REGIONAL FAVORITISM*

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We complement the literature on distributive politics by taking a systematic look at regional favoritism in a large and diverse sample of countries and by employing a broad measure that captures the aggregate distributive effect of many different policies. In particular, we use satellite data on nighttime light intensity and information about the birthplaces of the countries' political leaders. In our panel of 38,427 subnational regions from 126 countries with yearly observations from 1992 to 2009, we find that subnational regions have more intense nighttime light when being the birth region of the current political leader. We argue that this finding provides evidence for regional favoritism. We explore the dynamics and the geographical extent of regional favoritism and show that regional favoritism is most prevalent in countries with weak political institutions and poorly educated citizens. Furthermore, foreign aid inflows and oil rents tend to fuel regional favoritism in weakly institutionalized countries, but not elsewhere. *JEL Codes:* D72, R11.

I. INTRODUCTION

Some political leaders choose policies that mainly benefit their preferred regions. We call this phenomenon regional favoritism and see it as a form of rent seeking and possibly corruption. A great example of regional favoritism and corruption is Mobutu Sese Seko, who was dictator of Zaire (today's Democratic Republic of the Congo) from 1965 to 1997. He was a true kleptocrat who relied on the "diversion of Zairean government funds,

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embezzlement of export earnings, and the massive diversion of foreign loans and aid" (Edgerton 2002, p. 211). In the 1980s his estimated fortune was $5 billion. He had bank accounts and properties all over the world (Edgerton 2002; Meredith 2005), but most lavishly spent "his" money in Gbadolite, a small town in Equateur province in remote northeastern Zaire. Gbadolite was Mobutu's ancestral home and is near his birthplace. There he built a huge palace complex costing $100 million, luxury guesthouses, and "an airport capable of handling supersonic Concordes which Mobutu often chartered for his trips abroad" (Meredith 2005, p. 299; Edgerton 2002). He also gave Gbadolite "the country's best supply of water and electricity, not to mention television stations, telephones, and medical services" (Edgerton 2002, p. 211). Regional favoritism is widespread in many African countries. Posner (2005, p. 96), for example, highlights that presidents in Zambia are expected "to build schools, clinics and roads in their home areas," and "channel donor aid or relief food to their regions."

Regional favoritism is common in other continents, too. In Sri Lanka, Mahinda Rajapaksa became prime minister in 2004 and president in 2005. Besides being president, he also heads the ministries of defence, finance and planning, and ports and aviation. Two of his brothers also have important positions in key ministries, and a third is speaker of the parliament. Mahinda Rajapaksa was born in the rural Hambantota district. Its main town, Hambantota, has around 11,000 inhabitants. The Mahinda Rajapaksa International Cricket Stadium for 35,000 spectators, and the Mattala Rajapaksa International Airport were built there in the past few years. Moreover, the Magampura Mahinda Rajapaksa Port in Hambantota is expected to become the country's largest port and boost economic development in the region.[1] In Bolivia, Evo Morales is the first president from a rural district in the highlands and also the first indigenous president. He uses natural resource revenues accruing in the lowlands to support the poor indigenous population in the highlands. In his native Orinoca district, which has fewer than 2,000 inhabitants, he built a modern sports stadium for 5,000 spectators and

1. See, for example, *The Economist*, "Putting the Raj in Rajapaksa," May 20, 2010, and *Sunday Observer*, "Hambantota Port to Make Lanka S Asian Transshipment Hub," April 21, 2013.

recently announced the construction of the country's largest museum.[2]

In addition to this anecdotal evidence, there is a large literature on distributive politics documenting regional favoritism. This literature builds on the early contributions of Bates (1974) on ethnic competition for the benefits of power in Africa, and Ferejohn (1974) and Goss (1972) on the pork barrel of rivers and harbors and defense contracting in the United States.[3] Golden and Min (2013) review the literature on redistributive politics based on an inventory of more than 150 empirical studies. They notice that most studies focus on a single democratic country and a single good or a single policy outcome. They argue that the focus on democracies is due to the "absence of reliable, systematic data on the allocation of government goods and services in nondemocratic regimes," and the focus on a single country is due to "difficulties in aligning data and concepts across countries" (Golden and Min 2013, pp. 75–76). Kramon and Posner (2013) find that the pattern of (ethnic) favoritism in six African countries varies dramatically across policy outcomes. They conclude that there is "need for caution in making general claims about who benefits from distributive politics" based on empirical studies focusing on a single policy outcome (Kramon and Posner 2013, p. 461).

We complement the existing literature on distributive politics by taking a systematic look at regional favoritism in a large and diverse sample of countries that includes democracies as well as autocracies, and by employing a broad measure of regional favoritism that captures the aggregate distributive effect of many different policies. In particular, we use information about the birthplaces of political leaders and satellite data on nighttime light intensity to study whether subnational administrative regions have more intense nighttime light when they are the birth region of the current political leader.

The focus on the birth regions of political leaders is motivated by the foregoing examples. Political leaders may favor their birth region for various reasons. They may want to spend embezzled

2. See, for example, *The Economist*, "The Permanent Campaign," July 16, 2009; eju.tv, "Evo inaugura estadio de $us.100.000 en Orinoca," October 3, 2009; and La Republica, "El museo más grande de Bolivia estará dedicado a la 'revolución' de Evo Morales." December 1, 2012.

3. Weingast, Shepsle, and Johnsen (1981) present an early theoretical framework showing why beneficiaries of distributive politics are often geographically concentrated.

public funds in their birth region, possibly together with their family and clan members. Or they may choose policies benefiting their birth region because of ethnic favoritism, or to secure the support, electoral and otherwise, in their stronghold. These policies can include transfers (e.g., Dahlberg and Johansson 2002; Larcinese, Rizzo, and Testa 2006; Berry, Burden, and Howel 2010), biased taxation (e.g., Kasara 2007), asymmetric public goods provision (e.g., Kramon and Posner 2012, 2013; Burgess et al. 2013), as well as localized public employment schemes or state-run enterprizes (e.g., Shleifer and Vishny 1994).

We rely on satellite data on nighttime light intensity because neither public expenditure data nor governance indicators are widely available at the subnational level. Light intensity is constantly recorded by U.S. Air Force Weather Satellites, and annualized nighttime light data is provided by the National Oceanic and Atmospheric Administration (NOAA). Henderson, Storeygard, and Weil (2012) document a strong relationship between nighttime light intensity and GDP at the country level and propose the use of nighttime light intensity as a measure of economic activity at the subnational level. Nighttime light data is also used as a proxy for economic activity by Sutton and Costanza (2002), Doll, Muller, and Morley (2006), Sutton, Elvidge, and Ghosh (2007), Elvidge et al. (2009), Ghosh et al. (2009), and Michalopoulos and Papaioannou (2013, 2014), and to study political determinants of electrification by Min (2008, 2010). To the best of our knowledge, we are the first to compile and employ a panel data set of nighttime light intensity for subnational administrative regions from all over the world.

Our analysis is based on a panel data set with 38,427 subnational regions in 126 countries and annual observations from 1992 to 2009. The main variables are the logarithm of average nighttime light intensity, and a dummy variable that equals 1 for the birth region of each country's current political leader and 0 for all other regions. We find that this leader region dummy variable is positively associated with nighttime light intensity, although we include region fixed effects to control for time-invariant regional characteristics and country-year dummy variables to control, in the most flexible way, for changes over time in individual countries. We argue that the political leaders are the reason leader regions have more intense nighttime light, and that our findings provide evidence for regional favoritism. To address the potential endogeneity of leader regions, we look at regions that will shortly become leader regions or have been leader regions until recently. Our results suggest that being the leader region increases nighttime light intensity by around 4% and GDP by around 1% on average.

In addition, we explore dynamic and geographical aspects of regional favoritism. We show that regional favoritism becomes more prevalent as the political leaders' time in office increases, but the effects of regional favoritism on the leader regions do not outlast the political leaders. To study geographical aspects, we use different units of observation, that is, subnational regions based on alternative regional boundaries. The emerging pattern suggests that some distributive policies are targeted toward relatively small geographical areas, but a considerable part benefits rather large geographical areas and, thereby, presumably many people.

In a next step we look at potential determinants of regional favoritism. Better political institutions may reduce regional favoritism by constraining the political leaders. More education may reduce regional favoritism as educated citizens are more likely to participate in the political process and hold political leaders accountable. Using Polity2 scores and years of schooling as proxies for political institutions and education, we find that better political institutions and more education both reduce regional favoritism. Our results suggest that being the leader region increases nighttime light intensity and regional GDP by around 30% and 9%, respectively, in countries with weak political institutions and by around 11% and 3%, respectively, in countries with the lowest level of school attainment in our sample. Regional favoritism is also more prevalent in poorer countries and countries where the political leaders may be more attached to their birth region because of linguistic heterogeneity or strong family ties. Once we include all these potential determinants of regional favoritism jointly, we find that regional favoritism is most prevalent in countries with weak political institutions and poorly educated citizens.

We further study how windfall gains from foreign aid and oil production affect regional favoritism. We find that on average, higher aid inflows are associated with more regional favoritism, while higher oil rents are not. When interacting our measure of political institutions with foreign aid inflows and oil rents, we find that aid and oil tend to fuel rent seeking and regional favoritism in weakly institutionalized countries, but not in countries with comparatively better political institutions.

