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# Contracting for Force: the effects of transaction costs on mercenary employment by the Italian city states of the 13th to 15th centuries

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CONTRACTING FOR FORCE: THE EFFECT OF TRANSACTION COSTS ON  
MERCENARY EMPLOYMENT BY THE  
ITALIAN CITY STATES OF THE 13TH  
TO 15TH CENTURIES

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Presented to  
the Graduate School of  
Clemson University

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In Partial Fulfillment  
of the Requirements for the Degree  
Master of Arts  
Economics

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by  
John Anderson  
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Accepted by:  
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## ABSTRACT

The market for force in Italy through the 13<sup>th</sup> to 15<sup>th</sup> century is examined, through the medium of contracts between city states and mercenary soldiers. The historical era is divided into three distinct periods; each period is characterized by a typical contract type. Based on historical descriptions of these periods, it appears that the transaction costs associated with hiring private force providers varied significantly from period to period and regression analysis is performed in an attempt to determine the relationship between these costs and the number of private soldiers employed by the city states of Milan, Venice, and Florence in each period. The results of the analysis suggest that the effect of transaction costs in the market for force may be insignificant when compared to other considerations, particularly the ability of force providers to appropriate wealth directly.

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## CHAPTER ONE

### INTRODUCTION

#### Introduction to the Problem

As Jack Hirshleifer noted in his 1993 Presidential Address to the Western Economic Association International, there are two ways for an economic agent to make a living. She may produce goods which she can then either consume or sell, or she may take the goods which others produce and sell or consume these. These two different approaches can be characterized “as the way of production and exchange versus the way of predation and conflict” (Hirshleifer 1). In the ‘way of production and exchange,’ the Coase Theorem is seen to hold, with economic agents consistently cooperating with one another to their mutual benefit (Hirshleifer 10). In the ‘way of predation and conflict,’ economic agents instead seek advantage by simply taking from others. While this fundamental distinction is acknowledged and addressed in economic literature, there exists no clear, single explanation as to how these two fundamental approaches interact. Further, while strides have been made in providing economic explanations for the workings of certain types of non-productive conflict (such as litigation in order to protect monopoly rents), explanations for the use of violence, or force, remain relatively problematic. As it is the market for force which is of interest to this study, use of the term ‘conflict’ will henceforth be limited to that of the physical or violent variety. I argue that a deeper understanding of the interaction between these two approaches is warranted, specifically in regard to the conditions under which one may be expected to prevail over the other; the northern and central city states of 13<sup>th</sup>-15th century Italy, a

period that will be referred to as the city state era (CSE), provide an excellent historical vantage point from which to gain such an understanding. Of particular interest are the various contractual relations which existed between the city states and private force providers (PFPs) during this period as well as the manner in which the amount of force possessed by private entrepreneurs may have influenced the contractual process.

The typical contract type between city states and PFPs observed during the CSE varied in terms of length, number of troops contracted for, and the degree to which city states monitored contractual performance on the part of PFPs (generally in terms of the number and timing of troop inspections.) While no absolute rule can be said to exist in terms of matching particular contract types with a given period, as contracts varied in these characteristics throughout the entirety of the CSE, historians report a general trend in the types of contracts most commonly observed. In order to facilitate ease of discussion and study, the market for privately produced force in Italy during the CSE is here divided into three distinct periods, subsequently referred to as the early, middle, and late contractual periods.

During the early period, city states contracted with relatively small groups of mercenaries. The size of these groups varies, ranging from contracts with individuals to contracts with leaders of companies of 50-100 men. As the period progressed, individual contracts became rarer and company sized contracts more common. The typical short contract duration of the early period failed to fully employ private force providers, a failure which led to the rather chaotic and conflict ridden contractual system which characterizes the middle period. It is during this middle period that contractual

inefficiencies reach their highest level, particularly in term of opportunistic behavior on the part of PFPs, who became organized into large groups which possessed a capacity for violence sufficient to appropriate city state holdings through open conflict. The late contracting period can be regarded as a reaction to these inefficiencies. The typical contract of this final period marks an attempt by the city states to keep PFPs in continuous service to the state, while at the same time reducing the size of military formations under the control of any given entrepreneur and increasing the amount of city state contractual oversight.

The economic theory of transaction costs suggest that as the transactions costs associated with procuring a given product on the open market increase, firms demanding the product will exhibit a tendency to move away from such open market transactions and toward vertical integration and internal production of the good. A statistical analysis of the effects of each contracting period on the number and type of troops retained by the city states indicates that the high transaction costs associated with the middle contracting period of the CSE do not seem to have been accompanied by such a move away from open market transactions and, instead, coincided with an increase in the number of private troops retained by the city states; this thesis offers an economic explanation for this contra-intuitive result by arguing that while the system of governance necessary to support a stable contractual relationship between parties was not sound during the middle contracting period and that opportunism on the part of PFPs was extensive, the potential costs to city states of overt appropriation by independent military entrepreneurs greatly

exceeded the admittedly high contractual costs of the period. In short, any contract, no matter how inefficient and costly, was preferable to no contract at all.

### Outline of the Study

The works which provide the historical description of the CSE as it is presented here are reviewed in Chapter 2. An emphasis is placed on the historical contractual systems, but some general background, especially in regards to political and military conditions in Italy during the CSE is forwarded as well. This background is essential to understanding both the geographic region to which this study is confined, as well as an understanding of why some types of troops were more likely to be provided by PFPs than others. In addition, the decision to divide the CSE into three separate contracting periods is defended in this chapter by referring to the historical sources central to this study. As the CSE is examined using economic theories of both conflict and contracts, a review of key works dealing with both of these theories is presented. Finally, as both city states and PFPs are considered here as Coasian firms, a brief definition of this term is provided as well.

Chapter 3 describes the methods used to perform the statistical analysis. Particular attention is paid to the manner in which the data was gathered, as the reliance on a relatively small number of secondary sources places rather firm limits on the strength of the conclusions this study can offer. An explanation of the statistical model developed from this data is also included here.

