Keeping Dictators Honest: the Role of Population Concentration*

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April 2008

Abstract

In order to explain the apparently paradoxical presence of acceptable governance in many non-democratic regimes, economists and political scientists have focused mostly on institutions acting as de facto checks and balances. In this paper, we propose that population plays a similar role in guaranteeing the quality of governance and redistribution. We argue and demonstrate with historical evidence that the concentration of population around the policy making center serves as an insurgency threat to a dictatorship, inducing it to yield to more redistribution and better governance. We bring this *centered* concept of population concentration to the data through the Centered Index of Spatial Concentration developed by Do & Campante (2008). The evidence supports our predictions: only in the sample of autocracies, population concentration around the capital city is positively associated with better governance and more redistribution (proxied by post-tax inequality), in OLS and IV regressions. Finally, we provide arguments to dismiss possible reverse causation as well as alternative, non-political economy explanations of such regularity, discuss the general applicability of our index and conclude with policy implications.

Keywords: Capital Cities, Gravity, Governance, Inequality, Redistribution, Population Concentration, Revolutions, Harmonic Functions, Axiomatics.
JEL Classification: C43, D31, D63, D74, J19, R23.

*We owe a lot to Philippe Aghion, Alberto Alesina, and Michael Kremer for their guidance and advice throughout the project. We are also grateful for the numerous comments and suggestions by Daron Acemoglu, James Alt, Susan Athey, Robert Barro, Eli Berman, Davin Chor, Ngan Dinh, Jeffry Frieden, Ed Glaeser, Jerry Green, William Hiss, Torben Iversen, Michael Katz, David Laibson, Rafael Lalive, Erzo Luttmer, Daniel Mejía, Emi Nakamura, Rohini Pande, Maria Petrova, Yi Qian, Karine Serfaty de Medeiros, Andrei Shleifer, Jón Steinsson, Anh T.T. Vu, and seminar participants at Clemson University, Ecole Polytechnique, ESOP (University of Oslo), GRIPS (Tokyo), Harvard's theory and development lunches and development seminar, Paris School of Economics, Singapore Management University, University of Houston, University of Lausanne's Faculty of Business and Economics, and the Workshop on Conflicts and Inequality (PRIO, Oslo), and to Ngan Dinh, Janina Matuszeski, and C. Scott Walker for help with the data. The usual disclaimer applies.

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1 Introduction

Why do some dictatorships perform much better than others? Throughout human history, and still true to this date, nations have most commonly been governed by dictatorships, systems of coercive power where elections are at best political tools of legitimization. This form of government, while inherently undesirable in its restriction of freedom as compared to democracy,[1] is no perfect predictor of disastrous economic governance. Examples of rapid growth and development under regimes hostile to free elections are numerous, ranging from Britain during the industrial revolution to post-Mao China. The spectrum of autocracies indeed covers a wide range of heterogeneous performance[2], as shown for instance in Figure 1, which plots the measure of the Rule of Law in 1996 gathered by Kaufman, Kraay & Mastruzzi (2006, henceforth KKM) against the polity score from the POLITY IV dataset (2004). There is a clear cutoff point at the polity score of 5, as endorsed by Fearon (2007): while among the democratic countries (polity score>5) the relationship in question is very clear, the case of non-democratic countries (polity score≤5) is full of idiosyncrasy. This particularity urges for a better understanding of how autocracies produce governance. After all, when elections are not a choice, then what are the mechanisms that can induce dictators, or the ruling elites, to instate and maintain good laws and policies?

[FIGURE 1 HERE]

In this paper, we contribute to answering these questions by proposing and asserting the case for one factor that could arguably predict "less bad" dictatorships from "bad" ones. That factor is population. More specifically, our thesis emphasizes the role of the concept of population concentration around the capital city as de facto checks and balances in autocratic regimes, begetting better governance and more redistribution towards the disadvantaged fraction of the population. This theoretical idea is based on a simple model of revolution threat previously studied in Campante & Do (2007).[3] Accordingly, since dissent voices are hardly heard through democratic channels in an autocracy, when the poor are numerous and concentrated around

[1] There is a strong case for the intrinsic desirability of democracy originating from political philosophy, as demonstrated by Sen(1999).

[2] The similar observation is made by Rodrik (2000), Almeida & Ferreira (2002), Glaeser et al. (2004), among others.

[3] We will only briefly discuss the noticeable role of population size, as it has been studied at length in this paper.

the political center of the country, they incubate a greater threat of insurgency attempt, as the expected gains from a revolution quickly outweigh the possible losses (similar to DiPasquale & Glaeser, 1998). The insurrection menace leads the regime to use different preemptive measures to stay in power, including constructive methods such as improved economic policies and effectiveness, bettered voices and accountability, controlled corruption, and redistribution targeted to the destitute group that constitutes the largest threat. We thus predict a positive relationship between higher population concentration around the capital city and governance indices as well as redistribution (measured by the differentiating effects on pre- and post-tax inequalities); furthermore, it prevails only in non-democratic countries, not in democracies. In addition, when governance is controlled for, the threat measured by population concentration leads to lower political stability and higher use of repression.

The body of empirical evidence robustly verifies our theoretical predictions. In order to measure population concentration around the capital cities, we apply the concept of the Centered Index of Spatial Concentration developed in Do & Campante (2008) to world population map data in 1990. First, regarding governance in the sample of non-democratic countries (defined by the threshold of polity score of 5), we consistently find a sizeable, significant positive relationship between population concentration and five out of six of KKM's governance indicators, namely control of corruption, voice and accountability, rule of law, government effectiveness and quality of regulations, and expectedly no such link with the last indicator, political stability. A worthy example comes from the comparison between Saudi Arabia and Kuwait, both belonging to the same region and religion, both best described as distinctly autocratic, both having huge reserves of natural resources, wherefrom maintaining a similarly high level of GDP per capita: Kuwait is much more concentrated around its own capital, thus under more scrutiny and pressure from its own people, and predictably, has substantially better governance. Moreover, when governance indicators is controlled for, we do find a negative correlation between population concentration and political stability. We also find evidence that higher concentration breeds a better funded military force, a proxy of the use of repression. Second, within the sample of autocracies, population concentration is also associated with lower post-tax inequality, but not pre-tax inequality, suggesting the link with redistribution. Such link is shown to operate mostly with respect to the poorest quintile of the population, again consistent with our theoretical account of revolution threat and redistribution to the poorest. All of these empirical

regularities fail to reproduce in the sample of democratic countries, underlying the particularity of population concentration in autocracies, and thus dismissing a few alternative explanations. The case of the causal link between population concentration and governance and redistribution outcomes is strengthened by the use of land area, lagged life expectancy, and lagged population growth rate, as IVs for population concentration and population size. We also discuss specific cases of endogenous capital city locations and shown a pattern of deteriorating governance consistent with our theory. In sum, the empirical results strongly support the influential role of population concentration in autocracies, while equally emphasizing the empirical importance of our methodological approach to this concept.

Our contribution builds on a fast growing literature that examines the working of autocracies, from Barrington Moore's *Social Origins of Dictatorship and Democracy* (1966) to Acemoglu & Robinson's *Economic Origins of Dictatorship and Democracy* (2005), as our theoretical focus on revolutions has been central in both texts. On the other hand, we are less interested in actual revolutions that may give birth to democracies: in this aspect, we are closer to Bueno de Mesquita et al. (2003) and Besley & Kudamatsu's (2007) treatment of non-democratic regimes. Most of this literature focuses on the institutions that motivate or limit dictators (e.g. Gehlbach & Keefer (2007) on investment promotion, Besley & Prat (forthcoming) on media capture), while our paper discusses the case of a non-institutional factor, namely population. Population size has been suggested to increase the threat of revolts in works by Grossman & Iyigun (1997) and Fearon & Laitin (2003), an important link in the construction of our theory. On the other hand, population concentration is argued to correlate with autocratic regimes (Ades & Glaeser, 1995)[4] and civil wars (Collier & Hoeffler, 2004).

The rest of the paper is organized as follows. Section 2 provides a narrative discussion of our theory of political influence with historical facts supporting its two main links. Section 3 calculates population concentration on cross-country data and utilizes it to test the theoretical predictions. Section 4 discusses further uses of our index before concluding.

[4]Compared to Ades & Glaeser, we study a different direction of causation, and emphasize the need of a correct measure of concentration.

2 Population Concentration, Insurrections and Preemption - Theory and Historical Support

"It is not admissible that fifty individuals in the Republic's capital be able to unsettle and threaten fifty million Brazilians. "

Juscelino Kubitschek, President of Brazil (1956-60)[5]

2.1 Brief Summary of Theory

We follow the theoretical model studied in Campante & Do (2007), with an emphasis on population concentration over population size. In an autocratic regime where the people are relatively deprived of voices through institutional channels, the presence of a large mass of relatively poor people concentrated around the capital city accentuates the risk of a spontaneous attempt of insurrection that threatens to topple down an unpopular government. In anticipation, the government could take preemptive measures to reduce this pool of potential rebels as well as divert their interest away from subversive activities, by extending the franchise, redistributing more to the poor, improving voice and accountability, controlling corruption, and creating economic opportunities, especially around the capital city – measures that we call "constructive counter-revolution methods". We argue that through this mechanism, the poor mass are able to keep the government honest in autocratic regimes.

Intuitively, the government should adjust its counter-revolution measures so that the marginal effectiveness of insurrection prevention equates the marginal cost. A larger, poorer mass that is more concentrated around the capital city clearly presents a higher threat of insurgency, because individual costs are reduced more than individual expected gains (Grossman & Iyigun, 1997, and DiPasquale & Glaeser, 1998), and that there is a larger pool of rebels to draw from (Fearon & Laitin, 2003). In presence of a magnified "supply" of insurgency threat, the marginal impact of prevention is enlarged, thus in equilibrium the government is willing to pay more to reduce the insurrection menace. With the availability of repressive methods, the increased demand for counter-revolution measures is likely to imply that some constructive methods will be used, unless the substitution possibility of repressive methods is so large that repression overwhelms constructive developments. With some complementarity between the repressive

[5]Quoted in Couto (2001). The translation is our own.

and the constructive methods, an additional prediction is that population concentration also positively affects measures of repression. On the other hand, the combination of a higher potential threat and more reactions have no unambiguous implications on the actual occurrence of revolutions, or by the same token, political stability. Political stability is negatively affected by the threat of revolutions only when the constructive measures are controlled for. The link from population concentration to political and economic outcomes is hence stated as follows:

Proposition 1 *In non-democratic countries, the concentration of the poor population around the capital city leads to better governance, more accountability of the government, more redistribution, but also more repression. While its aggregate effect on political stability is ambiguous, when governance variables are controlled for population concentration leads to lower political stability. Additionally, these effects are not present in democratic countries.*

2.2 Revolutions and Population Concentration

A brief look at the main revolutions in the past two centuries shows just how important the population around the capital city is, in countries where democratic channels of voice are obscure at best. When an insurrection erupts from the citizenry's anger and misery, it usually draws its pioneering 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 always needs to pay monumental costs to lay siege to the government. A relatively small mob in the capital city thence has as much political influence as a huge group of rebels elsewhere. In that case, a dictator-ruled capital city (or the region surrounding it) that is full of poor dissidents bears a huge risk of insurgency.

A classic example is Paris's transition century from the Ancien Régime to the Third Republic. On the Eve of the Ancien Régime, Paris with her 550 thousands inhabitants 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;[6] yet the Parisian crowd held far

[6]National and city population figures come from estimates of McEvedy & 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.

more revolutionary power than residents anywhere else, because of their proximity to power. 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 dictator or monarch who does not want to be guillotined.

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 all Parisian insurrections managed to change the status quo like those in 1830 and 1848 did, they have indeed occurred in a repetitive pattern: 1827, 1832, 1834, 1839, 1848, 1849, 1851, 1869, and 1871. Interestingly, insurrections of considerable size originating in other places around the country, including the 1831 and 1834 revolts of the *canuts*, or 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 large, professional armies. 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 revolution, failing to mobilize even the troops at his immediate disposal to confront the populace. As Traugott synopsizes, during this period the change of regime in France is best described as "as Paris goes, so goes the nation".[7]

The logic of revolution stemming from population concentration is by no means limited to the relatively large countries like nineteenth century France. The much-loved example of comparative historians is the year of revolutions, 1848 [8] Among the 30 most populated cities

[7]Traugott also proposes several explanatory factors bearing a sharp similarity to our theory. He emphasizes the densely concentrated Paris of all classes, that first creates the direct threat of aggression towards the notables, and second increases the vulnerability of the poorest, pushing them to destitution because of grain price inflation, making their revolt costless and inescapable in their eyes.

