AIDDATA
A Research Lab at William & Mary

Beyond the Tyranny of Averages

Development Progress from the Bottom Up

September 2017

Samantha Custer, Matthew DiLorenzo,
Takaaki Masaki, Tanya Sethi, and Jessica Wells

Acknowledgments

The authors would like to thank Ariel BenYishay, Brad Parks, and Alena Stern (AidData, College of William & Mary) for their invaluable assistance in consulting on the research design and drafting of this report. We owe a debt of gratitude to our external peer reviewers that helped us refine our thinking and prose, including: Joseph Asunka (William & Flora Hewlett Foundation); Nancy McGuire Choi (Polaris); and Hetty Kovach (Bill and Melinda Gates Foundation), among others. John Custer, Harsh Desai, Sid Ghose, Soren Patterson, Will Sheahan, Jacob Sims, and Jennifer Turner (AidData, College of William & Mary) provided helpful feedback and inputs at various stages of drafting this report.

We would be remiss not to thank our AidData Center for Development Policy consortium partners at Development Gateway, Brigham Young University, University of Texas-Austin, and Esri for their steadfast support and effort these last five years in producing high quality, geocoded data on aid investments around the world. This report and the broader work of the AidData Research Consortium would not have been possible without this rich, granular development finance information.

This research was conducted with generous support from the United States Agency for International Development (USAID) Global Development Lab (through cooperative agreement AID-OAA-A-12-00096). The views expressed here do not necessarily reflect the views of USAID or the United States Government. This study also supports AidData's commitments as an anchor partner of the Global Partnership for Sustainable Development Data (data4sdgs.org).

Citation:

Custer, S., DiLorenzo, M., Masaki, T., Sethi, T., and J. Wells. (2017) *Beyond the Tyranny of Averages: Development Progress from the Bottom Up*. Williamsburg, VA: AidData at the College of William & Mary.

Contents

Figures

References

Acronyms

ADM	Administrative Region
AfDB	African Development Bank
AIMS	Aid Information Management System
AMP	Aid Management Platform
CAR	Central African Republic
CRS	Creditor Reporting System
DAC	Development Assistance Committee
DFID	United Kingdom's Department for International Development
DHS	Demographic and Health Survey
GADM	Global Administrative Areas Database
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIE	Geospatial Impact Evaluation
IATI	International Aid Transparency Initiative
IDA	International Development Association
IEG	World Bank's Independent Evaluation Group
KfW	Kreditanstalt für Wiederaufbau
MDGs	Millennium Development Goals
NORAD	Norwegian Agency for Development Cooperation
NSO	National Statistical Organization
ODA	Official Development Assistance
OECD	Organization for Economic Co-Operation and Development
PPTAL	Demarcation of Indian Territories Project
RCT	Randomized Control Trial
SDGs	Sustainable Development Goals
SSA	Sub-Saharan Africa
UN	United Nations
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UN-HABITAT	United Nations Human Settlements Program
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WB	World Bank

Chapter 1

Introduction: Pockets of affluence, hotspots of poverty

In 2000, the city of Shanghai outperformed the state of West Virginia in the United States in its gross domestic product (GDP) per capita, a widely used measure of economic development (Milanovic, 2005). In 2015, residents of poor neighborhoods in the city of Baltimore could reasonably expect to live as long as residents of war-torn Iraq – just less than 69 years (Verbeek, 2015). These facts call attention to a stubborn reality: hotspots of deprivation exist in the 'developed' world, while pockets of affluence are present in the 'developing' world (UNDP, 2013).

If the lives and livelihoods of the poor are not improving across the board, where are we seeing the biggest gains and setbacks? Almost half a century has passed since Robert McNamara, then-president of the World Bank, called upon world leaders to "eradicate absolute poverty by the end of [the twentieth century]". To this end, international development partners committed billions of dollars annually to reduce poverty and bolster shared prosperity in countries around the globe. Yet, looking back on the Millennium Development Goals (MDGs) era, the United Nations (2015) acknowledges that development progress has been uneven.

Several of the world's poorest countries have achieved middle-income status and experienced sharp declines in overall poverty rates. Nevertheless, national statistics mask deep inequalities within countries (Development Initiatives, 2017, p. 6). Vulnerable and marginalized groups – women, migrants, the elderly, persons with disabilities, ethnic minorities, and the rural poor, to name a few – face a particularly high risk of being 'left behind' (World Economic Forum, 2016; UNESCO, 2016). Unfortunately, inequalities appear to be widening within low- and middle-income countries, even as progress has been made against global poverty reduction targets (Wei, 2016; UNESCO, 2016).[1]

India is case in point. With average per capita income of $1,598 in 2015, India is now considered to be a lower-middle income country by the World Bank (Somvanshi, 2016). However, the richest state in India (Goa, $4,903) had a per capita income seven times that of the poorest state (Bihar, $682).[2] If governments and their development partners are going to succeed in achieving sustainable development for all, they must not succumb to the "tyranny of averages" (Coontz, 2013) but rather view the world from a subnational perspective (Kanbur & Venables, 2005; Bird et al., 2010). Otherwise, they will overlook pockets of deprivation and miss opportunities to target resources to those communities and individuals that are most in need of assistance.

Policymakers often fall into the trap of evaluating progress from the top-down, rather than the bottom-up. Bilateral aid agencies and multilateral development banks tend to use national-level indicators (e.g., GDP per capita, child mortality rates) to select the countries and sectors where they will work (Alkire et al., 2011). By contrast, governments in the developing world are generally more interested in how subnational localities (e.g., provinces, districts, municipalities) within their countries are performing. Sandefur (2013) calls this the "seeing like a donor versus seeing like a state" disconnect.

How effective is the international community in channeling resources to the least developed regions within countries and addressing spatial inequality?[3] The absence of sufficiently granular information has made it difficult to answer these questions in clear and convincing ways. In this report, we seek to close this evidence gap by leveraging new data and methods that bring aid targeting and effectiveness debates to the subnational level

Section 1.1

More precise instruments are needed to address inequality

An estimated 1.8 billion people worldwide reside in "less favored" or "low potential" regions within countries, while 1 billion people live in urban slums (Bird et al., 2010).[4] Geographically disadvantaged communities are often remote, disconnected, marginalized, and poorly endowed (Addison et al., 2008;).[5] These spatial inequalities – that is,

[1] Wei (2016) describes two distinct realities in the Asia region: inequality is increasing within developing countries, even as it is decreasing or stabilizing in developed countries. UNESCO (2016) similarly notes that economic inequality remains consistently higher in developing countries than in developed countries, particularly in the Africa and Latin America regions.

[2] According to Development Initiatives (2017), India is one of four countries that are collectively home to more than half of the poorest fifth of the global population. The other three countries are Nigeria, China, and Indonesia.

[3] Kanbur and Venables (2005, p. 11) define spatial inequality as: "inequality in economic and social indicators of wellbeing across geographical units within a country." In its 2016 report on "Taking on Inequality," the World Bank emphasizes a relationship between inequality of opportunity and inequality in outcomes.

[4] Per Bird et al. (2010), "less favored" refers to political disadvantage, while "low potential" refers to low agricultural or natural resource endowments, as well as ecological disadvantage.

[5] Addison et al. (2008) identifies spatial disadvantage – specifically remoteness, absence of natural resources, political exclusion, and weak

the uneven distribution of public services, infrastructure, wealth, and opportunity – exacerbate pre-existing cleavages between groups, setting in motion a vicious cycle of discrimination and deprivation (e.g., Bird et al., 2010; Lamichhane, 2015).[6] Moreover, spatial inequalities can have far-reaching consequences: slowing economic growth, eroding social cohesion, undermining trust in public institutions, and heightening the risk of violent unrest (Alesina et al., 2004, 2016; Cederman et al., 2013; Dreier et al., 2001).[7]

Yet, measuring and monitoring these disparities is notoriously difficult. Approximately 350 million people worldwide are not covered by household surveys and it is estimated that the actual number of people living on less than $1.25/day might be 25% higher than what current estimates suggest (Carr-Hill, 2013).[8] Many of these people live in the shadows (without official documentation) or in hard-to-reach areas. Others still are transient. They include migrants, pastoralists, indigenous populations, landless and homeless populations, ethnic minorities, and persons with disabilities, among other groups. Failing to count these "missing millions" can leave policymakers with a set of "blind spots" when they target resources to reach those in greatest need of assistance. This dynamic can also make it difficult to measure whether the lives and livelihoods of the most vulnerable and disadvantaged members of society are actually improving (Stuart et al., 2015).

Political imperatives, competing organizational priorities, and logistical impediments all dampen enthusiasm for collecting data disaggregated by geography and demography (Jerven, 2014; Custer & Sethi, 2017). As a result, the most commonly used measures of development inputs and outcomes are often only available as national-level aggregates, which are insufficient to detect vulnerable demographic groups and communities (Chronic Poverty Research Center, 2009; UNESCO, 2016). This status quo exposes governments and their development partners to greater risk that they may inadvertently worsen geographic inequalities in their zeal to achieve the best possible value-for-money in the delivery of assistance.

Fortunately, the tide is beginning to turn. Indeed, a subnational data revolution is underway. Government agencies and international organizations are increasingly releasing satellite imagery, generating and publishing remotely sensed data, and georeferencing household surveys (Wulder & Coops, 2014). Companies are sharing data on mobile phone, Internet, and credit card use to help analyze local economic activity, mental health, and social mobility (Data2x, 2017). Civil society groups are mobilizing communities to provide "citizen-generated data" on local infrastructure and social vulnerability (Wilson & Rahman, n.d.). Aid agencies are also investing in efforts to map sustainable development investments at the subnational level (Chandy et al., 2013).

Section 1.2

Seeing beyond the tyranny of averages

Over the last five years, with generous financial support from the United States Agency for International Development's Global Development Lab,[9] AidData and its partners have dramatically increased the availability of geographically disaggregated data to answer the question: *who is funding what, where, and to what effect*?[10] They have worked together to subnationally geocode the project portfolios of the World Bank, the African Development Bank, the Asian Development Bank, China, and India. They have also pinpointed the latitude and longitude coordinates of development projects recorded in the aid information management systems (AIMS) of finance and planning ministries in 16 countries across Asia, Africa, and Latin America.[11] In total, AidData and its partners have identified the geographical locations of nearly 70,000 development projects (and more than 205,000 discrete project intervention sites) worth approximately $1.23 trillion. AidData makes these data public through its website (aiddata.org) and the websites of its partner organizations (e.g., mapafrica.afdb.org).

In the interest of catalyzing a new generation of aid targeting and aid effectiveness research, AidData has also eliminated a major barrier to the uptake of subnational analysis of development investments: the computationally-intensive task of joining geocoded development project data with outcome and covariate data at comparable spatial and temporal scales. It has

economic integration – as one of its five traps that underpin chronic poverty. Bird et al. (2010) further identify several factors that contribute to the emergence of spatial inequalities, including: agro-ecological characteristics, institutional governance failures, stigma and exclusion, inadequate infrastructure, and crime and violent conflict.

[6] This comparison is often referred to as: horizontal inequality (between social groups with a shared identity) and vertical inequality (across individuals in a society). Frances Stewart and Naila Kabeer provide additional context for horizontal vs. vertical inequality in their essays in UNESCO's 2016 World Social Science Report.

[7] A growing number of studies underscore the relationship between spatial inequalities, variable access to opportunities, and differential development outcomes. See Ravallion and Wodon (1997); Bird and Shepherd (2003); Fafchamps and Moser (2004); Christiansen et al. (2005); Escobal and Torero (2005); and Kanbur and Venables (2005), among others.

[8] Vulnerable populations are often harder to reach using conventional data collection approaches, and therefore national statistics such as census and household surveys either do not capture this group, or, even if they do, may not adequately reflect progress (or the lack thereof) for these populations. See Stuart et al. (2015) for a more fulsome description of this data gap: https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9604.pdf.

[9] This work has largely been conducted under the auspices of the AidData Center for Development Policy, a consortium of the College of William & Mary, Development Gateway, University of Texas-Austin, Brigham Young University, and Esri. USAID's Global Development Lab, through the Higher Education Solutions Network program, funds the work of this consortium. For more information, see: http://aiddata.org/aiddata-center-for-development-policy.

[10] Custer (2014) provides a brief overview of the rationale and demand for hyper-local aid information to enhance aid coordination and targeting in *Geospatial World*: https://www.geospatialworld.net/article/tracking-development-via-effective-aid-management/.

[11] These sixteen countries include: the Democratic Republic of the Congo, Haiti, Honduras, Nepal, Niger, the Philippines, Senegal, Timor-Leste, Uganda, Nigeria, Somalia, Colombia, Iraq, Afghanistan, Burundi, and Sierra Leone. Two more countries, Bangladesh and Ghana, will soon release geocoded AIMS data in partnership with AidData.

done so by building a tool called *GeoQuery* that fuses geocoded aid data with data from from satellites, weather stations, surveys, and censuses and administrative sources—and allows anyone to easily request and access these data at geographical units (e.g. the municipalities, districts, provinces) and time periods of their choosing.[12]

Additionally, AidData has built and led a global network of 120 scholars from 50 universities, think tanks and policy institutes – called the AidData Research Consortium – that is committed to using these data and tools to help the global development community better understand aid targeting and aid effectiveness at the subnational level. AidData's Working Paper Series has been used to showcase new analysis of development investments that relies on sub-nationally georeferenced data.[13]

In this report, we draw upon this cumulative body of data and research from the last five years to inform ongoing debates about whether aid is responsive to local needs and opportunities (targeting) and able to improve development outcomes (effectiveness). Specifically, we analyze approximately 3,400 World Bank projects in about 30,000 discrete locations and 141 countries, as well as the within-country distribution of aid projects in Malawi and Nigeria, which are reported by other major bilateral and multilateral development organizations and private foundations through the AIMS.

The remainder of the report is organized into three chapters:

- In Chapter 2, we consider the **targeting** of scarce resources, assessing whether development partners have been successful in channeling aid to less developed regions within countries.

- In Chapter 3, we consider **effectiveness**, reviewing the relationship between aid and development outcomes at the subnational level, particularly the conditions under which aid is effective at improving local development.

- In Chapter 4, we chart with a **way forward** by identifying limitations of the existing data and priority areas of focus for governments and their development partners that we expect will fuel progress in the coming years.

[12] *GeoQuery* is accessible via http://geo.aiddata.org/.

[13] The AidData Working Paper Series is accessible via http://aiddata.org/working-papers.

Chapter 2

Targeting: Is development aid responsive to spatial inequality?

At the start of the new millennium, 189 United Nations member states declared war on extreme poverty in all its forms, committing to ambitious goals to be achieved by 2015 (UNICEF, 2014). Governments, multilateral development banks, and bilateral aid agencies rallied around the MDGs as a common agenda with specific, time-bound, and measurable targets.

What progress have we seen to date? The international community met its global goal to halve the number of people living in extreme poverty since 1990,[14] but the prognosis is less rosy when it comes to a worrying trend of growing inequality within countries. According to the United Nations (2015, p. 1), "one in five persons in developing regions still live on less than $1.25 per day." Meanwhile, UNDP (2013) asserts that, "the majority of the world's population lives in societies that are more unequal than 20 years ago."

Low- and middle-income countries and their development partners are at a critical inflection point: they must learn from past progress (or lack thereof) to optimize future investments to eradicate poverty and ensure shared prosperity for all. Scholars and practitioners have long debated whether international development cooperation – specifically, official development assistance – is making a dent in *global* poverty. They may be asking the wrong question.

In the post-2015 era, the international community should be increasingly concerned with where aid is going within countries (targeting) and the conditions under which it helps local communities remedy spatial inequalities (effectiveness). Getting more granular insights on the role of aid in addressing *subnational* poverty is of greater importance given the explicit mandate within the Sustainable Development Goals (SDGs) to "leave no one behind."

In this chapter, we marshal some of the best location-disaggregated data available to delve into the topic of the responsiveness (and efficiency) of development partners in channeling resources to geographically disadvantaged regions within countries. Specifically, we organize this discussion in three questions: (1) where do the poor live; (2) are development partners reaching the poorest communities; and (3) what determines how aid is allocated within countries? Our analysis points to four key messages, which we discuss at length in the remainder of the chapter:

- Development partners put a premium on economic efficiency; they concentrate their aid investments in wealthier regions with more numerous beneficiaries, rather than the neediest regions.
- Economically efficient aid is unlikely to help the poorest regions break free from poverty and may make them relatively worse off compared to their geographically advantaged peers.
- World Bank project investments do not appear to be politically expedient, but Chinese aid disproportionately benefits the birth regions of national leaders.
- Aid allocation favoring urban areas may be politically expedient, but perpetuate poverty for remote regions with less political clout.

Section 2.1

Detecting spatial inequalities: Where do the poor live?

Where do pockets of poverty exist? How might development investments generate the biggest payoffs and impacts on poverty? In this section, we contrast two different narratives of development progress: a top-down view that draws upon commonly used national-level aggregates versus a bottom-up view leveraging location-disaggregated data to capture trends at the subnational level. We look at three dimensions of development – income, health, and education – as barometers of the relative advantage or disadvantage of a given country or subnational locality.[15] We also use measures that capture changes over time to evaluate whether these countries and subnational localities are making significant development gains, experiencing major development setbacks, or getting "stuck" (i.e., achieving no or minimal progress).

[14] Target 1.a of the Millennium Development Goals sought to: halve, between 1990 and 2015 the proportion of people whose income is less than one dollar a day.

[15] Countries organize themselves in smaller administrative regions (e.g., provinces, districts, municipalities) to effectively govern within their borders. The OECD (2004) defines these administrative regions as, the "territorial units, which a country is divided in." The number of administrative levels and regions, as well as the extent of their authority and powers to discharge government functions, varies depending upon the country. See the following link for the definition of administrative regions: https://stats.oecd.org/glossary/detail.asp?ID=6226.

2.1.1

Income: National averages mask uneven growth trajectories

What do the average income prospects of countries look like from the top-down? We use average growth in GDP per capita between 2000 and 2015 to get a cross-national perspective, which coincides with the time period when the MDGs were in effect. Policymakers and practitioners frequently rely on growth in GDP per capita as a coarse measure of overall development progress, as indicated by its inclusion as an indicator under the poverty goal of the MDGs.

Measures of GDP do not capture all elements of human development, but they do "[capture] at least the well being that results from the production of goods and services" (OECD Observer, 2004). In Figures 1 and 2, we spotlight the top 20 and bottom 20 countries with the highest and lowest levels of average GDP growth throughout the period of 2000 to 2014, respectively.[16] Based upon this top-down view of development progress, we can see that countries like Myanmar and Ethiopia have achieved major development gains on average, while countries such as Haiti and the Central African Republic experienced development losses.

Figures 1 and 2: Top and Bottom Performers in Average Yearly GDP Growth Rate, 2000 to 2015 (%)

Figure 1: Top Performers

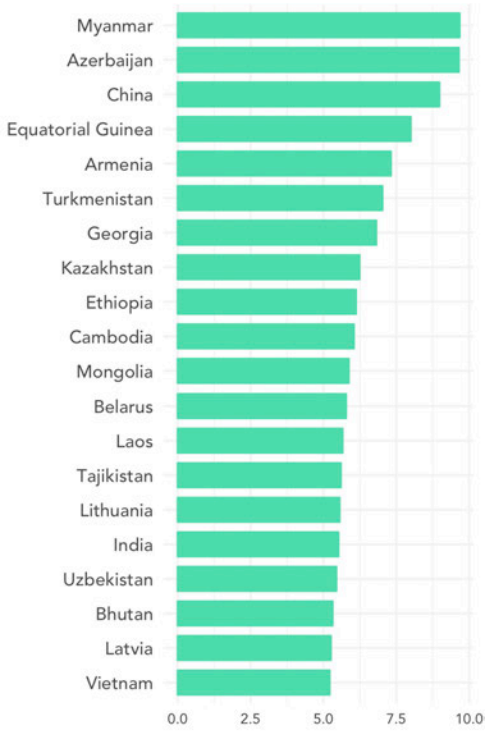
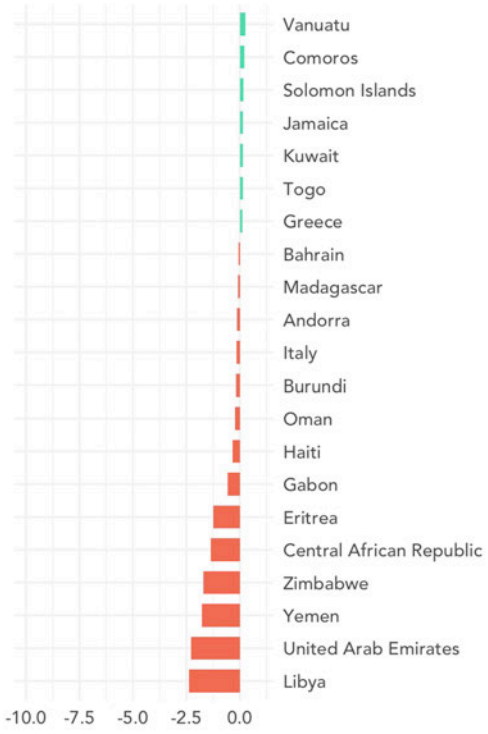


Figure 2: Bottom Performers



Note: Data in figures is sourced from the World Bank's World Development Indicators.

[16] Since our intent is to compare a national-level indicator of progress to a subnational measure of progress, we use GDP growth, which more closely matches the concept of "economic activity" and to which researchers appeal in using nighttime lights as a proxy for subnational development, rather than a more comprehensive index like the inequality-adjusted Human Development Index. While some national indices capture more dimensions of development, they do not have subnational counterpart measures for which comparisons between the two levels of analysis would be instructive.

Do the same trends hold true when looking at the income prospects of countries from the bottom-up? There are few consistent, time-series data on local-level economic welfare outcomes due to the limited capacity of national statistical offices (NSOs) and insufficient demand from policymakers and scholars. Nonetheless, recent advances in technology and transparency are opening up opportunities to track local-level economic outcomes.

In this analysis, we use *luminosity* – the visible light energy emitted by homes, businesses, and other public and private infrastructure – as a proxy measure for local economic activity. As Hodler and Raschky (2014, p. 1002) explain, "[n]ighttime 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." A large body of evidence demonstrates that luminosity levels and trends track closely with measures of economic development and growth.[17]

Luminosity, like GDP growth, is an imperfect measure, but it offers a glimpse of development progress at the subnational level. Given that luminosity data is collected by satellites, it also offers the potential to conduct global-level analyses. We use publicly available satellite imagery to calculate the difference in nighttime luminosity (i.e., the percentage of pixels in a satellite image that are "lit up" or "illuminated")[18] between 2000 and 2013 to gauge local economic growth levels for different subnational localities within the same country.

For the sake of comparison, we examine six countries in two cohorts. Figure 3 presents the nighttime light gains and losses of subnational localities[19] within three countries classified as "high-growth" at the national level (Myanmar, Ethiopia, and Peru).[20] In Figure 4 we replicate the same analysis for three "low-growth" countries (Haiti, Central African Republic, and Nepal). In both figures, local administrative regions are color-coded on a consistent scale to signify the absolute change in their nighttime luminosity between 2000 and 2013. Lighter purple and more yellow regions experienced greater increases in nighttime light, compared with slow progress or stagnation in dark blue and purple regions.

