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ISOLATED CAPITAL CITIES AND MISGOVERNANCE: THEORY AND EVIDENCE

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Abstract

Motivated by a novel stylized fact – countries with isolated capital cities display worse quality of governance – we provide a framework of endogenous institutional choice based on the idea that elites are constrained by the threat of rebellion, and that this threat is rendered less effective by distance from the seat of political power. In established democracies, the threat of insurgencies is not a binding constraint, and the model predicts no correlation between isolated capitals and misgovernance. In contrast, a correlation emerges in equilibrium in the case of autocracies. Causality runs both ways: broader power sharing (associated with better governance) means that any rents have to be shared more broadly, hence the elite has less of an incentive to protect its position by isolating the capital city; conversely, a more isolated capital city allows the elite to appropriate a larger share of output, so the costs of better governance for the elite, in terms of rents that would have to be shared, are larger. We show evidence that this pattern holds true robustly in the data. We also show that isolated capitals are associated with less power sharing, a larger income premium enjoyed by capital city inhabitants, and lower levels of military spending by ruling elites, as predicted by the theory.

Keywords: Governance; Institutions; Capital Cities; Population Concentration; Revolutions; Insurgencies; Democracy; Power Sharing; Inefficient Institutions.

JEL Classification: D02, D74, R12

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1 Introduction

Governance goes hand-in-hand with development. It is well-established that the quality of governance is positively correlated with income per capita and a number of variables associated with development, both across countries (e.g. Kaufman, Kraay and Zoido-Lobaton 1999) and within countries (e.g. Putnam 1993, Ferraz and Finan 2008) – though there are various views on whether this represents causality in one way or the other, or perhaps both (e.g. Kaufman and Kraay 2002, Sachs et al. 2004). If we interpret governance broadly as concerning the institutional environment and the ability to implement collective choices (Baland, Moene and Robinson 2009), it has been often argued that it is central in understanding different paths of development (e.g. Acemoglu, Johnson and Robinson 2005). In any event, there can be little doubt that the quality of governance directly affects the provision of public goods, and thus matters greatly for welfare and efficiency.

But governance is clearly endogenous, emerging as part of a collective choice by a society. Since good governance imposes limits on the extent to which rulers and elites can appropriate the apparatus of government to their own benefit, understanding it requires understanding the constraints under which these rulers and elites operate. This is particularly elusive in contexts where there are relatively few explicit, formally established constraints such as those imposed by a functional democratic process through which incumbents might be held accountable.

We explore one specific source of informal constraints on rulers: the spatial distribution of a country's population. We start off motivated by a basic – and as far as we can tell, novel – stylized fact: countries with isolated capital cities display worse quality of governance. Pairing this stylized fact with the historical evidence that capital cities have often played a pivotal role in determining the outcome of insurgencies and revolutionary standoffs, and that incumbents seem to react to the incentives posed by this role, we posit that the link between isolated capitals and misgovernance is far from coincidental.

We develop a theoretical framework to shed light on these questions. In our model of endogenous institutional choice, rules for allocating political power and economic resources are chosen by a ruling elite that can extract rents from citizens, but is subject to the threat of rebellions from dissatisfied citizens. Our key assumption is that such rebellions are more effective when they take place closer to the capital city – embodying the principle that "spatial proximity to power increases political influence" (Ades and Glaeser 1995, p.198), and especially so when that influence is mediated by the threat of violence.

In this context, one way to protect against these threats is to locate the seat of political power (the capital city) in an isolated place, even though doing so might be economically inefficient.[1] The ruling elite also chooses whether to share power more broadly, which allows for greater productivity to the extent that the existence of checks and balances allows for the use of more productive technologies that require

[1] We take the choice of location of the capital city as a short-hand description for all the policy levers that affect the spatial distribution of individuals relative to the capital city, of which actually relocating the capital is just a relatively extreme example – though, as we will see, not that infrequently used or contemplated – alongside migration policies, specific economic incentives to populate certain areas, and so forth.

public goods such as the rule of law or the enforcement of contracts. This "good governance", however, imposes costs to the incumbent elite, because it requires that any rents be shared more broadly with those with whom power is shared.

We consider two alternative scenarios. Under "democracy", we assume that elites are constrained to maximizing the welfare of the average individual. Under "autocracy", in contrast, the elite is free to maximize the welfare of its own members, subject only to the constraint of possible violent removal. While explicitly modeling the underpinnings of democracies and autocracies (or of transitions between them) is beyond the scope of our model, we use this stark contrast to capture the idea that in established democracies an incumbent regime will likely be removed through regular means in case it fails to respond to the preferences of citizens.

Our central result is that a positive correlation between the isolation of the capital city and misgovernance emerges in equilibrium, but only in the non-democratic context. In a democracy, the constraint imposed by the threat of rebellion does not matter, because any new elite will be strictly limited in their ability to obtain rents by the average citizen. As a result there is no link between the degree of isolation of the capital city and the quality of governance, as both are pinned down by the efficient choices. In the autocratic case, on the other hand, the correlation emerges as a result of causality running both ways. A more isolated capital city implies a larger income gap between the elite and the average citizen, since a more protected elite can extract more rents. This means that the ruling elite has more to gain by forsaking the sharing of power and rents and choosing bad governance: the ability to take a greater slice makes the elite worry less about having an inefficiently small cake. By the same token, misgovernance also encourages the choice of a more isolated capital city: good governance means that rents have to be shared more broadly anyway, so the elite has less of an incentive to protect its position by isolating the capital city.

Informed by the theoretical framework, we then go to the data to further probe the link between isolated capitals and governance, and to test whether our suggested mechanism is supported by the evidence. We establish that our motivating correlation is indeed robust – to controlling for a number of variables that are reckoned to correlate with quality of governance and isolation of the capital, and to different ways of measuring these concepts. Most importantly, we show that the central prediction of the model is supported by the evidence: the correlation is present only for relatively non-democratic countries.

The model also suggests ways of unpacking the definition of governance in the data. Our logic would not lead us to expect that isolated capital cities would be correlated with greater political instability, since isolation is a way of protecting against the threat of removal. The data show that Political Stability is precisely the one component measure of the World Bank's World Governance Indicators that does not correlate with the isolation of the capital. In other words, countries where the capital city is in an isolated location have governments that are less effective, less accountable, more corrupt, and less able or willing to sustain the rule of law, but that are not more unstable. We also show that there is no correlation between

isolated capitals and dimensions of government performance that are unrelated to the kind of institutional incentives our framework highlights, as illustrated by the measure of average number of days to return a letter sent to a non-existent address (from Chong et al 2012). This suggests that our stylized fact is unlikely to be driven by some unrelated correlation between isolated capitals and lack of state capacity.

We also look at direct evidence on our proposed mechanism, by looking at measures of power sharing. We use data from the Polity IV project to show that isolated capital cities are indeed associated with less power sharing, as captured by constraints on executive power and by the extent of political competition. Interestingly, we find no significant connection (and a point estimate of the opposite sign) between the concentration of population around the capital and another Polity IV measure that arguably does not relate as closely to the degree of power sharing, namely whether regular succession in the executive is hereditary or not.

Last but not least, the model yields ancillary testable predictions, and the evidence is again supportive. In the model, when the capital's inhabitants pose a more serious rebellion threat, their income will be relatively larger, and elites will have higher incentives to isolate the capital city, resulting in higher income per capita in the capital city (relative to the income per capita of the country as a whole) in countries where the capital city is more isolated. That holds in the data. Moreover, military spending is higher in countries were the capital city is less isolated, which the model predicts to the extent that such spending can be used as an alternative source of protection – and it is so even if we control for whether the country has been involved in interstate wars, which are an obvious alternative driver of military spending. Once again, and consistent with the model, these features are true for the sample of relatively non-democratic countries, but not for the sample of established democracies.

Our paper is closely related to Campante and Do (2012), which looks at how the spatial distribution of population and the isolation of capital cities affect political accountability and government performance across US states. We look here at a very different mechanism, which we show to be in force in a very different, non-democratic context. This distinction is very important, because the mechanism highlighted in that paper – namely, that isolated capital cities lead to less accountability being provided by the news media or the electoral process – points at a direction of causality running from the isolation of the capital to governance. Here, in contrast, we argue that the reverse direction is just as important in the case of weakly institutionalized polities, as incumbents have considerably more influence in affecting the spatial distribution of population relative to the capital. Our theory thus highlights precisely this joint determination of governance and the spatial distribution of population relative to the capital.

This two-way feedback in fact underscores the difficulty of empirically disentangling causality running one way or the other. In particular, it is hard to think of sources of exogenous variation, at the cross-country level, that affect the latter without affecting the former.[2] The source of exogenous variation used

[2]For instance, Pierskalla (2012) provides evidence that a long history of statehood increases the concentration of population around the capital, but it stands to reason that such history would also directly affect governance in other ways (Chanda and Putterman 2005).

by Campante and Do (2012) in the context of US states – the location of a state's centroid – is unfortunately not relevant in the context of the countries we focus on. After all, the equanimous, republican logic of locating the capital at a relatively central position, which underlies the first-stage relationship accross US states, was bound to be much less influential to the decisions of autocrats and/or colonial powers concerning the designation of the capital. (In fact, our theoretical framework itself implies that this designation will follow a very different logic in democracies.) As it turns out, there is no correlation between the isolation of the capital city and the isolation of the centroid within our sample of autocracies.[3]

In light of this inherent empirical difficulty, it is especially important that our framework makes specific predictions regarding the context and nature of that link. It is far from clear that alternative stories unrelated to the special role of the capital city and the threat of rebellions would also predict that isolated capitals are associated with misgovernance only in non-democratic contexts, and that this association does not extend to political instability or state capacity. Along with the direct evidence on power sharing and on the model's ancillary predictions, this adds confidence that the stylized fact we detect is far from mere coincidence, and is in fact driven by the forces we highlight.

Our paper also contributes, more broadly, to a literature that stresses the political implications of spatial distributions, both in economics (e.g. Ades and Glaeser 1995, Davis and Henderson 2003) and in political science (e.g. Rodden 2010). In fact, the importance of the spatial distribution of population and its connection with the threat of rebellion facing rulers has long been recognized by an important group: rulers themselves. As we discuss in detail later in this paper, the history of decisions on where to locate capital cities makes it remarkably clear that protection against perceived instability threat is a pervasive concern behind capital relocations, either planned or actually implemented. We will also show that these relocations, which have indeed happened fairly often (just about one every six years over the last century), are typically in the direction of increased isolation.

A related literature has studied how the isolation of countries or their geographical size affects institutions and development. Nunn and Puga (2012) study the effects of rugged terrain, which makes countries less accessible, hindering trade but also offering protection to African regions being raided during the slave trades. Ashraf, Galor and Ozak (2010) proxy geographical isolation by an index intended to capture the time required to travel from a country's capital to other places in the world. In different ways, both papers argue that isolation may have a positive effect on development by reducing the risk of external conflict, even if it may have other negative effects such as through reduced trade. In either case, these papers do not deal with the specific institutional role of the capital city, and its isolation with respect to the country's population. On a different vein, Stasavage (2010) emphasizes how geographical distances from European capital cities might have hindered the historical development of representative institutions, by hindering the accountability of representatives, though his historical data do not allow for consideration

[3] As noted by Herbst (2000, p. 16), with respect to Africa, "[most] colonial capitals were located on the coast, demonstrating the low priority of extending power inland compared to the need for easy communication and transport links with Europe." These capitals by and large persisted as such after independence.

of the spatial distribution of population.

We also build on the literature on the endogenous emergence of institutions, and their implications for development. Closest to our paper is Guimaraes and Sheedy (2012), who look at equilibrium institutions in a context where rebellion threats constrain institutional choices. We add the crucial assumption that those threats are related to the spatial distribution of population relative to the capital city, to the study the role of the latter. Along a similar vein, we relate to the literature that studies the emergence of institutions as a result of latent social conflict and (the threat of) violence, e.g. Besley and Persson (2009), Bueno de Mesquita and Smith (2009), or Acemoglu and Robinson (2005). In particular, we address the broad question of the persistence of inefficient institutions (e.g. Acemoglu 2006). We identify the spatial distribution of individuals as a novel source of variation in the constraints that underpin institutional choices, which may leave agents who stand to benefit from those inefficient institutions better able to get away with their preferences. Last but not least, we are close to the recent strand of that literature that has tried to unpack the evolution of political institutions along different dimensions, such as checks and balances, the degree of power sharing, and political stability (e.g. Besley, Persson, and Reynal-Querol 2012). We provide further support for the view that these dimensions can interact in subtle ways, and move in separate directions as a result.

The remainder of the paper is organized as follows: Section 2 presents the motivating stylized fact and historical evidence on revolutions and capital cities; Section 3 analyzes the model and its implications; Section 4 discusses the empirical evidence; and Section 5 concludes.

2 Isolated Capital Cities and Misgovernance: Some Motivation

Our basic premise is the idea that the spatial distribution of people in a given country or polity of interest matters for political outcomes, and that the capital city, as the seat of political power, is an especially important location in that configuration. Whether incumbent governments are relatively isolated or not from the bulk of their citizens will affect the incentives they face in a number of dimensions, and this will in turn shape the institutional context from which better or worse governance will emerge. We thus start off by looking at whether there is any evidence of an association between the quality of governance in a given country and the degree of isolation of its capital city. (This section will briefly look at the raw data, for the sake of motivation, while leaving the assessment of robustness to Section 4.)

2.1 Data

In order to measure quality of governance across countries, we resort to the well-known and widely used Worldwide Governance Indicators (WGI), from the World Bank (Kaufman, Kraay and Mastruzzi, 2010). They aggregate information, from a number of different sources ranging from surveys of households and firms to assessments from NGOs, commercial providers and public organizations, into six different measures: Rule of Law, Voice and Accountability, Government Effectiveness, Regulatory Quality, Control

of Corruption, and Political Stability. (Sources for all variables are detailed in Appendix B.) Since the year-to-year variation in the quality of governance measures is not very meaningful, we will average them over time time-varying control variables, for the period over which the WGI are available (1996-2010). To make things as simple as possible, and making use of the fact that these individual measures are very highly correlated, we will summarize them in a single number, using the first principal component of the six measures taken together.[4]

When it comes to measuring how isolated a capital city is, what we need is a measure of the concentration of population around the capital. For this, we use the axiomatically grounded family of measures proposed in Campante and Do (2010) – the Centered Index of Spatial Concentration (CISC).[5] Since this is a relatively novel concept, it is worth spending some time describing the measure we will use, as well as its properties.[6]

More specifically, our preferred measure within that family is the "Gravity-based" CISC (G-CISC). This can be defined as the sum (over the spatial distribution of individuals) of the negative of a logarithmic function of the distance between each individual and the capital city. More formally, let X be a convex set that can contain (the representation of) all countries, p_x denote the distribution of individuals in a given country, defined over X, and z_x be the distance between a point $x \in X$ and the country's capital, which we fix at a point $c \in X$. We then have:[7]

$$GCISC = \int_X (1 - \alpha \log z_x) dp_x, \tag{1}$$

where $\alpha > 0$ is a normalization parameter to be adjusted so that the measure is contained between 0 and 1. A measure of one represents a situation of maximum concentration, in which all individuals live arbitrarily close to the point designated as the center of the capital, while zero represents a situation where the capital is maximally isolated, with all individuals living as far from it as possible in the context of interest. Different choices could be made in that regard, in particular as to whether we adjust the measure of concentration for the geographical size of the country. We will focus on what Campante and Do (2010) call "$GCISC_2$", which does adjust for geographical size: it is a measure of how concentrated the population of a country is relative to how far from the capital that particular country's population could possibly be. In other words, $GCISC_2$ weighs distances differently depending on the size of the country. That said, we will later look at other possibilities, for the sake of robustness.

This measure, as a member of the CISC family, satisfies three key desirable properties for a measure of spatial concentration around a point of interest – properties that this family only will simultaneously

[4]The correlation between the different average measures, in our sample of 178 countries, is never below 0.73, and typically far above 0.8. The Kaiser-Meyer-Olkin overall measure of sampling adequacy is 0.896, indicating that a principal components analysis is warranted.

[5]Standard measures such as the share of population living in the capital (capital primacy) are rather unsatisfactory and coarse, as they rely on arbitrary definitions of what counts as the capital city and discard all the information on the spatial distribution outside of that arbitrarily delimited city. Other measures, such as urbanization or population density, actually capture different concepts, related but clearly distinct from the role of the capital city. We will nevertheless use some of the standard measures for robustness.

[6]The following discussion draws from Campante and Do (2012).

[7]A description of the G-CISC as we actually compute it in practice, given the data we have, can be found in Appendix B.

satisfy (Campante and Do 2010).[8] First, it satisfies subgroup consistency: if a subset of a population becomes more concentrated around the capital, so does the overall distribution. Second, it is monotonic: moving people closer to the capital implies a more concentrated distribution. Third, it is rank invariant: the ranking of distributions is independent of the units in which distance is measured. The GCISC also satisfies a property of convexity that seems reasonable in our context, namely that a given movement of a person towards the capital has a greater impact on concentration if it happens close to the capital.

The G-CISC is also the only measure within the CISC family that also displays a property of invariance under mean-preserving spreads of the distribution around points other than the capital. This technical point means, in practice, that the measure is unbiased to approximations that have to be performed in computing the measure with actual data. Specifically, we calculate population concentration around capital cities based on a gridded map of world population, in which we attribute the population of each cell in the grid to the centroid point in that cell. The G-CISC is unbiased to that type of measurement error, in that "random" deviations do not change the rankings of distributions as measured by it.

We use the database *Gridded Population of the World* (GPW), Version 3 from the Socio-Economic Data Center (SEDC) at Columbia University. This dataset, published in 2005, contains the information for the years 1990, 1995 and 2000, and is arguably the most detailed world population map available. Over the course of more than 10 years, these data are gathered from national censuses and transformed into a global grid of 2.5 arc-minute side cells (approximately 5km, or 3 miles), with data on population for each of the cells in this grid.[9] As it turns out, the autocorrelation in the measure of population concentration is very high across the ten-year period in question. For this reason, we choose to focus on $GCISC_2$ as computed for the one year, 1990, that is judged by the SEDC as having the highest data quality.[10] [11]

2.2 Isolated Capital Cities are Associated with Misgovernance

A crude look at the data immediately suggests that countries with relatively isolated capital cities score worse in governance, as measured by the WGI. Figure 1 makes this point in simple fashion, by splitting the sample between countries with "more isolated capitals" (below the median in our GCISC sample, which corresponds to France) and "less isolated capitals" (above the median). The figure contrasts the

[8] The CISC family consists of sums of a monotonically decreasing, isoelastic ("constant relative risk aversion") function of the distance between each individual and the capital.