[8]Dowe et al.'s 2001 edited volume provides trenchant accounts of the 1848 Revolutions.

in Europe in 1800, 11 of the top 15 were shocked by the revolutionary wave[9], most of them were capital cities of sovereign or vassal states; while none of the next 15 except Copenhagen (16th) and Prague (30th) (again, capital cities) were touched. Incited by the harsh economic conditions following a widespread economic slum (Berger & Spoerer 2001), the large masses of the poor in these capitals quickly exploded into large scale revolts that in many cases resulted in important changes in the political landscape of Europe.

These patterns of revolutions are not confined to pre-modern history. The recent "color revolutions" in post-communist countries offer very similar stylized facts. In the Ukrainian Orange Revolution of 2004/05, *The Economist* states that "Kiev's key lesson [on revolutions] is that numbers are all-important: 5,000 or even 15,000 people can be violently dispersed; 50,000 are a different proposition." (March 18th, 2006). It is all the more striking that the protesters in the streets of Kiev did not necessarily represent the true proportions of supporters and opposition of the incumbent government, which albeit enjoying landslide victories in the Pro-Russian East of Ukraine, could not mobilize that fraction of the population because the opposition population is much more concentrated around Kiev. The 5th October Revolution in Serbia in 2000, the Rose Revolution in Georgia in 2003, and the Tulip Revolution in Kyrgyzstan in 2005 have very similar patterns. In terms of costs the insurgents have to pay, these examples of revolutions next door stand in sharp contrast with those based from remote lands. Most of the latter fail to disturb the reign; even when they succeed, they usually pay enormous costs, in time (Laurent-Désiré Kabila waited in the jungle East of (then) Zaire for more than 30 years to depose Mbutu in 1997) and lives (of which the Chinese Communist Long March to Yan'an is an illuminating example).

In sum, the population concentrated around the capital city matters much more than elsewhere, when it comes to voicing discontent sentiments through non-democratic channels such as revolutions and riots, instead of democratic elections. With a larger, poorer pool of citizens comes a higher risk of turmoil. Because they live in the neighborhood of the political center, their violence is felt with no delay, and for a relatively low cost igniting a chain of sequential events that draw waves of people onto the revolutionary "bandwagon", once again depending on the concentration of the poor, easy to mobilize mass.[10]

[9] They are Paris, Naples, Vienna, Amsterdam, Berlin, Rome, Palermo, Venice, Milan, Hamburg and Lyon; the other four are London, Dublin, Lisbon, Madrid. City population data are from Bairoch et al., 1988.

[10] This "bandwagon" or "domino" effect is also consistent with existing models of revolutions proposed by

2.3 Compromise From the Elite as a Constructive Counter-Revolution Measure

Historical accounts of counter-revolution measures are equally abundant of compromises made by the ruling elite. While repressive measures are also common, dictatorships do seriously consider yielding several rights and privileges to the mass as a means to placate revolutionary threats.

Acemoglu & Robinson (2000) provide a comprehensive exploratory discussion of the extension of the franchise in the West in the nineteenth century, following the British experience first in 1832, and then in 1867 and 1884. Such moves were oftentimes accompanied by increased redistribution and liberalized economic opportunities, at the expense of the powerful and rich proponents of these democratizing laws. They were by and large motivated by the desire to preserve orders in the face of unprecedented political unrest that threatened to culminate into a widespread revolution. As the authors argued, the threat of revolution was by far the most important factor accounting for the democratization of the British political environment, compared to alternative explanations on grounds of the Enlightenment of the elite, partisan political struggle, or a middle class drive. Indeed, the policies of compromise have spared Britain from the 1848 revolutionary wave. Similar examples are found in the making of the providence State in Germany, as noted by Williamson (1998) (cited by Acemoglu & Robinson): "the main aim of [Bismarck's] welfare program was to avoid revolution through timely social reform and to reconcile the working class to the authority of the state.", or Sweden, as Tilton (1974, p. 568) remarked "Swedish democracy had triumphed without a revolution–but not without the *threat* of a revolution."

Traugott's treatment of nineteenth century France shows another aspect of compromise by the ruling elite: when the mass get their rights, revolutions no longer succeed. The most important factor that differs the pre-1848 and post-1848 periods, argues Traugott, is the new principles of equality before the law, freedom of the press, and the rights of assembly and association which came into practice thanks partly to the triumphant Parisian crowds. As party politics began to form, insurrections declined sharply, and when it did occur as in 1871, it was no longer able to gather enough support from all walks of life.[11] The declaration of the Third

Granovetter (1978), Kuran (1989, 1995).

[11]Traugott also mentioned the decline of concentration of the poor at the heart of Paris, and transportation improvement that stabilized food prices in the capital, as main factors leading to the downtrend of insurrections,

Republic finally instituted the rule of democratic practices, in lieu of Parisian insurrections.

From a comparative angle, the logic of population concentration and serious insurrection threat elucidates the much discussed gap of redistribution between the United States and Western Europe, as highlighted by Alesina and Glaeser (2004). They note that "America's vast geographic spread ensured that despite the dramatic success of many early labor groups in the United States, it was impossible to organize an effective nationwide movement that threatened the entire nation." (Alesina and Glaeser 2004, p. 107) They also proceed to observe how important rebellions could not gather enough momentum so as to topple the national government due to the distance between their epicenters in major population centers such as New York and the political capital in Washington, DC. This missing link is at work in all Western European countries, producing the actual redistribution as we could predict and observe.

In sum, historical evidence shows that in many cases the ruling elite needs to appease insurgency threats by either extending democratic institutions for more voices and scrutiny from the mass, or redistributing economic rents and opportunities to the poor population, and usually both. Together with the elements of revolutions discussed in the previous section, it implies an important role of population concentration in shaping the political and economic policy landscape.

3 Empirical Results

For empirical purposes we choose to use the Gravity-based CISC (Do & Campante, 2008) that measures concentration around the capital city using the average logarithm of distance to the capital city as shown in the following formula: $\mathbf{I} = \int_{population} \log(distance(x, \mathbf{C}))d\mu(x)$. The measure satisfies a set of natural axioms, and also exhibits additional properties that are desirable for empirical purposes: it could effectively disentangle the "gravitational force" of the capital city from other local forces in any other points. We devote the first part of the implementation to an empirical description and justification of the index, compared to other measures of concentration. The second part tests the predictions of our theory: that population concentration predicts better governance and more redistribution towards the poor.

an explanation that rhymes well with our story of revolutions.

3.1 Description of Data

We calculate population concentration around capital cities across countries in the world using 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. [12]

We compute two different versions of our index of population concentration (henceforth denoted PCI). The first version (PCI_1) is normalized by population size and the maximum distance across countries, while the second version (PCI_2) is normalized by population size and the maximum distance within the country (PCI_2), both as described in section **??**.[13] The former captures concentration relative to what it could possibly be in any country, while the latter captures concentration relative to what it could possibly be in that specific country. We have thus taken out the information mechanically related to population size in PCI_1, and in addition information mechanically related to geographical size in PCI_2.[14]

3.2 Comparison of Population Concentration Across Different Measures

Table 1 shows the basic descriptive statistics for the two versions of the index, for the three years in the sample, and Table 2 presents their correlation. Tables 1 and 2 also present the descriptive statistics and correlation with representative alternative measures of concentration, as discussed in section **??**. The first alternative is the location Gini coefficient, a non-centered measure most often used in the political economy literature, the second one is the inverse of the average distance ("*Inv_Avg_Dist*"), a centered index borrowed from the urban planning

[12] 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.

[13] Alternatively, PCI_2 could be normalized by (log) land area, instead of (log) maximum distance within the country, so as to avoid possible cases of very large distances within one single country without any appropriate connection to its size (i.e. if the Falkland Islands were counted as part of the UK in the data.) In practice, this delivers very similar results in all aspects. We thus choose the normalization procedure that is more easily interpretable.

[14] While the non-normalized measure may present some interest in itself, we do not report it because of its extremely high correlation with population size, which prevents us from disentangling any independent effect.

literature, and the third one is the share of capital city population, or "capital city primacy", a convenient measure that is unstable, as it is problematic to specify an artificial boundary of the capital city. The first two measures are directly calculated from the same gridded map, while the third is provided by the SEDC as collected from individual country's statistics[15]. The appropriate benchmark is arguably PCI_1, and not PCI_2, since both location Gini and Inv_Avg_Dist, as usually used in the literature, do not normalize by the geographical size of each country.[16]

The first remarkable fact is that there is very little variation from 1990 to 2000: the autocorrelation is extremely high, and almost all variation comes from the cross-country dimension. This persistence is by no means mechanical, as our index takes into consideration all points on the map, and is theoretically responsive to any movement with respect to the capital city. Furthermore, compared to the other measures, ours exhibits by far the highest level of persistence. It thus suggests two intuitive interpretations: first, that the pattern of population distribution is fairly constant within each country during a period of 10 years, and second, that our index is perhaps the best to refine the noises produced by migration and landscape development. For this reason, we choose to focus on PCI_1 in one year, 1990, for it has the highest quality of data as judged by the SEDC.

[TABLES 1 AND 2 HERE]

Most salient in Table 2 is the *negative* correlation between our index and the location Gini. This underscores the point that non-centered measures of concentration are ill-suited for the concept of population concentration around the capital. This point becomes even more striking when we compare the list of countries with very high and very low levels of concentration, which are displayed in Table 3. We can see that the list of the countries whose population is least concentrated around their capital cities accords very well with what was to be expected: these are by-and-large countries where the capital city is not the largest city. (The exceptions are Russia, on which we will elaborate later, and the Democratic Republic of the Congo, whose capital is located on the far west corner of the country.) The same list for the location Gini,

[15] Capital city population of African countries in 1990 is missing, but the results are unchanged using similar measures in 1995.

[16] We have also undertaken the comparison with other measures, including the use of a linear impact function, an inverse impact function, and the share of the population in the largest urban extent. All qualitative conclusions remain similarly strong, but are omitted due to space limitation, and only available upon request.

in contrast, classifies as "very concentrated" these same countries that have big territories and unevenly distributed populations. While this concept may of course be useful for many applications, it is quite apparent that using non-centered measures of concentration can be very misleading in our centered context.

On the other hand, Table 2 shows the correlation between PCI_1 and the alternative centered index Inv_Avg_Dist to be positive and relatively high, as was to be expected, though not overwhelming. Nevertheless, there are very important empirical differences between the two – in addition to the conceptual properties that our axiomatic approach guarantees. The first such difference can be seen from Figure 3, which plots histograms of both indices. We can see from the figure that the distribution of Inv_Avg_Dist is very skewed, whereas our measure has a more compelling bell-shaped distribution.[17] This implies that our measure is generally less sensitive to extreme observations, a character that will have its impact felt in the regression analysis.

[TABLE 3 AND FIGURE 3 HERE]

A second important difference can be illustrated by considering a specific comparison, between Brazil and Russia. Russia's capital, Moscow, is the country's largest city, and is located at about 600km (slightly less than 400 miles) from the country's second largest city, St Petersburg. In contrast, Brazil's capital, Brasília, is now the country's sixth largest city, and is around 900km (more than 550 miles) away from the country's largest cities, São Paulo and Rio de Janeiro, whose combined metropolitan area population is about ten times as large as Brasília's.[18] One would thus be led to expect that a measure of population concentration around the capital city would rank Russia ahead of Brazil. Table 3 shows that this is the case with our PCI_1, but not with Inv_Avg_Dist. The reason why Inv_Avg_Dist paints this relatively distorted picture is that it gives a larger weight to people who are very far from the capital point of interest; roughly speaking, it gives a relatively large weight to people who are in Vladivostok. As a result, the measure of concentration tends to be pushed down for countries with big territories – in fact, this tendency to give extra weight to outliers is also behind the

[17] The skewness is by no means an artificial product of taking the inverse of average distance: in fact, the twin measure Neg_Avg_Dist also exhibits a comparable prevalence of outliers.

[18] According to official data, the metro area population of São Paulo, Rio de Janeiro, and Brasília is around 19 million, 12 million, and 3 million, respectively.

skewed distribution that we pointed out in the preceding paragraph. Our measure corrects for this tendency, and that is why it produces a more intuitive ranking.

The measure of capital city primacy, as shown in Table 2, displays a positive but relatively low level of correlation with both measures, PCI_1 and PCI_2. It has by far the highest variation over time in Table 1. These two observations invite prudence regarding this measure's quality: as we have noticed, its outright dependence on the definition of boundary of the capital city implies a low level of stability, and possibly misleading comparisons across countries. It is important to remark that although the SEDC's dataset on capital population estimation provides arguably the best data available, its definition of the boundary of capital city and urban extension is still contingent on each country's statistics, at times coming close to the point of arbitrariness. A telling example is that of Vietnam, ranked as the second lowest capital city primacy, since the official population size of what is considered the capital city, Hanoi, is very small (less than 1%), whereas in reality it is at the heart of a large, heavily populated region stretching to Vietnam's whole Northern Plain. In fact, such a case is typical to many developing countries with a large rural population, in that there cannot be any objective way to delimit the capital city on population map, while the official boundary is of little use.