Myanmar and Ethiopia were among the top 10 performers in average GDP growth per capita; however, the nighttime lights data paint a more nuanced and complex picture. In both countries, the largest economic activity gains appear to have accrued disproportionately to a small number of local administrative regions that are centrally located and proximate to the capital city.[21] Outside of these areas, far less progress was achieved between 2000 and 2013. In Peru, local economic development gains were more widely dispersed, but one still observes clustering along the country's Pacific coast.

Nighttime light data also enable the detection of areas that have experienced lots of economic activity at the local level, even in countries that one would otherwise classify as "low-growth" based upon national-level averages. Haiti and Nepal were relatively poor performers on the measure of average GDP growth per capita; however, some regions within these countries saw relatively high amounts of activity between 2000 and 2013.

In the case of Nepal, there are indications that several subnational localities actually experienced a decline in local economic activity during the same time period. The final country, the Central African Republic (CAR), is an example where national-level trends appear to be reasonably representative of local-level trends in economic activity. There is remarkably little variation in nighttime light trends across subnational regions in low-growth CAR. As among the world's least developed countries, CAR receives only 3.87 percent of total aid going to the Middle Africa.

Examining the determinants of this spatial inequality is outside of the scope of this study; however, we do know from previous empirical research that national and subnational factors are both at work.[22] At the national level, regime type and baseline levels of educational achievement seem to matter (Hodler & Raschky, 2014). Ruling elites in less democratic countries have fewer incentives to minimize geographic disparities of wealth and opportunity since they do not face the same pressure to secure votes and support from across the country. Educated citizens tend to exert stronger oversight and accountability pressures on their political leaders. Subnational factors also matter – for example, the unequal geographical distribution of public funding can reinforce or widen spatial inequalities (Kline & Moretti, 2014; Dreher et al., 2015).

---

[17] Gennaioli et al. (2013) generate estimates of regional GDP data set for 1,503 regions in 82 countries. Hodler and Raschky (2014, pp. 1028-1031) use these data to estimate the relationship between nighttime lights and regional GDP. They show that the elasticities (the percentage change in one variable given a percentage change in another variable) between an increase in nighttime lights and short-term and long-term growth, respectively, are about 0.386 and 0.227. On the relationship between luminosity levels and trends and measures of development and growth, see also Henderson et al. (2012); Weidmann and Schutte (forthcoming); Khomba et al. (2017).

[18] For our analysis, we use the average annual intensity of nighttime light over cloud-free nights from the NOAA Version 4 DMSP-OLS Nighttime Lights Series. The intensity of light emissions is measured on a scale of 0 to 63 with a higher value indicating greater intensity.

[19] Figures 3 and 4 depict ADM2-level regions. Dreher et al. (2014, p. 14) note that "ADM1 regions generally correspond to provinces, states, or governorates, while ADM2 regions usually consist of counties, districts, or municipalities."

[20] To provide some regional variation, we selected one country each from Latin America, Africa, and Asia for each cohort (high or low growth). Because there are no Latin American countries among the top 20 for the 2000 to 2015 period, we selected Peru since it had a relatively high growth rate within its region. We included Nepal among the "low-growth" countries for the same reason.

[21] Comparing trends in economic activity to maps of population does reveal some overlap, but there is substantial variation in trends among regions with similar levels of population density. We address the issue of population density more directly in the next section.

[22] During the 2000-2013 period, the Polity IV project (2014) classified Myanmar and Ethiopia as "closed anocracies." In contrast, Peru was rated as a democracy for all years except 2000 in this time period.

Figures 3 and 4: Subnational Variation in Nighttime Light Trends in High and Low Growth Countries, 2000 to 2013

Figure 3: High Growth Countries

Peru
(496,200 mi^2)

Ethiopia
(426,400 mi^2)

Myanmar
(261,228 mi^2)

Figure 4: Low Growth Countries

Central African Republic
(240,535 mi^2)

Nepal
(56,827 mi^2)

Haiti
(10,714 mi^2)

Change in Mean Luminosity of Pixels within Regions from 2000 to 2013

Note: Lighter regions are higher growth regions. Colors are on a consistent scale across countries. ***Source:*** *NOAA Version 4 DMSP-OLS Nighttime Lights Series (2013 and 2000); GADM. The darkest regions are regions that experienced a change of between -7.89 and -7.68 in the mean luminosity of pixels within regions from 2000 to 2013, the lightest regions are regions that experienced a change of between +52.8 and +53 in the mean luminosity of pixels within regions from 2000 to 2013.*

2.1.2

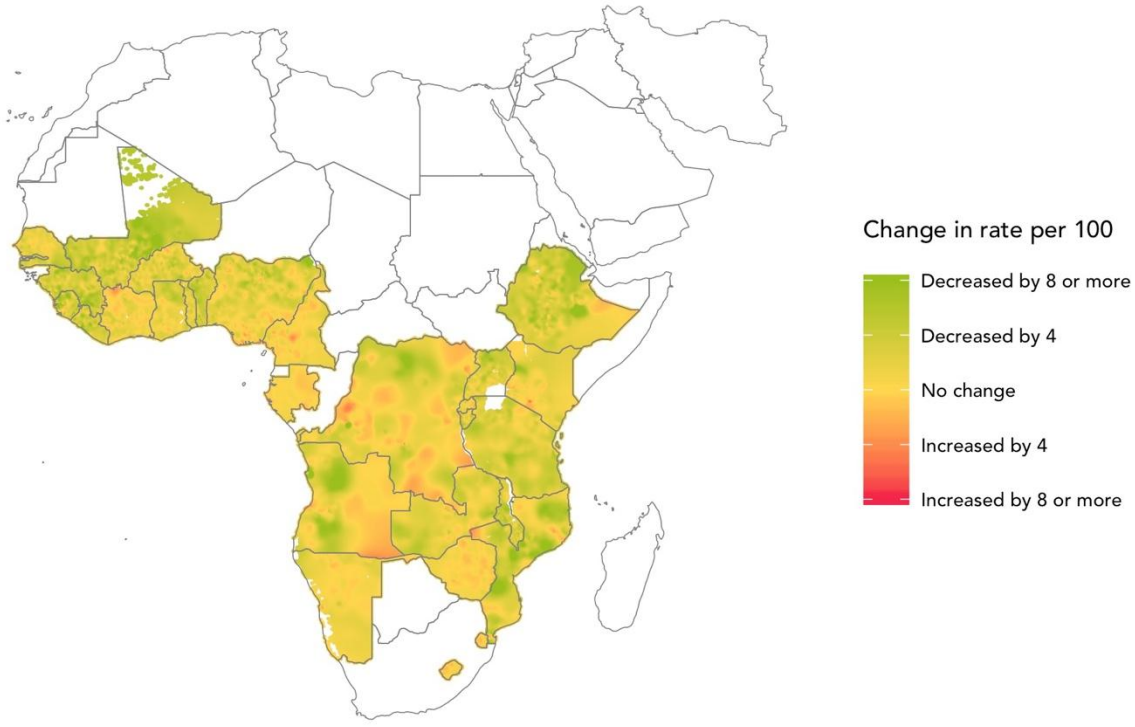
Health: Child mortality hotspots exist even in "well-performing" countries

Another headline measure of development progress is the probability that a child will die before his or her fifth birthday.[23] Globally, under-5 mortality is on the decline – UNICEF (2017) reports that the world has halved both the rate and number of child deaths since 1990. However, this progress falls far short of the two-thirds reduction that UN member states pledged to achieve by 2015. Some countries have made less impressive progress than others. While sub-Saharan Africa (SSA) overall saw only a 24 percent decline in child mortality between 1990 and 2015, national-level progress varied widely. Some countries reduced mortality rates by over 70 percent, while other countries made far less substantial gains (Wang et al., 2016).

In a recently published study, Burke et al. (2016) use georeferenced data from 82 demographic and health surveys conducted in 28 Sub-Saharan African countries between 1980 and 2010 to measure under-5 mortality at the subnational level (10 kilometer by 10 kilometer grid cells). They also measure child survival gains and losses during the 1980s, 1990s, and 2000s at this same level of spatial resolution (Burke et al., 2016). Figure 5 draws upon these data to present a high-resolution map of under-5 mortality trends over this thirty-year period.

Similar to what we observed in the case of local economic development gains, one can see that high average levels of under-5 mortality in countries such as the Democratic Republic of Congo obscure pockets of progress in some of its administrative regions. Conversely, some generally well-performing countries like Kenya were home to subnational hotspots where child mortality levels actually increased between the 1980s and the 2000s.

Figure 5: Subnational Changes in Under-5 Mortality in Sub-Saharan Africa between the 1980s and 2000s:



Note: *Source is Burke, Heft-Neal, and Bendavid (2016.)*

[23] Expressed as a probability of death out of 1,000 live births, (UNICEF, 2017).

The Burke et al. (2016) study also underscores why we should pay more attention to variation within countries: the authors found that differential outcomes in under-5 mortality were better explained by local-level factors (e.g., temperature, malaria burden, conflict) than national-level considerations.

2.1.3

Education: Subnational leaders and laggards in boosting access

Education is instrumental in creating opportunities for families and communities to lift themselves out of poverty. Unequal access to education can have the opposite effect of leaving millions behind. Similar to what we have seen with regard to income and health prospects, national-level aggregates hide inequalities in educational opportunities that divide more and less geographically advantaged regions. To underscore this point, we compare educational gains and losses at the national versus subnational level over the MDG period[24] using adult literacy rates from the World Bank[25] and educational attendance rates for children, aged 6-8, from the Global Data Lab.[26]

India has made huge strides in bolstering educational opportunities for its citizens. Its literacy rate[27] jumped from 61 to 72 percent between 2000 and 2015. However, as shown in Figure 6, these gains have been uneven. In 2001, the states of Tripura and Tamil Nadu each had baseline adult literacy rate rates of 73 percent. Yet, by 2011, Tripura shot ahead and achieved an adult literacy rate of 87 percent compared to 80 percent in Tamil Nadu. The union territory of Dadra and Nagar Haveli increased its adult literacy rate to 77 percent from a more modest baseline (60 percent) in 2001. It outpaced Andhra Pradesh and Rajasthan, two states that made relatively modest gains despite similar starting points.

As Figure 7 demonstrates, India has been comparatively more successful in reducing state-level disparities in school attendance for young children. By 2012, all states had achieved a near perfect educational attendance rate among children, aged 6-8. This progress is remarkable considering how far disadvantaged states like Bihar, which had less than a 50 percent educational attendance rate in 2001, had to improve to catch up with others.

By comparison, Ghana's track record in reducing inequalities in school attendance rates is more mixed. At the national level, it cut its average out-of-school rate for children of primary school age from 34 percent in 2000 to 8 percent in 2015. Nevertheless, there was considerable variation across subnational localities, with clear leaders, laggards, and backsliders.

In Figure 8, we can see that the majority of Ghana's ten administrative regions were able to attain an educational attendance rate of at least 75 percent among children aged 6-8 by 2014. However, the regions of Eastern and Greater Accra saw minor declines in school attendance and the school attendance rate in the Central region declined sharply – from over 75 percent to 55 percent attendance.

This section provided various snapshots of progress over the MDG period (2000-2015) to understand whether people's prospects were improving, stagnating, or worsening across three dimensions of development (income, health, and education). We approached this question from two different vantage points: (1) from the top-down, using country aggregates for a cross-national perspective; and (2) from the bottom-up, using disaggregated data at the subnational level to identify differences within countries. The intent of this discussion was twofold: to demonstrate that relying upon national-level aggregates can make it more difficult to detect pockets of progress and hotspots of deprivation within countries, and to pave the way for a discussion about aid targeting, which is the focus of the next section.

[24] Since many countries only have estimates available for a few years in this time period, we employ averages for consistency.

[25] These estimates are based upon the World Development Indicators between 2000-2015.

[26] Educational attendance, is defined as: the percentage of children (age 6-8) that currently attend or in the current school year attended school. See https://globaldatalab.org/areadata/methods/ for a discussion of the sources and limitations of the indicators.

[27] The measure of literacy we use is defined as: "Percentage of population age 7 and above who can read and write. For the purposes of census a person aged seven and above, who can both read and write with understanding in any language, is treated as literate. A person, who can only read but cannot write, is not literate.

Figures 6 and 7: Subnational Views of Education in India

Figure 6: A Subnational View of Literacy Gains in Indian States, 2001 to 2011

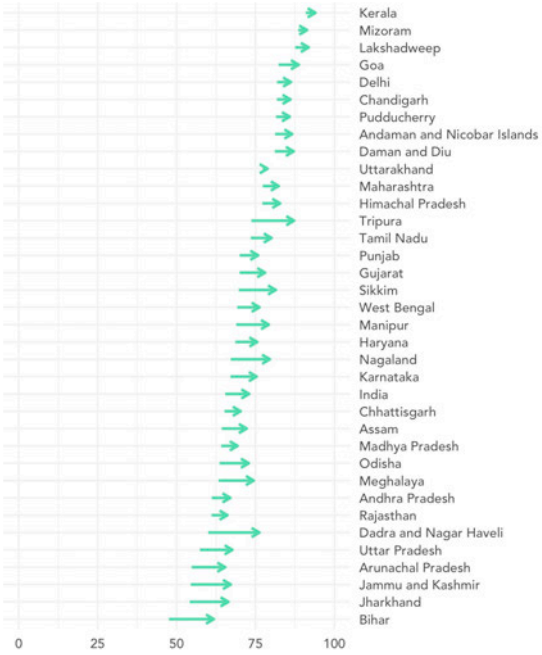
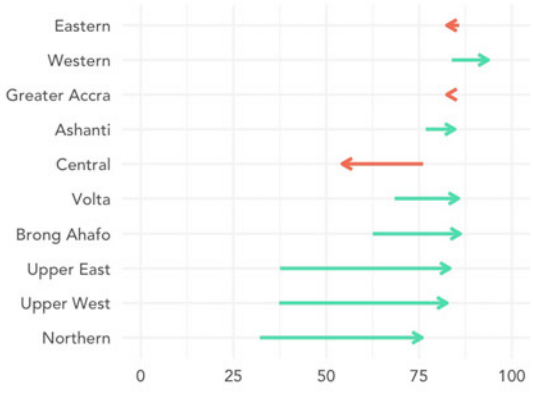


Figure 7: Educational Attendance Rate (Aged 6-8), by Indian states, 1999 to 2012

Note: Source of figure data is World Bank Country Partnership Strategy for India (FY2013 - 17).

Figure 8: Educational Attendance Rate (Aged 6-8), by Ghana's Regions, 1998 to 2014



Note: Figure data sourced from the Global Data Lab.

Section 2.2

Aid targeting: Are development partners reaching the poorest communities?

While global goals, cross-country comparisons, and national-level diagnostics will remain important in the post-2015 era, it is clear that living up to the rhetoric of "leave no one behind" requires looking not only at differences between countries, but also paying attention to inequalities within their own borders. In this section, we look at how responsive development partners have been in targeting resources to the least advantaged regions within countries to ameliorate spatial inequalities.

Official development assistance (ODA) is an important source of financing to work in concert with domestic revenues and spur development progress, particularly in

the poorest countries (Development Initiatives, 2015).[28] Countries participating in the Development Assistance Committee of the Organization of Economic Cooperation and Development (OECD-DAC) collectively give approximately $100-150 billion annually in ODA[29] to combat poverty and promote economic development in low- and middle-income countries.

The geographic scope of this international development cooperation is vast, with over 130 low-and middle-income countries receiving a net positive ODA (i.e., aid transfers less repayments) of over $5 million (based on our own calculation from the OECD-DAC database).[30] Over the past few decades, there has been an influx of countries outside of the OECD-DAC – referred to as 'non-DAC' donors or south-south cooperation providers — that also invest in development beyond their borders. They have been joined by a number of private foundations and non-governmental actors (Evans, 2010; Severino & Ray, 2010).[31]

Regardless of the source, there is a strong rationale for why aid *should* explicitly target the poorest and least developed communities within aid-recipient countries. Aid projects are uniquely positioned to reach high-risk areas with low economic returns, which would deter private investors (Mosley, 1987, pp. 94-95; Chandy et al., 2014). Moreover, if the fundamental mission of development organizations lies in eradicating poverty (in all its forms), there is an ethical imperative to ensure that the benefits of their investments accrue to poor regions that would otherwise be neglected (Mosley, 1987; Briggs, 2017).

This brings us to the critical question of this section: does foreign aid reach the poor? The litmus test must not merely be whether the poorest *countries* receive more aid, but whether development partners are targeting the preponderance of their assistance to the poorest *regions* within those countries. Since "deprivations tend to be spatially concentrated" (United Nations, 2016, p. xi), governments and their development partners need to systematically assess whether their efforts are directed towards those who need their support most (Abdulai et al., 2014).[32]

Previously, most studies of aid targeting have focused on cross-national trends due to a combination of insufficient demand for, and a limited supply of, more granular information on the subnational distribution of development projects.[33] However, AidData and its partners have overseen a far-reaching effort over the last five years to help close this evidence gap. In total, they have pinpointed the precise physical locations of nearly 70,000 development projects (and more than 205,000 discrete project intervention sites) worth approximately $1.23 trillion. These data are made publicly available via http://aiddata.org.

In the remainder of this chapter, we shed light on these questions of who is receiving, and benefiting from, foreign aid by analyzing the subnational distribution of: (1) approximately 3,400 geocoded World Bank (WB) projects, globally; and (2) over 340 aid projects in Malawi and Nigeria, as reported by major donor organizations and private foundations into country-owned aid information management systems (AIMS).[34]

2.2.1

Aid targeting is not so pro-poor at the subnational level

Studies suggest that, all other things being equal, more aid flows to poorer countries than wealthier ones.[35] Figure 9 bears this out, demonstrating a negative correlation between wealth (GDP per capita) and aid per capita.[36] Aid skeptics argue that development partners, particularly bilateral aid agencies, care more about geopolitical concerns or national interests in their aid allocation decisions (e.g., Neumayer, 2003; Alesina & Dollar, 2000). While this may be up for debate, there is also evidence that donors are increasingly selective in targeting aid to countries where needs are greatest (Claessens et al., 2009; Bickenbach et al., 2017; In'airat, 2014).

Nonetheless, even if more aid goes to poorer countries, it does not guarantee that aid reaches the poor *within* those countries. In fact, the distribution of aid projects is often highly skewed between subnational localities in a single

[28] Per the OECD, ODA is defined as: "government aid designed to promote the economic development and welfare of developing countries. Loans and credits for military purposes are excluded. Aid may be provided bilaterally, from donor to recipient, or channelled through a multilateral development agency such as the United Nations or the World Bank."

[29] This estimate excludes emerging donors such as Brazil, Russia, India, and China, which also provide significant amounts of financial support to the developing world.

[30] Our calculation excludes non-DAC donors that do not report to the OECD-DAC database. Net positive aid ODA refers to: "transfers to poor countries less the amount of reverse flows in the form of repayment of principal on [previously extended] credits." See: https://www.brookings.edu/wp-content/uploads/2016/06/11_development_aid_kharas.pdf.

[31] Evans (2010) enumerates this proliferation of actors within aid financing, including: 126 bilateral agencies from the OECD Development Assistance Committee (DAC), 23 non-DAC donors, and 263 multilateral aid agencies.

[32] The need to tackle spatial inequality is embedded in several Poverty Reduction Strategies Papers, which explicitly address regional disparities of income and poverty as a central focus of development policy (Booth & Curran, 2005).

[33] Fortunately, this is beginning to change and there has been an uptick of academic studies on the subnational allocation of aid, many undertaken by researchers affiliated with the AidData Research Consortium. For example, Briggs (2017) shows that the allocation of World Bank and African Development Bank projects does not target the poorer or the poorest; instead, more aid projects are allocated to *wealthier* regions. Other studies find that the pattern of aid allocation is more driven by political concerns instead of people's needs (e.g., poverty, literacy) (Jablonski, 2014; Moser, 2008; Masaki, forthcoming).

[34] Development partner organizations voluntarily report to the AIMS detailed information on their projects (e.g., locations, estimated costs, start and end dates of contract/project implementation). With this information, we can map the spatial distribution of projects funded by a wider set of different development partner organizations than the World Bank alone.

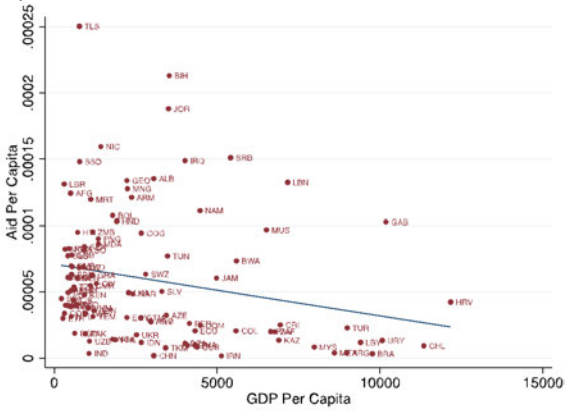
[35] See Alesina and Dollar, 2000; Dollar and Levin, 2006; Neumayer, 2003; and Bandyopadhyay and Wall, 2006.