[9] We limit our analysis to countries with more than one million inhabitants, since most of the examples with extremely high levels of concentration come from small countries and islands. The results with the full sample are very much similar and are available upon request.

[10] An important issue refers to how we deal with countries that have multiple capitals, or that changed capitals within the time period we focus on. Our general rule is to consider the de facto capital as being the site of the executive and the legislature. For instance, this means that we take the capital of the Netherlands to be The Hague (instead of Amsterdam) and the capital of Bolivia to be La Paz (and not Sucre). We leave South Africa out of the sample, since the executive and legislature have always been in different cities, while keeping Chile because the legislative moved more recently (1990). As far as changes in capital cities during our sample period, we have the cases of Myanmar (2005) and Kazakhstan (1997). We drop the former from the sample, and take the new capital (Astana) as reference in the latter, since the move occurred around the start of the time period for which we have the governance indicators. The results are unaffected by any of these choices.

[11] All of our analysis will exclude Mauritius, because it is an outlier in terms of the concentration of population. As it turns out, our results are made stronger by its inclusion, so we want to make sure that nothing is driven by this specific case.

average quality of governance in the two sets of countries, as captured by the first principal component of the WGI measures. What we see is that the countries with less isolated capitals score distinctly better than their more isolated counterparts. In fact, the difference in governance scores across groups is far from trivial: it corresponds to about 40% of a standard deviation in that distribution, and is roughly akin to the difference between the quality of governance in Bolivia (on the lower end) and in Bulgaria.

[FIGURE 1 HERE]

The same message is conveyed in Figure 2, which plots the measure of governance against our benchmark index of concentration, for all countries in the sample. What we see is a positive correlation, indicating that countries with more isolated capitals are reckoned to display worse governance. This positive correlation is statistically significant (with a t-statistic of 3.58), and quantitatively important: a one-standard-deviation change in the degree of isolation is associated with a change of almost 0.3 standard deviation in the quality of governance. For the sake of comparison, this corresponds to about one-half of the change associated with education (as measured by total years of schooling in 2000, from the Barro-Lee data set), which is well-known to be very strongly associated with governance patterns across countries.

[FIGURE 2 HERE]

We will argue that this association between isolated capital cities and misgovernance, far from being coincidental, reflects the relationship between that isolation and the constraints faced by incumbent regimes, especially in a context in which these constraints are mediated by the threat of insurrection.

2.3 Revolutions and Capital Cities

Our theory will argue that this is so because the capital city plays a key role in revolutionary situations, and as such individuals who are closer to the capital will, other things equal, constitute a greater threat to those incumbent regimes and elites. This idea embodies the principle that "spatial proximity to power increases political influence" (Ades and Glaeser 1995, p. 198), and particularly so when that influence is associated with the threat of violence.

A brief look at revolutionary episodes in the past two centuries shows just how important the population around the capital city is in these contexts. When an insurrection erupts, it usually draws its initial supporters from the "revolutionaries" who take root in the streets of the capital and its neighboring regions, before eventually attracting waves of insurgents under its revolutionary banner. From the start to the eventual accomplishment of an insurrection, physical contact with the stronghold of the government matters critically, inasmuch as a revolution from remote lands, all else equal, need to pay larger costs to lay siege to the government. A relatively small mob in the capital city thus has as much political influence as a much larger group of rebels elsewhere. In that case, a capital city that contains or is surrounded by dissidents entails a greater risk of insurgency against an autocratic incumbent, and as such those who live in the capital constitute a much greater threat.

A classic example is the transition century from the Ancien Régime to the Third Republic, in France. On the Eve of the Ancien Régime, the 550 thousand people living in Paris certainly did not represent the average or median opinion of some 29 million Frenchmen, among which many royalists willing to defend the monarchy at all costs.[12] Yet the Parisian crowd packed a far heavier revolutionary punch than those anywhere else. As described by Tilly (2003 p.162-167), the dense population of Paris made it inevitable that in times of trouble large brawls occurred regularly; it did not take much time to see the rise of sizeable mobs such as the crowd that stormed the Bastille on July 14, 1789, or the one that assaulted the Tuileries and arrested Louis XVI and his family on August 10, 1792. The risk of revolution starting from a large, concentrated capital is hardly negligible to any ruler who might fear the guillotine.

In a similar vein, Mark Traugott's (1995) detailed analysis of Paris and French insurrections during the following century emphasizes the idea that "in general, the rural population proved acquiescent, but the will of the capital initially held sway even when the numerical majority living in the countryside seemed resistant to the change." While not every Parisian insurrection managed to change the status quo like those in 1830 and 1848 did, they indeed occurred in a remarkably recurrent pattern: 1827, 1830, 1832, 1834, 1839, 1848, 1849, 1851, 1869, and 1871. Interestingly, insurrections of considerable size originating elsewhere in the country, including the 1831 and 1834 revolts of the *canuts* (silk workers) in Lyon, the second largest city, "systematically failed to produce comparable repercussions at the national level unless they coincide with unrest in the capital" (see Bezucha, 1974 and Montagne, 1966). Even when the workers-insurgents of Lyon managed to capture the whole city both times, it was certainly of minor concern to the freshly instituted monarch Louis-Philippe, who later subdued them with ease by using his large, professional army. In comparison, in 1848 the very same King, then much more entrenched in his throne, succumbed to the Parisian crowd and abdicated after less than three days of rebellion, failing to mobilize even the troops at his immediate disposal to confront the populace. As Traugott summarizes, during this period the change of regime in France is best described as "as Paris goes, so goes the nation".

The logic linking revolutions and capital cities is by no means limited to nineteenth century France, of course. As put by *The Economist*, in the context of the 2006 "Orange Revolution" in the Ukraine, "during a [revolutionary] stand-off, the capital city is crucial."(March 18th 2006, p. 28) The lingering political turmoil in Thailand, in recent years, is a striking example of how a government could be overthrown relatively effortlessly if it lacks support from the population of the capital city, even when such government was largely popular in the countryside (*The Economist*, Sep. 22nd, 2006).

The importance of these considerations is underscored by the many incumbent rulers who have tried to manipulate the concentration of population around the capital by moving the latter – more often than not with alleviating revolutionary pressure as one of the explicit, or barely concealed, goals. It is not hard to come up with examples from history. In the 17th century, Louis XIV moved away from the Parisian

[12] National and city population figures come from estimates of McEvedy and Jones (1978), and Braudel (1986). Braudel observed that France at the end of the Ancien Régime was still very much a rural country. Later on, royalist counter-revolutionaries rioted in Brittany, La Vandée and Dauphiné, regions too far from Paris to make any difference.

masses into the tranquility of Versailles, a move that is thought to have been influenced by his dislike of Paris, stemming from having witnessed and suffered the rebellions against the Crown that became known as the *Frondes* (1648-53), as argued by the contemporary account of the Duc de Saint-Simon. Modern examples are also easy to come by, as we will see shortly, and many other countries have fiddled with the idea, even if falling short of carrying it through. In just about every case, a chief concern was to have the new capitals to be "quiet, orderly places where civil servants could get on with their jobs without distraction."(*The Economist*, Dec. 18th 1997)

Looking closely at a couple of these examples helps illuminate that logic. For instance, Brazil had the capital moved in 1960 from Rio de Janeiro to Brasília – many hundreds of kilometers away from the main population centers of Rio de Janeiro and São Paulo, and far from the coast, where most of the country's population was and still is. The debate over moving the capital is much older, though, and from the start the advantages of moving away from the crowds were acknowledged by those in favor of the idea: as early as 1810, while Brazil was still under Portuguese rule, an advisor to the king made the point that "the capital should be in a healthy, agreeable location free from the clamorous multitudes of people indiscriminately thrown together." (*The Economist*, Dec. 18th 1997) As Couto (2001) remarks, the president who finally decided to build the new capital, Juscelino Kubitschek, was also guided by a desire to escape from the atmosphere of political agitation in Rio, where the president was more exposed to political crises and student demonstrations. As he himself put it, rather colorfully: "A tramway strike in Rio de Janeiro may bring down the President of the Republic." (Couto, 2001, p. 199, our translation)

The recent move in Myanmar (Burma), in 2005, from the major population center of Yangon (Rangoon) to the fortified "secret mountain compound" of Naypyidaw is another illuminating, if somewhat extreme example. (*International Herald Tribune*, Nov 11th 2005) As put by Varadarajan (2007):

> "Vast and empty, Burma's new capital will not fall to an urban upheaval easily. It has no city centre, no confined public space where even a crowd of several thousand people could make a visual – let alone political – impression. Naypyitaw (sic), then, is the ultimate insurance against regime change, a masterpiece of urban planning designed to defeat any putative "colour revolution" – not by tanks and water cannons, but by geometry and cartography. 320 kilometres to the south, Rangoon, with five million people, is home to one-tenth the country's population. But even if that city were brought to a standstill by public protests and demonstrations, Burma's military government – situated happily in the middle of paddy fields in the middle of nowhere – would remain unaffected."

As if to emphasize this design, the city was deliberately planned without mobile phone coverage, and civil servants were not allowed to take their spouses or children along when they originally moved (Htay 2007). These are measures that are hard to justify under the oft-mentioned rationales of developing an underpopulated part of the country or protecting against foreign invasion.

This pattern can be seen more systematically with the help of Table 1. This table lists all instances

in which capital cities were moved, on a permanent basis, by formally independent countries since World War I, with the corresponding distances and population numbers (for as close to the event as could be found).[13] The first thing to note from this table is that these are not rare episodes: on average, capital moves happen once every six years – the 1930s were the only decade that did not see one – and there are examples from every continent. Most importantly from our standpoint, the table also shows that the moves are overwhelmingly in the direction of greater isolation, at least under the rough measure of capital primacy (population in the capital city). This pattern might have been expected, since the capital is more often than not the largest city in the country, but what is striking is that the new capitals are typically a lot smaller than the old one – quite a few times, a new city built from scratch. In short, rulers and regimes that have chosen to move their capital cities have most often picked a more isolated location.

[TABLE 1 HERE]

In sum, the population concentrated in and around the capital city matters much more than those located elsewhere, from a political standpoint, particularly when it comes to extra-institutional channels such as revolutions and riots (as opposed to competitive, democratic elections). Just as importantly, rulers recognize that and react. This might involve the relatively extreme policy lever of picking or influencing the location of the capital city, which we have used to illustrate the point, but we should also stress that many others are available. For instance, they can try to placate discontent arising in the capital, or otherwise influence the distribution of population around the capital – say, with special incentives or coercion towards populating certain areas of the country, or with restrictions on domestic migration. Stark examples of such policies are not hard to come by either: from relatively benign registration systems that discourage internal migration (especially to cities) – such as the Chinese *hukou* or the Vietnamese *ho khau* – to more extreme cases such as the mass deportation of ethnic groups and the confinement of dissidents to remote areas in the Soviet Union, or the forced depopulation of cities during the reign of the Khmer Rouge in Cambodia. As with capital city moves, these are all policies that are not motivated solely by a desire to isolate the capital, but it is telling that one can hardly find examples of such regimes encouraging their populations to move closer to it. It is just as telling that they often specifically target groups considered particularly dangerous in terms of kindling insurgencies.

3 Isolated Capital Cities and Misgovernance: A Theory

Motivated by the previous evidence, we propose a theory of the joint determination of the quality of institutions and the degree of isolation of the capital city. Following Guimaraes and Sheedy (2012), we study the endogenous determination of institutions – understood as the set of rules that allocate political power and economic resources – as the equilibrium outcomes of a process in which any given set of rules

[13] Sources are listed in the Data Appendix. Exceptions involving temporary moves, or moves within a 10km radius are listed in the notes below the table.

can be challenged by rebellions. We add two crucial and related assumptions: first, that any individual's fighting strength in a rebellion is conditioned by spatial location. In particular, individuals who are closer to the capital city – the seat of political power – will (*coeteris paribus*) pose a greater threat to any set of established institutions. Second, that incumbent rulers and elites take that into account when deciding where to locate the seat of political power. We will see that those assumptions not only predict a link between the quality of institutions and the isolation of the capital city that is in line with the stylized fact, but also yield additional testable predictions that we can take to the data.

3.1 The Model

We study an environment in which an incumbent elite can extract rents from its citizens, but is constrained by the threat of insurrection. Besides setting transfers from citizens, the elite gets to choose the quality of governance and the degree of isolation of the capital city, both of which affect the productivity of the economy but also have distributional effects that feed back into that threat.

3.1.1 Individuals, Technology and Location

Consider a country containing a measure-one population of ex-ante identical individuals. They receive utility from their own consumption C of a homogeneous good, and disutility if they exert *fighting effort* F, which can be used to rebel against an existing institutional arrangement. (We will describe rebellions and institutional arrangements in detail later.) Individual utility can thus be summarized by:

$$\mathcal{U} = log(C) - F. \tag{2}$$

Ex-post, individuals will be in one of the following categories:

- Members of the *incumbent army*;
- *Civil authorities*;
- Citizens living in the capital city;
- Citizens living in a "faraway" location.

An incumbent army has measure a (a positive constant), and is in charge of protecting the existing regime. They might choose to share power with a set of measure ξ (a positive constant) of individuals, who would then become the civil authorities. As we will describe, this power-sharing arrangement is tantamount to *good governance*. The elite comprises the incumbent army and the civil authorities, so whether the measure of individuals in the elite will be $p = a$ or $p = a + \xi$ will be determined in equilibrium. The remaining $1 - p$ individuals are ordinary citizens, or citizens for short.

In order to capture the special role of the capital city in as simple a fashion as possible, we posit that there are two places where citizens can locate: the capital, denoted by $\mathscr{C}$, and elsewhere, which we denote

by $\mathscr{F}$ (for "faraway"). There will be $(1-p)\ell$ citizens in $\mathscr{F}$ and $(1-p)(1-\ell)$ citizens in $\mathscr{C}$, and we will thus think of ℓ as capturing the degree of isolation of the capital city, also to be endogenously determined.

Output in the economy is described by an aggregate production function:

$$Y = Ay(\ell)$$

where A denotes productivity and the function y is strictly concave in ℓ. That output depends on ℓ is meant to capture that different locations can have different endowments of characteristics affecting production. This implies that the degree of isolation of the capital city affects output.[14] The strict concavity in turn embodies the presence of congestion effects in both locations, so that it is very costly, in terms of output, to concentrate everyone in one of them. It implies that there exists ℓ^* that maximizes output in the economy. We can then write

$$Y = A(y^* - \phi(\Delta\ell)), \tag{3}$$

where $\Delta\ell \equiv \ell - \ell^*$ and $\phi(\Delta\ell)$ is the output loss owing to a choice of ℓ different from ℓ^*. Since y is strictly concave, ϕ is a convex function satisfying $\phi(0) = 0$ ($\Delta\ell = 0$ is the optimal choice), $\phi'(0) = 0$ (optimality condition) and $\phi'' > 0$.

The spatial distribution of population also has implications for the effectiveness of fighting. Those citizens who live in $\mathscr{F}$ incur extra costs if they want to join a rebellion to fight the incumbent regime. More specifically, for those in $\mathscr{C}$, F units of fighting effort yield F units of fighting strength; in contrast, for those in $\mathscr{F}$, F units of fighting effort translate into $F - T$ units of fighting strength, where T is a positive constant. This provides us with a simple shortcut for capturing the special role played by the capital city in rebellions against existing institutions.

Having laid out the role of the degree of isolation of the capital, we now turn to the role of governance. We assume that the parameter A can take two values, depending on which of two technologies is used: a *home technology* ($A = 1$) or a *market technology* ($A = \beta > 1$). The key distinction is that the market technology is only feasible if checks and balances are being provided by a set of civil authorities. The idea behind this assumption is that the more productive market technology requires public goods such as protection of property rights and enforcement of contracts. To capture that in stark fashion, we can assume that, in the absence of those checks and balances, the market technology is simply unavailable, or equivalently, that any output obtained through the market technology is subject to expropriation. This is what underlies our description of the power-sharing arrangement, in which checks and balances exist, as constituting good governance.[15]

[14] Note that output does not depend on p, which implicitly assumes that there is no difference between citizens and members of the elite when it comes to production, but this assumption is immaterial to the implications of the model.

[15] The assumption that sharing power entails higher productivity is derived as a result in Guimaraes and Sheedy (2012). Intuitively, sharing power allows for the commitment to rules that would otherwise be time-inconsistent, and thus expands the set of feasible output levels.

3.1.2 The Choice of Institutions

The incumbent army makes the key institutional decisions in the model. The choice variables are:

- Governance: the degree of power sharing;
- Degree of isolation of the capital: the location of citizens, meant to capture all policies that affect the distribution of population relative to the capital;
- Allocation of resources: transfers between citizens and elite (which can be individual specific).

The choice of governance is about extending political power beyond the members of the incumbent army. The upside of sharing power, as we have described, is that it allows for the use of the more productive market technology. There is a downside, however, in that good governance requires sharing rents with the civil authorities: all members of the elite must receive the same payoff. We take this as an assumption, for simplicity, but Guimaraes and Sheedy (2012) show that this is a condition for the stability of elite coalitions under the threat of rebellions. It follows that the choice of governance embeds a crucial trade-off: sharing power entails better governance and a more productive economy, but also dilutes the rents available to each member of the elite – in short, it entails a choice between a larger pie and taking a larger slice of a smaller one.

An incumbent army that chooses good governance is free to choose any set of measure ξ of individuals (outside the incumbent army) to comprise the set of civil authorities. However, since individuals are ex-ante identical, identities are irrelevant. Therefore, the decision about governance boils down to a discrete choice. Good governance ($s = G$) means the incumbent army shares power with a measure ξ of individuals ($p = a + \xi$), which leads to higher productivity by enabling the use of the market technology ($A = \beta$). In turn, bad governance ($s = B$) implies the incumbent army refrains from sharing power ($p = a$), which leads to lower productivity since individuals use the home technology ($A = 1$). Since all elite members get the same reward, we can denote the consumption of an elite member under governance regime s by $C_{\mathrm{p},s}$.

