Legalizing Extortion: Containing Armed Tribes by State Regulated "Protection Payments" in Ottoman Gaza (1519-1582).

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Bribing violent groups is a common phenomenon in contemporary and historical economies. Usually it is difficult to study this phenomenon empirically because it is considered illegal and thus it is hidden. The official state policy of regulating payments villages made to armed tribes in sixteenth century Gaza provides a rare opportunity to study this institution and its impact on economic growth and taxation. Moreover, the process of consolidation and corrosion of the Ottoman authority allows to examine how back and forth shifts in the balanced of power between a state and armed groups influence production and taxation. The paper characterizes three alternative strategies for villages exposed to raids: (i) bribing the armed tribe; (ii) paying high taxes to induce the state to protect the village; (iii) retrenching (cutting back) production to render a potential raid unprofitable. As the state consolidated its rule, the non-bribing villages (strategies ii & iii) increased production and their tax rates were reduced. Hence, the Ottoman rule facilitated economic growth mainly of non-bribing villages. The paper ascribes this empirical observation to a positive externality generated by the state coordination of the bribes across villages. This economic institution collapsed after local tribes had acquired firearms and rebelled in the 1570s. Following the revolt the economic growth of the non-bribing villages was reversed, while the bribing villages stagnated. Thus, just as the consolidation of Ottoman authority fostered the growth of the non-bribing villages, its corrosion adversely affected the non-bribing villages.

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In 1584 the Ottoman imperial divan sent a decree to the governor of the Gaza district concerning "Bedouin [nomad] evil-doers and highway robbers [that] do not cease to molest the wayfarers and the pilgrims"[2] near Ramle, a town located between Jaffa and Jerusalem. The decree endorsed a simple solution to the violent threat posed by the Bedouins: The state nominated a Bedouin *shaykh* to guard the road and his expected annual allowance was set to 20,000 akçe (silver coins). This episode demonstrates the roles that nomads played in Middle Eastern history: a violent threat and a remedy for such threats. It also shows that the Ottomans were not shy to openly bribe such violent groups.

Paying off violent groups was neither unique to Ottoman Syria nor to the sixteenth century. The Ottomans, who considered their Sultan to be the guardian of Mecca and Medina, paid off Bedouin tribes in order to protect pilgrims performing the holy *hajj*.[3] The Ottomans also struck deals with gangs of *Celâli* brigands during revolts in the late sixteenth and early seventeenth centuries. This practice was and continues to be used by other states; present-day media reports suggest that the United States and Britain are bribing violent groups in Iraq and Afghanistan to stave off violence.[4] Little is known, however, about transactions of this kind because states generally conceal such policies.

Fortunately, the Ottoman Empire was not silent about this practice. Payments to Bedouin tribes in Gaza were regulated and recorded by the state and incorporated into the rural tax system. The Ottoman tax records detailed the estimated annual production of every village, defined the village's tax rate, and listed the expected revenues and shares of various tax recipients including payments to Bedouin tribes. This paper interprets the payments to the tribes as state regulated "protection payments" or legalized extortion.

Extortion of producers is also a common but hidden phenomenon. Such extortion usually involves a deal between a violent organization and a producer, who agree, not necessarily in good will, that the producer pays off the organization to avoid being harassed. For the producer, *paying off* is a survival strategy in a *Hobbesian* world, where the state does not provide effective protection from banditry and violence. Alternatively, the producer can also agree to pay *higher taxes* to the state in order to induce the latter to defend its tax base. Finally, the producer can *retrench* (cut back) its production to render a potential raid

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[2] Uriel Heyd. *Ottoman Documents on Palestine* (Oxford, 1960). p. 99.

[3]. Karen Barkey. *Bandits and bureaucrats : The Ottoman route to state centralization*. Ithaca, N.Y: Cornell University Press, 1994. Suraya Faroqhi. *Pilgrims and Sultans: The Hajj Under the Ottomans*. London: Tauris & Co., 1996. pp:54-6. Even in the early twentieth century Ottomans used this practice when they paid off tribes in Trans-Jordan to protect the telegraph line to Mecca.. see: Rogan, Eugene. "Instant communication: The impact of the Telegraph in Ottoman Syria", *The Syrian Land: Processes of Integration and Fragmentation*. edited by Thomas Philipp & Birgit Schaebler, 1998. p. 118. (thanks to Avner Wishnitzer for the reference).

[4] Marie Colvin and Sarah Baxter "US bribe insurgents to fight Al-Qaeda" *The Sunday Times*, (September 9, 2007). Christina Lamb. "Britain's £1.5m bribes fail to buy Taleban peace deal" *The Sunday Times* (July 22, 2007).

unprofitable for the raiders. The application of these three survival strategies – (i) *bribing the bandits; (ii) paying high taxes and (iii) production retrenching* – is likely to be adjusted as a state consolidates its authority. This paper examines the relations between changes in taxation and rural production, and shifts in the balance of power between local tribes and the Ottomans during the first century of Ottoman rule over the Gaza district (1500s).

Historical accounts provide evidence for the initial Ottoman success in consolidating its rule. Amy Singer concluded: "One preoccupation of the Ottoman administration in this area was to keep control of the Bedouins. The pacification of the Bedouins in Southern Syria was one of the initial achievements of the Ottomans after they conquered the area from the Mamluks [1516]. At least until the end of Süleyman's reign (1566), the Bedouins were kept relatively quiescent by the Ottoman governors."[5] The initial Ottoman success – facilitated by the Ottoman short-lived monopoly on firearms – was reflected in the growth of the official economy, i.e. the economic activities that the Ottomans were able to tax. Figure 1 presents the average value of the *hasil*, the tax on crops and trees, in constant akçe prices of several balanced panel sub-samples.[6]

Figure 1: Average Tax Revenues (Akçe†) of Villages in the Gaza Sub-district (Balanced panels, 1519-1582)

Sources: 1519-1557(*tahrir*) *tharir defter*s 1557 (*waqf*) – 1582 *waqf* accounts. See details in section V. † Akçe – Ottoman Silver coins. These revenues exclude taxes on animals.

Figure 1 clearly shows that during the first four decades of the Ottoman rule the value of the *hasil* was monotonously increasing. This increase was achieved despite a decrease in the local tax rates. Thus, the economic growth was more rapid than the presented growth in tax revenues. This trend reversed: the available data indicates that the average value of the *hasil* declined between the years 1557 and 1582, when local Ottoman subjects acquired firearms and Bedouin tribes in the Gaza district revolted against the Empire.

This study examines the interplay between Gazan villages, the Ottoman Empire and Bedouin tribes during the sixteenth century. It focuses on the tax and bribe rates set by the state, and on the production of the villages that were recorded in the Ottoman tax records, the *tahrir defter*s. These documents were deciphered and compiled into a unique panel micro-

[5] Amy Singer, *Palestinian Peasants and Ottoman Officials Rural administration around sixteenth century Jerusalem*. Cambridge, 1995. p. 113 The Bedouins were a major challenge to the Ottoman rule also in Egypt, where the Ottomans nominated Bedouins to high offices with limited success. For more details see Winter, Michael (1992). Egyptian Society Under Ottoman Rule 1517-1798. London: Routledge.

[6] Balanced panels are multi-period datasets that include information on villages that ed continuously throughout the time period of note (specifically the sixteenth century). Thus the analysis of such samples avoids biases caused by the changing composition of an unbalanced sample.

dataset. This dataset facilitates the (first?) empirical analysis of the relationships between a state, racketeers, and the producers who made "protection payments". A more limited dataset, derived from accounts of *waqf*s (pious foundations), is also employed to evaluate the impact of the 1570s proliferation of firearms and the revolt on rural production in Gaza.

The next section briefly reviews the main historical actors and events in Ottoman Gaza in the sixteenth century. Section III presents a simple model that examines the interplay between a state, a tribe and local villages. Section IV describes the data that was deciphered from Ottoman documents. Section V uses the data to test the model's predictions regarding the rural production in Ottoman Gaza. The epilogue considers the demise of this institution following improvement in the banditry technology, proliferation of firearms. The appendices provide an example of an Ottoman tax record (A), detail geographic and administrative information in the bribing and non-bribing villages (B & C), Proofs of the model's propositions (D), and empirical evaluation of the impact of military forces (fortresses and cavalry) on the payment of bribes to the tribe (E & F).

II: Historical Background

The challenge that nomadic tribes posed for states in Middle Eastern history particularly in desert frontier areas is well known. The Romans constructed the *Limes Arabicus* to curb raids by tribesmen coming from the desert; Arab nomad tribes spread the message of Islam while conquering the Persian Empire and most of the Byzantine Empire; and nomads were the moving force in *Ibn Khaldun*'s classic model of Arab history. According to this model nomads either milk their herds while wandering in the desert or milk the townspeople and peasants, as long as they can protect them from other nomads.

During the late Mamluk period, which preceded the Ottoman conquest, Bedouin tribes played a significant role in local politics, and served as auxiliary forces in the Mamluk army. Some tribes however, used their military ability to loot caravans and raid or collect protection fees from villages. As the might of the Mamluk Empire dwindled during the late fifteenth century and early sixteenth century, the tribes became more independent and openly challenged the Mamluk authority. Probably the most humiliating of their attacks was the 1490 attack on the *hajj* caravan to Mecca and Medina, which cost the lives of thousands of pilgrims. Following this attack, Muslims from Syria and Egypt could not perform the holy duty for several years. It seems that similar attacks undermined also the rural economy and many villages were abandoned during the late Mamluk period.

The Ottoman conquest of Syria and Egypt (1516-17) did not bring in an immediate change in the Bedouin conduct. The contemporary Egyptian chronicler Ibn Iyas (1448-ca.1524) vividly described the turbulent events in these early years: Bedouin tribes were involved in the fighting during the 1520-1 revolt of a former Mamluk official, Al-Ghazali

who was the governor of Syria on behalf of the Ottoman Empire. The *Bani `Ata* and the *Bani `Atiya* tribes from the Gaza region played an important role in curbing this revolt: they took part in the attack on Al-Ghazali's allies, including the *`Arab Sawalma* tribe, another tribe from the Gaza region. The Ottomans handsomely rewarded the *Bani `Ata*, the *Bani `Atiya*.[7] This reward did not prevent the *Bani `Ata*, the *Bani `Atiya* from engaging in plundering and tribal wars in Syria thereafter. Indeed, Ibn Iyas mentioned that even a high-ranking Ottoman official could not safely travel in the region without a large military escort. [8]

The Ottomans decided to co-opt the *`Arab Sawalma* and the *Bani `Ata* tribes by bestowing them with shares of the tax revenues of about a third of the villages and *mezra'a*s (un-populated grain fields) in the Gaza *nahiye* (sub-district). It is noteworthy that the Ottomans did not co-opted in this way the other three tribes that roamed in the Gaza district, including the above mentioned *Bani `Atiya*, the ally of *Bani `Ata*. We may speculate whether the Ottomans decision to co-opt these two rival tribes was part of a *divide et impera* policy that characterized the ottoman policy in many other occasions. It is also possible that the Ottomans just re-instituted the old rights the tribes had in the Mamluk period as they did with other tax recipients such as former Mamluk soldiers or *waqf*s (pious foundations).

At any rate, the Ottoman policy towards the Bedouins changed from district to district and from time to time while using variety of means to subdue the Bedouin threat.

Ottoman Policy Towards Bedouin Tribes

The Ottoman perception of the Bedouins is echoed in a decree sent in 1578 from Istanbul to a governor in Syria: "The Bedouins are an uncivilized (*vahşi*)[9] group of people. By cajolery it is possible to get hold of them; after one got hold of them it is easy to punish them."[10] This quote reveals that the strength of the nomads was imbedded in their evasiveness and their ability to live and travel in wild, uncivilized, regions. Hence, the Ottomans were quick to buy allies from among the Bedouins such as the Turabeğ clan, who guided the Ottoman troops in the Sinai desert on their way to conquer the Mamluk Egypt. The Ottomans rewarded the clan by nominating its heads to serve as the governors of the Lajjun district.

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[7] "وصارت الاخبار في كل يوم ترد على ملك الأمرا بأن جان بردى الغزالى نائب الشام قد زخق وخرج من الشام في عسكر كثيف يقصد نخو الديار المصرية, ومعه ... ومن عربان بنى عطا وبنى عطية ... . وفيه قدمت الأخبار بأن عربان بني عطا وبني عطية **اتقعوا*** مع عربان طائفة السوالم وكسروا طربای بن قراجا شيخ عربان جبل نابلس, وكان ملك الأمرا اخلع عليه وعلى جماعة من مشايخ عربان جبل نابلس, وانعم عليهم بمال له صورة, على انهم يلاقون جان بردى الغزالى ويخربونه قبل أن يدخل الى القاهرة" (Ibn Ayas, 375).

* **اتقعوا** - The verb وقع does not appear in the 8th conjugation in Arabic dictionaries I consulted with. However, the verb اوقع ب means attack or assault, which fits the context. Perhaps, this verbal form is a scribe's mistake or it reflects a sixteenth century Egyptian form, which does not fully comply with classical Arabic grammar (thanks to Moshe Sharon for the linguistic advice).

[8] "وكانت العربان فى هذه الايام في غاية الفساد بالبلاد الشامية, من عربان بنى عطا وبنى عطية." (ابن اياس, 395).

[9] *vahşi* could be translated also as barbarian or savage.

10 Heyd, p. 96. The Bedouins were a major challenge to the Ottoman rule also in Egypt, where the Ottomans nominated Bedouins to high offices with limited success. For more details see Winter, Michael (1992). Egyptian Society Under Ottoman Rule 1517-1798. London: Routledge.

The Ottomans delegated their authority to Bedouins in other districts as well. For instance, a few years after the conquest of the Mamluk Empire, Sultan Selim I (1512-1520) nominated a Bedouin *shaykh* as the governor of Sidon and the Biq`a (currently in Lebanon), but he rebelled shortly afterwards. Similarly, during the second half of the sixteenth century another Bedouin *shaykh* was nominated as the governor of the Nablus district, but he extended his influence to adjacent districts. The Ottomans disliked his actions and in 1593 they invited him to a party, where he – literally – lost his head.[11] These events demonstrate the difficulty of striking a self-enforcing deal between the state and the tribesmen, even if the latter were allies in earlier events.

During most of the sixteenth century the Ottomans preferred to exert direct control in the majority of the districts in Palestine while using big sticks. For instance, the town of Jerusalem benefited from the protection of a newly built wall (1538-41) and a local garrison. They also restored and built fortresses to guard roads from bandits. The *Bayt Jibrin* fortress between Gaza and Jerusalem, for instance, was explicitly restored in the mid sixteenth century because Bedouins raided villages in its neighborhood and looted pilgrims. Istanbul ordered to station soldiers in the fortress, and to supply it with: 8 light cannons/mortars, 100 muskets and 540 kg. Gunpowder.[12] Appendix E demonstrates the demographic and economic growth that followed the fortress' restoration.

While fortified forces provided local solution for violent threats, the Ottomans used other type of forces for providing security to most of the Gaza district: the provincial cavalry. Like most of the other Ottoman administrative units, the Gaza district was organized according to the blueprint of the *dirlik* (livelihood, in Turkish) system, which provided sources of income for the *sıpahı* (cavalry) class.[13] Typically, a cavalryman was bestowed with income from few villages according to his rank and the number of armed men he was obliged to maintain. The cavalryman – named in the local regulations "owner of the village" (*köyün ashabı*) – had also to protect and ensure the rule of law in his villages. He was directly motivated to do so by his right to collect the fines on crimes committed in his domain, in addition to the indirect incentive to protect his-own tax base from attacks. [14] One theoretical implication of this profit motivated law enforcement is that the cavalryman exerted more efforts in protecting his villages the higher was the tax rate of his villages. Hence, setting a high tax rate could alleviate the violent threat to vulnerable villages.

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[11] Sharon, 1975.
[12] Hayed, 115-16. The source specifies 2 *kintar*s of lead and 3 *kintar* of gunpowder. The quantities in the text are based on the *kintar* used in Palestine (180 Kg.). If, however, the source refers to the *kintar* of Istanbul (55 Kg.) the quantities of the lead and the gunpowder are 130 and 195 (respectively).
[13] For an introduction on the *dirlik* and the *timar* see: İnalcık. *"Dirlik"* and "*Timar"* EI^2
[14] See: Heyd *Studies in Old Ottoman Law*. It should be noted, however, that not all villages were "owned" by cavalrymen, some paid their majority of their taxes the sultan's budget (*şahı*) and *waqf*s (pious foundations).

The importance of the local cavalry for the security in the Gaza district is highlighted by the arrangement that Istanbul made when the governor left the district with his cavalrymen in the course of their military duties. For instance, as part of the Ottoman preparations for a military campaign against Persia in 1578, few imperial decrees instructed to send troops from Egypt to Gaza in order to protect the district. Similarly, when the governor of Gaza was nominated as commander of the *hajj* caravan in 1594, the governor of a neighboring district and the commander of the garrison in *'Arish* were ordered by Istanbul to protect the Gaza district.[15]

Villages in The Gaza District

The Ottoman tax records, our main sources of information on the villages in the Gaza district, depict a rapid demographic and economic growth of rural Gaza during the early Ottoman period. The recorded population doubled itself within less than four decades and the taxed grains production increased by 176% during the same period. The tax records, however, contain detailed information about the demography and production of the official sector, which Ottomans managed to detect and to tax. Clearly, part of the rapid demographic and economic growth should be ascribed to the improvement in the Ottoman control over the district. For instance, the first survey do not reports the males in 7 villages, while last two surveys provide names of residents in virtually all the district villages. So part of the recorded demographic increase is due to improved ability to record, and not to actual demographic changes.

Table 1: Demography and Production in the Villages of the Gaza Sub-district

In addition, due to the scarcity of other sources on Gaza little is known about the *actual* life in villages in sixteenth Gaza. One can infer from studies of adjacent districts, which used sources like local court records, about the daily life in rural villages in southern Syrian including Gaza. This study draws on such inferences, for instance in assessing the proliferation of firearms in southern Syria.

Regulating Extortion

Regulating the payments villages made to two armed tribes – the *Bani `Ata* and *`Arab Sawalma* – were one of the main tools the Ottomans used in Gaza to pacify the Bedouin tribes. These payments were embedded in the tax system and recorded in the tax records as any other rural due. We do not have many details on how the payments to the tribesmen were actually collected in the sixteenth century Gaza. However, the nineteenth-century traveler

[15] Heyd, 78. Mühime Defteri Cilt 38, Sıra 106, 8 Safer 987 (7 march 1579); Cilt 38, Sıra 108, 8 Safer 987 (7 march 1579); Cilt 38; Sıra 176. 22 Safer 987 (19 April 1579).

John Burckhardt provided a vivid account of how such tributes were collected by Bedouins south to Damascus in 1812.[16] This account highlights several features that characterize peasants-strongmen relations: the insecurity of the peasants' property rights, the possibility that multiple strongmen may tax the peasants without coordination, and the strongman ability to impose an increase in the bribe rates. This latter feature is resulted by the mere fact that the bribe rate, agreed (implicitly) before production took place, is not likely to be honored afterwards because the tribe is tempted to violently extract a larger share. All these features created disincentives for peasants in nineteenth century Hawran, and possibly in sixteenth century Gaza as well, to invest in production and probably undermined agricultural production.[17]

It seems that the Ottomans intended to obviate these disincentives by defining how much, if any, should each village and grain fields (*mezra*s) pay to local tribes. Shortly after the conquest, the Ottomans defined and recorded in the tax registers payments by about a third of the villages to two tribes. Thus, continuous increases in the rates of impositions demanded by the tribes were prevented, and the peasants were able to optimally invest in production since the tax rate was already set and predictable. This innovation also coordinated the payments to various tax recipients and consequently a tax rate that can increase the total production and revenues.

Later on, in the mid-sixteenth century, the Ottomans institute a special procedure for making payments to the tribesmen. This procedure differed from the procedure of payments to other tax recipients as it explicitly aimed at preventing exploitation of the peasants by the Bedouins. The procedure of collecting 'protection payments' by the tribes was defined in Gaza's *kanunname*, the codified regulations of the district, which were attached to the tax records of 1557 and 1596:[18]

> "… At the time of the [tax] division[19] they [the tribesmen] will arrive at every village with 30-40 horsemen. At the time of the [tax] division or in any other time they [the tribesmen] should not arrive in the villages in groups for

[16] "… [T]he most heavy contribution [tax] paid by the peasants is the tribute to the Arabs [=Bedouins]. … [they] are, from remote times, entitled to certain tributes called *Khone* (brotherhood) [probably, khowe H.E.], from every village … . In return for this *Khone*, the Arabs abstain from touching the harvest of the village ... . Each village pays *Khone* to one Sheikh in every tribe, … and he protects the inhabitants against all members of his own tribe. … The amount of the *Khone* is continually increasing; for the Arab Sheikh is not always contented with the quantity of corn [i.e. grain] he received in the preceding year, but he asks something additional … which soon becomes part of his accustomed due." Burckhardt concluded that, "these various oppressive taxes, under which the poor *fellah* [peasants] groans, are looked upon as things of course, and just contribution;" (Burckhardt, 1822:301-302)

[17] Burckhardt made another interesting observation, namely, that protection payments were made in corn, i.e. grain. The analysis below indicates that the Gazan tribesmen preferred wheat over barley.

[18] Gazze *kanunnamesi*. *Tahrir defteri* 304. See note in bibliography. Amy Singer's help in the translation of this paragraph was indispensable.

