in change, a larger control and share of public services produced. As a result, *élites* lost their exclusiveness in financing city expenditures. In 1349, under the pressure of non-represented groups, the Nine had to revoke bankers' monopoly in tax farming. Members of judicial administration explicitly accused officials of the *Biccherna* to favor those from the *élites* in debt repayment and to promote speculation on voluntary loans. In July 1351, under the increasing pressures of internal protests, Nine were compelled to renounce to elect themselves or other members of merchants and bankers families to any financial office²¹.

Seven years after the Black Death, the Regime of Nine collapsed. While members of aristocratic clans had lost their privileges from public finances, emerging groups were claiming for more participation to both politics and administration. In March 1355, the alliance

¹⁹Numerical estimations of the demographic impact of the bubonic plague on the city of Siena has been provided in [12] and [53].

²⁰Prices of grain, wine and salt increased of 25%. The deterioration in labor relationships are reported from the contemporary chronicles. No numerical data are available. Detailed information on the measures to cap salaries are in [12].

²¹The description of main economic, financial and political facts of the years following the Black Death are in [12] and [11].

between these two social groups caused the end of the Regime of Nine.

2.3 The coalitional phase

After the revolt, the Regime of Twelve, a new oligarchy lead by a government composed by twelve citizens, representative of the new emerging economic sectors, took control of government. Members of families of merchants and bankers were now excluded from power, as well as aristocracy, which, however, had still a strong participation in administration²². The new regime was representative of many emerging guilds and increased, therefore, participation to political power. However, it was an oligarchy: some guilds were more represented than others and members' election was regulated by a strict procedure²³. Their government lasted for 13 years during which they deeply changed administrative organization.

Economic decisions were still taken by governors. Implementation, instead, was now left to a new office, the Twelve Priors of the Arts, representing the twelve main economic corporations of the city. They were responsible to set prices and salaries in each sector and to implement norms and sanctions²⁴. As during the Regime of Nine, there was a wide coincidence between those who were deciding and those who were implementing economic policies. However, participation was increased and both political and administrative phases were now representing the interest of a larger part of the productive system. Few changes also regarded judicial issues where, the main difference with respect to the previous regime was that judges and notaries were no more excluded from political representation.

Several modifications occurred in the way in which public finance was organized and managed. Decisions were still taken by governors and implementation left to the *Biccherna* and the *General Gabella*. The main innovation was the creation of the office of *Regolatori* (the regulators)²⁵, an administrative body entitled to check the regularity of all financial operations of the *Biccherna*, the *General Gabella* and other communal offices.

Sieneese public finance reacted positively to exogenous shocks and administrative changes. Governors raised sufficient resources to face ordinary and extraordinary expenditures, they kept on providing usual public services, such as the construction and maintenance of streets and city walls, and opposed continuous mercenary attacks that devastated the countryside in those years²⁶.

In September 1368, members of aristocratic clans revolted and instituted a new oli-

²²For a complete analysis of the political transition from the Regime of Nine to the new government of Twelve, see [49]. In [60] a full description of social composition of the new leading group is given.

²³As the members of the Regime of Nine, the new governors were selecting, before leaving the mandate, the group of citizens among which the new representatives would have been chosen. See [49].

²⁴Details on the functioning of the Twelve Priors of the Arts are in [60].

²⁵The office was created in 1358 and was originally called the office of *Riveditori* (the revisors). In 1363 it was institutionalized, had an own internal regulation and was transformed in the office of *Regolatori* (the regulators). See also [18].

²⁶Since the end of the 1350s the city suffered almost every year from an attack from mercenary companies, see [16].

garchy²⁷. This new experience lasted only one month. At the beginning of October, an insurrection led by popular factions excluded from previous government, took control of the city and gave birth to a coalition with members of families governing during the Regime of Nine and those of the Regime of Twelve. In December of the same year, popular factions tried to impose a new oligarchy with a government made of 15 representatives of their group. The experience ended almost immediately and a more stable coalition including again merchants, bankers and members of the twelve was formed. During the four decades which followed the end of the Regime of Twelve, the political life of Siena went through a tumultuous period with alternation at power of different coalitions. Two main experiences characterized this phase: the government of *Riformatori* (the reformers) starting in 1368 and ending in 1385, and the following government of *Priori* (the priors) ruling from 1385 to 1404. Relevant characteristics of this phase were the coalitional composition of power and some important organizational changes that gave the possibility for arising social groups to be, after their revolt, at least represented in administration.

Coalitional composition was the common trait of the two governments alternating since 1368. In September of that year a coalition was formed with 5 representatives from *Riformatori*²⁸, 3 from the Nine and 4 from the Twelve²⁹. In December the attempt of a popular oligarchy, formed by 15 of the *Riformatori*, failed and, one month later, the previous composition was restored. In 1371, the new proportion was of 12 *Riformatori* and 3 from the Nine. The government lasted until 1385 when 4 representative of the Nine, 4 from the Twelve and 2 from the new group of *Popolari*, members of popular factions never represented in the previous decades, formed a new coalition, the government of *Priori*. In 1387, composition was again changed and 1 representative of the *Riformatori* was admitted to government³⁰.

These four decades were characterized by one main significant organizational change: the use of special administrative commissions, called *balie*, with the objective to handle specific problems of the city. They were appointed to implement decisions on military, fiscal, and territorial issues and were formed by individuals from all politically represented social groups³¹. Participation to these as well as to all the other administrative offices, was guaranteed in a precise proportion reflecting political representation. Each group, which had emerged after the 1355, 1368 or 1385 political changes, was at least represented in administrative power³². Remaining administrative organization was unchanged during the period with no relevant modification in the way in which economic, judicial and fiscal decisions were implemented.

²⁷A deep description of political facts of the end of the Regime of Twelve is in [61] and [14].

²⁸An attempt to describe social origin of *Riformatori* is in [61].

²⁹The words Nine and Twelve are here used to identify families who had participated to government respectively under the Regime of Nine and the Regime of Twelve.

³⁰All the social groups which had participated at different stages to political life, became a recognized political party, called *Monti*, and took the name from the government experience: aristocrats (clans excluded from Regime of Nine) were the *Gentiluomini*, merchants and bankers were the *Noveschi* (Nine), artisans were the *Dodici* (Twelve), *Riformatori* and *Popolari* were the last two groups emerged. See [50].

³¹Procedures for the determination of the composition of *balie*, their dimension and tasks are fully described in [13].

³²Full description of offices composition in the last four decades of the 14th century is in [14].

The final phase of the tumultuous coalitional period coincided with 15 years of formal submission to the city of Milan. In 1389 Siena, seriously threatened by the Florentine army, decided to give to the Lord of Milan authority in its foreign policy. Historiography has unanimously interpreted the fact as the capability of the group of the city to mutually renounce to a part of autonomy to maintain future independency³³. In 1404, as the external threat was ended, Siena did not renew its alliance with Milan and entered in a period of stable cooperation among its social groups. Unlike the previous four decades, stability characterized participation of social groups to political power in 15th century.

Since 1404, *Riformatori*, *Popolari* and Nine formed a new coalition which lasted until 1480. No new group claimed for political power and, the functioning of the representative mechanism guaranteed the extension of participation to almost all the social parts³⁴. Two groups were excluded from power, Twelve and the aristocracy, and, however, they were involved in administration³⁵.

The institutional changes of the previous phase became stable in this period. Economic, judicial and fiscal administration still had the same structure as in the previous four decades, with social groups participating, even if in different proportions, to both decision and implementation. The use of *balíe* was even more common than before.

Political stability and groups cooperation positively affected state capacity. Siena maintained its independence throughout all the century, proving to be capable to resist to any external attack and to maintain a cohesive internal policy³⁶. The commune also proved its capability to continue to finance public services provision, as the extension of the water system or the continuous financing to the Hospital, the Cathedral and the University³⁷.