The results of the analysis and their meaning are presented in Chapter 4. Chapter 5 contains a discussion of these results and attempts an economic explanation of the observed phenomenon. A brief conclusion is also provided in this final chapter.

## CHAPTER TWO

### CONTEXT

#### The History

Michael Mallet's Mercenaries and Their Masters is used as the primary historical source for this study. Appropriately, the narrative provided by Mercenaries emerges, in part, out of contractual records documenting the relationship between city states and private force providers (PFPs) in various incarnations. Mallet's main focus is on the city states of Northern and Central Italy during the period running from 1189 CE when Italy became nominally unified under Henry VI, son of the German Emperor Frederick Barbarossa, and Constance, daughter to the Norman ruler of Sicily William II (Mallet 6), to 1530 CE by which time the Italian city state system had been largely absorbed by more broad European forces and Italian armies bore little connection to those fielded in the 13<sup>th</sup> to 15<sup>th</sup> centuries (Mallet 256). Society and Politics in Medieval Italy by J.K. Hyde provides a useful supplement to Mallet's mercenary history. A broader historical study, it provides a good account of the tensions between the wealthy urban class and rural nobility which ultimately made the procurement of heavy cavalry through traditional feudal institutions problematic in the city states of North-Central Italy.

The Northern and Central city states are distinguished from cities in the South Italy as the southern areas were more strongly and directly influenced by broader European trends, initially through the governance of the Normans, and the city state as an independent entity did not truly emerge (Mallet 7). In the case of the Papal states, practical unification of the territory was achieved under Pope Innocent III starting around

1200 CE (Mallet 6); by 1268 CE, a strong French influence in the form of the Angevin dynasty had taken hold and would remain in effect throughout the city state era (CSE) (Mallet 8). In 1282 CE, Sicily broke away from the Angevins but remained united under Aragonese rule (Mallet 8). The city of Naples operated as a kingdom rather than a city state and placed more emphasis on the use of feudal institutions in the raising of armies than did the cities to the north.

In the northern and central Italy, the rule of Henry VI and then his son Frederick II was essentially nominal in nature. By 1250 CE, with the city states of north-central Italy banded together in loose defensive alliances, such as the Milan led Lombard league and the Florence led Tuscany league, to maintain their de facto independence (Mallet 9), German Emperors had largely ceased to pursue their Italian claims (Mallet 6). Due to a number of factors, it is in these city states that the employment of PFPs subsequently became most intense.

As Mallet notes, “the first factor which has to be considered is... the economic one” (Mallet 16). The Italian city states were centers of commerce and production and as a consequence the opportunity costs of employing citizens as soldiers was relatively high, while at the same time, the cities possessed the wealth necessary to hire professional troops. As German attempts to control the city states waned, rivalries between the cities intensified, increasing the demand for soldiers. The incursions by imperial Germany had been relatively infrequent compared to the near constant conflict which emerged between the “hundreds of tiny principalities and independent communes” (Mallet 16). In addition, periodic external shocks to the supply of troops available occurred as portions of the large

armies which were occasionally deployed in Italy by the German Empire, Hungary, and the Angevin dynasty “remained as mercenaries of the Italian states” (Mallet 19). In 1360 CE, the Hundred Years War concluded and French and English soldiers migrated to the conflict rich Italian market in search of employment (Mallet 19). At this time, Italy was experiencing a rural depression which provided a source a labor for PFPs. Finally, and perhaps most importantly, a number of military technological developments in the 13<sup>th</sup> century combined with the social changes brought about through urbanization to make public procurement of the central element of 13<sup>th</sup> to 15<sup>th</sup> century Italian warfare, heavy cavalry, difficult and costly compared to procuring such units from private providers.

Key among these technological changes was the introduction of more powerful missile weapons such as the longbow and crossbow to Italian warfare. Both of these weapons, but especially the longbow, required a degree of specialization which exceeded that generally possessed by the part time citizen levies which the city states could internally produce and therefore in of themselves provided incentive for the city states to switch away from the internal production of force to private production by hiring professional bowmen (Mallet 19-20). However, the city states were eventually able to internally produce crossbowmen via systems of militias, while the ability to wield the longbow effectively proved so difficult to acquire that its use in Italy was generally limited to relatively rare foreign specialists (English) with many years of training. A more significant impact of the improvement in bow technology was the effect these weapons had on the cavalry arm, which now needed to be much more heavily armored in order to be effective on the battlefield. The costs involved in acquiring such heavy

armor, the increased number of horses (which tired more quickly because of the increased weight of the rider and of the plate armor protecting the horses), the support soldiers necessary to field such a military unit, and, finally, the skill necessary to move and fight while wearing the armor, all encouraged the development of a specialized, professional soldier class. Further, the feudal system which provided exactly such a class of soldiery in regions such as France and England, was no longer operative in the Italian city states where relations between the city states and rural nobility were often strained at best, while those nobles operating within city states found that they were best served by turning their attention towards matters of commerce rather than focusing on martial skills.

While the explicit division of the CSE into three separate contracting periods is not a feature of Mallet's history, the distinct characteristics of each period are well described. While arranging the CSE into contracting periods does allow for individual analysis of each period, the arrangement is, to some extent, necessarily arbitrary. Contractual features presented in this thesis as typical of one period are generally present to a lesser extent in the other two. Mallet points to the battle of Montaperti in 1260 CE, in which a largely public Florentine army was defeated by a largely private army fielded by Siena, as a plausible date to mark the shift by the city states from an emphasis on internal production of force to the procurement of force from private providers (although, here again, Mallet is careful to note that such key dates are largely a matter of narrative convenience rather than singular watershed moments) (Mallet 21). Prior to this date, private or mercenary soldiers were still an important component of city state armies but

were generally contracted for individually or in small groups. The small groups usually consisted of the 3-6 men who comprised a single cavalry 'lance,' - a unit made typically up of an armored, mounted soldier and the "small entourage of pages and archers" who led "the horses and provided covering fire" (Mallet 20). Once the importance of private troops became apparent, the north-central city states rapidly begin hiring PFPs in company sized elements where possible. In such cases the contract was between the city state and the company leader, a military entrepreneur. When company sized elements could not be hired, the city states continued to contract with individual proprietors and lances and then grouped these hired individuals and lances into companies for ease of administration. By hiring PFP companies, the transaction costs of the city states were reduced as one company contract now took the place of some 50-100 individual contacts. In addition, the company sized formations under a single military leader became more militarily efficient as they became accustomed to operating under the direction of a company leader (Mallet 21). By 1300 contracting for company sized elements was the norm. During this early contracting period, the contract period was generally from 2-3 months, the length of the traditional campaigning season (Mallet 82). PFPs would be dismissed after they were no longer needed for active service.