While contributing to the existing literature on redistributive politics and regional favoritism in general, our article is most closely related to contributions focusing on political leaders. These contributions include Kasara (2007), Franck and Rainer (2012), and Kramon and Posner (2012, 2013), who all study ethnic or regional favoritism in sub-Saharan African countries. The recent contribution of Burgess et al. (2013) on road building in Kenya may be closest to ours, as it also documents constraining effects of democratic political institutions on regional favoritism. Our article differs from all these contributions by using a broad measure of regional favoritism and by establishing that regional favoritism is not just common in some ethnically fractionalized sub-Saharan African countries, but is a more widespread phenomenon. Looking at economic growth rather than distributive policies, Jones and Olken (2005) find that political leaders matter more in autocratic than democratic countries. Similarly, we find that regional favoritism is more prevalent in autocratic countries. A likely driving force of both results is that autocratic leaders typically face fewer constraints.[4]

By documenting that sound political institutions and an educated citizenry reduce regional favoritism, we also contribute to the literature on the importance of political institutions and education for economic policies and policy outcomes in the interest of the majority (e.g., North 1990; Acemoglu, Johnson, and Robinson 2005; Acemoglu and Robinson 2012 on the importance of institutions; Lipset 1960; Glaeser et al. 2004; Glaeser, Ponzetto, and Shleifer 2007 on the importance of education).

Furthermore, we contribute to the literature on the effects of natural resource rents and foreign aid on corruption, governance, and rent seeking (e.g., Ades and Di Tella 1999; Treisman 2000; Leite and Weidmann 2002 on natural resources; Svensson 2000; Knack 2001; Alesina and Weder 2002; Tavares 2003 on foreign aid). Whereas previous studies primarily relied on cross-country variation in indices of perceived corruption, we exploit changes in observed nighttime light intensity within subnational regions from all over the world.[5] Thereby we test the theoretical models of Bhattacharyya and Hodler (2010) and Besley and Persson

4. Dreher et al. (2009) and Besley, Montalvo, and Reynal-Querol (2011) also study how economic policies and outcomes depend on political leaders.

5. Olken (2009) discusses the limitations of perception-based indexes of corruption and advocates the use of more objective measures.

(2011). These models predict that political leaders use natural resource rents and foreign aid inflows to provide public goods if political institutions are strong, but embezzle these revenues or transfer them to members of their group otherwise. We find some evidence in support of these predictions.

Finally, our paper is related to the emerging literature on the importance of geography, human capital and institutions for regional development (e.g., Banerjee and Iyer 2005; Huillery 2009; Acemoglu and Dell 2010; Iyer 2010; Michalopoulos and Papaioannou 2013, 2014; Gennaioli et al. 2013a, 2013b). We differ from most contributions by focusing on regional favoritism and by relying on panel data, which allows variation within subnational regions over time to be exploited, rather than just variation across regions. A notable exception is Gennaioli et al. (2013b) who assemble a panel data set of regional GDP to study convergence at the regional level. We use their data in a robustness exercise and to explore the relationship between nighttime light intensity and GDP at the regional level.

The remainder of the article is organized as follows: Section II presents the data; Section III, the empirical framework; Section IV, our findings; and Section V, our conclusions.

II. Data

Our units of observation are subnational regions. The Center for International Earth Science Information Network (CIESIN) at Columbia University and its project partners provide information on subnational administrative regions and their boundaries. We focus on administrative regions at the second subnational level. Our sample consists of all these regions in all countries for which CIESIN provides regional boundaries, but we drop countries with less than half a million inhabitants, which are mainly small island states, as well as the few regions that are unpopulated or entirely located above 65 degrees North. We end up with 38,427 regions from 126 countries.[6] These regions differ

6. The Polity IV project also excludes countries with less than half a million inhabitants. Some regions in Canada, Finland, Iceland, Norway, Russia, Sweden, and the United States (Alaska) are located above 65 degrees North. See the Online Appendix for a list of all countries in our sample.

in their area and population and typically also in their autonomy, geography, and climate.[7]

Satellite data on the intensity of nighttime lights stems from NOAA. Weather satellites from the U.S. Air Force circle the Earth 14 times a day and measure light intensity. NOAA uses observations from every night between 8:30 pm and 10:00 pm during the dark half of the lunar cycle in seasons when the sun sets early, but removes observations affected by cloud coverage or northern or southern lights. It further processes the data by setting readings that are likely to reflect fires, other ephemeral lights, or background noise to zero.[8] The objective is that the reported nighttime light is primarily man-made. NOAA then provides annual data for the time period from 1992 onward for output pixels that correspond to less than 1 square kilometer. The data come on a scale from 0 to 63, with higher values implying more intense nighttime light. Nighttime light intensity is a proxy for economic activity, as most forms of consumption and production in the evening require light. Also public infrastructure is often lit at night. It is therefore not surprising that Henderson, Storeygard, and Weil (2012) find a high correlation between changes in nighttime light intensity and GDP at the country level. We document a similarly high correlation at the level of subnational regions in Appendix B. For our purposes, the main advantage of the nighttime light data is their availability at the subnational level in the same high quality for all regions in all countries.

The examples of Gbadolite and Hambantota illustrate how well nighttime light data can capture changes in economic activity at the local level. Figure I shows nighttime light in Gbadolite for various years. Nighttime light was rather intense when Mobutu was president of Zaire. Then in 1997, Laurent-Désiré Kabila and his rebel groups seized power in what became the Democratic Republic of the Congo. Political rents stopped flowing into town, and nighttime light intensity dropped dramatically. Figure II

7. Averaged at the country level, the regional area ranges from 72 km^2 in the Netherlands to almost 97,000 km^2 in Sudan, and the regional population from around 7,100 in Guyana to around 5.9 million in Bangladesh.

8. Readings due to fires and other ephemeral lights are identified by their high brightness and infrequent occurrence. Background noise is identified by setting light intensity thresholds based on areas expected to be free of detectable lights (Baugh et al. 2010).

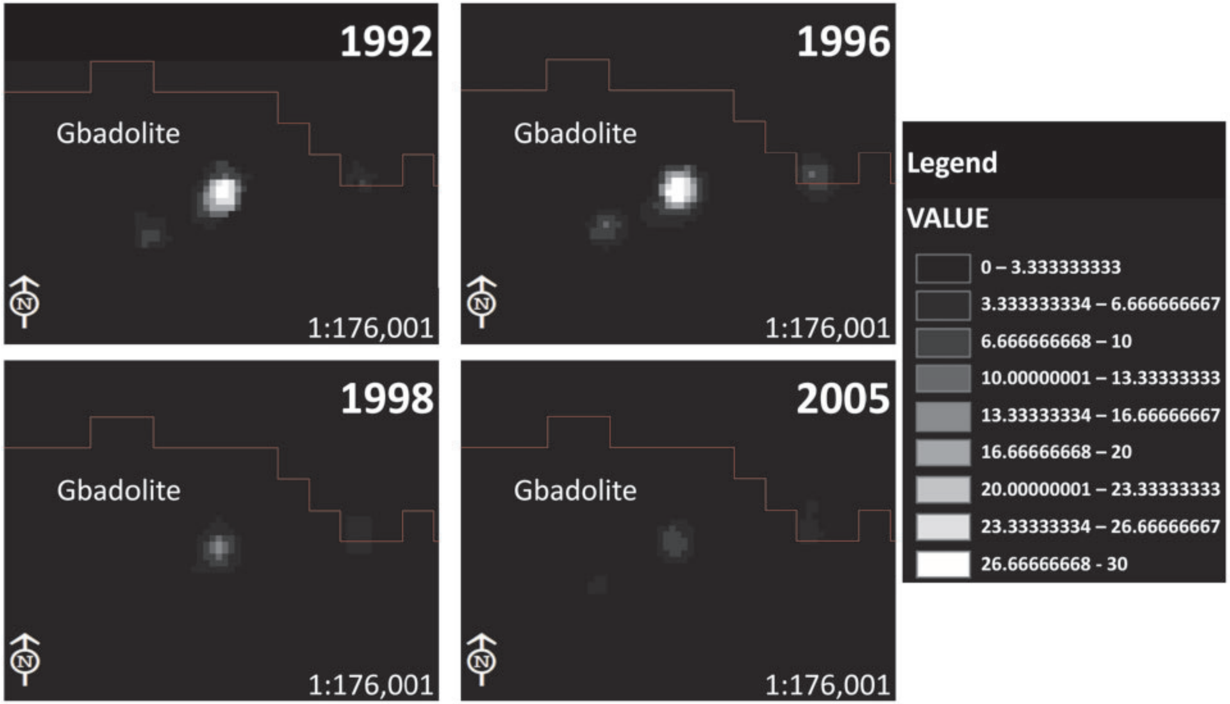

FIGURE I

Nightime Light Intensity in Gbadolite in 1992, 1996, 1998, and 2005

Mobutu Sese Seko was president of Zaire until 1997.