[19] kism zamanında - literally time of division. Refers to the period of harvest and the subsequent division of the yields between the peasants and the tax recipients.

it imposes unbearable dues[20] on the peasants. Let them take [their lot] from the [revenues] shares, which are registered [as belongs to the tribes] in the new imperial *defter*, from the hands of the owner of the village[21] … in order that they [the tribesmen] will not enter the villages. It [the transaction] should be registered. Henceforth, let it be done in the manner recorded above."

Clearly, this regulation aimed at protecting the peasants from probable harms by the tribesmen. It recognized that the entry of tribesmen into a village imposed an undue burden on the peasants, and tried to prevent it. It also set a tax collection procedure, which provided the Bedouins with their share in the tax revenue without any contact with the vulnerable peasants: 'the owner of the village', usually a well trained cavalryman, who was not likely to be easily deterred, was to deliver the Bedouins' share to them. In this way, the regulation intended to prevent the Bedouins from extorting the village for more than the shares legally allocated to them.[22] Moreover, it guarantied the state's control over the delivery of the payment, and thus it could facilitate coordination of the payments made by different villages. This regulation,similar regulations in Gaza[23] and other districts and the Ottoman theory of circle of justice (*Daire-i Adalet*)[24], suggest that the Ottomans understood very well the importance of protecting producers' property rights in enhancing the empire's economic prosperity.

Perhaps the terminology the Ottomans used to describe the payments to the Bedouins hints at the nature of these payments. The allocations were called *tımar-i 'arab* in the earliest tax survey (c. 1519), *hisse-i 'arab* (share of tribesmen) in the later tax surveys (c. 1531, 1548 & 1557) and *ikta' tariki* in the local regulations. The first term suggests that the Ottomans originally intended to incorporate the Bedouins into the *tımar* system and perhaps to employ them as auxiliary forces as did the Mamluks, but the second term hints that they were not treated as part of the military *tımar* system in the subsequent surveys. The last term hints that these tribes may have played a role in protecting roads in the Gaza area, as was the Bedouin

[20] Teklif-i ma la yutak.
[21] Refers to the main tax recipient of every village, and not to private owners.
[22] One could interpret the presence of the 30-40 horsemen as another check on the behavior of the Bedouins. Even though the text does not mention the identity of the 30-40 horsemen, it seems unlikely that they were Bedouins for the regulation forbade them from entering into the villages in groups. If this interpretation is correct, the company of horsemen, possibly part of the local cavalry unit, was meant to deter any misconduct.
[23] It should be noted that the local regulations of Gaza aimed at protecting the peasants not only from the tribesmen but also from other powerful persons; other paragraphs condemn some ten types of taxes and dues as illegal and as exploitive (*zulm*), and paragraph forbids law enforcement officers and tax collectors to demand additional payments while they visit villages.
[24] The theory of *Daire-i Adalet*, on which the Ottoman statesman and for a while the governor of Syria Kınalızade Ali (1510-72), wrote extensively, stresses the dependence of the empire's prosperity on the provision of justice and security to Ottoman subjects, who produce economic wealth. This notion is found in medieval Muslim writings about statecraft, including the works of the renowned fourteenth-century scholar Ibn Khaldun.

Shaykh described in the opening of the article. Such a role, however, is not clearly defined in the regulations.[25]

Descriptive statistics of the villages' taxes including payments to the Bedouins are presented in Table 2. First, despite the increase in the number of villages from 104 in 1519 to 134 in 1557, the percentage of villages that paid some tax to the tribes was about 30% in all of the surveys. Similarly, the tribes' share of the total tax revenue from villages in the *nahiye* of Gaza varied between 3.8% and 5.2%. In other words, the Ottomans bribed the tribes with a marginal, but not insignificant, share of the total tax revenues collected from the Gaza sub-district. The geographic distribution of the paying and *non-bribing* villages is presented in maps in appendix B.[26]

Table 2: Tribes' Tax Revenues by Year and Bribing Status

The impositions paid by rural producers to the *Bani `Ata* and the *`Arab Sawalma* tribes were counterbalanced by increasing lump-sum taxes these tribes had to pay to the local governor: These lump-sum taxes are not mentioned in the 1519 defter, but these lump-sum taxes were set to 25,000 akçe in 1531 and to 30,000 akçe in 1548 and 1557. The lump sum taxes between 1531 and 1557 amounted to 50-53% of the payments these tribes collected from villages and *mezra*s. In fact, as the tribes' fiscal balance sheet demonstrates (Table 3) the tribes gained very little for the rapid growth of the official economy in Gaza. This distinctive tax scheme hints that the payments to the tribes and the lump-sum taxes paid by the tribes were part of a well-designed tax system.

Table 3: Fiscal Balance Sheet of the Bani `Ata and `Arab Sawalma Tribes (Current Akçe)

Coordination of the Ottoman Strategy Towards the Bedouins in Gaza

The Ottoman policy towards *nomad* Bedouin tribes often involved inter-district, and sometimes inter-provincial, coordination of actions, including retaliation, against the Bedouins. The model below demonstrates that state's ability to coordinate bribing strategies across villages strengthens the state's position vis-à-vis the tribes. The most compelling documented evidences for coordination of the Ottoman bribing policy towards the Bedouins in Gaza are the tax records themselves. They detailed the expected bribes that each village

[25] See the episode that opens this paper. Cohen described how the Ottoman authorities in Jerusalem entrusted the heads of two villages, Qaryat al-`inab and Saris, to guard the road to Jaffa in return for road tolls. Zeevi refers to a similar case in which the villages of Bayt Iqsa and Bayt Laqiya collected road tolls from travelers and were responsible to guard the road. Amnon Cohen. *Economic Life in Ottoman Jerusalem* (1988). p. 199. .25 זאבי. ע'

[26] I have not observed any special geographic characteristics of the bribing villages.

had to pay to the tribes in Gaza, and the taxes the tribes were to pay to the Ottomans. These records were compiled four times between the Ottoman conquest (1516) and 1557, by teams sent from Istanbul. The records were formally ratified with the sultan's seal on their front cover. The gradual improvement of the quality of the first surveys of the Palestinian districts – observed by Cohen and Lewis – suggests that the Ottomans progressively improved their control over the Gaza district. The number of villages without detailed lists of the residents' names provides quantitative corroboration for Cohen and Lewis' observation: the number of such villages declined from 7 (6.4%) in the first tax survey (c. 1519) and 5 (3.9%) in the second survey (c. 1519) to 0 (0%) and 1 (0.7%) villages without name lists in the third and forth survey. The growing ability or willingness of the census takers to survey the population in all villages hints that the state had better capacity to use its representatives for controlling the population in rural Gaza.

Another evidence for an Ottoman attempt to coordinate the behavior of its representatives towards the Bedouins is the local regulation that specified the manner in which the payment to the tribes should be made. Yet, both the tax records and the local regulation are only *blueprints* of how the Gaza district should be managed, and they do not reveal how the local governor and cavalry of Gaza *actually* curbed the Bedouins. Specifically, we do not have evidence on coordination of the actions of the local cavalry in villages

We do have, however, evidence on such coordination at higher levels. The records of the Sultanic decrees sent from Istanbul provide substantial evidence for Istanbul's inter-district coordination of retaliation against rebellious Bedouins from the Gaza district. In 1572 the Governor of the Damascus province was ordered to prevent the district governors from aiding fleeing mutinous and to hand them over to the governor of Gaza. Similarly, in 1574 the governor of Lajjun (150 Km north to Gaza), who was a Bedouin by himself, not to provide refuge to rebels from Gaza. In 1579 Istanbul ordered the governors of Jerusalem, Nablus & Lajjun to assist the governor of Gaza to restrain Bedouins, "who kill people and loot money". Another example for an attempt to coordinate a regional boycott against the *Bani `Ata* and *Bani 'Atiya* tribes, as described above[27].

The coordination was not limited to the province of Damascus only, but involved inter-provincial coordination with Egypt: in 1578 and in 1586 the Governor of the neighboring province of Egypt was ordered to send troops to fight the rebellious Bedouins in Gaza. The coordination was not limited to retaliation only; during the following year the governor of Egypt was ordered to send a troops to guard the Gaza district, presumably from Bedouins,

[27] *Mühime Defterleri* Cilt 21 sıra 473; 21 Zafer 980. (3 July 1572); Cilt 24 sıra 721 3 Safer 982 (2 Feb 1574); Cilt 38, Sıra No. 108,. 8 Safer 987. (April 1579); Cilt40 ; Sıra No. 746; Sahifesi 323 27 Ramazan 987. (17 Nov 1579). Sometimes Istanbul even interfered with curbing the Bedouins inside the Gaza district: in 1574 the governor of Gaza was ordered to allocate forces to fight the Bedouins. Cilt 25 sıra 1016 30 Zilkade 981 (23 Mar 1574);

when the local cavalry went to a war campaign.[28] I take the inter-district and the inter-provincial coordination of the policy towards rebellious Bedouins from Gaza as indication that the ottomans were aware for the advantages of using a cohesive strategy for curbing the Bedouins. Hence, we may conjecture that the Ottomans used also a multi-village strategy against mutinous Bedouins in Gaza, as assumed by the dynamic model.

Literature Survey – To be completed

III - Model

This model considers the interaction between a state, a violent tribe and a village, in an economy without secured property rights. The state collects taxes from the village's product, net of the tribe's booty, and hence it has an incentive to defend the village from tribal raids. The state could also use the tax revenues to bribe the tribe in order to increase its revenues net of defense expenses. The key assumption of the model is that banditry is costly, and it is not always profitable for the tribe to raid the village. Hence, the state and the village can strategically set the taxes and the production to manipulate the tribe's profits and in some cases to render a raid on the village to be unprofitable.

The model characterizes few strategies that state and exposed villages can use to improve their welfare in *short run interaction* in a world without secure property rights:

i. The village or the state could *bribe* the bandits.
ii. The state and the village could agree to set a *high tax* rate that induces the former to protect the village.
iii. The village could *retrench* (cut back) his production to lower the potential booty and thus rendering a potential raid unprofitable.

When the village and the state choose to set *high tax rate*, to *retrench* or a combination of these strategies, they incur low levels of production and loss of social welfare. These losses are resulted by the inability of the parties to sustain a self-enforcing *Bribe for Peace* deal in short run interaction. On the other hand, a *long run* peaceful and mutually beneficial equilibrium could be sustained if that the players are sufficiently patient.

It is not clear, however, whether it is reasonable to assume that a nomadic tribe – a classic example for Olson's roving bandit – is patient enough to sustain such demanding equilibrium. This model demonstrates that the state's control over the delivery of the bribes enables her to coordinate the payments of different villages, and thus it could support a *Bribe for Peace* even when the tribe is relatively impatient. Alternatively, the coordination of the payments between villages could generate an externality that benefits *non-bribing* villages: it allows them to

[28] *Mühime Defterleri* Cilt 33; Sıra 629; 17 Zilkade 985 (25 Feb 1578); Another interesting decree ordered to banish to Cyprus military commanders (*Yeniçeri bölük başılar*) from Damascus because they were allies of mutinous Bedouins. Cilt 40; Sıra No. 50; 22 Zilhicce 986 (19 Feb 1579).

abandon the other survival strategies: *retrenching* and *paying high taxes* and increase production. Thus, the state's ability to coordinate bribing transactions across villages could generate economic growth of the *non-bribing* villages.

Model Setup

Consider an economy that includes (i) a village (ii) a tribe and (iii) a state. The village produces a crop while the tribe and the state use coercive power to extract shares of the villages product. They can use also fight each other, over these revenues. There is full information so that players know each other's type and costs schedules.

Strategies

The village decides on the level of production of the crop (Y) using labor (L); The tribe exerts costly efforts (e_T) in raiding the village or avoids this violent activity ($e_T=0$); The state announces the tax rate $(\tau \in [0,1])$ it will collect from the village, and it may allocate a share of the product $(q \in [0,1])$ to bribe the tribe, and finally it exerts efforts in protecting the village (e_S) from raids.

Technology

The *tribe's violent appropriation technology* divides the village's product between the tribe, and the other players. The share of the tribe's booty is: $b(e_S, e_T) = e_T / (e_S + e_T)$ where e_T and e_S are the efforts exerted by the tribe and the state (respectively).[29] A violent struggle costs the tribe a fixed cost (C_T) and α per unit of the tribe's effort (e_T). Similarly, such struggle costs the state a fix cost (C_S) while the cost of unit of the state's defense efforts (e_S) is normalized to unity. The total cost functions of a fight are:

Tribe: $TC_T = C_T + \alpha\, e_T$; **State:** $TC_S = C_S + e_S$.

The *village's production technology* is a convex and monotonously increasing in labor input: Y'(L)>0, Y"(L)<0.

Timing of the game

I. The state sets the tax rate (τ) and the rate of bribe (q) to be collected by the state and by the tribe (respectively).
II. The village produces Y units of the agricultural good.
III. The state delivers the bribe to the tribe ($\hat{q} \cdot Y$).
IV. The Bedouin tribe and the state decide simultaneously on the efforts they invest in raiding ($e_T \geq 0$) and protecting ($e_S \geq 0$) the village. The tribe may decide to avoid raiding the village ($e_T = 0$).
V. The State collects the tax from the village

[29] This appropriation technology was used by Grossman and Kim (1995) 103:6 JPE and by Konrad & Skerpedas (1998).

Figure 2: Extensive Form of the Model

Payoffs:

The *village's payoff* is:

(1) $$V_A = (1-b)(1-\tau)(1-q)p_Y Y(L) + (\bar{L} - L)$$

where *b,* τ and *q* are the booty, bribe and the tax rates, p_Y is market price, and *L* is the amount of labor invested in production. $(\bar{L} - L)$ is interpreted as leisure or production of untaxed products. The model assumes that $\bar{L}$ is sufficiently large to rule out corner solutions. The village has an outside option v_A^0.

The *tribe's payoff* is

(2) $$V_T = b(e_T, e_S)\cdot(1-q)p_y^T Y - e_T\alpha - C_T * 1(fighting) + q \cdot p_y^T Y$$

Where $b(e_T, e_S)$ is the booty rate, *q* is bribe rate, p_y^T is the price the tribe gets for the booty, α is the cost of unit of the tribes effort, *C* is the fixed cost of raiding and.

The *state's payoff* is:

(3) $$V_S = \tau \cdot [1 - b(e_S, e_T)]\cdot(1-q)p_Y Y - e_S - C_S * 1(fighting)$$

Where the state's cost of unit of effort of defense is normalized to 1.

Equilibrium

Equilibrium is a profile of strategies $(\tau, q, Y, \hat{q}, e_T, e_S)$ – the tax rate and the bribe rate announced in stage I, the level of production, the actual bribe rate (stage IV) and the levels of efforts exerted in raiding and defending the village – so they are optimal responses given the timing of the game. In addition, the bribe rate announced in *stage I* must be equal to the actual bribe rate transferred to the tribe in *stage III* $(q = \hat{q})$. The equilibrium concept used here is a sub-game perfect equilibrium.

Solution by Backward Induction

Stage IV: Equilibrium in the violent struggle between the state and the tribe:

The tribe and the state choose simultaneously the levels of efforts in banditry and defense *(e_T, e_T,* respectively*)* to maximize their consumption net of their costs:

(4) Tribe: $$\underset{e_T}{Max} V_T = \frac{e_T}{e_T + e_S} p_Y^T Y(1-q) + q \cdot p_Y^T Y - \alpha \cdot e_T - C_T \cdot 1(fighting)$$

State: $$\underset{e_S}{Max} V_S = \tau \frac{e_S}{e_S + e_T}(1-q)p_Y Y - e_S - C_S \cdot 1(fighting)$$

The FOCs of these problems yield the following condition in internal solutions:

(5) $$e_S(1-q)p_Y Y/\alpha = [e_S + e_T]^2 = e_T\tau(1-q)p_Y Y \Rightarrow e_S = e_T\tau\alpha\, p_y / p_y^T$$

Hence, the share of the tribe's booty (*b*) in *internal solution*s is:

(6) $$b = \frac{e_T}{e_T + e_S} = \frac{1}{1 + \alpha\tau\, p_Y / p_Y^T} \equiv \bar{b}$$

Note that the booty rate decreases with the variable cost of raiding (α) and the tax rate (τ) and the price the state gets for the rural product (p_Y) and it increases in price the tribe gets for the rural product (p_Y^T). Hence, an improvement in the technology of raiding $(\alpha \downarrow)$ increases the tribe's booty, while high tax rate $(\tau \uparrow)$ and a commercial boycott on the tribe $(p_Y^T \downarrow)$ results in a decrease in the booty rate.

The payoffs for the players in *internal solutions*, when the village is exposed to raids, are:

(7) $$V_T^{Exposed} = \bar{b}^2 (1-q) p_y Y = \left(\frac{1}{1 + \alpha\tau\, p_Y / p_Y^T} \right)^2 (1-q) p_y Y - C_T$$

$$V_S^{Exposed} = \tau (1-\bar{b})^2 (1-q) p_y Y = \tau \left(\frac{\alpha\tau\, p_Y / p_Y^T}{1 + \alpha\tau\, p_Y / p_Y^T} \right)^2 (1-q) p_y Y - \underline{C}_S$$

$$V_A^{Exposed} = (1-\tau)(1-q)(1-\bar{b}) p_y Y(L) - L = (1-\tau) \left(\frac{\alpha\tau\, p_Y / p_Y^T}{1 + \alpha\tau\, p_Y / p_Y^T} \right) (1-q) p_y Y(L) - L$$

Assuming that the state's fixed costs (C_S) are sufficiently low and that the tribe raids the village if the payoff of a raid strictly positive yields the No Profitable Raid (NPR) condition: $\underline{C}_T \geq (\bar{b})^2 (1-q) p_Y^T Y$.

Thus, the booty rate is: (8) $$b = \begin{cases} \bar{b} \equiv \dfrac{1}{1 + \alpha\tau\, p_Y / p_Y^T} & C_T < \bar{b}^2 (1-q) p_Y^T Y \\ 0 & C_T \geq \bar{b}^2 (1-q) p_Y^T Y \end{cases}$$

The payoffs of the players when the village is *unexposed* to raids, i.e. when it is not a profitable target for raid, are:

(9) State - tax on production net of the bribe: $V_S^{Unexposed} = (1-q)\tau \cdot p_Y Y$

Tribe - the bribe: $V_T^{Unexposed} = q \cdot p_Y^T Y$

Village - production net of tax and bribe: $V_A^{Unexposed} = (1-\tau)(1-q) \cdot p_Y Y(L) - L$

Stage III: The State Transfers Bribe the Tribe

The state bribes the tribe if this action increases its revenues. However, for state bribing the tribe when the village is protected is strictly dominated by not bribing. Similarly, bribing the tribe when the village is exposed without moving it beyond the *No Profitable Raid* constraint is dominated by not bribing.[30] The state may decide to bribe the tribe with a q of

[30] $\frac{\partial V_S^{Exposed}}{\partial q} = -\tau \cdot \bar{b}^2 p_y Y$; $\frac{\partial V_S^{Unexposed}}{\partial q} = -\tau \cdot p_y Y$

the village's product to render a raid *unprofitable*.[31] Such bribe could not exist in a *short-run* equilibrium for rural production is costly and hence the village would initially produce just to satisfy the *No Profitable Raid* constraint. In such case the state will not bribe the tribe.

Stage II: Rural Production

The village decides on the level of production (Y) taking into account the expected results of the violent struggle between the tribesmen and the state.

(11) $$\underset{L_Y}{Max}\, V_A = (1-b)(1-\tau)p_Y Y(L) + (\bar{L} - L)$$

s.t. (i) Booty rate: $$b = \begin{cases} \bar{b} \equiv \dfrac{1}{1+\alpha\tau\, p_Y / p_Y^T} & C_T < \bar{b}^2 p_Y^T Y \\ 0 & C_T \geq \bar{b}^2 p_Y^T Y \end{cases}$$

(ii) participation constrains: $V_A \geq V_A^0$

The *internal solutions* are characterized by FOC:

(12) $$(1-b)(1-\tau)p_Y Y'(L^*) = 1$$

The taxonomy of the village includes three types: (i) *unexposed* village; (ii) *exposed* villages; (iii) *retrenching* village.

Unexposed village (high values of C) is a village that does satisfy the No Profitable Raid constraint when it produces at the competitive level of production given the tax rate:

(13) $$(1-\tau)p_Y Y'(L^*) = 1 \text{ when } Y(L^*) \leq \frac{C_T}{p_Y^T}\bar{b}^2 \;\; \& \;\; V_A \geq V_A^0$$

A unexposed village is not vulnerable for attacks and it can ignore the bandits at the above-mentioned competitive level.

If the village is vulnerable for attacks it can choose between two options: producing while being *exposed* to raids and losing a share $\bar{b}$ of its product to bandits, or *retrenching* (cutting back) its production in order to satisfy the No Profitable Raid constraint.

An *exposed* village is characterized by:

(14) $$(1-\bar{b})(1-\tau)p_Y Y'(L^*) = 1 \qquad \text{when} \quad Y(L^*) > \frac{C_T}{\bar{b}^2 p_Y^T} \;\; \& \qquad V_A \geq V_A^0$$

A *retrenching* village is characterized by reduced production:

(15) $$Y(\hat{L}) \equiv \frac{C_T}{\bar{b}^2 p_Y^T}$$

The consumption-labor set of the villages is presented in figure 3. The vertical axis represents the consumption of Y, i.e. the production of Y net of the tax and the booty

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[31] $q = 1 - \dfrac{C}{\bar{b}^2 p_Y Y}$

collected by the state and the tribe (respectively). The horizontal axis is the labor input in production. Hence, the village can choose between consuming at the protected zone below or equal the threshold of the No Profitable Raid $\left(\hat{Y}\right)$ and consuming beyond this threshold while being exposed to banditry and losing a share of $\bar{b}$ of its product. This choice depends on the fixed cost of raiding (C_T): an increase in C_T shifts upwards the *No Profitable Raid* threshold and expands the region, in which the village is protected.