In Do & Campante, 2008, we present a fuller account of cross-country correlation between our index of population concentration, as well as the alternative measures, and several economic variables. It is with our index that the resulting patterns seem to be most significant and economically interesting, suggesting that ours is probably the least noisy measure to capture the concept of population concentration.

3.3 Governance and Population Concentration

We now proceed to assert the theoretical predictions that the concentration of citizens around the capital is positively associated with better governance, before moving on to discuss the corresponding causation. We use as dependent variables the six measures of the quality of governance, compiled by Kaufman, Kraay and Mastruzzi (2006, abbreviated KKM), including control of corruption, voice and accountability, the rule of law, regulation quality, government effectiveness and political stability, available for the years 1996, 1998, 2000, 2002, 2003, 2004, 2005.

Our first set of results, presented in Table 4, shows the regressions of these six variables

on PCI_1 from 1990, controlling for log of population size (as suggested by Campante & Do, 2007), log GDP per capita, ethno-linguistic fractionalization (ELF) and polity score of democracy, all in lag to prevent immediate reverse causation. The sample is pooled over the years 1996-2005, and divided into the groups of democratic (panel A) and nondemocratic countries (panel B). In all regressions, fixed effects for regions, years, and origins of the legal system are included, in order to treat the concern of confounding patterns common within groups of countries/observations divided along these lines. The standard errors are clustered at the country level.[19]

[TABLE 4 HERE]

For five of the six variables – control of corruption, voice and accountability, government effectiveness, rule of law, and quality of regulation – a higher degree of concentration around the capital city strongly predicts higher governance quality *only* in less democratic countries, with *beta coefficients* ranging from 25% to 35%.[20] No statistically significant effect is verified for more democratic countries. This is precisely in line with the idea that the concentration of population represents a form of checks and balances solely over non-democratic governments. For the sixth variable, political stability, our theory predicts an ambiguous correlation with population concentration, factually consistent with the last column of Table 4.

Figure 4 shows a graphical illustration of KKM's control of corruption and PCI_1 (after controlling for the variables described above, and for simplicity only for the year 1996). The picture tells a powerful story of population concentration.[21] Let us consider the example of Saudi Arabia (SAU) versus Kuwait (KWT): the two countries belong to the same region, and compare closely on polity score (both very bad), GDP per capita (oil-rich), while Saudi Arabia is far more ethnically homogenous (ELF of .18, compared to .66 for Kuwait). However, there is a big difference in population, and most importantly, population concentration: while Kuwait is a small country where most people live within a few miles from capital city, Saudi Arabia possesses a vast desert land unevenly occupied by a scattered population, with several provinces

[19]Error clustering dismisses the concern that we are simply adding more observations by including all years in the KKM dataset, while using only one year for PCI_1. We have also run the regressions for all the years individually, and random effect regressions with the pooled data, and confirmed all qualitative results. The details are available upon request.

[20]The beta coefficient signifies how much of one standard deviation of the dependent variable results from an increase of one standard deviation in PCI_1.

[21]When we exclude outliers such as Singapore and Côte d'Ivoire, the results remain robust.

having even higher than the capital province[22]. This difference shows off in the comparison of corruption issues: Saudi Arabia is perceived to have far more problems (three quarter of a standard deviation) than Kuwait.

[FIGURE 4]

Additional prediction on political stability We proceed with the prediction on the impact of population concentration (i.e. the threat of insurrection) on political stability, once governance variables are controlled for. It is verified with the results shown in Table 5, where we regress measures of political stability on PCI_1, controlling just for KKM's indicator of voice and accountability (columns 1 and 5), as well as all other governance indicators (the other columns). Columns 5 and 6 show that KKM's measure of political stability is negatively influenced by PCI_1 among nondemocratic countries, while that effect is absent in the sample of democratic countries. Columns 7 and 8 show similar results for other measures of stability, namely the average actual tenures of the chief executive and of the party in power, as implemented in Campante, Chor & Do (2007). These are calculated from the empirical probability of remaining in power each year over a moving window of 20 years, using a manually collected dataset from http://www.worldstatesmen.org. The result is robust for the average tenure of the chief executive, while it is marginally significant (p-value = 0.14) for the average tenure of the party in power. Reassuringly, the beta coefficients are of the same order of magnitude for these very different proxies of stability.

[TABLE 5]

Additional prediction on repressive measures Table 6 checks the possible impact of population concentration on repressive measures by looking at the share of military spending in the central government's budget and arms imports as proxies for repression, separately for nondemocratic and democratic countries. There is a strong association between PCI_1 and the dependent variables only in the sample of nondemocratic countries as expected from our theory.

[TABLE 6]

[22]The province of the capital city, Al Riyadh, is by far the largest in land area, yet has about 4.5 million inhabitants (1999), compared to the small province of Mecca with 5.8 million. Our calculation shows that Saudi Arabia's PCI_1 would be maximized if the capital city is located in between Mecca and Riyadh, but even if it were the case, its PCI_1 would still be as low.

3.3.1 Robustness checks

Alternative explanations We first examine possible alternative explanations and show that once they are controlled for, our channel of impact is still robust. As an example, we focus on the wide variation of KKM's measure of the rule of law, shown in Figure 1 for nondemocratic countries. The results are demonstrated in Table 7.

[TABLE 7]

Column 1 shows the regression with PCI_1 as the only explanatory variable. While the literature has discussed very good reasons to take into account the basic set of control variables used in all regressions including log GDP per capita, population size, polity score (e.g. Treisman, 2000) and ethno-linguistic fractionalization (from Alesina et al., 2003), column 1 asserts that our qualitative results remain robust even in case these control variables are flawed. Taking into account the full set of control variables, as shown in column 3, dampens the effect found in column 1. Columns 2 and 4 show results similar to columns 1 and 3, except that they focus on the sample of the year 1996 only.[23] alleviating the concern that we need the pooled sample to make our point.

Columns 5 to 10 control for different factors of influence on governance. More specifically, column 5 includes fuel exports and ore and metal exports to treat the impact of the availability of resources on governance as suggested by Ades and Di Tella (1999). Column 6 includes the measure of openness (imports plus exports as a share of total GDP) to take into account the pressure for better practices of governance from trade partners and international investors, as well as for risk diversification as shown by Rodrik (1998). Column 7 controls for the dummy whether the regime is presidential or parliamentary, taken from Kunicova's (2005) suggestion that presidential systems tend to have worse governance. Column 8 follows the lead of Persson, Tabellini and Trebbi (2003) in controlling for the measure of whether legislative seats are allocated under a plurality vote rule, which in principle promotes more accountability from individual politicians. Column 9 includes for three proxies for the strength of the autocratic regime, including the majority share of the ruling coalition in the parliament, the fractionalization of the ruling coalition (along party lines), and the fractionalization of the opposition

[23] 1996 is the first year KKM's data are available. The results are very similar for other years, and are available upon request.

(along party lines): A strong dictatorship could in principle both impose a low level of concentration through migration restriction or capital city location choice, and afford bad governance. Column 10 controls for the size of the government (measured by government expenditure) to show that the effect on governance is not just an artifact from larger governments. Throughout these columns, the estimated coefficient for PCI_1 remain strong and robustly significant, and of the same order of magnitude.

Columns 11 and 12 control for different geographical aspects that may correlate with population concentration. Column 11 includes the hypothetical value of PCI_1 if the population of each country is evenly distributed over its territory; it thus controls for the shape of the country, given the population size. Column 12 includes the population share of all urban extents in a country, a measure of urbanization based on the demarkation of cities as urban extents by the dataset *Gridded Population of the World*.[24] Once again, these factors do not seem to affect our qualitative result on population concentration.

Instrumental variable for population concentration The range of control variables discussed in the previous section might still miss out certain unobservables that could have influenced both population concentration and governance. We now turn to treat this potential source of bias by finding instrumental variables for population concentration. A preliminary examination of the determinants of population concentration (see Do & Campante 2007) shows the role of population size and land area in negatively predicting population concentration. In our first set of IV regressions shown in Table 8A, we use (log of) land area as an IV for PCI_1.

[TABLE 8A HERE]

The first stage shows a strong, negative relationship between land area and PCI_1 (the F-stat is very high), as a larger land size is associated with lower concentration around the capital city. The second stage results from Table 8A are thus interpretable as the impact of population concentration around the capital city on governance indicators, as long as there is no omitted channel of influence from land size to governance that has not already been controlled for by our standard set of control variables, as well as by the extensive set used in Table 7. Under this exclusion condition, table 8A shows statistically significant impacts of PCI_1 on control of

[24] We have also used the alternative measure of urbanization as calculated by the United Nation, and obtaining the same result.

corruption, rule of law, regulation quality, and on political stability controlling for the other governance indicators.

There still remains a concern of endogeneity: Population size is shown to be highly correlated with population concentration, and could be potentially endogenous. We address this issue by introducing two more IVs for population size, namely 5-year lag life expectancy at birth and 5-year lag growth of population size. They are intuitively related to population size across countries, as a country with higher life expectancy in the past tends to have larger population today, and a country with lower population growth in the near past is likely to be in a later stage of demographic transition, therefore larger in population size. Table 8B shows the corresponding regressions, with very strong first stage F-stats for both population size and population concentration. The second stage results are stronger than in Table 8A, with significant estimates for PCI_1 with all governance indicators, and for population size with all governance indicators but political stability. The use of three IVs for two instrumented variables also allows the Hansen-Sargan overidentification test: all regressions do not reject the null hypothesis that the instruments are valid,[25] The overidentification test results are thus consistent with our claim of a causal relationship from population concentration to governance indicators.

[TABLE 8B HERE]

Cases of capital city relocation We move on to discuss a particular form of endogenous population concentration: endogenous location of the capital city. Most of the time, capital city locations are grounded in historical contexts that far precede our period of interest. Since 1960, there have been only nine cases of capital city relocation (detailed in the Appendix), many of them are purposed to isolate the seat of the government from the large population and, albeit various officially proclaimed reasons, are commonly motivated by the anti-riot concern in the quote of Brazil's President Kubitschek cited at the beginning of section 2. For instance, Myanmar's newly built capital Naypyidaw was described by the journalist Siddharth Varadarajan as "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

[25] That is, the instruments are not correlated with the errors, and the excluded instruments are correctly excluded from the estimate equation. Due to a technical issue of non-full rank covariance matrices of moment conditions, we have to exclude the legal origin dummies in order to calculate the Hansen J stat: the results are essentially the same whether legal origin dummies are included or not.

by geometry and cartography." (*Himal Southasian,* February 2007)[26] All cases have happened under non-democratic regimes; most of the time the capital city is moved to a small city where population concentration abruptly diminishes, and as predicted, governance quality is also reduced. Only Tanzania's move (1996) of the capital from Dar-es-Salam to Dodoma seems to be an exception, as Tanzania's five governance measures have been on the rise since the late 1990's while Dodoma is a much smaller city compared to the old capital. This exception nevertheless confirms the norm: in fact, even if Dodoma is a smaller city, it is situated in the middle of the highly populated region in northern Tanzania, so that the relocation has increased and not decreased our measure PCI_1 for Tanzania, consistent with the improvement of governance afterwards. Finally, these particular cases do not drive our results: Table 9 replicates the OLS regressions in Table 4 without the countries that have relocated their capital cities, producing similar, if not slightly stronger, results for all governance indicators.

[TABLE 9 HERE]

3.4 Inequality, Redistribution and Population Concentration

While our direct predictions concern the impact of population concentration on redistribution in non-democratic countries, the rarety of good redistribution data leads us to focus on an indirect testable prediction: in non-democratic countries, a more concentrated population (around the capital city) implies a larger difference between pre-tax inequality and post-tax inequality.

The analysis of redistribution and inequality is undertaken with the most up-to-date and complete inequality dataset, the World Income Inequality Database (WIID) version 2.0 assembled by the World Institute of Development Economic Research (WIDER). This is a radically revised and updated version of the WIID 1.0, which built on Deininger and Squire's (1996) dataset. Inequality datasets are usually criticized for their lack of consistency both across and within countries (Banerjee and Duflo 2003, Atkinson and Brandolini 2001). The new version of the WIID goes a long way in addressing much of that criticism by carefully considering the characteristics of the surveys leading to each observation, and classifying them under several categories. Notably, it is made clear whether each survey conveys information on income or expenditure, what form of income or expenditure is concerned, and whether the concepts and

[26] The history of changes in the location of capital cities, considered at some length in Campante and Do (2007), is proof that this problem is very often explicitly considered.

methodologies of the survey are clear and reasonably correct.