[36] Small countries, with a total population of less than one million, are excluded from this analysis because these countries tend to have high volatility in terms of the levels of income and aid per capita.

country. For example, Figure 10 shows the district-level distribution of World Bank projects in Tanzania approved between 1995 and 2014. We selected Tanzania because this country received the largest number of World Bank projects in sub-Saharan Africa – a region where poverty is most prevalent

Figure 9: Poorer Countries Receive More Aid

Relationship between GDP Per Capita and Aid Per Capita by Country, 1995-2014



Note: This figure shows the relationship between aid per capita and GDP per capita, averaged over the 10-year interval between 1995 and 2014. Countries are represented by their three letter ISO code. ***Sources:*** *World Development Indicators (2016), and OECD-DAC (2016)*

Figures 10 and 11: World Bank Aid Allocation and Poverty Rate at the District Level in Tanzania

Figure 10: Poverty Rates and Estimated Amount of World Bank Aid Commitments Per Capita by ADM2 Region, 1995-2014

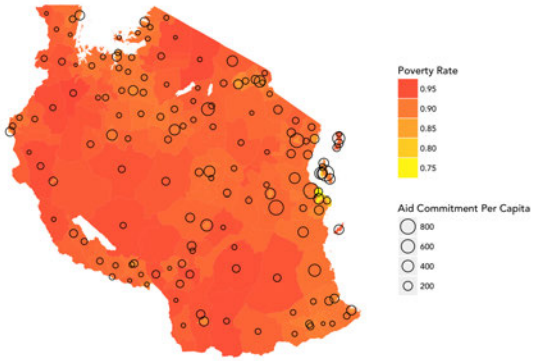
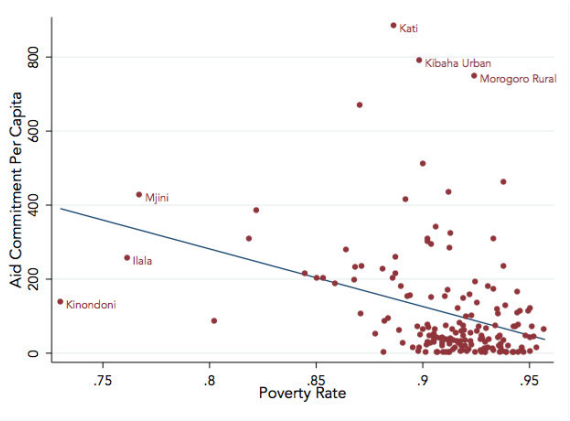


Figure 11: Poverty Rates and Estimated Amount of World Bank Aid Commitments Per Capita by ADM2 Region, 1995-2014



Notes: *The first figure shows the estimated amount of committed WB aid per capita allocated to each district in Tanzania between 1995 and 2014 while the second figure shows the correlation between the amount of WB aid per capita and poverty rate. Poverty rate (from WorldPop) measures the average percentage of people living under $2.00 per day in each district in 2010.* ***Sources:*** *Tatem et al. (2013), AidData 201*

While Tanzania received approximately 100 World Bank (WB) projects between 1995 and 2014, they were distributed in a scattershot manner across its 169 districts. Despite the World Bank's twin-goal of "ending extreme poverty and building shared prosperity," we find little evidence that more aid was targeted to poorer districts. In fact, quite the opposite, we find that *poorer* districts received fewer World Bank aid commitments (per capita) during the period of study (see Figure 15 on page 17). Ilala, one of the wealthiest districts in the country, received the largest amount of WB aid and also the largest number of WB projects (14 projects, worth an estimated $300 million in aid and $260 per capita).[37] The Dar es Salaam region – the country's commercial center and one of the country's wealthiest areas – received the most projects overall.[38]

Of course, there may be sound reasons why it makes sense for the World Bank to invest heavily in areas like Dar es Salaam. Cities are expanding rapidly in Africa, Asia, and Latin America and they pose a wide variety of development challenges (Standish, 2014; United Nations, 2014).[39] These cities, and particularly, megacities—large metropolitan areas of at least 10 million people—have a lot going for them: a high concentration of wealth and opportunity, as well as a rising middle class (French, 2013). However, the economic dynamism of cities belies hidden strains as infrastructure, public services, and social safety nets are overtaxed by new arrivals (UNDP, 2014; World Bank, 2011). An estimated 70 percent of Dar es Salaam's residents live in unplanned settlements on roughly a dollar a day (START, 2011, p. 8).

It is also important to remember that bilateral and multilateral development partners rarely make project placement decisions in isolation. In 2005, the international development community endorsed the Paris Declaration, which outlined five principles of effective foreign assistance.[40] Country ownership – the idea that "developing countries should set their own strategies for poverty reduction, improve their institutions and tackle corruption" – was one of these principles, effectively granting partner government more autonomy to design, implement, and site projects as they see fit (OECD, 2017).

Figures 12 and 13: Subnational Aid Allocation and Poverty in Malawi and Nigeria

Figure 12: Malawi
Poverty Rates and Project Count by ADM2 Region, 1997-2011

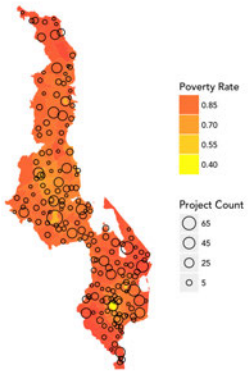
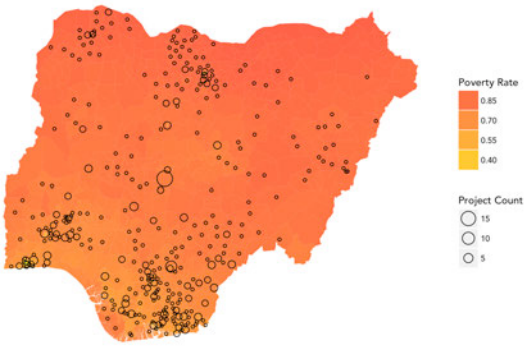


Figure 13: Nigeria
Poverty Rates and Project Count by ADM2 Region, 1995-2014



Sources: Tatem et al, Peratsakis et al (2012), AidData (2017)

[37] A single development finance project may be directed towards multiple subnational localities. While AidData is able to use World Bank project documents to identify the relevant subnational localities to be geocoded for each project, this information seldom delineates how the total dollar value of the project will be split across these locations in practice. Absent perfect information, we assume that the total amount of aid committed to a project is distributed equally across the subnational locations being targeted. Jablonski (2014) and Masaki (forthcoming) also employ the same approach.

[38] The issue of reverse causality is certainly lurking in this analysis. The observed positive relationship between poverty and aid in Tanzania might be driven by the possibility that WB projects might have successfully reduced poverty rates (as measured in 2010) in some districts, thus leading us to the spurious conclusion that poorer districts, or districts that experienced reductions in poverty rate due to WB-funded projects, seem to have received a greater amount of aid. To account for this possibility, we replicated the same analysis but calculated the amount of committed WB aid between 2010 and 2014 such that there is no possibility of WB aid (allocated after 2010) affect our poverty measure. Our findings remained intact even after we restricted our analysis to the post-2010 period.

[39] The United Nations (2014) estimates that the world will be home to 41 megacities by 2030, up from 28 in 2014 in its report, *World Urbanization Prospects*.

[40] See the following link for details on The Paris Declaration on Aid Effectiveness: http://www.oecd.org/dac/effectiveness/parisdeclarationandaccraagendaforaction.htm

Therefore, the subnational distribution of World Bank projects in Tanzania may simply reflect the priorities of the host government authorities. Fast-growing demand for better physical infrastructure and public service in urban centers has, in fact, made urban development one of the country's key national development priorities (Muzzini & Lindeboom, 2008). However, given that Government of Tanzania has also made "attracting investments, particularly in areas where the poor are more involved" a national development priority (Planning Commission of Tanzania, 2010, p. 10), it is not clear if this allocation of scarce public resources is optimal.[41]

The pattern of resource allocation that we observe in Tanzania also begs a broader question: does the same pattern hold when we turn to other countries and a broader cohort of development partners, including bilateral agencies or private foundations? We put this question to the test in two other African countries, Malawi and Nigeria, using project-level information reported into the AIMS and geocoded by AidData. In Malawi, this includes 269 aid projects reported by 27 development partners (99 percent of the AIMS portfolio). In Nigeria, this includes 74 projects reported by 28 development partners (20 percent of the AIMS portfolio).[42]

The Norwegian Agency for Development Cooperation (NORAD), United States Agency for International Development (USAID), and the European Union (EU) reported the largest numbers of geocoded projects in Malawi. In Nigeria, the Bill and Melinda Gates Foundation, the EU, and the Department for International Development (DFID) topped the list in terms of the number of geocoded projects reported.[43]

Since not all donors reported financial amounts associated with their projects to the AIMS, we use project count as a measure of aid intensity instead of aid commitment amounts.[44] Combining project locations from the AIMS with WorldPop's subnational poverty estimates, we can visualize the distribution of assistance within these countries down to the district (ADM2) level (see Figures 12 and 13).[45]

In some respects, Malawi and Nigeria have a lot in common. Both countries enjoyed an economic growth spurt at the start of the new millennium, which subsequently tapered off heading into 2015 due to falling oil prices. However, income inequality rose during this period and therefore economic progress has not trickled down to benefit all.[46] Over 50 percent of Malawi's population lived under the national poverty line in 2010, according to the World Bank's World Development Indicators. This is roughly on par with Nigeria, which registered a poverty rate of 46 percent in 2009.

Malawi relies heavily on official development assistance. ODA accounts for roughly 16 percent of the country's GNI and 90 percent of government expenditures.[47] Conversely, Nigeria is the largest economy in sub-Saharan Africa and foreign aid accounts for roughly 0.5 percent of its GNI and 10 percent of government expenditures. If greater reliance gives more bargaining power to donors (Parks et al., 2016), one might expect them to have more influence on the design of projects in Malawi (e.g., priorities, target beneficiaries) than in Nigeria.

However, this does not seem to be the case. Malawi and Nigeria may have different levels of aid dependence, but this appears to have little bearing on whether development assistance is targeting the poorest communities. Figures 12 and 13 show the district-level (ADM2) distribution of aid projects versus local poverty rates in both countries. What we find is strikingly similar to what was previously observed in Tanzania: aid is flowing disproportionately to regions that are home to the largest cities with the highest concentration of wealth.

In Malawi, districts with major cities were the big winners and received substantially more projects than regions that were less geographically advantaged. The country's largest city and capital, Lilongwe, received the largest number (99) of total aid projects to Malawi. Other densely populated districts also did well in attracting aid investments, including: Mangochi (54 projects), Zomba (46 projects), and Blantyre (32 projects).

In Nigeria, a disproportionate number of projects are located in the South. Again, the country's capital, Abuja received by far the largest number of projects (18), followed by Enugu Northin Enugu (8). This preference for channeling aid projects to the South might seem to be inconsistent with a pro-poor investment strategy, since poverty is "more prevalent in the northern part of the country," particularly in the North East and North West regions (Ajakaiye et al. 2016, p. 222). However, it is important to keep in mind that the security situation and presence of Boko Haram in the northeastern regions of

[41] In its latest 5-year development plan, the Government of Tanzania also acknowledges that "[i]nadequate assimilation of the national development priorities at the local level partly explains the failure of Tanzania to translate its high economic growth into substantial reduction poverty as well as in income and spatial inequity." See http://www.mof.go.tz/mofdocs/msemaji/Five%202016_17_2020_21.pdf

[42] Not all development partners regularly report their aid investments into the AIMS and, even if they do, these records may not include the geographic locations of projects down to the district-level (ADM2).

[43] Since donors self-reported their projects in the AIMS database, the definition of a "project" was up to the discretion of each donor organization. This implies that the number of projects may be over- or under-reported for some donors due to differences in the way they defined a project (although we suspect that these differences would be small at best). Interpreting our findings based on the number of projects requires some extra caution.

[44] Indeed, only 18 out of 74 projects in Nigeria include information on their financial amounts, while reporting on the amount of project aid is much more complete in Malawi (240 out of 269 projects are accompanied by their project amounts). Because of these gaps in the AIMS datasets, most of the projects in Nigeria would drop out if we were to use committed aid amounts in our analysis. It is worth highlighting that for Malawi, where most projects report financial amounts, our main findings remain intact if we use the estimated amounts of committed aid in our analysis, instead of project count.

[45] WorldPop's population mapping program integrates various sources of welfare and consumption data (e.g., USAID's Demographic and Health Survey and the WB's Living Standards Measurement Survey) to produce its own estimates of poverty (e.g., the proportion of people living under $1.25 or $2.00) at a highly granular level (with a high resolution of 1 square kilometer). Poverty estimates used in our analysis are based on 2010.

[46] The Gini coefficient, a frequently used measure of income inequality, increased from 0.39 in 2004 to 0.45 in 2011 in Malawi and from 0.42 to 0.45 in Nigeria between 2004 and 2010.

[47] Comparatively, Malawi is smaller than Nigeria in terms of the size of its population, economy, and natural resource endowments (particularly, petroleum).

Nigeria may partially explain this pattern. Still, there are regions throughout the country at levels of poverty similar to the northeast that received few or no aid projects.

If policymakers are not trying to reach the poorest communities, what else might be driving how aid is targeted at the subnational level? While there is a vast literature on the resource allocation strategies of bilateral aid agencies and multilateral development banks, most of these studies are cross-national in focus. [48] In the next section, we examine the factors that influence aid allocation at the subnational level.

Section 2.3

Revealed preference: What determines how aid gets allocated?

Government leaders in low- and middle-income countries and their external development partners must weigh numerous factors and make hard trade offs about how to best allocate scarce resources to address issues related to poverty. There is much conjecture about what drives aid allocation *between* countries, but far less attention is paid to the question of how development assistance dollars are distributed *within* countries.[49]

Development organizations may have their own guidelines and decision-making processes to determine how they allocate their aid budgets,[50] but partner governments also exert significant influence over where project activities are geographically sited (Masaki, forthcoming; Jablonski, 2014). Bilateral aid agencies and multilateral development banks, seeking to address past criticism, have increasingly sought to position themselves as responsive to national development strategies and the priorities of public officials in low- and middle-income countries.[51]

However, bilateral and multilateral development institutions still have some influence in the targeting of aid, since they must be able to defend their project design decisions to overseers, as well as approve or reject project proposals from their host government counterparts. It is, therefore, reasonable to assume that partner governments pay attention to the selection criteria of prospective funders – for example, anticipated economic rates-of-return, beneficiary analysis, and social and environmental safeguards to minimize the probability of "undue harm" – when they consider project design features (World Bank, 2011, p. 2; IEG, 2010).

In this section, we test two popular arguments about how subnational aid allocation decisions are made: economic efficiency versus political expediency. The *economic efficiency* argument views aid allocation as primarily a technocratic exercise performed by welfare-maximizing leaders that seek to improve the lives and livelihoods of as many people as possible at the minimum cost. Conversely, the *political expediency* argument views aid allocation as a much more politically contested exercise where domestic and international policymakers seek to gain leverage or curry favor through the aid distribution process.

2.3.1

Economic efficiency: Reducing poverty for the most people at least cost

If aid is an instrument to address poverty (in its various forms), it should in principle be targeted to improve the lives and livelihoods of those most in need (Briggs, 2017). Yet, as we explored in an earlier section of this report, aid *does not* appear to be reaching the poorest, or most geographically disadvantaged regions, within countries. Does this mean that government officials and their development partners are turning a blind eye towards poverty? Not necessarily.

In a world of scarce resources and seemingly limitless need, policymakers face a fundamental dilemma:[52] do they expend more to reach the poorest of the poor (who are generally located in remote and hard-to-reach locations) or do they seek to help the greatest number of poor people possible within their budget constraints? If decision-makers are motivated by *economic efficiency*, one would expect to see them target aid in such a way that is likely to reduce poverty for the maximum number of people at the minimum possible cost. An immediate hurdle they must overcome is that the poorest regions are more likely to be remote, rural places.

Development projects in rural, remote, and sparsely populated areas often have fewer beneficiaries (Ajmera & Fields, 2016) and higher delivery costs (AfDB, 2006). Aid

[48] See Neumayer (2003) for a systematic review of literature on bilateral and multilateral aid allocation behaviors.

[49] A notable exception is Briggs (2017), who studies the allocation of World Bank and African Development Bank projects approved between 2009 and 2010 in 24 sub-Saharan African countries. Our study has expanded the temporal scope of Briggs' analysis by including all World Bank projects approved between 1995 and 2014.

[50] Some development partners explicitly impose performance-based criteria to determine how aid should be allocated to different countries. International Development Association (IDA), for instance, has a performance-based allocation (PBA) system, which takes into account the needs and policy performance of its partner countries (IDA, 2010).

[51] See Boughton et al., 2004; Koeberle et al., 2005; and Smets and Knack, 2015. A notable exception is fragile states, which may not have sufficient institutional capacity to manage and implement development projects on their own. In these countries, external organizations may play the leading role in the design and implementation of their funded projects (Chandy et al., 2016).

[52] The expected poverty-reducing impact of aid is, among other things, a function of its responsiveness to the *level* of poverty in each locality and the number of beneficiaries being targeted by by a given development intervention.

agencies and their host government counterparts may therefore prefer densely populated areas with greater access to infrastructure and public services to maximize project beneficiaries and minimize costs.[53]

Nonetheless, the allure of economic efficiency can also create perverse incentives for governments and their development partners to underinvest in geographically isolated and sparsely populated areas where the poorest of the poor live (World Bank, 2009). As a result, those who design and site development projects can inadvertently cement – or even widen – spatial inequalities, as geographic disadvantages become a self-perpetuating cycle.

Using geocoded data on 3,400 World Bank projects in 143 countries[54] and 362 aid projects reported in the Malawi AIMS and Nigeria AIMS, we set out to test the extent to which economic efficiency is driving how aid projects are allocated across subnational regions. It is important to note that these geocoded locations do not necessarily correspond to areas where interventions actually took place, but localities where projects were *targeted*.[55]

If the logic of economic efficiency governs subnational aid allocation, one would expect to see (a) the majority of projects targeting the most populous areas, *and* (b) poorer regions attracting more aid after controlling for population density and infrastructure access. If this is not the case, then something other than an interest in poverty eradication is likely motivating aid allocation decisions.

For this analysis, we use three indicators: population density (the average number of population per square kilometers), physical proximity to road infrastructure (the average value of road length in per square kilometers) and nighttime light (as a proxy for subnational economic development).[56]

Development partners put a premium on economic efficiency: they concentrate their aid investments in wealthier regions with more numerous beneficiaries, rather than the neediest regions

Population density, income, and road access strongly predict which subnational regions receive international development finance.[57] Figures 14-16 visualize the predicted amount of World Bank investments in a region at different levels of population density, income (proxied by nighttime light), and road density.[58] The figures clearly show that all of these factors are strongly and positively correlated with World Bank investments. In other words, more World Bank financing is being allocated to densely populated and richer regions with better infrastructure.

[53] There is also some evidence that aid projects are less effective in geographically remote and dispersed locations (Mu & van de Walle, 2011; Hansen et al., 2011; Broegaard et al., 2011; Winters, 2014; and Wayland, forthcoming). This too may feed into future project siting decisions.

[54] Of 5,684 World Bank projects approved between 1995 and 2014, AidData has been able to identify the specific locations of 3,379 projects at the ADM1 (e.g., regions, provinces) level.

[55] In more precise terms, *targeted areas* refer to specific locations that World Bank project documents (e.g., project papers, project information documents, appraisal documents, completion reports) identify as the sites of planned interventions or potential beneficiaries of the proposed projects. In reality, projects may not end up being implemented in those targeted areas for a number of different reasons (e.g., a shortage of funds to complete projects; changes in the initial plan of the projects).

[56] Precise poverty measures are often not available at the subnational level for the majority of regions in the developing world; however, nighttime light has proven to be a reasonable proxy for the level of income in given localities (Jean et al., 2016; Storeygard, 2016). While studies (e.g., Henderson et al., 2012; Sutton & Costanza, 2002; Khomba et al., 2017; Weidmann et al., forthcoming) have shown that nighttime light intensity is strongly correlated with a number of other development outcomes (e.g., wealth, GDP, household consumption, household asset ownership, access to electricity), it clearly has its own limitations. For instance, luminosity data tends to suffer from significant measurement errors particularly in less populated areas (Cogneau & Dupraz, 2014; Chen & Nordhaus 2011). Despite such disadvantages, nighttime light intensity still offers "a noisy but globally consistent—and globally available—proxy for [subnational] economic activity" (Jean et al. 2016, p. 791).

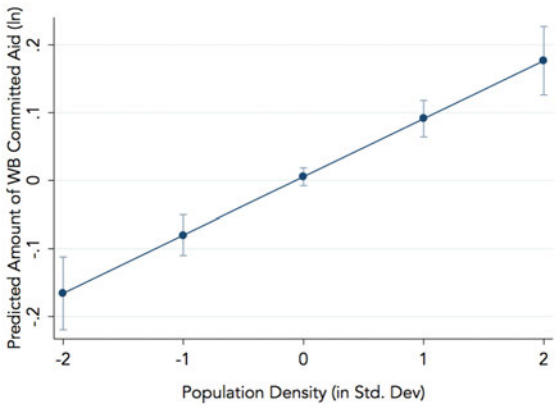
[57] Our empirical strategy relies on a standard linear regression with the estimated amount of World Bank financing as the dependent variable. Across all our models, we always control for country fixed effects, which account for all time-invariant, country-specific characteristics, because our interest lies in explaining variation across regions, not across countries. See Figure A-1 for the full econometric results.

[58] Descriptive statistics for these measures are reported in Appendix B.

Figures 14-16: Densely Populated, Wealthier, and Easier-to-Access Regions Receive More World Bank Aid

Figure 14: More Densely Populated Regions Tend to Have Higher World Bank Aid Commitment Amounts

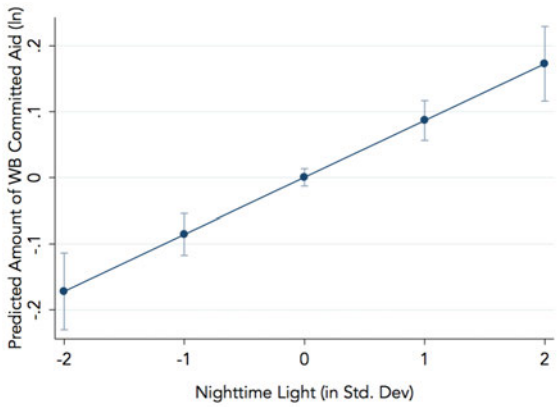
Predicted Amounts of World Bank Aid Commitments (Worldwide) by Variance in Standard Deviations from Mean Population Density), 1995-2014



Sources: CIESIN (2016), AidData (2016)

Figure 15: Wealthier Regions Tend to Have Higher World Bank Aid Commitment Amounts

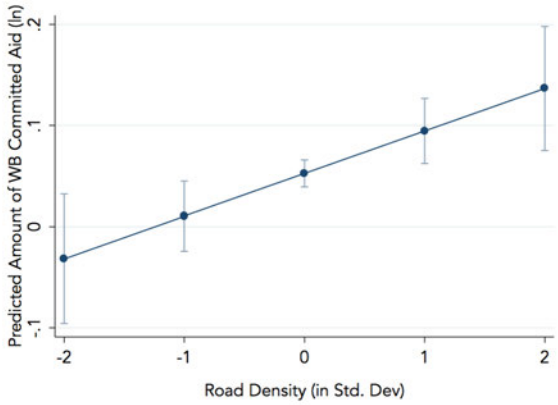
Predicted Amounts of World Bank Aid Commitments (Worldwide) by Variance in Standard Deviations from Mean Nighttime Light Amounts, 1995-2014



Sources: NOAA, AidData (2016)

Figure 16: More Accessible Regions Tend to Have Higher World Bank Aid Commitment Amounts

Predicted Amounts of World Bank Aid Commitments (Worldwide) by Variance in Standard Deviations from Mean Road Density, 1995-2014



Sources: CIESIN (2016), AidData (2016)

Notes: The figure shows the predicted amount of World Bank project aid (log-transformed) in a given region at different levels of population density, income, and road density scaled in standard deviations. This figure is generated using a linear regression where the estimated amount of WB aid is regressed on population density, income, and road density separately (after controlling for country-fixed characteristics).

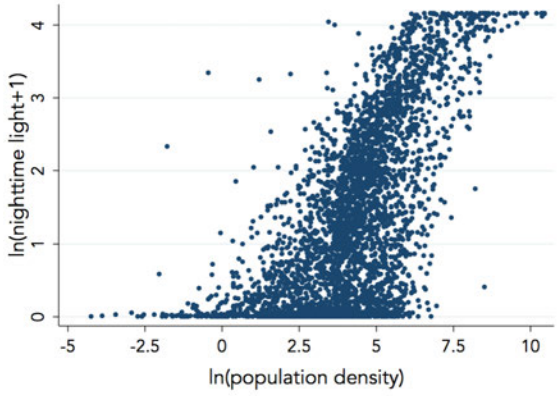
Therefore, if the mark of a pro-poor development organization is that it targets a disproportionate share of its investments to the poorest of the poor and the least developed geographic areas, the World Bank falls short of the mark. Yet, geographically disadvantaged regions tend to be sparsely populated *and* infrastructure-poor, such that development organizations might also consider it to be more efficient to focus their efforts where they can reach a greater number of poor people at a lower cost, even if those regions are relatively better off.