Starting from the second half of the 15th century, however, those conditions that had permitted political cooperation became factors that undermined institutional equilibrium. The *balíe* increased in number and dimensions assuming the importance of other stable administrative organisms. These special commissions, while favoring a prompt solution to problems, gave to groups the opportunity to form coalitions different than the one formed at the government level and represented an incentive to revolt against the *status quo*.

Around the 1470s the Nine, willing to centralize power and to limit the popular decisions taken by the Council of People, started to make alliances with the aristocracy. Using the *balíe*, the two groups slowly succeeded in dismantling the existent political cooperation. In 1480, groups determined a new government composition where aristocracy was readmitted to political power. In the following years, popular factions were excluded from politics and,

³³The interpretation is confirmed in [14], [3] and [19].

³⁴The mechanism of electoral procedure was progressively increasing the number of participants from the existing recognized groups. See [3].

³⁵According to [3] aristocracy could participate to: office streets maintenance (*viarii*), administration of internal peace, *Biccherna*, *General Gabella*, *Regolatori*, office for salt and pastures indirect taxation, guild of merchant and protection of abandoned minors. Twelve, instead, had no restriction in administrative participation.

³⁶During these decades, the city reached the maximum territorial expansion as reported in [17] and [40].

³⁷See [38] and [3].

in 1487 a member of the Nine, the Lord Pandolfo Petrucci, took control of the city and established a signory which lasted, with his successors, until 1525. In the following three decades the city went through a new oligarchy of Nine and aristocracy and in 1555 lost its independency and became part of the Republic of Florence³⁸.

This brief historical presentation of Siena has shown a city which survived to its mid-14th century crisis developing a political and administrative organization, which shifted from the control of one group to a long lasting situation where more than one social component was represented. This was a rare path in the late medieval northern - central Italy where, whenever a commune experienced popular governments after the Black Death, this regime was rapidly overturned by oligarchies lead by the old *élites*³⁹.

In the above narratives an emphasis has been given to the role of administrative participation for revolting group, as a key factor characterizing the post-bubonic plague phase, and that can account for increasing successful collectively act against the *status quo* and the success of popular factions. However, the same characteristics motivating the persistence of coalitional governments seem also to be associated with the decline of the cooperative political phase and the return to oligarchy at the end of the 15th century.

What was the role of exogenous shocks, such as the Black Death, and what was the effect of internal changes on political equilibria in late medieval Siena? What accounted for the persistence of popular representation in the 14th-15th century and its following decline? Section 3 provides an analytical answer to these questions.

3 An administrative explanation for collective actions success

This section provides an analytical representation of the interaction between social groups in the city of Siena in order to understand how an exogenous shock, such as the 1348 bubonic plague, and following organizational changes might have affected selection of political equilibria in late medieval Siena. The general framework for this analysis will be a model for collective action presented in [9], which is here adopted with a novel interpretation and no relevant formal change.

It is assumed that society was divided in two main social groups: *élite* and *non-élite*. The former included aristocracy, merchants and bankers, the leading social components during the Regime of Nine, the latter represented all the other groups excluded from power in the first half of the century. This assumption comes with two prices. First, considering aristocracy to have had the same historical fortune as merchants and bankers is a simplification, since clans were actually excluded from political representation. However they were practically involved in power and their economic and social interests were almost coincident with those of the leading group. Second popular groups did not politically acted unite and

³⁸For a deep description of the signory of *Pandolfo Petrucci* and the last decades of the independent history of Siena, see [36] and [37].

³⁹As shown in [20] and [55] the 14th century was a period of continuous revolts in central and northern Europe.

had different timing in their representation. Also in this case, however, history shows that they had common economic and social interests. Groups interacted for the production of a common project, which can be interpreted as the whole set of public services, such as economic policies for the protection of city activities, military defense and city maintenance. All of them were the typical goods produced independently by a medieval Italian commune.

These services could be produced according to two different technologies. First, both group could make an offer to produce the good with their own wealth and, producing the good according to a level of efficiency ρ , each of them would have get a share, σ for the *non-élite* and $1 - \sigma$ for the *élite* (with $0 \leq \sigma \leq 1$), proportional to the quantity of the good financed. This way of producing the good captures the mechanism used during the Nine to finance communal expenditures with a prevalent use of direct wealth and a lower use of distributed taxation. Alternatively, groups might have produced the good sharing contribution and getting an equal part, Q , of the services produced. This second technology reflects the prevalent use of widespread taxation contribution to communal resources since the second half of the 1348, as shown in subsection 2.2. Each group had the same set of strategies, concerning the choice of technology. Cooperation consisted in a more equal contribution and share, while Attack was the alternative, personally financed, mode of production. It is here assumed that the quantity of goods that groups obtained, reflected their political power. If they produced with the first technology and one group got a share higher than the other, then this would have meant an oligarchic situation, in which it was possible for a social component to impose an unequal distribution to the other. If groups produced according to more egalitarian technology, it corresponded to a coalitional distribution of political power. Results of groups interaction are shown in the following matrix.

		<i>Élite</i>	
		Cooperate	Attack
<i>Non-élite</i>	Cooperate	Q	0
	Attack	0	$(1 - \sigma)\rho$

The payoff matrix shows some implications of our assumptions. First, groups had to find an agreement to have a positive payoff. This implication captures the fact that in a medieval commune no group could act alone nor there could be one group choosing a way to contribute to expenditures and the other choosing an alternative way. Once a system of rules was set, each group had to obey, or to revolt, to that specific set of rules. Second, it shows two Nash equilibria, the one in which both groups cooperated and the one where both groups made an own offer of personal financing. Finally, it shows that without a prior

assumption on ρ , σ , Q and the way in which, eventually groups might have shift from one equilibrium to another, it is not possible to predict what convention would have been played.

In order to solve these problems, it is necessary to clarify to what ρ and Q correspond in the historical narrative. During the Regime of Nine, the way of contributing to communal expenditures was such that the wealthier group was financing directly the greatest part of them getting an high share of the good produced, unequal σ and $1 - \sigma$, and was highly remunerating all groups for their participation to contribution. This capability of high remuneration can represent the efficiency level ρ . The alternative way of producing the common project, instead, would have consisted in all groups giving an equal contribution, determined via distributed forms of taxation, getting an equal share from it, Q . The payoff from this form would have, in turn, depended on the capability of all groups to equally finance expenditures, a feature affected by exogenous factors, such as shocks changing population size, contractual power between economic actors, wealth and income distribution.

Following all these assumptions, the analytical framework presented might explain the oligarchy of the Regime of Nine. Initial historical conditions, contractual power and wealth distribution gave to the Nine, at the end of the 12th century, the capability to impose to the community an unequal way of realizing communal goods. They set a very low σ with a sufficient high level of efficiency ρ capable of compensating the *non-élite* for their small share of common project enjoyed.

Why did the *non-élite* accepted the unequal condition without revolting? Still following [9], the mechanism of switch from the unequal equilibrium to the other is here modeled as a collective action undertaken by one group, the *non-élite*, when

$$\delta(Q - \sigma\rho) > \sigma\rho. \quad (3.1)$$

According to the above formula, the *non-élite* would have revolted, trying to impose the more equal convention if gains from the switch, the left hand side of the inequality, would have overcome the payoff in the *status quo* convention, the term of the right hand side. Looking at the formula it is possible to observe that gains from the switch, $(Q - \sigma\rho)$, might be increased by a term δ which, according to [9], can be interpreted as the "pleasure of agency", a positive value ranging from 0 to $+\infty$ that represents the increasing benefits that the environment recognizes to those revolting and which is independent on the number of individuals participating to the switch⁴⁰.