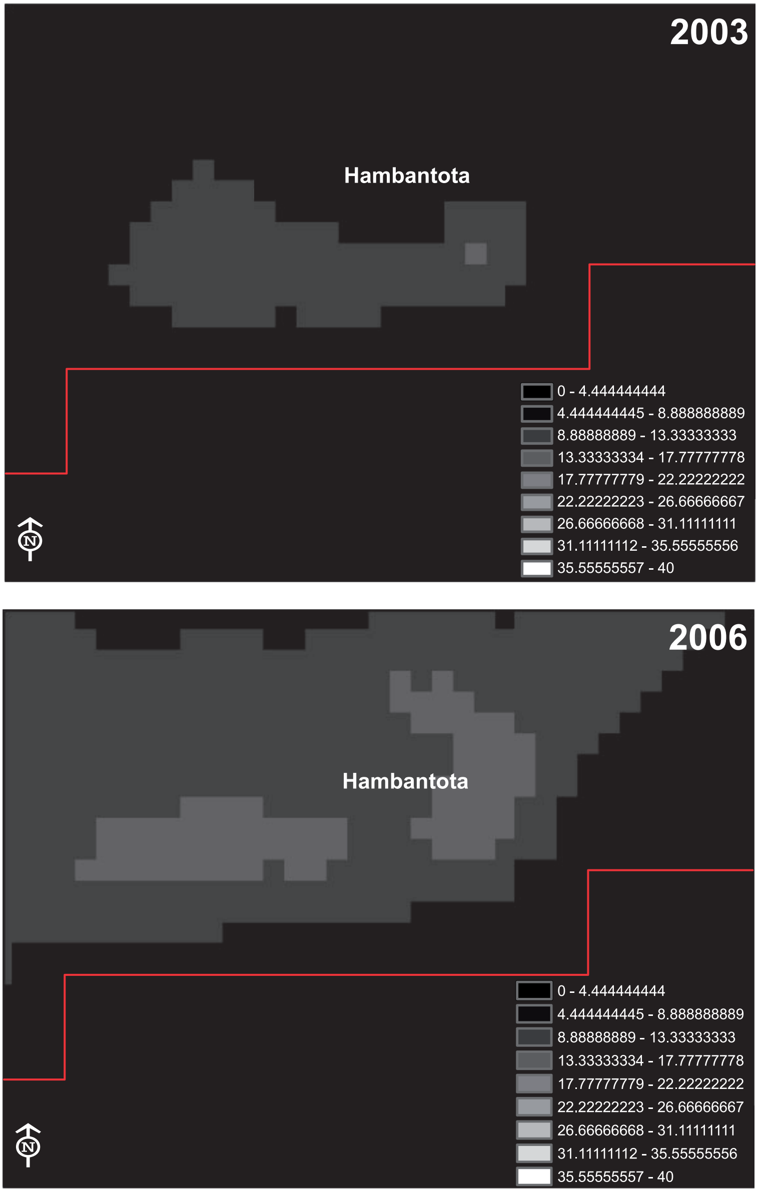

FIGURE II

Nightime Light Intensity in Hambantota in 2003 and 2006

Mahinda Rajapaksa became prime minister of Sri Lanka in 2004 and president in 2005.

shows that nighttime light in Hambantota became more intense after Mahinda Rajapaksa came to power.[9]

Our dependent variable, $Light_{ict}$, is based on the average nighttime light intensity of the pixels in region i in country c in year t. The distribution of the average nighttime light intensity is right-skewed with a concentration of 10.27% of observations at the lower bound (and a tiny concentration of 0.85% at the upper bound). We therefore follow Henderson, Storeygard, and Weil (2012) and Michalopoulos and Papaioannou (2013, 2014) in log transforming the average nighttime light intensity. So as not to lose all the observations with no reported nighttime light, we also follow Michalopoulos and Papaioannou (2013, 2014) in using the logarithm of average nighttime light intensity plus 0.01 as dependent variable.[10] Adding just a small constant before taking the logarithm ensures that the coefficients remain close to (semi-)elasticities. Moreover, doing so can be justified on the grounds that absence of reported nighttime light typically does not imply absence of nighttime light, and certainly not absence of economic activity (given that all regions are populated). It is rather an artifact of the way the data are collected and processed. In particular, man-made nighttime light in these regions may have been below the detection limit of the satellites' sensors or "wrongly" identified as ephemeral light or background noise. Indeed, Henderson, Storeygard, and Weil (2012, p. 1000) find that "there are remarkably few pixels with values 1 or 2." Nevertheless, we show below that our main result is robust to taking the logarithm of average nighttime light intensity without any constant added, even though we thereby lose 1 in 10 observations.

The Archigos database by Goemans, Gleditsch, and Chiozza (2009) identifies the effective political leader of each country for many years up to 2004. We extend this database in two directions. First, we add the political leaders for 2004 to 2010 for all countries

9. Changes in nighttime light intensity in a particular location can reflect changes specific to this location or country-wide changes, including changes in the satellites and their sensor settings. Average nighttime light intensity dropped from 1996 to 1998 (2005) by 71% (77%) in the region around Gbadolite compared to 24% (5%) in Zaire as a whole. Similarly, average nighttime light intensity increased from 2003 to 2006 by 195% in the Hambantota region, compared to 81% in Sri Lanka as a whole. These numbers let us conclude that the changes visible in Figures I and II are mainly, but not exclusively, location-specific.

10. Figures S.1 and S.2 in the Online Appendix show the distributions of the average nighttime light intensity and our dependent variable.

included in the original database. Second, we add the birthplace of all political leaders who were in power during the period 1990 to 2010. We collect this information using resources cited in the codebook of the Archigos database as well as various Internet sites. We map the political leaders' birthplaces with subnational regions via geographical information systems (GIS) using shapefiles with longitude and latitude information on settlement points (also provided by CIESIN) if possible, and latitude and longitude of birthplaces otherwise. We thereby exclude leaders who were born abroad as well as leaders for whom we could not find birthplace information.[11] We call a region in which the country's current political leader was born the leader region, and we construct the dummy variable $Leader_{ict}$, which is equal to 1 if region i was a leader region of country c in year t, and 0 otherwise. During our sample period, 390 of our 38,427 regions, that is, slightly more than 1%, have been a leader region. On average, these regions are 40% larger and five times more populous than other regions, and their average nighttime light intensity is roughly twice as high.

We use our data on political leaders to construct two additional variables. $Experience_{ct}$ corresponds to the number of years a political leader has been in power until year t, and $TotalTenure_{ct}$ corresponds to the total number of years that a political leader stays in power. Hence, although $TotalTenure_{ct}$ is constant during a political leader's time in power, $Experience_{ct}$ grows by 1 every year and equals $TotalTenure_{ct}$ only in his last year in power.

We use standard measures for political institutions, schooling, GDP, linguistic diversity, the strength of family ties, foreign aid inflows, and oil rents at the country level. Our measure of the quality of political institutions is $Polity_{ct}$, which is a rescaled Polity2 score that ranges from 0 to 1. It measures the constraints on the executive, the openness and competitiveness of executive recruitment, and the competitiveness and regulation of political participation. $Schooling_{ct}$ is the average years of schooling attained from Barro and Lee (2013). $NationalGDP_{ct}$ is the log of GDP per capita in U.S. dollars. $Language_c$ is the index of linguistic fractionalization by Alesina et al. (2003), which measures the probability that two randomly selected individuals speak different languages. $FamilyTies_c$ is Alesina and Giuliano's (forthcoming) measure of the strength of family ties based on responses to

11. All leaders for whom we could not find birthplace information were in office for less than half a year, and all but one for less than 50 days.

TABLE I
DESCRIPTIVE STATISTICS (1992–2009)

Variable	Obs.	Mean	Std. dev. overall, between, within	Min	Max
$Light_{ict}$	690,495	0.050	2.482, 2.425, 0.538	−4.605	4.143
$Leader_{ict-1}$	690,495	0.004	0.060, 0.045, 0.040	0.000	1.000
$Polity_{ct-1}$	684,213	0.789	0.257, 0.239, 0.099	0.000	1.000
	(2,205)	(0.670)	(0.312, 0.288, 0.123)		
$Schooling_{ct-1}$	648,240	8.168	2.783, 2.724, 0.570	0.925	13.022
	(1,922)	(6.968)	(2.920, 2.891, 0.518)		
$NationalGDP_{ct-1}$	683,669	8.868	1.147, 1.137, 0.151	5.080	10.855
	(2,200)	(8.212)	(1.347, 1.337, 0.180)		
$Language_{c}$	679,119	0.318	0.281, 0.281, 0.000	0.002	0.923
	(2,161)	(0.438)	(0.298, 0.298, 0.000)		
$FamilyTies_{c}$	551,004	0.096	0.311, 0.311, 0.000	−0.851	0.606
	(1,112)	(0.041)	(0.368, 0.371, 0.000)		
Aid_{ct-1}	690,495	6.191	4.743, 4.069, 2.440	−10.632	13.712
	(2,251)	(7.794)	(4.746, 4.348, 1.931)		
Oil_{ct-1}	645,396	9.357	4.116, 4.457, 1.001	0.000	16.396
	(1,820)	(6.590)	(5.262, 5.312, 1.191)		

Notes. Descriptive statistics at the country-year level in parentheses. Appendix A contains information and sources of all variables used.

three questions in the World Value Survey about the importance of the family and the relation between parents and children. Aid_{ct} is based on the Organisation for Economic Co-operation and Development's (OECD) International Development Statistics and defined as the logarithm of net official development assistance (ODA) per capita in current U.S. dollars.[12] Oil_{ct} is based on the World Bank's adjusted net savings database, which is available until 2008. Unit oil rents are defined as the difference between the world market price of oil and the country-specific extraction costs, both expressed in current U.S. dollars. Total oil rents are calculated as oil production multiplied by unit oil rents. We divide total oil rents by population size to get oil rents per capita and take the logarithm of oil rents per capita to get Oil_{ct}.

Appendix A provides a brief description and the sources of all variables used in our analysis, and Table I presents descriptive statistics for our main variables.

12. We use a transformation suggested by Levy-Yeyati, Panizza, and Stein (2007) to keep observations with zero or negative values of net ODA. See Appendix A for details. Results are very similar when setting Aid_{ct} to zero for all nonpositive values of net ODA.

III. Empirical Framework

The first objective of our empirical analysis is to study whether subnational regions have more intense nighttime light when they are the current political leader's birth region than otherwise. For that purpose we estimate the following equation:

$$Light_{ict} = \alpha_i + \beta_{ct} + \gamma Leader_{ict-1} + \varepsilon_{ict}. \qquad (1)$$

The regional dummy variable α_i indicates the use of region fixed effects to control for time-invariant regional characteristics, such as size and geography. The country-year dummy variable β_{ct} controls, in the most flexible way, for shocks and changes that are common to all regions within any given country, as well as for changes in satellites and their sensor settings. We use lagged values of $Leader_{ict}$ and later all other explanatory variables. The reasons are the likely delays between the central government's decision on the allocation of public funds and the arrival of these funds in the chosen regions and also between the arrival of these funds in the chosen regions and the increase in observed nighttime light via investment (e.g., construction of houses or plants), private consumption (e.g., electronic devices), or public infrastructure (e.g., lamp posts). We cluster the standard errors on the level of political leaders, that is, a cluster contains all country-years in which the country has been governed by the same leader or same set of leaders. For consistency reasons, we lag the clusters by one period.