Figure 17 underscores this point, showing that regions with higher levels of nighttime light (more economically developed areas) tend to have higher levels of population density and road access, which means more potential beneficiaries.[59]

For development partners other than the World Bank, we see a strikingly similar pattern of aid allocation behavior. In Figures 18 and 19, using data from the AIMS in Malawi and Nigeria, we see that in both countries, densely populated and richer areas, on average, received a greater number of projects. The same pattern is observed for each of the top 3 donors in each country, though the differences are less pronounced. Our findings are consistent with Marty et al. (2017) who find evidence that more health aid is targeted to areas with *greater* existing health infrastructure in Malawi.[60,61]

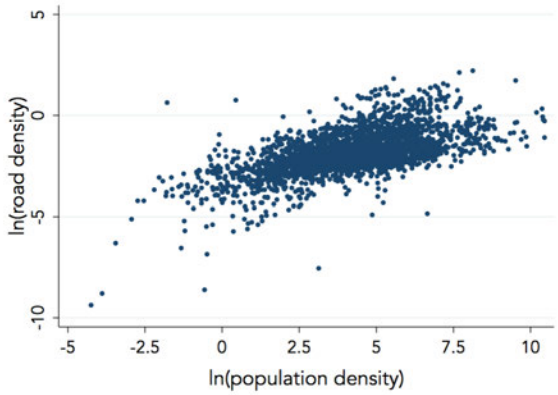
Figure 17: Wealthier Regions Tend to Be More Densely Populated

Regional Averages of Nighttime Lights and Population Density (Worldwide)



Sources: CIESIN (2016), NOAA

Regional Averages of Road Density and Population Density (Worldwide)



Sources: CIESIN (2016),

Notes: The figure shows the relationship between population density, on the one hand, and income and road density, on the other.

[59] If we use the number of projects as the dependent variable, instead of the estimated amount of WB aid, we find that poorer regions actually receive a greater number of projects after controlling for population density. The estimated effect of road access on the amount of WB aid (or the number of WB projects) is positive and statistically significant in the bivariate regression. But it changes its sign of effect and is negatively significant once population density is added as a control, which means that regions with poorer infrastructure receive greater WB investments when population density is held at constant (see Tables A-1 and A-2).

[60] The only systematic difference in our key findings between our global study of WB aid and case studies of Malawi and Nigeria is that road density is negatively correlated with the number of projects in Malawi while this variable is strongly positively correlated with WB aid in the global study.

[61] We have also replicated our analysis by disaggregating aid by sector. It is plausible that some sector-specific aid may be more pro-poor (e.g., health and education) than others. In Malawi, we have a sufficient number of projects to disaggregate project count by sector, while the small number of geocoded projects in the Nigerian AIMS dataset does not seem to warrant this type of replication exercise. In particular, we focus on health and education aid, and evaluate whether these subsets of projects may be more sensitive to the rate of poverty in Malawi. Consistent with Marty et al. (2017), we find that health aid targets less poor and more densely populated areas. In contrast, we do not find any significant relationship between the allocation of education aid with poverty and population density.

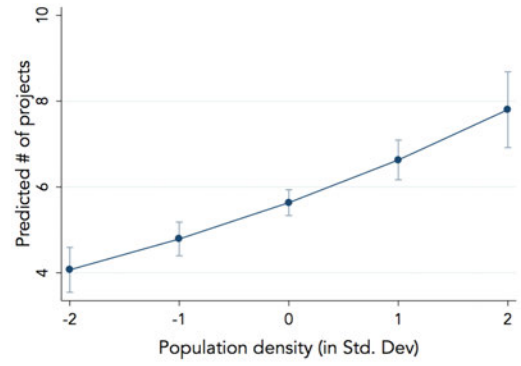
Figures 18 and 19: Malawi and Nigeria Case Studies

Regions in Malawi and Nigeria with lower poverty rates and higher population densities receive a higher number of aid projects

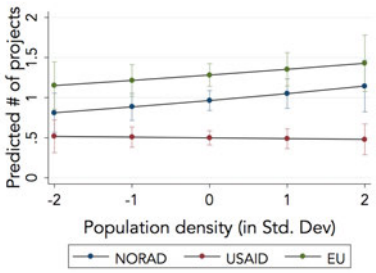
Figure 18: Malawi

Predicted Numbers of Aid Projects by Variance in Standard Deviations from Mean Population Density

All Donors



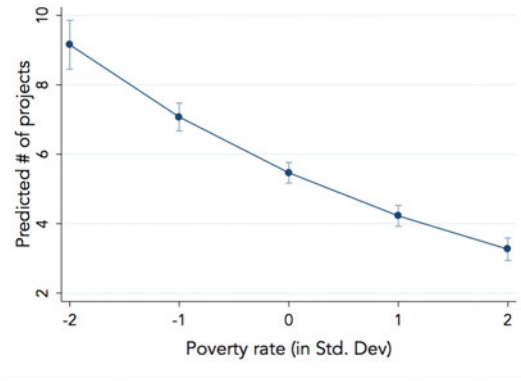
Three Largest Donors
(by number of projects)



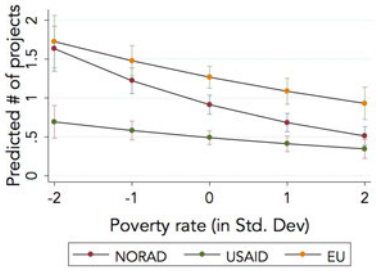
Sources: CIESIN (2016), Peratsakis et al (2012

Predicted Numbers of Aid Projects by Variance in Standard Deviations from Mean Poverty Rate

All Donors



Three Largest Donors
(by number of projects)

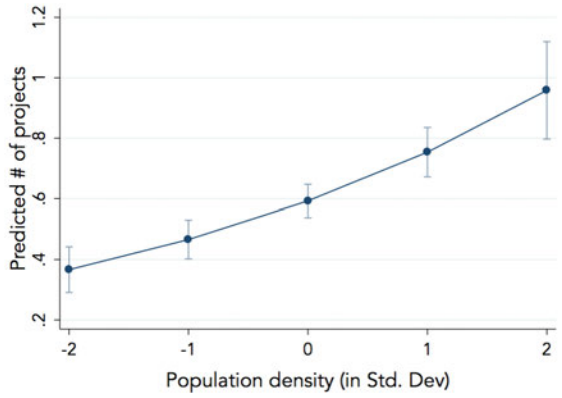


Sources: Tatem et al (2013 , Peratsakis et al (2012)

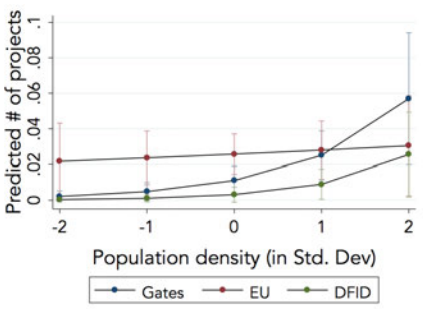
Notes: The figures above were generated based on the Poisson regression to test the bivariate relationship between population density (or poverty rate) and project count as reported in the AIMS in Malawi

Figure 19: Nigeria Predicted Numbers of Aid Projects by Variance from Mean Population Density (standard deviations)

All Donors



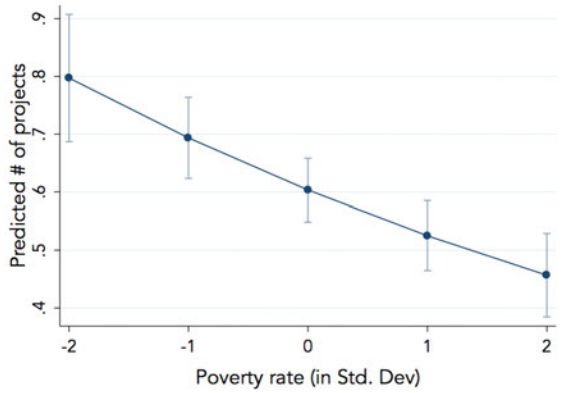
Three Largest Donors
(by number of projects)



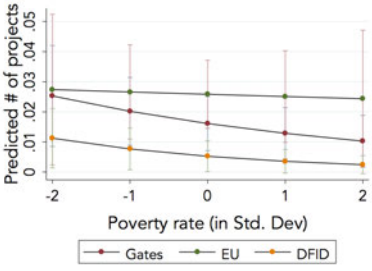
Sources: *Tatem et al,(2013), AidData (2017)*

Predicted Numbers of Aid Projects by Variance from Mean Poverty Rate (standard deviations)

All Donors



Three Largest Donors
(by number of projects)



Sources: *Tatem et al,(2013), AidData (2017)*

Notes: *The figures above were generated based on the Poisson regression to test the bivariate relationship between population density (or poverty rate) and project count as reported in the AIMS in Nigeria*

Economically efficient aid is unlikely to help the poorest regions break free from poverty and may make them relatively worse off compared to their geographically advantaged peers

Due to poor physical infrastructure and remoteness, delivering public services and private goods in sparsely populated, rural areas is far more costly than doing so in densely populated, urban areas (Johns & Torres, 2005; Kumaranayake & Watts, 2000). In response, development partners apparently seek to maximize their "value for money" by targeting assistance to reach the greatest number of beneficiaries possible, at the minimum possible cost per beneficiary. It is therefore not terribly surprising to see that urban areas and infrastructure-rich regions attract a disproportionate share of aid investments, the benefits of which can spill over to a greater number of people, relative to regions with few residents and less access to infrastructure.

Nonetheless, this strategy carries with it significant risks. Economically efficient aid targeting not only makes it far more difficult to reach the poorest of the poor, but it also creates the possibility that donors will inadvertently make already poor regions more worse off relative to their geographically favored peers. Bilateral and multilateral development partners – and their host government counterparts – should therefore keep in mind that (widening) spatial inequalities can have far-reach economic, social, and political consequences (Alesina et al., 2004, 2016; Cederman et al., 2013; Dreier et al., 2001).[62]

2.3.2

Political expediency: Gaining maximum leverage with domestic constituencies

The subnational aid allocation process could also be vulnerable to capture by politicians seeking to gain leverage or curry favor with domestic constituencies. As Jablonski (2014) puts it, delegating aid allocation to local institutions may invite "perverse consequences" (p. 301). Elected officials may use aid funds to support projects that increase their odds of staying in power.[63] Rather than channeling investments to the neediest communities, they may succumb to political pressure to buy votes and reward allies (Jablonski, 2014; Masaki, forthcoming; Moser, 2008).

Indeed, previous studies suggest that a significant amount of aid in Sub-Saharan Africa has been (mis)used to finance white-elephant projects, or "investment projects with negative social surplus" (Robinson & Torvik, 2005; Easterly, 2009).[64] These white elephant projects are economically inefficient yet often politically rational in that they allow politicians to reward groups whose support is essential for their own political survival (Robinson & Torvik, 2005). Other studies suggest that leaders in developing countries often favor their own home regions, even when delivering more resources to those communities yields few development benefits – or development benefits for few.[65]

To systematically test whether decision-makers are motivated by *political expediency* considerations, we evaluate whether leaders' birth regions receive a disproportionate amount of aid, as compared to other regions. We use new dataset that measures the birth

[62] These consequences include lower economic growth, political polarization, social conflict, and violent unrest (Alesina et al., 2004, 2016; Cederman et al., 2013; Dreier et al., 2001).

[63] In the cross-country aid allocation literature, political economy arguments mainly focus on the geopolitical or commercial interests of leaders *not* in aid-recipient countries, but in donor countries who seek to use aid for purposes that are not necessarily related to development: to buy policy concessions from recipient countries (Dudley & Montmarguette, 1976; Bueno de Mesquita & Smith, 2007; Annen & Moers, 2013); to ensure a friendly regime stays in power (Morrison, 2009; Dunning, 2004; Masaki, 2016); or to attempt to further the commercial or geopolitical interests of donor countries (Crawford 1997, 2001; Stokke, 1995).

[64] "Regional favoritism" is widespread in sub-Saharan Africa and often cited as a clear manifestation of inefficient allocation of public resources (Hodler & Raschky, 2014; Posner, 2005; Edgerton, 2002; Meredith, 2005). Posner (2005, p. 96), for example, notes 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.''

[65] John Cohen, a Harvard adviser who worked with the Kenyan government, wrote a paper in 1995 that includes a telling passage about Kenya's Public Investment Program, domestic politics, and the role of the World Bank. He writes that "[t]hroughout negotiations over how to curb the growth of Government-funded projects (1988-90), as well as through the complex process of designing and implementing a [Public Investment Program], internal discussions between Government officials, expatriate technical assistance advisors, and World Bank professionals monitoring the exercise always considered ethnic issues. … Government official-advisor discussion constantly focused on the fact that the increase in Government-financed projects was driven by such ethnic forces as: (1) the sequential efforts of Presidents Kenyatta and Moi to build facilities and infrastructure in their ethnic home areas or the areas of other ethnic groups belonging to their ruling coalitions; (2) the necessity for MPs tied to the ruling ethnic coalition to 'bring home the bacon' to their constituencies and ensure that visible public investments were made in their ethnic areas; and (3) the rising tide of 'construction driven corruption' that was associated with capital projects and tolerated by ruling elites so long as the rents generated benefited public service personnel who were members in good standing of the ethnic alliance in power. Importantly, both government officials and advisors discussed the negative effects these practices had on the effective use of scarce budgetary resources and how they negatively affected efforts to promote economic growth. In sum, it was clear to all concerned that Government-financed projects were proliferating with little or no regard to their potential contribution to economic and social development or to national or district development plan priorities aimed at social development and economic growth because ethnic godfathers close to the center of power were pushing for projects in their home areas" (Cohen, 1995). Also, see Barkan and Chege, 1989; Do et al., 2013; Burgess et al., 2015; Hodler and Raschky, 2014.

regions of heads of state from 174 countries over the 1994-2014 time period to facilitate this analysis.[66]

World Bank project investments do not appear to be politically expedient, but Chinese aid disproportionately benefits the birth regions of national leaders

Encouragingly, we find no evidence that World Bank projects disproportionately favor the birth regions of national leaders. There are several plausible reasons why one might not observe regional favoritism in the subnational allocation of World Bank projects. First, the World Bank has put in place a set of due diligence policies and procedures that are designed to protect their investments from political misuse and orient investments towards economic efficiency and development impact goals (IEG, 2010; Legovini et al., 2015; Dreher et al., 2015). Second, electoral incentives may have more impact on leaders' aid allocation decisions than allegiance to their home regions.[67]A third possibility is that the extent to which aid investments are guided by political expediency considerations may be mediated by the degree of autonomy development partners grant to their host government counterparts in low- and middle-income countries over the use of those funds.

Using AidData's geocoded dataset of Chinese development projects in Africa from 2000-2012, Dreher et al. (2015) separately analyze the subnational distribution of Chinese-financed and World Bank-finance development projects.[68] They find that Chinese development projects allocated disproportionately to leaders' birth regions. This pattern is not observed for World Bank projects, however.[69]

The Dreher et al. (2015) study suggests that political expediency may indeed be a resource allocation strategy utilized by national leaders to reward political allies and punish political opponents. However, it also suggests that this strategy may be more feasible with some development partners than others. China's aid policy is governed by a "principle of non-interference"[70] which grants partner country governments substantial authority to design and implement development projects as they see fit. This policy appears to have the (probably unintended) side effect of rendering Chinese development projects more vulnerable to policy capture. Consequently, other non-Western suppliers of development finance that adopt a similar policy of non-interference may be equally vulnerable to this type of domestic political manipulation.

Aid allocation favoring urban areas may be politically expedient, but perpetuate poverty for remote regions with less political clout

We have demonstrated in this chapter that, on average, aid favors wealthier, urbanized areas with better access to infrastructure regardless of the source of the aid. These biases may be attributable to the fact that development partners and their host country counterparts have prioritized the pursuit of economically efficient aid allocation strategies (i.e., achieving the best possible value-for-money in the delivery of aid). However, it is also possible that these biases are intentional and owe their explanation to political expediency considerations, as policymakers endeavor to be more responsive to wealthy, urban residents with greater bargaining power.[71]

[66]These data were collected via a combination of web scraping and manual coding using the Archigos data base of leaders. We obtained the birthplace coordinates by feeding search terms into Google in the following format: "[leader name] [leader's country name] birthplace." For most leaders, Google reports a topline result, which we automatically recorded and then geolocated using the geocode() function from the ggmap package in R. For cases that failed, we manually fixed the birthplace names using additional searches until the geocode() function was able to locate a coordinate set for the birthplace location. Finally, we located these points within an ADM1-level shapefile. Because the exact point location of a leader's birth was not always available (even though R will return geographic points for a geographic location name), we use these points only at the ADM1 level, which is the largest administrative region classification system below the national level. We then merged these data with 3,400 geocoded World Bank projects in more than 60,000 locations in 144 countries. The broad spatial and temporal scope of our analysis makes it easier to test the generalizability of the claim that political expediency influences how aid projects are allocated across subnational regions.

[67] Testing the impact of electoral incentives on aid allocation for all countries goes beyond the scope of this chapter, but several studies suggest that leaders seek to win votes through channeling more projects to districts or regions that are electorally important to them (Briggs, 2012; Jablonski, 2014; Masaki, forthcoming). If leaders' birth regions correspond to regions where leaders already enjoy solid political support, channeling aid projects to those regions may be unnecessary from a political survival standpoint.

[68] AidData has developed a methodology called Tracking Underreported Financial Flows (TUFF) to triangulate and synthesize information from four primary sources (e.g., English, Chinese and local-language news reports; Chinese ministries, embassies, and economic and commercial counselor offices; the aid and debt information management systems of finance and planning ministries in counterpart countries; and case study and field research undertaken by scholars and NGOs) to capture a more complete picture of the official finance activities (both ODA and other official flows) of relatively opaque development partners, such as China. For more information on AidData's TUFF methodology, see *http://china.aiddata.org/content/methodology*.

[69] Isaksson and Kotsadam (2016) use georeferenced data on World Bank and Chinese projects and georeferenced Afrobarometer survey data to evaluate the impact of different types of development projects on local corruption outcomes. They find that Chinese projects fueled local corruption, but World Bank projects did not.

[70] See, for example, Dreher et al. (2015); Tull (2006); Mthembu-Salter (2012); Jansson (2013).

[71] Indeed, many previous studies suggest that politicians privilege urban interests over rural counterparts. Lipton (1971) and Bates (1981) describe how urban elites are able to solicit policy concessions from their governments that view them as an immediate threat to their grip on political power. In addition, urban residents are often better informed about the role and performance of their government authorities "due to greater average wealth, higher education, better access to the media as well as a stronger urban focus in media coverage" (Majumdar et al., 2004, p. 139). They can then leverage this information to pressure their governments to adopt distributive policy that better reflects urban interests.

In all likelihood, subnational aid allocation decisions are governed by some mix of economic efficiency and political expediency criteria, depending on factors like the identity of the donor, national and local recipient institutions and needs, and types of aid. It is also important to note that the pattern of subnational aid allocation may vary across different sectors.[72] There does, however, seem to be a growing consensus that the needs of citizens in aid-recieving countries are secondary factors in determining subnational aid allocation decisions (Briggs, 2017; Odokonyero et al., 2015; Öhler & Nunnenkamp, 2014; Kotsadam et al., 2017).

In the next chapter, we move from the question of how aid is targeted within countries to the question of whether and under what conditions aid is effective at reducing inequality and improving local development outcomes.

[72] For instance, donor-funded public sector reform projects tend to concentrate in the capital city where all the government institutions are found while environmental projects may target where there is a greater environmental risk. As such, there is no reason to assume that all projects should target the poorest.

Chapter 3

Effectiveness: Is development aid improving the lives of local communities?

The poorest regions within countries lag behind geographically advantaged regions on various measures of development progress. They are also neglected by bilateral and multilateral development partners, increasing their risk of being 'left behind' as more and more resources are funneled into relatively well-off regions. But what is the relationship between aid and progress (or lack thereof) at the local level? Do development projects need to be located in the poorest regions to have positive development impacts?

Scholars and practitioners have long debated the effects of aid, asking whether, when, and how it helps low- and middle-income countries achieve better development outcomes.[73] Data limitations historically kept these discussions at either the country level or the project level. Fortunately, the growing availability of location-specific information – geocoded development finance, satellite imagery, georeferenced household surveys, mobile phone data and other sources – is fueling a new wave of aid effectiveness research at the subnational level (BenYishay et al., 2017).

In this chapter, we synthesize insights from this new body of research that harnesses geocoded data[74] to evaluate aid effectiveness in ways that are not currently possible at the country level. Specifically, we seek to understand aid's impact on four types of outcomes: economic growth, poverty, governance, and environmental protection. These four outcome areas are major priorities of the international development agenda (both during the MDG and the SDG era) that lend themselves to subnational analysis over time using remotely-sensed data or georeferenced survey data. In our discussion, we highlight how new forms of subnational data have allowed for a deeper understanding of the linkages between aid and development outcomes at the local level, as well the limitations of currently available data and methods.

Our review of this body of work gives rise to four findings of note which we discuss in greater depth in this chapter:

- **Growth:** The evidence is mixed on whether aid bolsters local economic growth.
- **Human welfare:** Aid generates modest improvements in health, education, and water.
- **Governance:** Some types of aid may fuel corruption and incite conflict.
- **Environment:** Aid has a mixed track record on biodiversity and conservation outcomes.

Section 3.1

A different vantage point: Leveraging geospatial information to fuel a new wave of aid effectiveness research

In the 1990s and early 2000s, hundreds of aid effectiveness studies were published using countries as the units of analysis. Researchers aggregated across large numbers of aid projects, often with quite different programmatic objectives, and then used cross-country regression methods to gauge aid's impact on outcomes like economic growth. Yielding contradictory and inconclusive results, this research left the development policy community with few actionable insights.

Since then, we have witnessed a rapid increase in the number of project-specific impact evaluations (Cameron et al., 2015). These studies employ significantly more convincing strategies to isolate the net, attributable impacts of individual development projects and interventions. However, scholars have still struggled to translate the findings from these micro-level studies into generalizable knowledge about the effects of aid, which has proven to be highly problematic (Rodrik, 2009; Pritchett & Sandefur, 2015).[75]

[73] Easterly (2013, p. 29) notes that this country-level focus predates the MDG era and is "so taken for granted that it is rarely even noticed."

[74] Another approach to evaluating the causal impacts of aid on outcomes is the use of randomized control trials (RCTs). RCTs have the advantage of randomly assigning treatments and are ideal for attributing causality to observed correlations. While RCTs are important and powerful (and expensive) tools, the findings of RCTs vary across contexts, are often based on a relatively small number of respondents, and may not generalize to other contexts. We focus on studies that use subnational, geocoded data to strike a balance between the generalizability sought in cross-national analysis and the precision of RCTs. This allows for a clearer picture of average effects and associations, which can be useful for policy.

[75] On the "micro-macro paradox" of aid effectiveness research, see Mosley (1987) and Howes et al. (2011).