The location of each citizen is also chosen by the incumbent army, implying that the equilibrium degree of isolation of the capital city emerges as part of the equilibrium set of institutions. This stark assumption is meant to capture the idea that the institutional environment affects the spatial distribution of individuals relative to the capital city through a number of policy levers: from internal migration policies and specific economic incentives to populate certain areas to, most directly, the very location of the capital city – changes of which, as we have seen, have been fairly often considered and implemented. In short, the isolation of the capital city is the outcome of institutional choices.

Again, since identities are irrelevant, the decision about the location of each citizen boils down to the choice of $\Delta\ell$. Output is maximized for $\Delta\ell = 0$, but the reduction in the fighting strength of individuals in $\mathscr{F}$ means that the incumbent army might want to set a wedge between the actual degree of isolation and what would maximize production. There is thus a trade-off between maximizing output and protecting against the threat of insurgency.

Last, the incumbent army chooses transfers. There are no constraints on taxes and transfers other than those imposed by the threat of rebellions, which ensures results are driven by the constraints on the incumbent army imposed by the struggle for power and not by exogenous constraints on the set of transfers. Let the consumption of citizen $\imath$, facing a potentially individual-specific tax, be denoted by $C_{\mathrm{w}}(\imath)$, and C_{p} denote the consumption of a member of the elite. The overall budget constraint is thus:

$$\int_{\mathcal{P}} C_{\mathrm{p}} \mathrm{d}\imath + \int_{\mathcal{W}} C_{\mathrm{w}}(\imath) \mathrm{d}\imath = Y. \tag{4}$$

where $\mathcal{P}$ and $\mathcal{W}$ are the set of elite members and citizens, respectively. Any system of transfers between individuals is feasible subject only to this budget constraint.

In sum, institutions stipulate the distribution of political power, the spatial distribution of individuals and the distribution of economic resources, that is: the set of citizens ($\imath \in \mathcal{W}$) in $\mathscr{C}$ and in $\mathscr{F}$, and the set of individuals who are in power ($\imath \in \mathcal{P}$), i.e. the elite; and the transfers of the homogeneous good that are made between individuals.

3.1.3 Rebellions

Any choice of institutions will be potentially subject to challenges by rebellions, to which all citizens have access in the same terms. Citizens can set up a *rebel army*, which is defined as a subset of citizens with size a (a positive constant) and denoted as $\mathcal{R} \subset \mathcal{W}$. A successful rebellion destroys the existing institutional setting, and the individuals in the rebel army become the incumbent army. They are then subject to the emergence of other rebel armies that could challenge their power.

A rebellion is successful if the fighting strength of its rebel army is sufficiently large so as to overcome the counterrevolutionary force interposed by the incumbent army. Each member of the incumbent army has fighting strength δ, a parameter that represents the advantage held by the incumbent regime in fighting a rebellion, and we assume for the moment that it implies no cost, in terms of effort or resources. Naturally, the elite could also make choices that affect its power, and we will look at this possibility in Section 3.3.4. We can summarize the condition for the success of a rebellion as:

$$\int_{\mathcal{R}} S(\imath) \mathrm{d}\imath > \delta a \tag{5}$$

where

$$S(\imath) = \begin{cases} F(\imath) & \text{if } \imath \in \mathscr{C} \\ F(\imath) - T & \text{if } \imath \in \mathscr{F} \end{cases}$$

and

$$F(\imath) = \mathcal{U}'_{\mathrm{p}} - \mathcal{U}(\imath).$$

The LHS and RHS of (5) are the fighting strength of the rebel army, $\mathcal{R}$, and of the incumbent counterrevolutionary forces, respectively, given by the integral of the individual strength of its members. (We assume that a "tie" is resolved in favor of the incumbent army.) In the case of the incumbent army, each individual has fighting strength δ. As for the rebel army, $S(\imath)$ denotes the fighting strength of each

individual $\imath$, which is given by his fighting effort, minus the cost T in the case of citizens located in $\mathscr{F}$. The fighting effort a rebel is willing to make is in turn given by the difference between his utility in case the rebellion succeeds and he gets to join the new elite ($\mathcal{U}'_{\mathrm{p}}$) and his utility under current institutions, $\mathcal{U}(\imath)$.[16]

A given set of institutions can only be sustained in equilibrium if it can resist any challengers: it must leave no profitable opportunity for any group to rebel against it. Equation (5) therefore constitutes the flipside of a no-rebellion constraint that has to be satisfied by any equilibrium choice of institutions by an incumbent elite.

3.1.4 Democracy and Autocracy

The final element in describing the model is to define the objective function to be maximized by the elite in their choice of institutions. In that regard, we assume that the elite operate either in a *democratic* or *autocratic* regime, each of which constitutes a "superinstitutional" environment that constrains in different ways what they are able to achieve. Specifically, we have:

- Democracy: there exist "super institutions" that restrict those in power to maximizing the average utility of everyone in the country.[17]
- Autocracy: there are no "super institutions" above those in power, so institutions are set up to maximize the payoff $\mathcal{U}_{\mathrm{p}}$ of an elite member.

The existence and operation of these "super institutions" are assumed – we simply impose that under democracy the incumbent army cannot "tear the constitution" and set up an autocratic regime more to their liking – and hence transitions between the two types of regime are left beyond the scope of the model. This stark distinction is thus a shorthand to capture the idea that incumbent elites face very different constraints under a stable democratic regime, in which the well-being of average citizens looms much larger than in autocracies, since their opinions can be expressed in competitive elections that can lead to the regular removal of incumbents.

3.1.5 In Sum: Sequence of Events

We can thus summarize the workings of the model according to the following sequence of events:

1. A random set with measure a is drawn and becomes the incumbent army.
2. Institutions are chosen by the incumbent army. In the case of democracy, they maximize average utility in the economy; in the case of autocracy, they maximize the utility of an elite member.

[16] Throughout the paper, we use $'$ to denote the value of a variable if current institutions are destroyed and replaced by new institutions. Similarly, $''$ denotes the value of a variable after two rebellions have occurred and new institutions have been set up, and so on.

[17] This assumption can be justified as arising from a probabilistic voting model, which typically entails a "mean voter" result.

3. There are opportunities for rebellions: any other set of measure a can form a "rebel army".

4. If a rebellion occurs, the winning army becomes the incumbent army and we are back to stage 2.

5. If no rebellions occur, production takes place (using either home technology or market technology).

6. In case of bad governance, agents who used the market technology have their production confiscated by others. Then taxes and transfers are implemented according to the prevailing institutions, and payoffs are received.

We now turn to the characterization of equilibrium.

3.2 Results: The Case of Democracy

We start off by considering the case of democracy. The key element to recognize is that in this case the no-rebellion constraint is not relevant, because it never binds: belonging to the incumbent army entails no benefit, because the new elite will be constrained to maximizing the welfare of the average citizen. In light of that fact, the solution is very simple. Since utility is concave, average utility is maximized when consumption across all individuals in the economy is equalized – which is feasible and imposes no further restrictions on the problem of choosing institutions because consumption of elite members is equalized by assumption and there are no constraints on taxes that can be imposed on citizens. Hence the problem of the incumbent elite is simply to maximize output in the economy.

In order to maximize output, the location of citizens is chosen so that $\ell = \ell^*$. Moreover, good governance is also chosen, as long as $\beta > 1$. Changes in ℓ^* affect the isolation of the capital city but have no impact on governance, while T has no impact whatsoever because the threat of rebellion is not a relevant constraint. The model thus predicts no relationship between governance and the isolation of the capital city in the case of democracy.

3.3 Results: The Case of Autocracy

We now turn to the characterization of equilibrium institutions in the case of autocracy. Since there is no uncertainty, maximization of utility by the elite is equivalent to maximization of consumption. Hence, equilibrium institutions are the result of:

$$\begin{aligned} &\max_{C_{\mathrm{w}}(\cdot),\Delta\ell,s} C_{\mathrm{p}} \\ &\text{s.t.} \quad \textstyle\int_{\mathcal{P}} C_{\mathrm{p}} \mathrm{d}\imath + \int_{\mathcal{W}} C_{\mathrm{w}}(\imath)\mathrm{d}\imath = Y, \\ &\text{and} \quad \textstyle\int_{\mathcal{R}} S(\imath)\mathrm{d}\imath \leq \delta a \ \text{ for all } \mathcal{R} \subset \mathcal{W} \text{ such that } P(\mathcal{R}) = a. \end{aligned} \tag{6}$$

The first restriction is the overall budget constraint and the second is the set of no-rebellion constraints.

The maximization problem (6) depends on the utility of elite members $\mathcal{U}'_{\mathrm{p}}$ in case a rebellion succeeds. Determining $\mathcal{U}'_{\mathrm{p}}$ then requires solving the maximization problem of the post-rebellion elite. Since this

elite is also subject to threats of rebellion, its constrained maximization problem is of an identical form to that in (6), with $\mathcal{U}'_{\mathrm{p}}$ now being determined as a function of $\mathcal{U}''_{\mathrm{p}}$. This shifts the original problem to one of determining the post-post-rebellion beliefs, and so on recursively, *ad infinitum*.

At all stages of this sequence of (hypothetical) events, elites solve a maximization problem of exactly the same form, the only potential difference being beliefs about the actions of subsequent elites were they to come to power through rebellions. In other words, there are no relevant state variables in the problem. Given that individuals are ex ante identical, there is no fundamental reason for elites to make different choices regarding institutions. Therefore it is natural to focus upon equilibria where outcomes (and hence beliefs) are functions only of the fundamentals – that is to say, Markovian equilibria.

A Markovian equilibrium $\{C_{\mathrm{w}}(\cdot), \Delta\ell, s\}$ can be found in two steps. First, the solution to (6) is obtained taking as given C'_{p} – namely, the payoff that would be obtained by the elite that emerges from a successful revolution. Second, we impose the condition of an identical elite consumption at each stage of the maximization process ($C'_{\mathrm{p}} = C^*_{\mathrm{p}}$), since the fundamentals remain unchanged across those stages.

The following proposition substantially simplifies the analysis:

Proposition 1 *Any Markovian equilibrium must have the following properties:*

(i) All citizens in $\mathscr{C}$ receive payoff

$$U_{\mathrm{w,C}} = \mathcal{U}'_{\mathrm{p}} - \delta \Rightarrow C_{\mathrm{w,C}} = C'_{\mathrm{p}} e^{-\delta}$$

(ii) All citizens in $\mathscr{F}$ receive payoff

$$U_{\mathrm{w,F}} = \mathcal{U}'_{\mathrm{p}} - \delta - T \Rightarrow C_{\mathrm{w,F}} = C'_{\mathrm{p}} e^{-\delta - T}$$

Proof 1 *See Appendix A.1.*

First of all, this proposition conveys the point that, in equilibrium, payoffs of citizens in each group are equalized. To see why this is the case, note that the elites are constrained by the rebellion with the strongest incentives for fighting – namely, the one comprised by the most disgruntled individuals. If there were identical individuals who were getting paid more than the most disgruntled, it would be possible to shuffle resources from the former to the latter, which would reduce their fighting effort and allow the elite to extract more from citizens. As a result, equalization of payoffs in each group minimizes the amount of fighting effort that could be put forth by the binding rebellion, or equivalently, yields the cheapest way to buy off any rebellion.

Second, the proposition establishes that the difference in payoffs across groups is given by the differences in the threat they represent. The extra cost of fighting (T) is translated into lower utility for those in $\mathscr{F}$. Moreover, rebelling citizens have to overcome the elite's defenses, given by δa, so a group of size a of citizens in $\mathscr{C}$ will only rebel if rewards for launching a successful rebellion exceed δa. This yields the

payoff difference between elite members and citizens in $\mathscr{C}$. The argument is similar for citizens in $\mathscr{F}$, and does not require a minimum size of the measure of citizens in any location, since citizens in $\mathscr{C}$ and in $\mathscr{F}$ can always join forces in a rebellion.[18]

We can now derive closed-form expressions for the consumption levels of each group of citizens and of the elite as a function of p, A and $\Delta\ell$, which will be determined later. Note that aggregate output $A(y^* - \phi(\Delta\ell))$ has to be divided between p elite members, $(1-p)(1-\ell)$ citizens in $\mathscr{C}$ and $(1-p)\ell$ citizens in $\mathscr{F}$. The budget constraint (4) and Proposition 1 thus yield:

$$C_{\mathrm{p}} = \frac{1}{p}\Big(A(y^* - \phi(\Delta\ell)) - (1-p)(1-[\ell^* + \Delta\ell])C'_{\mathrm{p}}e^{-\delta} - (1-p)[\ell^* + \Delta\ell]C'_{\mathrm{p}}e^{-\delta-T}\Big) \tag{7}$$

which is an expression of C_{p} as a function of $\Delta\ell$, A and p. We have used Proposition 1 to replace the consumption of each group of citizens with functions of C'_{p}.

In a Markovian equilibrium, it has to be the case that $C'_{\mathrm{p}} = C_{\mathrm{p}}$. Hence:

$$C_{\mathrm{p}} = \frac{A[y^* - \phi(\Delta\ell)]}{p + (1-p)e^{-\delta}\left(1 - [\ell^* + \Delta\ell](1-e^{-T})\right)} \tag{8}$$

$$C^c_{\mathrm{w}} = e^{-\delta}\frac{A[y^* - \phi(\Delta\ell)]}{p + (1-p)e^{-\delta}\left(1 - [\ell^* + \Delta\ell](1-e^{-T})\right)} \tag{9}$$

$$C^f_{\mathrm{w}} = e^{-\delta-T}\frac{A[y^* - \phi(\Delta\ell)]}{p + (1-p)e^{-\delta}\left(1 - [\ell^* + \Delta\ell](1-e^{-T})\right)} \tag{10}$$

The numerator of the equations corresponds to aggregate output, which is divided among the agents in the economy. In this division, each of the citizens in $\mathscr{C}$ receives $\exp(-\delta)C_{\mathrm{p}}$ and each of the citizens in $\mathscr{F}$ receives $\exp(-\delta - T)C_{\mathrm{p}}$, in accordance with the relative threat that they pose to the incumbent elite.

We now need to solve for the equilibrium choices of isolation of the capital city (ℓ) and governance (s, which determines p and A). The incumbent army chooses ℓ and s in order to maximize C_{p} as defined in (7), taking C'_{p} as given. We then impose the equilibrium condition $C'_{\mathrm{p}} = C_{\mathrm{p}}$ (equation (8)) to characterize those equilibrium choices.

3.3.1 The isolation of the capital city

We start with the equilibrium choice of $\Delta\ell$, which we can think of as representing the elite's incentives for locating the capital city in an isolated place. In order to simplify exposition, we will focus on interior equilibria, where $\ell \in (0,1)$.[19] Taking the first-order condition of (7) with respect to $\Delta\ell$ yields:

$$A\phi'(\Delta\ell) = (1-p)C'_{\mathrm{p}}e^{-\delta}(1-e^{-T}) \tag{11}$$

The LHS of (11) shows the marginal efficiency cost of further isolating the capital. The RHS displays the marginal benefit of the extra protection bought by that isolation: a more isolated capital makes it

[18] The assumption of log utility implies that the fighting effort an agent is willing to make depends on relative gains in consumption. In consequence, the ratio of consumption of individuals in each group depends only on δ and T.

[19] Section A.5 in the appendix discusses conditions for a corner solution $\ell = 1$, and shows that the implications of the model are essentially unchanged.

cheaper to stave off rebellion, as citizens who are farther away represent a lesser threat and can thus receive a lower level of consumption. The marginal benefit, quite intuitively, is greater when the decrease in rebellion threat entailed by distance from the capital is steeper (T is large). It is also greater when potential rebels have more to gain from a revolution (C'_{p} is large), because in this case the cost of buying them off is higher, and hence reductions in this cost are more valuable.

Imposing the equilibrium condition $C'_{\mathrm{p}} = C_{\mathrm{p}}$ on (11) yields

$$\phi'(\Delta\ell) = \frac{[y^* - \phi(\Delta\ell)]e^{-\delta}(1 - e^{-T})}{\frac{p}{1-p} + e^{-\delta}\left(1 - (\ell^* + \Delta\ell)(1 - e^{-T})\right)} \tag{12}$$

Figure 3 depicts the choice of $\Delta\ell$ in equilibrium captured by (12). The marginal efficiency cost is increasing in $\Delta\ell$, because of the convexity of ϕ. The marginal benefit, due to the impact of the protection offered by further isolating the capital on the elite's ability to extract rents, is initially increasing: starting from the social optimum any increase in isolation has a second-order effect on productivity, while the effect on rent extraction is first-order. The effect is concave (and can be decreasing) because the convexity of the efficiency cost means that a smaller output will erase the gains from the elite's ability to obtain a bigger share.

[FIGURE 3 HERE]

The equilibrium yields the comparative statics that we summarize as follows:

Proposition 2 *Comparative statics for the choice of $\Delta\ell$:*

(i) For a given s, $\Delta\ell$ is increasing in T;

(ii) For a given s, $\Delta\ell$ is increasing in ℓ^*;

(iii) For given parameters, $\Delta\ell$ is smaller when $s = G$.

Proof 2 *The LHS of* (11) *is increasing in $\Delta\ell$, equal to zero at $\Delta\ell = 0$ and does not depend on ℓ^* and T. It is shown in Appendix A.2 that C'_{p} is increasing in ℓ^* and T (Equations* (16) *and* (17)*). Moreover, the term $(1 - e^{-T})$ is also increasing in T. Hence increases in ℓ^* and T shift up the RHS of* (11)*, leading to a larger $\Delta\ell$. That proves the first and second statements.*

Keeping constant all parameters, the denominator of the RHS in (12) *is increasing in p, so it is larger if $s = G$. Hence good institutions shift down the RHS of* (12) *and lead to a smaller $\Delta\ell$.*

This proposition establishes two important points. First, parts (i) and (ii) identify two parameters that are monotonically related to the equilibrium isolation of the capital city. An increase in T or ℓ^* (the optimal isolation of the capital city) will increase equilibrium isolation. Graphically, increases in both T or ℓ^* lead to an increase in C'_{p}, which shifts up the marginal benefit curve and results in a higher $\Delta\ell$. At the

same time, T also has a direct impact on the marginal benefit curve, and ℓ^* on the marginal cost curve, that go in the same direction, so that the effect on $\Delta\ell$ works through a direct and an indirect channel.

