"Romes without Empires": Primate Cities, Political Competition, and Economic Growth

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Abstract

Many developing economies are characterized by the dominance of a super metropolis. The coexistence of a primate city with a low level of economic development is not an accident, the former being symptomatic of the causes of the latter. Taking historical Rome as the archetype of a city that centralizes political power to extract resources from the rest of the country, we develop two models of rent-seeking and expropriation which illustrate different mechanisms that relate political competition to economic outcomes. The "voice" model shows that rent-seeking by different interest groups (localized in different specialized cities/regions) will lead to low investment and growth when the number of these groups is low. Increased political competition in the form of more organized groups engaged in countervailing activity leads to more secure property rights and higher growth. The "exit" model allows political competition among those with political power (to tax or expropriate from citizens) over a footloose tax base. It shows that when this power is centralized, tax rates would be higher and growth rates lower. When political power is decentralized across different self-interested rulers in diverse jurisdictions, the competition over the mobile resources leads to lower tax/expropriation rates, raising the long-run rate of growth of the economy.

1 Introduction

At its zenith, around second century A.D., Rome had become by far the largest city in the world with a population probably well in excess of 800,000, representing the largest part of the urban population of Italy. Citizens of this megalopolis enjoyed some unprecedented advantages. Roman law had quite early on (123 B.C.) entitled each citizen to receive a certain quantity of wheat at a fixed price. By 58 B.C. a succession of amendments to the law had reduced this price to zero. By 45 B.C. no less than 320,000 Romans received a free daily ration of bread that varied from 1 to 1.5 kilograms (yielding calories that would exceed the daily needs of an average adult).[1] Though, it has been estimated that by this time between 30 to 40 percent of the residents of Rome were either unemployed or underemployed, "[t]he state distribution of bread never bore, and would never bear, the least resemblance to assistance. Nothing indicates that the poorest citizens were given preference;...everything points to the reverse."[2] Rome used its military and political might to suppress potential competitors to its rule and to extract resources from its empire. The result was that "the parasitic character of the Roman metropolis was not only responsible for a weakening of the Italian economy; it also played a central part in...the collapse of the empire."[3]

The parallels between the remarkable Roman concentration of urban population and political power in a primate city–a city that dominates all other urban areas in a given country–and similar patterns observed in the developing countries of the modern world has led Bairoch (1988) to label these modern primate cities "Romes without empires". Table 1 offers some suggestive examples of the dominance of several of these cities as of 1991.[4]

[1] See Bairoch (1988, p. 81).
[2] Veyne (1976) cited in ibid. p.84.
[3] ibid. p. 105.
[4] The table is taken from Balchin et al. (2000).

Table 1			
Country	Largest City	Population in largest city Urban population	Total population
		(percent)	(percent)
Guinea	Conakry	89	23
Mauritania	Nouakchott	83	39
Costa Rica	San Jose	77	36
Congo	Brazzaville	68	28
Angola	Luanda	61	17
Thailand	Bangkok	57	13
Gabon	Libreville	57	26
Liberia	Monrovia	57	26
Haiti	Port au Prince	56	16
Togo	Lome	55	14

Such concentrations were for a long time in the making. Around 1930, when developing market economies had an average level of urbanization of 12.6 %, 16% of their urban population lived in fourteen large cities (cities that had populations of more than half a million). Such a high concentration of urban population in large cities of the developed world had been attained in 1880, when its average level of urbanization stood much higher at 23%. The number of the large cities in the developing world as well as the size of the population in them increased radically between 1930 and 1980, by which date they had 43% of the urban population, a number which paralleled that of the developed countries. However, the level of urbanization in the latter stood at 65% whereas developing market economies had an urbanization level half of that.[5] Furthermore, as a recent survey puts it "[s]ince primate cities are invariably national capitals, they are centres of decision-making and opinion-forming. They are thus able to dominate their countries both economically and politically" (Balchin et al. 2000, p. 64).

Primate cities of the developing world typically started out as major outlets for the export of products from their hinterlands and became centers of colonial or post-colonial administration, benefiting from a "lack of effective competition from provincial centers".[6] Thus, in colonial Spanish America a tiny number of ports (one in Spain and three in America) monopolized trade and prevented the formation of a dense commercial network, impeding the genesis of a system of specialization and exchange across the

[5] For these numbers, see Bairoch (1988).

[6] Clark (1996) and Balchin (2000).

colonies. In contrast, British North America developed hundreds of ports and surrounding hinterland economies, letting them compete against each other.[7] This contrast is symptomatic of the structural differences that led the two regions along divergent political and economic paths. North et al. (2000) argue that centralization of political power that results in an authoritarian establishment of order typically leads these governments to transgress the rights of the citizens. The lack of well-defined rights implies that more resources have to be devoted by agents to protect themselves from the state reducing the amount of resources allocated to productive activities. By reducing the threat of unilateral expropriation of property, a more polycentric distribution of political power, on the other hand, would lead to more secure property rights and a larger share of resources allocated to productive activities. The connection between the security of property rights, the distribution of political power and cities have long been recognized. In the *Wealth of Nations*, Adam Smith emphasized the importance of "the liberty and security of individuals," noting that it was because of this security in the cities that industry flourished and "stock accumulated" there before the country. Smith argued that cities in France and England were given their freedom as a consequence of the political competition between the sovereign and feudal lords. As he put it "[t]he burghers naturally hated and feared the lords. The king hated and feared them too; but though perhaps he might despise, he had no reason either to hate or fear the burghers. Mutual interest, therefore, disposed them to support the king, and the king to support them against the lords. They were the enemies of his enemies, and it was his interest to render them as secure and independent of those enemies as he could" (2000, p. 430). It was also the direct pressure put on princes by alliances of cities such as the Hanseatic League, Greif et al. (1994) argue, that led to more secure property rights and, therefore, to the medieval expansion of trade. A related argument is put forward by Weingast (1995), who points out the role played by decentralization ("federalism") in the economic development and growth of "Netherlands from the late 16th through mid-17th century, England from the late 17th or early 18th through the mid-19th century, and the United States from the late 19th century until the late 20th century." An important reason why the industrial revolution could make headway in England was that when regulations in the established urban centers threatened to choke off the fledgling industrial activity, local justices in the north, who had their own political authority and,thus, regulatory power, competed to attract new forms of economic activity to their jurisdictions. This pattern, which would have been impossible in an economy where all fiscal and regulatory power had