We expect coefficient γ to be positive, which indicates that regions have more intense nighttime light when being a leader region than at other times. We interpret a positive and significant coefficient γ as evidence for regional favoritism. This interpretation rests on the assumption that the political leaders are the reason regions have more intense nighttime light when being a leader region. There is a potential endogeneity issue as some regions may simply have more intense nighttime light and higher chances of being the leader region than others. The use of region fixed effects already ensures that coefficient γ is unaffected by time-invariant differences across regions. However, it could be that regions that become more important or economically active over time get more intense nighttime light and also become more likely to be the leader region. Regional changes in economic activity and relative importance are likely to be gradual, while most changes in political leadership occur after elections or the natural death of political leaders. We would thus expect regions to have more intense nighttime light already before becoming a leader region, and possibly also after having been a leader region, if regional changes in economic activity and relative importance were the primary reason for more intense nighttime light in leader regions. To test whether there is such a pattern in the data, we focus on regions that are about to become a leader region or have been a leader region until recently. If these regions look no different in these years than in other years in which they were not a leader region, we view it as suggestive evidence that leader regions have more intense nighttime light because of the political leaders themselves rather than because of (other) changes in regional characteristics.

Our objectives go beyond establishing the existence of widespread regional favoritism. We are interested in understanding the dynamics and the geographical extent of regional favoritism, as well as its main determinants and how it is affected by windfall gains, such as foreign aid inflows and oil rents. To study the geographical extent of regional favoritism, we rerun specification (1) using alternative units of observation, that is, subnational units based on alternative geographical boundaries. To study the other questions of interest, we add to specification (1) interaction terms between $Leader_{ict-1}$ and the country-level variables introduced above. There is no need to include the country-level variables as such because specification (1) already contains country-year dummy variables.

Of importance for our analysis are of course primarily the 390 regions that have been a leader region during our sample period, while the other regions serve as control regions that help accurately estimate the country-year dummy variables.[13]

IV. Findings

We present our estimate of specification (1) in column (1) of Table II. The coefficient of interest, γ, is 0.038 and statistically highly significant. Hence, regions have more intense nighttime

13. Our subsequent results imply that these 390 leader regions are not all equally important for our main results. Arguably, the most important regions may be the 306 regions where a political leader was born who eventually stayed in power for three or more years (see Figure III), or the 190 leader regions from countries with intermediate or weak political institutions (see Table V and note 22), or the 149 leader regions characterized by both.

TABLE II

MAIN RESULTS AND ROBUSTNESS TESTS

Dependent variable	(1) $Light_{ict}$	(2) $Light_{ict}$	(3) $Light_{ict}$	(4) $Light_{ict}$	(5) $Light_{ict}$	(6) $Light0_{ict}$	(7) $Lightpc_{ict}$	(8) $RegionalGDP_{ict}$
$Leader_{ict-1}$	0.038***			0.019*	0.061***	0.029**	0.062**	0.021***
	(0.014)			(0.010)	(0.010)	(0.013)	(0.024)	(0.006)
$Leader_{ict}$		0.039***						
		(0.015)						
$Leader_{ict-2}$			0.041***					
			(0.013)					
$Light_{ict-1}$				0.400***	0.962***			
				(0.023)	(0.004)			
Pop_{ict}							−0.958***	−0.201***
							(0.066)	(0.049)
Number of regions	38,427	38,427	38,427	38,427	38,427	36,591	37,475	1,207
Observations	690,495	690,495	689,870	652,362	652,362	619,594	673,382	14,995
R-squared	0.319	0.319	0.318	0.412	0.964	0.393	0.197	0.653
Region FE	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes. Fixed effect regressions (except for column (5), which is standard OLS) using annual data for subnational regions between 1992 and 2009. $Light_{ict}$ is the log of average nighttime light intensity plus 0.01. $Light0_{ict}$ is the log of average nighttime light intensity (without adding a constant). $Lightpc_{ict}$ is the log of nighttime light intensity per capita plus 0.01. $RegionalGDP_{ict}$ is the log of regional GDP per capita. $Leader_{ict}$ is a dummy variable equal to 1 if region i is the birth region of the political leader in country c in year t, and 0 otherwise. Pop_{ict} is the log of regional population. Appendix A contains more information and sources of all variables used. Standard errors are adjusted for leader clustering. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

light when being the birth region of the current political leader than at other times. We interpret this finding as evidence for regional favoritism, that is, as evidence that political leaders choose policies that benefit their birth regions.

We next ensure that the result in column (1) is not an artifact of the lag structure in specification (1). In columns (2) and (3), we show that our choice of using the one-year lag of $Leader_{ict}$ is not crucial. Results are similar when we use current values or a two-year lag. In column (4), we add the lagged dependent variable, $Light_{ict-1}$, to the explanatory variables. The coefficient on $Light_{ict-1}$ is positive and statistically significant, while the coefficient on $Leader_{ict-1}$ drops in size but remains statistically significant at the 10% level. These coefficient estimates, however, suffer from the well-known Nickell (1981) bias. Angrist and Pischke (2009) recommend estimating a specification with fixed effects (but no lagged dependent variable) and one with the lagged dependent variable (but no fixed effects). They also document a useful bracketing property of these estimates in case of doubts about the appropriate specification. The true effect must be between the coefficient estimates of these two specifications. We follow their advice and estimate a specification with the lagged dependent variable but without region fixed effects in column (5). The coefficient on $Leader_{ict-1}$ is again statistically significant and somewhat larger than in our main specification (which includes fixed effects, but not the lagged dependent variable). Hence, the coefficient estimate in our main specification is rather conservative and may even underestimate the true effect.

We then explore the implications of using alternative dependent variables. In column (6), we use the logarithm of the average nighttime light intensity without adding a constant. We thereby drop all observations without any reported nighttime light. The estimated coefficient on $Leader_{ict-1}$ becomes somewhat smaller but remains statistically significant.[14]

Average nighttime light intensity can be seen as a measure of the nighttime light intensity per area. Alternatively, we might

14. We provide further robustness exercises to address concerns surrounding observations with no reported nighttime light or top-coding in the Online Appendix. We show that Honore's (1992) panel Tobit estimator and standard least squares with fixed effects yield similar results (see Online Appendix Table S.1, columns 1–4), and we discuss why the latter seems to be more appropriate. We further show that our results remain robust if we exclude regions with particularly low or high nighttime light intensity (see Online Appendix Table S.1, columns 5–6).

want to use a dependent variable based on nighttime light intensity per capita. We therefore use the high-resolution data on the spatial distribution of the world population by CIESIN. These data are based on national census data and are made available for every fifth year from 1990 onward. We calculate the population in our regions for these years and replace the missing years by a linear interpolation. For every observation, we divide the sum of all nighttime light pixel values plus 0.01 by the regional population to construct nighttime light intensity per capita. In column (7), we use the logarithm of nighttime light intensity per capita as dependent variable and control for the logarithm of regional population. The coefficient on $Leader_{ict-1}$ remains positive and statistically significant, and is even larger than in our main specification. Nevertheless we use our measure of nighttime light intensity per area, $Light_{ict}$, as dependent variable in the remainder of the article. The main reasons are concerns about the quality of our regional population data.[15] Moreover, we cannot meaningfully calculate the population for units of observations that are not based on administrative regional boundaries (as in parts of Table IV later). It is, however, noteworthy that almost all our results based on administrative regions remain qualitatively unchanged when using the logarithm of nighttime light intensity per capita instead of $Light_{ict}$ as dependent variable.[16]

Given the robustness of our main finding, the question arises whether the estimated effect is economically significant. Specification (1) suggests that the average nighttime light intensity is $100(\exp(\gamma) - 1)\%$ higher in a leader region than it would be in the same region if the current political leader were born elsewhere. Given our estimate of γ in column (1), it follows that being

15. These concerns are threefold. First, there are concerns about the quality of the underlying census data for some countries in our sample. Second, for some countries the population distribution is derived based on considerably fewer census units than we have regions in our sample. For these countries, our regional population data is unlikely to be accurate. Third, CIESIN uses censuses from various years to derive the population distribution for every fifth year, which necessarily involves some interpolation. We then interpolate the regional population we get from this five-yearly data. This double interpolation makes our regional population data exceedingly smooth and persistent.

16. We present the equivalent of Tables II–VI with the logarithm of nighttime light intensity per capita as dependent variable (whenever possible) in the Online Appendix (Tables S.2–S.6). There we also mention the few specifications that lead to qualitatively different results.

the leader region increases nighttime light intensity by 3.9%.[17] Henderson, Storeygard, and Weil (2012) study the relationship between nighttime light intensity and GDP at the country level. They argue that the relationship is linear, and the estimated elasticity is “roughly 0.3” (Henderson, Storeygard, and Weil 2012, p. 996). In Appendix B, we look at the relationship between nighttime light intensity and GDP at the regional level using the panel data of regional GDP per capita assembled by Gennaioli et al. (2013b). We confirm that the relationship is linear and also find an elasticity of around 0.3. Assuming the elasticity to be 0.3, an increase of nighttime light intensity by 3.9% translates into an increase of regional GDP by 1.2%. Hence, regional favoritism increases regional GDP in the birth region of the political leader by around 1%, on average.[18] As we will see later, this increase is much larger in countries with weak political institutions or poorly educated citizens.

