RESEARCH REPORT

A Political Economy Framework for the Urban Data Revolution

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With cities growing rapidly throughout much of the developing world, the global development community increasingly recognizes the need to build the capacities of local leaders to analyze and apply data to improve urban policymaking and service delivery. Civil society leaders, development advocates, and local governments are calling for an "urban data revolution" to accompany the new UN Sustainable Development Goals (SDGs), a revolution that would provide city leaders new tools and resources for data-driven governance. The need for improved data and analytic capacity in rapidly growing cities is clear, as is the exponential increase in the volume and types of data available for policymaking. However, the institutional arrangements that will allow city leaders to use data effectively remain incompletely theorized and poorly articulated.

This paper begins to fill that gap with a political economy framework that introduces three new concepts: permission, incentive, and institutionalization. We argue that without addressing the permission constraints and competing incentives that local government officials face in using data, investments in improved data collection at the local level will fail to achieve smarter urban policies. Granting permission and aligning incentives are also necessary to institutionalize data-driven governance at the local level and create a culture of evidence-based decisionmaking that outlives individual political administrations. Lastly, we suggest how the SDGs could support a truly transformative urban data revolution in which city leaders are empowered and incentivized to use data to drive decisionmaking for sustainable development.

Introduction

A century ago, 1 in 10 people lived in urban areas. Now, for the first time in human history, most people live in cities. By 2050, the urban share of the world's population will increase to two-thirds as cities of all sizes swell to accommodate an estimated 3 billion more urban dwellers. This staggering growth in urban population will be outpaced by increases in global urban land cover, which is expected to triple between 2000 and 2030, resulting in less dense and more sprawling cities and metropolitan regions. Rapid urbanization will be especially pronounced in developing countries in Africa and Asia and will bring profound implications for the Earth's ecology, the viability of future economies, and the quality of human life.

While national policies can and will affect the scope and patterns of urbanization, the global development community is refocusing attention on the local level, where an increasingly urbanized citizenry have direct contact with the institutions that provide a growing share of services. We see evidence of this in new urban frameworks and strategies recently adopted by the World Bank and several regional development banks, USAID, other bilateral and multilateral organizations, and private philanthropic institutions. As perhaps the most telling sign of an "urban turn" in mainstream development discourse, the United Nations included a dedicated goal related to sustainable cities in the Sustainable Development Goals (SDGs) framework, which replaced the Millennial Development Goals (MDGs) when they expired at the end of 2015.

The international development community has also focused new attention on how governments can use data to support sustainable development. Drawing from the lessons of the MDGs,[1] an influential 2013 report from the UN High Level Panel of Eminent Persons called for a "data revolution," kicking off UN discussions on the Post-2015 Development Agenda (United Nations 2013). The UN Secretary General subsequently convened an Independent Expert Advisory Group on a Data Revolution for Sustainable Development, which recommended a new data infrastructure and renewed investments in public statistical capacities to support progress and monitoring on the SDGs (United Nations 2014a). At the SDG Summit in September 2015, more than 70 global leaders launched the Global Partnership for Sustainable Development Data to support "data-driven decision-making by initializing more open, new, and usable data to help end extreme poverty, combat climate change and ensure a healthy life for all."[2]

At the intersection of these two trends—rapid urbanization in developing countries and renewed global attention to data-driven governance—we see growing calls for an urban data revolution to accompany the SDGs. Today, even basic data on the urban poor is often unavailable in the developing world, and the institutional capacity to collect and use data is weak or nonexistent. Disaggregating data by urban areas and improving local data analysis capacities were hallmarks of the "Localizing the SDGs" dialogues organized by the United Nations Development Group in 2014. Recent studies[3] have attempted to "test" the ability of local governments to monitor and report on progress in achieving Goal 11 (the "urban SDG"), with discouraging results: both studies call for improving the capacity of local authorities to collect data on key sustainable development indicators.

Supporting the capacity of local governments to collect data on SDG indicators may assist them in "reporting up" to national governments responsible for monitoring progress on the SDGs. However, a more important outcome of such capacity building should be to enable local governments themselves to use data effectively to monitor SDG achievement and influence SDG outcomes. Cities can use local data

to improve efficiency and fairness in urban service delivery, directly advancing the SDGs by, for example, identifying communities that lack access to safe and affordable drinking water (SDG target 6.1) or providing an accurate census of slum dwellers (SDG target 11.1). An urban data revolution could also make local governments more accountable to their citizens and ground policy decisions in evidence rather than ideology or political influence—goals cited in SDG targets 16.6 and 16.7 (on transparent and inclusive governance "at all levels").