Figure 3: The Consumption–Labor Set of a Village

Figure 3 also demonstrates that bribing the tribe to move below the No Profitable Raid constraint is not an equilibrium: The village strictly prefers to reduce its costly production to satisfy the constraint (stage II) before the state transfers the bribe (stage III). In other words, production at point A dominates any point in the line (A,B].

Stage I: Setting the Tax (τ) and the Bribe Rate (q)

The state sets the tax rate and announces the bribe (to be paid in stage III) to maximize its revenues net of the costs of defending the village. As mentioned above, unless the state is able to condition the bribing on the subsequent behavior of the tribe the bribe transferred in stage III is *q=0*. Hence, an announcement on a strictly positive bribe rate is not credible.

The tax rate chosen by the state is the tax rate that maximizes its income by manipulating the status of the village (*unexposed*, *exposed* or production *retrenching* village):

$$\tau = \arg\max\_ Max\left[V_S^{\Pr otected}, V_S^{Exposed}, V^{retrenching}\right]$$

where $V_S^{\Pr otected} = \tau Y(\tau) = \tau(L^*)$ so that L^* satisfies condition (13).

$V_S^{Exposed} = \tau(1-\bar{b})^2 Y(L^*)$ so that L^* satisfies conditions (14) & $V_A^{Exposed}(\tau) > V_A^{\Re trenching}(\tau)$

The production of the *retrenching* village is determined by the NPR constraint. Hence, the state can increase the tax rate (τ) until the competitive level of production decreases just to satisfy the NPR constraint. At the same time the increase of the tax rate (τ) shifts upwards the NPR curve. Clearly the participation constraint must also be satisfied. Such village is name a *highly taxed* village:

$V_S^{highly\_taxed} = \tau \cdot Y(L^*)$ so that NPR: $Y(L^*) = \frac{C_T}{\bar{b}^2 p_y} \equiv \frac{C_T}{p_y}\left(1 + \alpha\tau\, p_Y / p_Y^T\right)^2$; The village's PC: $V_A > V_A^0$; $Y(L^*)$ is the competitive level of production: $(1-\tau)p_Y Y'(L_Y^*) = 1$; & $V_A^{Highly\_taxed}(\tau) \geq V_A^{Exposed}(\tau)$

Alternatively, if the participation constraint of the village does not allow for such an increase in the tax rate, the village sticks to a *retrenching* strategy:

$V_G^{retrenching} = \tau Y(L)$ so that PC: $V_A = V_A^0$, NPR: $Y(L_Y) = \frac{C_T}{\beta^2 p_y^T}$;

$V_A^{\text{Re}trenching}(\tau) > V_A^{Exposed}(\tau)$ and $(1-\tau)p_Y Y'(L_Y^*) < 1$

The state-village relations are mutually beneficial because both of them use their comparative advantage – protection and production (respectively) – to alleviate the tribal threat. Specifically, the tax revenues induce the state to defend the village in the violent struggle with the tribe at stage IV. Hence, an increase in the tax rate collected by the state reduces (τ) the booty rate (b) at the intensive and possibly even at the extensive margins. In terms of the above taxonomy, higher taxes moves villages from the status of *exposed* to to the status of *unexposed*, *retrenching* or *highly taxed*.

In fact, since the model assumes that the villages is defenseless and only the state can protect it from a tribal raid, the village would not produce anything when the state does not collect taxes $(\tau = 0)$ because all its product would be expropriated by the tribe. Therefore, in the neighborhood of $\tau = 0$ an increase in the tax rate reduces the total rate of impositions (tax and booty) collected from the village and thus it induces the village to increase its production (see numerical example below). Therefore, an exposed village has an incentive to seek the protection of a specialist in violence that would protect it from raids and collect taxes from it.

Proposition 1:

i. An increase in the tax rate in the range $\tau \in \left[0, \frac{-1+\sqrt{1+\alpha}}{\alpha}\right)$ reduces the total rate of the impositions (tax and booty) collected from *exposed* village and thus it induces its production.

ii. The tax rate that maximizes the state's payoff from an exposed village is higher than the equivalent tax rate when the village is not exposed to banditry. Moreover, the optimal tax rate of the *exposed* village converges to the optimal tax rate of the unexposed as the variable raiding cost increases:

$\tau^{Exposed} \equiv \arg\max V_S^{Exposed} > \tau^{Un\exp osed} \equiv \arg\max V_S^{Un\exp osed}$

$\tau^{Exposed} \xrightarrow{\alpha \to \infty} \tau^{protected}$

iii. The level of production of the exposed village is lower than the level of production of the protected village: $Y^{Exposed} < Y^{protected}$.

Proof see appendix D.

Proposition 2: There are $\hat{C}_T$ and $\widetilde{C}_T$ such that: If the fixed cost of raiding the village (C_T) satisfies $C_T < \widetilde{C}$ the village will be an *exposed village*; If $C_T > \hat{C}$ the village is a

unexposed village; if $\hat{C} \geq C_T \geq \widetilde{C}$ the village will be either a *retrenching* or a *highly taxed* village.

Figure 4: Types of Villages and fixed Raiding Costs

Gains from a Bribe for Peace Deal

When the village is either an *exposed village* or a *retrenching village* all sides could achieve substantial gains if they could strike a self-enforcing deal: the state delivers a bribe to the tribe in exchange for peace. In the case of an *exposed village* both sides can save the costs of violence. In the case of *retrenching* village the latter could increase its production beyond the NPR constraint, from which all parties could benefit. Finally, in the case of *highly-taxed* and *exposed* villages the state could reduce the tax rate that induces rural production. Hence, a credible bribe for peace deal can generate growth and enhance the social welfare in all types of *unprotected* villages: *retrenching, highly-taxed* and *exposed* village. The state's ability to coordinate the bribing strategies across villages plays a crucial role in achieving such growth in dynamic setting.

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Numerical Example

This numerical example demonstrates the interaction between the fixed and varying costs of banditry, the tax rate, the rural production and the resulted equilibria. The production function in this example is: $Y(L) = L^{0.75}/0.75$. The prices of the rural good are equal and set to unity $\left(p_y = p_Y^B = 1\right)$. The cost of efforts exerted in banditry (α) gets the values 1, 15 and 80 to reflect the relative advantage of the state in violence (the cost for the state is set to unity). The numeric example includes also the calculation of the variables when there is no banditry as a reference case. The fixed cost of raid is initially set to zero $\left(C_T = 0\right)$.

Figure 5 presents the values of the rural production as a function of the costs of banditry and the tax rate. It depicts the pivotal role of the varying costs of banditry: as the varying cost of banditry decreases the maximal level of production drops. Specifically, when the state has no comparative advantage in violence – when the costs of banditry are equal to the cost of defense $\left(\alpha = 1\right)$ – the rural production is slashed.[32] Conversely, as the varying cost of banditry increases the production of the exposed village converges to the production of unexposed village. The historical evidence below highlight this relationship by considering the consequence of the proliferation of firearms.

[32] This model does not consider the impact of destruction caused by raids. Adding this factor to the analysis only amplifies this result.

Figure 5: Village Production by Banditry Costs and Tax Rate

Figure 5 also demonstrates that the production of an *exposed village* initially increases with the tax rate and then declines. The subsequent decrease is the standard adverse impact of rising tax rate on the producer's incentives as in the case of the *unexposed* village.

Figure 6 presents the state's revenues by raiding costs (α) and tax rate (τ). As with the production, the costs of banditry play a pivotal role: the higher the varying cost of banditry (α) the higher the maximal revenue the state can collects. In addition, as showed in the proposition above, an increase in the varying cost of banditry causes a decline in the optimal tax rate for the state – i.e. the tax rate that maximizes the state's revenues. Both the maximal revenue and the optimal tax rate converge to the maximal revenues and optimal tax rate of the *unexposed* village as the varying banditry cost increases. In other words, the consolidation of the state's rule is accompanied with a decrease in the tax rate of the *exposed villages* and an increase in the tax revenues.

Figure 6: The State's Revenues by Banditry Costs and Tax Rate

Figures 7-A to 7-C highlight the role of the No Profitable Raid (NPR) constraint. The figures present the state's revenues as a function of the tax rate, when the village is exposed $(\alpha = 30)$ and unexposed to raids $(\alpha = \infty)$, and the NPR curve. The villages right to the NPR curve are safe from banditry, while the villages left to the curve are profitable targets for looting. The NPR is crucially dependent on the ration of the fixed cost of raiding a village over the price of the rural product (C/p_y^T): Figure 8-A presents a *protected* village (high fixed cost of raiding) for which the state maximizes its revenues on the unexposed payoff schedule. Conversely, Figure 8-B presents an *exposed* village (low fixed cost of raiding), where the state picks the tax rate that maximizes its payoff on the exposed revenues curve. 8-C presents the intermediate case when the village is either *highly taxed* (B) or *production retrenching* (A-B). In the former case the state raises the tax rate until the village produces on the unexposed payoff curves so the NPR binds. In the latter case the state cannot increase the tax rate because of the participation constrain of the village, but the village chooses to cut back it production to render a potential raid unprofitable.

Figures 8-A, 8-B, 8-C

Note that the NPR curve, $\hat{Y} = C/p_{yY}^T \overline{b}^2 (\overset{+}{p_{yY}^T})$, depends on the Bedouin's value of the rural product (p_Y^T): a rise in the price of the rural product induces higher level of banditry efforts, and shifts outwards the NPR curves. Thus, it exposes to banditry previously protected village. Hence, an increase in the price of the rural product may cause a reduction in the

production because of the increased banditry. This adverse effect of the rise in the rural good's product is amplified when the means of banditry are tradable good, such as weapons. An increase in the price of the rural good relative to the price of weapons brings about investments in these means of banditry. These investments in weapons reduce the varying cost of raiding and hence it further reduces the production – i.e. the tax base – and the incentives for the state to protect the villages.

Dynamic Setting – Coordinated vs. Uncoordinated State Strategies.

The legal procedure of paying the bribe to the tribes – as defined in the local regulations – stressed the role of the representative of the state in the transaction. He was to deliver the bribe from the village to the Bedouins "with his own hands"[33] so the latter would not harm the village. The role of the state's representative in the delivery allowed the state to verify the bribes did not exceed the lawful share. Moreover, it could have enabled the state to coordinate the bribing strategy across villages, and perhaps even to condition the payment of the bribe from one village on the peaceful behavior of the tribe towards other villages.[34]

The dynamic model focuses on the potential gains from the state's ability to condition the delivery of the bribe from one village on the (mis)conduct of the tribe towards other villages. I assume that the state can disseminate the information about the tribe's transgressions and control the actions of its representatives in the villages at probability ρ. An increases in ρ facilitates a more cohesive strategy of the state throughout the set of villages, while when the $\rho=0$ the state plays a separate repeated game in each village and cannot condition its strategy in one village on the safety of another village.

The dynamic model is an infinitely repeated game that for simplicity uses a specific solution (*high-tax*) of the above one period game as the constituent game. The constituent game is summarized in Figure 9.

Players: a Tribe and a State.

Actions: Tribe {Raid, Peace}; State {Bribe, High Tax Rate, Low Tax Rate}

Stages of the game:

(I) The state set's high or low tax rate for period t.

(II) Rural production is high $\overline{Y}$ (low $\underline{Y}$) when the tax rate is low (high).

(III) When the tribe visits a village, the state decides whether the bribe the tribe.

(IV) After collecting the bribe, the tribe decides whether to raid the village

[33] See the above quote of the regulation.

[34] It should be stressed that such conditioning of the payment of the bribes is a *possible* interpretation of the state's involvement in the bribing actions, and it is not possible to support such intra-district inter-village cooperation because of the available documentation. I will present, however, evidence on inter-district, and even inter-provincial, cooperation in suppressing rebellious tribes.

* If any village was raided other villages learn about the misconduct in probability ρ. Back to stage (II) - the tribe visits the next village until all the villages were visited once during the (harvest) period.

Figure 8: Multi Village Regulated Extortion game

Payoffs:

Tribe: $V_T^{Bribe/Raid} > V_T^{Bribe/Peace}$; $V_T^{Low\_tax/Raid} > V_T^{Low\_tax/Peace}$;

$V_T^{High\_tax/Raid} < V_T^{High\_tax/Peace} = 0$

State: $V_S^{High\_tax/Raid} > V_S^{Low\_tax/Raid} > V_S^{Bribe/Raid}$;

$V_S^{Low\_tax/Peace} > V_S^{Bribe/Peace} > V_S^{High\_tax/Peace}$

In other words, the tribe prefers to raid when the state bribes or sets low tax rate that induces production and the potential gain. The tribe, however, prefers not to raid the village when the state sets a high tax rate and production is low because a raid yields negative return. The state prefers to set high tax rate when the tribe raids, and to set low tax rate when the tribe is peaceful. Bribing is always dominated by other actions. Hence, the only SGP equilibrium in a one shot game is: {High Tax, Peace}. However, {Bribe, Peace} is pareto superior but is not an equilibrium because the tribe prefers to deviate and raid the village. The following solution focuses on the tribe's considerations, while the state has similar considerations.[35]

Repeated Game - No Coordination

The folk theorem for discounting players shows that an efficient equilibrium {Bribe, Peace} could be achieved if the players are sufficiently patient or if the gains from deviating are small enough. Specifically, the tribe would not raid the village if the state uses a grim trigger strategy – bribe as long as the tribe did not raid this specific village; in case of a raid the increase tax rate – and its discount factor exhibits:

$$\delta \geq \frac{V_T^{Brive/Raid} - V_T^{Brive/Peace}}{V_T^{Brive/Raid} - 0} \equiv \delta^*$$

A {Bribe, Peace} equilibrium requires analogues conditions should also hold for the state.

I denote the payoffs derived from a village that can sustain a {Bribe, Peace} *long-term equilibrium* by $\left(\overline{V}_T^{Brive/Raid}, \overline{V}_T^{Brive/Peace}\right)$ and the payoff derived from a village that could not sustain such equilibrium by $\left(\underline{V}_T^{Brive/Raid}, \underline{V}_T^{Brive/Peace}\right)$. Clearly, when the state cannot coordinate its actions across villages, i.e. when it cannot gather and disseminate the information about the raids, the former villages would be *bribing* village while the latter villages would be *highly-taxed* villages.

Coordination Between Villages $(\rho > 0)$

[35] The state is more likely to be patient enough for sustaining long run equilibrium.

The impact of coordination of bribing across villages is naturally dependant on the distribution of the types of villages in the set of villages in the game. Such coordination can result in a strengthening of the state's position vis-à-vis the tribe only if the set of villages includes at two villages that paid the tribe. For a simple demonstration of the spillover that could be generated by such coordination the following analysis looks at a set of villages that include two identical *bribing villages* and a *highly taxed* villages (A, B & C, respectively). The coordination is modeled by the state's ability to inform its representative in village B whether village A was attacked in the same period with probability $\rho > 0$. Another key assumption is that the tribe has opportunity to visit each village only one time before the crops are taken out of the village.[36] This reflects the short time, during which the entire crop was kept in the village, before the state collected taxes (in kind) or the village sold its product.

Equilibrium: An equilibrium that allows for a higher level of production in repeated coordinated game is based on the state's grim strategy: bribe in the bribing villages (in uncoordinated equilibrium) until an indication of a raid on other village is received in probability $\rho > 0$. After receiving such a signal switch to high tax. The tribe strategy: raiding if the current value of raiding is higher than peace, otherwise do not raid.

Proposition 3 states that in a repeated multi-village setting an increase in ρ – the probability of signaling village *j* that village *i* was attacked – can either reduce the bribe rates or allow the state to lower the tax rate of the non-bribing village, and thus to induce production. The intuition of this proposition is that a raid on a village could damage the tribe not only by reducing the stream of future bribes from the attacked villages, but also the stream of future bribes from other villages. Hence, either a lower bribe rates could sustain an equilibrium or the state could increase the exposure of its tax base to raids by inducing production.

Proposition 3

Coordination of the state's strategy across villages when at least two villages are bribing in uncoordinated equilibrium creates an externality that allows either (i) to reduce the rates of bribe paid to the tribe; or (ii) to reduce tax rates, and thus increase the production of non-bribing villages.

Proof see appendix D.

IV – Main Data Source: *Tahrir Defter*s

The payments villages made to the Bedouin tribes, interpreted as regulated protection payments, the level production of the villages and the military forces financed by these

[36] This assumption differs from Barenhiam and Winston's analysis of multi-market interaction between firms, that may facilitate collusion, even it is not sustainable in each market separately.

villages lie at the heart of the empirical analysis of the paper. Most of this analysis draws on a unique micro-economic 4-period (1519-1557) panel dataset, extracted from the Ottoman *tahrir defter*s of the sub-district of Gaza. It is complemented with data on a sub-sample of the Gazan villages that were deciphered from accounts of *waqf*s.

The *tahrir defter*s are the cadastral records that were used by the Ottomans as the main legal tool to exert direct rule. According to Halil İnalcık:

> "Direct rule by the Ottomans meant basically the application of the *tımar* ["feudal"] system, which was based upon methodical recording of the population and [tax] recourses of the countries in the [*tahrir*] *defter*s (official registers). The establishment of the *tımar* system did not necessarily mean a revolutionary change in the former social and economic order. It was in fact a comprehensive reconciliation of local conditions and classes with Ottoman institutions which aimed at gradual assimilation."[37]

In Gaza the "reconciliation of local conditions and classes" included allocating tax revenues to former Mamluk soldiers[38] and to Bedouin tribes. In a nutshell, the *tahrir defter*s are the Ottoman blueprint for governing a district and dividing its tax revenues between Ottoman officials, forces and institutions on the one hand, and co-opted potential rivals on the other hand.

A *tahrir defter* of a district specifies the characteristics and the expected tax revenues of the relevant tax units including towns (*qasba*), populated villages (*qarya*), grain fields (*mezra`a*)[39], a parcels of land (*qit`a ard*), vineyards (*karm*) and nomad tribes that were expected to pay tax. This study uses the information on two types of the rural tax-paying units: villages and grain fields; other tax units did not pay tax to Bedouin tribes and thus are not relevant for this study. The fact that only grain-producing paid tax to Bedouins may indicate the importance of grain for the Bedouins.

Typically, a record of a village in the Gazan *tahrir defters* included the name of the village and its administrative affiliation; names, number and classification (by marital status and religion) of the adult male population; quantity and value of the crops paid in kind by the village (wheat, barley, beans, sesame etc.); the specific tax rate levied on the crop production (20-50%)[40]; tax on orchards, some summer crops and domesticated animals (sheep, goats and beehives); and the revenue shares allocated to each of the various tax recipients. Usually the

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[37] İnalcık, Halil. 1954. "Ottoman Methods of Conquest," *Studia Islamica.* II: 103.
[38] Lewis and Cohen, p. 18.
[39] İnalçık discusses the evolution of the term of *mezra'a*, on which see İnalçık "Mazra`a" *EI*^{2} (1978).
[40] The data derived from the *tahrir* registers makes it possible to calculate the agricultural production of products like wheat, barley, beans etc. by dividing the quantities of the product by the tax rate. However, in some cases the tax rate was not recorded in the survey. The tax rates of 28 villages were inferred from the records of the same villages in the preceding and / or subsequent survey.

main tax recipient was the Sultan, the district's governor, or a cavalryman; residual shares were allocated to pious foundations, and in the case of the Gaza sub-district also to two Bedouin tribes. Appendix **A** presents a record of the village of *Bayt `Afa* (approximately 30 km north/east of Gaza). This specific village paid 13% and 10.4% of its taxes on crops to *`Arab Sawalma* and *Bani `Ata,* respectively.

The information on the *mezra'as* is more limited, and the data are not as detailed as those recorded for villages. Typically, a record of a *mezra'a* included its name, sometimes the name of the village with which it was associated, the total tax revenue, and the identity of the tax recipients and their shares in the tax.

It is important to stress that the *tahrir* surveys have several limitations as a source for economic and demographic history. First, as any administrative data source, it is influenced by the purpose for which it was collected and recorded. Specifically, these tax records suffered from taxpayers' attempts to avoid the surveyors. Second, the surveys did not include the non-tax paying population such as Ottoman and Mamluk soldiers. Finally, the demographic and economic data in the 1596 defter of Gaza was most probably copied from the 1557 survey or manipulated the 1557 data. Due to doubts about the reliability of the late sixteenth century *defter*, this paper does not use it.[41]

I have encountered several problems in compiling the dataset on the Gaza sub-district. (i) The *siyakat* script is known for being notoriously difficult to decipher since the dots for the Arabic script are often missing. Hence, one could easily confuse letters such as 'ح', 'ج' and 'خ'; 'ق' and 'ف'; 'ي', 'ب', 'ن' and 'ت'; 'غ' and ع, etc. (ii) It is easy to confuse some villages because they have similar names, which include words like *Menasya, Sumeil, 'Iraq,* etc. (iii) The locations of the villages – mainly determined by Abdulfattah and Hütteroth (1977) and completed by the author – are based on British maps from the 19th and 20 centuries. It is reasonable to assume that some location names 'migrated' during the three centuries between the sixteenth century and the date when the maps were made; (iv) Likewise, both the Ottoman *tahrir* surveyors and the British cartographers may have misspelled place names.