We also use the data of Gennaioli et al. (2013b) more directly. In column (8) of Table II, we run a similar specification as in column (7), but use the log of regional GDP per capita as dependent variable. The sample size drops considerably, because regional GDP data are unavailable for some countries and not available for all years for other countries, and also because most regions in Gennaioli et al. (2013b) correspond to administrative regions at the first rather than the second subnational level (according to our data). Nevertheless, we find a strong effect of being the leader region on regional GDP. In our view this robustness exercise lends strong additional support to our finding of regional favoritism. It also provides first evidence that regional favoritism is not restricted to small areas around the political leaders’ birthplaces. We provide a more detailed discussion on the geographical extent of regional favoritism shortly.

17. Kennedy (1981) suggests a slightly different formula to interpret the effects of dummy variables in semi-logarithmic regressions. His formula suggests an increase of 3.9% as well.

18. Some political leaders may favor regions other than their birth region. For these political leaders, our approach inevitably looks for a change in a region that is not among their preferred regions. Other political leaders may favor regions around their birthplace that are smaller or larger than our subnational regions. In addition, the relevant ethnographic regions may even change within countries over time (Posner, 2005, 2007). The calculated economic effect of regional favoritism is therefore likely to be a lower bound.

In the next step, we address the concern that unobserved changes within regions may simultaneously increase nighttime light intensity and the probability of becoming a leader region. Therefore, we first investigate whether regions that are about to become a leader region or have been a leader region until recently are systematically different from other regions. We construct the following dummy variables: $Future1_{ict}$ and $Future3_{ict}$ indicate regions that will become a leader region next year or within the next three years, respectively. Similarly, $Past1_{ict}$ and $Past3_{ict}$ indicate regions that were a leader region in the previous year or within the previous three years, respectively. In columns (1) and (2) of Table III we add the lags of these dummy variables to our main specification. We see that regions are no different shortly before becoming a leader region or shortly after ceasing to be a leader region than they are in other years in which they are not a leader region.[19] This finding supports our interpretation that leader regions have more intense nighttime light because the political leaders are from these regions, rather than because of some underlying gradual changes within regions that simultaneously increase nighttime light intensity and the chances of becoming the leader region.

To provide further support, we investigate the dynamics of regional favoritism in more detail. We estimate a specification with many dummy variables for future, current, and past leader regions: 3 for the 3 years before the political leader gets into power, 17 for the first 17 years in which he is in power, 1 for the eighteenth and all subsequent years in which he is in power, and 3 more for the first 3 years after he lost power.[20] The results are displayed in Figure III.

The coefficient estimates suggest interesting dynamics. Before a political leader gets into power, nighttime light intensity in his region is very similar to other years in which his region is not a leader region. Even once the political leader assumes office, nighttime light intensity remains more or less unchanged for another two years. It is not until the third year in power that nighttime light becomes higher in the leader region. This sequence of

19. Results are very similar if we do not lag the dummy variables for past and future leader regions. The coefficients on these dummy variables are also similar if we omit $Leader_{ict-1}$.

20. There are 27 (31) political leaders in our sample that have been in power for 18 (17) or more years.

TABLE III

THE DYNAMICS OF REGIONAL FAVORITISM

Dependent variable	(1) $Light_{ict}$	(2) $Light_{ict}$	(3) $Light_{ict}$	(4) $Light_{ict}$	(5) $Light_{ict}$
$Leader_{ict-1}$	0.038**	0.039*	0.006	0.003	0.017
	(0.016)	(0.021)	(0.024)	(0.028)	(0.028)
$Leader_{ict-1} \times Experience_{ct-1}$			0.007***		0.009***
			(0.002)		(0.003)
$Leader_{ict-1} \times TotalTenure_{ct-1}$				0.005***	−0.002
				(0.002)	(0.003)
$Future1_{ict-1}$	−0.005				
	(0.029)				
$Future3_{ict-1}$		0.002	0.006	0.007	0.006
		(0.025)	(0.031)	(0.031)	(0.031)
$Pretrend_{ict-1}$			−0.005	−0.005	−0.005
			(0.018)	(0.018)	(0.018)
$Past1_{ict-1}$	0.011				
	(0.024)				
$Past3_{ict-1}$		0.002	0.007	0.007	0.006
		(0.020)	(0.027)	(0.027)	(0.027)
$Posttrend_{ict-1}$			−0.001	−0.001	−0.001
			(0.012)	(0.012)	(0.012)
Number of regions	38,427	38,427	38,427	38,427	38,427
Observations	690,495	690,495	690,495	690,495	690,495
R-squared	0.319	0.319	0.319	0.319	0.319
Region FE	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes

Notes. Fixed effect regressions using annual data for subnational regions between 1992 and 2009. $Light_{ict}$ is the log of average nighttime light intensity plus 0.01. $Leader_{ict}$ is a dummy variable equal to 1 if region i is the birth region of the political leader in country c in year t, and 0 otherwise. $Experience_{ct}$ is the number of years the political leader has been in power until year t. $TotalTenure_{ct}$ is the total number of years the political leader was in power up to 2010. $Future1_{ict}$ is a dummy variable equal to 1 if region i is the birth region of the political leader in $t+1$, but not in t; and 0 otherwise. $Future3_{ict}$ is a dummy variable equal to 1 if region i is the birth region of the political leader in $t+1$, $t+2$, or $t+3$, but not in t; and 0 otherwise. $Pretrend_{ict}$ is a time trend for the years in which $Future3_{ict}=1$. $Past1_{ict}$ is a dummy variable equal to 1 if region i is the birth region of the political leader in $t-1$, but not in t; and 0 otherwise. $Past3_{ict}$ is a dummy variable equal to 1 if region i is the birth region of the political leader in $t-1$, $t-2$, or $t-3$, but not in t; and 0 otherwise. $Posttrend_{ict}$ is a time trend for the years in which $Past3_{ict}=1$. Appendix A contains more information and sources of all variables used. Standard errors are adjusted for leader clustering. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

events should dampen any remaining concerns about the endogeneity of leader regions. The coefficient estimates for the years 3 to 10 are in a comparable range to our estimate of 0.038 in the main specification. After a drop in year 11, the nighttime light intensity in the leader region rapidly increases from year 12 onward. This rapid increase could be an indication that between country differences in the extent of regional favoritism can be partly explained by differences in political institutions that

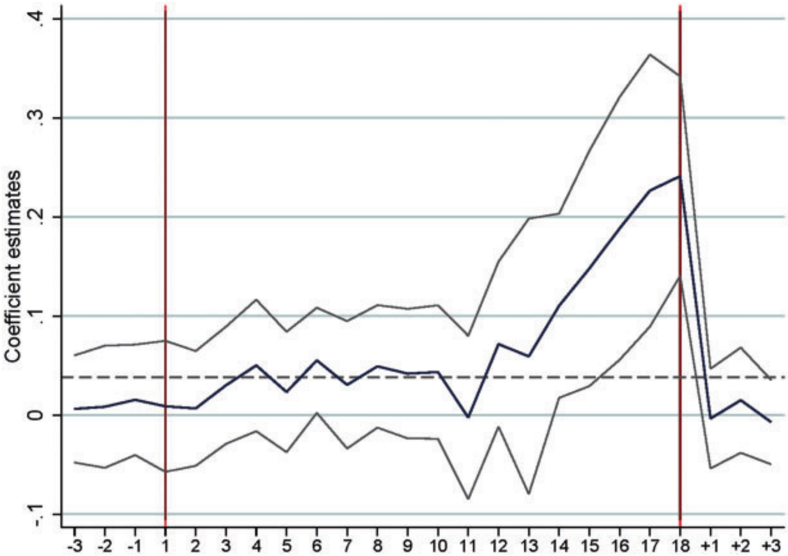

FIGURE III

The Dynamics of Regional Favoritism

Coefficient estimates of dummy variables accounting for the individual three years before a region becomes a leader region (−3, −2, −1), the first individual 17 years of being a leader region (1–17), the eighteenth and all subsequent years (18), and the first three years after the end of the political leader's reign (+1, +2, +3). The black line plots the coefficient estimates for each individual dummy variable, and the gray lines indicate the upper and lower limits of the 95% confidence interval. These estimates stem from a single fixed effects regression, where $Light_{ict}$ is regressed on the aforementioned 24 dummy variables and the full set of country-year dummy variables, using annual data for subnational regions between 1992 and 2009. Standard errors are adjusted for leader clustering. The vertical lines indicate the first and the last dummy variable representing leader regions. The horizontal dashed line indicates the coefficient estimate in our main specification (Table II, column (1)).

limit the political leaders' time in office. Most democratic countries have constitutions that allow heads of state a maximum of two terms of four to seven years in office. In countries with poor political institutions, such rules are often absent or not enforced. We return to the role of political institutions in greater detail later. After the end of the political leader's time in office, nighttime light intensity drops back to the initial level. Thus, regional favoritism seems to have no noticeable long-run effects. This finding suggests that most public funds flowing to a leader region are used for consumption purposes or investments that do not attract sufficient follow-up funding for maintenance from subsequent political leaders.

In column (3) of Table III we put more structure on the dynamics shown in Figure III. We add $Leader_{ict-1} \times Experience_{ct-1}$ as well as trend variables capturing the development during the three years before and after a region is a leader region to the specification in column (2). The results confirm that there is no positive trend before a political leader gets into power, that there is no noticeable effect on nighttime light intensity in his first years in power, and that regional favoritism significantly increases in the number of years a political leader has spent in power.[21] They also confirm that nighttime light drops as soon as the political leader loses power. We replace $Leader_{ict-1} \times Experience_{ct-1}$ by $Leader_{ict-1} \times TotalTenure_{ct-1}$ in column (4), and use both interaction terms in column (5). The results suggest that regional favoritism increases in the years political leaders have been in power mainly because they become more experienced over time, and probably not because political leaders who manage to stay in power for many years are inherently different from those who stay in power for shorter periods.