We limit ourselves to the observations of good quality: those attaining at least quality 2 (either the income concept or the survey is verifiable) on a scale from 1 (most reliable) to 4 (not unlike the use of 'acceptable/reliable quality" data from earlier datasets WIID 1 or Deininger-Squire). More importantly, unlike its predecessors, WIID 2.0 enables us to keep track of different kinds of sources, that we aggregate into three categories: Gross income, Net income, and Consumption (see the Data Appendix for more details). This is in line with the recommendation of Atkinson and Brandolini (2001) in their critique of the Deininger-Squire dataset. We then contract the dataset to represent only one observation for each country, year and type of data. As suggested by Deininger and Squire (1996) and reconfirmed by Atkinson and Brandolini (2001), we include a dummy variable for consumption-based inequality data, as well as one for gross-income inequality, in all regressions.

Even with the WIID 2.0, the scarcity of good inequality data for non-democratic countries still poses a problem. We are thus led to use all years after 1990 in the benchmark case of explaining net-income inequality (measured by the Gini coefficient) in non-democratic countries by population size and concentration, controlling for lag of log GDP per capita, polity and ethno-linguistic fractionalization, using regional and legal origin fixed effects, presented in column 1 in Table 11:

[TABLE 11 HERE]

The predicted pattern emerges strongly: in non-democratic countries, net-income inequality after 1990 is negatively predicted by concentration and size of the population in 1990. The following columns 2-4 check the cases when each of the main characters of column 1's sample is reversed. Column 2 shows the case of pre-1990 inequality, column 3 the sample of democratic countries, and column 4 gross-income inequality. Population concentration is significant in none of the three columns, its coefficient size largely reduced compared to column 1. Columns 5 and 6 show similar results for a simpler measure of inequality, the ratio between the richest and the poorest quintiles, for net- and gross-income distributions after 1990 in non-democratic countries. This measure exhibits the relative positions of the very rich and the very poor, thus hinting that redistribution at least touches the poor, a theme we will explore in greater depth later.

Columns 7 to 9 investigate the same relationship, using the alternative measures of population concentration, and once again uncover the same storyline: Inv_Avg_Dist does measure the concept of concentration around a certain point, but with lots of noise, resulting in an insignificant coefficient that is attenuated towards zero (the calculated *beta coefficient* for Inv_Avg_Dist is -0.26, compared to -0.87 for PCI_1), while capital city primacy is even more unstable (*beta coefficient* of only -0.06), and the location Gini distinctly stands for a very different concept.

We treat the potential endogeneity problem in column 10, instrumenting for population concentration using log of population density. In presence of a control variable of log of population size, this is equivalent to an instrumental variable of log of land area, the power of which was already demonstrated.[27] The result reassuringly confirms our theory. Together with the argument of persistence in our measure of population concentration, we confidently discard the worry of its endogeneity.

Our theory emphasizes on the role of the poor, a factor unobservable on population map data. We proceed to test an indirect prediction: population concentration should have a stronger effect on the welfare of the poorest, compared to the middle class. Table 12 breaks down the relationship between inequality and population concentration into four regressions of the inequality between each quintile and the richest quintile.

[TABLE 12]

The results are sharp: population concentration matters significantly, in both statistical and economic senses, to the poorest quintile, while having indistinct influences on the middle class (quintiles 2-4). Once again, the empirical evidence endorses our theory that population concentration affects constructive policies primarily affecting the poor.

4 Concluding Remarks

We have so far presented a simple, unified political economy framework capable of generating the positive impact of population concentration on several indicators of governance and redistribution, as consistently shown in the data. Yet there may still exist alternative explanations that generate the same causal link we have found, without recourse to a political economy account

[27] Since we use all years since 1990, instead of a single year as in the previous section, it is hard to conceive a well-suited IV for the value of PCI_1 in 1990. An attempt of using lags of life expectancy and population growth as in the previous section provides similar qualitative results, available upon request.

of insurgency threat. For instance, one could imagine that the existence of some fixed cost of instituting good governance and a system of redistribution that is specific to the capital city, which would reproduce the relationship we have found in the data. First, while this explanation may be natural for a system of taxation, it is more contrived with respect to governance aspects such as voice and accountability or the rule of law, salient outcome variables in our empirical results. Furthermore, it is far from clear how such an explanation would generate a different behavior in democracies and non-democracies: Why would such fixed costs be present in the latter, but not in the former? Finally, there is nothing in it that explains why the resulting redistribution weighs more on the poorest quintile, as found in the data. Other explanations based on transport cost or heterogeneity of skills also fail to project a consistent empirical picture, if not for very peculiar assumptions. The refutation of some of the most natural alternative explanations increases our confidence that the mechanism we propose is important in accounting for the role of population concentration.

Our findings lead to a number of policy implications. First, we now understand that infrastructure improvements and liberalization of harsh anti-migration policies in nondemocratic regimes have additional impacts on governance and on the poor, on top of the direct impacts on welfare and development that have been widely discussed in the literature. It remains to be seen whether this indirect effect of concentration is comparable to the negative effect of urban congestion, coupled with bad urban planning in developing countries. Second, our results point to the difficulty of governance improvement in nondemocratic countries with low population concentration (e.g. the Democratic Republic of the Congo), and of the extent of problems of dictatorships moving the capital city away from densely populated zones (e.g. Myanmar in 2005): our theory predicts deteriorating economic and political environments in both cases.

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A Appendix: Data Description

A.1 Standard Data

Population Concentration Index: The measures PCI_1 and PCI_2 are calculated and normalized as explained in the text, using original gridded population maps from the database *Gridded Population of the World* (GPW), Version 3 from the Socio-Economic Data Center, Columbia University (2005), containing maps in 1990, 1995 and 2000 of a global grid of 2.5 arc-minute side cells (approximately 5km).

Alternative Indices of Concentration: The alternative indices of concentration are also produced from the same dataset as our PCI_1 and PCI_2. The location Gini (noted in the Tables as "Gini Pop") is calculated as the Gini coefficient of inequality of a special sample, in which each "individual" corresponds to a gridded cell on the map, and each individual's "income" corresponds to the size of the population living within that cell. Inv_Avg_Dist is calculated as 1 divided by the population-weighted average of distance from each cell to the capital city. Neg_Avg_Dist is the opposite of the population-weighted average of distance from each cell to the capital city. "Cap Prim" (Capital city primacy) is calculated as the share of the capital city population over the total population. "Share Largest Point" and "Share Largest Urban Extent" are calculated as the ratio of respectively the largest settlement point and the largest urban extent over the total population. These population figures come directly from the SEDC.

Kaufmann, Kraay and Mastruzzi (KKM): From KKM's (2006) indices, 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 2002-2005 on an annual basis. We use the data in 1996 for our measure of population concentration in 1990. KKM data available at: http://info.worldbank.org/governance/kkz2005/pdf/2005kkdata.xls

Inequality Data are from the World Institute of Development Economic Research's (2005) "World Income Inequality Database v.2.0a", available at http://www.wider.unu.edu/wiid/wiid.htm. This is a radically revised version of the WIID 1.0, built on Deininger and Squire's (1996) dataset. We limit ourselves to the observations of good quality: those attaining at least quality 2 (either the income concept or the survey is verifiable) on a scale from 1 (most reliable) to 4. The sources of income are classified from the income definitions (labeled "incdefn") as follows: "Consumption" includes incdefn = "Consumption", "Consumption/Expenditure" and "Expenditure"; "Gross" includes incdefn = "Earnings, Gross", "Income, Factor", "Income, Gross", "Income, Taxable", "Market Income", and "Monetary Income, Gross"; "Net" includes incdefn = "Earnings, Net", "Income, Disposable", and "Monetary Income, Disposable".

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

Population by year: From the World Bank World Development Indicators (WDI).

Democracy: Polity IV democracy score, on a scale of 0 to 10.

Autocracy: Polity IV autocracy score, on a scale of 0 to 10.

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

The reference date for the annual observations in the Polity IV dataset is 31 December of each year. We match these to the data corresponding to 1 January of the following year for consistency with the DPI. Data available at: http://www.cidcm.umd.edu/inscr/polity/

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

Fuel exports: From the WDI. Value of fuel exports as a percentage of total merchandize exports.

Ore exports: From the WDI. Value of ore and metal exports as a percentage of total merchandize exports.

Openness: From the WDI. Openness measure equals the sum of imports and exports as a share of GDP.

Government Expenditure: From the WDI. Total government consumption expenditure as a share of GDP.

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.

A.2 Movement of Capital Cities:

The nine cases of an actual movement of the capital city since 1960 are the following:

- Belize, 1961, from Belize City to Belmopan, after a horrendous hurricane had destroyed most of Belize City.
- Brazil, 1960, from Rio de Janeiro to Brasília, a city constructed from scratches. The move had been cited for reasons dating back to the Brazilian independence in the nineteenth century, yet many scholars argued the deep reason had to do with the willingness to isolate the government from the large populations in São Paolo and Rio de Janeiro. Shortly afterwards, the 1964 coup d'état established a military dictatorship that lasted until 1985.
- Côte d'Ivoire, 1983, from Abidjan to Yamoussoukro, a small town in the middle of the country renown only for the largest basilica in the world. Abidjan still remains important in the economic and political life of the country. Governance indicators of Côte d'Ivoire have been on the sharp decline in the available sample of KKM data.
- Kazakhstan, 1997, from Almaty to Astana. Governance quality (KKM indicators) somewhat deteriorated during the following decade, except for political stability.
- Malawi, 1974, from Zomba (near Blantyre) to Lilongwe.
- Nigeria, 1991, from Lagos to Abuja.
- Myanmar, 2005, from Yangon to Naypyidaw in the province of Pyinmana, a rural location hitherto scarcely inhabited. We know from KKM that the military rule in Myanmar has been worsening during the last decade, although the number for 2006 is still unavailable.

- Pakistan, 1960, from Karachi to Islamabad, a newly constructed city. While our calculation shows that Pakistan is now more concentrated around Islamabad than Karachi, we are reluctant to draw the same conclusion for the case of 1960. The location that maximizes concentration in Pakistan is still not Islamabad, but Faisalabad in Pakistani Punjab.

- Tanzania, 1996, from Dar Es Salam to Dodoma. The new capital city is situated in the middle of a very populated region in the North of Tanzania, thus PCI has increased even if Dodoma itself is much smaller than Dar Es Salam. This move accompanies a process of democratization in Tanzania, along which governance has improved substantially.

We do not treat the selection of Berlin as the capital city of the unified Germany in 1990 as a movement of capital city, nor do we consider the unifications of Vietnam in 1976 or Yemen in 1990. While historical evidence suggests that the general level of governance deteriorates after unification, which is concordant with our theory, we suspect it does for very different reasons.

B An Illustrative Model of Geographical Political Influence

In this section we construct a simple illustrative model of political influence with iceberg transport cost to derive comparative statics relating population concentration around the capital city and dictatorial government's responses.

Let us first focus on the case of non-democracies where elections are ineffective, if not dismissed, and the populace must rely on non-institutional measures such as uprisings and revolutions to echo their political voices. Assume a geographical distribution μ of the population on a map, with the capital city $\mathbf{C}$. For each location x, denote its distance from the capital city d_x, and its representative agent $\mathcal{A}_x$. Each agent has an endowment of T_x (time, manpower etc.) which he chooses to spend on two substitutable activities: the production of ordinary goods C_x and the contribution S_x to political threats via non-institutional channels such as protests, uprisings and revolutions. For simplicity, we abstract from the issues of political uncertainty, and assume straightaway that the latter activity results in a certain outcome pS_x for the agent, which depends on how involved he is in the revolution (S_x), and how "profitable" the revolution could be (p). Here p exhibits the rate of return to the agent's contribution, and will be determined by the "production" of the aggregate political threat. More specifically, we expect a higher p when there is more inequality, as there would be a larger scope for redistribution both during and after revolutions.[28]

We choose to remain general by assuming only that the agent's final utility function has a Constant Elasticity of Substitution form for these two factors, namely that:

$$U_x = \left[(pS_x)^{\frac{\zeta-1}{\zeta}} + C_x^{\frac{\zeta-1}{\zeta}} \right]^{\frac{\zeta}{\zeta-1}},$$

with the assumption that the (constant) elasticity of substitution $\zeta \in [1, \infty)$, so that the two factors are imperfect substitutes.