[7] North, Summerhill and Weingast (2000).

been centralized, was eventually repeated elsewhere in Europe which saw the rise of a large number of new towns and cities that came to represent the new industrial interests as opposed to the established centers[8].

Wherever the interests represented by the cities were politically dominated by other interests the results were debilitating. Thus, for instance, in the early modern period, "[t]he economic crisis faced by the towns gave the [Eastern European] nobility, helped by its close links to the monarchy, the chance to break the bourgeois monopoly of foreign and domestic trade, to prohibit cities from granting asylum to runaway serfs, to outwit the burghers in commercial transactions and to secure price advantages for its own products by virtue of tariff reductions. Weakened by the measures rammed through diets by princes and noblemen, many Eastern European cities began to stagnate... This trend was accompanied by stagnating and in some instances declining productivity. Under such conditions peasant farming made little progress or even fell behind." (Rősener,1994, pp. 111-113). The contrast between the European and Asian historical experiences is also very instructive. Whereas medieval European cities "made one free,"[9], as Elvin (1978) puts it "Chinese air made nobody free." This was because unlike the cities in Europe "[t]he [Chinese] city had nothing like a city charter, and no independent administration;... no laws and privileges that applied especially to its inhabitants; and no indigenous social groups that would have thought of demanding city dwellers' "rights" from the central government. In short, Chinese cities had no separate legal or political status; they were not corporate entities and had none of the organizational features that set European cities apart...[The] Chinese city did not make people free in specific political and legal senses..." (Mote pp. 761-62). Moreover, "[t]he emergence of capitalism necessarily also depended on the expansion of the judiciary system to define the conditions under which private enterprise can grow; it has also required that economic interests be given relatively free rein to develop and that government allow rational implementation of business operations free of excessive interference. None of these conditions was being met in the late Ming and early Qing; there is no visible trend in that direction" (ibid., p. 769). It was in the second half of the nineteenth century that a number of port cities of the Asian agrarian empires were able to break free of the centralized authorities. International agreements imposed upon these authorities by the colonial powers established judicial systems that dramatically improved security of property rights and led to an

[8] See Bairoch (1988). De Vries (1984) shows that during early industrialization in Europe the slope of the rank-size distributions became flatter, indicating a movement towards polycentrism.

[9] The medieval german expression "stadtluft macht frei" (city air makes one free) indicated that serfs who made it to the city were freed from their obligations to their lords.

unprecedented economic expansion.[10] In the same vein, the recent economic renaissance of a number of Chinese cities followed the establishment of a decentralized fiscal system. Since the late 1970s the central Chinese government has given many cities as well as semi-rural settlements "...varying degrees of autonomy in handling foreign investment, collecting taxes and dispensing revenue...The number of administrative areas, defined as cities, consequently increased from 289 in 1982 to 570 in 1993" (Balchian et al., 2000, p. 68). Montinola, Qian, and Weingast (1996) argue that it is this decentralization that ensured the success of the Chinese reforms of 1979-1993. By establishing alternative centers of power, argue Montinola et al., decentralization generated forces that successfully resisted later attempts by the central government to compromise the reforms and led to the continuation of China's spectacular growth.

The connection between urban concentration and the level of economic development has been the subject of a large literature starting with the seminal paper of Williamson (1965) which put forward the hypothesis that one should expect a non-monotonic relation between the two. At early stages of development, Williamson supposed high urban concentration to be helpful by conserving on infrastructure and by enhancing information spillovers at a point when the economy suffers from a severe scarcity of infrastructure and information. With the development of the economy, it becomes possible to spread the infrastructure and information over to the hinterland, while rising costs in congested urban areas push producers and consumers out of these erstwhile centers. This pattern of income growth resulting initially in higher and later in lower urban concentration is supported by a number of empirical studies (Alonso, 1980; Wheaton and Shishido, 1981; Junius, 1999; Davis and Henderson, 2003).[11] A more recent strand of literature focuses on political factors to explain high urban concentration (Henderson, 1988; Ades and Glaeser, 1995; Henderson and Becker, 2000). Here the mechanism emphasized is that of a national government favoring a capital or central city in terms of investment, granting of loans, licences, etc. at the expense of the hinterland. This, it is argued, for instance allows the bureaucrats in the center to compete more effectively in the extraction of rents

[10] See Basu (1985), Broeze (1989), and Keyder et al. (1993).