We now take a closer look at the geographical extent of regional favoritism. We are mainly interested in whether the beneficiaries of regional favoritism are the political leaders' family and clan members living in rather narrow geographical areas around the political leaders' birthplace, or many people in relatively large geographical areas. In Table IV we therefore estimate specification (1) using alternative units of observation. In a first exercise, we focus on the very narrow geographical areas around the birthplace of each political leader in our sample period. We use the point coordinates of these birthplaces and build a circle with a radius of 5 km around each point. We clip the area on national borders and coastal boundaries, and calculate the average nighttime light intensity and our dependent variable $Light_{ict}$ for each of these 520 circular areas. Again, the dummy variable $Leader_{ict}$ is equal to one if and only if circular area i contains the birthplace of the effective political leader in country c and year t, and 0 otherwise. The estimates using only these 520 circular areas are presented in column (1). The coefficient on $Leader_{ict-1}$ is positive, statistically significant, and larger than in our main

21. In column (3) the effect of $Leader_{ict-1}$ on $Light_{ict}$ increases in $Experience_{ict-1}$, and becomes statistically significant at the 5% (10%) level if $Experience_{ict-1} \geq 5$ (4).

TABLE IV
THE GEOGRAPHIC EXTENT OF REGIONAL FAVORITISM

Dependent variable	(1) $Light_{ict}$	(2) $Light_{ict}$	(3) $Light_{ict}$	(4) $Light_{ict}$	(5) $Light_{ict}$	(6) $Light_{ict}$	(7) $Light_{ict}$
$Leader_{ict-1}$	0.049**	0.026**	0.023**	0.043***	0.028**	0.020**	0.005
	(0.024)	(0.010)	(0.012)	(0.010)	(0.011)	(0.009)	(0.009)
Number of regions	520	2,242	2,220	64,204	17,242	6,101	2,110
Observations	9,134	40,157	39,761	1,048,370	280,210	101,655	35,889
R-squared	0.520	0.602	0.603	0.210	0.298	0.362	0.449
Region FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Units of observation	Circular areas around birthplaces	SN1 regions	SN1 regions without SN2 leader regions	Rectangular cells (50 km × 50 km)	Rectangular cells (100 km × 100 km)	Rectangular cells (200 km × 200 km)	Rectangular cells (400 km × 400 km)

Notes. Fixed effect regressions using annual data for subnational regions between 1992 and 2009. The units of observations differ across columns and are indicated in the last row (see text for details). $Light_{ict}$ is the log of average nighttime light intensity plus 0.01. $Leader_{ict}$ is a dummy variable equal to 1 if region i is the birth region of the political leader in country c in year t, and 0 otherwise. Appendix A contains more information and sources of all variables used. Standard errors are adjusted for leader clustering. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

specification based on administrative regions at the second subnational level. Hence, regional favoritism strongly benefits people living close to the political leaders' birthplaces.

In column (2) we use administrative regions at the first subnational level (SN1 regions) as our units of observation. These regions are, on average, 17 times larger than the administrative regions at the second subnational level (SN2 regions). The coefficient of interest drops by around one third but remains statistically significant. In column (3), we keep the SN1 regions as units of observation, but when calculating the average nighttime light intensity, we omit all SN2 regions in which a political leader from our sample was ever born. The coefficient of interest becomes again slightly smaller but remains statistically significant. Hence, political leaders favor not only the SN2 region in which they were born but also other SN2 regions belonging to the same SN1 region. These results suggest that a substantial fraction of regional favoritism tends to benefit rather large geographical areas and, presumably, many people.

We next construct entirely different units of observations. We create grids of same-sized, rectangular cells covering the entire world. We calculate average nighttime light intensity and determine the leader regions or leader cells, respectively, after clipping these grids at coastal boundaries and national borders. Columns (4)–(7) are based on rectangular cells with side lengths of 50 km, 100 km, 200 km, and 400 km, respectively. The coefficient of interest is positive in all cases, but decreases in the size of the cells. It is statistically significant in columns (4)–(6), but no longer significant in column (7). These results suggest that although the main beneficiaries of regional favoritism are fairly local, a considerable part of the benefits extends to relatively large geographical areas. The use of rectangular cells (to the extent possible) also serves to show that our previous results are not an artifact of the different sizes and shapes of subnational administrative regions across the world.

Our large and diverse sample also allows us to look at potential determinants of the extent of regional favoritism. Again we are using our administrative regions at the second subnational level as units of observation. The pattern in Figure III already suggested that the degree of regional favoritism could be influenced by constraints on the political leaders' terms in office. Therefore, we start with an analysis of political institutions as a first potential determinant. Strong political institutions constrain political leaders (e.g., North 1990; Acemoglu, Johnson, and Robinson 2005; Acemoglu and Robinson, 2012) and may thereby reduce regional favoritism. In column (1) of Table V, we add the interaction term $Leader_{ict-1} \times Polity_{ct-1}$ to our main specification. The coefficient on $Leader_{ict-1}$ now measures the effect of being the leader region on average nighttime light intensity in countries with weak political institutions ($Polity_{ct-1} = 0$). The coefficient estimate suggests that being the leader region in such a country increases nighttime light intensity by 30.0%. Again assuming an elasticity of 0.3, the corresponding increase in regional GDP is 9.0%. Hence, regional favoritism has large economic effects in autocracies. The negative and statistically significant coefficient on the interaction term confirms that better political institutions reduce regional favoritism. The effect of $Leader_{ict-1}$ becomes statistically insignificant if $Polity_{ct-1} \geq 0.80$, that is, if the Polity2 score is at least 6.[22] Hence, our results suggest the absence of regional favoritism (or at least regional favoritism observable from outer space) in countries with strong political institutions.

Education is a second potential determinant of regional favoritism, as educated citizens are more likely to participate in the political process and to hold political leaders accountable (e.g., Lipset 1960; Glaeser et al. 2004; Glaeser, Ponzetto, and Shleifer 2007). In column (2), we thus add $Leader_{ict-1} \times Schooling_{ct-1}$ to our main specification. Calculating the economic effects as before implies that being the leader region in countries with the lowest level of school attainment ($Schooling_{ct-1} = 0.925$ years) increases nighttime light intensity by 11.4% and regional GDP by 3.4%. Moreover, we confirm that schooling also reduces regional favoritism.

We also look at further potential determinants of regional favoritism. In column (3), we use $Leader_{ict-1} \times NationalGDP_{ct-1}$ and find that regional favoritism is more prevalent in poorer countries. In columns (4) and (5), we use $Leader_{ict-1} \times Language_c$ and $Leader_{ict-1} \times FamilyTies_c$ to see whether regional favoritism is more prevalent in countries where the political leaders may be more attached to their birth region. We find that linguistic heterogeneity and strong family ties are associated

22. Of the 390 regions that have been a leader region during our sample period, 190 are located in countries where $Polity_{ct-1}$, averaged over the sample period, is below 0.80.

TABLE V

DETERMINANTS OF REGIONAL FAVORITISM

Dependent variable	(1) $Light_{ict}$	(2) $Light_{ict}$	(3) $Light_{ict}$	(4) $Light_{ict}$	(5) $Light_{ict}$	(6) $Light_{ict}$
$Leader_{ict-1}$	0.262***	0.119***	0.196**	−0.008	0.008	−0.036
	(0.056)	(0.040)	(0.082)	(0.017)	(0.012)	(0.134)
$Leader_{ict-1} \times Polity_{ct-1}$	−0.298***					−0.240***
	(0.063)					(0.065)
$Leader_{ict-1} \times Schooling_{ct-1}$		−0.012***				−0.024***
		(0.004)				(0.007)
$Leader_{ict-1} \times NationalGDP_{ct-1}$			−0.019**			0.050***
			(0.009)			(0.018)
$Leader_{ict-1} \times Language_c$				0.120***		0.016
				(0.040)		(0.052)
$Leader_{ict-1} \times FamilyTies_c$					0.063**	0.035
					(0.032)	(0.034)
Number of regions	38,427	36,033	38,179	37,795	30,631	29,123
Observations	684,213	648,240	683,669	679,119	551,004	520,081
R-squared	0.320	0.330	0.320	0.318	0.308	0.313
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes. Fixed effect regressions using annual data for subnational regions between 1992 and 2009. $Light_{ict}$ is the log of average nighttime light intensity plus 0.01. $Leader_{ict}$ is a dummy variable equal to 1 if region i is the birth region of the political leader in country c in year t, and 0 otherwise. $Polity_{ct}$ is the Polity2 score, rescaled so that it ranges from 0 to 1, with higher values implying stronger political institutions. $Schooling_{ct}$ is the average years of schooling attained. $NationalGDP_{ct}$ is the log of GDP per capita. $Language_c$ is the index of linguistic fractionalization. $FamilyTies_c$ is a measure of the strength of family ties. Appendix A contains more information and sources of all variables used. Standard errors are adjusted for leader clustering. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

with more prevalent regional favoritism. In column (6), we look at all five potential determinants together. The constraining effects of political institutions and schooling on regional favoritism remain large and statistically significant, whereas the effects of linguistic heterogeneity and strong family ties become statistically insignificant. Higher incomes are even associated with more regional favoritism once we control for political institutions and schooling. We conclude that political institutions and the citizens' education are the main determinants of regional favoritism.