We assume simple linear production functions of both C_x and S_x, with respective unit costs c_c and $c_{s,x}$, i.e. the budget constraint is written as $c_c C_x + c_{s,x} S_x = T_x$. The common cost of

[28] The idea that the occurrence of revolutions must rely on private gains dates back to Tullock (1971), and is seen as the common solution for the public good problem of revolutions. Elsewhere in Campante & Do (2007), and following Acemoglu & Robinson (2000, 2005), we discuss that the prospect of redistribution is a key motivation for revolutions in non-democracies.

productive economic activities $\bar{c}_c$ represents the aggregate level of productivity in the country that also incorporates the impact of good governance and state capture, variables that are observable and adjustable by the dictatorship. While the normal economic activities do not depend on distance to the capital city, subversive activities need to be initiated and coordinated at the political capital to be effective, implying that the corresponding costs depend on the relative location of each individual with respect to the capital city. This feature draws the sharp line between non-democracies and democracies, since in the latter regimes the low cost of participating in elections rules out non-institutional channels such as protests and revolutions (as discussed at length in Acemoglu & Robinson (2005)). While in fair elections all citizens have equal importance no matter where they live, individuals deciding to join a revolution initiated at the capital city face an important geographical constraint, if they do not live nearby. In that spirit, we model the individual cost of subversive activities due to distance, $c_{s,x}$, as a standard iceberg transport cost (as proposed by Paul Samuelson (1954) and used universally in trade and economic geography), making the actual costs of subversive activities a factor higher than the original costs in the capital city:

$$c_{s,x} = \bar{c}_s t_x, \quad t_x = \bar{t} \cdot dist(x, \mathbf{C})^{\gamma} = \bar{t} d_x^{\gamma}, \gamma > 0.$$

The common cost of subversion $\bar{c}_s$ represents the possibility and difficulty of subversive activities, which the dictatorship could also influence. Similarly to the trade literature on gravity equations, the transport cost is assumed to have a polynomial functional form in terms of distance, while the factor $\bar{t}$ exhibits transportation technologies.

The optimization program for agent $\mathcal{A}_x$ is simply that of a CES utility function, with the following solution for S_x:

$$\begin{aligned} c_{s,x} S_x &= T_x \frac{(c_{s,x}/p)^{1-\zeta}}{(c_{s,x}/p)^{1-\zeta} + c_c^{1-\zeta}} = T_x \frac{\bar{c}_s^{1-\zeta}}{\bar{c}_s^{1-\zeta} + (pc_c)^{1-\zeta} \bar{t}^{\zeta-1} d_x^{\gamma(\zeta-1)}} \stackrel{def}{\equiv} T_x w^{-1} \\ \Rightarrow S_x &= T_x w^{-1} \bar{c}_s^{-1} d_x^{-\gamma}. \end{aligned}$$

Here w represents the relative attractiveness of productive activities compared to subversive activities. When $\zeta > 1$, an increase of the cost of productive activities c_c would lead to a decrease in w, as resources shifts towards S_x. The opposite happens when the cost of subversive activities $\bar{c}_s$ increases. Similarly, w decreases when the return to subversive activities p increases. Most importantly for our purpose, when an individual lives farther from the capital city, i.e. when d_x is higher, he is less into subversion, and this due to two effects: the direct cost of subversive activities is higher, and it is

Now assume that the individual contributions combine into an aggregate political threat $\mathbf{R}$ by a CES production technology, which could become effective once reaching a certain critical level $\bar{\mathbf{R}}$, as discussed in Campante & Do (2007):

$$\mathbf{R} = \left[\int S_x^{\frac{\sigma-1}{\sigma}} d\mu(x) \right]^{\frac{\sigma}{\sigma-1}}. \tag{1}$$

It follows immediately that when population concentration is higher, the dictatorial government takes more preemptive measures. Those include not only repressive measures that either increase the direct cost $\bar{c}_s$, but also constructive measures that improves economic conditions expressed in $\bar{c}_c$, or redistributive policies that lowers p. Alternatively, the government could also try to affect the distribution of d_x by limiting immigration to the capital city, moving parts of the population even farther away, or relocating the capital city. Provided that the cost of these measures add up to the government's capacity constraint, in equilibrium all measures will be taken, and more of each of them all the more population concentration increases.

From this simple model, we could derive the following predictions with respect to population concentration around the capital city: among non-democratic countries, high population concentration is associated with better policies in governance improvement, more redistribution to the poor, more efforts in controlling the population by force, and possibly more attempts to relocate the capital city.

The model also lends naturally to aggregate measures of population concentration based on individual impacts on the capital city, which could be expressed by an impact function of distance to the capital city:

$$h(d) = d^{-\gamma\frac{\sigma-1}{\sigma}}, \quad \sigma \geq 1.$$

This functional form is similar to the Centered Index of Spatial Concentration developed in Do & Campante (2008): $\mathbf{I} = \int_{population} h(distance(x, \mathbf{C}))d\mu(x)$.

Figure 1
Rule of Law in Democratic and Non-Democratic Regimes

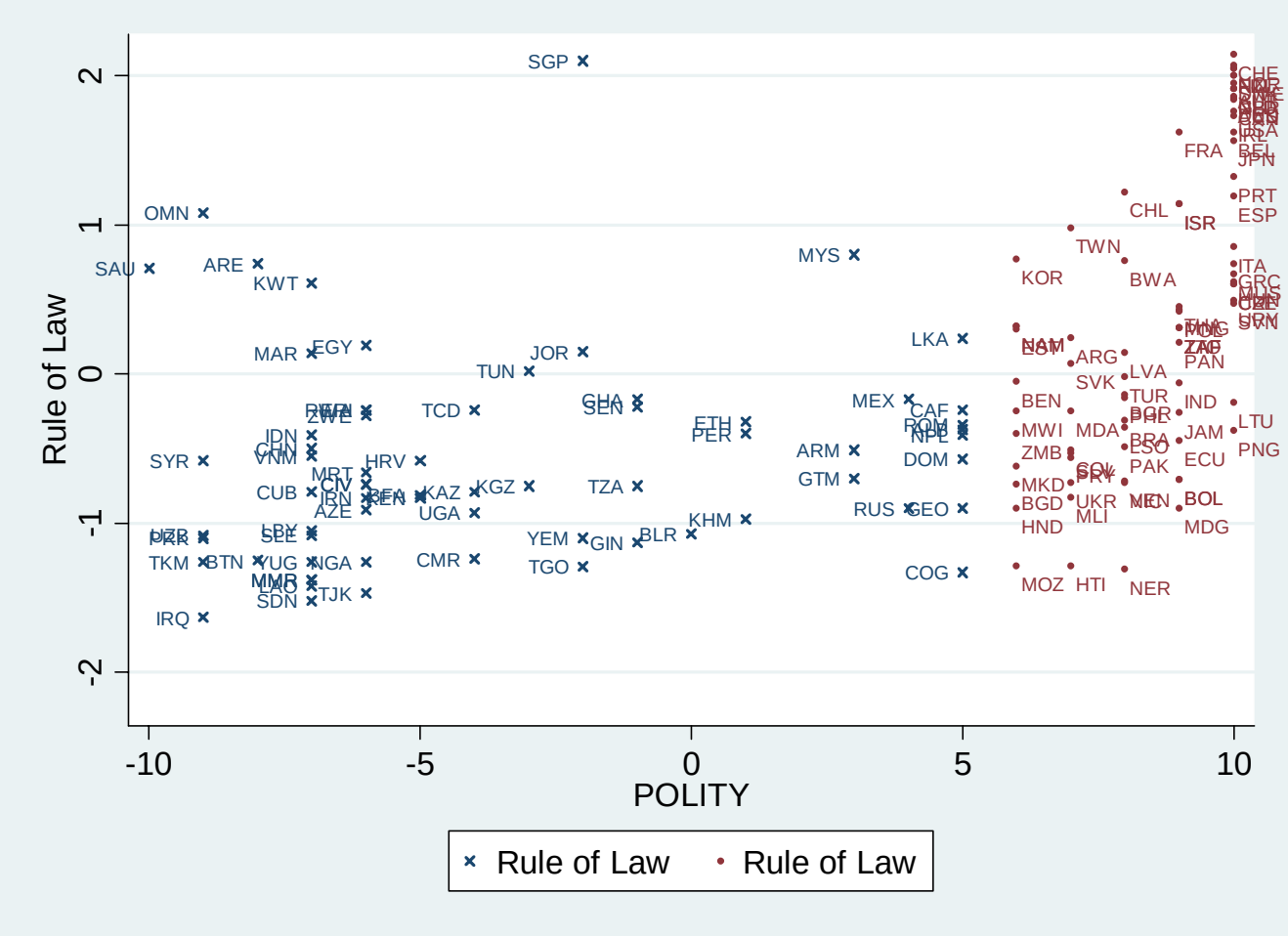
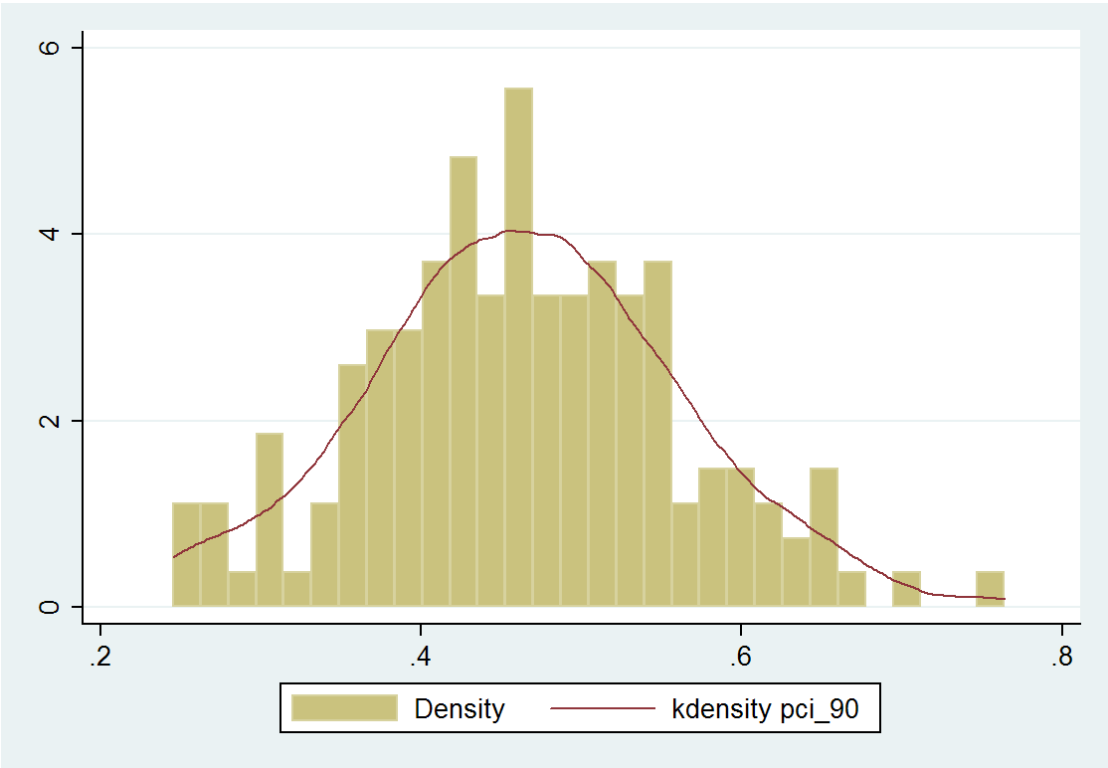


Figure 3
Histograms of PCI_1 (1990) and Inverse Average Distance (1990)