So what is necessary to launch a data revolution in developing countries that will enable local governments to apply data and evidence to address urban policy issues? The current focus in development policy is on helping local governments tap into new or nontraditional data sources (improving "big data" capacity), or open up existing administrative data for greater transparency ("open data" policies). Technological advances support progress in both directions, expanding the universe of potential data sources, driving down the cost of data collection and analysis, facilitating the dissemination or sharing of public data, and allowing for crowdsourcing of data and analysis. In order to take advantage of these technological developments and the reduced costs associated with data supply, capacity building is certainly necessary but, on its own, may not be sufficient.

The institutional preconditions that influence whether and how city leaders use data to solve problems will not be addressed by increasing data supply or analytic capacity. Capacity gaps do not explain why we continue to see vast differences across cities in uptake and use of data for governing despite declining supply costs. In this paper, we grapple with a more fundamental set of issues: Under what circumstances do local governments use data to make decisions? If we are interested in promoting use of data by local governments to achieve sustainable development outcomes, what are the most effective levers?

This paper proposes an analytic framework that adds three new concepts to global debates on the role of data in supporting sustainable urban development: permission, incentive, and institutionalization. The next section introduces the basic framework and defines these terms. We then explore the concepts of permission and incentive in greater detail, describing how they affect the ability of city governments to access, analyze, and apply data to policymaking and providing examples to ground these concepts in real-world challenges and solutions. Permission and incentive are essential elements of a third concept, institutionalization, which is necessary to sustain data-driven governance through changes in political administrations. We conclude by suggesting how this framework might be applied to current debates over the role of city leaders in advancing the SDGs.

Basic Framework

This paper focuses on fundamental challenges associated with data-driven local governance, defined as using accurate data to solve problems, deliver services, and plan for the future. Governance—global, national, regional, or local—is the process of deciding how to regulate private activities and spend limited public resources to achieve specific results that would not be achieved through private action alone. In this paper, we focus on local governance. When we look to city leaders to use data to govern, we want them to ground choices on allocating people, money, and other resources in evidence and knowledge generated from the best available data.

Data can support governance in multiple ways: by testing the effectiveness of policy interventions, identifying gaps or inefficiencies in service delivery, and anticipating future trends and challenges. Using data to aid decisionmaking may not seem like a controversial approach, but our research across dozens of countries suggests that use of hard evidence in urban governance is uncommon in many parts of the world, where relying on the status quo, the preferences of influential individuals, or simple ad hoc decisionmaking may be closer to the standard.[4]

There are many frameworks that describe how data can drive more informed and effective public policy decisions, all of which involve parsing data-driven governance into a set of components or phases.[5] In this paper, we propose a basic framework that, admittedly, simplifies many of the complexities explored elsewhere in the literature. In our framework, we suggest that, at a minimum, raw data can improve policy only after decisionmakers *identify* the problem(s) they seek to address, *access* or collect the relevant data, *analyze* the data to convert it into actionable evidence, and *apply* it to the problem(s) identified.

This basic framework is neither novel nor controversial. However, we add to it three new elements rarely explored in the existing literature: the *permission* constraints and *incentive* structures that local decisionmakers may face and the need to *institutionalize* data-driven governance so that it outlives individual political leadership or fads in public administration.

With these additions, we introduce a political economy analysis to questions of data-driven governance. Political economy analysis is "concerned with the interaction of political and economic processes in a society, including the distribution of power and wealth between groups and individuals, and the processes that create, sustain and transform these relationships over time."[6] It digs beneath the formal structures and technical interventions to reveal the underlying interests, incentives, and institutions that enable or frustrate change. While political economy analysis continues to gain traction

in international development discourse, recent calls for a data revolution in developing countries have largely ignored political economy factors like formal and informal institutional arrangements and actor incentives.[7] To our knowledge, political economy analysis has not yet been applied to questions of data-driven governance at the local level.

Our framework is represented visually in figure 1 and its basic components are introduced below. In the following sections, we explore how permission and incentive affect data access, analysis, and application, and how both are preconditions to institutionalization. We offer examples, drawn from our direct experience and from the literature on urbanization, local governance, and use of local data for decisionmaking, of how these concepts play out in practice.