[11] The most common measure of urban concentration used in the literature is urban primacy–typically the share of the largest urban area in the total urban population of the country (see Ades and Glaeser, 1995, Henderson, 2003). There are two exceptions to this rule: (1) Wheaton and Shishido (1981) and Henderson (1988) use the Hirschman-Herfindahl index of concentration, and (2) Rosen and Resnick (1981) employ the Pareto parameter measuring how quickly the city size declines as one moves downward in the distribution. However, because of data limitations, both measures cover a small number of countries for a single year.

against low-ranking rivals in the provinces. Finally, there is an emergent literature, as exemplified by Henderson (2003), that is directly relevant to our paper in that it grapples the link between urban concentration and economic growth.[12] Henderson finds evidence that there is a level of urban concentration that maximizes productivity growth and that this level depends on the development and the size of the economy.

Our paper differs from the existing literature in the area in that, unlike others (except Henderson, 2003), it focuses on the political economy mechanisms that causally link urban concentration to growth. The argument here is that urban concentration, by effectively centralizing political and economic power at the expense of potential competitors that could have risen elsewhere, has deleterious effects on the rate of growth of the "third world" economies. Several political economy mechanisms may account for the suggested negative effects of centralization. The paper (unlike Henderson, 2003) formalizes two of these which could be called the "voice" and "exit" mechanisms. The first one supposes that with division of labor and specialization different urban centers become nodes of different and potentially competing interests. To the extent that the political institutions allow for and respond to active rent-seeking by these interests, agents will not restrict themselves to purely economic activities, but engage in rent-seeking and try to redistribute income to themselves through political channels. The "voice" model (a version of the celebrated Grossman and Helpman (1994) lobbying setup) that formalizes such activity shows that as long as political competition remains limited, those organized groups that expend resources in rent-seeking succeed in redistributing income to themselves. However, a rise in the number of interests that engage in such political competition, reduces and eventually eliminates such redistribution. Insofar as redistribution leads to deadweight losses, its elimination would have beneficial consequences for economic development. The second mechanism is formalized in an "exit" model which starts with the argument that competition among rulers of political centers with some ability to conduct independent economic policy (such as cities that are administrative centers of regions within a country) might promote economic growth.[13] An environment that could give rise to such an outcome is one where footloose agents find it possible to move to those jurisdictions/cities where rulers offer policies that are more conducive to economic welfare of these agents. The "exit" model indeed shows that centralization of

[12] Gallup et al. (1999) imply that urbanization may promote growth. Henderson (2003) finds no evidence for this hypothesis.

[13] Karayalcin (2003) uses this setup in comparing the historical records of the agrarian empires of the East with that of the European states system.

power leads to higher expropriation rates[14] and lower levels of "public services", whereas political competition for mobile "resources" improves outcomes significantly, leading to higher long-run growth rates.

The role of political competition in promoting the adoption of more efficient policies in general has been noted in different contexts. Grossman and Helpman (1994) and Mitra (1999), for instance, show that the higher is the number of lobbies involved the smaller is the tariff subsidies awarded.[15] Acemoglu, Johnson, Robinson (2001) point out that concentration of political power in the hands of an elite implies that the majority of the population risks being *held up* by the elite after they undertake investments. This lack of secure property rights would then discourage investment and economic growth. Weingast (1995) argues that the crucial factor that generated economic expansion in both cases was political competition among jurisdictions (which he labels "market-preserving federalism") for the mobile capital and labor because this competition limited the ability of the state to confiscate wealth.[16] Epple and Romer (1991) present a static closed-economy model where exit, that is the mobility of factors (á la Tiebout, 1956) subject to taxation, limits the extent of redistribution. Optimal taxation when the tax base is mobile internationally has been studied extensively in the literature (see Persson and Tabellini (1995) for a survey.) Recent common property models of growth (see, for example, Benhabib and Rustichini, 1996, Lane and Tornell, 1996) focus on the negative effects of conflict among social groups on growth as they attempt to expropriate resources from each other. In Grossman and Kim (1996) agents adopt a "voice" strategy, namely arming themselves to the teeth against potential predators/expropriators.[17] Another historically important alternative strategy is insurrection or revolt that, if successful, results in the expropriation of the rulers by their subjects (see Grossman, 1991). Thus,

[14] For a similar argument see Acemoglu, Johnson, Robinson (2001) who point out that concentration of political power in the hands of an elite implies that the majority of the population risks being *held up* by the elite after they undertake investments. This lack of secure property rights would then discourage investment and economic growth.

[15] See also Persson and Tabellini (2000, ch. 7).

[16] Weingast (1995) Montinola, Qian, and Weingast (1996) also point out the fundamental role played by "federalism" in the remarkable growth performance of China over the past two decades. North, Summerhill, and Weingast (2000) and Nugent and Robinson (2001) emphasize the importance of political competition for the growth performance of a number of Latin American countries.

[17] In their empirical investigation of the importance of institutions, Acemoglu and Johnson (2003) find that institutions which protect citizens against expropriation have a first order effect on long-run economic growth.

Acemoglu and Robinson (2000b) argue cogently that the extension of the franchise in the West was a response to the threat of revolution. Democracy was necessary because the only safeguard for sustained redistribution desired by the masses was possession of political power. This link between political power and the redistribution of wealth it affords those who happen to command such power has been used in a number of different contexts. Acemoglu and Robinson (2002a) exploit this link to argue that political elites may block technological and institutional developments for fear that it would lead to loss of political power, which would then translate into an economic loss. Alesina and Rodrik (1994), among others, point out that in majoritarian democracies, which give the median voter the decisive political power, this power could be used to redistribute wealth. To the extent that such redistribution has to be carried out by distortionary taxation, this would lower the rate of growth of the economy.