How much was the set of rule and the organization remunerating an eventual effort of the *non-élite* to change the *status quo*? It has been observed how the administrative phase gave large advantages to individuals involved in it. Administrators decided how and when to implement decisions on salaries and prices, had a large power in judicial decisions and,

⁴⁰An usual way to model a switch in convention in evolutionary game theory is to look at the number of non-best responses in groups playing their best strategy. A switch occurs depending on the size of the group and the number of those non-bestresponding. Introducing the δ , size constraints are no more binding. See [9].

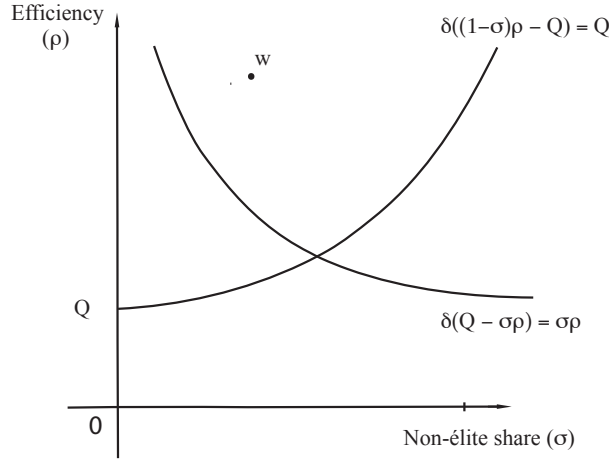


Figure 1: The graph shows the lines of points at which the *élite* and *non-élite* are indifferent between revolting or maintaining the *status quo*. These lines divide the space of unequal contracts in four parts which represent different basins of attraction for the interaction. The area in which point w lies, represents the basin of attraction for the unequal agreement. Moving clockwise, the area lying below the indifference curve of the *élite* and above the one of the *non-élite* is the one in which both contracts are absorbing. At the bottom, the area below both curves includes agreements for which the more equal convention is absorbing. Finally the left quadrant will represents combinations of σ and ρ for which none of the equilibria is absorbing. The figure is a slight modification of a similar version in [9].

above all, were crucially determinant in fiscal choices. In this environment, limited access to administration would have discouraged groups to revolt, with the expectation that even if reaching a different political equilibrium this would have not immediately transferred to a immediate effective capability to implement new policies. On the other side, instead, an eventual increase in administrative inclusion would have driven groups to change the convention, with the expectation of a great involvement at least in the implementation phase of decisions.

The Regime of Nine, therefore, can be represented as an oligarchic equilibrium in which the unequal share imposed by the *élite* to the *non-élite* was accepted both because of the lower level of Q , with respect to efficiency in compensation, and the low level of δ , because of the total control of administration by aristocracy and merchants. The acceptance of the *non-élite* is described by the the opposite inequality than the one in (3.1).

In Fig.1, point w shows how an agreement satisfying the above inequality, and therefore lying above lines of indifference for both the *élite* and *non-élite*, would have been an absorbing state of the groups' interaction.

How would Black Death changed the above situation? The plague did not have immediate effect in neither the political nor the administrative structure, then δ remained unchanged after 1348. However, it increased the relative potential output associated to a more equal distribution of contribution and shares. This might have occurred for at least

two mechanisms associated with the shock. First, because it raised the relative income of lower classes with respect to leading ones, augmenting the capability of the *non-élite* to support communal needs. Second, because it plausibly had an effect on wealth redistribution, lowering the capability of the *élite* to directly finance the state and increasing the importance of ordinary taxation for such scope⁴¹.

Was the exogenous shock sufficiently high to insure that the *élite* would have not counter-revolted? History shows that *non-élite*, even if successful in revolting, did not impose a more egalitarian political equilibrium and, while progressively changing administrative organization, it was subjected to the continuous threat of revolts of the previously leading groups. In other words, with a constant δ , Q increased at a level such that the *non-élite* found it convenient to revolt, condition shown in Eq. 3.1, but at which also the *élite* has the incentive to counter revolt, condition shown in Eq. (3.2).

$$\delta((1 - \sigma)\rho - Q) > Q. \quad (3.2)$$

A level of Q such to guarantee the two inequalities is possible if assuming values in the following interval

$$\frac{(1 - \sigma)p\delta}{1 + \delta} > Q > \frac{\sigma\rho(1 + \delta)}{\delta}. \quad (3.3)$$

The range, in turns, exists and is positive for the following conditions

1. $\forall \rho > 0$
2. $\sigma < 1/2$
3. $\delta > \frac{\sigma + \sqrt{\sigma - \sigma^2}}{1 - 2\sigma}$

where condition (1) says that it is independent of the efficiency of remuneration, condition (2) requires the initial equilibrium to be unfavorable to the *non-élite* while condition (3) is easily verified for low levels of σ and δ . All these conditions were presumably existent during the mid-14th century. The post-plague situation can be represented in Fig.1, if change in Q would have moved point w in the area in which both conventions are absorbing (right quadrant), a situation that can be interpreted as a state of continuous counter-revolts capable of leading to any of the two possible equilibria.

With the above analytical representation it has been shown that starting from an unequal distribution of political power, an exogenous shock sufficient to incentive the most disadvantaged group to revolt, might have not been sufficient to stably avoid counter-revolts of the *élites* determining a period of continuous internal conflicts in a community. This situation

⁴¹Extant registers do not allow for a full understanding of the effects of the plague on wealth distribution. However, in contemporary chronicles it is reported the advent of the so-called *gente nova*, the new people, representing those who were become wealthier after the plague. See also [53].

not only describes the post-plague social turmoils of Siena but also fits with similar popular revolts occurred in several Italian and European communities at that time, as already observed at the end of subsection 2.3.

Administrative reforms, started during the Regime of Twelve, radically changed the organizational set and guaranteed to any revolting social component, a prompt response to the desire for more participation and, especially, to the demand for more equal policies. In the present framework this might be translated to a change in δ which, keeping Q constant to the level reached after the Black Death, would have assured the incentive for the *non-élite* to revolt, inequality in (3.1), and, at the same time, would have prevented the *élite* to counter revolt, the opposite inequality of (3.2).

The two conditions hold when

$$\frac{Q}{(1-\sigma)\rho - Q} > \delta > \frac{\sigma\rho}{Q - \sigma\rho} \quad (3.4)$$

an interval existing when

$$Q > \rho\sqrt{\sigma(1-\sigma)} \quad (3.5)$$

which in Appendix A is proved to be related with previous interval of Q in the following way

$$\frac{(1-\sigma)p\delta}{1+\delta} > \rho\sqrt{\sigma(1-\sigma)} > \frac{\sigma\rho(1+\delta)}{\delta}. \quad (3.6)$$

Therefore, assuming that, after the Black Death the Q would have assumed a value such that

$$\frac{(1-\sigma)p\delta}{1+\delta} > Q > \rho\sqrt{\sigma(1-\sigma)}$$

then there would have existed a range in which increases in δ would have determined a stable switch to the cooperative equilibrium, a situation such that point w would have lied in the bottom area of attraction in Fig.1.

The model gives a possible explanation for the institutional uniqueness of the city of Siena. While experiencing an exogenous shock common to the one experienced by almost all European cities, Siena succeeded in maintaining a long-lasting cooperative equilibrium because groups increased administrative participation which, giving a positive effects to gains from collective actions, incentivated popular groups to revolt and the *élite* to not counter-revolt. At the same time, the model also accounts for institutional decline and the return of the oligarchy in the last 50 years of independence. In fact, the δ guaranteeing stability to the new convention has an upper bound, $\frac{Q}{(1-\sigma)\rho - Q}$. Levels of δ larger than it, namely a too high pleasure of agency, would have brought to a situation in which the *élite* would have found convenient to collective act to return to the unequal convention, the opposite of inequality in 3.1, and the *élite* to counter-revolt, inequality 3.2.