FIGURE 1

Political Economy Framework for Data-Driven Governance
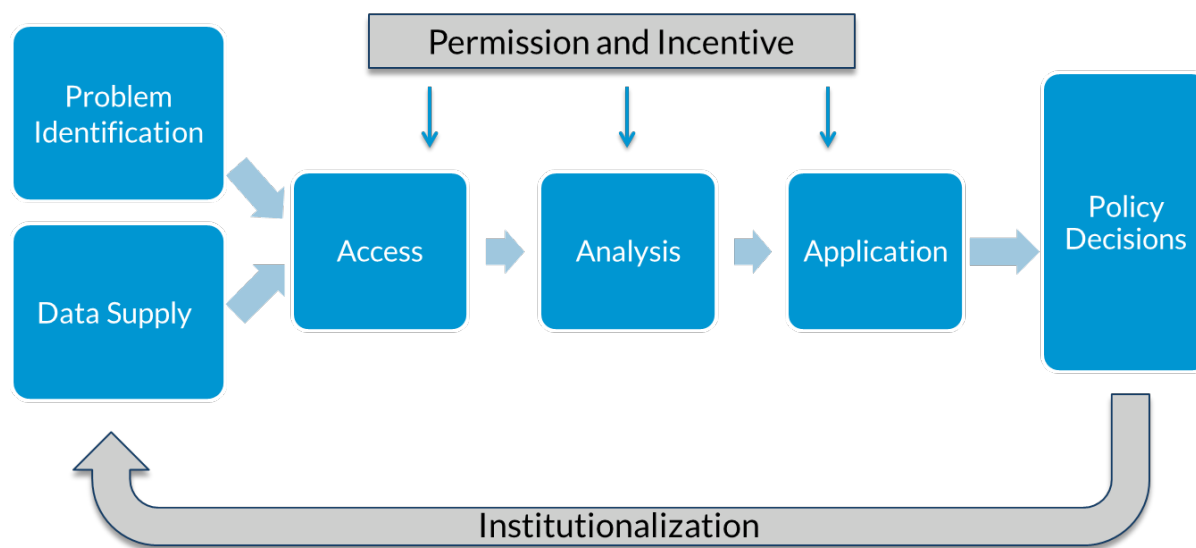
Components of the Framework

PROBLEM IDENTIFICATION

Data-driven governance can be a powerful tool to resolve urban problems. The first step in that process is selecting which problems to solve, which may be politically contentious. In some urban areas, the process of setting development priorities may be generally inclusive. In these places, there is every reason to accelerate access to data and data-driven decisionmaking to achieve goals at the local level. But what if the city is under repressive political control or vulnerable groups are excluded from the

political process? In these cases, increasing data capacities of the elite in power may simply make them more effective at advancing their own interests and repressing those of the disadvantaged. Here, the right thing to do may be to withhold support for more data capacity until steps have been taken toward a more egalitarian political regime.

The more interesting cases may be environments where the development process is not yet generally inclusive but where openings for change exist. In these places, creative advances in the availability and use of data may have their greatest payoffs. Local stakeholders can use data to incrementally insert transparency and accountability in new areas of governance until the overall development process is itself transformed.

By creating high-level goals and specific targets across several dimensions of sustainable development, the SDGs can play a critical role in reshaping local priorities. The starting point must be a scan of the current local development agenda in relation to the SDGs to identify areas that warrant high priority in building local capacity. Achieving the goal of poverty reduction, for example, will require better-informed decisions in several areas: education, job creation, infrastructure development, and so on (in both program planning and management). Where are the barriers to progress most severe and where is the payoff from better data likely to be highest?

DATA SUPPLY

As information collection and storage technology becomes more advanced and affordable, the pool of data relevant to policymaking rapidly increases. That data can skew the visibility of some urban problems, as Boston found when its StreetBump program revealed more potholes in wealthy neighborhoods than in poor ones, a discrepancy attributable to wealthier residents being more likely to own smartphones and use the app.[8] Others have discussed the data gap between developing and developed countries, and the SDGs call for support to national statistical offices in the developing world (SDSN 2015).[9] At the local level, there may be further inequality of data availability, including uneven coverage of existing data on housing quality, land tenure, and access to basic services for poor households.

The automation of local administrative records is vital to the effective use of data in urban planning and management. But vested interests are likely to resist such automation because it may expose poor performance and corrupt practices. Further, data gaps are not necessarily neutral with respect to development goals, and areas with missing data may well include those most in need of attention. Data supply also interacts with problem identification, as uneven data coverage will lead a data-driven government to focus on the problems it can see at the expense of those it cannot. Data supply is

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generally improving, but large gaps remain in the local data needed to further the achievement of the SDGs. How to fill those gaps is a topic of great importance but one beyond the scope of this paper, which focuses on obtaining better utilization of data that is now becoming available.

ACCESS

Though data is becoming cheaper and easier to collect, access to data relevant to local governance is still not a given, particularly in the developing world. Institutional obstacles, such as disputes over data access permission, can occur both within and between levels of government. Interagency disputes at the national level might prevent local governments from accessing data for local planning or service delivery. While access to national health information systems might improve local sanitation planning, a central ministry of health might withhold access to those systems, citing privacy concerns. There are also obstacles to accessing data sets outside of government. Cell phone network providers may have enormous, valuable data sets about where people live and work. These data sets are likely to be proprietary, however, and local governments may find it very difficult to access them.