The rest of the paper is organized as follows. Sections 2 and 3 present the models of "voice" and "exit" as versions of political competition. Section 4 concludes the paper.

2 Voice: Rent-seeking/Lobbying

The voice model presented here captures in a simple way the mechanism whereby limited political competition among self-interested parties would lead to distortions and dead-weight losses. Increased political competition, on the other hand, would lead to more secure property rights (in the sense of reduced expropriation/taxation from unorganized groups) and more investment. To the extent that one identifies different interests as being locally differentiated–as would be the case, for instance, in an economy where division of labor and specialization has advanced–this would imply that those countries that are more polycentric would have higher growth rates.

Consider now an economy populated by two types of agents: a ruler (government) and a large number of citizens whose mass is normalized to one. All agents live for two periods. There are N groups of citizens in the economy, each representing a special interest localized in different cities/regions. Each group has mass λ_i with $\lambda_i = 1$. Some of the groups are organized into interest groups, others remain unorganized. Without loss of generality let $\Theta = \{1, .., n\}$ and $\Lambda = \{n+1, .., N\}$ be the sets of organized and unorganized groups. Each citizen in group i maximizes lifetime utility U_i given by

$$U_i = u(c_{1i}) + \beta u(c_{2i}), \tag{1}$$

subject to

$$c_{1i} = (1 - \tau_i)e_i - s_i, \quad c_{2i} = Rs_i \tag{2}$$

where c_{ki} is consumption in period-k ($k\epsilon\{1, 2\}$)of an agent in group i, R is the gross rate of return, e interest and s denote endowment income and savings. The only policy instruments available to the ruler are proportional tax/subsidy rates, the vector of which is denoted by $\tau = (\tau_1, ..., \tau_N)$ where $\tau_i > 0$ ($\tau_i < 0$) denotes a tax (subsidy) rate. Solution of a citizen's problem given in (1) and (2) yields the indirect utility

$$V_i = V(\tau_i), \quad V'(.) < 0. \tag{3}$$

Suppose, as in Grossman and Helpman (1994), that the ruler's utility function $U_R(\tau)$ takes the form

$$U_R(\tau) = \sum_{j\epsilon\Theta} C_j(\tau) + a\Omega(\tau) \tag{4}$$

where $C_j(\tau)$ is the contribution schedule of interest group j, $\Omega = \sum_{i=1}^{N} \lambda_i V_i$ is aggregate social welfare, and a is the weight the ruler attaches to social welfare Ω. If $a = 0$, the ruler cares only about the contributions he receives, while if $a \to \infty$ he behaves as a utilitarian social planner.

Suppose that the tax-cum-subsidy policy is purely redistributionary

$$\sum \lambda_i \tau_i e_i - T = 0 \tag{5}$$

where T is the deadweight loss from taxation.

Rent seeking by organized lobbies takes the following form: all groups organized into lobbies offer truthful contribution schedules

$$C_j(\tau) = \max[0, \lambda_j(V_j(\tau) - \omega_j)] \tag{6}$$

(where the scalars ω_i are to be determined in equilibrium) that reveal how much they are willing to pay for the implementation of the policy vector τ. The ruler chooses τ after observing the offered contributions.

Focusing, as in Grossman and Helpman (1994), on equilibria where organized groups make positive contributions, (4) and (5) yield

$$\max U_R(\tau) = \sum_{j\epsilon\Theta} \lambda_j(V_j(\tau) - \omega_j) + a\Omega(\tau) \Rightarrow \max \sum_{j\epsilon\Theta} \lambda_j V_j(\tau) + a\Omega(\tau). \tag{7}$$

Thus,

$$\tau = \arg\max_{\tau} \left(\sum_{j\epsilon\Theta} \lambda_j V_j(\tau) + a \sum_{i\epsilon\Theta\cup\Lambda} \lambda_i V_i(\tau) \right), \tag{8}$$

that is the policy vector chosen by the ruler is the one that maximizes a weighted social welfare function where the welfare of organized groups receives the weight $1+a$, whereas that of the unorganized groups receives a weight of only a. In other words, rent-seekers (groups that engage in lobbying here) obtain favorable treatment from the ruler in return for the resources transferred to him. Note also that (6) is a special form of the more general political support function of Hillman (1989) and provides micro foundations for this function.

To put the results into sharp focus, specialize now the period utility functions $u($ $c_{ki})$ to $u($ $c_{ki}) = \ln c_{ki}$, and let the deadweight loss be proportional to total (and given $\lambda_i = 1$, average) income $e = \sum_{i\epsilon\Theta\cup\Lambda} \lambda_i e_i$, so that

$$T = \begin{cases} \sigma e > 0 \; if \; \exists i \text{ such that } \tau_i > 0, \\ 0 \; if \; \forall i \; \tau_i = 0. \end{cases} \tag{9}$$

(7) then yields the following expressions for the tax/subsidy rates for organized and unorganized groups

$$\tau_j = 1 - \frac{e}{e_j} \frac{(1+a)(1-\sigma)}{(\lambda_o + a)}, \quad j\epsilon\Theta \tag{10}$$

$$\tau_i = 1 - \frac{e}{e_i} \frac{a(1-\sigma)}{(\lambda_o + a)}, \quad i\epsilon\Lambda \tag{11}$$

where $\lambda_o \epsilon [0,1]$ denotes the mass of individuals organized in interest groups. These equations yield a number of results, the most important of which for our purposes are summarized by the following.