By merging data on the precise locations of aid projects with georeferenced data on development outcomes, researchers and evaluators can now measure the localized (subnational) effects of aid at and near project intervention sites, and control for a large number of unobserved factors that would otherwise confound their ability to isolate the causal impact of a given intervention on a development outcome of interest. This quasi-experimental approach, known as geospatial impact evaluation (GIE), "offers a middle way between project evaluations and aggregated cross-country comparisons" (Berlin et al., 2017).

A common concern among researchers and evaluators is that communities who receive aid are different from those who do not in consequential ways.[76] As described in Box 1, GIEs address such concerns by making comparisons only within tighter geographies, where factors other than aid are likely to be similar (comparing villages within a district, for example, rather than comparing broad regions of a country). Additionally, because outcome measures are often available for many years, one can now reliably account for any pre-project differences across aided and unaided areas that might bias the analysis. The result is a burgeoning set of studies that reliably addresses questions about aid effectiveness at subnational scales.[77]

In the remainder of this chapter, we help shed light on this question by reviewing what existing research tells us about the effects of aid at the local level. Since data sources are rapidly proliferating, readers should keep in mind that the upcoming discussion merely reflects the *current* state of the field. As with any other dynamic and rapidly evolving line of research, one should expect many new findings to emerge in the coming years.

Box 1

What Are Geospatial Impact Evaluations?

Geospatial impact evaluations (GIEs) use observational data to estimate the causal impact of development programs using quasi-experimental methods. Specifically, GIEs pair units of analysis (e.g. districts, villages, 1 kilometer by 1 kilometer grid cells) that are similar on a number of geographic and socioeconomic dimensions — distance to roads, population density, slope, elevation, precipitation, temperature, among many others — to isolate the causal effect of development programs on outcomes and minimize problems of reverse causality. This pairing of locations is achieved via a combination of propensity-score matching, difference-in-difference estimators, and regression discontinuity methods.

GIEs make it possible to rigorously evaluate programmatic impact in cases when it is not feasible (or ethical) to determine which individuals or communities participate in a program through random assignment. The fact that analysts can implement them retrospectively (for completed projects or currently-active projects) and remotely makes them particularly useful for studying conflict and fragile state settings.

Though they do not employ randomization methods, GIEs can control for omitted variables at fine geographic levels, thereby allaying longstanding concerns of impact evaluations. Of particular note is the fact that long-term data records from satellites and surveys create opportunities to capture pre-intervention measurements of outcome levels and trends (e.g. land cover change, local economic development) in both areas that do and do not receive aid.

[76] For example, if aid-recipient communities have certain features that make them more likely to experience rapid development progress *even in the absence of external assistance*, it is far more difficult for researchers and evaluators to identify cause-and-effect relationships.

[77] Because we are mainly interested in summarizing the findings of existing studies, and these studies use a variety of empirical approaches, we do not devote a great deal of space to detailing the methodological approaches used in each study.

Section 3.2

Growth: The evidence is mixed on whether aid bolsters local economic growth

To what extent does aid promote broad-based economic growth that has the potential to lift communities out of poverty? If there is anything close to consensus, it is that aid is modestly associated with positive growth over the long-term, at least at the national level (Glennie & Sumner, 2016; Galiani et al., 2016; Clemens et al., 2012).[78] However, does this still hold true at the subnational level?

Some researchers have turned to nighttime light luminosity derived from satellite imagery as a proxy measure of growth for small subnational units.[79] Dreher and Lohmann (2015) examine the effect of World Bank projects on local economic growth using nighttime lights data and find mixed results. Although the authors initially observe a positive correlation in their baseline analysis, once they account for the possibility of reverse causality (i.e., that a region's propensity for growth may attract aid projects), they find no significant effects of aid on local economic growth.[80] Dreher et al. (2015) replicate this result, but also determine that Chinese development projects significantly improve local economic growth outcomes.

In a study of aid projects in Malawi[81], Khomba et al. (2017) document that aid increases local economic growth (also using nighttime luminosity as a proxy) when they exploit variation in (1) regions' ethnic similarity to incumbent leaders and (2) information on regional parliamentary defections to the incumbent leader as a proxies for receiving aid. Using real annual household consumption data,[82] the authors validate nighttime luminosity as a good proxy for economic growth within regions, finding a strong correlation between growth in light density and growth in per capita consumption.[83]

Other researchers have employed different methods and subnational data sources in creative ways to overcome impediments to causal inference. Civelli et al. (2017) use geocoded data from Uganda's Aid Management Platform to arrive at similar results that suggest that the local income gains from aid projects may benefit women, in particular. Meanwhile, Berlin et al. (2017, p. 27), using geocoded aid data from Malawi and Uganda and household survey data, discover that "the presence of aid projects generates paid job opportunities outside the household that strengthen women's outside options, thereby potentially also strengthening their control over other areas influenced by relative bargaining power".

While these studies employ creative strategies to address the non-random assignment of aid projects, reverse causality, and other endogeneity problems, they are limited by their reliance on nighttime light as a proxy for economic growth. This has led other researchers to focus on alternative indicators of development progress to understand whether, when, and how aid impacts other elements of human welfare at the local level.

Section 3.3

Human welfare: Aid generates modest improvements in health, education, and water

The growing availability of subnational aid information and georeferenced survey data – such as Demographic and Health Surveys, Living Standards Measurement Study surveys, and Afrobarometer surveys – makes it possible to more precisely test the extent to which specific development inputs (aid-funded interventions) affect specific outcomes at the local level in low- and middle-income countries.

Several recent studies make important headway in this area, assessing the impacts of social sector aid projects on a variety of measures of the health and wellbeing of local population:

- Odokonyero et al. (2015), using georeferenced household survey data and data from Uganda's AIMS, find that health aid reduces the overall burden

[78] Two recent meta-analyses of aid effectiveness research arrive at different conclusions: one suggests a positive link between aid and growth, the other concludes that there is no such evidence (Doucouliagos & Paldam, 2011; Mekasha & Tarp, 2013). The main barrier to agreement is a lack of theoretical consensus on the conditions under which aid *should* cause or facilitate growth, which stems from disagreement over the underlying causes of economic growth. As Easterly (2003, p. 33) notes, the hypothesized effects of aid typically derive from a "financing gap" model of growth, where scholars see a scarcity of finance and capital as a main cause of slow growth and underdevelopment. However, this basic model of growth, independent of the effects of aid, is disputed among economists.

[79] This measure is available for small units (1km x 1km grid cells) and extends back to 1992, making it particularly useful in accounting for confounding factors.

[80] Dreher and Lohmann (2015) account for a region's probability of receiving aid in a given year by interacting its baseline probability of receiving aid with a dummy indicator of whether it is above or below the threshold for receiving concessional aid from the IDA. This approach allows them to account for the possibility of reverse causality.

[81] The authors use data from the AidData Malawi Aid Management Platform Dataset, which covers projects from 30 donors over the period of 2000 to 2011 (Peratsakis et al., 2012).

[82] Specifically, they use Integrated Household Surveys from the World Bank Living Standards Measurement Study.

[83] More precisely, Khomba et al. (2017, p. 5) find that "[t]he correlation between the growth in light density and the growth in per capita consumption is 0.53 over the period 2010-13."

and severity of disease within Ugandan communities.[84]

- De and Becker (2015), using geocoded project-level data from Malawi's Aid Management Platform and national household surveys from 2004-2005 and 2010-2011, calculate that the average health aid project (worth approximately $88,000) increases economic productivity by nearly 33,000 days (as a result of less disease burden); the average education project (worth approximately $160,000) results in 324 additional people attending school at some point in their lives; and the average water project (worth $229,000) results in 144 fewer cases of diarrhea.

- Marty et al. (2017) determine that, in spite of relatively poor targeting of those areas in greatest need of assistance, health aid has reduced the prevalence of malaria and improved the perceived quality of local healthcare in Malawi. More specifically, they find that health infrastructure aid reduced the prevalence of malaria by 1.2% and improved the perceived quality of local healthcare by 12.1%, while parasitic disease control aid reduced the prevalence of of malaria by 2.2% and improved the perceived quality of local healthcare by 14%.[85]

- Kotsadam et al. (2017) provide evidence that subnational localities in Nigeria that are physically proximate to aid projects have experienced significant reductions in neonatal, infant, and child mortality.[86] They also document that aid has proven to be particularly effective among disadvantaged groups, such as children living in rural areas and children of Muslim women, which suggests that aid can help narrow horizontal inequalities.

- Wayland (forthcoming) examines the subnational distribution of water, sanitation, and hygiene (WASH) projects in Malawi. He finds that households located close to WASH projects experienced fewer water-related diseases. The benefits of these projects also seem to be particularly significant for children; those children living in households within close geographical proximity to one or more WASH projects experienced an average reduction in water-related diseases of 19%.[87]

- Dolan et al. (2017) conducted a geospatial impact evaluation of a national campaign to distribute and promote the use of long-lasting insecticide treated bed nets in the Democratic Republic of the Congo. With two rounds of georeferenced Demographic and Health Surveys (DHS), the study leverages variation in the rollout of an insecticide treated bed net distribution campaign to estimate the effect of the program on all-cause child mortality among children who were living in those geographic areas at the time of the campaign. It discovers that the campaign was only effective in areas with high levels of malaria transmission. They also find that the program provided good value-for-money: $310 to save a child's life in a high malaria transmission area.

The emerging body of evidence therefore suggests that health, education, and water projects tend to have positive effects on local development outcomes in their respective sectors. Though modest, the effects of aid on indicators like disease prevalence and educational exposure can have important spillover benefits (or drawbacks) that may not be limited to progress on those immediate indicators. As georeferenced datasets, including household surveys, grow in number and availability, these types of studies can be undertaken in more countries, which will improve our collective understanding of aid's impacts on the health and wellbeing of local populations in the developing world.

Section 3.4

Governance: Some types of aid may fuel corruption and incite conflict

In Chapter 2, we explored whether delegating aid allocation decisions to host governments could create perverse incentives for politicians to use the siting of these investments to reward their supporters and punish their opponents. We now turn to the question of how aid impacts the quality of (local) governance. In recent years, researchers have been able to use georeferenced survey data[88] and conflict incidence data[89] to take the aid-governance debate to the subnational level by looking at an array of relevant indicators such as: tax compliance, public trust, corruption, and conflict.

Greater access to location-specific data has dramatically expanded the ability of scholars and practitioners to assess whether, when, and how aid affects the quality of subnational governance in low- and middle-income countries. For instance, Brazys et al. (2017) determine that perceptions of, and experiences with, local corruption increase in Tanzanian wards[90] that are geographically proximate to Chinese development projects. In contrast,

[84] The study utilizes the 2005/2006 Uganda National Household Survey and the 2011/2012 Uganda National Panel Survey to explore the relationship between aid and local health outcomes by analyzing survey respondents interviewed in both rounds. The data on aid projects are from the Uganda AIMS, Level 1, Version 1.4.1 dataset from aiddata.org.

[85] This study leverages data from Malawi's Aid Management Platform (georeferenced by AidData and its partners) and the 2004/2005 and 2010/2011 waves of Malawi's Integrated Household Survey (IHS).

[86] The study utilizes Demographic and Health Surveys for Nigeria and project-level aid data from Nigeria's Aid Information Management Platform (georeferenced by AidData).

[87] This study relies upon data from Malawi's Aid Management Platform (georeferenced by AidData and its partners) and the third wave of waves of Malawi's Integrated Household Survey (IHS).

[88] This includes both multi-country surveys and surveys specific to a given country .

[89] The georeferenced event dataset from the Uppsala Conflict Data Program

[90] Tanzania wards are local communities nested within larger districts. There are often several villages within one ward.

World Bank development projects are actually associated with *lower* levels of reported corruption when they are not co-located with Chinese development projects (Brazys et al., 2017).[91] Isaksson and Kotsadam (2016) document a similar relationship across a broader geographic area: reported experiences with corruption increase in areas near Chinese development projects in an analysis of twenty-nine African countries; however, no such relationship is observed for World Bank development projects.

Other studies suggest that aid may undermine social capital and government legitimacy. In Uganda, D'Onofrio and Maggio (2015) discover that the presence of any foreign aid at the county level undermines social capital (i.e., trust in other people), which they argue is the result of perceptions of increasing inequality.[92] They rely on georeferenced survey data from Afrobarometer and project location data from Uganda's AIMS. Marineau (2015), using data from the same sources, determines that aid is associated with lower tax compliance – an important indicator of government legitimacy – at the local level in Uganda.[93] However, Blair and Roessler (2016) discover the opposite: they find no evidence that U.S. or Chinese development projects undermine tax compliance in Liberia.

The availability of geocoded data has also opened up new research frontiers related to aid and conflict (Parks et al., 2016; Findley, forthcoming). Since aid is a resource transfer that can be contested by rival political factions, this has given rise to a critique that foreign aid "increases the booty for insurgents" (Grossman, 1992) and "makes rebellion more attractive" (Nunnenkamp, 2016). Using georeferenced event data from the Uppsala Conflict Data Program, Strandow et al. (2016) find that greater concentrations of aid projects are positively associated with military, but not civilian fatalities, in battle locations. In a similar vein, Wood and Molfino (2016) determine that humanitarian aid increases violence between rebels and government actors in a district-level (ADM1) study of twenty countries in sub-Saharan Africa. However, an analysis of the Democratic Republic of the Congo, Ethiopia, and Sudan over the period of 1989-2008 shows no effect of aid on conflict (Weezel, 2015).

What, then, can we say about whether aid helps or hurts local governance and conflict mitigation? By incorporating information that is only available at the local level – such as aid projects located in specific battle locations — georeferenced data is helping scholars sort out the mechanisms that may explain country-level relationships between aid, governance, and conflict (e.g., Wright, 2009; Bueno de Mesquita & Smith, 2009; Nunn & Qian, 2014). The emerging body of evidence provides some grounds for concern. Under certain conditions, aid may fuel corruption, reduce social trust, short-circuit domestic accountability relationships, and increase violent conflict. Nonetheless, much more research will likely be needed – using alternative measures of aid, governance, and conflict – across a larger number of donors and developing countries before it will be possible to draw strong conclusions.

Section 3.5

Environment: Aid has a mixed track record on biodiversity and conservation outcomes

While the cross-country aid literature has primarily focused on tracking development partner contributions to the environment,[94] the growing availability of georeferenced project data has led to a new focus on studying the relationship between aid projects and environmental outcomes at the local level. In particular, subnational project data combined with satellite data allows researchers to look at the discrete effects of projects on environmental quality at the local level over a relatively long period of time using GIE approaches.

To what extent do aid projects help or hurt forest protection and biodiversity conservation goals? On one hand, some of the evidence suggests that projects intended to preserve the environment are often effective at achieving their goals. By way of illustration, AidData and the Independent Evaluation Office of the Global Environment Facility (GEF) recently evaluated the carbon sequestration impacts of 202 projects that sought to combat land degradation. They find that the GEF projects had positive impacts on forest cover and vegetation productivity, sequestering approximately 108,800 tons of carbon at each intervention site (or 43.5 tons of carbon per hectare) (IEO, 2017).[95] The projects also provided

[91] This study relies on a 2013 Tanzania Citizen's Survey by Research for Poverty Alleviation (REPOA), georeferenced Afrobarometer data, and data on World Bank and Chinese development projects from AidData.

[92] The relationship between aid and inequality is a relatively understudied question at both the country and subnational levels. Country-level studies find mixed results on this question (e.g., Bjørnskov, 2010; Chong et al., 2009; Castells-Quintana & Larru, 2015; Herzer & Nunnenkamp, 2012; Shafiullah, 2011). At the subnational level, there is some evidence from Uganda that aid reduces inequality (D'Onofrio & Maggio, 2015), and Dreher et al. (2015) find that Chinese aid improves outcomes in the poorest regions, suggesting that Chinese aid may reduce inequality.

[93] Low confidence in local governments may have knock on effects for other aspects of development, as some argue that generalized trust is a social indicator important for both stability and for growth (Algan & Cahuc, 2014).

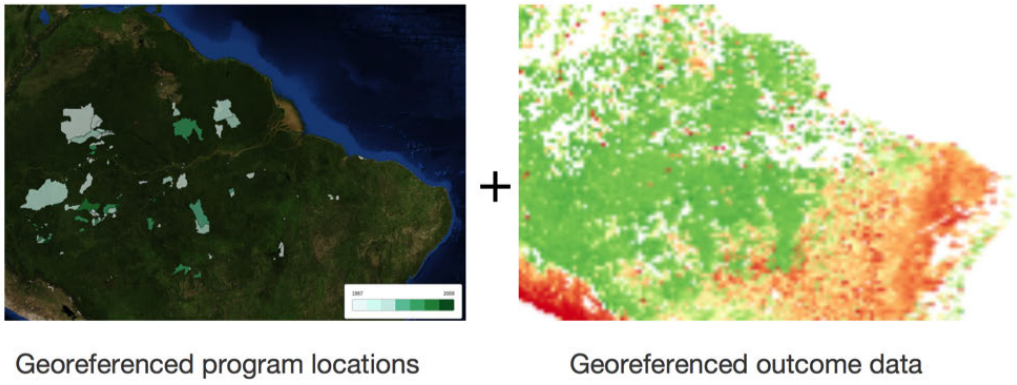
[94] Relatively few country-level studies have focused on the aid-environment relationship. Existing research focuses on donor contributions to environmental goals, rather than whether aid is effective at achieving environmental outcomes (OECD, 2012). Roberts et al. (2009) noted that "we lack credible, cross-country evidence that can provide generalizable answers" to understand whether donors have honored commitments to help countries in a way that respects the environment. Hicks et al. (2008) and Roberts et al. (2009) present evidence that bilateral aid and multilateral has "greened" over time (i.e., a greater proportion of projects do not involve activities that directly contribute to environmental degradation). Less research focuses on environmental outcomes, and what research there is tends to focus on individual cases. For example, a study by the United Nations Environment Programme (UNEP) analyzed some of the environmental impacts of post-conflict reconstruction projects in Sudan (2007).

[95] To do so, they first matched geocoded GEF project data with remotely sensed measures of "greenness" (vegetation density) and land cover

good value-for-money: the authors of the evaluation determine that the average, monetized carbon sequestration benefit of each project was $7.5 million, while the average cost of each project was $4.2 million, which represents a 78.5% return-on-investment.[96]

On the other hand, other GIEs have produced less encouraging evidence. Between 1995 and 2008, the World Bank and the German Development Bank (Kreditanstalt für Wiederaufbau, KFW) funded a project to demarcate and legally protect thirty-eight million hectares of indigenous lands in the Brazilian Amazon with the aim to reduce risk of deforestation. AidData partnered with KFW's Evaluation Department to evaluate whether the Demarcation of Indian Territories Project (PPTAL) achieved its stated objective, using 30 years of remotely-sensed land cover data, community land boundaries, and detailed project documentation (see Figure 20). Comparing forest cover change in geographic areas that were and were not included in PPTAL, the program evaluators find little evidence that the project generated the conservation effects that the architects of the approach intended.

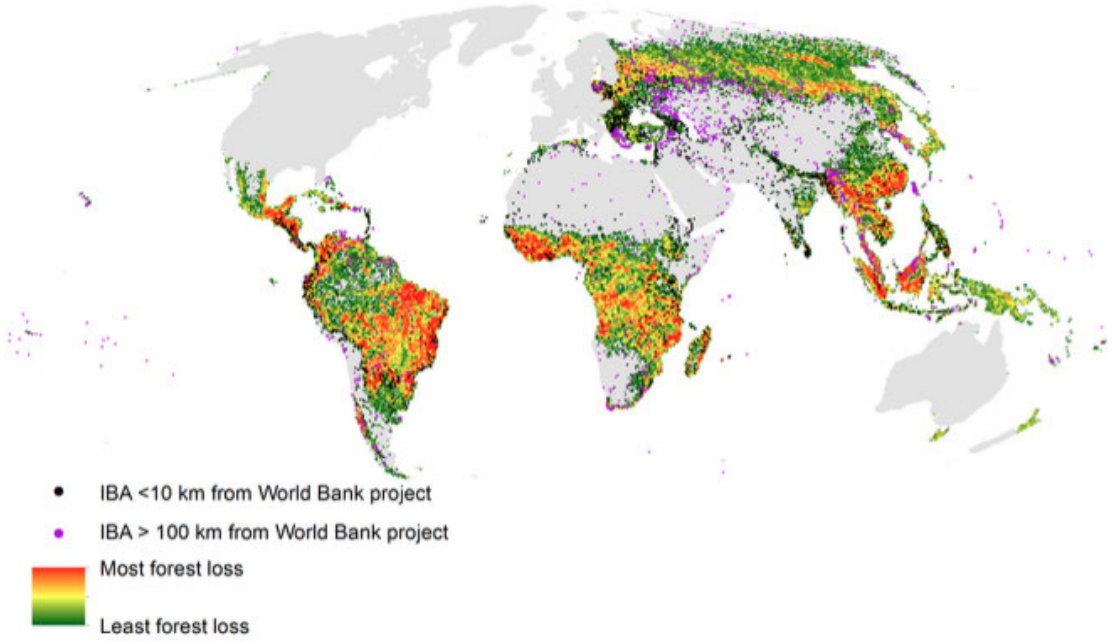
Figure 20: Joining Geocoded Aid Project Locations with Remotely-Sensed Deforestation Data in Brazil



change, and then compared post-program outcomes in GEF-supported areas and a nearly identical set of areas that did not receive GEF support.

[96] AidData and the GEF's IEO also used a machine learning-based (Causal Tree) method to enable the identification of spatially heterogeneous investment impacts. They found larger impacts in electrified areas, larger impacts in areas with poor baseline environmental conditions, and smaller impacts near urban areas (IEO, 2017).

Figure 21: The Effects of World Bank Projects on Biodiversity at the Subnational Level



Source: Figure from Buchanan et al (2016, p. 12)

Aside from the effects of aid projects intended to promote conservation, others have looked at whether projects inadvertently harm the environment. For example, studying the effects of World Bank projects in environmentally risky sectors (e.g., transport, energy, agriculture, forestry, fishing) that were subjected to stringent safeguards, Buchanan et al. (2016) find no evidence that these projects had net negative impacts on biodiversity and forest cover outcomes in ecologically sensitive areas (see Figure 21).[97]

Conservationists and environmental advocacy groups often claim that Chinese infrastructure projects are uniquely harmful to the environment in low- and middle-income countries. BenYishay et al. (2016) empirically test that assumption using AidData's geocoded project-level data on Chinese development projects to study the impacts of Chinese infrastructure projects on deforestation rates in Cambodia and Tanzania. They discover that project impacts vary depending upon local forest protection regimes. Ultimately, the authors conclude that: "China's development activities need not lead to widespread environmental damage when nearby ecosystems are appropriately protected, but domestic environmental governance plays a crucial role in shaping these outcomes" (BenYishay et al., 2016, p. 24).

In this chapter, we have showcased insights from subnational studies that exploit spatially precise data on development inputs and outcomes to address longstanding questions about the impacts of aid projects. In the concluding chapter of this report, we turn to a discussion of the possibilities and limits of the subnational data revolution to help the international community more effectively channel assistance to the areas of greatest need and opportunity and achieve improvements in local development outcomes.

[97] On this subject, also see Runfola et al., 2017a.