Intuitively, a higher impact of distance on the cost of rebellion (T) directly increases the effectiveness of isolating the capital city as a protection device, and hence naturally encourages the elite to choose a more isolated capital. By the same token, an increase in the optimal isolation of the capital city (ℓ^*) obviously reduces the marginal cost of increasing equilibrium isolation, one for one. The indirect channel on top of those, through C'_{p}, is more subtle: a greater T or ℓ^* increases the reward for a successful rebellion, and hence the incentive to rebel. After all, better protection for the elite lets it appropriate a larger fraction of output, but that also increases the value of becoming the new elite.[20] In short, a greater T or ℓ^* makes isolating the capital city a more effective or cheaper tool of protection, and also makes protection more valuable.

The second crucial point made by Proposition 2 is in turn established by part (iii): better governance leads the elite to choose a less isolated capital city. Intuitively, a society in which elites choose good governance is one with more power sharing, hence the marginal rents from increasing rent extraction are diluted among more people – and moreover, there are fewer citizens to exploit. This means the elite has, on the margin, less of an incentive to further isolate the capital in order to increase rent extraction.

Of course, this result is not enough to establish a negative correlation between the isolation of the capital city and the quality of governance, because the latter is also determined endogenously. We thus turn our attention to the equilibrium choice of governance.

3.3.2 Governance

How is the decision on governance influenced by the determinants of the isolation of the capital city? We know from Proposition 2 that the latter is monotonically increasing in the socially optimal degree of isolation (ℓ^*) and in the additional cost of rebellion faced by the citizens who are away from the capital (T). We will thus study how ℓ^* and T affect the choice of governance. Keeping in mind that the elite will choose good governance ($s = G$) if $\mathcal{U}_{\mathrm{p},G} > \mathcal{U}_{\mathrm{p},B}$, we can state the following:

Proposition 3 *For given parameters ξ, a, δ, β, y^* and function ϕ:*

(i) Fix T. Let $\bar{\ell}^*$ be such that $\mathcal{U}_{\mathrm{p},G} = \mathcal{U}_{\mathrm{p},B}$ when $\ell^* = \bar{\ell}^*$. Then $s = G$ if and only if $\ell^* < \bar{\ell}^*$.

(ii) Fix ℓ^*. Let $\bar{T}$ be such that $\mathcal{U}_{\mathrm{p},G} = \mathcal{U}_{\mathrm{p},B}$ when $T = \bar{T}$. Then $s = G$ if and only if $T < \bar{T}$.

Proof 3 *See appendix A.3*

Good governance is chosen if ℓ^* or T are small enough: if it is efficient to have many people in the capital, or if those who are far from the capital cannot be so heavily taxed because they can easily rebel,

[20] This is akin to the logic of so-called "spoils politics" (e.g. Dal Bo and Powell 2009), whereby political power is used to appropriate the economic spoils associated with control of the state, and an increase in the ability to appropriate the spoils induces a greater incentive for outsiders to fight for that control.

the elite chooses to share power. Figure 4 illustrates the result: a more isolated capital benefits the elite, but especially so in case bad governance is chosen and power sharing is kept to a minimum.

[FIGURE 4 HERE]

The intuition for this result stems from the key fact that sharing power implies sharing rents. It turns out that for those in the elite, the cost of sharing rents depends on the difference between the income of a member of the elite and that of the average citizen. When the capital city is more isolated, the average citizen is relatively impoverished, because she poses a smaller threat to the incumbent regime and can thus be more exploited. It follows that sharing rents is less appealing for the elite. In other words, the incumbent elite is more insulated when the capital city is isolated, which increases its ability to extract rents. The ability to extract a bigger slice means that they are less concerned with making the pie as a whole bigger, and as a result the elite is less inclined to share rents and power.

Combining Propositions 2 and 3, our central result becomes clear: *There is a negative correlation between the quality of governance and the degree of isolation of the capital city.*

The two propositions also have marked implications for economic performance. As ℓ^* or T increase, the economy will reach a point at which it switches to $s = B$, and at this point there is also a discrete increase in $\Delta\ell$. In other words, not only does the economy switch to worse governance and the lower productivity that it entails, but it also switches to even greater isolation of the capital – which further depresses output. Figure 5 illustrates this point, showing how the economy behaves as a function of ℓ^*. [21] The elite choose good governance as long as ℓ^* is relatively small. At some point, bad governance becomes the optimal choice, implying a discrete fall in output owing to lower productivity and a discontinuity in $\Delta\ell$ as explained in Proposition 2. Excessively isolated capitals benefit the ruling elite, but harm society as a whole.

[FIGURE 5 HERE]

3.3.3 Capital city premium

In addition to generating our basic stylized fact, our framework also yields additional predictions that we can take to the data. The first of them concerns the relationship between the income premium earned by those who live in the capital city and the degree of isolation of the capital. Citizens who live in the capital city earn a premium because they pose a greater threat to the incumbent elite, and equations (9) and (10) imply that this premium is given by:

$$\rho_{c,f} = e^T$$

The intuition is clear: the premium is increasing in the disadvantage faced by citizens who are away from the capital in threatening the elite with a rebellion, as those citizens can then be further exploited.

[21] Parameters for this example: $\beta = 1.17$, $a = 0.05$, $\xi = 0.05$, $y^* = 1$, $\delta = 1$, $T = 1$ and $\phi(\Delta\ell) = 4\Delta\ell^2$.

Since Proposition 2 implies that the isolation of the capital city is monotonically increasing in T, it follows that greater isolation will be correlated with a larger premium enjoyed by those who live in the capital. A lower threat of rebellion by outsiders increases the relative exploitation of those outsiders and also leads the elite to choose a more isolated capital city.

3.3.4 Military spending

Since the institutional environment is calibrated by the elite specifically so as to avoid rebellions, there are no actual rebellions in equilibrium. Nevertheless, the correlation between isolation of the capital city and the quality of governance is driven by the threat of rebellion. It is thus interesting to ask whether there is evidence of any link between the concentration of population around the capital and the level of concern displayed by elites regarding that possibility.

In order to think more systematically about that, we can extend the basic model by assuming that the elite can spend resources to increase its military power, in order to make rebellions more costly. Suppose the elite can buy *guns*, denoted by g, which affect the power of the incumbent army: power is now $\delta(g)$, with $\delta' > 0$ and $\delta'' \leq 0$. For the sake of simplicity, we assume that guns are imported.

The elite now chooses not only transfers, the degree of isolation of the capital city ($\Delta\ell$) and governance (s), but also military spending in guns (g). Subsequent elites will also face similar decision problems and, in a Markovian equilibrium, $g = g'$ (as well as $\Delta\ell = \Delta\ell'$, $s = s'$ and $C_{\mathrm{p}} = C'_{\mathrm{p}}$). The results in Proposition 1 remain unchanged (except that $\delta(g)$ replaces δ), but the budget constraint (4) changes, so the expression in (7) is replaced by

$$C_{\mathrm{p}} = \frac{1}{p}\Big(A(y^* - \phi(\Delta\ell)) - g - (1-p)(1 - [\ell^* + \Delta\ell])C'_{\mathrm{p}}e^{-\delta(g)} - (1-p)[\ell^* + \Delta\ell]C'_{\mathrm{p}}e^{-\delta(g)-T}\Big)$$

The first order condition with respect to g now yields

$$(1-p)\left(1 - [\ell^* + \Delta\ell][1 - e^{-T}]\right)\left(C'_{\mathrm{p}}e^{-\delta(g)}\delta'(g)\right) = 1, \tag{13}$$

and the expression in (8) becomes

$$C_{\mathrm{p}} = \frac{A[y^* - \phi(\Delta\ell)] - g}{p + (1-p)e^{-\delta(g)}\left(1 - [\ell^* + \Delta\ell](1 - e^{-T})\right)} \tag{14}$$

Substituting $C'_{\mathrm{p}} = C_{\mathrm{p}}$ from (14) into (13), we get

$$\frac{\left(1 - [\ell^* + \Delta\ell][1 - e^{-T}]\right)\left(A(y^* - \phi(\Delta\ell)) - g\right)\delta'(g)}{\frac{p}{1-p}e^{\delta(g)} + \left(1 - [\ell^* + \Delta\ell][1 - e^{-T}]\right)} = 1, \tag{15}$$

and from this we obtain:

Proposition 4 *Military spending g is decreasing in ℓ^* and in T.*

Proof 4 *See appendix A.4*

This proposition, in tandem with Proposition 2, implies a negative correlation between ℓ and g. In other words, a more isolated capital city will be associated with lower levels of military spending, to the extent that the latter is driven by the elite's desire to protect against domestic rebellion. Military spending and isolated capitals are substitutes in protecting the elite: when it is cheap to obtain protection by isolating the capital – such as when there is relatively little inefficiency in doing so (high ℓ^*), or when it is effective in staving off rebellion (high T) – the elite chooses to do so, and there is less need to invest in military protection.

This intuition can be seen from (13) and (15), as graphically depicted in Figure 6. The marginal cost of spending one unit in guns is 1 (the RHS of those equations), which yields the (decreasing) marginal benefit that extra guns allow the elite to reduce the amount of output kept by citizens (the LHS of those equations). Changes in T and ℓ^* – which we have shown to be associated with more isolation of the capital in equilibrium – affect that marginal benefit essentially because, when ℓ is high, citizens are already taking a small share of output. As a result, there is little additional gain from buying expensive guns to further exploit those who are already poor. Hence increases in T and ℓ^* shift the marginal benefit curve to the left, leading to a lower g. [22]

[FIGURE 6 HERE]

3.4 In Sum

Our framework, relying on the connection between the spatial distribution of population and the threat of rebellion, predicts that isolated capital cities will be associated with misgovernance. The link emerges as an equilibrium outcome in which causality runs both ways. Isolated capital cities lead to misgovernance, because they provide incentives for the elite to forsake power sharing, which is the key behind better governance. However, it is also true that misgovernance increases the incentives to isolate the capital city, as the ability to limit the sharing of resources makes it more appealing to further exploit citizens – and reducing the rebellion threat they pose, by isolating the capital city, facilitates that exploitation.

The framework also yields a number of additional testable predictions. Chief among them is that the link between isolated capital cities and misgovernance is a feature of non-democratic contexts only. The link vanishes to the extent that democratic institutions provide a closer alignment of political and institutional decisions with the intereste of the average citizen. They reason is that in a democratic scenario, rebellion threats are less prominent as a source of checks on incumbent regimes. Of course, in practice the distinction between democratic and non-democratic regimes is colored in different shades of grey, and those threats are ultimately always present to one degree or another. It seems clear, however, that its importance as a constraint on incumbents is considerably greater when the democratic process

[22] Note that there is again an indirect effect through C_{p}': high values of ℓ also imply that the benefits from rebellions are large, as they increase the value of becoming the new elite. This operates in the opposite direction, increasing the incentives of the current elite towards buying guns. However, from (15) it is clear that the direct effect dominates: the effect of T and ℓ^* on the numerator of the LHS is more important than the effect on the denominator.

malfunctions, so that regular means of replacing those incumbents are less available. In any case, in a democratic process the disadvantage in terms of influence that is imposed by physical distance from the center of power is much less pronounced than when it comes to the threat of rebellion, where physical proximity greatly enhances the danger that it poses, and the incentives of elites are not as affected by the spatial distribution of population.[23]

Second, our framework pinpoints a specific mechanism linking isolated capitals and misgovernance – namely, their impact on the incentives to share power. This means that we can also consider available measures of power sharing as a way of assessing the explanatory power of the theory in the data: we expect isolated capitals to be associated with less power sharing.

Last but not least, the theory also yields ancillary testable predictions, which are not as central to the logic of the model but can nonetheless be used to further check its explanatory power. The model predicts that individuals living in the capital city will enjoy an income premium over what is left to the population that is far from the capital, because of the greater political threat that they represent. We have showed that this premium will be positively correlated with the isolation of the capital city because when the danger posed by faraway citizens is smaller, their income is smaller, but also greater isolation arises. A second ancillary prediction in turn speaks to direct measures that the elite may resort to in order to defend against the rebellion threat. Our model implies that there will be a negative correlation between the isolation of the capital city and those additional measures. To the extent that military spending is often driven to a substantial extent by a concern with domestic rebellions, we interpret this as a negative correlation with military spending.

4 Isolated Capital Cities and Misgovernance: Empirical Evidence

We can now go to the data in order to check whether there is support for our model's predictions. The first crucial prediction is that isolated capitals are associated with misgovernance, but only in non-democracies. For that we can start off by revisiting the raw data as depicted in Figure 1, but now splitting the sample between a subsample of relatively non-democratic countries – those measured below the level of 5 in the well-known Polity measure of democracy, from the Polity IV project – and another of countries we can deem to be full-fledged democracies, as defined by a Polity score above 9. Figure 7 shows that the difference in governance scores between countries with more isolated capitals and those with less isolated capitals is apparent only for the subsample of less democratic countries – which for the sake of brevity we will refer to as "autocracies".

[FIGURE 7 HERE]

[23]This does not mean that the spatial distribution of population cannot affect democratic politics, as illustrated by Campante and Do (2012).

By analogy, we can also revisit Figure 2, now with one scatterplot per subsample. The difference, as illustrated in Figure 8, is once again clear: there is essentially no correlation in the group of full-fledged democracies, whereas a strong positive association emerges in the sample of autocracies.[24] In other words, the relationship we see in Figure 2, between isolated capital cities and worse governance, seems to be essentially driven by autocracies.

[FIGURE 8 HERE]

The impression given by the raw data is confirmed by the regression analysis, as shown in Table 2, with the first principal component of the six WGI measures as our main variable of interest. (All tables report coefficients estimated for the standardized variables, so that they should be interpreted in terms of standard deviations as computed for the full sample.) The first two columns show a positive correlation between the concentration of population around a country's capital city and the quality of governance. This correlation is statistically significant, and robust to a wide range of control variables that are often associated to governance – ranging from GDP per capita, urbanization, and population, to ethnic fractionalization and characteristics of the political system (such as the presence of majoritarian elections or of a presidential system).[25] This is important in reassuring us that what we are picking up is indeed related to the role of the capital city and its interaction with governance, as opposed to confounding factors.

[TABLE 2 HERE]

The next two columns show that this positive correlation is indeed particularly pronounced in the countries that we label as "autocracies", as defined by the threshold Polity score of 5, in spite of the relatively small sample size.[26] This is in stark contrast with Columns (5)-(6), which show that the correlation is essentially non-existent in those countries with established democracies (Polity score above 9). In fact, in spite of the relatively high standard errors, especially in the sample of democracies, we can specifically reject (p-value = 0.021) the hypothesis of equality of coefficients on the concentration of population around the capital across the two subsamples. Put simply, our model's central prediction is borne out by the data.

[24] The correlation is robust to the exclusion of Singapore, which seems to be an outlier in terms of governance among the countries in this subsample.

[25] All of our results are robust to including educational achievement as a control variable, as measured by total years of schooling in 1995 (from the Barro-Lee dataset). (Results are available upon request.) We choose not to include it in our main specifications because it is very highly correlated with income per capita (around 0.75 in the full sample), and ends up being statistically insignificant in all specifications. The results are also unaltered if we control directly for population density (also available upon request), which we do not do in the main specifications because we already include a control for population and the adjustment for country size implicit in our measure of concentration. Finally, we do not include the Polity score as a control variable in our specifications, beyond its use as a means to parse the sample, because it captures institutional checks and balances that can also be thought of as capturing different dimensions of the quality of governance. We will get back to this later.

[26] The threshold is chosen to maintain reasonable sample sizes, but results are robust to other choices of thresholds. They are also robust to a specification where we use the full sample and look at the coefficient on an interaction between isolation and an "autocracy" dummy. These are all available upon request.

Based on these results, we can also assess the quantitative importance of the correlation. Let us consider, in the context of the full specification for the subsample of autocracies (Column (4)), the thought experiment of increasing the concentration of population around the capital from the 25th to the 75th percentile within that subsample. (These would correspond approximately to Pakistan's Islamabad and to Peru's Lima, respectively.) The estimated coefficient would imply an improvement in the quality of governance of just over 1/2 of a standard deviation. Such an improvement would be roughly comparable to a move from the quality of governance measured for Bolivia to the level attributed to Turkey.

We can also use the data to unpack the different dimensions of governance, based on the mechanism highlighted by the theory, in order to further assess its plausibility. Consider first the different component measures of the WGI. As we have noted, the six measures are highly correlated with one another, and in light of that one might expect that they would display a similar relationship with the isolation of the capital if considered separately. As it turns out, this is true of five of the six measures – results for which we do not report, for the sake of brevity, but are readily available upon request. It is not the case, however, for Political Stability. Column (7) displays the regression result for this indicator in isolation, focusing on the sample of autocracies: we see no statistically significant correlation, with the point estimate being about one-third of what was estimated for the other five indicators taken together. In short, it seems that isolated capital cities are associated with worse governance across all dimensions, except that they are not linked to the political system being less stable.

This is not surprising when looked at through the lens of our framework: while it has no rebellions in equilibrium, the fact is that isolating the capital city is a rebellion-preventing measure. As such, we would not expect from our framework that incumbent regimes would necessarily be less stable when the capital is more isolated.[27] In contrast, this is quite unlike what one would expect from alternative stories that one might concoct to explain the connection between isolated capitals and poor governance.[28]

Another way to unpack the meaning of governance is to look at a measure of government performance that is unrelated, at least directly, to the political incentives of rulers and elites as it pertains to power sharing or political survival. One such measure has been proposed by Chong et al (2012), to isolate the government's ability to perform a simple task effectively: the average number of days it takes a country's post office to return letters sent to non-existent addresses in the countries' five largest cities. Of course, this measure ought to be correlated with broader measures of governance, not the least since one might imagine that less accountable governments could be more likely to pursue actions that would result in

[27] It is possible to extend our framework to consider the possibility of equilibrium rebellions by introducing stochastic shocks to the conflict technology (say, δ). In such a model, an exogenous increase in the isolation of the capital would tend to make the elite choose more, and not less, stability – this is so because staying in power is worth more due to the high rents afforded by an isolated capital. While the model would be overall much less transparent in its workings and predictions, because of interaction effects linking the choice of stability to those of governance (power sharing) and isolation, it would not imply that a more isolated capital would be associated with more political instability. (More on this is available upon request.)