Once the PFPs had become organized into company sized elements, either through private initiative or by city state employers, dismissing them after the campaign season rapidly became problematic. The unemployed companies began to group together into larger bands which posed a significant military threat to the city states. The city states, while continuing to contract with company sized elements, now found it necessary

to either contract for military service with these large bands, pay bribes to the bands in order to be left alone, or engage in open conflict with bands which, in the absence of paying contracts, tended to appropriate city state lands and wealth. This turbulent stage can be considered the middle contracting period wherein the transition from short-term to long-term contracts occurred. During this period, contracting inefficiencies abounded as the force available to the bands was sufficient to make prevention of opportunism on their part by their city state employers impossible. In addition, as William Caferro's "Mercenaries and Military Expenditure: The Costs of Undeclared Warfare in Fourteenth Century Siena" makes clear, the internal organization of the bands was loose and individual companies often disregarded contractual arrangements between band and city state, engaging in appropriation and extortion- behaviors which obviously would have made the city states less inclined to deal with the bands than otherwise.

The city states responded to the emergence of the bands by offering longer term contracts and by enfeigning prominent private military leaders in an effort to bind them to the state (Mallet 82). Mallet's history relates that these measures were largely successful. By 1360, the number of bands in Italy had been reduced to four, all of which possessed a high degree of internal organization and were well disciplined military formations. In contrast to the loose bands typical of the middle contracting periods, these 'great companies' could generally be depended on to honor the terms of the contracts they entered into, and often became affiliated with a specific state for an extended period of time. Still, the existence of such large private formations was uncomfortable for the city states, and by 1390 the great companies had largely ceased to operate in the mercenary

market and what will be termed here as the late contracting period was underway. During this period, contract length was gradually extended, with contracts being divided into two parts: the *ferma*, or set contract period, and the *ad beneplacitum*, or option period, during which the city state could retain the services of the PFPs if the state wished and proper notice was given. By mid-15th century, both the *ferma* and *ad beneplacitum* were usually for a length of six months, and lengths of one year *ferma* plus one year *ad beneplacitum* were not uncommon. These contracts lengths were a significant step toward private contractors taking continuous service with a particular city state and, eventually, toward these private troops coming under the complete control of the state (Mallet 82-83).

Mallet's history is supported by a number of auxiliary sources. A description of the contractual history between Italian city states and PFPs in accordance with that of Mallet's is offered by Daniel Waley in "The Army of the Florentine Republic from the Twelfth to the Fourteenth Century." While his account is limited to Florence, like Mallet, Waley's account notes the shift from largely public produced militias in the early 13<sup>th</sup> century to the more prominent role played by mercenaries in Florentine armies of the 14<sup>th</sup> century. Waley denotes the period between 1270-1305 as the time frame during which private forces became grouped into "cohesive companies of cavalry mercenaries" (Waley 98). Waley also provides a specific accounts. For example, he describes the formation of a mercenary band numbering some 500 horse along with "considerable... infantry" forces in 1322-1323 (Waley 106), an occurrence which conforms to the timetable presented by Mallet. C.C. Bayley's War and Society in Renaissance Florence,

which uses Leonardo Bruni's De Militia, a contemporary account of the Italian military system during the CSE, as its primary source material, also relates the shift from public militia based armies, to the central role of PFPs, and finally to the city states attempts to bring PFPs under public control. Finally, William Caferro's study of the costs of band incursions to the city state of Siena provides insight regarding the extent of the problem posed to city states by marauding bands. In addition, by providing a record of when Siena's payments to various bands occurred, Caferro's Mercenary Companies and the Decline of Siena is an excellent aid in identifying the time period during which such bands were most active. Again, the time frame outlined by Caferro conforms well to that provided by Mallet.

#### The Economics

Both the city states and PFPs are conceived of here as firms in the manner described by Ronald Coase in "The Nature of the Firm," wherein a firm "consists of the system of relationships which comes into existence when the direction of resources is dependent on an entrepreneur" (Coase 393). In the case of the PFP, the entrepreneur in question is the military leader named as such in the contract, the *condotteiri*. In the case of the city states, the nature of the entrepreneur is subject to some variation depending on the exact nature of government. In some cases, such as Milan under the rule of the *signoria*, there may indeed have been a single 'entrepreneur;' in other cases the idea of 'government' must act as a proxy for the individual entrepreneur. Coase quite clearly addresses the problem at hand, which has to do with the boundary of the firm and where this boundary occurs. The economic theory forwarded by Coase states that firms "will

tend to expand until the costs of organizing an extra transaction within the firm become equal to the costs of carrying out the same transaction by means of an exchange on the open market” (Coase 395), i.e. theory suggests that city states began hiring PFPs once the cost of raising such troops internally (which must include the cost of training such troops as well as any losses resulting from using citizens as soldiers rather than in some productive capacity) equaled the cost of hiring such troops. As will be seen, while the costs to the city state of the internal production of force appear to be relatively straightforward compared to the costs of procuring force via open exchange, as the transaction costs involved in the market for force tend to be significant, such appearances are deceptive. When the force possessed by organized PFPs is significant relative to that possessed by the state, the costs of internal production must include the costs of ‘non-transaction.’ The likely action of unemployed PFPs, overt appropriation of city state wealth, must be factored into the equation.