A mechanism similar to the one described in the model occurred in Siena in the last decades of the 15th century. The continuous increase in administrative participation and dimensions represented an incentive for collective action not only for the historically disadvantaged groups but it also increased the payoff from revolts for the leading classes which eventually revolted against the more egalitarian equilibrium and succeeded in restoring the oligarchy.

4 An empirical evaluation of state capacity in late medieval Siena

This section provides an empirical estimation of the effects of exogenous and endogenous changes on communal capacity to raise resources and expend them through the provision of public services. For this purpose a novel dataset on Sienese public finance is explored with the aim to observe fundamental changes in the evolution of main fiscal aggregates (subsection 4.1) and to assess the impact on their evolution of both exogenous shocks and organizational changes (subsection 4.2).

4.1 Assessing long run evolution of public finance

This first analysis of the novel dataset on Sienese public finance is an attempt to understand how the capacity of the commune to raise resources from its citizens and to use them for the provision of public services changed across different political phases. The dataset, deeply described in Appendix B, begins in 1337 and ends in 1418, therefore spanning since the last decades of the Regime of Nine to the beginning of the stable coalitional phase. It can account for several exogenous shocks as well as for all the main political and administrative changes. The analysis will focus on three main aggregates (all deflated according to a method described in Appendix B): real net income, real transfers and real net expenditures. The first two measures capture two different way of financing the Commune: real net income being the income raised by the public administration in form of current imposition and real transfers representing the personal wealth of the administrators directly transferred to finance the state. Real net expenditures, instead, include all the current expenditures of the commune in each semester net of repayment of sums anticipated by administrators in previous semesters⁴².

The evolution of these three aggregates in the period embraced in the dataset is studied with the help of the Bai-Perron method for the analysis of structural breaks as presented in [5]. The test, which has also been used in [23, 24], investigates on long run trends

⁴²A correct evaluation of expenditure and income over time should be implemented on *per capita* values. Unfortunately population data are fragmentary and insufficient to obtain measures of expenditures and income for each citizen. In particular, the inside-walls population is estimated in [12] around to 50,000 inhabitants. Population after the Black Death is estimated to be about 15,000 and the following values, as reported in [31], are around 17,000 inhabitants. These numbers, which are also confirmed in [6], do not include population living in the controlled territories from which a relevant part of resources came from. For all these data problems, it has been preferred to remain on total measures of income and expenditure.

with the property of not imposing an *a priori* assumption of dates for eventual structural change in the series of data. Instead, it allows for testing in a general multiple regression, two main hypotheses. First, it checks the existence of at least one break in regression coefficients against the null hypothesis of no breaks. Second, it tests the existence of $n+1$ breaks against the null hypothesis of a given number n of turning points. Through these two statistical tests, it finds the maximum number of significant changes in regression coefficients when no previous hypothesis is made on it⁴³.

Results of Bai - Perron test on real net expenditure, real net income and transfers are presented in Table 1.

Table 1: Structural breaks

Time series	Breakdates	Percentage change*	Main events
Real transfers	1349 - I semester	-49%	One semester after the end of the Black Death
Real net income	1355 - I semester	67%	End of the Regime of Nine and beginning of the Regime of Twelve
	1367 - II semester	-31%	Last semester of the Regime of Twelve
	1402 - II semester	90%	One year before the end of <i>Priori</i>
Real net expenditure	1355 - I semester	94%	End of the Regime of Nine and beginning of the Regime of Twelve
	1367 - II semester	-38%	Last semester of the Regime of Twelve
	1403 - II semester	87%	Last semester of the <i>Priori</i>

*Percentage changes are computed between the average value of each aggregate in the 20 semesters before the structural change and the average value in 20 semesters following it.

The first break observed is related with transfers of personal wealth used to cover deficits in the communal budget. As shown in Table 1 and Figure 2 this anticipated income dropped of 49% since the first semester of 1349.

This fact is relevant. No political or other internal fact occurred in this period while only one year before, the city was dramatically struck by the Black Death. As shown in [12] and [53], and used as hypothesis in section 3, the plague, which reduced of about 2/3 the population in the city, could have changed the economic relations in the city in a way such that former wealthy social groups were no more able to finance alone communal expenditures while new arising economic groups were demanding for a more participated way to contribute to state expenditures.

Structural breaks analysis on real net incomes, in turns, reveals that resources from current imposition had a different path. As shown in Fig. 3 and Table 1, major turning points were 1355, 1367 and 1402. The first one coincides with the semester in which the city experienced a relevant political change from the oligarchy of merchants and bankers to the the new government of artisans and other economic groups previously excluded from

⁴³Break points and correspondent break dates are obtained via the implementation of an algorithm for the Bai-Perron structural break test developed for the R-program for statistical analysis and explained in [63].

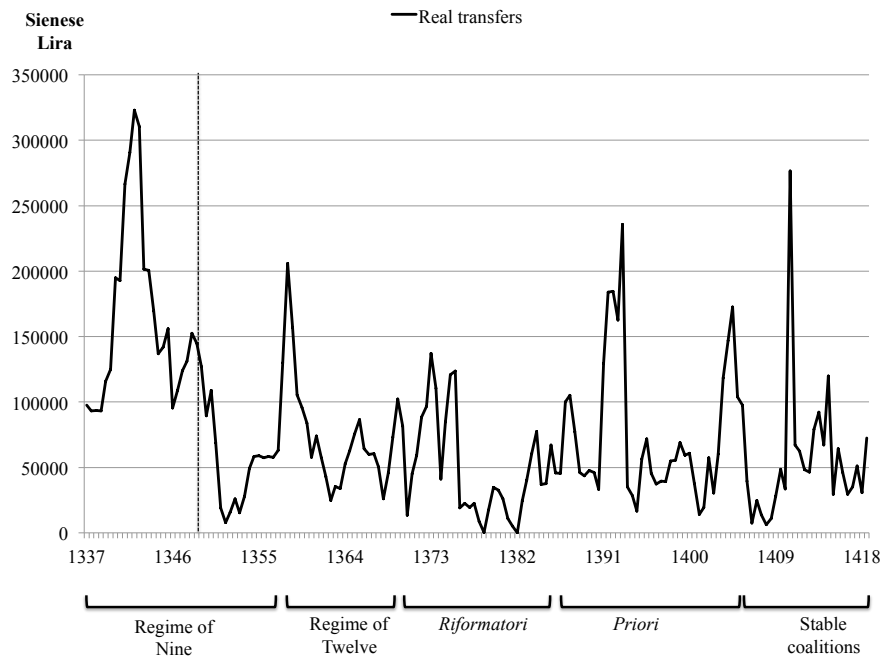


Figure 2: Structural breaks for real transfers. Source: Table 1 and Appendices ?? and D.