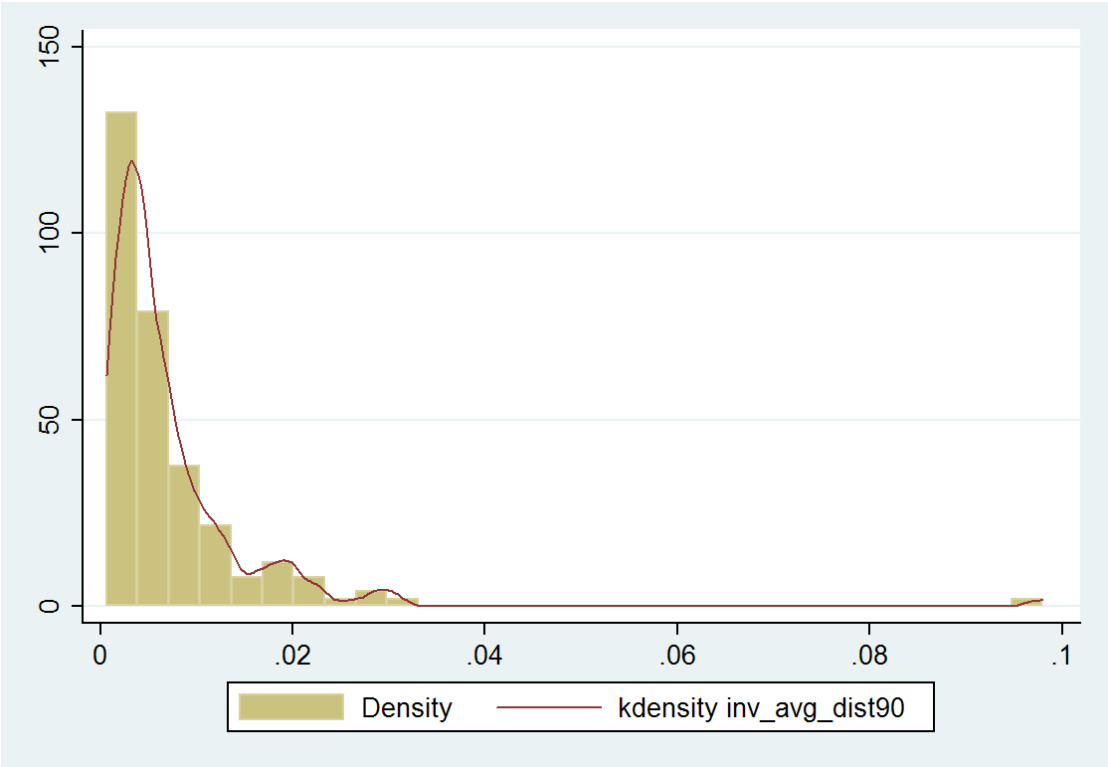


Figure 4
KKM's Control of Corruption (2000) and PCI_1 (1990)

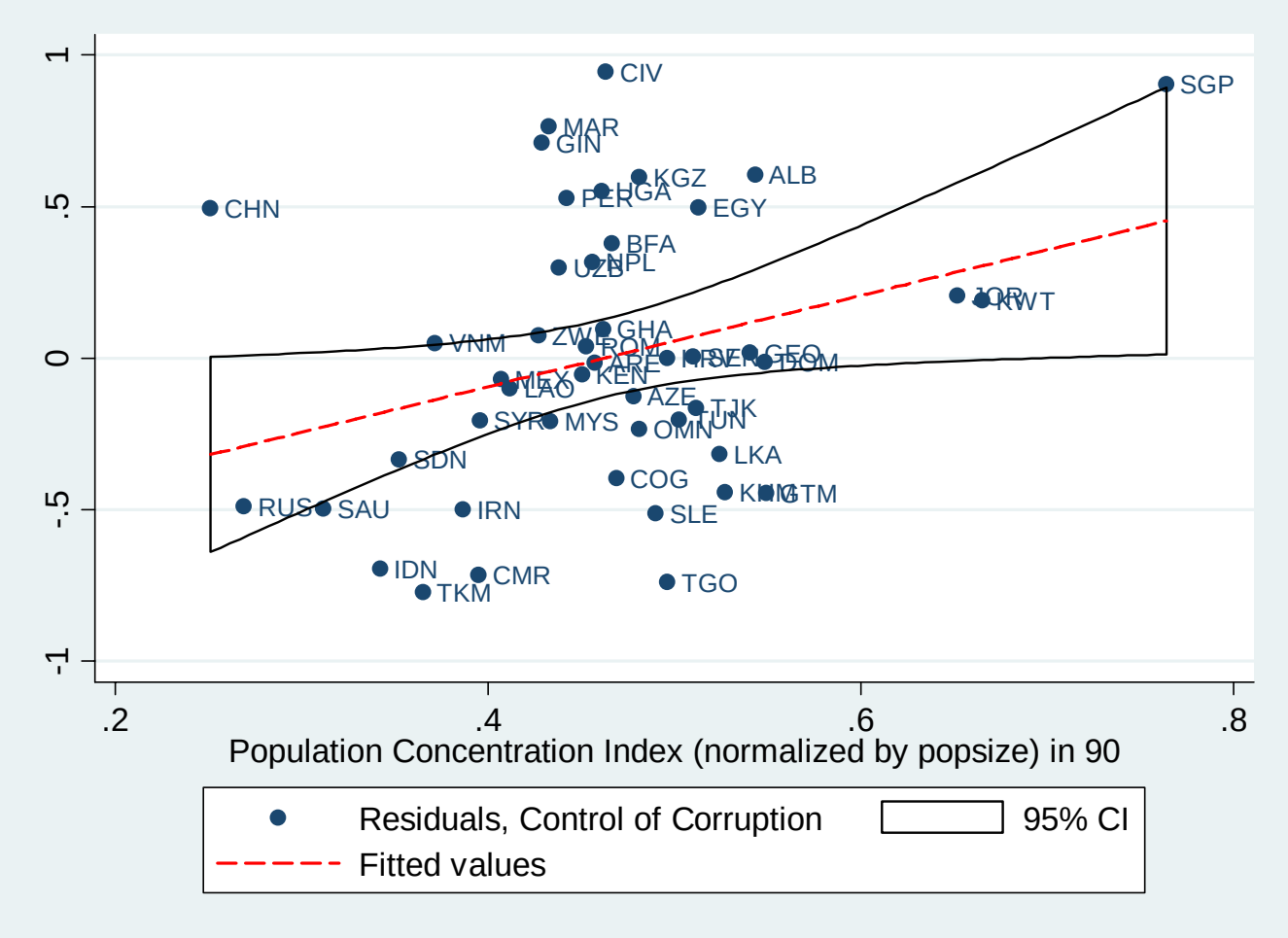


Table 1
Cross Country Summary Statistics

Variable	Observations	Mean	Standard Deviation	Min	Max
PCI_1 90	156	0.46393	0.09706	0.24554	0.76407
PCI_1 95	156	0.46439	0.09710	0.24391	0.76411
PCI_1 00	156	0.46480	0.09715	0.24177	0.76414
PCI_2 90	156	0.25271	0.07365	0.10474	0.58199
PCI_2 95	156	0.25337	0.07364	0.10036	0.58199
PCI_2 00	156	0.25397	0.07368	0.09725	0.58199
Inv Avg Dist 90	156	0.00730	0.00943	0.00067	0.09799
Inv Avg Dist 95	156	0.00732	0.00944	0.00067	0.09802
Inv Avg Dist 00	156	0.00735	0.00945	0.00066	0.09805
Gini Pop 90	156	0.64962	0.15875	0.13878	0.98692
Gini Pop 95	156	0.65147	0.15796	0.12438	0.98718
Gini Pop 00	156	0.65380	0.15695	0.10970	0.98766
Cap Prim 90	110	0.12257	0.12683	0.00165	1.03369
Cap Prim 95	156	0.11741	0.11818	0.00114	1.10165
Cap Prim 00	156	0.12098	0.11531	0.00106	1.02410
Growth PCI_1 90-95	156	0.099%	0.608%	-3.091%	2.171%
Growth PCI_1 95-00	156	0.089%	0.526%	-1.680%	2.206%
Growth GiniPop 90-95	156	0.326%	2.312%	-11.579%	20.872%
Growth GiniPop 95-00	156	0.390%	2.222%	-13.376%	18.889%
Growth Inv Avg Dist 90-95	156	0.240%	1.386%	-6.939%	7.480%
Growth Inv Avg Dist 95-00	156	0.212%	1.211%	-3.359%	7.875%
Growth Cap Prim 90-95	110	1.769%	5.933%	-14.898%	17.897%
Growth Cap Prim 95-00	156	4.085%	6.687%	-20.589%	31.523%

PCI_1 and PCI_2 are our index of population concentration, calculated and normalized as explained in the text. Inv Avg Dist is the reciprocal of the population-weighted average distance to the capital city. Gini Pop is the location Gini calculated from the distribution of gridded cells as explained in the text. Cap Prim is the share of population in the capital city. "Growth" variables are growth rates over periods of 5 years of the corresponding variables. More details available in the Data Description Appendix.

Table 2
Cross Country Correlation

	PCI_1 90	PCI_1 95	PCI_1 00	PCI_2 90	PCI_2 95	PCI_2 00	Inv Avg Dist 90	Inv Avg Dist 95	Inv Avg Dist 00	Gini Pop 90	Gini Pop 95	Gini Pop 00	Cap Prim 90	Cap Prim 95
PCI_1 90	1													
PCI_1 95	0.9997	1												
PCI_1 00	0.999	0.9997	1											
PCI_2 90	0.6326	0.6314	0.6298	1										
PCI_2 95	0.6352	0.6351	0.6346	0.9988	1									
PCI_2 00	0.636	0.6369	0.6375	0.9953	0.9988	1								
Inv Avg Dist 90	0.7125	0.7115	0.7103	0.3919	0.3919	0.3907	1							
Inv Avg Dist 95	0.7138	0.7131	0.712	0.3913	0.3917	0.3911	0.9999	1						
Inv Avg Dist 00	0.715	0.7144	0.7136	0.3905	0.3915	0.3914	0.9996	0.9999	1					
Gini Pop 90	-0.2678	-0.2718	-0.2754	0.3652	0.3555	0.3455	-0.2167	-0.2194	-0.2224	1				
Gini Pop 95	-0.2699	-0.2732	-0.276	0.3662	0.3581	0.3499	-0.2205	-0.2227	-0.2252	0.9987	1			
Gini Pop 00	-0.2708	-0.2733	-0.2753	0.3663	0.3601	0.3537	-0.224	-0.2256	-0.2275	0.9942	0.9984	1		
Cap Prim 90	0.4807	0.4792	0.4775	0.3814	0.3787	0.3749	0.6445	0.6429	0.6408	-0.073	-0.0748	-0.0773	1	
Cap Prim 95	0.4751	0.4739	0.4724	0.3733	0.371	0.3677	0.6631	0.6615	0.6595	-0.0807	-0.0825	-0.0848	0.9979	1
Cap Prim 00	0.4746	0.4736	0.4724	0.3855	0.3837	0.3809	0.6389	0.6374	0.6354	-0.0754	-0.0765	-0.0782	0.9961	0.9979

PCI_1 and PCI_2 are our index of population concentration, calculated and normalized as explained in the text. Inv Avg Dist is the reciprocal of the population-weighted average distance to the capital city. Gini Pop is the location Gini calculated from the distribution of gridded cells as explained in the text. Cap Prim is the share of population in the capital city. More details are available in the Data Description Appendix.

Table 3
Ranking by PCI_1 90

Code	Country	PCI_1 90	Rank PCI_1 90	PCI_2 90	Rank PCI_2 90	Inverse Average Distance 90	Rank Inv Avg Dist 90	Gini Pop 90	Rank Gini Pop 90	Cap Prim 90	Rank Cap Prim 90
USA	United States	0.246	1	0.246	74	0.00067	1	0.914	149	0.002	4
BRA	Brazil	0.247	2	0.147	12	0.00093	6	0.852	140	0.012	12
CHN	China	0.251	3	0.169	21	0.00090	4	0.751	113	0.008	9
ZAF(b)	South Africa (Cape Town)	0.263	4	0.105	1	0.00091	5	0.923	150	0.052	45
RUS	Russia	0.269	5	0.250	77	0.00069	2	0.930	153	0.064	52
IND	India	0.270	6	0.171	22	0.00101	7	0.540	39	0.010	10
MOZ	Mozambique	0.290	7	0.145	11	0.00103	8	0.661	88	0.052	47
KAZ	Kazakhstan	0.298	8	0.149	14	0.00133	11	0.750	112	0.019	18
ZAR	Congo Kinshasa (DR)	0.298	9	0.156	15	0.00104	9	0.606	58	0.082	73
CAN	Canada	0.301	10	0.244	72	0.00087	3	0.987	156	0.026	25
PRI	Puerto Rico	0.622	147	0.354	146	0.02124	150	0.493	21	0.106	91
SLV	El Salvador	0.628	148	0.345	142	0.02047	148	0.531	37	0.079	69
CRI	Costa Rica	0.631	149	0.392	152	0.01834	145	0.654	86	0.075	62
ARM	Armenia	0.645	150	0.404	154	0.02152	151	0.564	50	0.332	153
TTO	Trinidad and Tobago	0.648	151	0.346	144	0.02940	154	0.614	62	0.037	31
LBN	Lebanon	0.648	152	0.328	137	0.02443	152	0.596	56	0.326	151
JOR	Jordan	0.652	153	0.450	155	0.02116	149	0.884	147	0.241	141
KWT	Kuwait	0.665	154	0.384	149	0.03021	155	0.732	104	0.017	15
MUS	Mauritius	0.704	155	0.582	156	0.02841	153	0.627	70	0.108	93
SGP	Singapore	0.764	156	0.353	145	0.09799	156	0.516	28	1.102	156

PCI_1 and PCI_2 are our index of population concentration, calculated and normalized as explained in the text. Inv Avg Dist is the reciprocal of the population-weighted average distance to the capital city. Gini Pop is the location Gini calculated from the distribution of gridded cells as explained in the text. Cap Prim is the share of population in the capital city. More details are available in the Data Description Appendix.