Chapter 4

Conclusion: How can the subnational data revolution help us leave no one behind?

The SDGs explicitly aim to "leave no one behind." But achieving sustainable development for all will require a major shift in how we allocate resources and measure progress. Those who make and shape development policy will need to transcend the tyranny of averages if they want to detect hotspots of deprivation, effectively target scarce resources to areas of need and opportunity, and monitor progress within these communities.

Fortunately, there is a growing body of georeferenced data and subnational research for policymakers and practitioners to learn from, and build upon, as they seek to understand development progress from a bottom-up perspective. In this report, we introduced new evidence that speaks to longstanding debates about whether aid is responsive to needs and opportunities (targeting) and able to improve local development outcomes (effectiveness).

The prognosis for countries seeking to move the needle on multidimensional poverty (e.g., income, health, education) clearly varies depending upon whether one looks at national averages or performance across subnational localities. Development partners, meanwhile, have not been particularly successful in helping countries reduce spatial inequalities: aid projects are seldom targeted to geographically disadvantaged (marginalized) regions where the needs are greatest. In fact, aid is often allocated disproportionately to wealthier and more urbanized areas with relatively good access to infrastructure, so development partners may be inadvertently widening disparities within the countries where they work.

With respect to the impacts of aid projects on local development outcomes, we have seen that aid can help communities realize improvements in areas like health, education, water, and conservation. However, aid may also have unintended consequences on governance at the subnational level – for example, fueling local corruption, undermining social trust, or provoking violent conflict.

In this concluding chapter, we discuss current limitations and future possibilities to exploit the subnational data revolution as development partners and their host country counterparts endeavor to reduce inequalities between and within nations. Ultimately, we propose four forward-looking priorities for countries and their development partners to fully harness the subnational data revolution to leave no one behind:

- Invest in spatially precise outcome measures to systematically monitor progress against the SDGs and channel resources to communities lagging behind.
- Align incentives through having global standards setting bodies make disclosure of subnational project locations mandatory, rather than optional, in reporting.
- Demonstrate the value of georeferenced data and reduce barriers to entry for researchers, policymakers, and practitioners to use it to target and evaluate investments.
- Integrate spatial inequality diagnostics into pre- and post-project assessments to transparently monitor how geographically disadvantaged communities are benefiting from development investments.

Section 4.1

Limitations: Searching for a less fuzzy picture of development progress

As a result of the subnational data revolution, we are now better able than ever before to answer questions about how aid is targeted within countries and whether it affects a host of development outcomes. However, there is still a need for caution in drawing strong conclusions. In this section, we outline several limitations of current data and methods to help detect and respond to spatial inequalities.

4.1.1.

Trees vs. forest: Should we expect all development projects to have local-level outcomes?

How *should* aid affect multidimensional poverty, governance and environmental outcomes? There are good reasons to expect that aid-funded development projects will be associated with improved outcomes at the local level. One would expect aid to increase the resources available to deliver frontline services, strengthen the capacity of subnational governments to provide public goods, and expand local economic and educational opportunities. However, aid *should* also contribute to national outcomes that are harder to detect at the local level.

This is particularly true if aid is channeled through national governments, making it difficult to accurately trace the downstream reach and localized effects of those centralized investments. For example, development partners may provide budget support or invest in strengthening national institutions such as parliaments and ministries of finance and planning whose effects at the community level may be more diffuse and difficult to measure, yet still essential.

4.1.2

False certainty: Will missing data mischaracterize results or behaviors?

Development partners do not always report on their investments in a timely or complete fashion, which may lead to a distorted view of their aid portfolios. Many low- and middle-income countries have systems that are owned and operated by the host government to track incoming development finance (e.g., AIMS). While these data have the "potential to significantly assist in decision-making among policy makers, the usefulness of the information is only as good as the reporting" (AidData, 2017).

Unfortunately, host government officials frequently express frustration with donor reporting to the AIMS that is out-of-date or missing valuable information, such as project locations (Custer & Sethi, 2017). If there are systematic differences in terms of who reports and who does not, gaps in coverage not only make it difficult to evaluate aid targeting or effectiveness, but also could potentially bias conclusions that are based on such data. The same can be said of project-level data with variable coverage across sectors, geographical areas, and time.

4.1.3

Fuzzy inputs: How will imprecise data affect our conclusions?

Sometimes georeferenced data is coded too coarsely to be useful for the measurement of local-level trends. For example, a project may have occurred in a specific geographic location (e.g., a town or village), but if this location information is not properly documented, assigning geographic coordinates to this project's location will be challenging. Instead, it will probably be necessary to geocode that project at higher order administrative levels (e.g., districts or provinces).

This inherent uncertainty about project locations can introduce imprecision in the targeting of new projects and the evaluation of past or present interventions. Many subnational studies simply exclude from their analysis any aid projects that cannot be precisely mapped to geographic locations. As such, analysts are often limited to studying the targeting and impacts of aid projects for which specific geographic information is available. For example, Box 2 outlines the challenge of drawing conclusions on the responsiveness of aid to social vulnerability at the municipal level, when most financial flow data are not consistently reported at that level of specificity. The utility of this approach would be vastly improved if financial flow data were reliably reported at a more granular level.

AidData is developing new tools and methodological advances to help address this limitation. One such tool is a statistical software package called *geoSIMEX t*o help analysts who use imprecise geographic data evaluate the reliability of their statistical results (Runfola et al., 2017b). We expect that additional improvements in geocoding and subsequent data processing will also help address this problem.

Box 2

Developing Multidimensional Measures of Social Vulnerability

By, Will Sheahan, Jacob Sims, Jennifer Turner

Although subnational data allow us to see where development projects are located, we still often do not know whether these projects are reaching the areas of greatest need. Further work is required to develop measures of the spatial distribution of need within countries and thus give better information to people making decisions on where to allocate resources.

AidData is working to address the lack of rich, multidimensional data through a pilot study of Colombia. Using 26 variables from Colombia's National Administrative Department of Statistics (DANE) 2005 general census, we have used statistical methods to develop a *Social Vulnerability Index* (SVI). After creating the index to identify where vulnerable populations are concentrated, we then compared these results with the distribution of aid projects across regions.

Colombia is a good test case for two reasons. First, the government has committed to improving its monitoring of SDG financing and results at a subnational level. SDG targets have been integrated into regional development strategies, and the government is working to improve both the availability and quality of data at the subnational level. Second, the government has targeted inequality as one of its priorities in implementing the SDGs. If the government and development partners better understand where vulnerable people live, they will have the capacity to allocate projects more efficiently. Finally, for a country that has endured decades of civil conflict, this pilot provides an opportunity to examine variation in progress on SDG indicators focused on peace and conflict prevention (Goal 16).

Our analysis reveals three key findings:

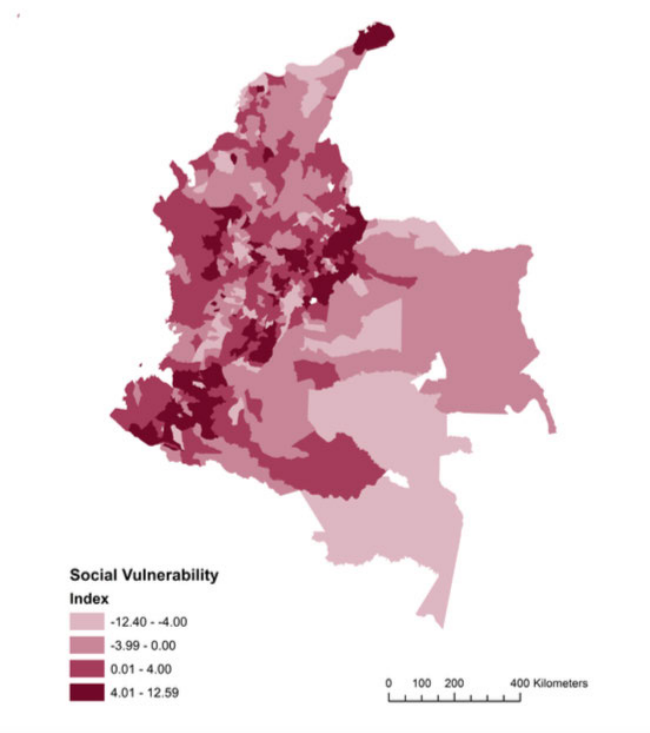
1. The primary drivers of geographic variations in Colombian vulnerability are: (i) ethnic minority status; (ii) age and disability; (iii) employment opportunities; and (iv) housing composition.

2. The most vulnerable municipalities were Uribia, Sucre and Bolivar, Arbolebda, Boavita, and San Pablo, which are primarily concentrated in the northern and southwestern areas of the country.

3. Preliminary analysis suggests that municipalities identified as the most vulnerable may not be those that received the largest number of development projects.

Further study will be required to better understand how population density affects these numbers, since many of the regions identified as the most vulnerable also have relatively small populations. Cities generally had low scores on the vulnerability index due to a large number of affluent residents, but they are also home to many poor individuals, including the majority of Colombia's internally displaced persons. This method can be reapplied once the Colombian government carries out additional census rounds.

The utility of this approach would be vastly improved if financial flow data were reported at a more granular level. Currently, census data are reported at the municipality level, but financial flow data are not consistently reported at the municipality level. Some of the aid projects evaluated during the pilot were reported only at the district or national level. Thus, our finding pertaining to resource allocation in response to need should be treated with some caution.



4.1.4

Imperfect proxies: How will they affect our ability to draw conclusions?

A central impediment to effective targeting and rigorous evaluation of development investments is the lack of consistent, reliable, and geographically disaggregated data on development outcomes. Researchers have come up with creative strategies for measuring subnational poverty, but proxies are far from perfect. Nighttime light, for example, is a generally good proxy measure of subnational economic development, but it is unable to measure welfare gains or losses in geographic regions that are completely unlit (Jean et al., 2016).[98]

Also, for analysts who wish to answer questions about development finance at the subnational level, the burden in terms of skills required to acquire, understand, manipulate, and analyze sources of geospatial data is increasing. Even with conceptual mastery over the use of geospatial data, a major obstacle is the enormous computational requirements to acquire analysis-ready data on relevant variables of interest (e.g., data on forest cover change).

For this reason, subnational analyses of aid targeting or effectiveness are usually based on individual countries (or a small number of countries), often during a fairly limited time period. This limits the extent to which one can confidently draw generalizable conclusions from existing subnational studies of targeting and effectiveness.

To address this challenge, AidData has created a powerful spatial data repository and online portal through which these data can be easily fused together and accessed (see Box 3). *GeoQuery* enables program evaluators, policy analysts and other users without GIS or computer science training to easily access and merge spatially-referenced development investment, outcome, and covariate data. This public portal is currently in public beta mode (see http://geo.aiddata.org/).

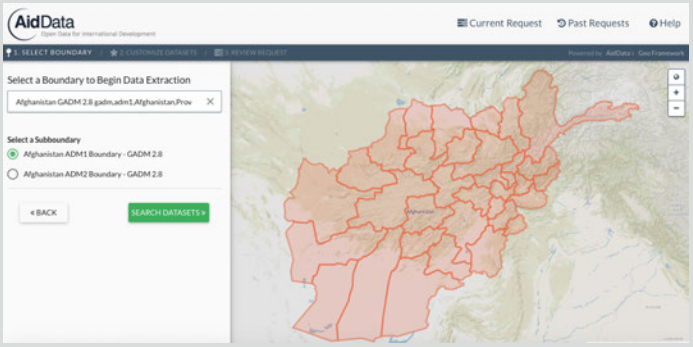
Box 3

AidData's GeoQuery

geo.aiddata.org

To ease the burden of acquiring spatial data, AidData has developed a data integration and extraction tool called *GeoQuery*. This online tool allows analysts to select subnational boundary files corresponding to one or more countries of interest and choose from various sources of spatial data to join with that file. It provides global raster data on marine and terrestrial protected areas, nighttime light precipitation, temperature, slope, elevation, land cover change, vegetation productivity, population density, access to roads, travel time to population centers, child mortality, air pollution, among other variables. Users of *GeoQuery* can fuse geocoded aid project data with any number of these variables and access these data at geographical units (e.g. the municipalities, districts, provinces) and time periods of their choosing.

Many of the datasets housed in *GeoQuery* also allow users to select different statistics to match the needs of their study. For example, users interested in using a measure of nighttime light can choose from the minimum, mean, or maximum level of observed luminosity within the geographic regions they have selected. Alternatively, users can choose to have *GeoQuery* generate a sum of the values of nighttime light within a given subnational locality. Similar options are available for the measures of forest cover, precipitation, air temperature, ground slope, and physical elevation. Additional datasets will be added over time to provide researchers, policymakers and practitioners easily accessible spatial data that is immediately ready for analysis.



[98] Insofar as development partners are interested in measuring and improving the welfare of the poorest of the poor, using nighttime light growth as a proxy might provide a misleading picture of progress (or a lack of progress).

4.1.5

Data gaps: How can we optimize investments without seeing *all* resources?

In the post-2015 era, aid is expected to account for a decreasing proportion of the total resources that low- and middle-income countries have to finance development projects. Just as our conclusions about subnational aid effectiveness may be biased by excluding information about projects or initiatives at the country level, the same may be true of excluding different forms of development finance such as domestic public sector budgets, corporate social responsibility funds, South-South cooperation activities, private philanthropic flows, etc.

At the country level, research has shown that conclusions about the effects of aid on civil conflict, for example, can change when one omits sources of funding from non-traditional actors (Strange et al., 2017). Unfortunately, many of these less traditional development finance flows are relatively opaque. While traditional bilateral aid agencies and multilateral development banks adhere to minimum global reporting standards such as the International Aid Transparency Initiative (IATI) and the OECD's Creditor Reporting System (CRS), newer development finance providers do not comply with these standards, making it difficult to measure and assess their contributions.

4.1.6

Cost-benefit calculus: Will policymakers and scholars act upon available evidence to respond to spatial inequalities and improve local outcomes?

Demand for subnational data, whether inputs or outcomes, far exceeds the capacity of low- and middle-income countries to produce it. In a recent study that AidData conducted in Senegal, Timor-Leste and Honduras, government officials, development partner staff, and civil society leaders frequently reported that they regard geo-referenced and sector-specific administrative, survey, and census data from national statistical offices to be high-value data sources (Custer & Sethi, 2017). Yet, it was not clear if this high level of demand for subnational data would translate into use of such data in decision-making, even if availability was not a constraint.

Government-produced data are often viewed with suspicion, mostly due to a perceived lack of accuracy, timeliness, and coverage. This was a particular concern with respect to data collected at the local level — for instance, by front-line key service providers who may lack the motivation and skills to ensure the quality of data. In addition, the absence of clear rewards for making decisions based upon evidence, and of penalties for not doing so, gives tacit permission to policymakers and practitioners to pay lip service to the importance of development data, while allowing other considerations (such as convenience or organizational imperatives) to determine the ways decisions are actually made.

Section 4.2

Possibilities: A roadmap for the future of the subnational data revolution

If policymakers and practitioners want to translate the rhetoric of "no one left behind" into practice, they must prioritize resources and attention to benefit at-risk communities. While there is a burgeoning subnational data revolution that is beginning to bear fruit, the international community will need to marshal additional resources, innovate new methods, and mobilize political commitments for this vision to become a reality. In this section, we outline several forward-looking priorities for countries and their development partners to fully harness the subnational data revolution to leave no one behind.

4.2.1

Invest in spatially precise outcome measures to systematically monitor progress against the SDGs and channel resources to communities lagging behind

Few would argue against the merits of having more precise estimates of local development outcomes in principle; however, policy makers and practitioners frequently express concern that collecting such data is prohibitively expensive and technically difficult to the point that it is practically infeasible. To harness the

subnational data revolution, governments and their development partners will need to identify alternative ways to dramatically decrease the costs and increase the ease of sustainably generating these estimates. One way that they can do this is by investing more concertedly in initiatives that crowd in the interest of entrepreneurs, researchers, and data scientists to help solve this subnational data problem.

In 2014, for example, AidData and USAID's Global Development Lab were able to offer up to US$2 million in funding for cutting edge research and innovative methods using subnational data through a competitive solicitation process (Parks et al., 2015). This competitive solicitation process yielded nine award winners, such as Stanford University's Sustainability and Artificial Intelligence Lab that is generating some exciting breakthroughs in leveraging satellite imagery to map and track poverty from space (see Box 4).[99]

Similarly, the Global Partnership for Sustainable Development Data — a multi-stakeholder initiative of 150+ governments, companies, and organizations working to fill data gaps — in partnership with the World Bank's Development Data Group have hosted two competitive calls for proposals seeking scalable innovations in data production and use to advance the SDGs in fields such as the environment and leaving no one behind.[100]

Box 4:

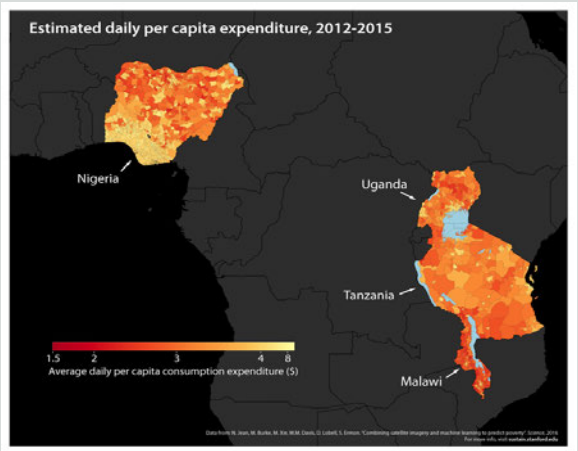
Mapping and Tracking Poverty From Space

Researchers are actively developing advanced methods from computer science to more accurately map and track poverty at the subnational level. One approach pioneered by the Sustainability and Artificial Intelligence Lab (SAIL) at Stanford University supplements satellite imagery of nighttime light with high-resolution daytime satellite imagery to identify specific geographic features that are detectable via daytime imagery and that correlate with nighttime light.

These geographic features are then used to predict sparser consumption and asset measures that are available from geocoded household surveys. SAIL researchers found during an initial pilot that this method of measurement could predict up to 75% of the subnational variation in consumption expenditure and asset wealth outcome. Their model also substantially outperformed the nighttime lights, with particular improvements in poorer areas.

This approach has a number of advantages. It is based on publicly available data and is inexpensive (though computationally intensive) to implement. Additionally, it provides more fine-grained subnational poverty estimates than nighttime light data alone can provide. SAIL has so far applied this method to generate subnational poverty estimates in Uganda, Tanzania, Nigeria, Malawi, and Rwanda. Improving upon these estimates and extending these approaches over geographical space should be a priority for development partners and their host government counterparts if they are serious about "leaving no one behind."

Figure 22: Estimated Daily Per Capita Expenditure in Two Sub-Saharan African Countries



Source: http://sustain.stanford.edu/predicting-poverty

[99] See http://aiddata.org/blog/aiddata-funds-next-generation-of-development-research-using-geospatial-data for more information.

[100] See http://data4sdgs.org for more information.

4.2.2

Align incentives through making disclosure of subnational project locations mandatory, rather than optional, in national and global reporting standards

When it comes to reporting on their activities, there are powerful incentives for governments and organizations to race to the bottom and do the minimum possible absent rewards or penalties. Even in fairly robust global reporting regimes, providing precise point-level location information (i.e., latitude and longitude) for funded activities may be voluntary, rather than required. Reliable access to this type of granular information is even more difficult to come by in domestic financial documentation, such as national budgets and expenditures published by governments, or what is reported by development partners into country-owned aid information management systems.

At the national level, transparency advocates and reform-minded policymakers should consider codifying more stringent standards in open data initiatives and access to information laws which mandate the publication of precise location information for public sector investments. At the international level, global standards bodies and watchdogs might also amp up the positive (and negative) pressure for international organizations, bilateral aid agencies, multinational corporations, and South-South Cooperation providers to do the same. For example, Publish What You Fund (a UK-based aid transparency advocacy group) has made the inclusion of subnational locations a more prominent part of its 2018 Aid Transparency Index (ATI), which has the potential to align the incentives of donors in favor of disclosing this information (PWYF, 2017).[101]

[101] The ATI is an independent assessment of development partner transparency in their financial reporting, particularly in relation to what they publish regarding they publish regarding their activities via the International Aid Transparency Initiative registry. According to PWYF (2017), "the weighting of the [ATI] indicator scores [for 2018] has been changed [following a period of public consultation and now] includes information on how a project performed (such as a review or evaluation document) and some specific indicators such as sub-national location data and the sector of work". For more information, see: http://www.publishwhatyoufund.org/wp-content/uploads/2017/06/2018-Aid-Transparency-Index-Guidelines.pdf. As a disclaimer, one of the authors of this study participated in the expert consultation phase of the 2018 ATI review.

4.2.3

Demonstrate the value of georeferenced data and reduce barriers to entry for researchers, policymakers, and practitioners to use it to target and evaluate investments

One of the perennial challenges for data producers is making the case why it is worth the effort for busy policymakers and practitioners to use this information in their work (Masaki et al., forthcoming). This challenge is particularly acute for georeferenced (or geospatial) data that is often unfamiliar to public, private, and civil society leaders who have historically drawn upon cross-national or national-level aggregates to support their decision-making. Even for researchers and analysts predisposed to adopt new data sources and methods, the learning curve to access and process geospatial data may dampen their enthusiasm, particularly if there is only nascent demand for subnational analyses.[102]

Funders and producers of georeferenced data and analysis should take a cue from the literature on the diffusion of new innovations and its central hypothesis that the adoption of new technologies follows an S-curve. AidData and its consortium partners spent several years promoting the idea of geocoding, subnational targeting analysis, and geospatial impact evaluation before seeing much evidence of take-up. However, over the course of the last year we have entered a period where we are seeing rapidly accelerating uptake and diffusion—the sharp upswing of the S curve—among bilateral and multilateral development finance institutions, researchers, in-country civil society organizations and think-tanks.

A proactive program of sustained outreach and training to accompany the dissemination of new georeferenced data and tools was an important driver of this uptake. For example, through its Summer Fellows program, AidData has embedded 77 students trained in the tools of geocoding and geospatial analysis with civil society organizations, government ministries, development partner organizations in 10 countries.[103] For 10 weeks

[102] For instance, the complexity of accessing and spatially joining satellite, survey, administrative, and event data over multiple time periods, including the locations of development interventions, has often limited use of these data.