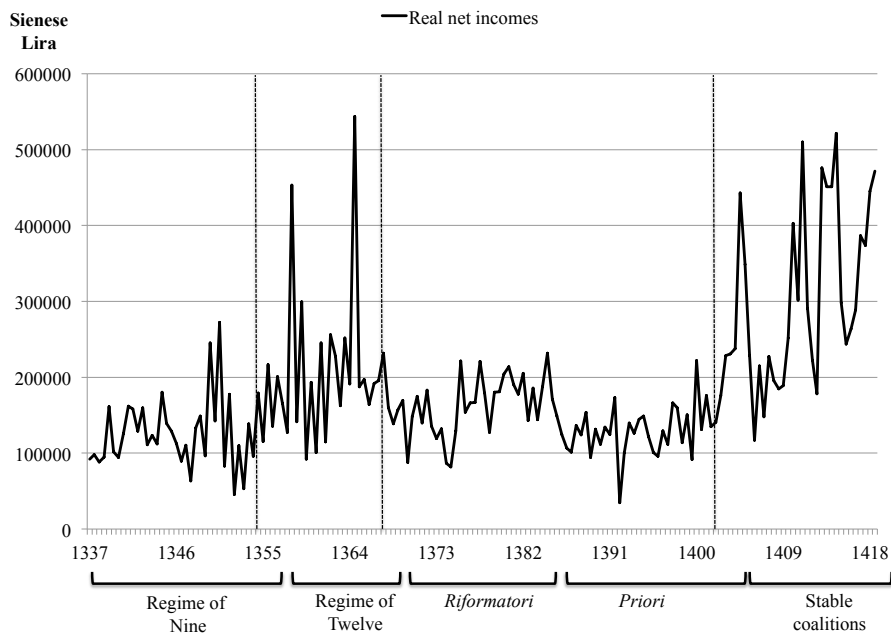


Figure 3: Structural breaks for real income. Source: Table 1 and Appendices ?? and D.

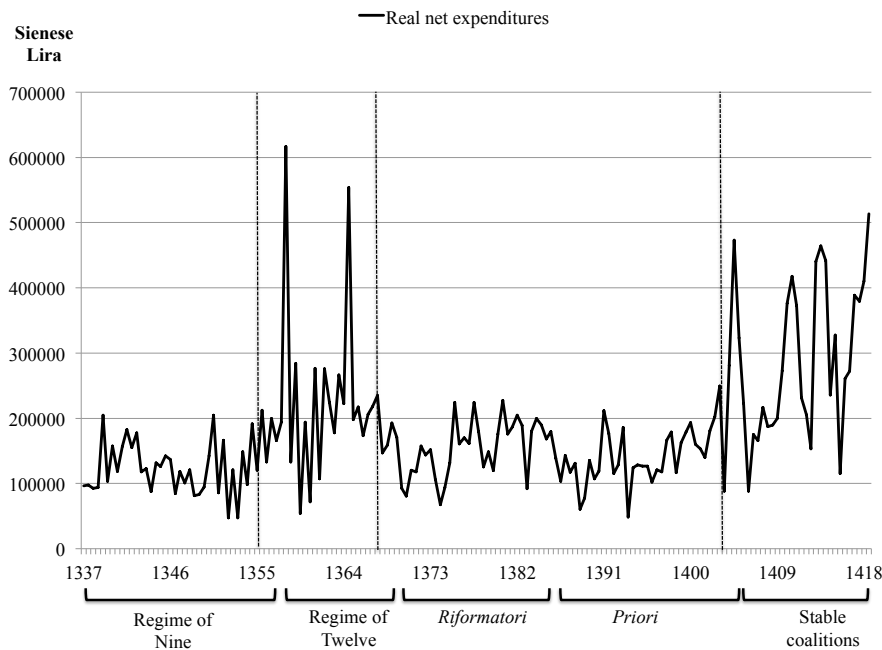


Figure 4: Structural breaks for real expenditure. Source: Table 1 and Appendices ?? and D.

power. The break is associated with an increase of 67% in income. A second breaks occurred at the end of Twelve’s regime, before the shift to the coalitional phases with a large popular representativeness. Here incomes decreased of 31%. No break is observed during the tumultuous political phase characterizing the last three decades of the 14th century and, instead, a lower level of real net incomes is reported during this phase. Finally, just before the beginning of the period of stable coalitions, net income rose again with a percentage change of 90%. Fig. 4 and Table 1 reveal that expenditures followed a similar pattern with breaks almost coincident to income in dates and magnitude.

Overall, this structural break analysis might suggest that Black Death negatively affected the capability of higher social classes to use their wealth to finance the commune, confirming the main hypothesis introduced in section 3. At the same time, the exogenous shock did not relevantly affect the collection and use of resources. In addition, turning points observed in real income and expenditure do not seem to be associated with other exogenous shocks, such as wars or the frequent mercenary raids occurred in the second half of the 14th century. These results, therefore, seem to contrast the view that governments with higher popular representativeness had a lower capability to raise and expend resources as suggested in [57]. Data, instead, show that there had been an almost coincidence between some political and administrative changes and all major shifts in real net income and expenditure, with some organization sets associated with significantly higher average levels of these values.

In subsection 4.2 an econometric analysis is implemented in order to check the importance of these changes and external shocks on communal revenues and expenditures.

4.2 The role of administration

The questions to which this subsection aims to answer are: what factors did affect the evolution of real net expenditures over time? Were they concurrent with changes regarding political and administrative participation or did they depend on other external factors, such as the 1348 Black Death, wars and mercenary attacks or internal revolts?

The hypothesis, introduced in Sections 2 and 3 and also partially confirmed by the structural break analysis in subsection 4.1, is that after the exogenous shock of the Black Death, wealth redistribution and increase in lower social groups' contractual power made financing the commune via shared form of taxation more advantageous for the whole society than raising resources from personal wealth of officials. In addition, as a response to a period of continuous conflict, subsequent political factions extended the right to participate to administration and this, in turn, supported a cooperative distribution of politics. Here, it is checked whether these changes were relevant for the maintenance of communal capability to raise resources and expend them. In particular, the idea is that more than the extension of political representation, it was the introduction of coalition in administrative functions that allowed the commune to maintain, or even increase its state capacity. In particular, the introduction of a cooperative behavior in administration occurred in two circumstances: when the Regime of Twelve enlarged the participation to economic administration and when all social groups were allowed to be represented in administrative offices. To test this hypothesis, it is implemented a linear regression model for main aggregates of Sienese public finance. Eq. (4.1) shows the model for net incomes

$$\begin{aligned} NetInc_t = & \beta_0 + \beta_1 OliCoal_t + \beta_2 FullCoal_t + \beta_3 FullPart_t + \beta_4 BlackDeath_t + \\ & \beta_5 MIL_t + \beta_6 INT_t + \beta_7 t + \varepsilon_t \end{aligned} \quad (4.1)$$

The linear regression checks for the effect on real net income at each semester t , $NetInc_t$, of different combinations of political and administrative organization with respect to the initial condition: the one under the Regime of Nine, when both politics and administration were oligarchically distributed. Therefore, the three dummies $OliCoal$, $FullCoal$ and $FullPart$, will indicate, respectively, a situation with oligarchic political power and extended participation to administration (as the one during the Regime of Twelve), the case in which both politics and administration are coalitionally distributed and at least one social group is excluded from both politics and administration (as during the *Riformatori* and *Priori*) and a situation in which, full administrative participation was granted to all groups (as during the phase of stable coalitions). Other three binary dummies, $BlackDeath$, MIL and INT , capture respectively whether a semester was before or after the Black Death⁴⁴, if there was at least one external war or mercenary attack suffered by the city and whether the commune

⁴⁴Since the Black Death left the city during the summer of 1348, the post-Black Death phase is considered to start since the first semester of 1349.

suffered any internal revolt in the semester⁴⁵. A time trend t is added to the model⁴⁶. A same linear regression model is also run on real net expenditure, called $NetExp_t$. Results are in Table 2.

Regression results show that no external facts, such as the Black Death or mercenary attacks did play a statistically significant role in the evolution of net income and expenditures. Nor other event, exogenous to the present hypothesis, such as internal revolts, significantly affected the evolution of aggregates. Instead, with respect to the Regime of Nine, two different modifications are associated with positive and statistically significant increases in both income and expenditure: the introduction of cooperation in administrative functions and the extension of the inclusion to all groups. Increase of political participation, on the other side, has a positive but not statistically significant coefficient. These results, therefore, confirm the initial hypothesis. Exogenous shocks did not impact on the evolution of income and expenditure. Administrative changes positively affected both the two aggregates, while the shift from oligarchy to coalitions in politics did not signify a statistically relevant change in the capacity to raise and use resources by the commune.