While the *tahrir defter*s suffer from limitations as a source for studying rural demography and economy for they reflect the data collected by the Ottoman authorities, for the very same reason they are perfectly suitable for studying the Ottoman decision making, including the allocation of tax revenues to various tax recipients, such as the Bedouins: these records contain much of the data the authorities had, when they allocated the rights to tax revenues, and they contain the division of the tax revenues of every taxpaying unit.

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[41] Singer (1996), Lowry (1992) and Kaldy-Nagy (1968) mention this phenomenon in the context of Jerusalem, Lemnos and Hungary (respectively) during the late sixteenth century. I discuss at length the process of data collection and compilation of the defter, the resulted merits and limitations of these records as historical sources in the introduction to my dissertation. It also includes details on the copied and manipulated entries.

In other words, the following analysis reflects the Ottoman point of view of the demographic and economic situation and the terms they offered to the Bedouins, not the actual production, actual demographic changes nor the actual payments made to the tribes. One implication of this observation is my inability to distinguish between economic growth – the creation of new resources – and movement of resources from the unofficial sector to the official sector in the economy. Similarly, the payments the villagers made to the tribes analyzed here are the legal 'protection payments', and do not include other payments that may had been extorted from peasants.

The accounts of *waqf*s (pious foundations) are a complementary source for the years 1557 and 1582. They provide an indication of the tax revenues of approximately fifty villages that paid part of their taxes to *waqf*s. Unlike the *tahrir defter*s, the *waqf* accounts do not contain information on the demography of villages, nor on the composition of the rural production. However, despite these limitations, this source is invaluable for the analysis of the 1570s proliferation of firearms the rural economy and rural tax revenues.

V - Empirical Analysis

The following empirical analysis uses the data from Ottoman Gaza to explore the determinants of the state regulated bribes paid to the tribes, and the evolution taxation and production of bribing and non-bribing villages during the first four decades of the Ottoman rule. It begins with descriptive statistics of the *bribing* and *non-bribing* villages, then it test the predictions of the model regarding the taxation and production of the *non-bribing* villages along the process of consolidating the Ottoman rule.

Who Bribes? Descriptive Statistics

Table 4 presents descriptive statistics of the *bribing* and *non-bribing* villages. It documents that in all the periods the *non-bribing* villages were demographically larger than the *bribing* villages, and thus presumably less vulnerable than bribing villages. The average tax revenues collected from *bribing* villages were lower than the tax revenues collected from *non-bribing* villages. But, per-male tax revenues were larger for the bribing villages, which may suggest that in cost benefit analysis of a raid the *bribing* villages were more profitable target. The grain production exhibits an interesting pattern: the wheat production of the *bribing* village was initially higher than the wheat production of the *non-bribing* villages, while the opposite was true for the cheaper barley. The wheat production of the non-bribing villages, however, converged to and eventually overtook the wheat production of the *bribing* villages. This pattern is used for the identification of the *retrenching* villages.

Table 4: Characteristics of Bribing and Non-Bribing Villages

Table 5 presents OLS and Tobit estimations of the determinants of the bribe rate. It uses the pooled sample of villages and grain fields, a sub-sample of the villages and a sub-sample of the grain fields. Since the grain fields were not permanently populated, the male population of the grain fields was set to 0 for the pooled estimation. In all estimations in Table 5 the payments to the tribes are positively associated with the total tax revenue, and they are negatively associated with the male population. This paper proposes that these associations represent the costs and benefits of a raid for the Bedouins: demographically smaller villages were easy to loot, while fertile or productive villages and grain fields were lucrative prey. This observation coincide with Svensson's finding that bribes made by firms in modern Uganda were positively correlated with their "ability to pay" and negatively correlated with their "refusal power".[42]

Table 5: Demographic and Economic Determinants of Bribes to the Tribes

Testing The Model

The model presented above suggests that villages exposed to raids will: (i) *bribe* the tribes; (ii) *pay high taxes* to the state; or (iii) *retrench* production to satisfy the No Profitable Raid constraint. The *highly tax* and the *retrenching* villages are characterized by high fixed cost of raiding the village (C_T) in comparison to the bribing villages. Analysis of the dynamic interaction between production and bribes suggests that as the state consolidates it rule the tax rates of the *highly taxed* villages will be reduced, and the *retrenching* villages will increase their production.

The Ottoman tax records contained detailed information regarding the tax and bribe rates (τ), the composition of production of the local villages (wheat, barley, sesame and animals), and on the prices of the products (p_y). However, they do not contain any proxy neither for the cost of raiding the villages (C_T)[43] nor on the potential booty rate $(\bar{b})$ that together with the price (p_y) determine the village's level of retrenched production: $\hat{Y} = C_T / (p_Y \bar{b}^2)$. Hence, while testing whether the *non-bribing* villages had initially higher tax rates that fell by time is straightforward, testing the retrenchment hypothesis is more difficult. The analysis below uses changes in composition of production and price differences of similar crops to circumvent the difficulty that arises by the absence of data on the raiding cost (C_T). It begins, however, with examining the hypothesis regarding the tax rates.

Convergence in Tax Rates

[42] Svensson's (2003). "Who pays Bribes and How Much?" *QJE*

[43] My efforts to use geographic variables generated with GIS were not successful.

Figures 9 present the average tax rate of bribing and non-bribing villages in three samples: A: the full sample; B: a balanced sub-sample; C: a balanced sub-sample with no villages that switched bribing status. In all three samples the tax rate of non-bribing villages was initially (1519) higher by more than 3 percentage points than the tax rate of the bribing villages. However, by 1557 the tax rate of the former dropped by about 3 percentage points while the latter increased by more than 1 percent point. The drop in the tax rate of the non-bribing villages is explained by model as reduction in the tax rates of the highly-taxed villages during the process of consolidation of the Ottoman authority. It should be noted that the smaller increase in the tax rate of the bribing villages is not explain by the model. At any rate, by 1557 the tax rate of the bribing villages overtook the tax rate of the non-bribing villages. The repetition of this pattern in all three samples suggests that it is not resulted by changing composition of the village population.

Figure 9: Changes in Tax Rates (%) of Bribing and Non-Bribing Villages

Regression estimates presented in table 6 show that the time-trends of the tax rates of the bribing and non-bribing villages were indeed significantly different. Regressions (i)-(v) include the full population of the villages, while regressions vi and vii in clued balanced samples with and without villages that switched bribing status. Regression (ii), (iii) and (iv) control for the number of males in the village and average rainfall in the village location, while regressions (v), (vi) and (vii) control for number of males and include location fixed effects. All the regressions without location fixed effects indicate that the tax rate of the non-bribing villages was initially (1519) higher by about 3.5%. Moreover, all the regressions show that the trend of the bribing villages was not significantly different from zero, while the trend of the bribing villages decreased by about 0.14% every year. Hence, we may conclude that the downward convergence of the tax rates of the non-bribing villages is robust to various specifications and to restrictions on the analyzed sample.

Table 6: Convergence of Tax Rates of Bribing and Non-Bribing Villages

Identifying Retrenching Villages – Empirical Strategy

The identification of *retrenching* villages and the change in their behavior is liable to suffer from severe endogeneity problem: villages differ in their productivity (land, precipitation etc) self-defense (hilly vs. lowland villages) and demographics; thus, a simple regression of changes in production is likely to be misleading. Ideally, the identification of the impact of the violent threat on rural production should be based on comparison of production decisions of villages that differ only in their exposure to raids – represented by the NPR constraint – but are identical in other respects.

The empirical strategy used here utilizes the detailed information on the composition of production of the villages and the differences in prices to identify retrenchment: it considers

the of lucrative wheat as the "treat" – i.e. exposed – crop and the similar grain but cheaper barley as unexposed "control" crop. The production of the two crops involves virtually the same types of fields and production inputs and very similar production technologies. This similarity is reflected in a correlation of 0.65 between production of wheat and barley by the same village. The official price of a sack of wheat, however, was higher by 42.8%-92.3% than the official price of a sack of barley.[44] Hence, the main working assumption of the identification strategy is: wheat was a more lucrative booty than barley. This working assumption is also supported by the preference of contemporary Egyptians and modern Bedouins to consume wheat, and by the idiom "eaters of Barley bread" that nineteenth century Bedouins used to humiliate their poor enemies.[45]

In terms of the above model a lower price of the rural good shifts out the NPR constraints for barley and wheat: $p_{Barley} < p_{Wheat} \Rightarrow \quad \hat{B} \equiv \frac{C_T}{p_B \bar{b}^2} > \frac{C_T}{p_W \bar{b}^2} \equiv \hat{W}$

where $\hat{B}$ and $\hat{W}$ are the maximal levels of production so the crop is unexposed for raids.

This assertion assumes that since both wheat and barley were produced in the very same village protected by the same cavalryman, the fixed and varying costs of raiding (C_T and α, respectively) were identical for wheat and barley.[46] Moreover, the same tax rate (τ) applied for both crops. The higher price of wheat may have compelled some of the *non-bribing* villages to *retrench* the production of wheat because the NPR constraint did bind, while the lower barley price allowed such villages produce barley when the NPR constrain did not bind. In other words, barley production is a potentially good proxy for the village's potential wheat production, had not the non-paying villages retrenched. On the other hand, the *bribing* villages did not have to retrench the production of either wheat or *barley*. Hence, the temporal changes in differences in the composition of the wheat-barley production of *bribing* and *non-bribing* villages could identify villages that gradually stopped *retrenching* the production of wheat.

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[44] The price of *gharira* of wheat was 150 akçe and the price of *gharira* of Barley was 105 akçe in the 1519 *defter*, while in the 1531-47 *defter*s the respective prices were 240 akçe and 130 akçe.

[45] Adam Sabra describes that soup kitchens usually provided wheat bread to the poor and needy, and only in times of high prices or draught they resorted to barley bread. See his: *Poverty and Charity in Medieval Islam: Mamluk Egypt, 1250-1517*. Cambridge University Press, 2000. p.113; Rogan and Tell mentions that in Mandatory Trans-Jordan barley bread was usually considered suitable only for slaves. *Village, Steppe and State: The Social Origins of Modern Jordan*. p. 121. William M. Thomson. *The Land and the Book;*. (London: Nelson and sons, 1883). P. 182; For details on the importance of wheat in the diet of modern Bedouin in the Negev see: K. Abu-Saad, S.Weitzman, Y. Abu-Rabiah, H. Abu-Shareb and D. Fraser "Rapid lifestyle, diet and health changes among urban Bedouin Arabs of southern Israel" http://www.fao.org/DOCREP/003/Y0600M/y0600m06.htm

[46] The harvest of barley is in April-May and the harvest of the Wheat is in June-July. Hence, looting these two crops before the harvested crop was taxed and sold required two separate raids.

The main limitation of this identification strategy is rooted in the biological differences between the two types of cereals: barley is more resilient to draughts than wheat. Hence, it is more prevalent in southern drier villages, which could be more vulnerable to raids. This problem is addressed by the examination of the inter-temporal changes in the composition of wheat-barley production assuming that *differences* in rainfall are time invariant. I also use control for such village characteristics by village fixed effects or by controlling for modern rainfall for the villages that their location was identified in modern maps. Another difference between the two crops is that wheat was a tradable good which was shipped over the Mediterranean, while the profits from shipping the low value barley must have been smaller.

Statistical support for the similarities and dissimilarities between wheat and barley are presented in table 7. The table presents the results of separate regressions of wheat and barley production on the villages' characteristics (males, altitude, slope of the village's area and average modern rainfall), "International" (Tuscan) wheat price and time trend. It is evident that wheat and barley have virtually identical coefficients for the villages' male population and topographical variables (altitude and slope). Wheat and barley differ, however, in their relation to rainfall and to the "international" wheat price: Wheat is positively correlated with average rainfall, while barley is negatively correlated; in addition, wheat seems as more sensitive to "international" wheat price than barley.

Table 7: Determinants of Barley and Wheat Production

Another working assumption is that the Ottomans gradually consolidated their authority in Gaza, and managed to progressively reduce the Bedouin threat in the course of the first four decades of their rule. This period started with the war with the Mamluks (1516-7) and the revolt of Al-Ghazali (1520-1); according to Ibn Iyas, the revolt was followed with chaos in Syria caused by Bedouin tribes, including the *Bani `Ata*.[47] The period culminated in the heydays of Sultan Sulieman the Magnificent (kanuni) with the codification of the local regulations, which were attached to the 1557 *defter*. This assumption is reflected in the growing tax revenues collected by the Ottomans: the *hasil* is presented in Figure 1 (above) steadily increased as well as the road tolls in Gaza district, which presumably were particularly sensitive to violence.[48] Similarly, the steady growth of the population, villages and *mezra`a*s (fields of grains), recorded by the Ottomans between 1519 and 1557, indicate at the strengthening Ottoman control over the district.

The fundamental evidence for *retrenchment* in wheat production is presented in figures 10-A, 10-B and 10-C, which analyze the composition of grain production. Figure 10-A

[47] Ibn Iyas, p. 395.
[48] Road tolls increased from 58,000 akçe in 1519 to 80,000 akçe in 1531 to 126,740 akçe in 1548 to 150,000 akçe in 1557Cohen and Lewis. P.55.

presents the average production of barley – the "control" crop – of bribing and non-bribing villages. The figure demonstrates that in 1519, 1531, and 1548 the barley production of both types of villages had virtually the same growth rates and levels. At the last period (1557), however, the barley production of the bribing villages dropped. Figure 10-B presents the average production of wheat – the "treated" crop. Initially (1519) the non-bribing villages produced less wheat than the bribing villages. But in 1531 and 1548 the wheat production of non-bribing villages converged to the production levels of the bribing villages, and the former overtook the latter in the last period. The drop in the barley production of the bribing villages suggests that the recent overtaking in wheat production was probably resulted by some unobserved reasons that affected the also barley production. Hence, this drop is not necessarily related to retrenching, i.e. to the impact of the NPR constraint. Finally, figure 10-C documents the convergence in the composition of grain production of the *bribing* and *non-bribing* villages (1519-48), and shows that the drop in wheat and barley production of the *bribing* villages in the last period (1557) had a minor impact on their composition of grain production. I interpret these results as evidence that non-bribing village chose to cut-back wheat production in the turbulent early Ottoman period, and increased wheat production to the production level of the bribing villages by the relatively secure mid-sixteenth century.

Table 8 presents naïve estimations of the retrenchment and subsequent convergence in wheat production. Regressions (i)-(v) show that the wheat production of the bribing villages was higher by 30-40% than the production of the non-bribing villages, but this gap gradually narrowed by the 1540s their levels of production converged. On the other hand, regressions (vi)-(x) show that the barley production of the bribing and non-bribing villages differed neither in levels nor in time-trends. These regressions correspond to figures 10-A and 10-B, and demonstrate that theses results are stable with various control variables.

Table 8: Retrenchment in Barley and Wheat Production – Naïve estimations

Tables 9 and 10 present estimations of the convergence in the composition of grain production of bribing and non-bribing villages in various sub-samples. It includes three groups of sub-samples: villages, whose tax rates changed and did not change between 1519 and 1557; villages, whose tax rates were fixed; and did not change; and villages, whose tax rates did change during this period. The convergence is statistically significant in the full sample regressions and in the full sample and in the sample of the located villages (i, ii, iii & v) but it is not statistically significant in the balanced samples (iv & vi). Regressions (vii-ix) suggest that the convergence did not exist in the sub-sample of the villages whose tax rate did not change; finally, regressions (x-xii) shows a rapid convergence in the composition of grain production in the sample of villages whose tax rates changed at least once during the

examined period. Indeed, the convergence in the full sample is driven by the last type of villages together with the villages that joined the sample after the first period.

Table 9: Convergence of ln(Wheat/Barley) of Bribing and Non-bribing Villages (Linear Trend Specification)

Table 10: Convergence of ln(Wheat/Barley) of Bribing and Non-bribing Villages (Dummy Specification)

In terms of the above model the estimations could not identify villages that only *retrenched* wheat production, but rather villages, that were *retrenching* and had *high tax* rates. In addition, the full sample convergence is resulted also by villages that were not included in the first tax survey; the fact that villages with high share of wheat production joined the samples during the process of consolidation of the Ottoman rule may suggest that living in such villages was not affordable had these villages were to retrench production of wheat.

Supportive Evidence for Retrenchment by Non-Bribing Villages

Thus far the study provided evidence for retrenchment in wheat production by the *non-bribing* villages. The data on sesame production and the tax on animals provide supportive evidence for *retrenchment* of the *non-bribing* villages. Sesame was a very lucrative crop as the official price of a sack of sesame was 400-450 akçe, while the official prices of a sack wheat was 150-240 akçe; thus, sesame was, presumably, very sensitive to raids. It is not surprising, therefore, that the average sesame production of *bribing villages* exceeded the production of the *non-bribing* villages in 1519, 1531 and 1548 (see figure 11). Only in 1557 the *non-bribing* villages increased their sesame production to the production level of the *bribing* villages. Once again, this study relates this convergence to improved security that allowed *non-bribing* villages to increase production without fearing from violent expropriation.

Figure 11: Sesame Production (Bushels) by Bribing Status (1519-1557)

Animal-raising – particularly goats-rearing – is assumed to be sensitive to banditry for goats are mobile capital that could be used by tribesmen who specialized in rearing them. According to the 1557 regulations the tax on goats and sheep was set to 1 akçe for every two goats or sheep and the tax on beehives was set to 1 akçe per unit. Hence, these taxes approximate the number of reared goats and sheep, cultivated beehives. Figure 12 presents the average animal tax revenues of *bribing* and *non-bribing* villages. The figure indicates that in the first two surveys the *bribing* villages raised somewhat more goats, sheep, and bees than the *non-bribing* villages. However, as the Ottomans strengthened their control over the Gaza district during the 1540s and 1550s, the *non-bribing* villages increased their animal-raising

and surpassed the animal-raising of the *bribing* villages. This overtaking was presumably facilitated by a decrease in likelihood that the animals of the *non-bribing villages* would be taken by violent means. It coincided with the above documents convergence in wheat and sesame production.

Figure 12: Tax Revenues on Goats and Beehives (akçe) by Bribing Status (1519-1557)

This empirical section presented evidence that corresponded to the main prediction of the model: villages under threat of violent expropriation villages could be protected by (i) *bribing* the strongmen; (ii) paying *high taxes* to a specialist in violence (state) that will fight the strongmen; and/or (iii) *retrenching* the production of lucrative products to render itself unprofitable target for raids. As the state established its supremacy and thus the village's property rights become more secure, the need to resort to these three strategies faded.

The main results of the empirical analysis of these three strategies are:

i. **Bribe rates** - The tribes continued to collect bribes at similar rates even when the state consolidated its rule; in fact, the value of bribes to the tribes increased with the economic growth of the villages. However, the Ottomans balanced this growth by collecting continuously increasing lump-sum taxes collected from the tribes (see table X). Thus, the villages gained very little from the economic growth in Gaza, and the actual share of the bribes to the tribes from the total production decreased.

ii. **High taxes** - Initially, the tax rates of the *non-bribing* villages were higher than the tax rates of the *bribing* villages, but by the mid sixteenth century the tax rates of the former declined and converged to the tax rates of the *bribing* villages (see figures 12-A, 12-B & 12-C).

iii. **Retrenchment** - In the early tax surveys the *non-bribing* villages produced less wheat and sesame, and apparently reared fewer animals than the *bribing* villages. By the mid-sixteenth century the *non-bribing* villages increased the production of wheat and sesame to the levels of the *bribing* villages. Moreover, it seems that in 1548 and 1557 the *non-bribing* villages overtook the *bribing* villages in terms of animal rearing. The fact that throughout the examined period the *non-bribing* villages produced more of the cheap barley than the *bribing* villages is particularly telling: it implies that the former had the needed fields, ploughs and labor to increase wheat production but only when the state consolidated its rule they did so. This wheat-barley comparison is the firmest evidence for retrenchment of the *non-bribing* villages.

The *non-bribing* villages, however, could not abandon the above survival strategies for long because the *Pax Ottomana* was openly challenged by Bedouin tribes after they improved

their expropriation technology. The following section examines the available evidence on the change in the balance of power and its implication for the *bribing* and *non-bribing* villages.

VI: The Collapse of the Regulated Extortion Institution

The balance of power between the Ottoman authorities and local groups in Syria shifted during the second half of the sixteenth century: while the Ottomans maintained an effective monopoly on firearms until the 1560s, during the 1560s and 1570s Druze, Bedouins, peasants and even Jews started to accumulate and trade in such weapons. This process occurred despite the official prohibition on the *re`aya*, the Ottoman subjects, to hold firearms.[49]

Ottoman efforts to stop the contraband of muskets, and to collect these arms from its subjects in districts adjacent to Gaza left some documentation on this issue. For some reason most of the information deal with Safed, 150 Km north to Gaza: A couple of 1577 decrees referred to ships that imported to *`Aka* and Tyre muskets that were later sold to Bedouins and brigands; one of these decrees noted that the local Bedouins possessed more than 3,000 muskets. A 1579 decree deals with the inspector of the market in Safed, who was charged with exporting wheat to the 'infidels' and importing western muskets, which were sold to the Bedouins, and thus he committed a few crimes in one transaction. Finally, a decree of 1581 mentioned that peasants in the Safed district alone possessed 7,000 muskets.[50] It is important to stress that the proliferation of firearms was a new phenomenon, as one of the above 1577 decree stated: "formerly nobody in the said *sanjak* [the Safed district] used a musket and had no idea what a musket was."[51]

This paper assumes that significant quantities of firearms also spread to the Gaza district as they spread to Jerusalem and many other Ottoman districts in Anatolia and Iraq. Had the sixteenth century court records of Gaza survived we would most likely have documents recording cases similar to the 1570-1571 court cases from Jerusalem noted above.