[103] To date, AidData has placed Summer Fellows in the following countries: Thailand, Senegal, Uganda, Nepal, Mexico, Timor-Leste, Peru, Philippines, Ghana. Fellows have included a range of students (undergraduate through doctoral candidates) from a number of universities such as: the College of William & Mary, Brigham Young University, University of Georgia, London School of Hygiene and Tropical Medicine, University of Texas, Clark University, and George Washington University.

each summer, these Fellows share their expertise to help their host organizations integrate geospatial data into their policy and program decision-making. One of our consortium partners, Development Gateway, has a related Aid Management Fellows effort to embed young professionals within ministries of finance or planning in low- and middle-income countries to build "political will and local capacity to not only use [geospatial] data and tools, but also curate and maintain them" (Custer, 2014). AidData, through the College of William & Mary (our host institution), also offers training in geospatial data and methods as part of The Young African Leaders Initiative (YALI) sponsored by the US Department of State. This has proven to be a great venue to envision and equip these young policy entrepreneurs to put geospatial data and tools to work to advance their goals back in their home countries.[104]

4.2.4

Integrate spatial inequality diagnostics into pre- and post-project assessments to transparently monitor how geographically disadvantaged communities are benefiting from development investments

As we discussed in Chapter 2, evidence of spatial inequalities can easily be drowned out by other arguments, such as economic efficiency or political expediency. Ultimately, if we want to foment a subnational data revolution to leave no one behind, people in positions of authority must not only know where to find spatially precise data and how to use it, they must also heed the implications that come with it. As Custer and Sethi (2017) write, this requires that we "crowd-in, rather than short-circuit, the interest of political actors in favor of using data as they allocate resources, target projects, and evaluate development programs" (p. 81). In other words, what would make it worth the while of policymakers and practitioners to pay attention to spatial inequalities when making investment decisions?

One possibility would be to mainstream the use of subnational analyses into the standard procedures by which governments and their partners design, appraise, and report on new development projects. While their processes vary in scope and complexity, most governments and organizations have set procedures they must abide by in the course of preparing new development investments for consideration.[105] If more organizations required those appraising projects to explicitly assess how these investments would likely impact geographically disadvantaged communities, this could provide a natural use case (and incentive) for policymakers and practitioners to ensure they are reducing rather than exacerbating inequalities between communities. The same could also be said for including this in post-project evaluations.

Section 4.3

Final Thoughts

The implication of the SDGs is the need to disaggregate resources and progress by "the characteristics of people and their locations", while still enabling aggregation and comparability across space and time (Badiee et al., 2016). This is easier said than done. Ethnic minorities, internally displaced persons, refugees, migrants, the elderly, and persons with disabilities, to name a few, are often underrepresented in data collection efforts. These vulnerable groups are practically invisible to those seeking to allocate resources and monitor progress against national priorities and global goals (UN, 2014). Counting these "missing millions" is a political challenge, a policy imperative, and a profound data gap (Stuart et al., 2015).

In this report, we drew upon five years of work in partnership with USAID's Global Development Lab and the AidData Center for Development Policy to put a spotlight on one facet of vulnerability – spatial inequalities that arise between more and less favored regions within countries. We used geographically precise data on development investments and results to unmask persistent pockets of deprivation at the subnational level, as well as assess how governments and their development partners are responding to these inequities (targeting) and with what results (effectiveness).

This research comes at a critical moment as the international community takes stock of how to crowd in financing for sustainable development from more sources than ever before and optimize future investments to ensure no one is left behind. We hope that this report, while not exhaustive, awakens readers not only to the potential of the geospatial data and tools, but also provides actionable recommendations for them to fully harness the subnational data revolution to leave no one behind.

[104] Per the US Department of State (2017), the Mandela Washington Fellowship is YALI's flagship program which, since 2014, "brings up to 1,000 African civic, business, and community leaders aged 25-35 for six weeks of academic coursework, leadership training, and networking at US universities".

[105] For example, in the design of projects, many governments and organization typically consider some combination of: anticipated economic rates-of-return, beneficiary analysis, and social and environmental safeguards to minimize the probability of undue harm.

Works Cited

Abdulai, A., & Hulme, D. (2014). The politics of regional inequality in Ghana: State elites, donors and PRSPs. ESID Working Paper No. 41.

Acemoglu, D., & Robinson, J. A. (2001). A theory of political transitions. *American Economic Review*, *91*(4), 938–963.

Acemoglu, D., & Robinson, J. A. (2013). *Why nations fail: The origins of power, prosperity, and poverty*. New York, NY: Crown Business.

Addison, T., Harper, C., Prowse, M. (Ed.), Shepherd, A., Barrientos, A., Braunholtz-Speight, T., ... Moore, K. (2008). The Chronic Poverty Report 2008/09: Escaping Poverty Traps. Chronic Poverty Research Centre, University of Manchester. http://curis.ku.dk/ws/files/41820129/CPR2_whole_report_CD_version.pdf

AfDB. (2006). *Guidelines for financial management and financial analysis of projects*.

Ahmed, F. Z. (2012). The perils of unearned foreign income: Aid, remittances, and government survival. *American Political Science Review, 106*(1), 146–65.

AidData. (2016). WorldBank_GeocodedResearchRelease_Level1_v1.4.1 geocoded dataset. Williamsburg, VA and Washington, DC: AidData. Accessed on December 1, 2016. http://aiddata.org/research-datasets.

AidData. (2017) Financing the SDGs in Colombia. Williamsburg, VA: AidData at the College of William & Mary. http://aiddata.org/financing-the-sdgs-in-colombia

Ajakaiye, O., Jerome, A. T., Olaniyan, O., Mahrt, K., & Alaba, O. A. (2016). Spatial and temporal multidimensional poverty in Nigeria. In C. Arndt, A. McKay, & F. Tarp (Eds.), *Growth and Poverty in Sub-Saharan Africa* (216–237). Oxford, UK: Oxford University Press.

Ajmera, M., & Fields, G. A. (2016). *Invisible children: Reimagining international development at the grassroots*. London: Palgrave Macmillan.

Alesina, A., & Dollar, D. (2000). Who gives foreign aid to whom and why? *Journal of Economic Growth, 5*(1), 33–63.

Alesina, A., Baqir, R., & Hoxby, C. (2004). Political jurisdictions in heterogeneous communities. *Journal of Political Economy, 112*(2), 348–396.

Alesina, A., Michalopoulos, S., & Papaioannou, E. (2016). Ethnic inequality. *Journal of Political Economy, 124*(2), 428-488.

Algan, Y. & Cahuc, P. (2014). Trust, growth, and well-being: New evidence and policy implications. *In Handbook of Economic Growth, 2,* (49–120). Elsevier.

Alkire, S., Roche, J. M., & Seth, S. (2011). Sub-national disparities and inter-temporal evolution of multidimensional poverty across developing countries. Oxford Poverty & Human Development Initiative. Research in Progress Series. Research paper no. 32a.Retrieved September 05, 2017, from http://www.ophi.org.uk/publications/ophi-research-in-progress/

Altincekic, C., & Bearce, D. H. (2014). Why there should be no political foreign aid curse. *World Development, 64,* 18–32.

Amelan, R. (2016). Unchecked inequalities could threaten UN's Sustainable Development Goals, according to social science report. Retrieved from http://www.unesco.org/new/en/media-services/single-view/news/unchecked_inequalities_could_threaten_uns_sustainable_dev/

Annen, K., & Moers, L. (2012). Donor competition for aid impact, and aid fragmentation. IMF Working Paper 12/204.

Arndt, C., Jones, S., & Tar, F. (2015). Assessing foreign aid's long-run contribution to growth and development. *World Development, 60,* 6-18.

Backer, D., Bhavnani, R., & Huth, P. (Eds.). (2016). Aid and conflict: What we know and need to know. *Peace and Conflict*. (120-127). New York, NY: Routledge.

Bandyopadhyay, S., & Wall, H. J. (2007). The determinants of aid in the post-Cold War era. Federal Reserve Bank of St. Louis. *Working Paper Series* 2006-021B.

Barkan, J., & Chege, M. (1989). Decentralising the state: District focus and the politics of reallocation in Kenya. *Journal of Modern African Studies, 27,* 431–453.

Bates, R. H. (1981). *Markets and states in tropical Africa: The political basis of agricultural policies*. Berkeley, CA: University of California Press.

BenYishay, A., Heuser, S., Runfola, D., & Trichler, R. (2016). Indigenous land rights and deforestation: Evidence from the Brazilian Amazon. AidData Working Paper #22. Williamsburg, VA: AidData.

BenYishay, A., Parks, B., Runfola, D., & Trichler, R. (2016). Forest cover impacts of Chinese development projects in ecologically sensitive areas. *AidData Working Paper #32*. Williamsburg, VA: AidData. Retrieved from http://aiddata.org/working-papers.

BenYishay, A., Runfola, D., Trichler, R., Dolan, C., Goodman, S., Parks, B., Tanner, B., Heuser, S., Batra, G., & Anand, A. (2017). Primer on geospatial impact evaluation methods, tools, and applications. *Working Paper*.

Berlin, M. P., Bonnier, E., & Olofsgård, A. (2017). The donor footprint and gender gaps. *WIDER Working Paper 2017/130*. Helsinki: UNU-WIDER.

Bermeo, S. B. (2016). Aid is not oil: Donor utility, heterogeneous aid, and the aid-democratization relationship. *International Organization, 70*(1), 1–32.

Bichekbach, F., Mbelu, A., & Nunnenkamp, P. (2017). Is foreign aid concentrated increasingly on needy and deserving recipient countries? An analysis of theil indices, 1995-2015. Kiel Working Paper No. 2078.

Bird, K., & Shepherd, A. (2003). Livelihoods and chronic poverty in semi-arid Zimbabwe. *World Development, 31*(3), 591-610.

Bird, K., Higgins, K., & Harris, D. (2010). Spatial poverty traps: An overview(321). Retrieved from Overseas Development Institute website: https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/5514.pdf

Bjørnskov, C. (2010). Do elites benefit from democracy and foreign aid in developing countries?. *Journal of Development Economics*, *92*(2), 115-124.

Blair, R., & Roessler, P. (2016). China and the African state: Evidence from surveys, survey experiments and behavioral games in Liberia. *USAID Research and Innovation Grants Working Papers Series.* Washington D.C.: USAID.

Boone, P. (1996). Politics and the effectiveness of foreign aid. *European Economic Review, 40*(2), 289-329.

Booth, D., & Curran, Z. (2005). *Developing the empirical evidence for DFID's strategy for exclusion: Aid instruments and exclusion*. London: Overseas Development Institute.

Boughton, J. M., & Mourmouras, A. (2004). Whose programme is it? Policy ownership and conditional lending. In D. Vines & C. L. Gilbert (Eds.), *The IMF and Its Critics: Reform of Global Financial Architecture* (225–253). New York: Cambridge University Press.

Brazys, S., Elkink, J. A., & Kelly, G. (2017). Bad neighbors? How co-located Chinese and World Bank development projects impact local corruption in Tanzania. *The Review of International Organizations, 12*(2), 227-53.

Briggs, R. (2017). Does foreign aid target the poorest? *International Organization*, *71*(1), 187-206.

Broegaard, E., Freeman, T., & Schwensen, C. (2011). Experience from a phased mixed-methods approach to impact evaluation of Danida support to rural transport infrastructure in Nicaragua. *Journal of Development Effectiveness 3*(1), 9-27.

Buchanan, G. M., Parks, B. C., Donald, P. F., O'Donnell, B. F., Runfola, D., Swaddle, J. P., Tracewski, L., & Butchart, S. H. M. (2016). The impacts of World Bank development projects on sites of high biodiversity importance. *AidData Working Paper, 20.*

Bueno de Mesquita, B., & Smith, A. (2007). Foreign aid and policy concessions. *Journal of Conflict Resolution, 51,* 251-84.

Bueno de Mesquita, B., & Smith, A. (2009). A political economy of aid. *International Organization*, *63*(2), 309-340.

Burgess, R., Jedwab, R., Miguel, E., Morjaria, A., & Miquel, G. P. (2015). The value of democracy: Evidence from road building in Kenya." *American Economic Review, 105*(6), 1817-1851.

Burke, M., Heft-Neal, S., & Bendavid, E. (2016). Sources of variation in under-5 mortality across sub-Saharan Africa: a spatial analysis. *The Lancet Global Health, 4*(12), e936-e945.

Burnside, C., & Dollar, D. 2000. Aid, policies, and growth. *American Economic Review, 90,* 847–68.

Caldeira, E., & Rota-Graziosi, G. (2014). The crowding-in effect of simple unconditional central grants on local own-source revenue: The case of Benin. *Journal of African Economies, 23*(3), 361–87.

Cameron, D. B., Mishra, A. & Brown, A. N. (2016). The growth of impact evaluation for international development: how much have we learned? *Journal of Development Effectiveness, 8*(1), 1-21.

Carnegie, A., & Marinov, N. (2017). Foreign aid, human rights, and democracy promotion: Evidence from a natural experiment. *American Journal of Political Science.*

Carr-Hill, R. (2013). Missing millions and measuring development progress. *World Development, 46,* 30-44.

Castells-Quintana, D., & Larrú, J. M. (2015). Does aid reduce inequality? Evidence for Latin America. *The European Journal of Development Research*, *27*(5), 826-849.

Cederman, L. E., Gleditsch, K. S., & Buhaug, H. (2013). *Inequality, Grievances, and Civil War*. New York: Cambridge University Press.

Chandy, L., Derviş, K., Ingram, G., Kharas, H., & Rocker, S. (2014, April). Profitable development solutions: How the private sector can contribute to the post-2015 agenda. Retrieved September 11, 2017, from https://www.brookings.edu/research/profitable-development-solutions-how-the-private-sector-can-contribute-to-the-post-2015-agenda/

Chandy, L., Ledlie, N., & Penciakova, V. (2013). *The final countdown: Prospects for ending extreme poverty by 2030*. Brookings Institution.

Chandy, L., Seidel, B., & Zhang, C. (2016). Aid effectiveness in fragile states: How Bad is It and How Can It Improve?" Brooke Shearer Series, Number 5, The Brookings Institute.

Chauvet, L., & Guillaumont, P. (2004). Aid and Growth Revisited: Policy, Economic Vulnerability and Political Instability. In B. Tungodden, N. Stern and I. Kolstad (eds.), *Towards Pro-Poor Policies. Aid, Institutions and Globalisation*, ABCDE 2003 Annual World Bank Conference on Development Economics Europe. New York: Oxford University Press.

Chen, X., & Nordhaus, W. D. (2011). Using luminosity data as a proxy for economic statistics. *Proceedings of the National Academy of Sciences of the United States of America, 108*(21), 8589-8594.

Chong, A., Gradstein, M., & Calderon, C. (2009). Can foreign aid reduce income inequality and poverty? *Public Choice*, *140*(1), 59-84.

Christiaensen, L., Demery, L., & Paternostro, S. (2003). Economic growth and poverty in sub-Saharan Africa: Messages from the 1990s. *World Bank Economic Review, 17*(3), 317-347.

Civelli, A., Horowitz, A., Teixeira, A. (2017). Foreign aid and growth at the subnational level. *AidData Working Paper, 36*. Williamsburg, VA: AidData.

Claessens, S., Cassimon, D., & Van Campenhout, B. (2009). Evidence on changes in aid allocation criteria. *World Bank Economic Review, 23*(2), 185-208.

Clemens, M. A., Redelet, S., & Bhavnani, R. (2012). Counting chickens when they hatch: The short term effect of aid on growth. *Economic Journal, 90*(2000), 1–33.

Cogneau, D., & Dupraz, Y. (2014). Questionable inference on the power of pre-colonial institutions in Africa. Paris School of Economics Working Paper N 2014-25.

Cohen, J. M. (1995). Ethnicity, foreign aid, and economic growth in sub-Saharan Africa: The case of Kenya. *HIID Development Paper, 520*. Cambridge, MA: Harvard Institute for International Development.

Coontz, S. (2013). When numbers mislead. *Sunday Review. The New York Times.* Retrieved from http://www.nytimes.com/2013/05/26/opinion/sunday/when-numbers-mislead.html

Crawford, G. (1997). Foreign aid and political conditionality: Issues of effectiveness and consistency. *Democratization, 4*(3), 69-108.

Crawford, G. (2001). *Foreign aid and political reform: A comparative analysis of democracy assistance and political conditionality.* Houndmills, Basingstoke, Hampshire: Palgrave.

Crost, B., Felter, J., & Johnston, P. (2014). Aid under fire: Development projects and civil conflict. *The American Economic Review, 104*(6), 1833-1856.

Custer, S. (2017). Counting the "missing millions": Disruptive ideas to leave no one behind | AidData. Retrieved from http://aiddata.org/blog/counting-the-missing-millions-disruptive-ideas-to-leave-no-one-behind

Custer, S. J. (2016). Tracking development via effective aid management. Geospatial World Magazine. Retrieved September 05, 2017, from https://www.geospatialworld.net/article/tracking-development-via-effective-aid-management/

Custer, S., & Sethi, T. (Eds.). (2017). Avoiding data graveyards: Insights from data producers and users in three countries. Williamsburg, VA: AidData at the College of William & Mary

Custer, S., Rice, Z., Masaki, T., Latourell, R., & Parks, B. (2015). Listening to leaders: Which development partners do they prefer and why? Williamsburg, VA: AidData. http://aiddata.org/listening-to-leaders.

D'Onofrio, A. D., & Maggio, G. (2015). Does foreign aid fuel trust? AidData Working Paper #17. Williamsburg, VA: AidData. Technical report.

Dalgaard, C. J., Hansen, H., & Tarr, F. (2004). On the empirics of foreign aid and growth. *The Economic Journal, 114*(496), F191-F216.

Data2x. (2017). Big Data and the Well Being of Women and Girls. Retrieved from Data2x website: http://data2x.org/wp-content/uploads/2017/03/Big-Data-and-the-Well-Being-of-Women-and-Girls.pdf

De, R. & Becker, C. (2015). The foreign aid effectiveness debate: Evidence from Malawi. *AidData Working Paper, 6*. Williamsburg, VA: AidData.

Development Initiatives. (2015). Investments to End Poverty: Meeting the Challenge, Reducing Poverty to Zero. Retrieved from http://devinit.org/wp-content/uploads/2015/09/Investments-to-End-Poverty-Report-2015_online.pdf

Development Initiatives. (2017). P20 initiative baseline report. Retrieved from Development Initiatives website: http://devinit.org/wp-content/uploads/2017/03/P20-Initiative-baseline-report.pdf

Djankov, S., Montalvo, J. G., & Reynal-Querol, M. (2008). The Curse of Aid. *Journal of Economic Growth, 13*(3), 169–94.

Do, Q. A., Nguyen, K. T., & Tran, A. N. (2013). One Mandarin benefits the whole clan: Hometown favoritism in an authoritarian regime. Paper presented at the 2014 Annual Congress of the European Economic Association in Toulouse, France.

Dolan, C., McCord, G., Grepin, K., BenYishay, A., & Tanner, J. (2017). The impact of an insecticide treated bednet campaign on all-cause child mortality: A geospatial impact evaluation from the Democratic Republic of Congo. *Working Paper.*

Dollar, D., & Levin, V. (2006). The increasing selectivity of foreign aid, 1984–2003. *World Development, 34*(12), 2034–46.

Doucouliagos, H., & Paldam, M. (2009). The aid effectiveness literature: The sad results of 40 years of research. *Journal of Economic Surveys*, *23*(3), 433-461.

Dreher, A., & Lohmann, S. (2015). Aid and growth at the regional level. AidData Working Paper #9. Williamsburg, VA: AidData.

Dreher, A., Fuchs, A., Hodler, R., Parks, B. C., Raschky, P. A., & Tierney, M. J. (2014). Aid on demand: African leaders and the geography of China's foreign assistance. AidData Working Paper #3. Williamsburg, VA: AidData.

Dreher, A., Fuchs, A., Parks, B. C., Strange, A. M., & Tierney, M. J. (2015). Apples and dragon fruits: The determinants of aid and other forms of state financing from China to Africa. AidData Working Paper #15.

Dreier, P. J., Mollenkopf, J. H., & Swanstrom, T. (2001). *Place matters: Metropolitics for the twenty-first century*. 2nd ed., revised. Lawrence: University Press of Kansas.

Dudley, L., & Montmarquette, C. (1976). A model of the supply of bilateral foreign aid. *American Economic Review, 66*(1), 132-142.

Dunning, T. (2004). Conditioning the effects of aid: Cold War politics, donor credibility, and democracy in Africa. *International Organization, 58*(2), 409-423.

Easterly, W (2003). Can foreign aid buy growth? *The Journal of Economic Perspectives, 17*(3), 23–48.

Easterly, W. (2006). *The white man's burden: Why the west's efforts to aid the rest have done much ill and so little good*. New York: Penguin Press.

Easterly, W. (2009). Can the West Save Africa? *Journal of Economic Literature, 47*(2), 373-447.

Easterly, W. (2013). *The tyranny of experts: Economists, dictators, and the forgotten rights of the poor*. New York, NY: Basic Books.

Edgerton, R. B. (2002). *The troubled heart of Africa: A history of the Congo*. New York: St. Martin's Press.

Escobal, J., & Torero, M. (2005). Measuring the impact of asset complementarities: The case of rural Peru. *Cuadernos de Economía (Latin American Journal of Economics), 42*(125), 137-164.

Evans, A. (2010). Aid effectiveness post-2010 -- a think piece on ways forward. Retrieved from https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/7263.pdf

Fafchamps, M., & Moser, C. (2004). Crime, isolation, and law enforcement. Research Paper 2004/5. Helsinki: UNU-WIDER.

Findley, M. G. (Forthcoming). Does foreign aid build peace? *Annual Review of Political Science*.

Finkel, S. E., Pérez-Liñán, A., & Seligson, M. A. (2007). The effects of U.S. foreign assistance on democracy building, 1990-2003. *World Politics, 59*(3), 404–38.

French, H. W. (2013). How Africa's new urban centers are shifting its old colonial boundaries. The Atlantic. Retrieved September 05, 2017, from https://www.theatlantic.com/international/archive/2013/07/how-africas-new-urban-centers-are-shifting-its-old-colonial-boundaries/277425/

Galiani, S., Knack, S., Xu, L. C., & Zou, B. (2016). The effect of aid on growth: Evidence from a quasi-experiment. *Journal of Economic Growth*.

Gennaioli, N., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2012). Human capital and regional development. *The Quarterly Journal of Economics, 128*(1), 105-164.

Glennie, J., & Sumner, A. (2016). *Aid, growth, and poverty*. London: Palgrave Macmillan.

Goldsmith, A. A. (2001). Foreign aid and statehood in Africa. *International Organization, 55*(1), 123–48.

Grossman, H. I. (1992). Foreign aid and insurrection. *Defence Economics, 3*(4), 275-288. Retrieved from http://pdf.usaid.gov/pdf_docs/PNABN614.pdf

Hansen, H., & Tar, F. (2001). Aid and growth regression. *Journal of Development Economics, 64*, 547-70.

Hansen, H., Andersen, O. W., & White, H. (2011). Impact evaluation of infrastructure interventions. *Journal of Development Effectiveness, 3*(1), 1-8.

Henderson, V. J., Storeygard, A., & Weil, D. N. (2012). Measuring economic growth from outer space. *American Economic Review, 102*, 994–1028.

Herzer, D., & Nunnenkamp, P. (2012). The effect of foreign aid on income inequality: Evidence from panel cointegration. *Structural Change and Economic Dynamics*, *23*(3), 245-255.

Hicks, R. L., Parks, B. C., Roberts, J. T., & Tierney, M. J. (2008). *Greening aid? Understanding the environmental impact of development assistance.* Oxford University Press.

Hodler, R., & Raschky, P. A. (2014). Regional favoritism. *Quarterly Journal of Economics, 129*(2), 995-1033.

Howes, S., Otor, S., & Rogers, C. (2011). Does the World Bank have a micro-macro paradox or do the data deceive? *Development Policy Centre Discussion Papers 1105.* Development Policy Centre, Crawford School, Australian National University.