An emphasis on transaction costs in regards to the vertical integration versus market procurement decision is provided by Oliver Williamson in “Transaction-Cost Economics: The Governance of Contractual Relations” and in “The Vertical Integration of Production: Market Failure Considerations.” Williamson, like Coase, maintains that there exist two “main alternatives” in terms of the type of “institutional framework within which the integrity of a transaction is decided... markets and hierarchies” (Williamson(b) 235), where ‘hierarchy’ can be considered synonymous with ‘vertically integration.’ Among the factors which Williamson stresses as key to an understanding of transaction costs are the concepts of opportunism and uncertainty, both of which play a large role in

the contractual history of city state and PFP, although it is the costs associated with opportunism that are stressed here. In addition to the problem of opportunistic behavior on the part of PFPs employed by the city states, the bands of the middle contractual period faced their own problem of opportunism as well. Band leaders were often unable to effectively control various company sized elements which comprised the larger band-sized entities (again, those few bands which did survive into the mid-14th century, the 'great companies,' had exceptionally talented leaders who were able to unite their troops, impose centralized discipline and eliminate the problem of opportunism.)

Williamson stresses that, in many cases, internalization occurs not "on account of technological economies associated with production but because of what may be referred to broadly as 'transactional failures' in the operation of markets" (Williamson(a) 112); again, it must be noted that the potential for transactional failures in the CSE market for force, especially during what has been defined as the middle contracting period were very large indeed. Yet, as will be seen, even though the PFPs could threaten the viability of the markets 'institutional framework' as they possessed the ability to simply appropriate city state resources rather than trade for them, this potential did not cause a shift toward internal production by the city states but rather increased procurement of private troops.

Battles between city states and PFP bands were not uncommon in the middle contractual period, but the general trend favoring Coasian over conflict solutions is not particularly surprising from an economic standpoint. Conflict invariably involves the destruction of otherwise useful resources. City states choosing to internally produce troops and fight PFP bands rather than hire them would stand to lose X amount of

wealth to band appropriation, while  $Y$  amount of wealth would be consumed by the fighting. The city state would be better off hiring the band for some amount less than  $X+Y$ , and the band is better off as well as it receives an amount greater than  $X$ , the wealth it could expect to be able to appropriate. While the decision to fight might be made in cases where the city state expected to be able to neutralize the PFP band at some cost less than the cost of hiring the band, the information necessary to confidently make such a prediction of success was no means easy to come by. Jack Hirshleifer's work illustrates the difficulties associated with specifying even very simple, theoretical conflict models (Hirshleifer 92). Such difficulties are magnified considerably when weighing actual conflict decisions, and a desire to avoid the uncertainty associated with war outcomes no doubt encouraged city states to transact, even under unfavorable circumstances, rather than fight.

## CHAPTER THREE

### The Data

Observations of troop levels retained by three major city states, Venice, Florence, and Milan, of the north-central region were obtained through secondary historical sources. Three sources were used: Michael Mallet's Mercenaries and Their Masters, C.C. Bayley's War and Society in Renaissance Florence, and D. Waley's "The Army of the Florentine Republic from the Twelfth to the Fourteenth Century." The troop number observations were categorized according to type (whether the troops in question were infantry or cavalry forces), as well as by source (whether they were privately produced troops hired by the state on the open market or public troops internally produced by the state.) In cases where the total number of troops for a city state was given without exposition regarding their type and/or source, the observation was categorized as unknown with respect to type and/or source. Each observation consists of the total number of troops of a particular type possessed by Venice, Milan, or Florence; partial observations (for example, instances in which the size of a particular private cavalry unit hired as part of a larger private cavalry component fielded by a state was given, but the size of the total component was not) were not included in the data set. The data were also classified according to the contractual period from which an observation was drawn as well as whether the troops were part of a city state's standing army or a deployed (or "active") force. The data set consists of 52 observations; a table of the raw data is provided in the appendix (Table A1).

## The Model

In order to estimate the effect of the various classifications (type, source, contractual period, and activity,) as well as the effect of the interaction of the contract periods and other variables of interest upon the number of troops in terms of a percentage change, a linear regression was performed accorded to the following specification:

$$\begin{aligned} \ln(\text{troops}) = & \beta_1 + \beta_2(\text{foot}) + \beta_3(\text{foot* period2}) + \beta_4(\text{foot*period3}) + \beta_5(\text{private}) + \\ & \beta_6(\text{private*period2}) + \beta_7(\text{private*period3}) + \beta_8(\text{unkprivate}) + \\ & \beta_9(\text{unkprivate*period2}) + \beta_{10}(\text{unkprivate*period3}) + \beta_{11}(\text{unkfoot}) + \\ & \beta_{12}(\text{unkfoot*period2}) + \beta_{13}(\text{unkfoot*period3}) + \beta_{14}(\text{action}) + \\ & \beta_{15}(\text{action*period2}) + \beta_{16}(\text{action*period3}) + \beta_{17}\text{period2} + \beta_{18}\text{period3} + \varepsilon . \end{aligned}$$

The variables are defined as follows:

- troops = the total number of troops of a given classification employed by a state
- foot = an indicator function with a value of '1' if the troops were infantry and '0' if the troops were mounted
- private = an indicator function with a value of '1' if the source of the troops was private and '0' if the source was public
- unkprivate = an indicator function with a value of '1' if the source of the troops was unknown and '0' if it is known to have been either public or private
- unkfoot = an indicator function with a value of '1' if it is not known whether the troops were infantry or cavalry (or a mixture of both) and '0' if the troop type is known

action = an indicator function with a value of '1' if the troops were part of a  
 deployed force and '0' if they were part of a standing army  
 period2 = an indicator function with a value of '1' if the observation was drawn  
 from the year 1321 c.e. or later and '0' if drawn prior to this date  
 period3 = an indicator function with a value of '1' if the observation was drawn  
 from year 1390 c.e. or later and '0' if drawn prior to this date.