Proposition 1 *Let, for simplicity, all individuals have the same endowment income so that $e_i = e$ for all $i\epsilon\Theta \cup \Lambda$. Then organized groups receive a subsidy and unorganized groups are taxed as long as the mass of individuals belonging to rent-seeking groups is less than a critical level $\tilde{\lambda}_o = 1 - \sigma(1+a)$. Once the critical level is reached redistribution ends.*

Proof. This follows immediately from (8)-(11). ■

The proposition reflects the argument that interest groups typically engage in rent-seeking activities, attempting to redistribute income from the rest of the population to themselves. Such activity succeeds as long as it does not meet with effective opposition from groups that are adversely effected.

Proposition 2 *Redistribution depresses aggregate investment and, thus, growth until political competition among interest groups reaches a critical level (expressed by the critical mass of organized groups in Proposition 1). Beyond that critical level investment and growth bounces to a higher level.*

Proof. First note that (1) and (2) yield $s_i = [\beta/(1+\beta)](1-\tau_i)e_i$. Thus, total savings s is given by $s = [\beta/(1+\beta)]\sum_{i\epsilon\Theta\cup\Lambda}(1-\tau_i)\lambda_i e_i$. Substituting the ruler's budget constraint yields $s = [\beta/(1+\beta)](e-T)$. Once political competition among groups (as measured by the mass λ_o of citizens engaged in organized rent-seeking activity) reaches the critical level $\tilde{\lambda}_o$ the ruler stops redistributing income through taxes and subsidies, deadweight losses vanish and savings, investment, and, thus, growth rises to a higher level. ■

Thus, we have established that once it attains a certain critical level, increased political competition among interest groups leads to reduced taxation (expropriation), improving the security of property, and, thus leading to more investment and higher levels of growth.

3 Exit: Long-run growth under centralized and decentralized systems

I now turn to an analysis of long-run growth under centralized and decentralized systems. To do so I use a simple dynamic setup to illustrate the main points. An economy in this setup consists of two types of agents, rulers and citizens. Citizens produce a good that can be used for consumption and investment. Rulers appropriate a portion of the good produced and in return may choose to supply public services that enhance the productivity of the citizens. Rulers are identified with different cities/regions which I will label jurisdictions. I start by discussing the role and nature of these public services.

3.1 Productive "Public Services"

Each citizen i in jurisdiction j has access to a production technology summarized by

$$y_i^j = \alpha k_i^j f(G^j/Y^j), \quad f(0) = 0, f' > 0, f'' < 0, \tag{12}$$

where y_i^j is the quantity of the composite good produced by the citizen i, α is a positive constant, k_i^j is the stock of "capital"[18] that the citizen has in his possession, f is a function that depends on the total output of the jurisdiction $Y^j = \int y_i^j di$, and $G^j \geq 0$ denotes the amount of public good provided by the ruler of jurisdiction j. The formulation of the function $f(\cdot)$ reflects three considerations: (i) the higher is the level of public services provided, the more productive is each producer; (ii) the provision of public services is essential for "social order" and for production so that if the ruler fails to provide such services no production can take place ($f(0) = 0$); and (iii) typically the provision of public services such as security, adjudication, irrigation works, roads, and waterways is subject to congestion, i.e. the public service is rival but not excludable.[19] For a given amount of public services G^j, the quantity of the service available for each user falls as more users take advantage of the services provided. Thus, in (1) we have an increase in Y^j for given G^j reducing the level of public services available to each producer as well as leading to a decline in the output y_i^j of each producer.[20] Note for future reference that had there, unrealistically, been no congestion in the provision of public services, the resulting growth rate would display scale effects.

Equation (12) also implies that the output of an individual producer is subject to constant returns to the private capital, provided that the ruler maintains a constant level of public services to total output, that is a constant level of congestion.

I now turn to the description of the problem faced by the citizens.

[18] I interpret the "capital stock" k as a composite having physical and human capital components. It is straightforward to show that under certain conditions a model with both types capital can be formulated as in (1) (see Barro and Sala-i-Martin, 1995, pp. 144-146). I also interpret human capital as a "comprehensive stock of all knowledge" and human capital accumulation as including research, development, and invention. In this I follow Lucas (2002) who questions the usefulness and empirical validity of the models that interpret "human capital" as "schooling" and, thus, need to add a second state variable called "blueprints" to account for all sources of productivity growth.

[19] Note that G is a flow, so that the right interpretation say, for roads, would be total mileage per year, etc.

[20] For a thorough analysis of this and other formulations as well as their implications, see Barro and Sala-i-Martin (1992) and Eicher and Turnovsky (2000).

3.2 The citizens

Citizens are infinitely-lived dynastic families. Each family i residing in jurisdiction j chooses its consumption c_i^j to maximize its lifetime welfare U_i^j given by

$$U_i = \int_0^\infty u(c_{i,t}^j)e^{-\rho t}dt, \quad u(c_{i,t}) = \frac{(c_{i,t}^j)^{1-\theta} - 1}{1-\theta} \tag{13}$$

subject to the budget constraint[21]

$$c_i^j + \dot{k}_i^j = (1-\tau^j)y_i^j \tag{14}$$

where τ^j is the constant rate at which the ruler expropriates income. Henceforth, for simplicity I shall call τ^j the tax rate with the understanding that this need not coincide with the legal tax rate (legitimized by whatever political mechanism that may exist). This is important because extra-legal expropriation historically played an important role in the transfer of income from the ruled to the ruler.[22]

A jurisdiction j starts life with a continuum of citizens whose mass is N^j. The citizens may choose to change the location of their residence, which coincides with the location of their productive activities. Changing a location is taken to imply migration from one jurisdiction to another. Citizens migrate, taking their capital with them, if doing so improves their welfare. Citizens who migrate incur a one-time migration cost $\xi \geq 0$.