A deeper analysis on the real net expenditure might rise a question about how were resources used over time. The analysis on expenditure composition is made creating two variables from the dataset. The first, called $CityPerc_t$, represents the percentage value of city expenditures on the total net resources used by the city. In this measure are included resources used for military defense, the maintenance of streets and walls and services provision (as water and other utilities for citizens). Payments for the administration and interests on communal debt are excluded. The second variable is $AdminPerc_t$, representing the resources used for the maintenance of the administrative apparatus⁴⁷.

The two variables are regressed on the same linear model in Eq. (4.1) and results are shown in Table 2. Results of model implementation show that a statistically significant negative effect for the percentage of expenditure for the city was associated with the extension of both administrative and political participation. No significant effect was concurrent with the introduction of full participation of administration and no exogenous factor played a relevant role in the determination of this fraction of expenses. On the other side, an opposite result is found for the part of resources used for administration. In addition, a second conclusion is possible. It was sufficient for the commune to extend participation in both administrative and political power that, even before the inclusion of all groups in the implementation phase, the percentage of expenditures for the city decreased and the one for administration increased. Institutional changes, therefore, were associated with an increasing capability to use resources and to a decreasing use of them for services for the city.

⁴⁵For the construction of the binary dummies for military attacks and internal conflicts see Appendix C

⁴⁶Net expenditures and all the following time series variables are also adjusted for seasonality.

⁴⁷The first variable is a sum of military and city expenditures shown in Appendix D while the second includes administration costs.

How were the increasing expenses of the commune sustained?

It has already been observed that during the Regime of Nine main sources of incomes was officials' personal wealth while during the following regimes indirect taxation and forced loans became prominent revenues for the public apparatus. How were institutional changes and exogenous factors affecting this increased capability of the commune to raise resources via loans and indirect taxation? To answer the question, a variable called *PubCredit_t*, measuring the percentage of income raised via forced loans and indirect taxation on the net total current income raised by the commune in each semester, is constructed ⁴⁸. The choice to include both forced loans and indirect taxes is motivated by the fact that when new loans were imposed they were guaranteed with indirect taxes ⁴⁹. For this reason, the collection of the two kinds of resources is considered as a measure of the capability of the commune to effectively extract resources in form of public credit from citizens.

Three different types of this variable according to three different possible behavior of citizens are constructed

1. $PubCredit_t^1 = (Loans_t + IndTax_{t-1})/NetIncome_t$
2. $PubCredit_t^2 = (Loans_t + IndTax_t)/NetIncome_t$
3. $PubCredit_t^3 = (Loans_t + IndTax_{t+1})/NetIncome_t$

where $loans_t$ and $IndTax_t$ are respectively loans and indirect taxes raised at time t and $NetIncome_t$ is the real income from current imposition. The three equations show three different possible attitudes of citizens towards loans and taxation. In Eq. (1), it is assumed that citizens looked at the quantity of indirect taxes raised in the previous semester in order to effectively lend to the commune at time t . Eq. (2) shows citizens that considered how much was raised in the same semester they lend. According to Eq. (3), citizens decided with respect to how much would have been raised in the following period. Since no extant document can inform about citizens' expectations, all the three specifications are regressed on the same linear model in Eq. (4.1). Results are shown in Table 2. They show that in each hypothetical behavior, exogenous factors did not have role in determining the change in percentage of resources raised via loans and indirect taxes. Less unambiguous is the message about the role of politics and administration. When considering citizens looking at forced loans and indirect taxation of the same semester, both political and administrative changes played a significant role in increasing loans. When the other two specifications are used, only administration becomes relevant.

Summarizing, the results on qualitative composition of current income reveal that extension of administrative participation played a fundamental role for the capacity of the

⁴⁸The category is constructed summing up Loans and Indirect taxation and dividing them by Net Income. These categories are described in Appendix D.

⁴⁹See also [10], [49] and [30].

Table 2: Regression results

Dep. variable	Intercept	<i>OliCoal</i>	<i>FullCoal</i>	<i>FullPart</i>	<i>BD</i>	<i>MIL</i>	<i>INT</i>	<i>t</i>
<i>NetInc_t</i> $R^2=0.45$	-917095 (1071970)	58950** (26388)	-16530 (35562)	128958** (53652)	11456 (26591)	4234 (15057)	17865 (34428)	771 (798)
<i>NetExp_t</i> $R^2=0.39$	-1018895 (1140826)	92048** (28083)	1332 (37846)	126646*** (57098)	-19593 (28299)	4511 (16024)	-5767 (36639)	854 (849)
<i>CityPerc_t</i> $R^2=0.1$	-0.97 (2.26)	-0.09* (0.05)	-0.14** (0.07)	-0.05 (0.11)	0.02 (0.05)	0.04 (0.07)	0.03 (0.03)	0.002 (0.001)
<i>AdminPerc_t</i> $R^2=0.1$	0.62 (2.26)	0.09* (0.05)	0.14* (0.07)	0.05 (0.11)	-0.02 (0.05)	-0.03 (0.03)	-0.04 (0.07)	0.002 (0.001)
<i>PubCredit_t¹</i> $R^2=0.09$	7.8 (8.95)	0.52** (0.22)	0.42 (0.29)	0.56 (0.48)	-0.23 (0.28)	0.01 (0.11)	0.19 (0.28)	-0.005 (0.006)
<i>PubCredit_t²</i> $R^2=0.22$	3.01 (2.3)	0.09 (0.05)	0.2** (0.07)	0.35** (0.12)	0.04 (0.07)	0.10 (0.07)	0.003 (0.02)	0.001 (0.001)
<i>PubCredit_t³</i> $R^2=0.06$	8.28 (7.35)	0.29 (0.18)	0.4 (0.24)	0.67* (0.39)	-0.33 (0.23)	-0.05 (0.09)	0.04 (0.23)	-0.005 (0.005)

OLS are used in regression. Standard errors in parentheses.***Significant at 99%. **Significant at 95%. *Significant at 90%.

commune to raise resources via public credit. When it is assumed that citizens were lending as a response to the indirect taxation raised in the same period, extension of political representation was even anticipating this positive effect.

5 Conclusion

This paper has investigated the role of exogenous shocks and administrative changes in the determination of political equilibrium and state capacity in late medieval Siena.

The particular historical trajectory of the commune has motivated the choice. While, after the *Black Death*, most of Italian autonomous cities were either turning to regional states ruled by oligarchies, or they were losing their independence, Siena maintained its independence and control on nearby territories, through a coalitional form of political power. The conjecture of the paper is that changes in administration were key factors for the long lasting of political cooperation and the maintenance of state capacity.

To prove this, the paper has combined historical narrative, a game-theoretical approach and an empirical analysis. In particular, section 2 has provided a brief historical treatment of main economic, social and political facts of late medieval Siena. The analysis has shown the peculiarity of Siennese political path and the almost coincidence, since mid-14th century, between a progressive increase in administrative participation and the long term sustain of political cooperation. Section 3 has provided an analytical explanation of this relationship. There, it has been shown the conditions under which an exogenous shock, such as a bubonic plague, might render viable but not stable over time more equal political conventions, thus explaining a common political path in late medieval Italian city-states. In addition, the model has shown how changes in administration, favoring social groups inclusion, might

have increased the stability of such conventions, explaining Sienese peculiarity. Finally, the two empirical studies in section 4 have shown how administrative changes not only allowed for a persistence in coalitional politics but were also associated with a clear maintenance of state capacity.