Table 4: Governance and PCI

	(1)	(2)	(3)	(4)	(5)	(6)
	Control for Corruption	Voice & Accountability	Rule of Law	Regulation Quality	Government Effectiveness	Political Stability
	A. Democratic Countries					
PCI_1 90	-0.759	0.017	-0.135	0.0861	0.209	-0.573
	[0.76]	[0.47]	[0.56]	[0.59]	[0.61]	[0.77]
Log GDP per capita	0.600***	0.372***	0.570***	0.482***	0.622***	0.288***
	[0.10]	[0.060]	[0.087]	[0.094]	[0.085]	[0.10]
Log Population	-0.144**	-0.0827***	-0.125***	-0.0835*	-0.0599	-0.242***
	[0.055]	[0.030]	[0.045]	[0.042]	[0.045]	[0.058]
Polity score	0.0949**	0.151***	0.0931***	0.0863**	0.0815**	0.136***
	[0.037]	[0.029]	[0.030]	[0.040]	[0.034]	[0.038]
Ethno-Ling. Fractionalization	-0.275	-0.116	-0.153	0.121	0.0943	-0.805***
	[0.27]	[0.17]	[0.23]	[0.24]	[0.24]	[0.30]
Regional Fixed Effect	YES	YES	YES	YES	YES	YES
Legal Origin Fixed Effect	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES
Observations	573	575	575	575	575	575
R-squared	0.85	0.8	0.87	0.73	0.87	0.68
	B. Non-Democratic Countries					
PCI_1 90	**2.483*** **	**1.452*** **	**1.735*** **	**2.377*** **	**2.152*** **	**-1.128**
	[0.60]	**[0.52]**	**[0.54]**	**[0.88]**	**[0.75]**	**[0.90]**
Beta coefficients	***0.347*** **	***0.272*** **	***0.241*** **	***0.318*** **	***0.295*** **	***-0.136***
Log GDP per capita	0.440***	0.0983	0.324***	0.345***	0.380***	0.389***
	[0.076]	[0.072]	[0.083]	[0.11]	[0.090]	[0.13]
Log Population	0.0243	0.0029	0.00135	0.0412	0.0726	-0.177***
	[0.049]	[0.039]	[0.057]	[0.078]	[0.061]	[0.063]
Polity score	-0.000367	0.0617***	0.00919	0.0257*	0.0119	0.0134
	[0.0084]	[0.010]	[0.0094]	[0.015]	[0.011]	[0.016]
Ethno-Ling. Fractionalization	-0.167	0.28	-0.22	0.123	-0.0679	-0.107
	[0.19]	[0.21]	[0.20]	[0.39]	[0.31]	[0.33]
Regional Fixed Effect	YES	YES	YES	YES	YES	YES
Legal Origin Fixed Effect	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES
Observations	351	355	355	355	355	355
R-squared	0.73	0.54	0.74	0.54	0.67	0.43

Intercept omitted. Country-level clustered robust standard errors in brackets. Panel A consists of countries with polity score larger than 5, Panel B consists of countries with polity score les than or equal to 5. Dependent variables are from Kaufman, Kraay and Mastruzzi's (2006) governance indices. GDP per capita and population are from the World Development Index database. PCI is the population concentration index from our calculation. Independent variables are taken with lag. The beta coefficients display how much of a standard deviation of the dependent variable results from a change of a standard deviation in PCI. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Additional Prediction on Political Stability and PCI

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Political Stability	Political Stability	Average Executive Tenure (Log)	Average Party Tenure (Log)	Political Stability	Political Stability	Average Executive Tenure (Log)	Average Party Tenure (Log)
	A. Democratic Countries				**B. Non-democratic Countries**			
PCI_1 90	-0.589	-0.707	0.447	-0.528	**-2.522*** **	**-3.350*** **	**-2.099** **	**-1.7**
	[0.55]	[0.47]	[0.75]	[0.80]	**[0.79]**	**[0.72]**	**[1.04]**	**[1.13]**
Beta coefficients					***-0.303*** **	***-0.404*** **	***-0.324** **	***-0.237***
Log GDP per capita	-0.0637	-0.219***	-0.240**	-0.054	0.294***	0.0471	0.00925	-0.1
	[0.083]	[0.070]	[0.11]	[0.12]	[0.10]	[0.10]	[0.14]	[0.16]
Log Population	-0.164***	-0.141***	-0.00698	-0.0241	-0.180***	-0.186***	-0.0835	-0.0153
	[0.047]	[0.038]	[0.063]	[0.056]	[0.049]	[0.042]	[0.060]	[0.066]
Polity score	-0.0062	-0.000131	-0.0524	-0.0313	-0.0459***	-0.0245*	-0.014	-0.0136
	[0.029]	[0.023]	[0.049]	[0.044]	[0.014]	[0.012]	[0.015]	[0.016]
Ethno-Ling. Fractionalization	-0.696***	-0.705***	-0.503	-0.489	-0.376	-0.052	0.31	0.254
	[0.24]	[0.20]	[0.37]	[0.46]	[0.26]	[0.24]	[0.40]	[0.41]
Voice and Accountability	0.944***	0.584***	0.0129	-0.0625	0.960***	0.577***	-0.121	-0.166
	[0.11]	[0.15]	[0.16]	[0.17]	[0.14]	[0.14]	[0.16]	[0.17]
Other governance variables		YES	YES	YES		YES	YES	YES
Regional Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES
Legal Origin Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES
Observations	575	573	573	573	355	351	351	351
R-squared	0.79	0.82	0.31	0.33	0.61	0.7	0.39	0.51

Intercept omitted. Country-level clustered robust standard errors in brackets. Panel A consists of countries with polity score larger than 5, Panel B consists of countries with polity score les than or equal to 5. Dependent variables are from Kaufman, Kraay and Mastruzzi's (2006) governance indices. GDP per capita and population are from the World Development Index database. PCI is the population concentration index from our calculation. Independent variables are taken with lag. The beta coefficients display how much of a standard deviation of the dependent variable results from a change of a standard deviation in PCI. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Military spending and population concentration

	(1)	(2)	(3)	(4)
	Arms imports (Log)	Military expenditure share of budget	Arms imports (Log)	Military expenditure share of budget
	A. Democratic Countries		**B. Non-Democratic Countries**	
PCI_1 90	-0.163	-0.807	8.425***	2.776***
	[2.31]	[1.09]	[1.17]	[0.88]
Log GDP per capita	0.683**	0.418***	0.528*	0.0325
	[0.27]	[0.13]	[0.27]	[0.16]
Log Population	0.674***	0.207**	1.202***	-0.0649
	[0.15]	[0.080]	[0.12]	[0.082]
Polity score	-0.138	-0.183***	-0.0118	-0.016
	[0.11]	[0.057]	[0.036]	[0.016]
Ethno-Ling. Fractionalization	0.105	0.136	0.427	1.388***
	[0.72]	[0.30]	[0.51]	[0.39]
Fuel	-0.00547	-0.002	0.0155***	0.00876***
	[0.0049]	[0.0028]	[0.0047]	[0.0031]
Ores	0.0237**	0.0166***	0.0147*	0.00443
	[0.0097]	[0.0058]	[0.0083]	[0.0034]
Legal Origin Fixed Effect	YES	YES	YES	YES
Regional Fixed Effect	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES
Observations	194	158	511	433
R-squared	0.66	0.65	0.5	0.69

Intercept omitted. Country-level clustered robust standard errors in brackets are clustered at country level. Military spending share of central government budget, arms imports, GDP per capita, population size, fuel and ores exports are from the World Development Index database. Polity score is from the Polity IV database. Ethno-linguistic fractionalization is from Alesina et al. (2003). PCI is the population concentration index from our calculation. Independent variables are taken with lag. *** p<0.01, ** p<0.05, * p<0.1

Table 7: Robust Results with Rule of Law

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Dependent Variable: Rule of Law											
PCI_1 90	**2.979****	**3.039****	**1.735*****	**1.512***	**2.644****	**2.136****	**2.774*****	**4.241*****	**3.086*****	**2.831*****	**3.476*****	**2.976*****
	[1.32]	**[1.39]**	**[0.54]**	**[0.85]**	**[1.00]**	**[0.84]**	**[0.83]**	**[0.81]**	**[0.69]**	**[0.95]**	**[1.26]**	**[0.90]**
Log GDP per capita			0.324***	0.407***	0.538***	0.435***	0.496***	0.419***	0.454***	0.490***	0.497***	0.477***
			[0.083]	[0.093]	[0.10]	[0.085]	[0.079]	[0.091]	[0.079]	[0.083]	[0.086]	[0.11]
Log Population			0.00135	-0.0165	0.0901	0.0734	0.0899	0.194***	0.143**	0.115*	0.107*	0.111*
			[0.057]	[0.066]	[0.070]	[0.057]	[0.058]	[0.064]	[0.056]	[0.060]	[0.059]	[0.058]
Polity score			0.00919	0.00478	-0.0133	-0.00348	-0.00525	0.00571	0.00446	0.00436	-0.00303	-0.00297
			[0.0094]	[0.016]	[0.014]	[0.011]	[0.011]	[0.013]	[0.011]	[0.012]	[0.011]	[0.011]
Ethno-Ling. Fractionalization			-0.22	-0.727**	0.343	0.273	0.503*	0.607**	0.649**	0.439*	0.432*	0.443*
			[0.20]	[0.29]	[0.24]	[0.23]	[0.26]	[0.28]	[0.31]	[0.24]	[0.25]	[0.25]
Legal Origin Fixed Effect			YES	YES								
Regional Fixed Effects			YES	YES								
Fuel exports					-0.00328*							
					[0.0018]							
Ores and metal exports					0.00102							
					[0.0051]							
Openness						0.0000923						
						[0.0019]						
Presidential system							-0.248					
							[0.16]					
Plurality rule								0.139				
								[0.15]				
Majority of government									0.888***			
									[0.29]			
Government fractionalization									0.282			
									[0.21]			
Opposition fractionalization									0.284**			
									[0.13]			
Government Expenditure										0.0140**		
										[0.0060]		
PCI Uniform											-0.573	
											[1.37]	
Largest Share Urban Ext.												0.00129
												[0.0033]
Year Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	437	64	355	54	253	336	359	281	237	345	362	362
R-squared	0.14	0.14	0.74	0.76	0.57	0.42	0.56	0.6	0.66	0.56	0.55	0.55

Intercept omitted. Country-level clustered robust standard errors in brackets. The dependent variable is Kaufman, Kraay and Mastruzzi's (2006) rule of law indicator. GDP per capita, population, fuel and ore exports, openness, government expenditure are from the World Development Index database. PCI, PCI if uniform distribution, urbanization are from our own calculation from the Gridded Population of the World dataset. Plurality rule, presidential system, majority of government, government and opposition fractionalization are from the Database of Political Institutions. Independent variables are taken with lag.
*** p<0.01, ** p<0.05, * p<0.1

Table 8A: Land Area as IV for Population Concentration

	First Stage		Second Stage						
	(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)
Instrumented Variables	**PCI_1 90**	**Dependent Variables**	**Control for Corruption**	**Voice & Accountability**	**Rule of Law**	**Regulation Quality**	**Government Effectiveness**	**Political Stability**	**Political Stability**
Log Land Area	**-0.0499*** **								
	[0.0043]								
		PCI_1 90	**2.484*** **	**0.783**	**1.465***	**2.009***	**1.8**	**-0.994**	**-2.507** **
			[0.85]	**[0.73]**	**[0.78]**	**[1.05]**	**[1.15]**	**[1.34]**	**[0.97]**
Log Population	-0.00332	Log Population	0.0254	-0.0285	-0.015	0.0244	0.0509	-0.166**	-0.141***
	[0.0053]		[0.059]	[0.047]	[0.066]	[0.089]	[0.079]	[0.083]	[0.049]
Log GDP per capita	-0.0015	Log GDP per capita	0.462***	0.107	0.332***	0.334***	0.382***	0.397***	0.0558
	[0.010]		[0.078]	[0.072]	[0.084]	[0.11]	[0.092]	[0.13]	[0.11]
Polity score	0.00292***	Polity score	-0.00165	0.0629***	0.00933	0.0285**	0.0125	0.00678	-0.0312**
	[0.0011]		[0.0085]	[0.0097]	[0.0088]	[0.014]	[0.011]	[0.015]	[0.012]
Ethno-Ling. Fractionalization	-0.0115	Ethno-Ling. Fractionalization	-0.181	0.188	-0.234	0.119	-0.092	-0.053	0.065
	[0.035]		[0.21]	[0.22]	[0.21]	[0.40]	[0.33]	[0.35]	[0.26]
		Governance Indicators							YES
Year Fixed Effect	YES	Year Fixed Effect	YES	YES	YES	YES	YES	YES	YES
Regional Fixed Effect	YES	Regional Fixed Effect	YES	YES	YES	YES	YES	YES	YES
Legal Origin Fixed Effect	YES	Legal Origin Fixed Effect	YES	YES	YES	YES	YES	YES	YES
F-stat	91.85								
Observations	306		306	310	310	310	310	310	306
R-squared	0.85		0.72	0.51	0.74	0.54	0.66	0.42	0.69