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[49] In Anatolia, however, the Empire supplied peasant units with firearms to fight in the wars of the late sixteenth century. These soldiers became brigands after these units were demobilized, and the Ottomans sought to collect their weapons from them.

[50] The evidence on firearms other districts is more limited: In 1570 and 1571 the court of Jerusalem convicted two Jews in two separate cases of buying muskets from Bedouins; Also, in 1578 the governor of Safed was ordered to confiscate muskets from Jews in the town of Safed. In 1581 a Damascene trader was charged with selling muskets, bullets and gunpowder to Druze. Heyd, p.81-3, 88..*Mühime Defteri*. Cilt 35; Sıra No. 16; 17 Rabiülahir 986. (23 June 1578); Andul-Rahim Abu-Husayn. *The View From Istanbul: Ottoman Lebanon and the Druze Emirate*. London: Centre for Lebanese Studies and Tauris, 2004. pp: 32, 141. כהן, אמנון (תשמ"ב). ע"ע: 207-208.
I hardly found any sixteenth century evidence on gunpowder supply in the vicinity of Gaza, but it is known that nineteenth century Bedouins in Sinai were able to produce gunpowder from charcoal and saltpetre they collected and sulphur they bought in urban markets. See: Benjamin Adam Saidel. "Matchlocks, Flintlocks, and Saltpetre: The Chronological Implications for the Use of Matchlock Muskets among Ottoman-Period Bedouin in the Southern Levant" *International Journal of Historical Archaeology, Vol. 4, No. 3, 2000*

[51] Heyd, p. 81.

One can learn about the importance of firearms for the Ottoman authority from the case of the Druze, who acquired muskets as early as 1565: During the next two decades the Druze rebelled, and refused to pay their taxes and to surrender their weapons despite repeated Ottoman attempts, headed by the local and provincial governors, to invade the Druze country (located in modern Lebanon). Only the 1585 punitive campaign headed by the governor of Egypt, who assembled Ottoman forces from Syria and Egypt, was successful in subduing the Druze. The Ottoman documents explicitly mentions that the Druz had better muskets that the Ottomans as one of the obstacles for restraining the rebellion.[52] The adverse impact of the proliferation of firearms on the publics order was felt in other Ottoman provinces – such as Iraq and Anatolia – during the late sixteenth and early seventeenth centuries.[53]

The proliferation of firearms coincided with the outbreak of a long war with Persia (1577-90), to which cavalry Ottoman forces from southern Syria including Gaza were sent. The war with Persia reinforced the change in the local balance of power, and it made it even more difficult to the Ottomans to subdue local armed groups.

Therefore, it seems natural that following the proliferation of firearms in the neighborhood of Gaza during the late 1560s and 1570s and the dilution of local forces due to the war with Persia, Bedouin tribes and other indigenous groups southern Syria revolted. It is somewhat surprising that the *Bani `Ata* tribe, one of the tax recipients, rebelled together with the *Bani 'Atiya*. In 1577 the Ottomans sent a reinforcement of 400 soldiers from Egypt to help the local forces in suppressing the *Bani `Ata* and *Bani 'Atiya*. The two tribes continued to revolt: A 1593 imperial decree described them as being "in a state of permanent rebellion,"[54] and condemned them for looting pilgrims on their way to Mecca.

The harsh fiscal impact caused by the contemporary Bedouin and peasant revolt in the Safed district is described in a decree dated to 1581: "during the last three years the fief-holders have been unable to collect a penny of their revenue."[55] The decree explicitly relates the proliferation of firearms and the war against Persia to the inability of the *tımar* holders to collect the revenues allotted to them. This probable exaggeration reflects both the difficulty

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[52] Abu-Husayn, Abdul-Rahim. "Problems in the Ottoman Administration in Syria during the 16th and 17th Centuries: The Case of the Sanjak of Sidon-Beirut," *International Journal of Middle East Studies*, Vol. 24, No. 4. (Nov., 1992), pp. 665-675. For an example from early seventeenth century Anatolia see: Jennings, R. C. "Firearms, bandits, and gun-control: some evidence on Ottoman policy towards firearms in the possession of reaya, from judicial records of Kayseri, 1600-1627" *Archivum Ottomanicum*, no. 6, pp. 339-358, 1980.

[53] For instance, a decree from 1587 mentioned that the governor Suğla (near Konya) and a local kadi collected 'one thousand' firearms from brigands. The decree states that "my imperial armory urgently needs these firearms" and thus it shows that these firearms were of sufficient quality to be used by the imperial army. See: Daniel Goffman. *The Ottoman Empire and Early Modern Europe*. Cambridge: Cambridge university press, 2002. p.115. Khoury, Dina Rizk. *State and Provincial Society in the Ottoman Empire : Mosul, 1540-1834***.** Cambridge: Cambridge University Press, 1997. p. 39;

[54] Heyd, 85

[55] Heyd, 88. Another translation of the decree appears in Abu Hussayn. p. 30-31.

the *tımar* and *ze`amet* holders faced in collecting their share in the product, and the decline in actual production due to the insecurity.

A limited indication of the economic consequences of the proliferation of firearms and the subsequent Bedouin revolt for the Gazan villages can be traced through *waqf* accounts.[56] These documents provide information on the revenues that these pious foundations collected in 1557 and 1582 from Gazan villages and their share in the *hasıl* (total crop and tree production). Hence, the *hasıl* could be retrieved by a simple calculation.

Table 14 presents the average *hasıl* of villages before the *Bani `Ata* rebellion and during the rebellion. Columns (i) and (ii) compare the *hasıl* of 1582 with the *hasıl* of 1557, both derived from the *waqf* accounts (39 villages). Columns (iii) and (iv), on the other hand, compare the above 1582 *hasıl* with the *hasıl* calculated from the 1557 *tahrir defter* (48 villages). The two comparisons complement each other: while the first comparison suffers from a lower number of observations, the second comparison uses data derived from two different sources. Both comparisons demonstrate that the *hasıl* of the villages that did not pay tax to the Bedouins declined by about 32% during the Bedouin rebellion, while the *hasıl* of the villages that paid tax to the Bedouins stagnated or somewhat declined.

Table 14: Average *Hasıl*† (akçe) of Villages by Sources & Payment to Tribes (1557-1582)

The contrast between the sharp decline of the *hasıl* of the non-bribing villages and the mild decline of the *hasıl* of the bribing villages suggests that the rebels chose their targets well: the Bedouins did not abuse the gooses who laid golden eggs for them. In other words, the incentives the Ottomans created for the Bedouins – by allocating them rights for payments made by villages –influenced their behavior even when they rebelled against the Ottomans.

The change in the balance of power and the presumed decline in tax revenues, which followed the introduction of firearms in the second half of the sixteenth century, was felt throughout the Ottoman Empire. First, revolts and mutinies spread in many Ottoman provinces. Subsequently, a new institutional equilibrium decentralized emerged, in which local forces played a greater role in the local politics and presumably acquired larger share of the available resources.

The Bedouins and other local armed groups played a pivotal role in the new institutional equilibrium. Dror Zeevi claimed that following the decay of the traditional Ottoman forces – the *sipahi*s (cavalry) and the *yeniçeri* (infantry) – the Bedouins became an unrivaled military

[56] A *tahrir defter*-based evaluation of the fiscal or the economic consequences of the rebellion in Gaza on the rural demography and economy is likely to be misleading for the late sixteenth century (c. 1596) *tahrir defter* was – at least partly – copied from and manipulated the data of the 1557 survey. Indeed, the revolts and the resulting insecurity are probably one of the main reasons for the poor reliability of the last *defter*. The relationship between effective control and data collection by the Ottoman Empire is demonstrated by the data collection the Ottomans undertook after the suppressing the *Celâli* revolts. See Barkey p. 199.

force in the southern and western districts of the Damascus province. Hence, all the governors in southern Syria employed Bedouins commanders and soldiers in the military and policing armed forces. The Bedouins collected taxes, escorted convoys of travelers and Ottoman officials, and were used by the Ottomans in their battle against local rebels and foreign pirates. Hence, Zeevi concluded that during the seventeenth century Bedouins replaced the traditional Ottoman forces and secured themselves a strong official status vis-à-vis the Ottoman authorities.[57]

During the seventeenth century the Ottomans could no longer determine and control the rents that local violent entrepreneurs, such as Bedouin tribes, took hold of. Controlling and determining these rents – the regulated "protection payments" made by Gazan villages to the tribes – lie at the hart of current paper. It showed that the during the first half-century of Ottoman rule, the Empire generated economic and fiscal growth in Gaza by giving two Bedouin tribes a stake in the status-quo and balancing them with military forces. This growth-generating status-quo collapsed following the proliferation of firearms and Bedouin revolt in the 1570s.

[57] זאבי. ע"ע: 115-125 .

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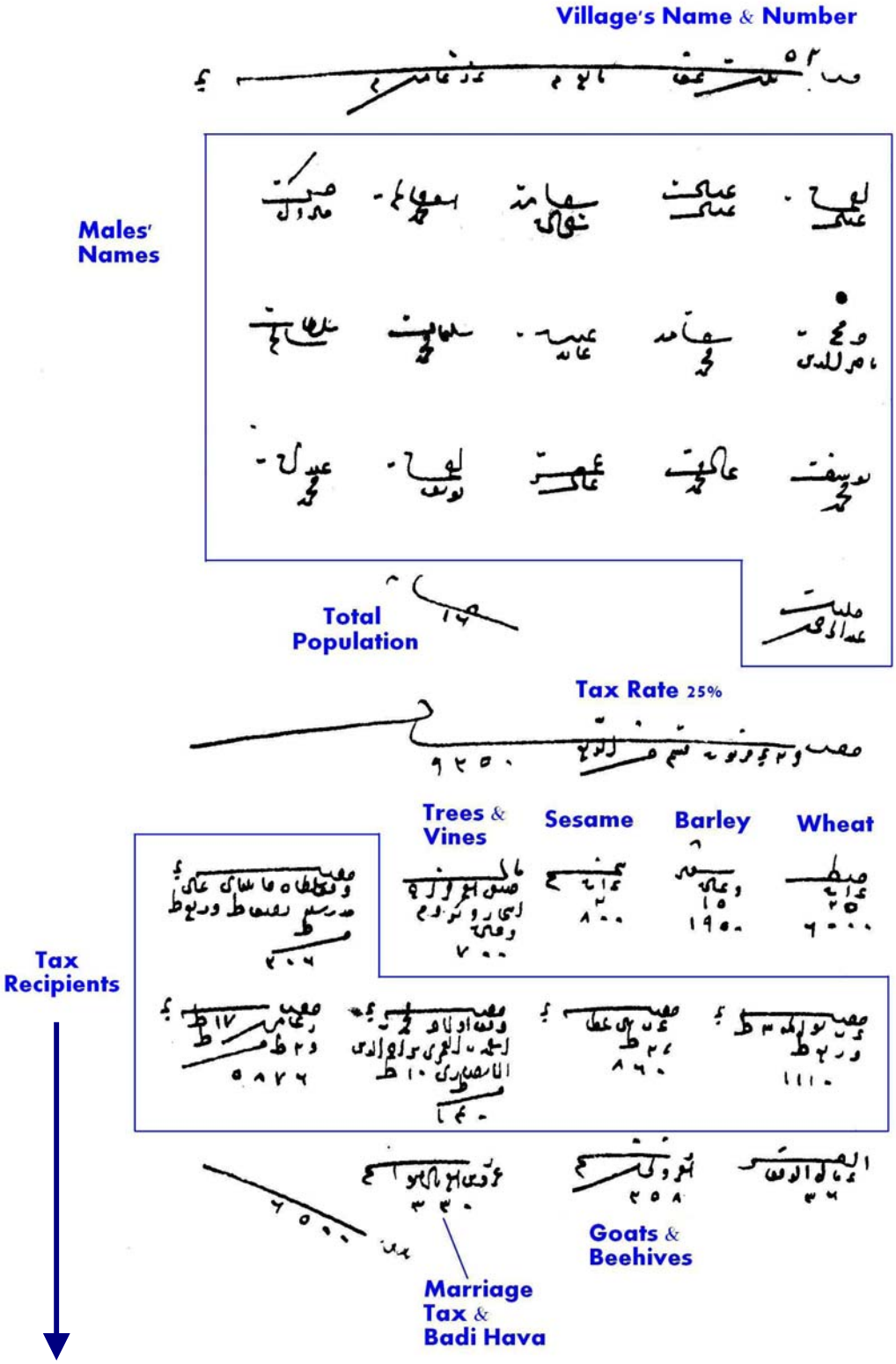
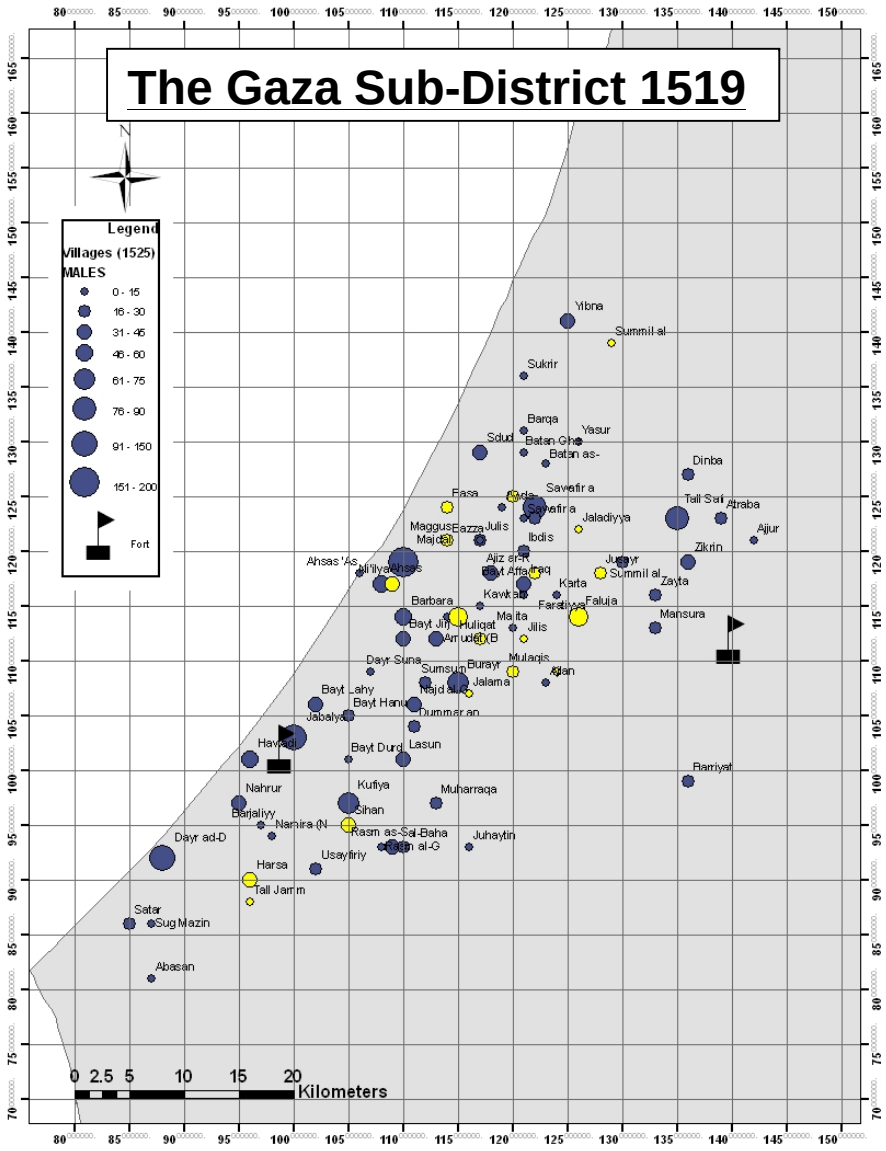
Appendix A: A Record from the *Tahrir Defter*: *Bayt 'Afa* (1557).



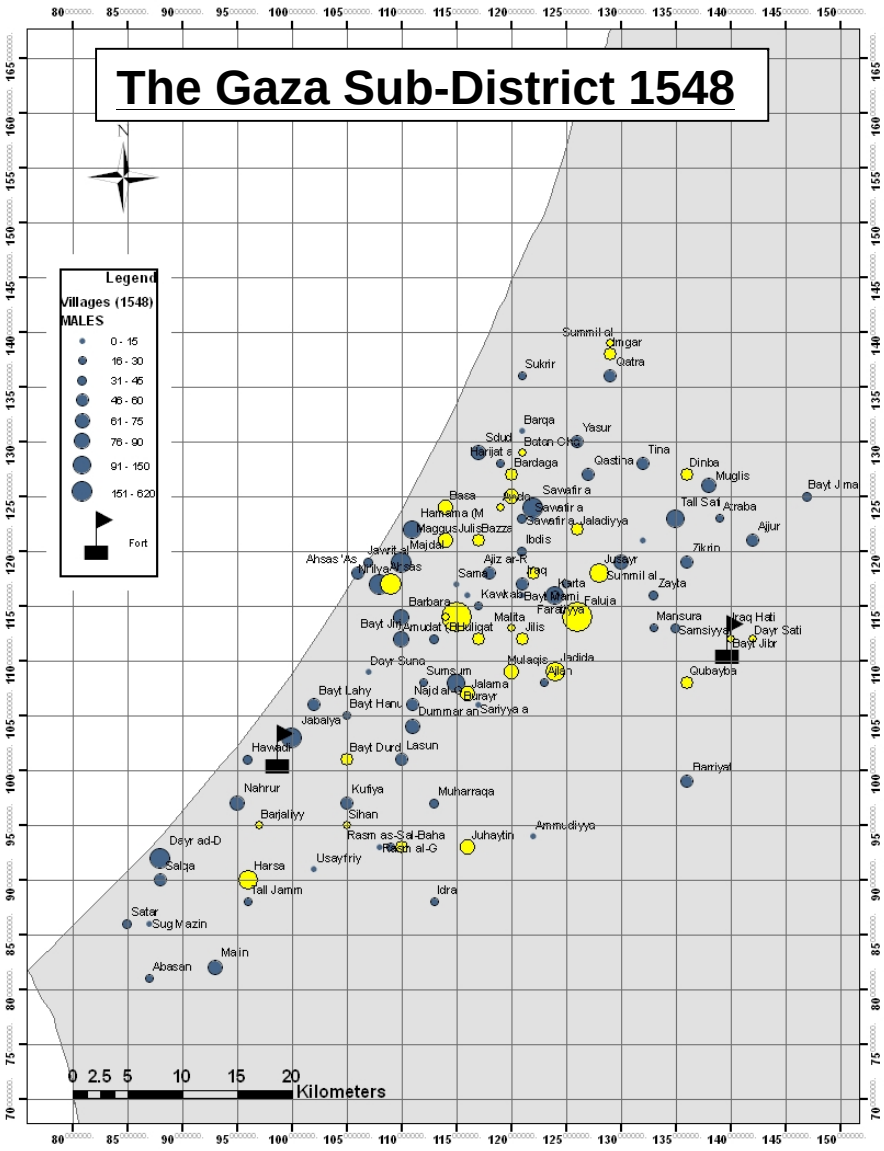
The tax recipients include: `*Arab Sawalma* (tribe) 13% = 1110 akçe; `Arab *Bani `Ata* (tribe) 10.4%=860 akçe; Waqf Awlad Muhammad… 1.7%=140 akçe; Waqf Sultan *Qait Bey* … 2.4% =206 akçe; Za'amat 71.2% = 5876 akçe.