Although most studies on regional and ethnic favoritism focus on sub-Saharan African countries, our large sample with countries from all over the world allows us to study whether and how regional favoritism differs across continents. In column (1) of Table VI, we therefore use interaction terms between $Leader_{ict-1}$ and dummy variables for each continent. Our estimates suggest that regional favoritism is prevalent in Africa (with 42 countries in our sample) and Asia (with 31 countries) but not in the Americas (with 21 countries), Europe (with 28 countries), and Oceania (with 4 countries). In column (2), we add $Leader_{ict-1} \times Polity_{ct-1}$. The coefficient on the interaction term between $Leader_{ict-1}$ and the dummy variables for the four larger continents are all positive, statistically significant, and very similar in magnitude, while the coefficient on $Leader_{ict-1} \times Polity_{ct-1}$ is again negative and statistically significant. These results suggest that differences in regional favoritism across continents are primarily driven by differences in political institutions and that there is widespread regional favoritism on all these continents when political institutions are weak. In column (3), we add the four other interaction terms already employed in Table V. The coefficients on the interaction terms with the four main continental dummy variables are again remarkably similar, which confirms that differences in regional favoritism across continents are mainly due to differences in the determinants of regional favoritism. In addition, the results in column (3) confirm the key role of political institutions and education in constraining regional favoritism.

We next study how windfall gains in the form of foreign aid inflows and oil rents affect regional favoritism and rent seeking. These windfall gains can be seen as positive shocks to the governments' budget. In the first two columns of Table VII, we look at the average effects of aid inflows and oil rents. The results suggest that foreign aid does, on average, promote rent seeking and regional favoritism, whereas oil does not. To

TABLE VI
REGIONAL FAVORITISM ACROSS CONTINENTS

Dependent variable	(1) $Light_{ict}$	(2) $Light_{ict}$	(3) $Light_{ict}$
$Leader_{ict-1} \times Africa_c$	0.071***	0.235***	0.041
	(0.026)	(0.047)	(0.167)
$Leader_{ict-1} \times Americas_c$	0.000	0.243***	0.056
	(0.025)	(0.067)	(0.179)
$Leader_{ict-1} \times Asia_c$	0.121***	0.296***	0.005
	(0.042)	(0.073)	(0.147)
$Leader_{ict-1} \times Europe_c$	−0.019*	0.239***	0.035
	(0.010)	(0.067)	(0.163)
$Leader_{ict-1} \times Oceania_c$	−0.112	0.106	0.167
	(0.077)	(0.101)	(0.168)
$Leader_{ict-1} \times Polity_{ct-1}$		−0.278***	−0.252***
		(0.070)	(0.068)
$Leader_{ict-1} \times Schooling_{ct-1}$			−0.027***
			(0.007)
$Leader_{ict-1} \times NationalGDP_{ct-1}$			0.047**
			(0.020)
$Leader_{ict-1} \times Language_c$			0.024
			(0.046)
$Leader_{ict-1} \times FamilyTies_c$			0.011
			(0.037)
Number of regions	38,427	38,427	29,123
Observations	690,495	684,213	520,081
R-squared	0.319	0.320	0.313
Region FE	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes

Notes. Fixed effect regressions using annual data for subnational regions between 1992 and 2009. $Light_{ict}$ is the log of average nighttime light intensity plus 0.01. $Leader_{ict}$ is a dummy variable equal to 1 if region i is the birth region of the political leader in country c in year t, and 0 otherwise. $Africa_c$, $Americas_c$, $Asia_c$, $Europe_c$, and $Oceania_c$ are dummy variables for the respective continents. $Polity_{ct}$ is the Polity2 score, rescaled so that it ranges from 0 to 1, with higher values implying stronger political institutions. $Schooling_{ct}$ is the average years of schooling attained. $NationalGDP_{ct}$ is the log of GDP per capita. $Language_c$ is the index of linguistic fractionalization. $FamilyTies_c$ is a measure of the strength of family ties. Appendix A contains more information and sources of all variables used. Standard errors are adjusted for leader clustering. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

focus on the interplay between political institutions and windfall gains, we add the triple interaction terms $Leader_{ict-1} \times Polity_{ct-1} \times Aid_{ct-1}$ and $Leader_{ict-1} \times Polity_{ct-1} \times Oil_{ct-1}$. The results in column (3) suggest that higher aid inflows are associated with more rent seeking and regional favoritism in countries with poor political institutions, but not in countries with sound political institutions. The coefficient estimates in column

TABLE VII
AID, OIL, AND REGIONAL FAVORITISM

Dependent variable	(1) $Light_{ict}$	(2) $Light_{ict}$	(3) $Light_{ict}$	(4) $Light_{ict}$
$Leader_{ict-1}$	−0.019	0.020	0.086	0.118
	(0.015)	(0.022)	(0.073)	(0.084)
$Leader_{ict-1} \times Aid_{ct-1}$	0.008***		0.019**	
	(0.002)		(0.009)	
$Leader_{ict-1} \times Oil_{ct-1}$		0.000		0.010
		(0.002)		(0.008)
$Leader_{ict-1} \times Polity_{ct-1}$			−0.121	−0.109
			(0.074)	(0.094)
$Leader_{ict-1} \times Aid_{ct-1} \times Polity_{ct-1}$			−0.019*	
			(0.010)	
$Leader_{ict-1} \times Oil_{ct-1} \times Polity_{ct-1}$				−0.014
				(0.010)
Number of regions	38,427	38,179	38,427	37,851
Observations	690,495	645,396	684,213	641,410
R-squared	0.319	0.335	0.320	0.335
Region FE	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes

Notes. Fixed effect regressions using annual data for subnational regions between 1992 and 2009. $Light_{ict}$ is the log of average regional nighttime light plus 0.01. $Leader_{ict}$ is a dummy variable equal to 1 if region i is the birth region of the political leader in t; and 0 otherwise. $Polity_{ct}$ is the Polity2 score, rescaled so that it ranges from 0 to 1, with higher values implying stronger political institutions. Aid_{ct} is the log of net overseas development assistance per capita plus 1 (see Appendix A for details). Oil_{ct} is the log of oil rents per capita plus 1. Appendix A contains more information and sources of all variables used. Standard errors are adjusted for leader clustering. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

(4) suggest the same pattern for oil rents but are not statistically significant.[23]

Complementary to the foregoing results, we also study how negative shocks to the governments' budgets affect regional favoritism. We thereby focus on natural disasters, such as floods, storms, earthquakes, volcanic eruptions, and landslides. Natural disasters tend to decrease public revenues and to cause upward pressure to reallocate public funds toward disaster relief and reconstruction projects. These changes in the governments' budget

23. In the Online Appendix, we estimate the same specifications as in Table VII using an instrumental variables approach, which exploits exogenous variation in the donors' total aid budgets and the world market price of oil over time (see Table S.8). Results are similar, but somewhat weaker for aid inflows and somewhat stronger for oil rents.

may make it harder for the political leaders to channel public funds toward their birth region. We find some evidence that natural disasters tend to reduce regional favoritism.[24]

V. Conclusions

We have presented a new approach to study regional favoritism using information on the birthplaces of political leaders and satellite data on nighttime light intensity in 38,427 regions from 126 countries with yearly observations from 1992 to 2009. This approach complements the literature on distributive politics by using a large and diverse sample of countries, which includes democracies as well as autocracies, and by employing a broad measure that captures the aggregate distributive effect of many different policies. We have documented that regions have more intense nighttime light when being the birth region of the current political leader, and we have argued that this finding provides evidence for widespread regional favoritism.

The dynamics of regional favoritism are such that political leaders need a few years before they successfully engage in regional favoritism, and then become increasingly better at supporting their birth region. The effects of regional favoritism do not outlast the political leaders. Hence, regional favoritism typically does not lead to sustainable development in the birth regions of the political leaders. Our exploration of the geographical extent of regional favoritism offers a somewhat less daunting picture: While some benefits of regional favoritism are fairly local, a considerable part of the benefits flow to relatively large geographical areas and, therefore, possibly to many citizens.

Our large and diverse sample has allowed us to look at potential determinants of regional favoritism. We have found regional favoritism to be most prevalent in countries with weak political institutions and poorly educated citizens. Political leaders face fewer constraints in these countries and may therefore find it less difficult to engage in rent seeking and regional

24. See Online Appendix Table S.10 and the corresponding discussion for details.

favoritism. In addition, political leaders in these countries often manage to cling to power for many years, and we find that regional favoritism becomes endemic when political leaders stay in power for longer than around two terms of four to seven years. Sound political institutions and education are socially desirable for many reasons. We submit that their constraining effect on regional favoritism is one of them and that the enforcement of term limits seems to be a crucial aspect.

In the last part of our study, we have used our approach to examine the distributive effects of foreign aid and oil rents. We thereby complement the literature on the effects of foreign aid and oil rents on governance and corruption, which typically relies on perception-based measures, by using an observable measure of economic activity in subnational regions across the globe. We have provided some evidence that foreign aid and oil rents tend to fuel rent seeking and regional favoritism in weakly institutionalized countries, but not in countries with comparatively better political institutions. These findings support the theoretical predictions of Bhattacharyya and Hodler (2010) and Besley and Persson (2011).

We believe that our approach of combining panel data on nighttime light intensity at the subnational level with information about the birthplaces of politicians opens a promising avenue for future research on regional favoritism and the political economy of regional development.

Appendix A: Description and Sources of Variables

$Light_{ict}$: Logarithm of average nighttime light intensity plus 0.01. Source: NOAA.

$Leader_{ict}$: Dummy variable equal to 1 if region i is the birth region of the political leader of country c in year t; and 0 otherwise. Source: Goemans, Gleditsch, and Chiozza (2009), extended by authors.

$Population_{ict}$: Logarithm of regional population in thousands (see text for details). Source: CIESIN.

$Light0_{ict}$: Logarithm of average nighttime light intensity (without adding a constant). Source: NOAA.

$Lightpc_{ict}$: Logarithm of nighttime light intensity per capita (see text for details). Sources: NOAA, CIESIN.

RegionalGDP$_{ict}$: Logarithm of regional GDP per capita in US dollars (current purchasing power). Source: Gennaioli et al. (2013b).