3.3 The rulers

Each jurisdiction is ruled by one infinitely-lived ruler. Rulers derive utility from consumption. They also derive an additional benefit from ruling a jurisdiction with a minimum number, $\bar{N} > 0$, of inhabitants. We suppose that this is the minimum number required, *inter alia*, to sustain, for instance, the jurisdiction and its ruler as independent entities. Formally,

$$U_r^j = \int_0^\infty u(c_{r,t}^j)e^{-\rho t}dt + \Omega(N^j), \quad u(c_{r,t}) = \frac{(c_{r,t}^j)^{1-\theta} - 1}{1-\theta},$$

[21] In what follows I drop the time subscripts except where there is risk of confusion.

[22] Historically, of course, everywhere more than one agent taxed the producer and not every tax demanded by every collector was "legal". I simplify by assuming that there exists one ruler per jurisdiction. However, allowing for other expropriators will not change the conclusions regarding the contrast between centralized and decentralized systems and adds nothing to understanding the basic mechanisms involved in that contrast.

$$\Omega(N^j) = \begin{cases} \Delta > 0 \text{ if } N^j \geq \bar{N} > 0 \\ 0 \text{ if } N^j < \bar{N} \end{cases}, \tag{15}$$

where the subscript r indicates a ruler and the function $\Omega(N^j)$ captures the additional benefits a ruler enjoys when the jurisdiction has at least $\bar{N}$ citizens.[23]

From citizens residing and producing in jurisdiction j its ruler collects tax revenues $\tau^j Y^j$ of which he uses a fraction $(1-\mu^j)$ to finance the provision of public goods; thus, $G^j = (1-\mu^j)\tau^j Y^j$. The rest is employed for the ruler's consumption; thus $c^j = \mu^j \tau^j Y^j$.

I now turn to the description of equilibrium first in a centralized economy and secondly in a decentralized system of multiple jurisdictions forming an economy .

3.4 The centralized economy

A centralized economy for our purposes is an economy from which its inhabitants find it impossible to emigrate. Formally, a centralized economy is an economy where the migration cost $\xi \to \infty$. Thus, the ruler of such a centralized economy finds himself with a subject population on which taxes can be imposed without fear of losing at least some of them to a rival ruler. The problem that confronts such a ruler is to determine (1) the level of the proportional tax to be imposed upon his citizens and (2) the fraction of the tax revenue that can be used to finance the ruler's consumption. An increase in the tax rate has two contradictory consequences. On the one hand, it reduces the rate of return on investment and, thus, lowers the rate of capital accumulation by his citizens. This depresses future output and future revenues that can be appropriated by the ruler. On the other hand, given the existing capital stock, a higher tax rate yields, ceteris paribus, more tax revenue, enabling the ruler to supply a higher quantity of the public good. This, in turn, increases both the output and the rate of return on investment.

Formally, to solve the problem confronting the ruler of the centralized economy, we start by describing the behavior of the citizens facing given τ and μ (thus, a given quantity of the public good relative to total output).[24] Citizens maximize their utility given in (13) subject to (12) and (14), facing an after tax rate of return on capital equal to $(1-\tau)\alpha f(G/Y)$. It is straightforward to show that given constant τ and μ, the

[23] The only role this additional benefit plays in the analysis that follows is to ensure that a ruler that chooses the optimal tax and appropriation rates is never indifferent between that choice and that of adopting policies that lead to the loss of all citizens.

[24] In this section I drop the economy superscripts j because we are concerned with a single centralized economy.

choices of the citizens yield growth rates for consumption, capital, and output all equal to the same constant g given by

$$g = (1/\theta)\left\{(1-\tau)\alpha f[(1-\mu)\tau] - \rho\right\}. \tag{16}$$

Given our restrictions on the function $f(\cdot)$, this growth rate initially rises with the tax rate τ at low values and falls with it as τ keeps rising, reflecting the trade-offs mentioned above. The value of τ that maximizes the growth rate g is implicitly given by $(1-\tau)(1-\mu)f'[(1-\mu)\tau] = f[(1-\mu)\tau]$. Since a higher rate of consumption μ reduces the amount of public good supplied by the ruler, it lowers the growth rate.

The welfare of an individual citizen, given this constant growth rate, (12), (13), and (14) can be expressed as

$$U_i = (1-\theta)^{-1}\left[\frac{k_{i,0}^{1-\theta}}{\rho - g(1-\theta)} - \frac{1}{\rho}\right], \quad \frac{dU_i}{dg} > 0. \tag{17}$$

Thus, the welfare of an individual citizen depends positively on the growth rate g.[25]