The paper, therefore, provides at least three relevant messages.

First, regarding the process of state emergence and formation, it has shown that political equilibria can be interpreted as a result of groups interaction as they are affected and shaped by exogenous shocks and institutional changes. When groups interact in the formation and maintenance of a political organization, the outcomes of such relationships are the results of the joint effect of exogenous shocks on the relative rank of alternative technologies and the way in which the set of rules remunerate collective actions lead by single groups. In this new framework, administration, the implementation phase of political life, can positively absorb demand for power and bring the whole community to a more productive, stable and egalitarian outcome.

Second, the paper has shown that administrative changes had more impact on public finance than the extension of political participation. In a period of dramatic economic crisis and continuous external attacks what really mattered for the capability to raise resources was the capacity to share the phase of implementation. As long as large components of the society were participating to it, this reinforced their willingness to pay and contribute to the realization of the public good, especially the defense of their independency.

Finally, the paper has also provided a new interpretation for the understanding of different political and economic trajectories of Italian city-states at the end of the Middle Age. The historical and analytical treatment of medieval Siena, in fact, provides a new possible interpretation to compare and understand different political paths in Western history. Looking at different ways of organizing administration in late medieval experiences, might serve as a key explanation for divergences as well for similarities in social and economic European institutions.

Appendices

A Existence of δ and the interval for Q

As shown in section 3, the following range for δ

$$\frac{Q}{(1-\sigma)\rho - Q} > \delta > \frac{\sigma\rho}{Q - \sigma\rho}. \quad (\text{A.1})$$

exists when

$$Q > \rho\sqrt{\sigma(1-\sigma)}. \quad (\text{A.2})$$

However, for coherence with respect to the interval of Q insuring the post-plague mechanism of revolts and counter-revolts we need to check the relationship of such lower boundary for Q , $Q > \rho\sqrt{\sigma(1-\sigma)}$, with the two boundaries shown in 3.3

$$\frac{(1-\sigma)p\delta}{1+\delta} > Q > \frac{\sigma\rho(1+\delta)}{\delta}. \quad (\text{A.3})$$

First, it is investigated the relationship between the boundary in (A.2) and lower boundary in (A.3). Assuming, for simplicity, that $\delta = 1$, it means, for condition 3 in section 3, that

$$\sigma < 1/5 \quad (\text{A.4})$$

Substituting $\delta = 1$ in the two terms under observation, their relation becomes

$$\rho\sqrt{\sigma(1-\sigma)} > \sigma\rho(2) \quad (\text{A.5})$$

which is true only when $0 < \sigma < 1/5$ that, in turns is implied when $\delta = 1$, which is a condition in (A.4).

Second, the relationship between the boundary in in (A.2) and upper boundary in (A.3) is investigated. Still, for simplicity, assume $\delta = 1$ which implies condition in (A.4). The relation becomes

$$\frac{(1-\sigma)p}{2} > \rho\sqrt{\sigma(1-\sigma)} \quad (\text{A.6})$$

which is verified when $\sigma > 1$ (out of the range of values in our framework) and $\sigma < 1/5$, the condition in (A.4). As a conclusion the following relation is verified⁵⁰

$$\frac{(1-\sigma)p\delta}{1+\delta} > \rho\sqrt{\sigma(1-\sigma)} > \frac{\sigma\rho(1+\delta)}{\delta}. \quad (\text{A.7})$$

⁵⁰It can be proved that inequalities are true also assuming values of δ smaller and larger than 1, as for example $\delta = 1/2$ and $\delta = 3/2$.

B A novel dataset for Sienese public finance

The evolution of public finance and state capacity during the 14th century Siena is here analyzed using a novel dataset collecting a detailed description of revenues and expenditures of the commune as they were reported in the accounting books of the *Biccherna* in the period between 1337 and 1418⁵¹. In particular, for the years between 1337 and 1361, data have been directly taken from the registers of the *Biccherna*, while for the following period, communal revenues and expenditures of the central fiscal office have been derived from registers of *Regolatori*⁵². The period under observation spans, therefore, from the first semester of 1337 to the second semesters of 1418⁵³. The choice of initial and ending dates is motivated by documents availability: this time range constitutes the most continuous series of original public finance registers for the 14th century Siena⁵⁴.

This time interval embraces 81 years of fiscal administration during which the commune knew 5 different political regimes. The initial 18 years of the dataset (1337-1355) give a picture of public finance during the last two decades of the Regime of Nine. Since 1355 to 1368, the finance under the whole government of Twelve is observed. The following 50 years of the dataset, report the effects of three different coalitional phases on fiscal system of the commune. Since 1368 to 1384, data refer to the period of *Riformatori*, the "reformers", characterized by a coalition between popular representatives, merchants and bankers⁵⁵. Then, since 1385 to 1404, it is comprised the government of *Priori*, the "priors", during which those ruling under the Twelve returned at power together with popular factions excluded in the previous two decades⁵⁶. Finally, the dataset includes 14 initial years (1404-1418) of the full coalitional phase in which the city of Siena was ruled by a government representative of members of the Nine, members of the popular factions governing during the *Riformatori*, members of the *Priori* while members of the Twelve and the old city aristocracy were excluded from representation in political institutions⁵⁷. In Table 3 are reported registers used for each time interval.

Some caveats must be done about the use of these archival sources.

Data coming from the registers of the *Biccherna*, especially those referring to the pre-*Regolatori* period, might not include all the communal revenues and expenditures. It has been observed that voluntary loans were usually not reported in official registers in order to

⁵¹The dataset is available from the author under request.

⁵²For a detailed explanation on how data has been collected and summarized see appendices ?? and D. Data have been reported in the Sienese silver coin, the *lira* as it was in the communal accounts. When sums of money were registered in Florentine gold coins, the *Fiorini*, they have been converted in Sienese *lira* according to the rates of exchange given by the officials in the same registers of the *Biccherna* or *Regolatori*.

⁵³Although the year in Siena used to start on March 25th, the first administrative semesters started on January 1st and ended on June 30th and the second started on July 1st and ended on December 31st. See also [10].

⁵⁴Before 1337 the archival availability of registers of the *Biccherna* is not continuous. After 1418, books of both the *Regolatori* and the *Biccherna* are fragmentary.

⁵⁵For a detailed analysis of Siena during the *Riformatori*, see [61], [14] and [50].

⁵⁶The political and administrative analysis of the government of *Priori* is in [14, 13].

⁵⁷The detailed history of Siena in the 15th century is in [3].

Table 3: Archival sources

Time interval	Sources
1337 I semester - 1362 I semester	<i>Biccherna</i> 187, <i>Biccherna</i> 191, <i>Biccherna</i> 200, <i>Biccherna</i> 201, <i>Biccherna</i> 202, <i>Biccherna</i> 205, <i>Biccherna</i> 207, <i>Biccherna</i> 208, <i>Biccherna</i> 210, <i>Biccherna</i> 212, <i>Biccherna</i> 213, <i>Biccherna</i> 215, <i>Biccherna</i> 216, <i>Biccherna</i> 217, <i>Biccherna</i> 219, <i>Biccherna</i> 221, <i>Biccherna</i> 223, <i>Biccherna</i> 224, <i>Biccherna</i> 225, <i>Biccherna</i> 226, <i>Biccherna</i> 227, <i>Biccherna</i> 228, <i>Biccherna</i> 230, <i>Biccherna</i> 231, <i>Biccherna</i> 234, <i>Biccherna</i> 235, <i>Biccherna</i> 236, <i>Biccherna</i> 237, <i>Biccherna</i> 238, <i>Biccherna</i> 239, <i>Biccherna</i> 240, <i>Biccherna</i> 241.
1362 II semester - 1365 I semester	<i>Regolatori</i> 2.
1365 II semester	<i>Biccherna</i> 246.
1367 I semester - 1376 II semester	<i>Regolatori</i> 3, <i>Biccherna</i> 249.
1377 I semester - 1384 II semester	<i>Biccherna</i> 259, <i>Biccherna</i> 260, <i>Biccherna</i> 261, <i>Biccherna</i> 262, <i>Biccherna</i> 263, <i>Biccherna</i> 264, <i>Biccherna</i> 265, <i>Biccherna</i> 267, <i>Biccherna</i> 268, <i>Biccherna</i> 270.
1385 I semester - 1392 II semester	<i>Regolatori</i> 4
1393 I semester - 1406 I semester	<i>Regolatori</i> 5
1406 II semester - 1418 II semester	<i>Regolatori</i> 6

leave discretion to administrators in managing them⁵⁸. In addition, there could have been existed subordinate financial offices, other than the General *Gabella*, whose operations were not registered in the books of the *Biccherna*.