The natural log of the troop number is used as a proxy for percentage change in  
 number of troops. The coefficients attached to the unit category variables 'foot,'  
 'private,' 'unkfoot,' 'unkpriv,' and 'action,'  $\beta_2, \beta_5, \beta_8, \beta_{11}$ , and  $\beta_{14}$ , indicate the  
 percentage change to the size of a military element in the early contracting period  
 associated with these classifications. The coefficients attached to the interactions of these  
 variables with the 'period2' classification,  $\beta_3, \beta_6, \beta_9, \beta_{12}$ , and  $\beta_{15}$ , indicate the further  
 percentage change associated with the various unit categories when the various  
 classifications apply in the middle contracting period. Likewise, the coefficients attached  
 to the interactions of the unit category variables and the 'period3' classification indicate  
 the further marginal change associated with the unit categories in the late contracting  
 period (i.e. the change from the middle to late contracting period for each unit  
 classification.)  $\beta_{17}$  and  $\beta_{18}$ , the coefficients attached to the 'period2' and 'period3'  
 indicators, estimate the overall remaining percentage change in unit size (not including  
 the period effects' interactions with other variables) brought about by the change from  
 the early to middle, and middle to late contracting periods respectively.

### Other Useful Statistics

As an addition to the information provided by the linear regression coefficients, some general statistical measures were taken in an effort to illustrate the overall general trend in troop procurement through the CSE. For each period, the observations were divided into four groups: publicly produced foot soldiers, private foot soldiers, publicly produced mounted soldiers, and private mounted soldiers. The average size of each observation for these four groups was calculated and used to calculate the ratio of private to public troops of each type in each period. In cases where the source of the troops was unknown, an average was calculated but omitted from the private/public calculation.

## CHAPTER FOUR

### RESULTS

#### General Results

The results presented in this chapter can be divided into three sections: the effects of unit category variables, the effects of period classifications, and the effects of unit category and period classification interactions upon the dependent variable, 'ln(troops).' While the variable 'unkfoot' was included in the model as a theoretical possibility, no actual observations were classified as such, and the 'unkfoot' variable and both period classification interactions with this variable were dropped from the regression<sup>1</sup>. Of the remaining independent variables, seven, 'foot\*period2,' 'private,' 'private\*period3,' 'unkprivate\*period3,' 'action,' 'action\*period2,' and 'action\*period3,' were not statistically significant at the 5% level, leaving six statistically significant variables. The regression yielded an adjusted R-squared value of 0.635.

The results of the regression are presented in tabular form in Table A-2, located in the appendix. For all five significant variables, the magnitude of the coefficients is quite large, exceeding an absolute value of '1' (which represents a 100% change in troop number size) in all cases. These large values represent somewhat of a conceptual challenge, especially when they are negative as the number of troops cannot, obviously drop below zero. However, as each effect occurs in conjunction with several others,

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<sup>1</sup> Observations of '0' troops were also dropped from the data, leaving a total of 50 observations included in the regression analysis. The '0' observations were included when calculating the average number of troops by type and source.

negative percentage changes in the number of troops in excess of 100% are best understood simply as very strong effects.

Also located in the appendix is Table A-3 which lists average observation sizes for foot and mounted soldiers for both public and private source classifications. Of most interest here is the very large value (5.49) for the ratio of privately source mounted soldiers to publicly sourced mounted soldiers in the middle contractual period. This figure represents a large increase over the early contractual period.

#### Results for Unit Category Variables

During the early contracting period, which will be treated as the base period, the percentage change in the size of associated with the troops being infantry as opposed to cavalry is 213.4%. The effect of private sourcing on troop size in the early contracting period (-73.4%) is not significant at the 5% level.

#### Results for Unit Category and Period Classification Interactions

The coefficients associated with the interaction of unit category variables and period classifications can be regarded either as marginal changes to the effect of the unit category variable in the base period (in the case of interactions between unit category variables and the 'period2' variable), or as marginal changes to the effect of the unit category variable in the base period plus the marginal change which occurred in the middle contracting period (in the case of interactions between unit category variables and the 'period3' variable.) For example, as noted above, 'foot' causes a 213.4% increase in the number of troops observed. The coefficient associated with 'foot\*period2' is not significant and will be disregarded, so there is no marginal change in the percentage

change in number of troops caused by the 'foot' classification in the middle contracting period. The coefficient associated with 'foot\*period3' is -2.452, or a -245.2% change. This value represents the marginal change to the percentage change brought about by the 'foot' classification during the middle contracting period, which is itself composed of the percentage change caused by the variable 'foot' in the early contracting period (213.4%) plus the marginal change caused by 'foot' during the middle contracting period (assumed to be 0%). For the 'private' classification the marginal change in the middle contracting period is 198.5%; the effect in the late contracting period is not significant at the 5% level.

#### Results for Period Classifications

The effect on number of troops caused by the 'period2' classification is a 129.1% decrease from the base period. The marginal change to this effect caused by the 'period3' classification is a 251.0% increase (i.e. a 121.9% increase in the number of troops compared to the number in the base period.)

## CHAPTER FIVE

### DISCUSSION AND CONCLUSION

#### The Data

Before attempting to ground the results of the regression analysis in economic theory, some attention to the peculiarities of the data upon which the regression was performed is warranted. It must be noted that the data are not random. They have been taken from three historical studies. While it is apparent upon reading these works that each of the authors has selected values from a larger population, it is equally apparent that the reported troop numbers have been deliberately selected so as to illustrate a specific historical point to the reader. As the historical narratives of all three authors, Bayley, Mallet, and Waley, feature the shifts in predominate contract types (which have here been simplified to the three distinct contract periods), it seems reasonable to expect that the values the authors have chosen to report would reflect these contractual conditions. This expectation makes the failure of the contractual explanation, as evinced by the regression results, all the more interesting. It suggests that either the authors lacked a sufficient understanding of transaction cost theory to select data which correctly illustrate the expected contractual effects, or that such data were simply not to be found.