Turning now to the problem faced by the ruler, we first observe that since his consumption is given by $c = \mu\tau Y$ it also grows at the common constant rate g given time-invariant choices for τ and μ. His lifetime welfare is hence given by

$$U_r = (1-\theta)^{-1}\left[\frac{c_{r,0}^{1-\theta}}{\rho - g(1-\theta)} - \frac{1}{\rho}\right] + \Omega(N), \quad c_{r,0} = \mu\tau a K_0 f[(1-\mu)\tau] \tag{18}$$

where $K_0 = \int k_{i,0} di$ is the aggregate initial capital stock. The ruler uses the instruments at his disposal, τ and μ to maximize his lifetime welfare. The first-order conditions for his maximization problem can be expressed (with $\pi \in \{\tau, \mu\}$) as

$$\partial U_r/\partial\pi = \Lambda\left\{[\rho - g(1-\theta)]\left(\partial c_{r,0}/\partial\pi\right) + c_{r,0}\left(\partial g/\partial\pi\right)\right\} = 0, \quad \Lambda \equiv c_{r,0}^{-\theta}\left[\rho - g(1-\theta)\right]^{-2} \tag{19}$$

where

$$\partial c_{r,0}/\partial\tau = (\mu/f)\, Y_0\left[f(\cdot) + (1-\mu)\tau f'(\cdot)\right] > 0, \quad \partial g/\partial\tau = (\alpha/\theta)\left[(1-\mu)(1-\tau)f'(\cdot) - f(\cdot)\right]$$

$$\partial c_{r,0}/\partial\mu = (\alpha\tau K_0)\left[f(\cdot) - \mu\tau f'(\cdot)\right], \quad \partial g/\partial\mu = -\left(\alpha/\theta\right)(1-\tau)\tau f'(\cdot) < 0.$$

[25] In (6) the sign of the partial derivative follows from $\rho - g(1-\theta) > 0$ which is required for the transversality condition to hold.

From (19) a number of conclusions immediately follow. First, note that since $\partial U_r/\partial\tau = 0$ for optimality and since $\partial c_{r,0}/\partial\tau > 0$, the choice of τ by the ruler here implies that $\partial g/\partial\tau < 0$. That is, the optimal tax rate for the ruler of the centralized economy is not the one that maximizes the growth rate. One consequence of this is that the growth rate that results from the ruler's choice is not the one that maximizes the welfare of his citizens. To see this recall from (17) above that a citizen's lifetime welfare depends positively on the growth rate. Thus, the growth rate that would be optimal for this citizen is the maximum one that the economy can attain.[26] The growth rate chosen by the ruler is, however, less than this maximum. Further, given the relationship between the growth and tax rates discussed above, it is easy to see that the tax rate is higher than the one that would be chosen by a benevolent ruler that seeks to maximize the welfare of the citizens. Second, observe that since $\partial U_r/\partial\mu = 0$ for optimality and since $\partial g/\partial\mu < 0$, the choice of μ by the ruler implies that $\partial c_{r,0}/\partial\mu > 0$. Now with the restrictions imposed on $f(\cdot)$, $c_{r,0} = 0$ when $\mu = 0$ and $c_{r,0} = 0$ when $\mu \to 1$, we have $c_{r,0}$ increasing at low levels of μ and decreasing at higher values of μ. These considerations imply that the ruler chooses a rate of consumption μ that is less than the rate that would maximize his initial consumption $c_{r,0}$. Clearly, this is the case because of intertemporal considerations. Though a higher μ makes it possible to enjoy higher current consumption, it lowers the growth rate and thus the future consumption of the ruler. Finally (8) implies the familiar condition for efficiency

$$\frac{dY}{dG} = \frac{f'(\cdot)}{f(\cdot) + \tau(1-\mu)f'(\cdot)} = 1. \tag{20}$$

Thus, the ruler chooses the level of G such that the marginal benefit, dY/dG, of public services provided equals its marginal cost in terms of output foregone (which is one unit). Note that the equation in (20) implicitly yields a unique value for $\tau(1-\mu) = Y/G$ that only depends on the properties of the function $f(\cdot)$ and nothing else. One consequence of this is that changes in the underlying structure of the economy that lead to alterations in the optimum level of the tax rate τ would necessarily be accompanied by changes in μ of the same sign.

To see how the tax and consumption rates are affected by this structure start by focusing on the parameter a that measures the productivity of capital (see (12)) given public services. As the calibration-simulation example summarized in Table 2 shows

[26] This would not in general be the case. It is true here because of the functional forms used. Allowing for more general cases neither affects the main conclusions of the paper nor does it add any significant new insights about the mechanisms formalized.

rulers in more productive economies tax less and retain a lower fraction μ of tax receipts for their private consumption.[27] Intuitively, in a more productive economy where investment has a higher rate of return, the ruler is better off encouraging private investment by expropriating less in exchange for higher future consumption. The ruler also keeps a lower fraction of the tax proceeds for his consumption because the public services he provides are more productive as well. Note that given the unique level for $\tau(1-\mu) = Y/G$ the lower tax rate raises the growth rate of the economy.

Table 2

a	0.1	0.5	1	2	3
τ	0.85	0.43	0.38	0.35	0.34
μ	0.61	0.23	0.12	0.06	0.03

One question the historical literature raises is the effect of changes in the rate at which the ruling classes–here consolidated into one ruler–discount their future. It has been argued, for instance, that intensified dynastic struggles in certain periods made rulers short-sighted. On the other hand, high-ranking officials found their tenures frequently cut short by rulers fearful of the rise of rival power-holders. This tended to make these officials in turn less concerned with a future they may not live to enjoy. This issue of a higher average rate of time preference for the rulers can be studied here by decoupling the ruler's rate of time preference from that of the ruled. The results of this straightforward exercise are summarized in a simulation example in Table 3 which shows that as expected a higher rate of time preference ν for the ruler tends to make him tax more and retain a higher proportion μ of the tax receipts for his own consumption. This lowers the growth rate of the economy and the welfare of his subjects.