Humphreys, M., & Weinstein, J. M. (2009). Field experiments and the political economy of development. *Annual Review of Political Science, 12*(1), 367–78.

IDA. (2009). *A review of the use of output-based aid approaches*. Washington, D.C.: World Bank

IDA. (2010). *IDA's performance based allocation system: Review of the current system and key issues for IDA16*. Washington, D.C.: World Bank

IEAG. (2014). A world that counts: Mobilising the data revolution for sustainable development. Retrieved from http://www.undatarevolution.org/wp-content/uploads/2014/12/A-World-That-Counts2.pdf

IEG. (2010). *Cost-benefit analysis in World Bank projects*. Washington, D.C.: World Bank.

IEO. (2017). A value for money analysis of GEF interventions in land degradation and biodiversity. IEO briefing, May 2017.

In'airat, M. (2014). Aid allocation, selectivity, and the quality of governance. *Journal of Economics, Finance and Administrative Science, 19,* 63-68.

Isaksson, A. S., & Kotsadam, A. (2016). Chinese aid and local corruption. Working Paper, University of Gothenburg.

ISSC, IDS and UNESCO (2016), Challenging inequalities: Pathways to a just world. World Social Science Report 2016. Paris: UNESCO Publishing. http://unesdoc.unesco.org/images/0024/002458/245825e.pdf

Jablonski, R. S. (2014). How aid targets votes: The impact of electoral incentives on foreign aid distribution. *World Politics, 66*(2), 293–330.

Jansson, J. (2013). The sicomines agreement revisited: Prudent Chinese banks and risk-taking Chinese companies. *Review of African Political Economy, 40*(135), 152-162.

Jean, N., Burke, M., Xie, M., Davis, W. M., Lobell, D. B., & Ermon, S. (2016). Combining satellite imagery and machine learning to predict poverty. *Science, 353*(6301), 790-794.

Jerven, M. (2014). Benefits and Costs of the Data for Development Targets for the Post-2015 Development Agenda. Post-2015 Consensus Working Paper. Retrieved from: http://www.copenhagenconsensus.com/sites/default/files/data_assessment_-_jerven.pdf

Johns, B., & Torres, T. T. (2005). Costs of scaling up health interventions: A systematic review. *Health Policy and Planning, 20*(1), 1-13.

Kanbur, R., & Venables, T. (2005) 'Spatial Inequality and Development.' *Journal of Economic Geography, 5*(1), 1-2.

Kelly, G., Brazys, S., & Elkink, J. A. (2016). The dragon's curse? China, the World Bank, and perceptions of corruption in Tanzania. AidData Working Paper #26. Williamsburg, VA: AidData.

Khomba, D. C., & Trew, A. (2017). Aid and growth in Malawi. *AidData Working Paper #42*. Williamsburg, VA: AidData. Accessed at http://aiddata.org/working-papers.

Kline, P., & Moretti, E. (2014). People, places, and public policy: Some simple welfare economics of local economic development programs. *Annual Review of Economics, 6*(1), 629–666.

Knack, S. (2001). Aid dependence and the quality of governance: Cross-country empirical tests. *Southern Economic Journal, 68*(2), 310-329.

Knack, S. (2004). Does foreign aid promote democracy? *International Studies Quarterly, 48*(2), 251–66.

Koeberle, S., Bedoya, H., Silarszky, P., & Verheyen, G. (Eds). (2005). *Conditionality revisited: Concepts, experiences, and lessons learned*. Washington D.C.: World Bank.

Kono, D. Y., Montinola, G. R., & Verbon, N. (2013). Helping hand or heavy hand? Foreign aid, regime type and domestic unrest. *International Political Science Review*, 1–16.

Kotsadam, A., Østby, G., Rustad, S. A., Tollefsen, A. F., & Urdal, H. (2017). Development aid and infant mortality. AidData Working Paper #39. Williamsburg, VA: AidData.

Kumaranayake, L., & Watts, C. (2000). Economic costs of HIV/AIDS prevention activities in sub-Saharan Africa. *AIDS, 14*(3), S239–52.

Lamichhane, K. (2015). *Disabilities, education, and employment in developing countries: From charity to investment.* Cambridge: Cambridge University Press.

Le, T. H., & Winters, P. (2001). Aid policies and poverty alleviation: The case of Viet Nam. *Asia-Pacific Development Journal, 8*(2), 27-44.

Legovini, A., Di Maro, V., & Piza, C. (2015). Impact evaluation helps deliver development projects. World Bank Policy Research: Working Paper 7157.

Lipton, M. (1971). *Why poor people stay poor: Urban bias in world development*. Cambridge, MA: Harvard University Press.

Majumdar, S., Mani, A., & Mukand, S. W. (2004). Politics, information, and the urban bias. *Journal of Development Economics, 75*, 137-165.

Makofane, M. D. M., & Gray, M. M. A. (2007). Factors hindering the successful outcome of rural community projects. *Social Work, 43*(3), 201-208.

Marineau, J. F. (2015). Weakening state capacity? A subnational analysis of foreign aid and tax compliance in Uganda and Malawi. Working Paper.

Marty, R., Dolan, C.B., Leu, M., & Runfola, D. (2017). Taking the health aid debate to the subnational level: The impact and allocation of foreign health aid in Malawi. *BJM Global Health, 2*(1), e000129.

Masaki, T. (2016). Coups d'état and foreign aid. *World Development, 79*, 51-68.

Masaki, T. (2016). The impact of intergovernmental transfers on local revenue generation: Evidence from Tanzania. UNU-WIDER Working Paper Series: 2016/113.

Masaki, T. (Forthcoming). The political economy of aid allocation: Evidence from Zambia. *African Studies Review*.

McArthur, J. W., & Rasmussen, K. (2017). Global economy and development at Brookings. *Change of Pace: Accelerations and Advances During the Millennium Development Goal Era*.

McNamara, R. S. (1973). The Nairobi Speech. Address to the Board of Governors by Robert S. McNamara, President, World Bank Group, Nairobi, Kenya. http://www.juerg-buergi.ch/resources/Archiv/ Entwicklungspolitik-Archiv/Dokumente-zur-Entwicklungspolitik/ McNamara_Nairobi_speech.pdf.

Mekasha, T. J., & Tarp, F. (2013). Aid and growth: What meta-analysis reveals. *The Journal of Development Studies*, *49*(4), 564-583.

Meredith, M. (2005). *The state of Africa*. London: Free Press.

Milanovic, B. (2005). Half a world: Regional inequality in five great federations, *Journal of the Asia Pacific Economy, 10*(4), 408–445.

Mohammed, A. (2015). Deepening income inequality. *Outlook on the Global Agenda 2015,* (8-10).

Morrison, K. M. (2009). Oil, nontax revenue, and the redistributional foundations of regime stability. *International Organization, 63,* 107-38.

Moser, C. (2008). Poverty reduction, patronage, or vote buying? The allocation of public goods and the 2001 election in Madagascar. *Economic Development and Cultural Change, 57*(1), 137–162.

Mosley, P. (1987). *Overseas aid: Its defense and reform*. Brighton: Wheatsheaf Books.

Moyo, D. (2009). *Dead aid: Why aid is not working and how there is a better way for Africa*. New York: Farrar, Straus and Giroux.

Mthembu-Salter, G. (2012). Goodwill and hard bargains: The DRC, China and India. *SAIIA Occasional Paper 114.* Johannesburg: South African Institute of International Affairs.

Mu, R. & van de Walle, D. (2011). Rural roads and local market development in Vietnam. *Journal of Development Studies, 47*(5), 709–34.

Muzzini, E., & Lindeboom, W. (2008). *The urban transition in Tanzania: Building the empirical base for policy dialogue*. Washington, D.C.: The International Bank for Reconstruction and Development/The World Bank.

Neumayer, E. (2003). *Pattern of aid giving: The impact of good governance on development assistance*. London: Routledge.

Neumayer, E. (2003). The determinants of aid allocation by regional multilateral development banks and United Nations agencies. *International Studies Quarterly, 47*(1), 101-22.

Nunn, N. & Qian, N. (2014). U.S. food aid and civil conflict. *American Economic Review, 104*(6), 1630-1666.

Nunnenkamp, P. (2016). Recent patterns of post-conflict aid: Did donors help sustain peace? Kiel Working Paper No. 2043.

Nunnenkamp, P., Öhler, H., & Andrés, M. S. (2017). Need, merit and politics in multilateral aid allocation: A district-level analysis of World Bank projects in India. *Review of Development Economics, 21*(1), 126-56.

Odokonyero, T., Ijjo, A., Marty, R., Muhumuza, T., & Moses, G. O. (2015). Sub-national perspectives on aid effectiveness: Impact of aid on health outcomes in Uganda. AidData Working Paper #18. Williamsburg, VA: AidData.

OECD Observer. (2004) Is GDP a satisfactory measure of growth. OECD Observer. No 246/247, December 2004-January 2005. http://oecdobserver.org/news/archivestory.php/aid/1518/Is_GDP_a_satisfactory_measure_of_growth_.html

OECD. (2005). Is GDP a satisfactory measure of growth? *OECD Observer, 2004*(246-247), 30-31.

OECD. (2012). Trends in aid to environment, a component of sustainable development finance (1991-2011). In *Development Cooperation Report 2012: Lessons in Linking Sustainability and Development*. OECD Publishing.

OECD. (2017). Paris Declaration and Accra Agenda for Action. Retrieved September 11, 2017, from http://www.oecd.org/dac/effectiveness/parisdeclarationandaccraagendaforaction.htm

Öhler, H., & Nunnenkamp, P. (2014). Needs-based targeting or favoritism? The regional allocation of multilateral aid within recipient countries. *Kyklos, 67*(3), 420– 446.

Parks, B. C., Masaki, T., Faust, J., & Leiderer, S. (2016). Aid management, trust, and development policy influence: new evidence from a survey of public sector officials in low-income and middle-income countries. AidData Working Paper #30. Williamsburg, VA: AidData. Accessed at http://aiddata.org/working-papers.

Parks, B., Tierney, M. J., & Bergeron, C. (2016). Foreign aid and conflict: What we know and need to know. In D. Backer, R. Bhavnani, & P. Huth (Eds.), *Peace and Conflict 2016*(120-127). London: Routledge.

Peratsakis, C., Powell, J., Findley, M., Baker, J., & Weaver, C. (2012). Geocoded activity-level data from the government of Malawi's aid management platform. Washington D.C.: AidData and the Robert S. Strauss Center for International Security and Law.

Planning Commission of the United Republic of Tanzania. (2011). The Tanzania five year development plan (2011/2012-2015/2016): Unleashing Tanzania's latent growth potentials.

Posner, D. N. (2005). *Institutions and ethnic politics in Africa*. Cambridge: Cambridge University Press.

Pritchett, L., & Sandefur, J. (2015). Learning from experiments when context matters. *American Economic Review, 105*(5), 471-75.

Qian, N. (2015). Making progress on foreign aid. *Annual Review of Economics, 7*, 277–308.

Ravallion, M., & Wodon, Q. (1999). Poor areas, or only poor people? *Journal of Regional Science, 39*(4), 689-711.

Reinikka, R., & Svensson, J. (2004). Local capture: Evidence from a central government transfer program in Uganda. *Quarterly Journal of Economics, 119*(2), 670-705.

Resnick, D. (2014). Urban governance and service delivery in African cities: The role of politics and policies. *Development Policy Review, 32*(S1), S3–S17.

Roberts, J. T., Parks, B. C., Tierney, M. J., & Hicks, R. L. (2009). Has foreign aid been greened? *Environment: Science and Policy for Sustainable Development*, *51*(1), 8-21.

Robinson, J. A., & Torvik, R. (2005). White elephants. *Journal of Public Economics, 89*, 197-210.

Rodrik, D. (2009). The new development economics: We shall experiment, but how shall we learn? In *What works in development? Thinking big and thinking small*, edited by Easterly, W. and Cohen, J. (24-54). Washington D.C.: Brookings Institution Press.

Runfola, D., BenYishay, A., Tanner, J., Buchanan, G., Nagol, J., Leu, M., ... & Marty, R. (2017). A top-down approach to estimating spatially heterogeneous impacts of development aid on vegetative carbon sequestration. *Sustainability*, *9*(3), 409.

Runfola, D., Marty, R., Goodman, S., Lefew, M., & BenYishay, A. 2017b. geoSIMEX: A generalized approach to modeling spatial imprecision. AidData Working Paper #38. Williamsburg, VA: AidData

Sandefur, J. (2013). Seeing like a state in Africa: Data needed. Center for Global Development. Retrieved from https://www.cgdev.org/blog/seeing-state-africa-data-needed

Severino, J., & Ray, O. (2009). The End of ODA: Death and Rebirth of a Global Public Policy. Center for Global Development. Working Paper Series. Working Paper No. 167. Retrieved from https://www.cgdev.org/publication/end-oda-death-and-rebirth-global-public-policy-working-paper-167

Shafiullah, M. (2011). Foreign aid and its impact on income inequality. *International Review of Business Research Papers*, *7*(2), 91-105.

Smets, L., & Knack, S. (2015). World Bank policy lending and the quality of public sector governance. (Policy Research Working Paper). Washington, D.C.: World Bank Group.

Smith, A. (2008). The perils of unearned income. *The Journal of Politics, 70*(3), 780–93.

Somvanshi, K. K. (2016). World Bank to change classification of countries; India will now be called 'lower-middle income' The Economic Times. Retrieved from http://economictimes.indiatimes.com/

Standish, R. (2014). Thanks to urbanization, tomorrow's megalopolises will be in Africa and Asia. Foreign Policy. Retrieved September 05, 2017, from http://foreignpolicy.com/2014/07/11/thanks-to-urbanization-tomorrows-megalopolises-will-be-in-africa-and-asia/

START. (2011). Urban poverty & climate change in Dar es Salaam, Tanzania: A case study. Washington, D.C.: START International, Inc.

Stokke, O. (1995). Aid and political conditionality: Core issues and state of the art. In O. Stokke (Ed.), *Aid and Political Conditionality*. London: Frank Cass.

Storeygard, A. (2016). Farther on down the road: Transport costs, trade and urban growth in sub-Saharan Africa. *Review of Economic Studies, 83*, 1263-1295.

Strandow, D., Findley, M. G., & Young, J. K. (2016). Foreign aid and the intensity of violent armed conflict abstract: Foreign aid and the intensity of violent armed conflict. AidData Working Paper #24. Williamsburg, VA: AidData.

Strange, A., Dreher, A., Fuchs, A., Parks, B. C., & Tierney, M. J. (2017). Tracking underreported financial flows: China's development finance and the aid-conflict nexus revisited. *Journal of Conflict Resolution, 61*(5), 935-963.

Stuart, E., Samman, E., Avis, W., & Berliner, T. (2015). The data revolution: Finding the missing millions. ODI Research Report #3. Retrieved from https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9604.pdf

Sundberg, R., & Melander, E. (2013). Introducing the UCDP georeferenced event dataset. *Journal of Peace Research, 50*(4), 523–532.

Sutton, P. C., & Costanza, R. (2002). Global estimates of market and non-market values derived from nighttime satellite imagery, land use, and ecosystem service valuation. *Ecological Economics, 41*, 509–527.

The p20 initiative: Data to leave no one behind. (2017). *Development Initiatives.*

Tierney, M. J., Nielson, D. L., Hawkins, D. G., Roberts, J. T., Findley, M. G., Powers, R. M., Parks, B. C., Wilson, S. E., & Hicks, R. L. (2011). More dollars than sense: Refining our knowledge of development finance using AidData. *World Development, 39*(11), 1891-1906.

Tull, D. M. (2006). China's engagement in Africa: Scope, significance and consequences. *Journal of Modern African Studies, 44*(3), 459-479.

UNDP. (2013). *Humanity divided: Confronting inequality in developing countries.* New York: UNDP.

UNEP. (2007). Sudan: Post-conflict environmental assessment. *Technical Report*, United Nations Environment Programme.

UNESCO. (2016). World social science report: Challenging inequalities - Pathways to a just world. UNESCO Publishing.

UNICEF. (2017). Under-Five Mortality. Retrieved September 11, 2017, from https://data.unicef.org/topic/child-survival/under-five-mortality/

United Nations (2014). The millennium development goals report 2014. Retrieved from: https://data.unicef.org/wp-content/uploads/2015/12/MDG-2014-English-web_170.pdf

United Nations. (2014). A world that counts. Retrieved from United Nations website: http://www.undatarevolution.org/wp-content/uploads/2014/11/A-World-That-Counts.pdf

United Nations. (2015). Sustainable development goals: Fact sheet. Retrieved from http://www.un.org/sustainabledevelopment/wp-content/uploads/2015/08/Factsheet_Summit.pdf.

United Nations. (2016). *Global sustainable development report: 2016 edition*. New York: United Nations.

Verbeek, J. (2015). Increasingly, inequality within, not across, countries is rising. *World Bank Blogs*, available at http://blogs.worldbank.org/developmenttalk/increasingly-inequality-within-not-across-countries-rising

Wang, H. et al. (2016). Global, regional, national, and selected subnational levels of stillbirths, neonatal, infant, and under-5 mortality, 1980–2015: A systematic analysis for the Global Burden of Disease Study 2015. *The Lancet, 388(10053),* 1725–1774.

Wayland, J. (Forthcoming). Constraints on aid effectiveness in the water, sanitation, and hygiene (WASH) sector: Evidence from Malawi. *African Geographical Review*.

Weezel, S. V. (2015). A spatial analysis of the effect of foreign aid in conflict areas. AidData Working Paper #8. Williamsburg, VA: AidData.

Wei, Y. D. (2017), Geography of Inequality in Asia. Geogr Rev, 107: 263–275. doi:10.1111/j.1931-0846.2016.12212.x

Weidmann, N. B., & Schutte, S. (2017). Using night light emissions for the prediction of local wealth. *Journal of Peace Research, 54*(2), 125–140.

Williamson, C. R. (2009). Exploring the failure of foreign aid: The role of incentives and information. *Review of Austrian Economics, 23*(1), 17-33.

Wilson, C., & Rahman, Z. (n.d.). Citizen-generated data and governments: Towards a collaboration. Retrieved from: http://civicus.org/images/citizen-generated%20data%20and%20governments.pdf

Winters, M. (2014). Targeting, accountability and capture in development projects. *International Studies Quarterly, 58*(2), 393–404.

Wood, R. M., & Molfino, E. (2016). Aiding victims, abetting violence: The influence of humanitarian aid on violence patterns during civil conflict, *Journal of Global Security Studies*, ogw007.

World Bank. (2008). *World development report*. Washington, D.C.: World Bank.

World Bank. (2009). *World development report*. Washington, D.C.: World Bank.

World Bank. (2011). *Forest carbon partnership facility (FCPF) readiness fund common approach to environmental and social safeguards for multiple delivery partners.* Washington, D.C.: World Bank.

World Economic Forum. (2016). Deepening income inequality. In: Outlook on the Global Agenda 2015. Retrieved September 01, 2017, from http://reports.weforum.org/outlook-global-agenda-2015/top-10-trends-of-2015/1-deepening-income-inequality/

Wright, J. (2009). Aid effectiveness and the politics of personalism. *Comparative Political Studies, 43*(6), 735-62.

Wright, J. (2009). How foreign aid can foster democratization in authoritarian regimes. *American Journal of Political Science*, *53*(3), 552–571.

Wulder, M., & Coops, N. (2014). Satellites: Make Earth observations open access : Nature News & Comment. Retrieved from https://www.nature.com/news/satellites-make-earth-observations-open-access-1.15804

Appendix A: Regression Outputs

In Tables A-1 and A-2, we present our findings from the OLS and Poisson regressions using the estimated amount of WB aid commitments and the count of WB projects as the dependent variable, respectively. To estimate the amount of WB aid commitments allocated to each region, we assume that the total amount of aid committed to a given project is split equally across all the subnational regions that the project targeted.

Table A-1: OLS Regression Results Using World Bank Aid Commitment as the Dependent Variable

Variables	(1)	(2)	(3)	(4)	(5)
Population density	0.086***				0.120***
	(0.013)				(0.027)
Nighttime light		0.086***			0.005
		(0.014)			(0.027)
Road density			0.0421***		-0.048**
			(0.016)		(0.020)
Birth region				-0.000	0.000
				(0.006)	(0.006)
Observations	3,586	3,600	3,442	3,601	3,442
R-squared	0.849	0.849	0.846	0.846	0.850
Adjusted R-squared	0.839	0.838	0.836	0.836	0.840

*Notes: Robust standard errors in parentheses. Across Models (1)-(5), we control for country-fixed effects. *** p<0.01, ** p<0.05, * p<0.1.*

Table A-2: Poisson Regression Results Using Project Count as the Dependent Variable

Variables	(1)	(2)	(3)	(4)	(5)
Population density	0.176***				0.294***
(0.020)				(0.035)	
Nighttime light		0.138***			-0.095***
	(0.021)			(0.034)	
Road density			0.101***		-0.071***
		(0.019)		(0.026)	
Birth region				0.002	0.005
			(0.011)	(0.010)	
Observations	3,586	3,600	3,442	3,601	3,442

*Notes: Robust standard errors are reported in parentheses. Across Models (1)-(5), we control for country-fixed effects. *** p<0.01, ** p<0.05, * p<0.1*

.

Appendix B: Descriptive Statistics

Table B-1: Descriptive Statistics on Variables Being Used in the Global Analysis of WB Aid Allocation

Variable	Description	N	Mean	Std. Dev	Min	Max	Source
World Bank Aid Commitments	Estimated amount of WB aid commitments being allocated to a given ADM1 region between 1995 and 2014 (log-transformed). The amount of aid is assumed to be split equally across regions if a given project targets more than one ADM1 regions	3601	11.066	8.553	0.000	22.523	AidData (2016)
Number of WB Projects	Total number of WB projects being allocated to ADM1 region between 1995 and 2014	3601	5.581	7.710	0.000	57.000	AidData (2016)
Population density	ln(population density + 1) where population density refers to the number of people per square kilometers in 2000, averaged by ADM1 region	3586	4.214	1.922	-23.920	10.466	CIESIN (2016)
Nighttime light	ln(nighttime light + 1) where nighttime light refers to the intensity of stable nighttime lights in 2000 measured on a scale of 0 to 63 and averaged at the ADM1 level	3600	1.389	1.221	0.000	4.159	NOAA
Road density	ln(road density + 1) where road density refers to road length (in kilometer) divided by land area (in square kilometers)	3442	-1.874	0.969	-9.396	2.185	CIESIN (2013)
Birth region	ln(birth region + 1) where birth region refers to the number of years for which a given ADM1 region was the birth region of incumbent president. See footnote 68 in the main text for a description of the data collection procedures for this variable.	3601	0.274	0.714	0.000	3.045	Our own coding based on online search and the Archigos database

About AidData

AidData is a research lab at the College of William & Mary. We equip policymakers and practitioners with better evidence to improve how sustainable development investments are targeted, monitored, and evaluated. We use rigorous methods, cutting-edge tools and granular data to answer the question: who is doing what, where, for whom, and to what effect?

AidData
Institute for the Theory and Practice of International Relations
College of William & Mary
427 Scotland St.
Williamsburg, VA 23185

WILLIAM & MARY

CHARTERED 1693