[28] For the sake of an example, consider a story where, if the capital is somehow located in an isolated place, the state has a harder time taxing its citizens and developing its fiscal capacity, the lack of which in turn leads to bad governance. Besides begging the question of why an incumbent regime would refrain from moving its capital to a more favorable location, such a story about a relative lack of control over the population would lead us to expect that this would be a more fragile, unstable regime – as suggested by Herbst (2000), in a different context, with respect to low population densities in Africa.

ineffective provision of services – say, by packing the post office with incompetent political appointees – and, in fact, the raw correlation with the WGI principal component in our sample is substantial (-0.72). Still, we would not expect it to respond directly to the incentives highlighted by our theory.

Indeed, Column (8) shows that, in spite of that high correlation with governance, we find no correlation between that measure of government performance and the isolation of the capital city. The point estimates are rather small, and if anything their sign would imply that non-democratic countries where the capital is less isolated actually take longer to return the letters.[29] This provides compelling evidence that the stylized fact we detect is not an artifact of some correlation between isolated capitals and generally low state capacity that is unrelated to the kind of forces our theory underscores.

The strong association between isolated capital cities and poor governance, as well as the fact that it is present only in relatively non-democratic contexts, is not only robust to the many control variables that are considered in Table 2, but also holds under various ways of measuring the degree of isolation of the capital, and the quality of governance. This is the message conveyed by Table 3. The first three pairs of columns reproduce the full specifications for autocracies and full-fledged democracies in Table 2, still with the WGI minus "Political Stability" as the dependent variable, but with different measures for the isolation of the capital city.

[TABLE 3 HERE]

Columns (1)-(2) look at a different version of the G-CISC, which Campante and Do (2010) label "$GCISC_1$". It differs from the one we have been using in that it does not adjust for the geographical size of the country in question.[30] We see a similar positive, statistically significant correlation for autocracies, which is indeed quantitatively larger than the effect documented in Table 2. Yet another approach to capturing the isolation of the capital city is exemplified in Columns (3)-(4), where the key independent variable of interest is the distance between the actual capital and the least isolated place in the country. This is, in other words, the location that has maximal concentration of the country's population around it.[31] We again see a significant correlation between isolated capital cities – those that are relatively far from the maximal concentration points – and worse governance, and only in autocracies. In addition, Columns (5)-(6) show the very same stylized fact using a coarser measure of the concentration of population, namely capital primacy: the share of the country's population living in the capital city as officially delimited. We have argued before that this is a very unsatisfactory measure of concentration around the capital, but it is

[29] The results in Columns (7) and (8) would be very similar if we include the full set of controls (available upon request.)

[30] Specifically, instead of setting the normalization parameter α so that a measure of zero corresponds to the entire population of a country being as far away from the capital as would be possible in that specific country, it sets that benchmark as having that population be as far away from the capital as would be possible in *any* country. (In this case, only the country that contains that largest possible distance, the United States, could conceivably be assigned a measure of zero: if all its population were on the Midway Islands, in the Hawaiian archipelago.) In other words, distances are weighed in the same way no matter if a country's territory is large or small.

[31] Notably, for most countries the location with maximal concentration is the country's largest city, which often turns out to be the capital city itself. The exceptions are illustrative: in China, it is close to Zhengzhou, the largest city in that country's most populous province (Henan); and similarly for India, where it is also in the most populous state (Uttar Pradesh). In the US, it is Columbus, OH, right in the middle of the large population concentrations of the East Coast and the Midwest.

nevertheless reassuring to find that the stylized fact is confirmed in this case as well. In short, no matter how we measure the degree of isolation of the capital city, we reach the same conclusion: it is associated with misgovernance, but only in non-democratic contexts.

Last but not least, Columns (7)-(8) show that the stylized fact is also robust to a different way of measuring the quality of governance. We use another measure, the Rule of Law index compiled by Freedom House, which also gives us a sufficiently wide coverage in terms of the number of countries – and particularly of non-democratic ones. (We rescale the index so that higher scores correspond to better governance.) Turning once more to our benchmark measure of concentration, we find yet again that more isolated capital cities are associated with worse governance, and only in non-democratic countries. The quantitative assessment is even very much comparable to our benchmark case, with an increase of over one-fourth of a standard deviation in the governance scores as a result of a one-standard-deviation increase in the concentration of population around the capital.[32]

We now turn to the question of whether we can shed direct light on the power sharing mechanism highlighted by the theory: is there any empirical connection between the isolation of capital cities and the degree of power sharing? We tackle this question by looking at the Polity IV data set. We have used the so-called Polity measure to parse the sample between democracies and autocracies, but the data contain more information that can be used to shed light on more subtle distinctions. In particular, the Polity measure aggregates the content of several other measures – and the extent to which they can be interpreted as relating to the degree of power sharing varies considerably.

Out of the four variables aggregated into the Polity IV index of Democracy, two are described as pertaining to either the realm of "independence of executive authority" (*ExecutiveConstraints*) or to that of "political competition and opposition" (*ParticipationCompetitiveness*). The former refers to "the extent of institutionalized constraints on the decisionmaking powers of chief executives" (Marshall, Jaggers, and Gurr 2011, p. 24), ranging from "unlimited authority" to "executive parity or subordination". The latter in turn captures " the extent to which alternative preferences for policy and leadership can be pursued in the political arena" (p. 26), and ranges from "repressed" to "competitive". These are clearly related to the degree of power sharing that exists within a political system: an unchecked executive and a limited scope for political competition are clear signals of concentration of power.

A first look at how these measures relate to the isolation of the capital city can be had by revisiting the instances of capital city moves that were listed in Table 1. Table 4 reproduces that list, but adding two columns describing the changes in *ExecutiveConstraints* and *ParticipationCompetitiveness* from ten years before to ten years after the date of the move (or closest date available). We see that on average there is a substantial drop in the two measures, particularly if we leave aside the hybrid cases in which only part of the government is moved. This indicates that the capital city moves are typically accompanied

[32] We have also tried the same exercise with a measure of governance compiled from the World Justice Program, which unfortunately has considerably narrower coverage: our subsample of autocracies ends up with only 20 countries. Unsurprisingly, the results fall short of statistical significance, but with similar quantitative implications (available upon request).

by more concentrated power, consistent with the idea that increasing the isolation of the capital allows incumbent regimes to get away with less power sharing.

[TABLE 4 HERE]

We can then ask whether the pattern linking the isolation of capital cities with less power sharing holds more systematically. Table 5 starts off, in Column (1), by looking at the aggregate Polity measure in autocracies, again defined by the threshold of Polity=5 and computed as the average value between 1975 and 2010. (We stop at 1975 in order to restrict ourselves to the post-decolonization period.) We see a significant negative correlation, indeed showing that countries with isolated capital cities tend to display institutions that are farther from the democratic ideal. This connection is brought into sharper focus, however, when we look at the power sharing measures of *ExecutiveConstraints* and *ParticipationCompetitiveness*, in Columns (2) and (3) respectively. The quantitative implications are in fact very similar to what we found for our measures of governance, ranging between 1/2 and 2/3 of a standard deviation in response to a change in the concentration of population around the capital from the 25th to the 75th percentile in the sample. In absolute terms, this would correspond for instance to a move from the degree of constraints on the executive in Mexico to those in France, or from Tajikistan to Chile when it comes to political competition (as averaged over the 1975-2010 period). In sum, countries with isolated capitals seem to display particularly low marks when it comes to the degree of power sharing in their political systems.[33]

[TABLE 5 HERE]

Interestingly, the relationship with isolated capital cities is much weaker, and statistically insignificant, for the other two component measures (*RecruitmentCompetitiveness* and *RecruitmentOpenness*), as shown in Columns (4)-(5). In particular, we can reject the equality of their coefficients to those of the first two measures, at least at the 10% level. These latter measures have to do with "executive recruitment": roughly put, competitiveness has to do with whether competitive elections exist, and openness is about whether there is hope for citizens to achieve executive positions through a regularized process. Note also that the coefficient on the openness variable, while very imprecisely estimated, is of a similar size to the "power sharing" coefficients, in absolute value, but of the opposite sign.

This measure of openness in particular, while clearly related to democracy, does not speak directly to how power is shared between different groups in society. For instance, countries receive a maximum score in the openness measure essentially as long as succession is not hereditary – which allows, for instance, the post-Stalin Soviet Union, no one's idea of a regime with widespread power sharing, to achieve that maximum score. Naturally, all four measures tend to be correlated, so that countries with high degrees of power sharing will typically score high in the recruitment measures as well. It is nevertheless interesting

[33] The results are once again very different when we consider the sample of democratic countries. While there is much less variation within that group of countries in terms of the dependent variables of interest, it is still the case that no connection with the concentration of population around the capital is detected.

that *RecruitmentOpenness* is the least correlated with the other three, and particularly so with the power sharing measures: 0.59 and 0.47, when the pairwise correlations between the other three is never below 0.83. This suggests that it can indeed be interpreted as addressing other aspects of the institutional setting.

In sum, it seems that the greater distance from democracy in countries with isolated capital cities is specifically related to less power sharing, consistently with the mechanism emphasized by our model. While these measures are evidently imperfect, the results again increase our confidence that the basic stylized facts are expressing the workings of such a mechanism.

Beyond this direct evidence, we can also check our model's ancillary predictions, as established in the previous section. We start by looking at the capital city premium. In order to measure this variable, we look at data from the McKinsey Global Institute (Dobs et al. 2011), which estimate city-level income per capita, in 2007, for 600 cities around the world. Out of these, 77 are country capitals, and for all these countries we compute the capital city premium as the ratio between the capital's income per capita and the countrywide GDP per capita that we have used in the previous analysis.

Because the sample size is now smaller, in light of the limited number of countries for which we have data on income per capita for the capital city, we will now split the sample between autocracies and democracies according to the average of the Polity score between 1975 and 2000. This helps us obtain a reasonable sample size of autocracies, in contrast with the more recent time period used in Tables 1-4, because there are many more countries that fall below the Polity = 5 threshold as we move farther back in time. (Again, we stop at 1975 in order to restrict ourselves to the post-decolonization period.) On the other hand, going back to this less democratic period greatly restricts the sample of countries with a Polity score above 9. For this reason, we contrast the autocracy sample with the set of countries with scores above the autocracy threshold of 5. All in all, we are still left with a small sample, and for that reason we have to be especially parsimonious when it comes to the set of control variables.

Table 6 displays the results of a simple regression analysis along the lines of Table 2. The aforementioned data caveats aside, we see a negative correlation between the capital city premium and the concentration of population around the capital in autocracies. This correlation is quantitatively considerable, being comparable in size to what we found in the case of governance. In other words, the inhabitants of isolated capital cities earn a substantially larger premium over the rest of the population. This correlation is exactly what was predicted by our model. It could certainly be the case that omitted factors are also influencing this correlation, but it is telling that once again, as shown by Columns (3)-(4), this connection does not extend to those countries that are more democratic, just as we would expect from our framework.

[TABLE 6 HERE]

Our second ancillary prediction relates to the possibility that the elite might try to reduce the threat of rebellion by investing in its own military strength. We proxy this by the amount of military expenditures

pursued by a country's central government, as a percentage of total central government expenditures, averaged between 1990 and 2006 (from the World Development Indicators). We find in Table 7 that autocratic regimes (defined as in Table 6) facing a population that is more concentrated around its capital city will spend significantly more with the military than regimes with isolated capitals. This is exactly in line with the model's prediction: isolated capital cities work as protection against rebellion threats, and hence obviate the need for further protection. The same is not at all true of relatively democratic regimes, which again reaffirms the model's logic.[34]

[TABLE 7 HERE]

The use of military spending as our proxy for anti-rebellion investment is obviously predicated on the assumption that this kind of spending is driven to a substantial extent by this sort of domestic concern. Table 7 provides evidence in favor of this interpretation, albeit with statistical significance only at the 10% level. Note in particular that Column (3) includes as a control variable a dummy for whether the country has been involved in an interstate conflict between 1975 and 2007, as coded by the Correlates of War dataset. What we see is that the correlation between military spending and the concentration of population around the capital city is essentially unaltered, and still statistically significant (at the 10% level). Quite strikingly, the number of wars falls short of statistical significant, confirming that the domestic threat seems to be a key driver of the military spending decision. This is again unlike what happens in relatively democratic contexts, as illustrated by Column (6).

In sum, the evidence seems to lend additional support to the mechanism highlighted by our theory to explain the connection between isolated capital cities and misgovernance. An isolated capital serves as bulwark against the threat posed by rebellions; this means that regimes that are thus protected are better able to extract rents from those who are far from the capital, and less inclined to spend resources on the additional protection provided by military strength.

5 Concluding Remarks

Motivated by a simple, novel stylized fact – that countries with relatively isolated capital cities display worse governance – this paper has developed a model of endogenous institutions where an autocratic elite's choices are constrained by the threat of rebellion, and where the threat posed by any individual as a potential rebel decreases with her distance to the seat of power. In this model, isolated capital cities allow the elite to extract more rents from citizens without triggering a rebellion, leading to a large income gap and hence decreasing incentives for power sharing and the better governance associated with it. Conversely, broader power sharing discourages the choice of an isolated capital city, since it leaves the elite with relatively lower rents to protect. The evidence shows that the stylized fact holds robustly and,

[34] Results are similar if we use arms imports (averaged between 1990 and 2006) as our dependent variable. (Results available upon request.)

as predicted by the model, only for relatively non-democratic countries. It also shows that there is no correlation between the isolation of the capital city and dimensions of government performance unrelated to the incentives our model highlights. Last but not least, we also find direct evidence that isolated capital cities are linked with less power sharing, and for the model's additional predictions, on the premium earned by those who live in the capital and on the elite's willingness to invest in military protection.

This underscores the importance of the spatial distribution of the population as a source of informal checks and balances over autocratic regimes. This source of accountability can certainly be relevant in the context of democracies (Campante and Do 2012), but it stands to reason that it might be of particular interest in places that have relatively little in the way of checks and balances of a more formal kind. To the extent that we care about the quality of governance – either as an end in itself or as a means of fostering development – the lesson is that one should be especially attentive to those countries where the spatial distribution is particularly inimical to accountability. Among those countries that are relatively non-democratic, and for a given level of consolidation of democratic institutions, one should bear in mind that those regimes that are able to ensconce themselves in an isolated capital are likely to face lower accountability and thus be less responsive to their citizens.

Isolated capitals in weakly institutionalized contexts should thus be seen as both a symptom and an enabler of misgovernance. Having said that, our results also let us unpack the meaning of misgovernance: the constraints on the behavior of incumbents are ultimately imposed by the threat of violent removal from office. This lies beyond the scope of our model but, to the extent that the implied political instability is costly (e.g. Alesina et al 1996), it highlights that such informal checks and balances may well come at a price (e.g. Campante and Glaeser (2009), on the case of Argentina).

As a final note, we should point out that the framework we have developed can presumably be used to understand other phenomena related to the threat of revolutions and the response of incumbent regimes to such threat. In this paper, the variable that affects the extent to which an individual or group represents danger to an incumbent elite is their distance to the seat of political power, but we can think of other factors that may act in similar ways – for instance, Glaeser, Ponzetto, and Shleifer (2007) emphasize the role of education in facilitating coordination among potential rebels. Applying our framework to these other contexts, we can sketch a theory of incumbent regimes that may choose to pair less power sharing and worse governance with, say, less human capital.We leave these applications as promising avenues for future research.

6 References

Acemoglu, Daron (2006). "Modeling Inefficient Institutions." In: Richard Blundell, Whitney K. Newey, and Torsten Persson (eds.) *Advances in Economics and Econometrics, Volume 1: Theory and Applications, Ninth World Congress (Econometric Society Monographs).* Cambridge, UK: Cambridge University Press.

Acemoglu, Daron, Simon Johnson, and James A. Robinson (2005). "Institutions as a Fundamental Cause of Long-Run Growth ." In: Philippe Aghion and Steven N. Durlauf (eds.), *Handbook of Economic*

Growth, Vol. 1A, Elsevier, p. 385-472.

Acemoglu, Daron and James A. Robinson (2005). *Economic Origins of Dictatorship and Democracy.* Cambridge, UK: Cambridge University Press.

Ades, Alberto F. and Edward L. Glaeser (1995). "Trade and Circus: Explaining Urban Giants." *Quarterly Journal of Economics* 110(1): 195-227.

Alesina, Alberto, Arnaud Devleeschauwer, William Easterly, Sergio Kurlat, and Romain Wacziarg (2003). "Fractionalization," *Journal of Economic Growth* 8: 155-194.

Alesina, Alberto, Sule Özler, Nouriel Roubini, and Phillip Swagel (1996). "Political Instability and Economic Growth." *Journal of Economic Growth* 1(2): 189-211.

Ashraf, Quamrul, Oded Galor and Omer Ozak (2010). "Isolation and Development". *Journal of the European Economic Association* 8(2-3): 401-412.

Baland, Jean-Marie, Karl Ove Moene, and James A. Robinson (2009). "Governance and Development." In: Dani Rodrik and Mark Rosenzweig (eds.), *Handbook of Development Economics, vol. 5*, Elsevier, p. 4597-4656.

Besley, Timothy and Torsten Persson (2009). "The Origins of State Capacity: Property Rights, Taxation, and Politics". *American Economic Review* 99 (4) :1218-1244.

Besley, Timothy, Torsten Persson, and Marta Reynal-Querol (2012). "Political Instability and Institutional Reform: Theory and Evidence." London School of Economics (unpublished).

Bezucha, Robert J. (1974). *The Lyon Uprising of 1834: Social and Political Conflict in the Early July Monarchy.* Cambridge, MA: Harvard University Press.

Braudel, Fernand (1986). *L'Identité De La France*, 2 vols. Vol. 1: *Espace Et Histoire*, Vol. 2: Les Hommes Et Les Choses. Paris: Arthaud-Flammarion, 1986.

Bueno de Mesquita, Bruce and Alastair Smith (2009). "Political Survival and Endogenous Institutional Change." *Comparative Political Studies* 42(2): 167-197.

Campante, Filipe R. and Quoc-Anh Do (2010). "A Centered Index of Spatial Concentration: Expected Influence Approach and Application to Population and Capital Cities." Harvard Kennedy School (unpublished).

Campante, Filipe R. and Quoc-Anh Do (2012). "Isolated Capital Cities, Accountability and Corruption: Evidence from US States." Harvard Kennedy School (unpublished).

Campante, Filipe R. and Edward L. Glaeser (2009). "Yet Another Tale of Two Cities: Buenos Aires and Chicago." NBER WP 15104.