Observations for the city states of Milan, Venice, and Florence have been assumed to be comparable for the purposes of this study. All three city states were in the upper tier of Italian urban centers, with similar populations (Hyde 153). It is noted that if this assumption does not hold, the values returned by the regression analysis, as well as the simple averages in Table A-3, must be regarded in a highly critical light. This is

especially true as the observations for Milan and Venice are confined entirely to the late contractual period and therefore it can not be expected that the effects of any asymmetries between the three city states will ‘average out.’

### Variables of Secondary Interest

While the early, middle, and late contract periods are used to separate certain types of contractual effects, the periods also serve as simple measures of time. The distinction between troops supplied by PFPs and troops produced by the cities themselves represented by the ‘private’ variable presumably encapsulates the effects of various contract types. The effect of any change in conditions from one contract period to another other than the typical contract type which affected the amount of force employed by the city states is reflected in the coefficients associated with the variables ‘period2’ and ‘period3.’ Obviously the number and nature of the conflicts the city states took part in during the respective contractual period will play a large role in determining the sign and magnitude of these coefficients. Changes in population will also have an effect, with larger populations naturally leading to larger armies.

As open conflict of one variety or another was ubiquitous through the CSE, no attempt has been made here to characterize any of one of the contractual periods as being more conflict intensive than any of the others. As noted in Chapter 2, Mallet describes the inter-city conflicts of the middle and late contractual periods as occurring more frequently than those between the city states and foreign invaders, but higher battle frequency need not occur in conjunction with larger armies. Not all conflicts are of equal intensity and the type of warfare common in one period may have required more force

inputs from the city states than the type of warfare common in another. Such an asymmetry in conflict intensity may be a contributing factor to the observed differences between the coefficients associated with the 'period2' (-1.291) and 'period3' (2.51) variables. The negative value attached the 'period2' value could then be, in part, explained by conflicts during the middle contracting period being of a smaller scale than those of either the early period or of the late period, while the large positive effect on troop numbers associated with the late contract period could be attributed to conflicts in this period being of a very intense type. These scenarios are offered as conjecture- no measurement of conflict intensity through the contracting periods has been attempted.

A more certain explanation for the negative effect of 'period2' on troop numbers, although one that seems unlikely to account for a negative value of such large magnitude, is population effects. The Black Death struck the city states at the midpoint of the 14th century with devastating effect (Hyde 178). The attending decrease in population, as well as the adverse economic effects which accompanied it, no doubt produced a tendency for city state force size to decrease. The large, positive effect on troop numbers associated with the 'period3' variable reflects, in part, the city states' recovery from the setback of the plague.

The distinction between infantry and mounted troops is, obviously, very significant from a military point of view. The effect of the 'foot' classification during the various contracting periods upon troop numbers can therefore be expected to reflect the art of war as it was practiced in each period, which, in turn was influenced by the social and political realities which were predominant during a given contractual period. The

large, positive coefficient on the ‘foot’ variable during the early contracting period suggests city states during this period maintained relatively large bodies of infantry. This result is supported by the relatively large average size of foot components (procured both through private and public sources) during this time (see Table A-3.) The army fielded by Florence in 1260 at the battle of Montaperti, where 14000 foot soldiers were deployed along side 1400 cavalry is representative of the type of composition typical of the early contracting period (Mallet 12). To a large extent, such ratios reflect an emphasis on communal or citizen armies in which professional soldiers played a limited role, although the emphasis on professionals increased from 1260 onward (Mallet 13). In addition to being characterized by short term contracts between city states and relatively small bodies of men, the early contractual period was a time of transition between a military system based primary on feudal traditions and a system centered upon autonomous urban centers. Feudal nobles were increasingly integrated into the urban system and the amount of cavalry forces provided by these aristocrats decreased significantly (Hyde 82). At the same time, numerous institutions such as guilds and political parties developed in the city states during this period, and these organizations assisted in the formation of militias comprised of urban footmen (Waley 74). These two developments suggest that the availability of the two troop types was a significant factor in the positive relationship between the number of troops having been large and the type of troops having been infantry. Another historical circumstance which likely contributed to the effect of the ‘foot’ classification in the early contractual period was the threat to the north-central city

states posed foreign (i.e. non-Italian) forces. The role of the city states in such conflicts was a defensive one, and infantry forces are more suited to defensive operations.

By the late contractual period, the effect of the 'foot' classification on troop numbers is negative. Again, supply effects combined with the nature of warfare during this period provide an explanation of the observed effect. By this time, there was an abundance of professional mounted troops available on the market and as the typical conflict of this period was "inter- city state" in nature. Such conflicts generally involved offensive, raiding activity on the part of at least one of the parties to war and the shift away from foot soldiers to cavalry forces is quite understandable (Mallet 146).

I note that there is no need to turn to economic or historic reasoning to explain the large positive coefficient (1.305) associated with the "unkprivate\*period2" variable; it is likely that in cases where the source of the troops is not provided, the element was composed of troops provided by PFPs and publicly produced soldiers. The size of the observation will therefore tend to be larger than observations that are limited to either publicly produced or privately provided troops.

#### Variables of Primary Interest: Private as Opposed to Public Formations

This study is primarily concerned with varying contractual effects upon the amount of private force hired by the state. The fundamental question is as follows: to what extent can transaction cost economics explain changes in the number of private troops employed by the city states across periods where different types of contracts predominated, and to what extent can alternative explanations, rooted in conflict theory, be resorted to when transaction cost economic theory fails to explain the observed

phenomenon? Ideally the design of the regression analysis isolates the explanatory power of the contractual efficiencies and difficulties associated with each contractual period to the 'private' variable and this variable's interaction with the period classifications, as the only decision directly affected by the types of contracting solutions available is whether to hire private troops or produce public ones. It is therefore these three independent variables that are of the most interest. As confidence in the coefficients associated with the 'private' and 'private\*period3' cannot be established, it is how the effect of the 'private' classification changes from the early contractual period to the second, represented by the 'private\*period2' variable that is the main focus of this chapter.