Intercepts omitted. Country-level clustered robust standard errors in brackets. All first stage F-stats are larger than 10. Sample comprises of non-democratic countries (lag polity measure less than 5). Dependent variables are from Kaufman, Kraay and Mastruzzi's (2006) governance indices. GDP per capita and population are from the World Development Index database. PCI is the population concentration index from our calculation. Independent variables are taken with lag. The beta coefficients display how much of a standard deviation of the dependent variable results from a change of a standard deviation in PCI. *** p<0.01, ** p<0.05, * p<0.1

Table 8B: IVs for Population Concentration and Population Size

	First Stage			Second Stage						
	(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)
Instrumented Variables	**PCI_1 90**	**Log Pop 90**	**Dependent Variables**	**Control for Corruption**	**Voice & Accountability**	**Rule of Law**	**Regulation Quality**	**Government Effectiveness**	**Political Stability**	**Political Stability**
Log Land Area	-0.0516***	0.546***								
	[0.0027]	[0.062]								
Life Expectancy	0.001	0.0472**								
(in 1985)	[0.0011]	[0.023]								
Population Growth	-0.758	-32.95***								
(in 1985)	[0.55]	[9.26]								
			PCI_1 90	**4.489*** **	**2.955*** **	**3.752*** **	**5.092*** **	**4.409*** **	**2.08**	**-2.272***
				[1.20]	**[0.98]**	**[1.15]**	**[1.70]**	**[1.22]**	**[1.78]**	**[1.35]**
			Log Population 90	**0.220** **	**0.185* **	**0.210** **	**0.328** **	**0.307*** **	**0.136**	**-0.119**
				[0.092]	**[0.095]**	**[0.096]**	**[0.14]**	**[0.10]**	**[0.17]**	**[0.10]**
Log GDP per capita	-0.513***	-0.00429	Log GDP per capita	0.514***	0.168**	0.395***	0.418***	0.452***	0.486***	0.0703
	[0.17]	[0.013]		[0.091]	[0.079]	[0.096]	[0.14]	[0.12]	[0.16]	[0.12]
Polity score	-0.00382	0.00279**	Polity score	-0.0083	0.0562***	0.00215	0.0186	0.00394	-0.00211	-0.0311**
	[0.022]	[0.0011]		[0.010]	[0.012]	[0.012]	[0.018]	[0.013]	[0.019]	[0.012]
Ethno-Ling. Fractionalizatio	-1.183**	-0.0048	Ethno-Ling. Fractionalizatio	0.084	0.475*	0.07	0.534	0.262	0.34	0.0785
	[0.57]	[0.031]		[0.29]	[0.26]	[0.27]	[0.48]	[0.39]	[0.47]	[0.30]
			Governance Indicators							YES
Regional Fixed Effect	YES	YES	Regional Fixed Effect	YES	YES	YES	YES	YES	YES	YES
Legal Origin Fixed Effect	YES	YES	Legal Origin Fixed Effect	YES	YES	YES	YES	YES	YES	YES
F-stat	90.02	29.67								
Observations	306	306		306	310	310	310	310	310	306
R-squared	0.66	0.86		0.66	0.44	0.67	0.42	0.58	0.32	0.69

Intercepts omitted. Country-level clustered robust standard errors in brackets. All first stage F-stats are larger than 10. Sample comprises of non-democratic countries (lag polity measure less than 5). Dependent variables are from Kaufman, Kraay and Mastruzzi's (2006) governance indices. GDP per capita and population are from the World Development Index database. PCI is the population concentration index from our calculation. Independent variables are taken with lag. The beta coefficients display how much of a standard deviation of the dependent variable results from a change of a standard deviation in PCI. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Governance and PCI, No Relocated Capital Cities

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Control for Corruption	Voice & Accountability	Rule of Law	Regulation Quality	Government Effectiveness	Political Stability	Political Stability
	A. Democratic Countries						
PCI_1 90	-0.643	0.099	-0.105	0.0794	0.211	-0.434	
	[0.81]	[0.52]	[0.59]	[0.65]	[0.66]	[0.81]	
Log GDP per capita	0.628***	0.384***	0.609***	0.520***	0.648***	0.316***	
	[0.11]	[0.066]	[0.087]	[0.096]	[0.089]	[0.10]	
Log Population	-0.158***	-0.0928***	-0.143***	-0.0980**	-0.0714	-0.260***	
	[0.056]	[0.031]	[0.044]	[0.042]	[0.045]	[0.058]	
Polity score	0.0954***	0.152***	0.0941***	0.0865**	0.0826**	0.138***	
	[0.036]	[0.027]	[0.029]	[0.039]	[0.033]	[0.037]	
Ethno-Ling. Fractionalization	-0.219	-0.0422	-0.0888	0.172	0.133	-0.791***	
	[0.28]	[0.17]	[0.23]	[0.24]	[0.24]	[0.30]	
Regional Fixed Effect	YES	YES	YES	YES	YES	YES	
Legal Origin Fixed Effect	YES	YES	YES	YES	YES	YES	
Year Fixed Effect	YES	YES	YES	YES	YES	YES	
Observations	552	554	554	554	554	554	
R-squared	0.85	0.81	0.88	0.73	0.87	0.69	
	B. Non-Democratic Countries						
PCI_1 90	**2.664*** **	**1.678*** **	**2.100*** **	**2.899*** **	**2.433*** **	**-0.599**	**-1.581***
	[0.62]	**[0.53]**	**[0.52]**	**[0.85]**	**[0.77]**	**[0.85]**	**[0.82]**
Log GDP per capita	0.472***	0.135*	0.377***	0.348***	0.408***	0.484***	0.374***
	[0.079]	[0.073]	[0.080]	[0.11]	[0.097]	[0.11]	[0.12]
Log Population	0.0353	0.0157	0.0272	0.0658	0.0802	-0.161**	-0.146**
	[0.053]	[0.041]	[0.059]	[0.082]	[0.066]	[0.065]	[0.057]
Polity score	-0.00169	0.0608***	0.00749	0.0261*	0.0113	0.0128	-0.0127
	[0.0089]	[0.011]	[0.0098]	[0.015]	[0.011]	[0.016]	[0.018]
Ethno-Ling. Fractionalization	-0.132	0.321	-0.151	0.0924	-0.0712	-0.0879	-0.730**
	[0.21]	[0.21]	[0.21]	[0.42]	[0.34]	[0.32]	[0.29]
Voice and Accountability							0.674***
							[0.19]
Regional Fixed Effect	YES	YES	YES	YES	YES	YES	YES
Legal Origin Fixed Effect	YES	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES	YES
Observations	319	323	323	323	323	323	123
R-squared	0.74	0.56	0.77	0.58	0.7	0.47	0.67

Intercept omitted. Country-level clustered robust standard errors in brackets. Panel A consists of countries with polity score larger than 5, Panel B consists of countries with polity score les than or equal to 5. Dependent variables are from Kaufman, Kraay and Mastruzzi's (2006) governance indices. GDP per capita and population are from the World Development Index database. PCI is the population concentration index from our calculation. Independent variables are taken with lag. *** p<0.01, ** p<0.05, * p<0.1

Table 11: Inequality, Redistribution and Population Concentration

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Method	OLS with Fixed Effects									IV:Log(Dens.)
Dependent Variable	Gini				Ineq Q5/Q1		Gini			
Time (Pre/Post-1990)	Post	*Pre*	Post	Post	Post	Post	Post	Post	Post	Post
Countries (Non-Democratic or Democratic)	N.-D.	N.-D.	*Democ.*	N.-D.	N.-D.	N.-D.	N.-D.	N.-D.	N.-D.	N.-D.
Gross/Net Income	Net	Net	Net	*Gross*	Net	*Gross*	Net	Net	Net	Net
PCI1 90	**-84.12***	-61.780	-9.723	-14.130	**-41.92****	-29.660				**-99.75***
	[44.8]	[44.8]	[8.63]	[39.4]	**[19.0]**	[34.1]				**[50.4]**
Lag (Log Pop)	**-5.263****	-3.569**	0.046	0.487	**-2.376***	-3.554	-2.009*	-1.784	-0.178	**-6.332****
	[2.23]	[1.66]	[0.72]	[3.31]	**[1.25]**	[2.07]	[1.00]	[1.62]	[2.41]	**[2.83]**
GiniPop 90							33.00**			
							[13.0]			
Inv_Avg_Dist 90								-608.900		
								[385]		
Cap Primacy 90									-6.896	
									[21.4]	
Lag (Log GDP)	-2.23	-4.14	-3.978***	-9.011***	-1.04	-6.894*	-0.96	-2.51	-3.18	-2.62
	[3.46]	[3.60]	[1.21]	[2.88]	[1.90]	[3.56]	[2.91]	[3.34]	[4.18]	[3.61]
Consumption Dummy	-2.33	-10.05	-2.663*	0.00	-3.55	0.00	-1.21	-2.44	-2.07	-2.55
	[2.95]	[5.84]	[1.51]	[0]	[2.34]	[0]	[2.83]	[3.03]	[3.26]	[2.88]
Ethno-Ling. Fract.	13.32	-15.17**	3.43	-15.03	13.17**	-21.60	13.22*	17.97**	21.78**	11.66
	[8.09]	[7.04]	[3.01]	[12.6]	[5.85]	[20.4]	[7.81]	[7.44]	[10.4]	[8.88]
Lag (Polity)	0.188	1.530***	-0.896**	0.613	-0.013	0.320	0.190	0.345	0.169	0.195
	[0.41]	[0.52]	[0.44]	[0.43]	[0.20]	[0.47]	[0.31]	[0.43]	[0.45]	[0.40]
Regional Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Legal Origin Fixed Effect	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	85	37	425	68	56	24	85	85	76	84
R-squared	0.59	0.89	0.83	0.54	0.45	0.60	0.61	0.56	0.58	0.59

Intercept omitted. Country-level clustered robust standard errors in brackets. Columns 1-9 uses OLS with regional and legal origin fixed effects. Column 10 uses lag of log(density) as instrument for PCI. As marked, non-democratic countries are those with lag of polity less than 5, democratic countries the rest. Gross and net income inequalities are classified from WIID 2.0 dataset. Consumption dummy signifies observations of inequality of consumption. The other variables are classified as in the text. *** p<0.01, ** p<0.05, * p<0.1

Table 12: Inequality by Quintiles and Population Concentration

	(1)	(2)	(3)	(4)
Dependent Variable:	Inequality Q5/Q1	Inequality Q5/Q2	Inequality Q5/Q3	Inequality Q5/Q4
PCI_1 90	**-39.47***	**-11.640**	**-5.681**	**-2.656**
	[20.0]	**[7.05]**	**[3.98]**	**[2.07]**
Beta coefficient	***-0.509****	***-0.452***	***-0.431***	***-0.423***
Log Population Size	-2.284*	-0.826*	-0.418*	-0.200*
	[1.27]	[0.46]	[0.24]	[0.11]
Log GDP per capita	-1.226	-0.302	-0.129	-0.048
	[1.94]	[0.66]	[0.33]	[0.15]
Consumption Dummy	-3.873	-1.442*	-0.752*	-0.391**
	[2.41]	[0.76]	[0.37]	[0.16]
Ethno-Ling. Fract.	12.85**	3.986*	1.987*	0.918*
	[5.85]	[2.08]	[1.07]	[0.50]
Polity Score	0.024	0.010	0.005	0.000
	[0.21]	[0.071]	[0.035]	[0.015]
Regional Fixed Effect	YES	YES	YES	YES
Legal Origin Fixed Effect	YES	YES	YES	YES
Observations	54	54	54	54
R-squared	0.44	0.54	0.57	0.62

Intercept omitted. Country-level clustered robust standard errors in brackets. The sample in all columns are restricted to post-1990, non-democratic countries (lag polity less than 5), gross income distribution. Consumption dummy signifies observations of inequality of consumption. The other variables are classified as in the text. *Beta coefficients* represent the percentage effect of one standard deviation change in PCI_1. *** p<0.01, ** p<0.05, * p<0.1