Center for International Earth Science Information Network (CIESIN), Columbia University; and Centro Internacional de Agricultura Tropical (CIAT), (2004). "Gridded Population of the World (GPW), Version 3", Columbia University. Available at http://beta.sedac.ciesin.columbia.edu/gpw.

Chanda, Areendam and Louis Putterman (2005). "State Effectiveness, Economic Growth, and the Age of States." In: Matthew Lange and Dietrich Rueschemeyer (eds.), *States and Development: Historical Antecedents of Stagnation and Advance*, New York: Macmillan.

Chong, Alberto, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer (2012). "Letter Grading Government Efficiency." Harvard University (unpublished).

Couto, Ronaldo Costa (2001), *Brasília Kubitschek de Oliveira.* São Paulo: Record.

Dal Bo, Ernesto and Robert Powell (2009). "A Model of Spoils Politics." *American Journal of Political Science* 53(1): 207-222.

Davis, James C. and J. Vernon Henderson (2003). "Evidence on the Political Economy of the Urbanization Process." *Journal of Urban Economics* 53(1): 98-125.

Dobbs, Richard, Sven Smit, Jaana Remes, James Manyika, Charles Roxburgh, and Alejandra Restrepo (2011). *Urban World: Mapping the Economic Power of Cities.* McKinsey Global Institute.

Ferraz, Claudio and Frederico Finan (2008). "Exposing Corrupt Politicians: The Effect of Brazil's Publicly Released Audits on Electoral Outcomes." *Quarterly Journal of Economics* 123(2): 703-745.

Glaeser, Edward, Giacomo Ponzetto, and Andrei Shleifer (2007). "Why Does Democracy Need Education?" *Journal of Economic Growth* 12(2):77-99.

Guimaraes, Bernardo and Kevin D. Sheedy (2012). "A Model of Equilibrium Institutions." London School of Economics (unpublished).

Herbst, Jeffrey (2000). *States and Power in Africa: Comparative Lessons in Authority and Control.* Princeton, NJ: Princeton University Press.

Htay, Hla Hla (2007). "Myanmar's new capital offers small luxuries in total isolation." Agence France Presse, 23 Feb.

International Herald Tribune (2005). "A Government on a Move to a Half-Built Capital." November 11th issue.

Kaufman, Daniel and Aart Kraay (2002). "Growth Without Governance." *Economía*, 3: 169-229.

Kaufman, Daniel, Aart Kraay, and Massimo Mastruzzi (2010). "The Worldwide Governance Indicators: Methodology and Analytical Issues." World Bank Policy Research Working Paper No. 5430.

Kaufman, Daniel, Aart Kraay, and Pablo Zoido-Lobaton (1999). "Governance Matters," World Bank Policy Research Working Paper No. 2196.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny (1998). "Law and Finance." *Journal of Political Economy* 106(6): 1113-1155.

Marshall, Monty G., Keith Jaggers, and Ted Robert Gurr (2011). "Polity IV Project: Dataset Users' Manual." Center for Systemic Peace, available at www.systemicpeace.org/polity/polity4.htm.

McEvedy, C., and Jones, R., (1978). *Atlas of World Population History.* New York: Penguin.

Montagne, Pierre (1966). *Le Comportement politique de l'Armée à Lyon sous la Monarchie de Juillet et la Seconde République.* Paris: Pichon et Durand-Auzias.

Nunn, Nathan and Diego Puga (2012). "Ruggedness: The Blessing of Bad Geography in Africa". *Review of Economics and Statistics* 94 (1): 20-36.

Pierskalla, Jan H. (2012). "State Antiquity and Population Concentration around the Capital." Duke University (unpublished).

Putnam, Robert (with Roberto Leonardi and Raffaella Y. Nanetti) (1993). *Making Democracy Work: Civic Traditions in Modern Italy.* Princeton: Princeton University Press.

Rodden, Jonathan (2010). "The Geographic Distribution of Political Preferences." *Annual Review of Political Science*13: 321-340.

Sachs, Jerey, John W. McArthur, Guido Schmidt-Traub, Margaret Kruk, Chandrika Bahadur, Michael Faye, and Gordon McCord (2004). "Ending Africas Poverty Trap." *Brookings Papers on Economic Activity* 2004(1): 117-240.

Stasavage, David (2010). "When Distance Mattered: Geographic Scale and the Development of European Representative Assemblies." *American Political Science Review* 104(4): 625-643.

The Economist (1997). "Capital Punishments," December 17th issue.

The Economist (2006). "Waving the Denim", March 18th issue.

The Economist (2006). "Old Soldiers, Old Habits", September 21st issue.

Tilly, Charles (2003). *The Politics of Collective Violence,* Cambridge: Cambridge University Press.

Traugott, Mark (1995). "Capital Cities and Revolution," *Social Science History,* 19: 147-169.

Varadarajan, Siddharth (2007). "Dictatorship by Cartography, Geometry." *Himal South Asian*, February issue.

A Proofs

A.1 Proof of Proposition 1

The no-rebellion constraint in (6) can be written as following:

$$\int_{\mathcal{R}} X(\imath)\mathrm{d}\imath \geq (\mathcal{U}_{\mathrm{p}}'^{\mathrm{e}} - \delta)a$$

where $X(\imath) = \mathcal{U}(\imath)$ for those in $\mathscr{C}$ and $X(\imath) = \mathcal{U}(\imath) + T$ for those in $\mathscr{F}$.

Denote the average X by $\bar{X}$. We have to show that the distribution of X is degenerate, $X(\imath) = \bar{X}$ for all $\imath$. Suppose it is not. Then (i) the elites can achieve $X(\imath) = \bar{X}$ for all $\imath$ and still respect the budget constraint; (ii) If the distribution of taxes is not degenerate then there exists a set $\underline{\mathcal{R}}$ with measure a such that

$$\int_{\underline{\mathcal{R}}} X(\imath)\mathrm{d}\imath < \bar{X}a$$

but since

$$\int_{\underline{\mathcal{R}}} X(\imath)\mathrm{d}\imath \geq (\mathcal{U}_{\mathrm{p}}'^{\mathrm{e}} - \delta)a$$

we get

$$\bar{X}a > (\mathcal{U}_{\mathrm{p}}'^{\mathrm{e}} - \delta)a.$$

But that means that a reshuffling of taxes leading to $X(\imath) = \bar{X}$ for all $\imath$ makes the no-rebellion constraint slack for all sets $\mathcal{R}$ of citizens with measure a. In that case the elite can raise taxes and increase C_{p}. Hence a non-degenerate distribution of X cannot be optimal.

Thus in equilibrium, using $\mathcal{U}_{\mathrm{p}}' = \mathcal{U}_{\mathrm{p}}$,

$$\bar{X} = \mathcal{U}_{\mathrm{p}} - \delta$$

which yields the claim.

A.2 The effect of the determinants of isolation on the elite's income

Here we keep fixed the choice of governance and show how $\mathcal{U}_{\mathrm{p},S}$ varies with changes in ℓ^* and T, where $S \in \{B, G\}$ denotes the choice of governance.

First, note that

$$\frac{d\mathcal{U}_{\mathrm{p},S}}{d\ell^*} = \frac{\partial \mathcal{U}_{\mathrm{p},S}}{\partial \Delta\ell}\frac{\partial \Delta\ell}{\partial \ell^*} + \frac{\partial \mathcal{U}_{\mathrm{p},S}}{\partial \ell^*} = \frac{\partial \mathcal{U}_{\mathrm{p},S}}{\partial \ell^*},$$

where the second equality comes from the derivative of $\mathcal{U}_{\mathrm{p},S}$ with respect to $\Delta\ell$ being zero (optimality condition). Since ℓ^* also affects $\mathcal{U}_{\mathrm{p},S}$ through its direct effect on $\mathcal{U}_{\mathrm{p},S}'$, we need to consider the equilibrium value of $\mathcal{U}_{\mathrm{p},S}$, which is given by the log of consumption as given in (8). Taking logs and differentiating it with respect to ℓ^* yields:

$$\frac{d\mathcal{U}_{\mathrm{p},S}}{d\ell^*} = \frac{e^{-\delta}(1 - e^{-T})}{\frac{p}{1-p} + e^{-\delta}\left(1 - (\ell^* + \Delta\ell)(1 - e^{-T})\right)}. \tag{16}$$

This expression is positive, hence $\mathcal{U}_{\mathrm{p},S}$ is increasing in ℓ^*.

Likewise, the derivative of $\mathcal{U}_{\mathrm{p},S}$ with respect to T is given by:

$$\frac{\partial \mathcal{U}_{\mathrm{p},S}}{\partial T} = \frac{e^{-\delta} e^{-T}(\ell^* + \Delta\ell)}{\frac{p}{1-p} + e^{-\delta}\left(1 - (\ell^* + \Delta\ell)(1 - e^{-T})\right)}, \tag{17}$$

which is also positive.

A.3 Proof of Proposition 3

Inspection of the expression in (16) shows that, for given parameters,

$$\frac{d\mathcal{U}_{\mathrm{p},G}}{d\ell^*} < \frac{d\mathcal{U}_{\mathrm{p},B}}{d\ell^*}$$

That is because the differences between both expressions are the term $p/(1-p)$ in the denominator of $d\mathcal{U}_{\mathrm{p},S}/d\ell^*$, which is larger if $s = G$ (since p is larger in case of good governance), and the value of $\Delta\ell$ that is smaller if $s = G$ (as given by Proposition 2). The denominator is increasing in the term $p/(1-p)$ and decreasing in $\Delta\ell$.

Hence if functions $\mathcal{U}_{\mathrm{p},G}$ and $\mathcal{U}_{\mathrm{p},B}$ cross each other at $\ell^* = \bar{\ell}^*$, then $\mathcal{U}_{\mathrm{p},G} > \mathcal{U}_{\mathrm{p},B}$ if and only if $\ell^* < \bar{\ell}^*$.

The expressions for $\mathcal{U}_{\mathrm{p},G}$ and $\mathcal{U}_{\mathrm{p},B}$ assume certain beliefs about the choice of governance of subsequent elites. We now show that the comparison between $\mathcal{U}_{\mathrm{p},G}$ and $\mathcal{U}_{\mathrm{p},B}$ is indeed what determines the equilibrium choice of governance. Suppose an elite expects the following elites to choose good governance. In case $\mathcal{U}_{\mathrm{p},G} > \mathcal{U}_{\mathrm{p},B}$, the payoff of an elite that deviates and chooses bad governance cannot be larger than $\mathcal{U}_{\mathrm{p},B}$ – so the elite does not deviate. That is because the payoff of an elite is smaller if it expects other elites to get higher consumption (and that is the only way future decisions affect the current elite). Since $\mathcal{U}_{\mathrm{p},B}$ has been calculated assuming $C'_{\mathrm{p}} = C_{\mathrm{p},B}$, which is smaller than $C_{\mathrm{p},G}$, the payoff from deviating can only be smaller than $\mathcal{U}_{\mathrm{p},B}$. Analogously, an elite that expects the following elites to choose bad governance has no incentives to deviate if $\mathcal{U}_{\mathrm{p},G} < \mathcal{U}_{\mathrm{p},B}$.

An analogous argument proves the result for T.

A.4 Proof of Proposition 4

The expression in (15) can be written as:

$$1 + \frac{p}{1-p}\frac{e^{\delta(g)}}{1 - [\ell^* + \Delta\ell][1 - e^{-T}]} - [A(y^* - \phi(\Delta\ell)) - g]\delta'(g) = 0$$

Taking derivatives of this function (call if H) shows that:

$$\frac{\partial H}{\partial g} > 0\ ,\ \frac{\partial H}{\partial \ell^*} > 0\ ,\ \frac{\partial H}{\partial T} > 0$$

Hence, for a given s, the implicit function theorem yields:

$$\frac{\partial g}{\partial \ell^*} < 0\ ,\ \frac{\partial g}{\partial T} < 0$$

The result at the discontinuity point when we switch from $s = G$ to $s = B$ goes in the same direction. At the discontinuity point $\bar{\ell}^*$, it has to be that $C'_{\mathrm{p}} = C_{\mathrm{p,G}} = C_{\mathrm{p,L}}$. But when $s = G$, $\Delta\ell$ is smaller, which implies a larger g as well since (13) has to hold. Hence there is a negative correlation between ℓ and g and hence a positive correlation between concentration around the capital and military spending.

A.5 Corner solution: $\ell = 1$

Since $\Delta\ell$ is always positive, ℓ will never be zero. However, there is nothing in the model that ensures $\ell < 1$. The main text assumes an interior solution for $\Delta\ell$. Here we consider the case of a corner solution yielding $\ell = 1$.

Proposition 2 in the paper states that $\Delta\ell$ is increasing in T and ℓ^*, and decreases when governance is good. A corollary of Proposition 2 is that (i) $\ell = 1$ for high enough values of T (*coeteris paribus*); (ii) $\ell = 1$ for high enough values of ℓ^* (*coeteris paribus*); and (iii) if $\ell = 1$ for $s = G$ then $\ell = 1$ for $s = B$ but the reverse is not necessarily true.

When $\ell = 1$, changes in T and ℓ^* do not affect the isolation of the capital city (since all citizens are in $\mathscr{F}$). Consumption of an elite member C_{p} is given by:

$$C_{\mathrm{p}} = \frac{1}{p}\left(A(y^* - \phi(1-\ell^*)) - (1-p)C'_{\mathrm{p}}e^{-\delta-T}\right)$$

and in equilibrium:

$$C_{\mathrm{p}} = \frac{A(y^* - \phi(1-\ell^*)}{p + (1-p)e^{-\delta-T}})$$

Proposition 3 refers to the effect of ℓ^* and T on governance and states that good governance is chosen if ℓ^* and T are small enough. The possibility of a corner solution for $\Delta\ell$ has essentially no impact on this result. The derivative of $\mathcal{U}_{\mathrm{p}}$ with respect to T is:

$$\frac{\partial \mathcal{U}_{\mathrm{p}}}{\partial T} = \frac{e^{-\delta-T}}{\frac{p}{1-p} + e^{-\delta-T}}$$

which is positive and larger in case p is small (bad governance). Hence the result in proposition 3 is unchanged.

The derivatives of $\mathcal{U}_{\mathrm{p}}$ with respect to ℓ^* is

$$\frac{\partial \mathcal{U}_{\mathrm{p}}}{\partial \ell^*} = \frac{\phi'(1-\ell^*)}{y^* - \phi(1-\ell^*)}$$

which is positive and independent of the choice of governance. Hence the result in proposition 3 is unchanged except in the (measure-zero) case where $\mathcal{U}_{\mathrm{p},G} = \mathcal{U}_{\mathrm{p},B}$ exactly at the point where the first order condition for $\Delta\ell$ yields $\ell = 1$. In that particular case, $s = G$ if $\ell^* < \bar{\ell}^*$ (as in Proposition 3), but if $\ell^* > \bar{\ell}^*$ the elite will be indifferent between good and bad governance. But since in that case increases in ℓ^* do not affect the isolation of the capital, that has no impact on the relation between s and ℓ.

Proposition 4 refers to the effect of ℓ^* and T on military spending. The proposition states that isolation of the capital city and military spending are substitutes, hence more isolated capitals lead to less military spending. When $\ell = 1$, larger values of ℓ^* and T do not increase the isolation of capital, hence this effect is not there anymore. Larger values of T imply citizens are poorer, reducing incentives for buying guns (there is less to tax). Larger values of ℓ^* imply less efficiency losses (output y is closer to y^*) hence there is more to tax and larger incentives to buy guns. But none of that tells us anything about the relation between isolation of capital and military spending since that happens only when $\ell = 1$.

B Data Appendix

GCISC: We compute the index using original gridded population maps from the database *Gridded Population of the World* (GPW), Version 3 from the Socio-Economic Data Center (SEDC), Columbia University (2005), containing maps in 1990, 1995 and 2000 of a global grid of 2.5 arc-minute side cells (approximately 5km). The measures $GCISC_1$ and $GCISC_2$ are calculated and normalized as explained in the text. Following Campante and Do (2010), we have the formula $GCISC_1 = \sum_i s_{1i}\left(\alpha_1 \log(d_i) + \beta_1\right)$, where s_{1i} is the share of the country's population living in cell i and d_i is the distance between cell i's centroid and the point of interest (e.g. capital city). The parameters (α_1, β_1) are $\left(-\frac{1}{\log(\bar{d}_1)}, 1\right)$, where $\bar{d}_1$ is the maximum distance, across all countries, between a country's capital (or other point of interest) and another point in that country. By the same token, $GCISC_2 = \sum_i s_{2i}\left(\alpha_2 \log(d_i) + \beta_2\right)$, where s_{2i} is the share of the country's population living in cell i, normalized by $\log(\bar{d}_2)$, where $\bar{d}_2$ is the maximum distance, for each country, between the country's capital (or other point of interest) and another point in that country. The parameters (α_2, β_2) are $(-1, 1)$. In this way, $GCISC_2$ controls for the country's size, while $GCISC_1$ does not.

Capital Primacy Share of the capital city population over the total population, from the SEDC.

Distance from Maximum Concentration: This variable is calculated for each country by measuring the distance between the actual site of the capital city, and the site of the capital that would maximize the GCISC. The maximization is done with Matlab's large scale search method (with analytical gradient matrix), from a grid of 50 initial guesses evenly distributed on the country's map for large countries.

World Governance Indicators (WGI): From Kaufman, Kraay, and Mastruzzi (2010), including Voice and Accountability, Control of Corruption, Rule of Law, Government Effectiveness, Political Stability, and Regulation Quality, themselves a composite of different agency ratings aggregated by an unobserved components methodology. On a scale of -2.5 to 2.5. Data are available for 1996-2002 at two-year intervals, and thereafter for 2002-2010 on an annual basis. We average the data, for each country, for the period available. The data are available at: http://info.worldbank.org/governance/wgi/index.asp

Freedom House: Political Rights index (Freedom House). The original data are on a scale of 1 (best) to 7 (worst), which we re-scale, by subtracting from 8, so that higher scores indicate better governance. Average between 1990 and 1999.

Real GDP per capita: From the World Bank World Development Indicators (WDI). Real PPP-adjusted GDP per capita (in constant 2000 international dollars).

Population: From WDI.

Polity: Polity IV composite score as Democracy minus Autocracy, on a scale of -10 to 10, from Polity IV project.