It has not been possible to resolve the first problem, since no extant archival source reports precise and continuous information about voluntary loans⁵⁹. Instead, registers of *Regolatori* have been used to partially clarify the second problem. In the research conducted on the documents of this office since 1362 to 1418, it has been found that even if financial offices, devoted to the collection of single direct and indirect imposition, were proliferating in the second half of the 14th centuries, they only occasionally obtained the right to autonomously expend their revenues for reasons other than their ordinary needs. At the end of their administrative period they usually transferred the incomes collected either to the *Biccherna* or to the General *Gabella* (which would have, in turn, given the whole income to the central financial office). It is reasonable, therefore, to suppose that the institutional minimalism of the first half of the century attested in [10], the strong centrality of the *Biccherna* and the almost absent information about financial offices other than the two main ones, did not admit the existence of centers of autonomous collection and expenditure of resources.

⁵⁸See [10].

⁵⁹The problem has also been observed in [10] and [16].

Two data adjustments have been made in order to construct a continuous and comparable series of revenues and expenditures. First, data for missing semesters have been filled interpolating between near available periods⁶⁰. Second, public incomes and expenditures have been deflated in order to adjust for inflation during the 14th century⁶¹. Consumer price index used for adjustment of public finances has been taken from [46]⁶².

C Dummies creation

Table 4 presents historical information and sources according to which dummies for military attacks and internal revolts, respectively variables MIL_t and INT_t , have been created. For internal revolt, the variable has value = 1 one semester after the turmoil, assuming that changes in income and expenditure were a sudden response to the revolt.

D Categories construction

Original data of semester communal incomes and revenues reported in the registers of the *Biccherna* have been organized in several categories presented, with a brief description, in Table 5.

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⁶⁰The method is commonly used in the analysis of historical dataset. See, for example, [25].

⁶¹The deflation procedure is justified by historically attested inflationary phenomena during the 14th century Tuscany. See [21] and [32] for the inflation problem in the whole region and [7] and [12] for prices variations in the 14th century Siena.

⁶²The consumer price index in [46] represents the more continuous and reliable inflation index constructed for the evolution of prices in the late medieval central Italian regions. It is a Laspeyres index (the quantity of each good in the consumption basket is determined for each period of the time series) and refers to variation of commodities' prices in Tuscany since 1205 to 1608. The absence of a continuous series of prices and salaries for Siena in the same period has not permitted the construction of a specific consumer price index for the city.

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Table 4: Dummies creation

<i>Military attacks</i>			
Year	Semester	Event	Source
1342	II	Attack from the mercenary company of Werner of Urslingen	[16]
1350	I	Attack from the mercenary company of Werner of Urslingen	[16]
1354	II	Attack from the mercenary company of Montreal d'Albarno	[16]
1357	II	Attack from the mercenary company of Conrad of Landau	[16]
1359	II	Attack from the mercenary company of Conrad of Landau	[16]
1360	II	Attack from the mercenary company of Conrad of Landau	[16]
1362	II	Attack from the mercenary company of Hannekein Baumgarten	[16]
1363	II	Attack from the mercenary company of Niccoló da Montefeltro	[16]
1364	II	Attack from the mercenary company of Hannekein Baumgarten	[16]
1365	I	Attack from the mercenary company of Albert Sterz	[16]
1365	II	Attack from the mercenary company of John Hawkwood	[16]
1366	I	Attack from the mercenary company of John Hawkwood	[16]
1367	II	Attack from the mercenary company of John Hawkwood	[16]
1369	II	Attack from the mercenary company of Misser Anisi	[16]
1370	I	Attack from the mercenary company of Lucius of Landau	[16]
1375	I	Attack from the mercenary company of John Hawkwood	[16]
1379	I	Attack from the mercenary company of John Hawkwood	[16]
1380	II	Attack from the mercenary company of Charles of Dorazzo	[16]
		Attack from the mercenary company of the Bretons	[16]
1381	I	Attack from the mercenary company of the Bretons	[16]
1381	II	Attack from the mercenary company of John Hawkwood	[16]
1382	II	Attack from the mercenary company of Villanozzo of Brutifort	[16]
1383	II	Attack from the mercenary company of John Hawkwood	[16]
1384	I	Attack from the mercenary company of Bretons	[16]
1384	II	Attack from the mercenary company of John Hawkwood	[16]
1385	II	Attack from the mercenary company of Eberhart de Landau	[16]
1386	II	Attack from the mercenary company of Boldrino da Panicale	[16]
1387	II	Attack from the mercenary company of Bernardone della Salla	[16]
1388	II	Attack from the mercenary company of John Deltfol	[16]
1392	II	Attack from the mercenary company of Cecchino Broglia	[16]
1393	II	Attack from the mercenary company of Bretons	[16]
1394	II	Attack from the mercenary company of Bordo de Michelotti	[16]
1395	II	Attack from the mercenary company of Cecchino Broglia	[16]
1395	I	Attack from the mercenary company of Bernardone della Salla	[16]
1396	II	Attack from the mercenary company of Bartolomeo da Prato	[16]
1399	II	Attack from the mercenary company of Cecchino Broglia	[16]
		War with Florence	[14]
<i>Internal revolts</i>			
Semester	Event	Source	
1344	I	Conspiracy lead by the Captain of War	[11]
1346	I	Conspiracy lead by the Tolomei family	[11]
1355	I	Artisans' and stonemasons' revolt	[49]
1368	I	Revolt against the Twelve	[49]
1370	II	<i>Bruco's</i> revolt	[?]

Table 5: Categories of communal incomes and revenues

Group	Category	Description
<i>Revenues</i>	Condemnations	All condemnations collected by officials and soldiers of the commune.
	Indirect taxation	Indirect taxes imposed on consumption or economic activities, collected by the General <i>Gabella</i> and then transferred to the <i>Biccherna</i> or directly collected by the central fiscal office. This categories includes also indirect taxes from the countryside.
	Direct taxation	All direct impositions, called <i>dazi</i> , imposed on the assessed movables and immovables of citizens and/or inhabitants of the countryside.
	Loans	Forced loans imposed on the city and the controlled countryside.
	Extraordinary incomes*	All non-regular revenues of the commune, such as gains from currency exchange.
<i>Expenditures</i>	Administration	All salaries for public administration (including foreign officials) and other costs for ordinary implementation of administrative functions.
	Military expenditures	All the defensive expenditures, sums spent to compensate mercenary companies for not attacking the city and expenditures for maintenance of internal order.
	City services	Ordinary and extraordinary expenditures for the maintenance of city services and other utilities (also including religious celebrations).
	Debt expenditures	Payments of interests and principal on communal debt.
	Extraordinary expenditures*	All non-ordinary expenditures (e.g. loss from currency exchange)

*Not reported in qualitative composition analysis for their discontinuity and low incidence.