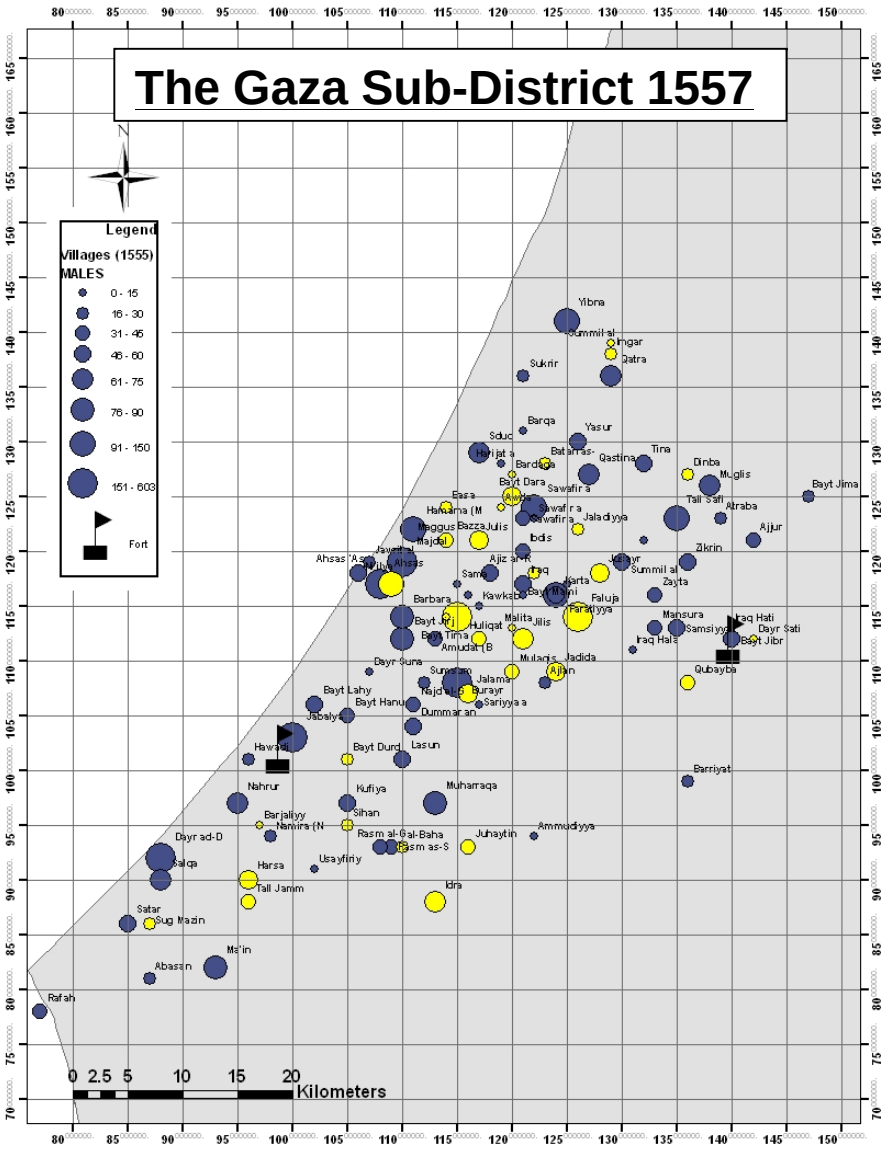
Appendix B: Maps of the Gaza Sub-District (1519-1557)



Notes: 1) The maps include villages only, and do not include *mezra'a*s.

2) Villages, which paid taxes to tribes, are marked with yellow circles; those, which did not pay are marked with blue circles.


The Gaza Sub-District 1548
Legend
Villages (1548)
MALES
0 - 15
16 - 30
31 - 45
46 - 60
61 - 75
76 - 90
91 - 150
151 - 620
Fort
0 2.5 5 10 15 20
Kilometers


The Gaza Sub-District 1557
Legend
Villages (1555)
MALES
0 - 15
16 - 30
31 - 45
46 - 60
61 - 75
76 - 90
91 - 150
151 - 603
Fort
0 2.5 5 10 15 20
Kilometers

Appendix C – Characteristics of Bribing and Non-Bribing Villages by Main Tax recipients

The villages in the Gaza district were "owned" by low and high ranked cavalrymen (*timar* and *ze'amet*, respectively), the local governor, the Sultan and pious foundations (*waqfs*). Table 15 (next page) displays demographic and economic characteristics of the villages in the Gaza sub-district by principal revenue recipient and whether they bribed the tribes. It is noticeable that within each category bribing villages had generally larger populations and produced more wheat. This pattern always holds for the villages in the realm of the cavalrymen (*timar* and *ze'amet*, respectively), which included the vast majority of the bribing villages. A similar pattern is evident in Table 14 (appendix C), which presents the parallel distribution of fields of grain (*mezra`a*s). The bribing *mezra`a*s yielded more tax revenues than the non-bribing units. Interestingly, none of the assets in the Gaza district that were assigned to pious foundations paid bribes probably because they were not located in risky areas; These observations corroborate the inference that the payments to the tribes were regulated protection payments, particularly with regard to the villages in the estates of the cavalrymen, i.e., the *timar* and *ze'amet*.

Table 12: Distribution of Active *Mezra`a*s by Tax Recipient and Payments to Tribes

		Tımar		Ze`amet		Governor		Sultan		Waqf	TOTAL	
Paid some tax to the tribes		**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**No**	**Yes**	**No**
1531	**Total tax (Akçe)**	1568.9	1230.9		2060.7	1902.0	1500	483.5	892.5		1120.7	1177.7
	Tribes' tax share	17.4%	N.A.		N.A.	9.9%	N.A.	31.1%	N.A.		20.2%	N.A.
	Observation	15	46	0	3	2	1	13	18	0	30	69
1548	**Total tax (Akçe)**	1459.3	1254.0	510.0	376.0	2316.7	1322.9	837.2	506.5	1200.0	1209. 4	820.6
	Tribes' tax share	16.3%	N.A.	11.1%	N.A.	28.3%	N.A.	45.7%	N.A.	N.A.	25.1%	N.A.
	Observation	6	28	1	3	6	9	20	52	1	33	91
1557	**Total tax (Akçe)**	2277.4	1146.0	696.0	1551.5	2917.7	3602.7	1196.2	605.3	1200.0	1574.6	1089.6
	Tribes' tax share	28.7%	N.A.	9.7%	N.A.	24.7%	N.A.	36.8%	N.A.	N.A.	25.7%	N.A.
	Observation	7	45	2	13	3	6	19	49	1	31	114

Table 13: Distribution of Villages by Tax Recipient and Payments to Tribes

Tax reciever		Tımar		Ze`amet		Governor		Sultan		Waqf	TOTAL	
Paid some tax to the tribes		Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No
1531	**Males**	20.1	24	28.7	62.8	36.3	57	12.3	43.9	43.8	22.05	37.77
	Total tax (Akçe)	4771.3	3835.6	7005	6206	9106.7	8548	1814	2780.7	6413.8	5209.73	4848.69
	Wheat (Bushels)	219.03	128.97	148.15	94.81	183.93	152.02	90.25	131.01	149.75	198.82	133.15
	Tribes' tax share	17.60%	N.A.	23.10%	N.A.	7.50%	N.A.	32.60%	N.A.	N.A.	18.80%	N.A.
	Observation	28	46	6	5	3	18	3	19	8	40	96
1548	**Males**	29.7	30.5	32.3	62.1	70.3	119.9	37.3	60.6	71.4	33.98	57.97
	Total tax (Akçe)	4898.3	4265.4	6504	5454.3	11566	9885	5519.1	5285.9	9309.9	5613.93	5970.91
	Wheat (Bushels)	135.47	87.67	106.71	40.59	105.13	104.47	101.09	71.77	184.76	124.83	91.22
	Tribes' tax share	17.40%	N.A.	34.60%	N.A.	6.80%	N.A.	21.70%	N.A.	N.A.	19.00%	N.A.
	Observation	29	43	4	8	3	17	7	16	7	43	91
1557	**Males**	31	31.1	37.3	55	137	130.5	50.2	60.5	70	36.56	58.65
	Total tax (Akçe)	5171.8	4479.9	9230	8954.2	14880	10815.5	7758	6885.9	10246.2	6264.56	7023.62
	Wheat (Bushels)	120.41	81.97	159.86	73.02	47.68	152.08	77.55	84.60	122.94	119.18	95.97
	Tribes' tax share	19.20%	N.A.	17.60%	N.A.	7.80%	N.A.	22.50%	N.A.	N.A.	19.10%	N.A.
	Observation	31	40	6	13	1	15	5	16	9	43	93

Source: See section III.

Appendix D – Proofs of the Model's Propositions:

Proposition 1:

Denote the share of crops left for the village after the collection of taxes and booty VS.

$$VS = (1-\tau)(1-\bar{b}) = (1-\tau)\frac{\alpha\tau}{1+\alpha\tau}$$

$$\frac{\partial VS}{\partial \tau} = -\frac{\alpha\tau}{1+\alpha\tau} + (1-\tau)\frac{\alpha\gamma}{(1+\alpha\tau)^2}$$

$$\Rightarrow \frac{\partial VS}{\partial \tau} > 0 \text{ when } \tau \in \left[0, \frac{-1+\sqrt{1+\alpha}}{\alpha}\right); \frac{\partial VS}{\partial \tau} < 0 \text{ when } \tau > \frac{-1+\sqrt{1+\alpha}}{\alpha}$$

and $\tau^{Exposed} = \frac{-1+\sqrt{1+\alpha}}{\alpha}$ maximizes the share of the village.

Finally, since the village's production decreases in the total rate of imposition the production is maximized at this level of production.

The state payoff from an *unexposed* village:

$$V_G^{Unexposed} = \tau * Y(\tau)$$

Hence, bearing in mind that Y is a standard production function (Y'>0;Y"<0) the tax rate that maximizes the state's revenue an *unexposed* village ($\tau^{Exposed}$) is characterized by:

$$\frac{\partial V_G^{Unexposed}}{\partial \tau} = Y(\tau) + \tau * Y'(\tau) = 0$$

The state payoff from an *exposed* village:

$$V_G^{Exposed} = \tau * (1-s)^2 Y(\tau(1-b)) = \frac{\alpha^2\tau^3}{(\alpha\tau+1)^2} Y\left(\frac{\alpha\tau^2}{\alpha\tau+1}\right)$$

Hence, the tax rate that maximizes the state's revenue from an *exposed* village ($\tau^{Unexposed}$) is characterized by:

$$\frac{\partial V_G^{Exposed}}{\partial \tau} = \frac{\alpha^2\tau^3}{(\alpha\tau+1)^3}\left[Y(\cdot)\left(1+\frac{2}{\alpha\tau}-\frac{1}{\alpha\tau(\alpha\tau+2)}\right)+\tau * Y'(\cdot)\right] = 0$$

As, $\left(1+\frac{2}{\alpha\tau}-\frac{1}{\alpha\tau(\alpha\tau+2)}\right) > 1 \Leftrightarrow \frac{2}{\alpha\tau}-\frac{1}{\alpha\tau(\alpha\tau+2)} > 0 \Leftrightarrow 2(\alpha\tau+2) > 1$

and Y exhibits positive diminishing marginal productivity (Y'>0;Y"<0), the optimal tax rate for the *exposed* village must be higher than the optimal tax rate for the *unexposed* village: $\tau^{Exposed} > \tau^{Unxposed}$.

Finally, $\left(1+\frac{2}{\alpha\tau}-\frac{1}{\alpha\tau(\alpha\tau+2)}\right) \xrightarrow{\alpha\to\infty} 1 \Rightarrow \tau^{Exposed} \xrightarrow{\alpha\to\infty} \tau^{protected}$

The village production is decreasing in the total rate of impositions (booty and tax). The total rate of impositions of the protected village is lower than the exposed village because it does not raided and it pays lower tax rate. Therefore, the production of the exposed village is lower than the production of the protected village.

Proposition 2

To be completed

Proposition 3

(i) Consider the tribes payoff from raiding a village when the state sticks to the long-run uncoordinated strategies: (bribe, bribe , high-tax) for the two bribing villages and the highly taxed villages (respectively) defined above. The highly taxed village is not a profitable target and thus it is not influencing the tribe's consideration. The tribe could either collect the bribe form the first bribing village and then collect the bribe and raid the second bribing village, or raid both of them and taking the risk that the second village would not pay his bribe with probability $\rho > 0$. A long run state coordinated $(\rho > 0)$ equilibrium must ensure that the payoff from permanent collection of the bribes from the two bribing villages is larger than the payoff of raiding one or two of the villages When the tribe raids both villages or when it raids the second village in t=0 and the first village in t=1.

When the tribe raids both villages:

$$\frac{1}{1-\delta} 2 \cdot \overline{V}_T^{Bribe/Peace} \geq \overline{V}_T^{Bribe/Raid} + \rho \overline{V}_T^{Raid} + (1-\rho)\overline{V}_T^{Bribe/Raid}$$

$$\Rightarrow \delta \geq \frac{(2-\rho)\overline{V}_T^{Bribe/Raid} + \rho \overline{V}_T^{Raid} - 2\overline{V}_T^{Bribe/Peace}}{(2-\rho)\overline{V}_T^{Bribe/Raid} + \rho \overline{V}_T^{Raid}} \equiv \hat{\delta}$$

when $\rho = 0$ this condition is equal to the condition for long-run bribing uncoordinated equilibrium {Bribe, Peace} $(\delta^* = \hat{\delta})$; it is less restricting as the state's ability to coordinate its strategy across villages (ρ) increases $(\delta^* > \hat{\delta})$.

When the tribe raids the second village in t=0 and the first village in t=1:

$$\frac{1}{1-\delta} 2 \cdot \overline{V}_T^{Bribe/Peace} \geq \overline{V}_T^{Bribe/Peace} + \overline{V}_T^{Bribe/Raid} + \delta\left(\rho \overline{V}_T^{Raid} + (1-\rho)\overline{V}_T^{Bribe/Raid}\right)$$

$$\Rightarrow \delta \geq \frac{\overline{V}_T^{Bribe/Raid} - \overline{V}_T^{Bribe/Peace}}{\overline{V}_T^{Bribe/Raid} + \overline{V}_T^{Bribe/Peace} - (1-\rho)(1-\delta)\overline{V}_T^{Bribe/Raid}} \equiv \tilde{\delta}$$

Since the tribe was sufficiently patient in uncoordinated equilibrium

$$\delta \geq \delta^* \equiv \frac{V_T^{Brive/Raid} - V_T^{Brive/Peace}}{V_T^{Brive/Raid} - 0} \Rightarrow (1-\delta^*) = \frac{V_T^{Brive/Peace}}{V_T^{Brive/Raid}}$$

$$\Rightarrow \delta \geq \frac{\overline{V}_T^{Bribe/Raid} - \overline{V}_T^{Bribe/Peace}}{\overline{V}_T^{Bribe/Raid} + \overline{V}_T^{Bribe/Peace} - (1-\rho)\overline{V}_T^{Bribe/Peace}} \equiv \widetilde{\delta}$$

$$\rho > 0 \Rightarrow \delta^* > \widetilde{\delta}$$

Hence, the sate can reduced the bribe while still sustaining uncoordinated long run {Bribe, Peace} equilibrium.

(ii) a similar analysis to (i) shows that the state could use the externality generated by the coordination of the bribing strategies to reduce the tax rate on the non-bribing villages and boost both production and revenues without being expose to attacks.

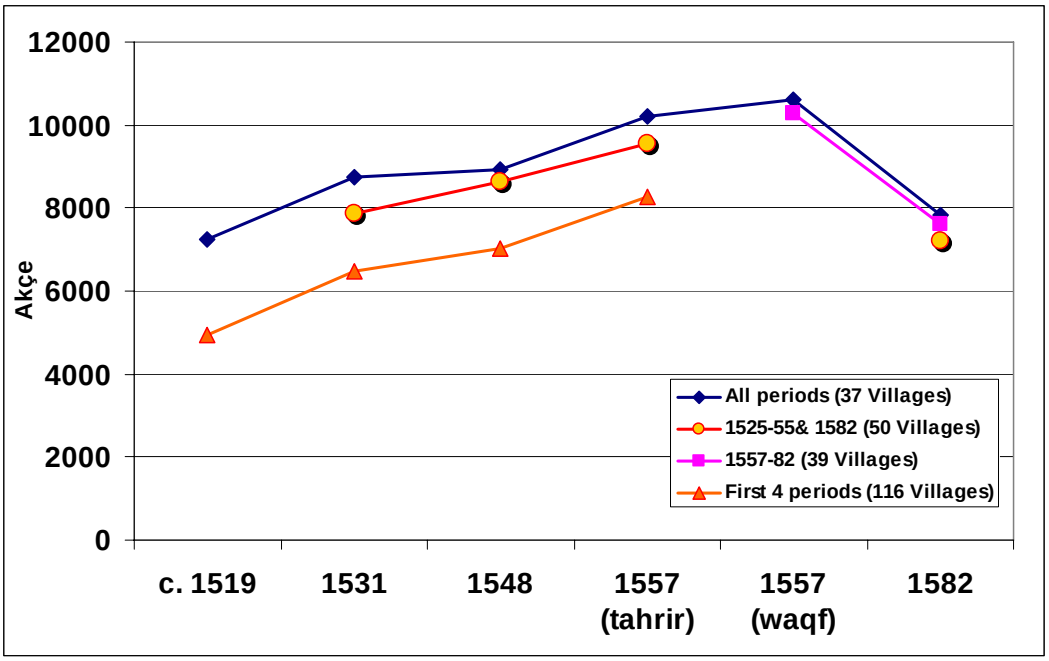
Appendix E: Balancing the *Tımar* System and the Bribes to the Tribes

One of the implications of the model presented in this paper suggests that the bribe rate is positively influence by the varying raiding costs. A fully specified model shows that the bribe rate is negatively influenced by the varying cost of defending the village. A support for the latter contention is based on the relation between the structure of the local military administration in the Gaza district and the bribes allocated to the tribes. The local administration was based on a cavalry unit. Each cavalryman was responsible for law enforcement in few villages and / or *mezra`a*s (grain fields) and lived off taxes collected from these villages. The expected income of the cavalryman was set according to his rank and military achievements. Moreover, the income of a *tımar* holder determined the amount and type of equipment and worriers he was obliged to maintain regularly and to contribute to military campaigns, and the number of additional men. Hence, the income of a *tımar* holder is a reasonable proxy for his military ability to defend his villages and *mezra`a*s. In other words, the following analysis assumes that a higher income of the cavalryman implies that it was cheaper for him to defend his villages and *mezra`a*s, and test the model prediction with the data from Gaza.

Table 23 presents estimations of the relations between the total income of the cavalrymen and the percentage of the total tax revenue paid to the Bedouins. Naturally, it analyses only the sub-sample of the villages and *mezra`a*s that were allotted to cavalrymen, and it excludes villages and *mezra'a*s that paid taxes to the Sultan, the governor or pious foundations. In almost all these estimations there is a negative and statistically significant association between the total income of *tımar* and *ze`amet* holders and the percentage paid to the tribes. The only exception is the sub-sample of *mezra`a*s (regression v) which has an insignificant negative association. This negative association is robust to various specifications. I interpret the negative association between the military strength of the village owner, represented by his total income, and the payments to the tribes as evidence that Ottomans used payments to the tribes and the allocation to *tımar* estates interchangeably: villages allocated to stronger *tımar* owners were better protected and thus paid less to Bedouins.

Figures and Tables

Figure 1: Average Tax Revenues (Akçe†) of Villages in the Gaza Sub-district (Balanced panels, 1519-1582)



Sources: 1519-1557(*tahrir*) *tharir defter*s 1557 (*waqf*) – 1582 *waqf defter*s. See details in section V. † Akçe – Ottoman Silver coins. These revenues exclude taxes on animals.

Table 1: Demography and Production in the Villages of the Gaza Sub-district

	Total Villages	Adult Males	Agricultural Production in Villages* (Bushels)				
			Wheat	Barley***	Durra	Beans	Sesame
c. 1519	**103**	**3,049***	166,413.4	157,683	15,467.6	145	14,705.6
c. 1531	**126**	**4,474**	349,241.1	305,103.6	13,239.5	11,315.60	7,797.2
1548	**133**	**6,780**	346,063	446,367	N.A.***	N.A.***	16,175.4
1557	**136**	**7,075**	415,108.6	521,861.6	N.A.***	N.A.***	23,698.9

* The population of 10 villages was not recorded in the first survey.

** The production of *mezra'a*s (un-populated plots) is not included in this table.

*** The category of "barley" in the first two *defter*s was changed to "barley etc." in the 3rd and 4th defters, and the last category probably included also durra and beans.

Sources: *Tahrir Defter*s 427, 1015, 265 & 304.

Table 2: Tax Revenues by Year and Payments to Bedouins

Year		Paid tax to Bedouins	Did not pay tax to Bedouins	Total
c. 1519	**No. of Villages (%)**	29 (27.9%)	75 (72.1%)	104 (100%)
	Total Tax Revenues (akçe)	90025	429711	519736
	Bribes to Tribes (akçe)	19498	N.A.	19498
	% Bribes out of Revenues	21.7%		3.8%
c. 1531	**No. of Villages (%)**	39 (31.7%)	84 (68.3%)	123 (100%)
	Total Tax Revenues (akçe)	212359	580247	792606
	Bribes to Tribes (akçe)	41429	N.A.	41429
	% Bribes out of Revenues	19.5%		5.2%
1548	**No. of Villages (%)**	43 (32.1%)	91 (67.9%)	134 (100%)
	Total Tax Revenues (akçe)	241399	633924	875323
	Bribes to Tribes (akçe)	45930	N.A.	45930
	% Bribes out of Revenues	19.0%		5.2%
1557	**No. of Villages (%)**	43 (32.1%)	91 (67.9%)	134 (100%)
	Total Tax Revenues (akçe)	269376	747710	1017086
	Bribes to Tribes (akçe)	46972	N.A.	46971
	% Bribes out of Revenues	17.4%		4.6%

Sources: *Tahrir Defter*s 427, 1015, 265 & 304.

Table 3: Fiscal Balance Sheet of the Bani `Ata and `Arab Sawalma Tribes (Current Akçe)

	Revenues			**Expenses**	
	Bribes Collected from Rural Producers			**Lump Sum Tax paid by the Tribes to the Governor**	**Net Revenues (iii)-(iv)**
	Villages	**Grain Fields**	**Total (i)+(ii)**		
	(i)	**(ii)**	**(iii)**	**(iv)**	**(vi)**
1519	19,498	6,346	25,844	0†	25,844
1531	41,429	5,574	47,003	25,000	22,003
1548	45,930	10,355	56,285	30,000	26,285
1557	46,971	13,144	60,115	30,000	30,115

† There is not entry for Bedouin tribes as taxpayers in the first *defter*. In addition, the payments the tribe collected are described only in the first *defter* as *tima-i `Arab*. This term suggests that these Bedouins were considered part of the untaxed military elite, like the other *timar* holders.