Ethno-Linguistic Fractionalization: From Alesina et al. (2003).

Legal Origin: From La Porta et al. (1999). Dummy variables for British, French, Scandinavian, German, and socialist legal origin.

Region dummies: Following the World Bank's classifications, dummy variables for: East Asia and the Pacific; East Europe and Central Asia; Middle East and North America; South Asia; West Europe; North America; Sub-Saharan Africa; Latin America and the Caribbean.

Executive Constraints: Variable *XCONST* (Executive Constraints), from Polity IV project, averaged between 1975-2010, with transition years coded as missing values. Refers to "the extent of institutionalized constraints on the decisionmaking powers of chief executives, whether individuals or collectivities," i.e. "the checks and balances between the various parts of the decision-making process": 1- Unlimited Authority, 3- Slight to Moderate Limitation, 5- Substantial Limitations, 7- Executive Parity or Subordination. (Even-numbered scores are "Intermediate" categories.)

Participation Competitiveness: Variable *PARCOMP* (Competitiveness of Participation), from Polity IV project, averaged between 1975-2010, with transition years coded as missing values. Refers to "the extent to which alternative preferences for policy and leadership can be pursued in the political arena": 0- Unregulated, 1- Repressed, 2- Suppressed, 3- Factional, 4- Transitional, 5- Competitive.

Recruitment Openness: Variable *XROPEN* (Openness of Executive Recruitment), from Polity IV project, averaged between 1975-2010, with transition years coded as missing values. Refers to "the extent that all the politically active population has an opportunity, in principle, to attain the position through a regularized process": 0- Lack of regulation, 1- Closed, 2- Dual Executive-Designation, 3- Dual Executive- Election, 3- Open.

Recruitment Competitiveness: Variable *XRCOMP* (Competitiveness of Executive Recruitment), from Polity IV project, averaged between 1975-2010, with transition years coded as missing values. Refers to "extent that prevailing modes of advancement give subordinates equal opportunities to become superordinates": 0 - Lack of regulation, 1- Selection, 2- Dual/Transitional, 3- Election.

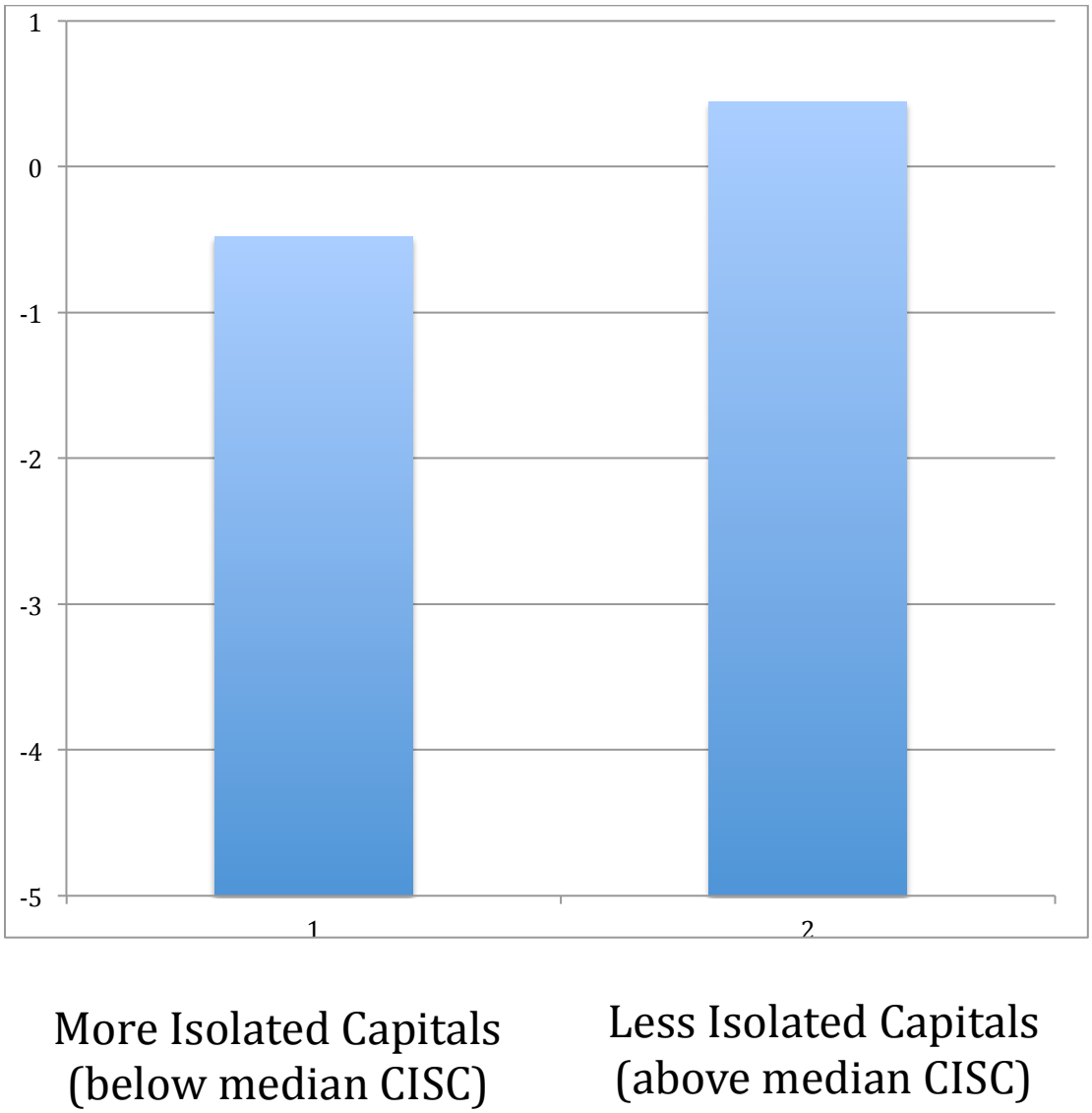
GDP per capita in capital city: From Dobbs et al (2011), estimates for 2007. We extract the data from the interactive map available at http://www.mckinsey.com/Insights/MGI/Research/Urbanization/Urban_world.

Military Budget: Average (1990-2006) military expenditure as a share of central government expenditures, from WDI.

Interstate War: Dummy for presence of an instance of interstate war between 1975-2007, from Correlates of War (COW) project.

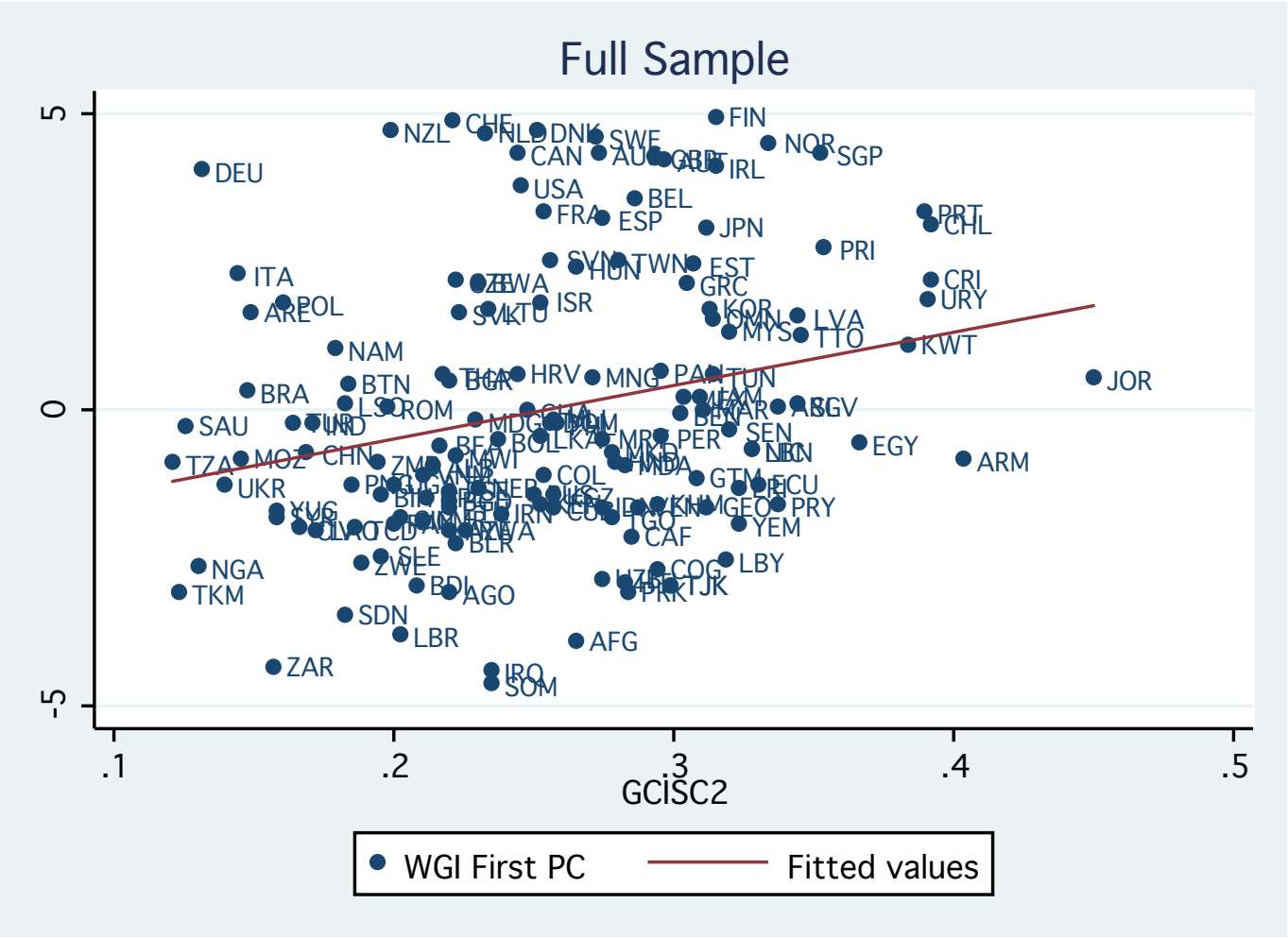
Capital city population (Tables 1 and 4): See Online Appendix.

FIGURE 1. Governance in Countries with More and Less Isolated Capitals



Notes: Average of the first principal component of six World Governance Indicators measures (Rule of Law, Voice and Accountability, Government Effectiveness, Regulatory Quality, Control of Corruption, Political Stability) in subsamples of countries with $GCISC_2$ below and above median for the full sample of countries (median = 0.2534).

FIGURE 2. Governance and Isolation of the Capital City



Notes: WGI First PC: first principal component of six World Governance Indicators measures (Rule of Law, Voice and Accountability, Government Effectiveness, Regulatory Quality, Control of Corruption, Political Stability).