The coefficient on the 'private' variable (-0.734) can be regarded as a baseline reference, significant at the 10% level rather than the 5% level. It suggests that army components obtained on the market tended to be smaller than components produced internally by states. This result is supported by the relatively small ration of private to public infantry forces (0.11) employed by the city states during this early period. Any number of explanations for this observed effect is possible, but there seems to be no reason to dismiss the fundamental one forwarded by the economic theory of transaction costs which states that a firm will purchase a good up until the point where the cost of the good equals the cost of producing it (Coase 395). All other factors held equal, this equality of costs occurred when the amount of private force was smaller than the amount of public force. Even if the coefficient attached to the 'private' variable is dismissed

entirely as insignificant, this equality will hold at some ratio of private to public force, and the marginal effect of the middle contractual period remains clear.

All three of the historical works used as sources for the regression analysis describe contractual transaction costs as increasing through the move from the early contract period to the middle contracting period, as contacts with bands were extremely difficult to enforce. Transaction cost economics therefore yields the expectation that the coefficient attached to the 'private\*period2' variable should be negative, reflecting these increased costs and indicating that maintaining the equality of costs between private procurement and public production produced a tendency for city states to shift toward vertical integration of troop production. The large positive coefficient (1.985) on the 'private\*period2' variable confounds this expectation; in order to explain this result, transaction cost theory must be augmented by conflict theory.

The basic premise that city state raised armies by hiring and producing at the point where the cost of a unit of force associated with these two methods was equal need not, and should not, be discarded. The increase in the number of troops brought about by said troops being private as the transaction costs associated with procuring private troops increased does not indicate that city states elected to pursue high cost methods of acquiring force when lower cost methods were available. What it does suggest is that the costs associated with the contracting inefficiencies that characterize the middle period were exceeded by the costs of not contracting with PFPs.

The force wielded by large private bands during the middle contracting period was considerable and was the central factor in increasing the transaction costs associated

with hiring such bands<sup>2</sup>. As they possessed enough force to legitimately challenge city states in overt conflict, it was difficult for city states to effectively reign in opportunistic behavior (Caferro(a) 220). Bands were subject to reputational effects as those which took payment and then went on to appropriate from their employers could expect to find their chances of further employment reduced, and this effect would be expected to limit opportunistic behavior to some extent. However, the loose organizational structure of the bands prior to the emergence of the ‘great companies’ made them vulnerable to a free rider problem: when the smaller, company sized elements which comprised the bands engaged in appropriation or extortion, the negative reputational effect was bourn by the entire band, while the individual company received all wealth obtained by violating the contractual terms.

The key to understanding why more private troops were hired despite these increased transaction costs lies in the ability of PFPs to appropriate. Generally, the ‘make or buy’ decision is unhampered by considerations of appropriation, and goods on the open market which are not bought do not pose a problem to the firm which passes on the purchase. Force does. PFPs hired in large formations could be expected to engage in costly opportunistic behavior, substituting public produced troops for PFPs eliminated this particular costly behavior but essentially guaranteed that the unemployed PFPs

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<sup>2</sup> It should be noted, however, that the changes in transaction costs caused by the emergence of the bands were not all positive. As larger numbers of troops could be obtained by the city states with a single contract, a reduction in transaction costs would have occurred as fewer contracts were necessary to obtain a given number of troops. This decrease, however, may have been insignificant when compared to the large increase in costs caused by increases in opportunistic behavior by the bands.

would now seek to acquire wealth through overt conflict with the state, which in turn required the city states to acquire more force themselves. By hiring PFPs, city states increased the amount of force at their disposal, while at the same time reducing the amount of external force threatening them. It becomes apparent that the increased transaction costs of the middle contractual period may have been the lesser of two evils. These costs, though high, were exceeded by the costs associated with not hiring bands, either in terms of wealth appropriated by unemployed PFPs or in the increased costs associated with the necessity of fielding larger armies in order to ward off such independent operators.

Unemployed force providers represented a problem to European states throughout the Middle Ages (Hale 86). Generally the problem was containable and manifested itself through small scale crimes committed by discharged soldiers. The emergence of large, cohesive private formations in Italy during the CSE magnified the threat and made it difficult to suppress. While city states, often working together in groups, at times engaged in direct military confrontation with PFPs (Mallet 32), the effect of the 'private\*period2' variable suggests that often the most efficient course of action available to the city states was to hire the PFPs rather than fight them.

### Conclusion

The contractual story of the CSE provides a large amount of information regarding the relationship between city states and PFPs. By dividing the CSE into distinct contractual periods and comparing the typical contract of these periods, it becomes clear that transaction costs varied considerably from one period to another. But,

based on the limited investigation performed here, it appears that transaction costs effects considered in isolation can be conraindicative of actual market outcomes when the product being bought and sold is force. The ability of PFPs to act independently to appropriate city state wealth, or at least threaten to do so in order to extort payments, was a more important factor in the city state's decision of whether to hire private troops or whether to produce such troops internally.

APPENDIX

Table A-1: Troop Numbers (Categorized)

troops	year	Foot	private	unkpriv	unkfoot	Action	Period 2	Period 3	City
800	1260	0	0	0	0	0	0	0	Florence
200	1260	0	1	0	0	0	0	0	Florence
1400	1260	0	0	0	0	0	0	0	Florence
14300	1260	1	0	0	0	0	0	0	Florence
0	1260	0	1	0	0	1	0	0	Florence
800	1288	0	0	0	0	0	0	0	Florence
600	1289	0	0	0	0	0	0	0	Florence
500	1289	0	1	0	0	1	0	0	Florence
500	1289	0	0	0	0	1	0	0	Florence
400	1289	0	1	0	0	1	0	0	Florence
600	1289	0	0	0	0	1	0	0	Florence
6000	1289	1	0	0	0	1	0	0	Florence
500	1302	0	1	0	0	1	0	0	Florence
1000	1302	1	1	0	0	1	0	0	Florence
500	1302	0	0	0	0	1	0	0	Florence
5000	1302	1	0	0	0	1	0	0	Florence
1000	1310	0	0	0	0	0	0	0	Florence
800	1312	0	1	0	0	0	0	0	Florence
1300	1312	0	0	0	0	0	0	0	Florence
12000	1312	1	0	0	0	0	0	0	Florence
300	1325	0	0	0	0	0	1	0	Florence
1500	1325	0	1	0	0	1	1	0	Florence
500	1325	0	0	0	0	1	1	0	Florence
15000	1325	1	0	1	0	1	1	0	Florence
2000	1341	0	1	0	0	1	1	0	Florence
2000	1342	0	1	0	0	1	1	0	Florence
40	1342	0	0	0	0	1	1	0	Florence
600	1343	0	1	0	0	1	1	0	Florence
1000	1343	0	0	0	0	1	1	0	Florence
10000	1343	1	0	0	0	1	1	0	Florence
3000	1351	0	0	1	0	1	1	0	Florence
4800	1356	1	0	0	0	0	1	0	Florence
4000	1359	0	1	0	0	1	1	0	Florence
0	1359	0	0	0	0	1	1	0	Florence
1500	1363	0	0	1	0	0	1	0	Florence
4000	1363	1	0	1	0	0	1	0	Florence
8000	1363	1	0	0	0	1	1	0	Florence
4000	1364	0	0	1	0	1	1	0	Florence
11000	1364	1	0	1	0	1	1	0	Florence
6000	1397	0	1	0	0	1	1	1	Florence