Future1_{ict}: Dummy variable equal to 1 if region i is the birth region of the political leader in $t+1$, but not in t; 0 otherwise. Source: Authors' calculation.

Future3_{ict}: Dummy variable equal to 1 if region i is the birth region of the political leader in $t+1$, $t+2$, or $t+3$, but not in t; 0 otherwise. Source: Authors' calculation.

Pretrend$_{ict}$: Time trend variable for the years in which *Future*$3_{ict}=1$. It is equal to 1 (2) if region i will become the birth region of the political leader in 2 (1) years; 0 otherwise. Source: Authors' calculation.

Past1_{ict}: Dummy variable equal to 1 if region i is the birth region of the political leader in $t-1$, but not in t; 0 otherwise. Source: Authors' calculation.

Past3_{ict}: Dummy variable equal to 1 if region i is the birth region of the political leader in $t-1$, $t-2$, or $t-3$, but not in t; 0 otherwise. Source: Authors' calculation.

Posttrend$_{ict}$: Time trend variable for the years in which *Past*$3_{ict}=1$. It is equal to 1 (2) if region i was the birth region of the political leader 2 (3) years ago; 0 otherwise. Source: Authors' calculation.

Experience$_{ct}$: Number of years the current political leader of country c has been in power until year t. Source: Goemans, Gleditsch, and Chiozza (2009), extended by authors.

TotalTenure$_{ct}$: Total number of years the political leader of country c in year t was in power up to 2010. Source: Goemans, Gleditsch, and Chiozza (2009), extended by authors.

Polity$_{ct}$: Revised Combined Polity Score (Polity2), rescaled so that it ranges from 0 to 1, with higher values implying stronger political institutions. Source: Polity IV.

Schooling$_{ct}$: Average years of schooling attained (population aged 15 and over). Source: Barro and Lee (2013).

NationalGDP$_{ct}$: Logarithm of GDP per capita in US dollars (purchasing power at 2005 constant prices). Source: Heston, Summers, and Aten (2012).

Language$_{c}$: Index of linguistic fractionalization. Source: Alesina et al. (2003).

FamilyTies$_{c}$: Measure of the strength of family ties based on the first principal component of three variables in the World Value Survey, which capture beliefs on the importance of the family in an individual's life, the duties and responsibilities of parents and children, and the love and respect for one's own parents. Source: Alesina and Giuliano (forthcoming).

Aid$_{ct}$: Logarithm of net overseas development assistance per capita disbursed in current USD dollars plus 1. It is calculated as $AID_{ct} = \text{sign}(ODA_{ct})\ln(1 + |ODA_{ct}|)$, where ODA_{ct} is net overseas development assistance per capita to country c in year t. This formula proposed by Levy-Yeyati, Panizza, and Stein (2007) allows for a log-specification without censoring the aid variable at zero. Source: International Development Statistics, DAC-OECD.

Oil$_{ct}$: Logarithm of oil rents in US dollars per capita plus 1 (see text for details). Source: Adjusted net savings data.

Appendix B: Nighttime Light Intensity and Regional GDP

This appendix first briefly reviews the findings of Henderson, Storeygard, and Weil (2012) on the relationship between nighttime light intensity and GDP at the country level, and then presents novel information about this relationship at the level of subnational regions.

Henderson, Storeygard, and Weil (2012) devote an entire section of their paper to the study of the relationship between the log of average nighttime light intensity and the log of GDP at the country level. They look at this relationship both in the short run using annual data and in the long run using the difference between the first two and the last two years of their sample period. Results are similar for the short and the long run. In particular, Henderson, Storeygard, and Weil (2012, p. 996) find that the "best fit elasticity of measured GDP growth with respect to lights growth . . . is roughly 0.3." They also show that the relationship appears to be linear and similar for country groups with different incomes.

To study the relationship between nighttime light and GDP at the level of subnational regions rather than at the country level, we use the novel panel data set of regional GDP assembled by Gennaioli et al. (2013b). They provide regional GDP per capita for 1,503 regions from 82 countries. There are 66 countries that appear in their and our sample. For all these countries, the regions in Gennaioli et al. (2013b) are more aggregated than

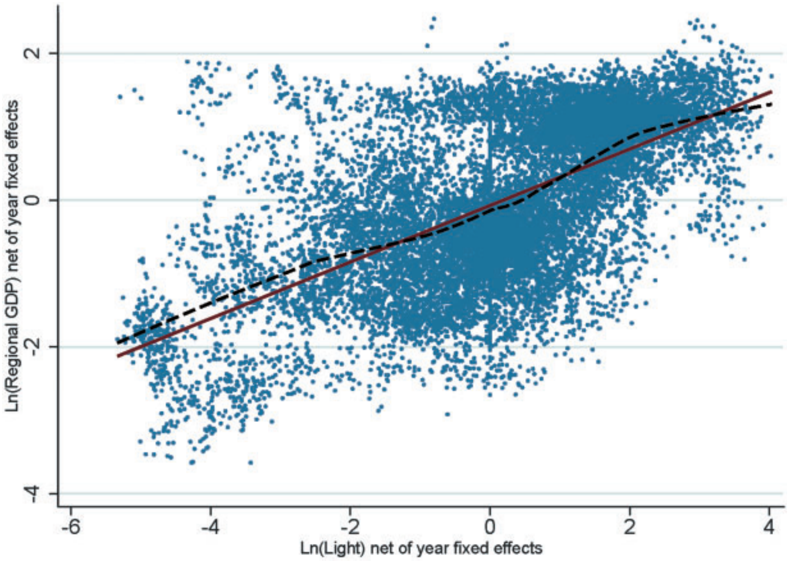

FIGURE A.1

Regional GDP versus Nighttime Light Intensity: Overall Panel

Plot of relationship between the log of average nighttime light intensity ($Light_{ict}$) and the log of regional GDP per capita ($RegionalGDP_{ict}$), both net of year fixed effects, based on all observations. The solid line represents the linear line of best fit, and the scattered line represents the nonparametric fit (using locally weighted scatterplot smoothing).

our administrative regions at the second subnational level.[25] We aggregate our administrative regions to match those of Gennaioli et al. (2013b), so that we can then calculate the average nighttime light intensity for the regions for which Gennaioli et al. (2013b) provide regional GDP data.

We use the combined data set to present two figures inspired by Henderson, Storeygard, and Weil (2012). Appendix Figure A.1 uses all observations to show the short-run relationship between the log of average nighttime light intensity ($Light_{ict}$) and the log of regional GDP per capita ($RegionalGDP_{ict}$), both net of year fixed effects to account for changes in the satellites and their

25. The regions in Gennaioli et al. (2013b) roughly correspond to administrative regions at the first subnational level (according to our data) for the majority of countries, but they are considerably more aggregated for eight countries and less aggregated for three countries.

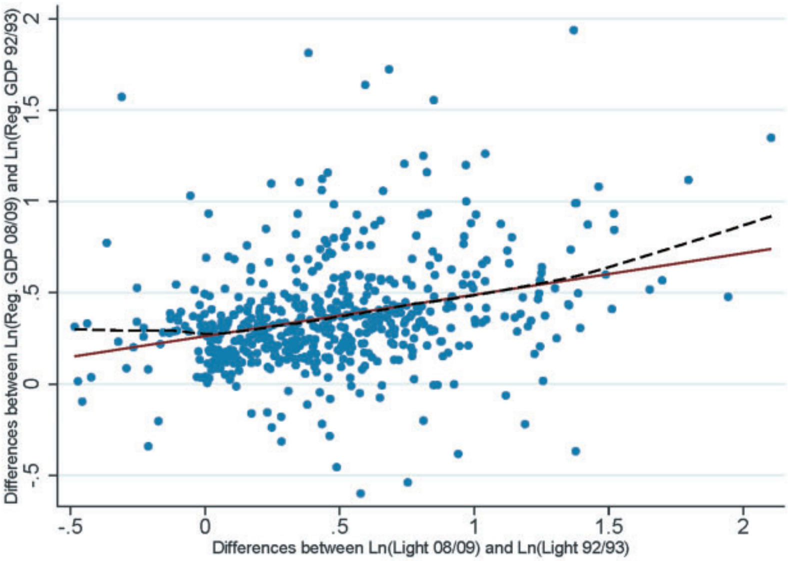

FIGURE A.2

Regional GDP versus Nighttime Light Intensity: Long Differences

Plot of long-run relationship between changes in average nighttime light intensity and changes in regional GDP per capita. Horizontal axis shows difference between $Light_{ict}$ averaged over 2008 and 2009, and $Light_{ict}$ averaged over 1992 and 1993. Vertical axis shows difference between $RegionalGDP_{ict}$ averaged over 2008 and 2009, and $RegionalGDP_{ict}$ averaged over 1992 and 1993. The solid line represents the linear line of best fit, and the scattered line represents the nonparametric fit (using locally weighted scatterplot smoothing).

sensor settings. The linear line of best fit has a slope of 0.386 (with a p-value of .000). The nonparametric line suggests that the relationship is indeed linear. Appendix Figure A.2 shows the long-run relationship. The difference between the log of average nighttime light intensity averaged over the last two years and the first two years of the sample period is on the horizontal axis, and the equivalent difference in the log of regional GDP per capita on the vertical axis. The linear line of best fit has a slope of 0.227 (with a p-value of .000). Moreover, the nonparametric line is again relatively close to being linear.

These results suggest that the relationship between nighttime light and GDP is linear and thereby similar across regions with different nighttime light intensity and income levels. Moreover, the estimated elasticities at the regional level are similar to the country level, even though the long-run elasticity is somewhat lower at the regional level.

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Supplementary Material

An Online Appendix for this article can be found at QJE online (qje.oxfordjournals.org).

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