FIGURE 3. Equilibrium Choice of the Isolation of the Capital City

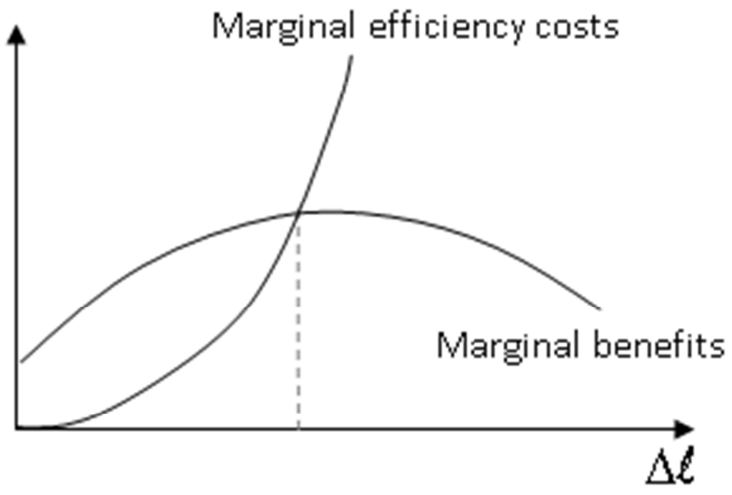


FIGURE 4. Equilibrium Choice of Quality of Governance

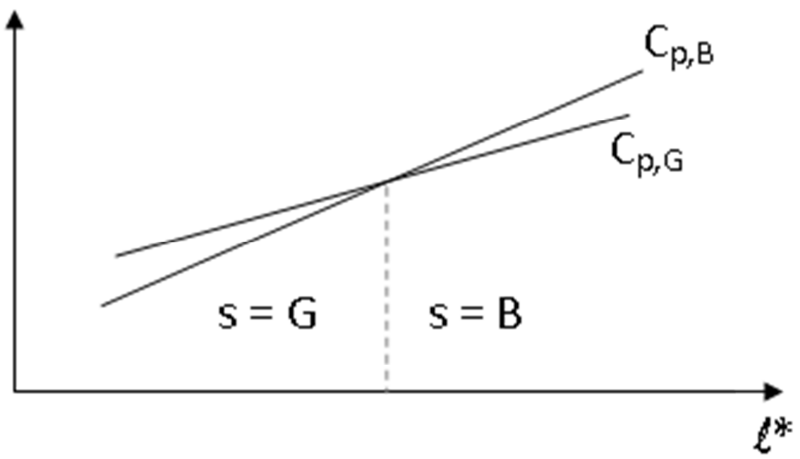


FIGURE 5. Comparative Statics

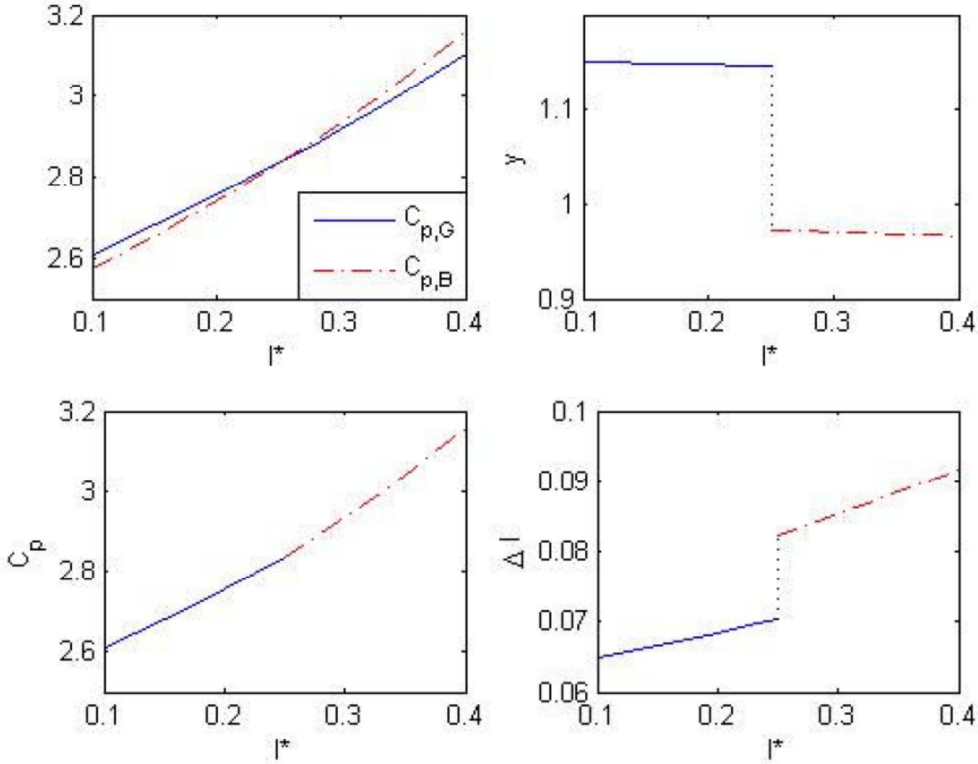


FIGURE 6. Equilibrium Choice of Military Spending

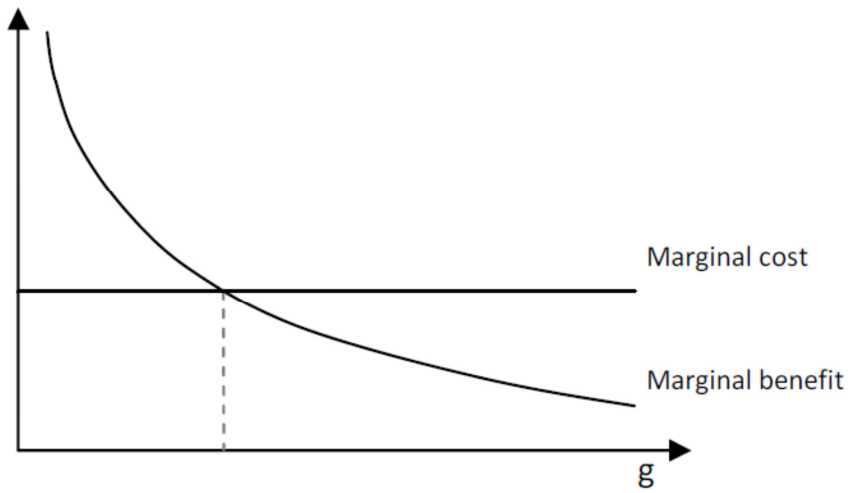
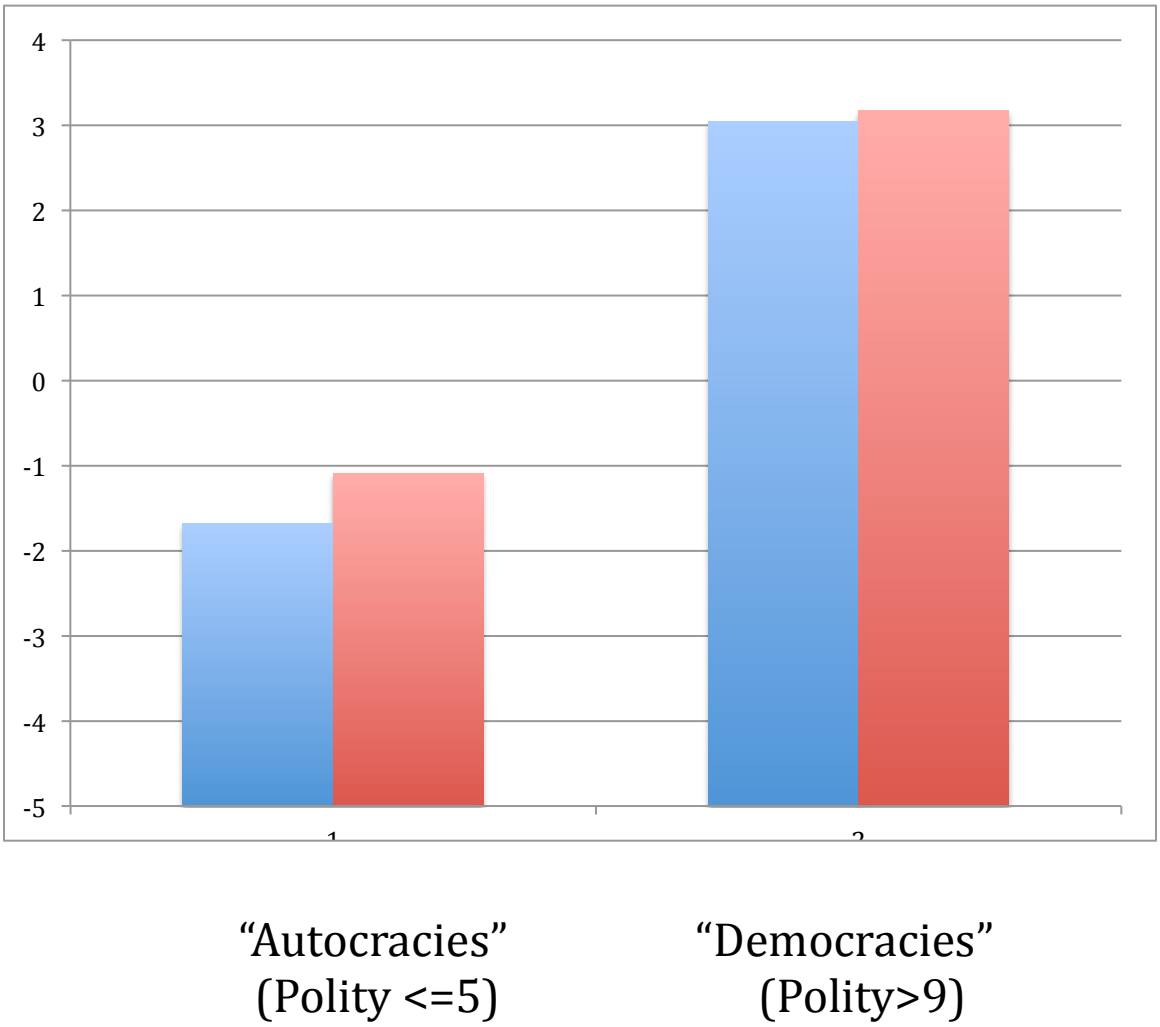
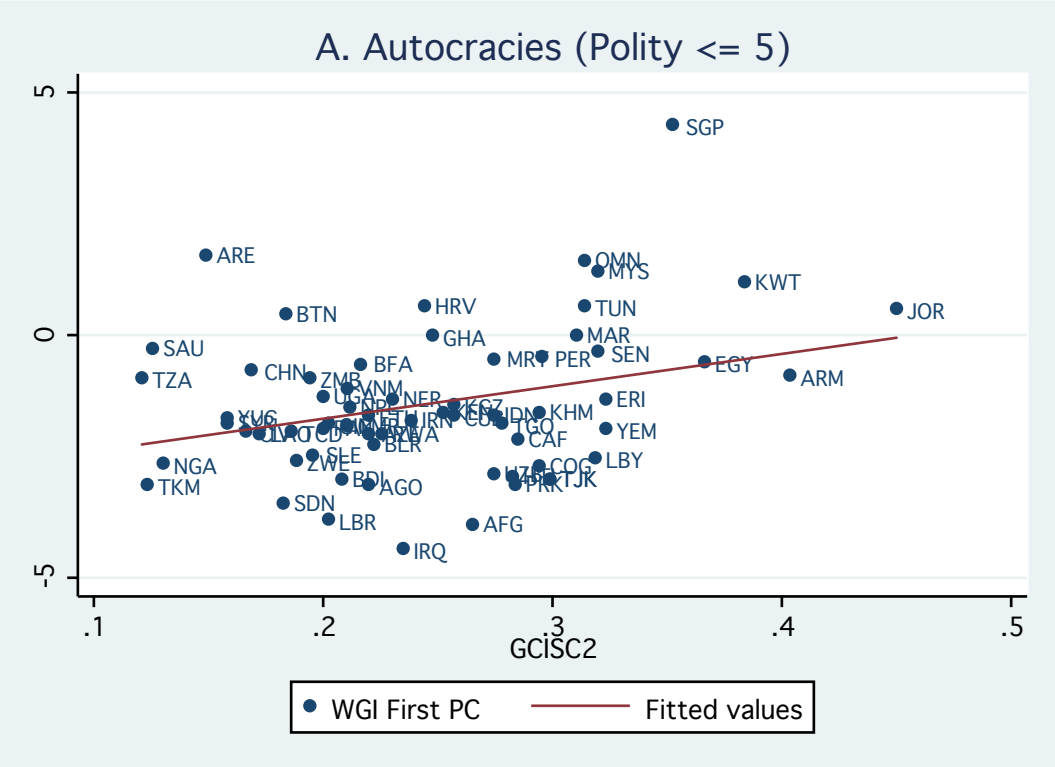


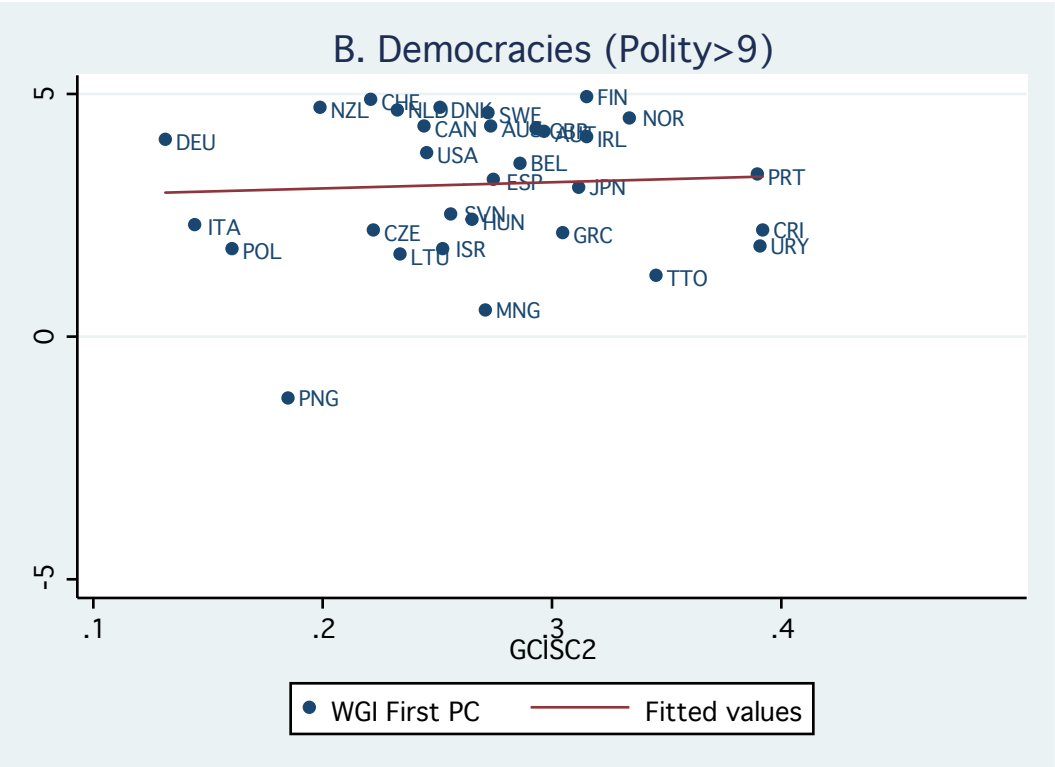
FIGURE 7. Governance in Countries with More and Less Isolated Capitals: Autocracies vs Democracies



Notes: Average of the first principal component of six World Governance Indicators measures (Rule of Law, Voice and Accountability, Government Effectiveness, Regulatory Quality, Control of Corruption, Political Stability) in subsamples of countries with $GCISC_2$ below (blue) and above (red) median for the full sample of countries (median = 0.2534), computed separately for "autocracies" (average Polity score less or equal to 5) and "democracies" (average Polity score greater than 9).

FIGURE 8. Governance and Isolation of the Capital City: Autocracies vs Democracies





Notes: WGI First PC: first principal component of six World Governance Indicators measures (Rule of Law, Voice and Accountability, Government Effectiveness, Regulatory Quality, Control of Corruption, Political Stability).

Table 1. Changes in Capital Cities since World War I

Country	From	To	Year	Distance (km)	Population (From)	Population (To)
Russia	St. Petersburg	Moscow	1918	633	2.3 million (1917)	1.8 million (1915)
Turkey	Istanbul	Ankara	1923	351	680K (1927)	75K (1927)
Australia	Melbourne	Canberra	1927	472	670K (1914)	-
China	Nanjing	Beijing	1949	1219	2.8 million (1955)	2.8 million (1953)
Mauritania	-	Nouakchott	1957	-	-	200 (1957)
Brazil	Rio de Janeiro	Brasilia	1960	754	3.1 million (1960)	-
Rwanda	Butare	Kigali	1962	80	n.a.	6K (1962)
North Yemen	Ta'izz	Sana'a	1962	198	87K (1975)	135K (1975)
Pakistan	Karachi	Islamabad	1966	1144	1.9 million (1961)	-
Malawi	Zomba	Lilongwe	1974	227	24K (1977)	99K (1977)
Cote d'Ivoire	Abidjan	Yamoussoukro	1983	228	1.2 million (1978)	200K (2005)
Chile*	Santiago	Valparaiso	1990	98	4.6 million (1990)	800K (2002)
Nigeria	Lagos	Abuja	1991	541	5.7 million (1991)	-
Tanzania*	Dar-es-Salaam	Dodoma	1996	571	2.3 million (2002)	213K (2002)
Kazakhstan	Almaty	Astana	1997	974	1.1 million (1999)	281K (1999)
Malaysia**	Kuala Lumpur	Putrajaya	1999	47	1.7 million (2000)	70K (2000)
Myanmar (Burma)	Yangon	Naypyidaw	2005	330	4.1 million (2007)	-

*Legislative only; **Executive only. Multiple sources (see online appendix). We include designation of capital cities by independent countries; any designation at the time of independence is included only if chosen capital is different from colonial capital. (Mauritania had no colonial capital.) Instances where capital cities were moved within the same metopolitan area (<10km), namely Philippines (1975) and Sri Lanka (1982), are not included. (West) Germany (1990) and Albania (1920) are not included, since in these cases the existing regimes had maintained temporary capitals pending reunification and completion of independence process, respectively. "n.a." stands for "not available". Distance is measured "as the crow flies". All cities are referred to by their current English designations.

Table 2. Isolated Capital Cities and Misgovernance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Var.:	WGI PC	WGI PC	WGI PC	WGI PC	WGI PC	WGI PC	Pol. Stability	Log Avg Days
	Full Sample		Autocracies		Democracies		Autocracies	
$GCISC_1$	0.1513***	0.1335**	0.2355***	0.2545***	0.0646	0.0249	0.0754	0.0159
	[0.054]	[0.054]	[0.076]	[0.084]	[0.089]	[0.097]	[0.117]	[0.114]
Basic Set of Controls	X		X		X		X	X
Full Set of Controls		X		X		X		
Observations	127	127	53	53	31	31	53	49
R-squared	0.830	0.838	0.693	0.696	0.881	0.896	0.545	0.441

Robust standard errors in brackets. Z-scores (normalized variables) reported.
WGI PC: First Principal Component of Worldwide Governance Indicators measures (Rule of Law, Voice and Accountability, Government Effectiveness, Regulatory Quality, Control of Corruption, Political Stability).
Log Avg Days: log of average number of days to return wrongly addressed letter, from Chong et al (2012).

Autocracies: Polity<=5; Democracies: Polity > 9.
Basic Control variables: Log GDP per capita, Log Population, Urbanization, and Region and Legal Origin dummies. Full Set of Controls adds Majoritarian and Presidential system dummies, and Ethnic Fractionalization.

*** p<0.01, ** p<0.05, * p<0.1

Table 3. Isolated Capital Cities and Misgovernance: Robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dep. Var.: Governance	WGI PC	WGI PC	WGI PC	WGI PC	WGI PC	WGI PC	Freedom House	Freedom House
	Autocracies	Democracies	Autocracies	Democracies	Autocracies	Democracies	Autocracies	Democracies
$GCISC_1$	0.3777***	-0.0667						
	[0.158]	[0.238]						
Distance Max. Concentration			-0.1952**	0.0255				
			[0.077]	[0.071]				
Capital Primacy					0.9855**	-1.5937*		
					[0.443]	[0.896]		
$GCISC_2$							0.2593***	-0.0066
							[0.073]	[0.031]
Observations	53	31	53	31	52	31	52	29
R-squared	0.689	0.898	0.691	0.902	0.802	0.915	0.634	0.891

Robust standard errors in brackets. Z-scores (normalized variables) reported.
WGI PC: First Principal Component of Worldwide Governance Indicators measures (Rule of Law, Voice and Accountability, Government Effectiveness, Regulatory Quality, Control of Corruption, Political Stability)

Autocracies: Polity<=5; Democracies: Polity > 9, except for Columns (5) and (6), where the threshold for Autocracies is 8.
Control variables: Log GDP per capita, Log Population, Urbanization, and Region and Legal Origin dummies, Majoritarian and Presidential system dummies, and Ethnic Fractionalization; and Log Land Area, for Columns (1) and (2) only; and Maximum Distance in the Country (Log of maximum distance (in km) between capital city and any point in the country), for Columns (3) and (4) only.

*** p<0.01, ** p<0.05, * p<0.1

Table 4. Changes in Capital Cities and Power Sharing

Country	From	To	Year	*Δ Exec. Constr.*	*Δ Part. Comp.*
Russia	St. Petersburg	Moscow	1918	1	-2
Turkey	Istanbul	Ankara	1923	-2	-1
Australia	Melbourne	Canberra	1927	0	0
China	Nanjing	Beijing	1949	1	-2
Mauritania	-	Nouakchott	1957	-2	0
Brazil	Rio de Janeiro	Brasilia	1960	-4	-2
Rwanda	Butare	Kigali	1962	0	0
North Yemen	Ta'izz	Sana'a	1962	2	-1
Pakistan	Karachi	Islamabad	1966	0	0
Malawi	Zomba	Lilongwe	1974	0	0
Cote d'Ivoire	Abidjan	Yamoussoukro	1983	1	1
Chile*	Santiago	Valparaiso	1990	6	3
Nigeria	Lagos	Abuja	1991	-2	-3
Tanzania*	Dar-es-Salaam	Dodoma	1996	0	0
Kazakhstan	Almaty	Astana	1997	-1	-1
Malaysia**	Kuala Lumpur	Putrajaya	1999	0	0
Myanmar (Burma)	Yangon	Naypyidaw	2005	-1	0
Average				*-0.06*	*-0.47*
Average (excl. partial changes)				*-0.50*	*-0.79*

*Legislative only; **Executive only.For sources and notes, see Table 1. Changes in Polity IV variables ("Executive Constraints" and "Participation Competitiveness") are between 10 years after and 10 years before change of capital, with the exception of Mauritania, Rwanda, and Kazakhstan ("pre" measure for first year of independence) and Myanmar (Burma) ("post" measure for 2010, latest available).

Table 5. Isolated Capital Cities and Power Sharing in Autocracies

Dep. Var.:	(1) Polity	(2) Executive Constraints	(3) Particip. Compet.	(4) Recruit. Compet.	(5) Recruit. Openness
$GCISC_2$	0.2266**	0.2021***	0.3360***	0.0272	-0.2046
	[0.092]	[0.065]	[0.087]	[0.086]	[0.226]
Observations	53	53	53	53	53
R-squared	0.635	0.715	0.548	0.619	0.401

Robust standard errors in brackets. Z-scores (normalized variables) reported.

Autocracies: Polity<=5.
Control variables: Log GDP per capita, Log Population, Urbanization, Region and Legal Origin dummies, Majoritarian and Presidential system dummies, and Ethnic Fractionalization.

*** p<0.01, ** p<0.05, * p<0.1

Table 6. Isolated Capital Cities and Capital Premium

	(1)	(2)	(3)	(4)
Dep. Var.: Capital Premium				
	Autocracies		Democracies	
$GCISC_2$	-0.3265*	-0.3811**	0.0453	0.0740
	[0.174]	[0.176]	[0.165]	[0.176]
Full Set of Controls		X		X
Observations	38	38	27	27
R-squared	0.245	0.327	0.501	0.562

Robust standard errors in brackets. Z-scores (normalized variables) reported.
Dependent variable: GDP per capita in capital city / GDP per capita
Autocracies: Polity (1975-2000)<=5; Democracies: Polity (1975-2000) > 5. Control variables: Log GDP per capita, Log Population, Urbanization.
Full Set of Controls adds Majoritarian and Presidential system dummies, and Ethnic Fractionalization.
*** p<0.01, ** p<0.05, * p<0.1

Table 7. Isolated Capital Cities and Military Expenditures

	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.:	Military Budget	Military Budget	Military Budget	Military Budget	Military Budget	Military Budget
		Autocracies			Democracies	
$GCISC_2$	0.2833*	0.3272*	0.2855*	-0.1579	-0.0997	-0.0527
	[0.155]	[0.163]	[0.165]	[0.162]	[0.146]	[0.142]
Interstate War			0.3658			0.4928*
			[0.278]			[0.266]
Full Set of Controls		X	X		X	X
Observations	65	65	65	43	43	43
R-squared	0.067	0.426	0.446	0.301	0.801	0.827

Robust standard errors in brackets. Z-scores (normalized variables) reported.
Dependent variables: Military Budget (Log of Share of Central Government Budget, avg. 1990-2006, WDI).
Interstate War: dummy for involvement in interstate war between 1975 and 2007 (Correlates of War).
Autocracies: Polity (1975-2000)<=5; Democracies: Polity (1975-2000) > 5. Control variables: Log GDP per capita, Log Population, Urbanization.
Full Set of Controls adds Regional and Legal Origin dummies, Majoritarian and Presidential system dummies, and Ethnic Fractionalization.
*** p<0.01, ** p<0.05, * p<0.1