Table 3

ν	0.03	0.04	0.05	0.06
τ	0.38	0.40	0.41	0.43
μ	0.12	0.16	0.20	0.23

A similar issue also arises in the historical literature regarding the citizens. Rulers in many a centralized economy tended also to be less careful about the life and limb of their citizens. This would make these citizens discount the future, which may at any time be cut short, at a higher rate ρ. The effect of such higher levels of ρ on the choices of the ruler is summarized in the numerical example in Table 4 which shows that both μ and the tax rate τ is higher for those rulers whose citizens discount the future at higher levels. However, the rise in both μ and τ is less significant as compared to the previous

[27] The baseline values of the parameters in the following examples are $K_0 = 2$, $\rho = 0.03$, $\theta = 0.99$, $\delta = 0.02$, $a = 1$, $f(\cdot) = [(1-\mu)\tau]^{\beta}$ with $\beta = 0.5$.

case.

Table 4

ρ	0.03	0.04	0.05	0.06
τ	0.3794	0.3796	0.3798	0.3799
μ	0.1215	0.1219	0.1223	0.1227

One can also show that a decrease in the average intertemporal elasticity of substitution $\sigma \equiv 1/\theta$ raises the rate at which the ruler expropriates the ruled. Intuitively, as the preference for growth becomes less pronounced, the desire to increase current at the expense of future consumption leads to higher levels of μ and τ as the example in Table 5 suggests.

Table 5

θ	0.95	0.97	0.99	1.1	1.2
τ	0.35	0.37	0.38	0.44	0.48
μ	0.06	0.09	0.12	0.24	0.30

Finally, simulation results reported in Table 6 illustrate the point that in economies where public services are more efficient (as measured by the elasticity parameter $\beta \equiv d\ln f(\cdot)/d\ln(G/Y)$) the rulers choose to provide more of them. The financing of such services then requires a higher tax rate as well as a lower rate of retention of tax proceeds for the ruler's consumption.

Table 6

β	1/6	1/5	1/4	1/2
τ	0.18	0.20	0.24	0.38
μ	0.19	0.17	0.16	0.12

I now turn to the discussion of equilibrium in the case of a decentralized economy.

3.5 The decentralized economy

Consider now an environment where households and rulers find themselves distributed over a number of jurisdictions j ($j \in \{1, 2, .., M\}$). Initially, each jurisdiction has $N^j \geq \bar{N}$ inhabitants and a ruler. Suppose that the cost of migration is low enough to allow movement of households across the jurisdictions; for simplicity assume that this cost $\xi = 0$.

Citizens that can move around within this decentralized economy will choose to reside in that jurisdiction that offers them the highest level of lifetime welfare. Rulers will, therefore, have to compete to attract tax-paying citizens to ensure the continuing

existence of a tax base and the viability of their jurisdictions and rule. What will be the equilibrium outcome of the interaction of the M rulers and their citizens?

Given our bare-bones setup, the answer is straightforward and captures the essence of the centralized vs. decentralized economy argument. To see what is involved, note first that each ruler j's strategy space S_j is given by $S_j = [0,1] \times [0,1]$ with a typical strategy $s_j = (\tau_j, \mu_j)$. Given the payoff functions U_r^j in (4) and M rulers, the game Γ_M played by these rulers is formally $\Gamma_M = [M, \{S_j\}, \{U_r^j\}]$. The strategy profile $s = (s_1, .., s_M)$ constitutes the Nash equilibrium of the game Γ_M if for every $j = 1, ..., M$, $U_r^j(s_j, s_{-j}) \geq U_r^j(s'_j, s_{-j})$ for all $s'_j \in S_j$. It is straightforward to see that the Nash equilibrium of the game Γ_M is that each ruler will choose $\tilde{s}_j = (\tau_m, \mu_m)$ which ensures the maximum growth rate. To see why, recall that the lifetime welfare of a household is maximized when the growth rate is at its maximum (see (6)). If other rulers do not adopt the combination $\tilde{s}_j$, the ruler that does will be able to attract the subjects of others to his jurisdiction, thereby receiving a payoff higher than he would otherwise get. If other rulers adopt $\tilde{s}_j$, a ruler that does not loses all his residents and earns a payoff that is less than what he would earn had he adopted $\tilde{s}_j$. Note also that the growth rate maximizing tax rate is implicitly given by $(1 - \tau_m)f'(\tau_m) = f(\tau_m)$ and that competition among rulers results in $\mu_m = 0$.

4 Concluding Remarks

Starting from the observation that many developing economies are characterized by the dominance of a super metropolis, we have argued that the coexistence of a primate city with a low level of economic development is not an accident, the former being symptomatic of the causes of the latter. Taking historical Rome as the archetype of a city that centralizes political power to extract resources from the rest of the country, we developed two models of rent-seeking and expropriation which illustrate different mechanisms that relate political competition to economic outcomes. The "voice" model showed that rent-seeking by different interest groups (localized in different specialized cities/regions) would lead to low investment and growth when the number of these groups is low. Increased political competition in the form of more organized groups engaged in countervailing activity is then shown to lead to more secure property rights and higher growth. The "exit" model allowed political competition among those with political power (to tax or expropriate from citizens) over a footloose tax base. It showed that when this power is centralized, tax rates would be higher and growth rates lower.

When political power is decentralized across different self-interested rulers in diverse jurisdictions, the competition over the mobile resources leads to lower tax/expropriation rates, raising the long-run rate of growth of the economy.

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