Sources: *Tahrir Defter*s 427, 1015, 265 & 304.

Figure 2: The Regulated Extortion Game

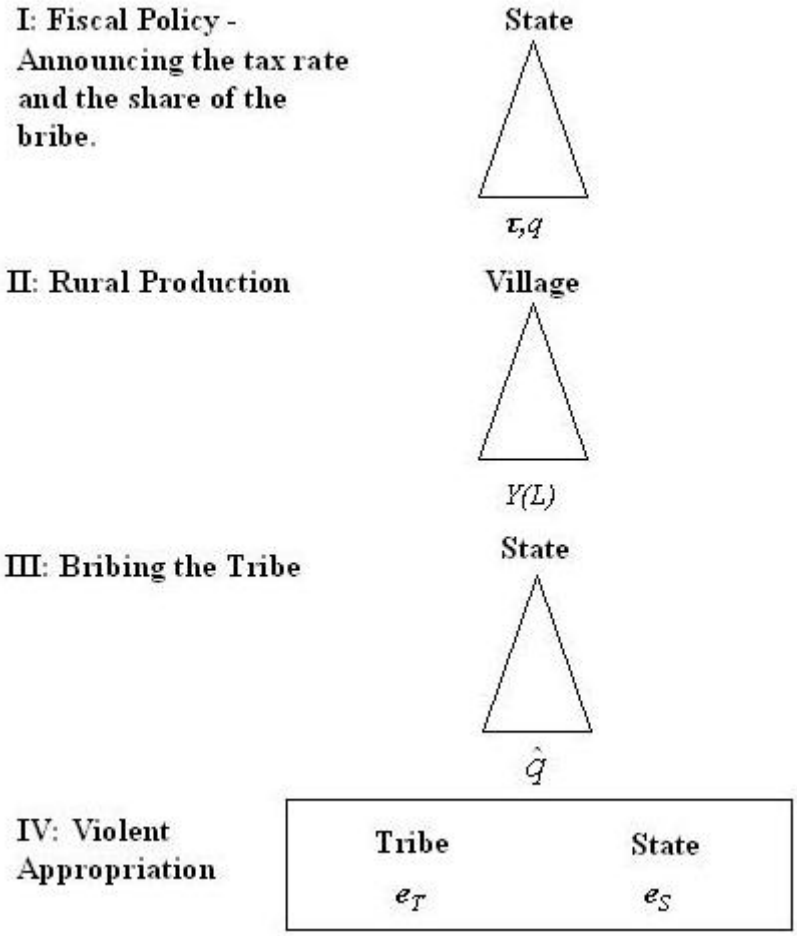


Figure 3: The Consumption–Labor Sets of a Village

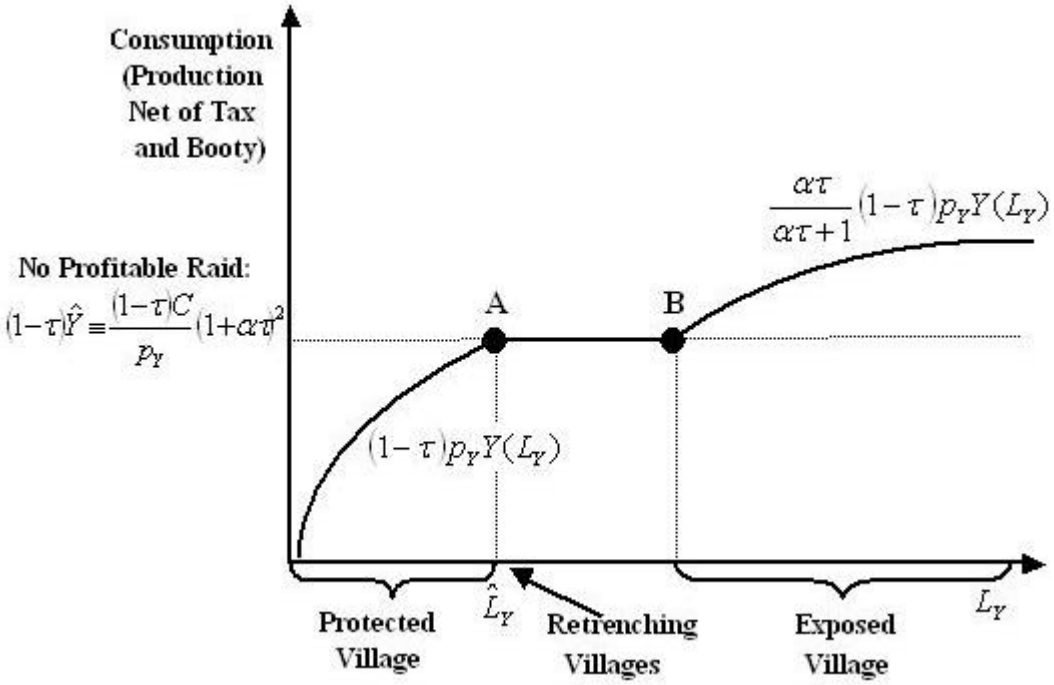


Figure 4: Types of Villages and fixed Raiding Costs

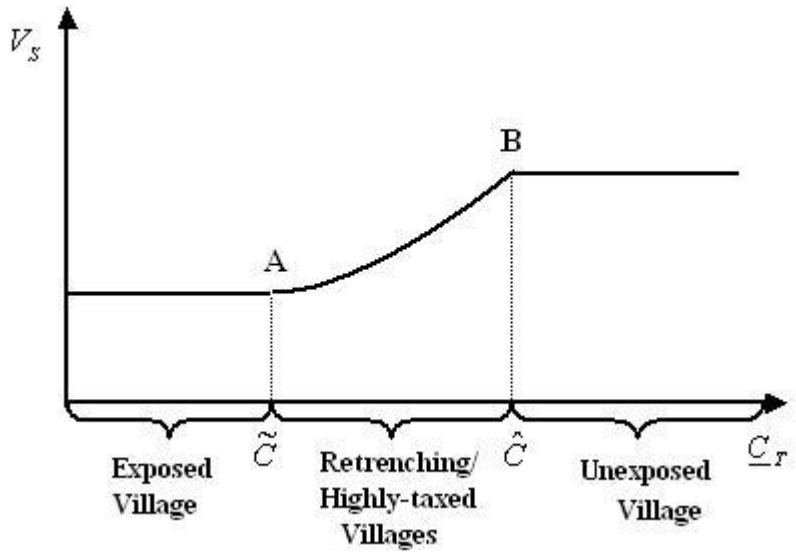


Figure 5: Production Village by Banditry Costs and Tax Rate

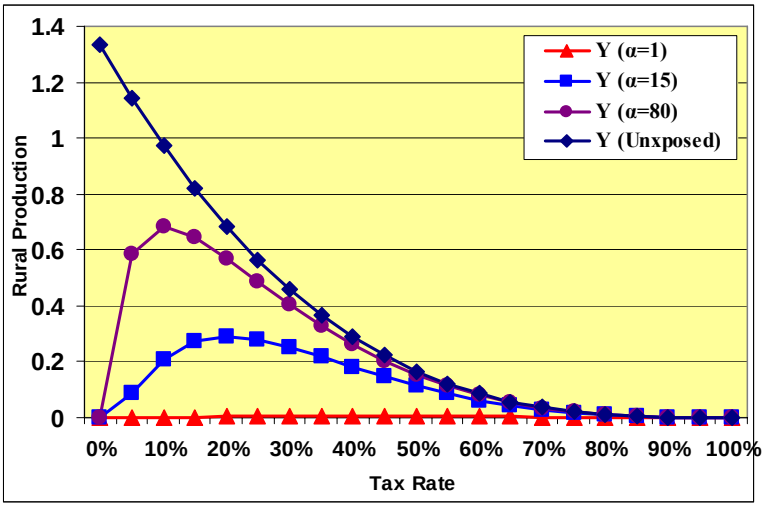


Figure 6: The State's Revenues by Banditry Costs and Tax Rate

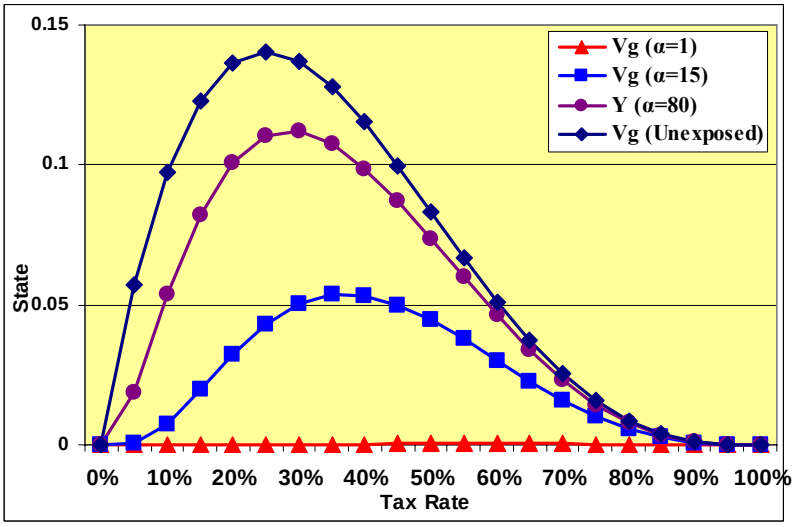


Figure 7-A: Protected Village

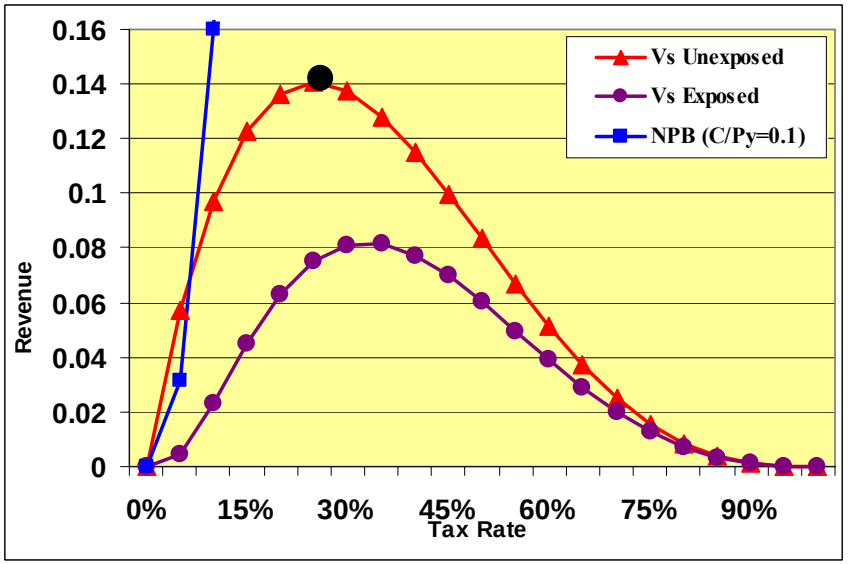


Figure 7-B: Exposed Village

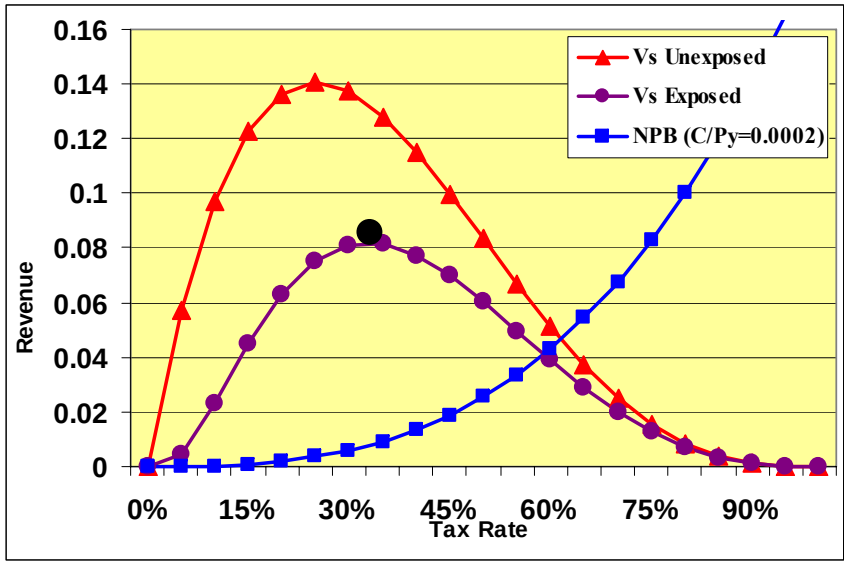


Figure 7-C: Highly Taxed (B) and Retrenching [A-B) Villages

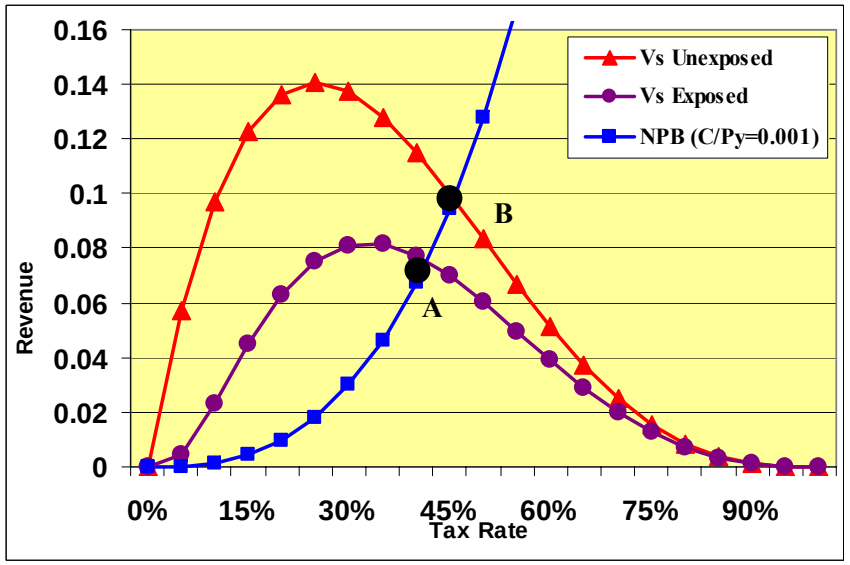


Figure 8: Multi Village Regulated Extortion Game

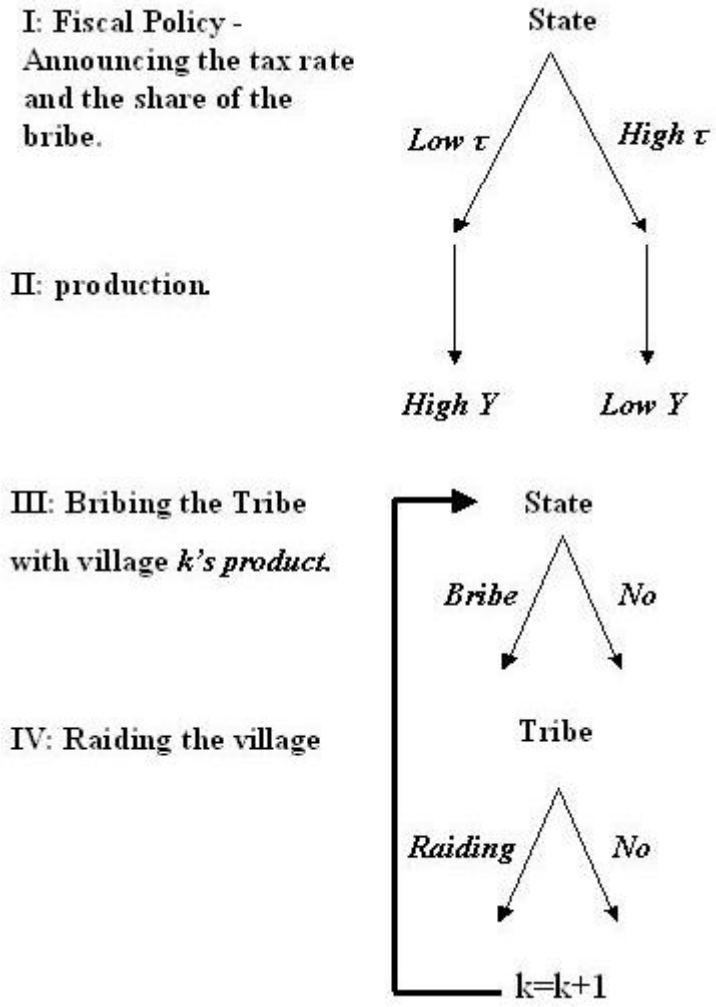


Table 4: Characteristics of Bribing and Non-Bribing Villages

	1519		1531		1548		1557	
Bribing	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Adult Males (mean)	22.72	32.72	22.62	43.17	33.98	58.60	36.56	60.58
Adult Males (median)	19	24	19	26.5	24	35	27	40
Tax Revenue per village (akçe)	3104.3	5729.5	5445.1	6907.7	5613.9	6966.2	6264.6	8216.6
Tax revenue per male	178.2	173.2	325.2	212.0	237.9	177.8	229.4	198.8
Wheat (Winchester bushel)	2419.5	1794.0	3368.3	3047.1	2863.0	2755.2	2879.4	3414.3
Barley (Winchester bushel)	1713.7	1994.5	2537.3	2866.1	3450.7	3673.3	3190.5	4501.6
Bushels of wheat per male	168.5	86.2	197.6	122.5	122.7	81.5	113.6	90.5
Bushels of barley per male	101.8	106.7	147.6	135.0	162.7	119.1	131.0	139.7
Observations	29	75	39	84	43	91	43	91
Notes:								

Sources: *Tahrir Defter*s 427, 1015, 265 & 304.

Table 5: Demographic and Economic Determinants of Bribes to the Tribes

Dependant Variable Bribe Rate (%)						
Sample	**Villages & Grain Fields**		**Villages**		**Grain Fields**	
	OLS (clustered)	**Tobit**	**OLS (clustered)**	**Tobit**	**OLS** [iii]	**Tobit**
Males	-0.04 (0.01)***	-0.34 (0.08)***	-0.02 (0.01)**	-0.22 (0.077)***	NA	NA
Ln (Total tax)	2.02 (0.75)***	9.07 (1.74)***	1.07 (1.24)	6.25 (2.56)**	2.749 (0.624)***	11.983 (2.599)***
Mezra`a (dummy)	0.656 (1.96)	-5.177 (4.38)	NA	NA	NA	NA
Sultan (dummy)	5.019 (2.14)**	13.27 (4.02)***	-1.95 (2.88)	-7.98 (5.53)	9.454 (1.72)***	32.807 (6.92)***
Waqf (dummy)	-6.46 (1.27)***	-215.49 (NA[ii])	-7.23 (1.66)***	-177.93 (NA[ii])	-3.077 (10.26)	-208.66 (NA[ii])
Ze`amet (dummy)	0.957 -(0.29)	1.57 (6.00)	2.3 (3.45)	3.16 (5.67)	-1.42 (3.33)	-3.59 (14.5)
Governor (dummy)	-2.261 (1.47)	-8.03 (5.86)	-4.99 (1.80)***	-19.17 (6.5)***	2.39 (3.09)	17.99 (10.97)
Observations	1012	1012	484	484	530	530
R^2 / Pseudo R^2	0.05	0.02	0.05	0.03	0.08	0.03

Notes: Coefficients for years' dummy are not reported.

i. The SE of the OLS estimation of the *mezra`as* are not robust because only a small part of the *mezra`as* were linked between different periods.

ii. The SE of the *waqf* dummy could not be calculated in the Tobit estimations because *waqf* villages did not bribe the tribes.

Figure 9: Changes in Tax and Bribe Rates (%) of Bribing and Non-Bribing Villages

Table 9-A: Full Sample (N=453)

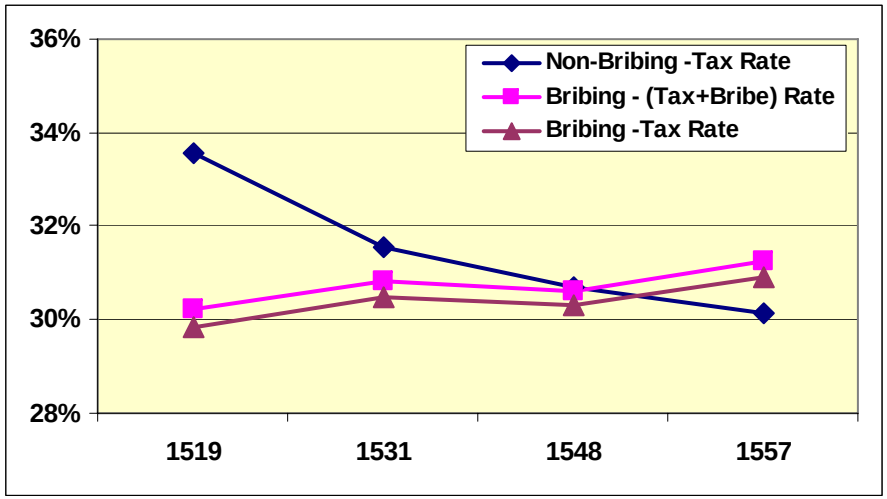
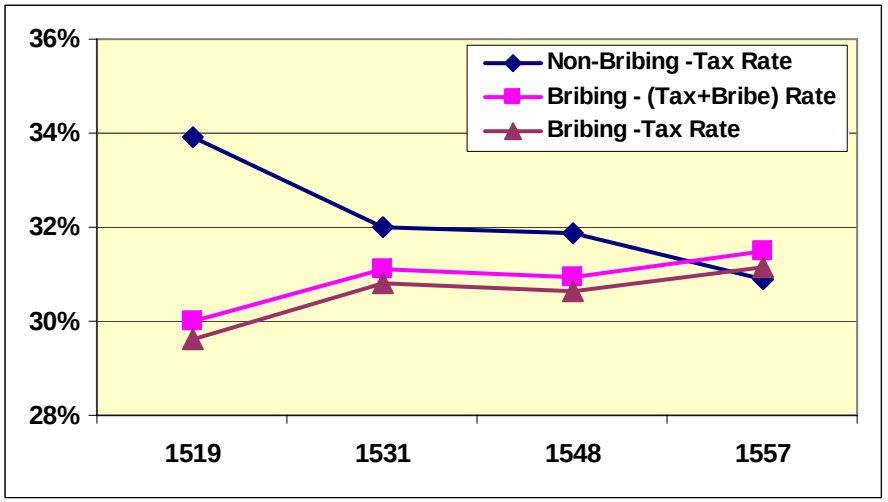


Figure 9-B: Balanced Sample (N=312)



Note:

- The balanced Sample (II) includes villages that switched from bribing to non-bribing status, while the last figure presents villages that did not change their bribing status.