Table A-1: Troop Numbers (Categorized)(Continued)

4500	1397	1	1	0	0	1	1	1	Florence
1500	1405	0	0	1	0	0	1	1	Venice
1000	1425	1	0	0	0	0	1	1	Milan
5725	1434	0	1	0	0	0	1	1	Milan
1800	1434	0	0	0	0	0	1	1	Milan
19750	1439	0	0	1	0	0	1	1	Milan
5250	1439	1	0	1	0	0	1	1	Milan
16100	1439	0	0	1	0	0	1	1	Venice
8900	1439	1	0	1	0	0	1	1	Venice
2000	1476	0	1	0	0	0	1	1	Milan
6000	1476	0	0	0	0	0	1	1	Milan
10000	1476	1	0	0	0	0	1	1	Milan

Table A-2: Regression Results

Variable	Estimate	Std. Error	t-statistic	Prob> t
foot	2.134	0.436	4.895	0.000
foot*period2	0.191	0.629	0.304	0.763
foot*period3	-2.452	0.670	-3.661	0.001
private	-0.734	0.423	-1.735	0.091
private*period2	1.985	0.678	2.930	0.006
private*period3	-1.266	0.913	-1.386	0.174
unkprivate*period2	1.305	0.453	2.882	0.007
unkprivate*period3	-0.486	0.710	-0.685	0.498
action	-0.489	0.394	-1.242	0.222
action*period2	1.047	0.628	1.669	0.104
action*period3	-0.066	0.978	-0.067	0.947
period2	-1.291	0.586	-2.204	0.034
period3	2.510	0.697	3.603	0.001

Notes:

1. R-Squared value = 0.732, Adjusted R-squared value = 0.635
2. Number of observations = 50
3. Variable definitions:

troops	= the total number of troops of a given classification employed by a state
foot	= an indicator function with a value of '1' if the troops were infantry and '0' if the troops were mounted
private	= an indicator function with a value of '1' if the source of the troops was private and '0' if the source was public
unkprivate	= an indicator function with a value of '1' if the source of the troops was unknown and '0' if it is known to have been either public or private
action	= an indicator function with a value of '1' if the troops were part of a deployed force and '0' if they were part of a standing army
period2	= an indicator function with a value of '1' if the observation was drawn from the year 1321 c.e. or later and '0' if drawn prior to this date
period3	= an indicator function with a value of '1' if the observation was drawn from year 1390 c.e. or later and '0' if drawn prior to this date.
foot*period2	= an indicator function with a value of '1' if the source of the troops were infantry and the observation was drawn from the year 1321c.e. or later and '0' in all other cases

foot\*period3 = an indicator function with a value of '1' if the troops were infantry and the observation was drawn from the year 1390 c.e. or later and '0' in all other cases  
 private\*period2 = an indicator function with a value of '1' if the source of the troops was private and the observation was drawn from the year 1321 c.e. or later and '0' in all other cases  
 private\*period3 = an indicator function with a value of '1' if the source of the troops was private and the observation was drawn from the year 1390 c.e. or later and '0' in all other cases  
 unkprivate\*period2 = an indicator function with a value of '1' if the source of the troops is unknown and the observation was drawn from the year 1321 c.e. or later and a value of '0' in all other cases  
 unkprivate\*period3 = an indicator function with value of '1' if the source of the troops is unknown and the observation was drawn from the year 1390 c.e. or later and a value of '0' in all other cases  
 action\*period2 = an indicator function with a value of '1' if the troops were part of a deployed force and the observation was drawn from the year 1321 c.e. or later and a value of '0' in all other cases  
 action\*period3 = an indicator function with a value of '1' if the troops were part of a deployed force and the observation was drawn from the year 1390 c.e. or later and a value of '0' in all other cases

Table A-3: Average Troop Numbers (by Type, Source, and Period) and Source Ratios

avg. troop numbers	early period	middle period	late period
private foot	1000	0	4500
public foot	9325	7600	5500
private horse	400	2020	4575
public horse	833	368	3900
foot: private/public	0.11	0.00	0.82
horse: private/public	0.48	5.49	1.17
unknown foot	0	10000	7075
unknown horse	0	2833	12450

Notes:

1. Troops of unknown source have been omitted from the public/private ratio calculation

Table A-4: Complete Army Strength Observations

city	date	private foot	private horse	public foot	public horse	unk foot	unk horse	Private /public
Florence	1260	0	200	14000	1400	0	0	0.01
Florence	1289	1000	400	5000	500	0	0	0.25
Florence	1351	unknown	unknown	unknown	unknown	11000	4000	unknown
Florence	1363	unknown	unknown	unknown	unknown	4000	1500	unknown
Milan	1439	unknown	unknown	unknown	unknown	5250	19750	unknown
Venice	1439	unknown	unknown	unknown	unknown	8900	16100	unknown

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