Table 9-C: Balanced Sample – No Switchers (N=244)

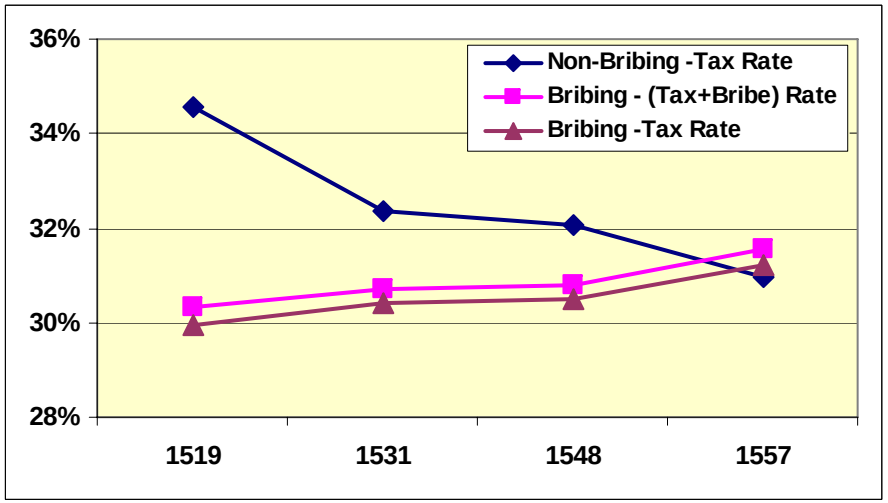


Table 6: Convergence of Tax Rates of Bribing and Non-Bribing Villages

Dependant variable: tax rate of the village							
	Full Population of Villages in the Gaza Sub-District					Balanced Sample	Balanced Sample No Switchers
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
Bribing	-3.871	-3.782	-3.461	-3.342	-1.355	-1.048	
	(1.433)***	(1.430)***	(1.764)*	(1.763)*	(1.824)	(1.893)	
Year	0.028	0.015	0.003	-0.007	0.035	0.049	0.046
	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)
Not-Bribing* Year	-0.139	-0.148	-0.129	-0.138	-0.121	-0.144	-0.151
	(0.042)***	(0.042)***	(0.052)**	(0.053)***	(0.044)***	(0.050)***	(0.055)***
Males		0.022		0.02	-0.005	-0.008	-0.01
		(0.007)***		(0.008)**	(0.012)	(0.015)	(0.015)
Rain			-0.015	-0.015			
			(0.006)**	(0.006)**			
F.E.					Y	Y	Y
Observations	449	449	347	347	449	304	244
R-squared	0.04	0.07	0.08	0.11	0.79	0.75	0.76

- Constant terms and location FE are not reported.
- Robust s.e. in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.
- Year =0 in 1519.

Table 7: Determinants of Barley and Wheat Production

	Ln(Barley)					Ln(Wheat)				
	(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**	**(vi)**	**(vii)**	**(viii)**	**(ix)**	**(x)**
Year	0.010 (0.002)***	0.012 (0.002)***	0.012 (0.002)***	0.012 (0.002)***	0.018 (0.004)***	-0.002 (0.003)	-0.0015 (0.003)	-0.002 (0.003)	-0.001 (0.003)	0.006 (0.0004)**
Males	0.007 (0.002)***	0.006 (0.002)***	0.007 (0.002)***	0.007 (0.002)***	0.006 (0.002)***	0.008 (0.002)***	0.006 (0.002)***	0.007 (0.002)***	0.007 (0.002)***	0.004 (0.002)**
Altitude		-0.0016 (0.0009)*					-0.0014 (0.0008)*			
Slope			-0.113 (0.063)*					-0.117 (0.061)**		
Rain				-0.0016 (0.0007)**					0.0027 (0.0007)***	
Fixed Effects					Y					Y
Observations	443	343	343	342	443	442	343	343	341	442
R-squared	0.19	0.24	0.24	0.23	0.74	0.15	0.16	0.17	0.20	0.19

Year=0 in 1519.
Robust standard errors in parentheses; * significant at 10%; ** significant at 5%.

Conditional on time trend, the production of barley and production of wheat have similar correlations with male population, and topographical variables of the located villages. However, their correlations with modern rainfall and wheat price in Tuscany are significantly difference. Hence, conditional on the time trend barley is a reasonable control for population and topography, but not for impact of climate and international prices.

Figure 10-A: Barley Production (Bushels) by Payments to Bedouins (c.1519-57)

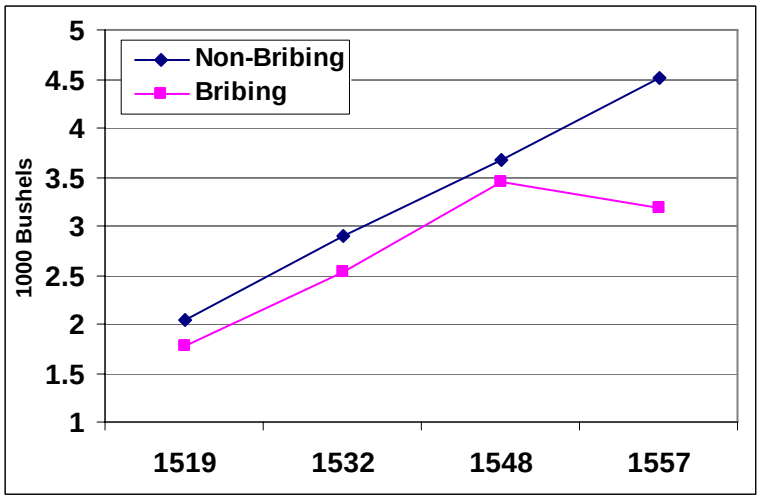


Figure 10-B: Wheat Production (Bushels) by Payments to Bedouins (c.1519-57)

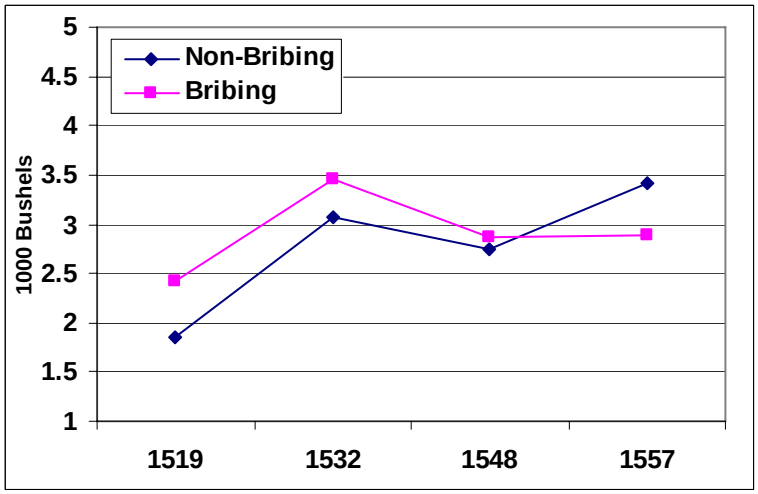


Figure 10-C: Ln(Wheat/Barley) by Payments to Bedouins (c.1519-57)

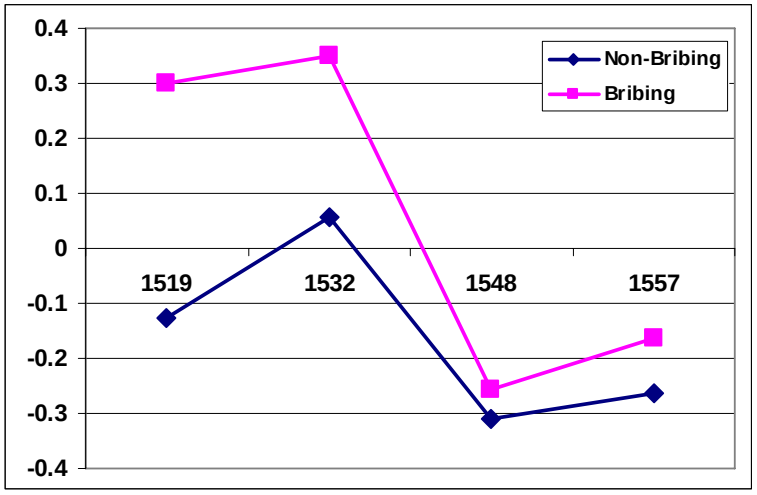


Table 8: Retrenchment in Barley and Wheat Production – Naïve estimations (Full Sample)

	Ln(Wheat)					Ln(Barley)				
	(i)	**(ii)**	**(iii)**	**(iv)**	**(v)**	**(vi)**	**(vii)**	**(viii)**	**(ix)**	**(x)**
Bribing	0.361 (0.123)***	0.403 (0.115)***	0.298 (0.143)**	0.353 (0.132)***	0.331 (0.217)	-0.009 (0.125)	0.030 (0.120)	-0.007 (0.130)	0.045 (0.122)	-0.127 (0.251)
Bribing*Year	-0.014 (0.005)**	-0.011 (0.005)**	-0.014 (0.006)**	-0.011 (0.006)*	-0.011 (0.006)*	-0.005 (0.006)	-0.002 (0.005)	-0.006 (0.006)	-0.003 (0.006)	0.002 (0.006)
Males		0.008 (0.002)***		0.007 (0.002)***	0.005 (0.002)**		0.0075 (0.002)***		0.006 (0.002)***	0.006 (0.002)***
Rain			0.0025 (0.0009)***	0.0025 (0.0008)***				-0.0016 (0.0008)**	-0.0016 (0.0007)**	
Fixed Effects					Y					Y
Observations	443	443	341	341	443	443	443	342	342	443
R-squared	0.02	0.17	0.06	0.21	0.19	0.06	0.19	0.10	0.23	0.73

Year=0 in 1519; time trend is not reported.

Robust standard errors in parentheses; * significant at 10%; ** significant at 5%.

Table 9: Convergence of ln(Wheat/Barley) of Bribing and Non-bribing Villages (Linear Trend Specification)

	Dependant variable: ln(Wheat/Barley)											
	Fixed and Changing Tax Rates						Fixed Tax Rate			Changing Tax Rates		
	Full Sample	Full Sample	All Located Villages	Balanced Sample	Located Balanced Sample	Balanced Sample No Switchers†	Balanced Sample	Balanced Sample	Balanced Sample No Switchers†	Balanced Sample	Balanced Sample	Balanced Sample No Switchers†
	(i)	(iii)	(iii)	(iv)	(iv)	(vi)	(vii)	(vii)	(viii)		(ix)	(x)
Bribing	0.48 (0.18)***	0.41 (0.22)*	0.46 (0.18)**	0.38 (0.21)*	0.444 (0.212)**		-0.221 (0.18)*	-0.098 (0.18)*		0.52 (0.025)**	1.22 (0.31)***	
Bribing* Year	-0.011 (0.006)*	-0.014 (0.007)*	-0.013 (0.006)**	-0.011 (0.007)	-0.010 (0.006)*	-0.009 (0.008)	0.0002 (0.007)	-0.0015 (0.007)*	-0.007 (0.007)	-0.02 (0.008)**	-0.031 (0.014)**	-0.033 (0.016)**
Rain			0.0045 (.0006)***									
F.E.		Y		Y	Y	Y		Y	Y		Y	Y
Obs.	446	446	344	292	344	248	192	192	168	100	100	80
R-squared	0.06	0.61	0.26	0.59	0.65	0.58	0.06	0.57	0.58	0.07	0.67	0.66

† Switcher – villages that switched from bribing to non-bribing status.

- Constants, time trends and location fix effects are not reported.
- Robust s.e. in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.
- Year =0 in 1519.

Table 10: Convergence of ln(Wheat/Barley) of Bribing and Non-bribing Villages (Linear Trend Specification)

	Dependant variable: ln(Wheat/Barley)									
	Fixed and Changing Tax Rates						Fixed Tax Rate		Changing Tax Rates	
	Full Sample	Full Sample	All Located Villages	Balanced Sample	Located Balanced Sample	Balanced Sample No Switchers	Balanced Sample	Balanced Sample No Switchers	Balanced Sample	Balanced Sample No Switchers
	(i)	(iii)	(iii)	(iv)	(iv)	(vi)	(vii)	(viii)	(ix)	(x)
Bribing	0.48 (0.18)***	0.41 (0.22)*	0.46 (0.18)**	0.38 (0.21)*	0.444 (0.212)**		-0.098 (0.18)*		1.22 (0.31)***	
Bribing* Year	-0.011 (0.006)*	-0.014 (0.007)*	-0.013 (0.006)**	-0.011 (0.007)	-0.010 (0.006)*	-0.009 (0.008)	-0.0015 (0.007)*	-0.007 (0.007)	-0.031 (0.014)**	-0.033 (0.016)**
Rain			0.0045 (.0006)***		Y					
F.E.		Y		Y	Y	Y	Y	Y	Y	Y
Observations	446	446	344	292	208	248	192	168	100	80
R-squared	0.06	0.61	0.26	0.59	0.65	0.58	0.57	0.58	0.67	0.66

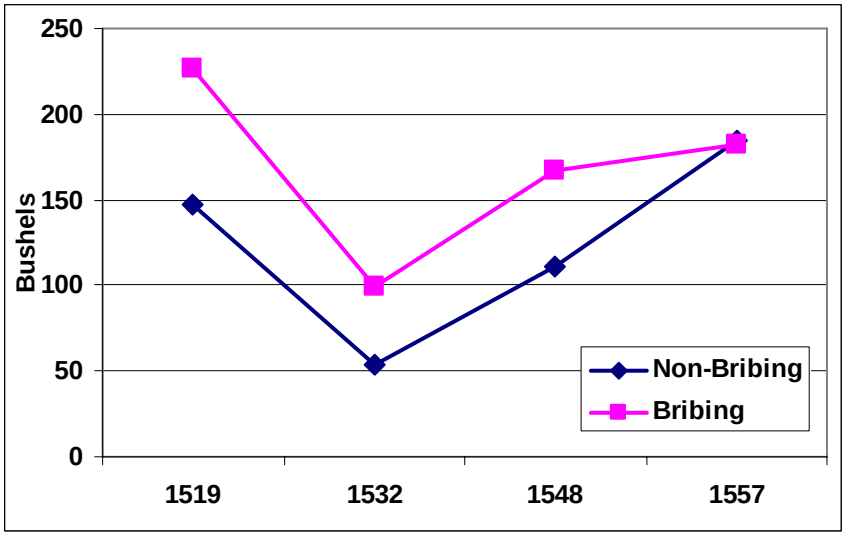
- Constant terms and location FE are not reported.
- Robust s.e. in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.
- Year =0 in 1519.

Table 10: Convergence of ln(Wheat/Barley) of Bribing and Non-bribing Villages (Time Dummy Specification)

	Dependant variable: ln(Wheat/Barley)									
	Fixed and Changing Tax Rates						Fixed Tax Rate		Changing Tax Rates	
	Full Sample	Full Sample	All Located Villages	Balanced Sample	Located Balanced Sample	Balanced Sample No Switchers	Balanced Sample	Balanced Sample No Switchers	Balanced Sample	Balanced Sample No Switchers
	(i)	(iii)	(iii)	(iv)	(iv)	(vi)	(vii)	(viii)	(ix)	(x)
Bribing	0.35 (0.12)***	0.24 (0.16)*	0.25 (0.12)**	0.27 (0.162)*	0.41 (0.205)*		-0.02 (0.15)		0.81 (0.20)***	
Bribing* 1548-57	-0.26 (0.123)*	-0.31 (0.152*)*	-0.18 (0.13)	-0.28 (0.152)*	-0.21 (0.160)*	-0.26 (0.167)	-0.15 (0.16)	-0.10 (0.16)	-0.56 (0.014)*	-0.62 (0.39)
Rain			0.0045 (.0006)***		Y					
F.E.		Y		Y	Y	Y	Y	Y	Y	Y
Observations	446	446	344	292	208	248	192	168	100	80
R-squared	0.09	0.63	0.27	0.59	0.65	0.62	0.61	0.62	0.67	0.65

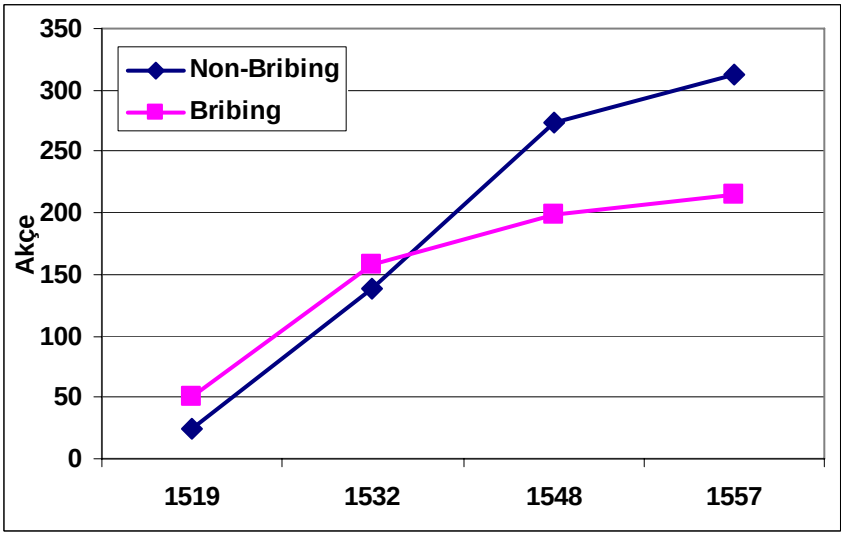
- Constant term, time dummies and location FE are not reported.
- Robust s.e. in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%.

Figure 11: Tax Revenues on Goats and Beehives (akçe) by Payments to Bedouins (1519-1557)



Sources: Calculations based in *tahrir defter*s 427, 1015, 265 & 304.

Figure 12: Tax Revenues on Goats and Beehives (akçe) by Payments to Bedouins (1519-1557)



Sources: Calculations based in *tahrir defter*s 427, 1015, 265 & 304.

Table 11: Average *Hasıl* † (akçe) of Villages by Sources & Payment to Tribes (1557-1582)

Sources	***Waqf* accounts (1557 & 1582)**		***Tahrir* (1557) *Waqf* Account (1582)**	
Paid Some Tax to Tribes	**Yes**	**No**	**Yes**	**No**
	(i)	**(ii)**	**(iii)**	**(iv)**
1557	6,912.3	12,188.7	6,414.4	11,598.3
1582	6,355.2	8,314.1	6,298.1	7,744.9
Change	-8.10%	-31.80%	-1.80%	-33.20%
Observations	14	25	15	33

Notes:
† *Hasıl* is the total tax on crops (wheat, barley, etc.) and trees (olives, vines, almonds etc.).

Source: calculations based on TT304, TT312 & TT602

Table 14: Tribes' Share of Tax Revenue and Military Ability of the *Tımar* Holder

OLS Estimate	Tımar Villages and Mezra`as	Tımar Villages and Mezra`as	Tımar Villages	Tımar Villages	Tımar Mezra`as
	(i)	(ii)	(iii)	(iv)	(v)
Estate holder's income *1000 (Akçe)	-1.392 (0.495)***	-1.204 (0.612)**	-1.636 (0.57)***	-1.694 (0.561)***	-0.597 (0.941)
Males	-0.38 (0.116)***	-0.383 (0.117)***	-0.398 (0.113)***	-0.394 (0.118)***	
Tax Revenue (Akçe)	0.003 (0.0007)***	0.003 (0.0007)***	0.003 (0.0007)***	0.002 (0.0014)	0.004 (0.0019)**
Mezra`a (dummy)	-17.839 (4.5)***	-18.259 (4.52)***			
No. of estate holders†		-1.085 (2.4)			
Wheat (Bushel)				0.0033 (0.0017)*	
Barley (Bushel)				-0.0034 (0.0015)**	
Observations	362	359	214	211	148
Pseudo R^2	0.03	0.03	0.02	0.03	0.02

Robust SE in parentheses

† No. of estate holders is 1 when only one cavalryman received the revenue from the relevant tımar, 2 when two cavalrymen received etc.

Dummy variable for years are not reported.

* significant at 10%; ** significant at 5%; *** significant at 1%