ANALYSIS

Turning raw data into actionable evidence need not be a complicated process, but it does require a certain analytical skill set. Local governments may not have staff capable of performing the analyses that make raw data useful for governance. If a city trains its staff to perform this function, they may risk losing them to the private sector, where these skills are just as valuable but may command higher salaries. Municipal capacity to turn data into knowledge is also sensitive to demand. If city leaders believe they do not need sophisticated knowledge to make governance decisions, they will not allocate the necessary human and financial resources.

APPLICATION

Applying evidence to governance leads to changing budgets, policies, and practices on the basis of new information, a complex and much-debated process. New and useful evidence about where people live and work must find its way into city plans, and data about the quality of health services and clinic-specific financial management should be included in debates over next year's budget. But the integration of evidence into governance is not automatic, and specific individuals, such as city planners or local elected officials, must take action on information. The best way to incorporate new data into governance practices (like development planning) is not always obvious, and actors must consider various incentives about how to apply evidence in governing.

PERMISSION

Local authority to access data, analyze it, and make data-driven decisions is inconsistent across cities and countries. While many developed countries have devolved significant power over key services such as health, education, and water to the local level, many developing nations reserve those powers for higher levels of government. The uneven nature of decentralized governance has enormous implications for whether and how local stakeholders use data in their decisionmaking.

INCENTIVE

Even if all other factors of data-driven governance are aligned, there is still no guarantee city administrations will use data to make decisions. Local government officials must consider different incentives that affect the decisions they make, including local political dynamics, the nature of their national electoral system, the extent to which they are accountable for their decisions, the transparency of their institutions, and so on.

Permission

Permission constraints refer to the political, legal, and functional obstacles that prevent city-level officials from accessing data, converting data to evidence, and using that evidence to implement policies. Many permission constraints stem from the national intergovernmental system within which cities are embedded. With few exceptions, such as Singapore, cities are governed by subnational units of government subsidiary to higher levels of government. Although the structure of municipal governments and their level of autonomy vary widely across countries, higher levels of government universally determine the powers and functions of city governments. National and regional governments can directly or indirectly limit the ability of city officials or their constituents to access, analyze, or apply data. We refer to these as "vertical governance" constraints.

Other permission constraints relate to functional divisions between agencies *within* a city government or political divisions *between* local governments that share responsibility for delivering urban services across a metropolitan area. We refer to these as "horizontal governance" constraints.

Still other permission constraints relate to the broader legal framework within which city governments operate, including property laws governing data ownership and access, privacy rules governing the disclosure and use of data, and constitutional and statutory limits on public action. We refer to these as "external legal" constraints. These constraints are heterogeneous in nature and, like vertical governance constraints, vary widely across country contexts.

Access

How does permission intersect with access to data for governance? A national ministry may, for example, collect data on sectoral policies and programs at the city level but not share that data with city governments. This often occurs when services that affect urban populations or intersect with municipal functions are managed by central agencies. Central agencies may not share data with their local counterparts for a number of reasons: city and national governments could be controlled by competing political parties, there may be high transaction costs associated with data transfer, records may be incomplete or could expose central agencies to criticism, or agencies may fall victim to bureaucratic inertia. See box 1 for an example of how decentralization of responsibility for health services in Kenya removed vertical constraints and, in doing so, facilitated the use of data to allocate resources at the local level.

Horizontal governance constraints can also impede city agencies' ability to access data. If a city sanitation department does not have access to epidemiological data controlled by the city department of public health, sanitation workers will have a hard time identifying and fixing broken and leaking sewer pipes. This administrative "siloing" of data can also be driven by a number of factors: costs associated with sharing, legal or contractual constraints, default assumptions that data should be held within the agency that collected it, or (again) bureaucratic inertia. However, there is increasing awareness that sharing data across agencies can improve the efficiency of public administration

Legal constraints also limit city governments' access to data relevant to governance. Most notably, huge volumes of data on urban populations across a range of urban services are held by private businesses under proprietary control. Anonymized cell phone data could be extremely valuable for land use and transportation planning, allowing officials to see where people live, work, and travel, but such data is typically owned by private telecommunications companies. Case studies from Sri Lanka demonstrate the value of accessing this kind of information. Researchers there negotiated access to call transaction records and other anonymized information that allowed them to assess whether current residential and commercial zoning in Colombo matches how the land is used, an important piece of information for any city to have. They found that the cell phone data painted a dramatically different map of the city, and at a cost far below that of traditional transit and land use surveys (Samarajiva et al. 2015).

BOX 1

Case Studies on Permission: Nakuru City, Kenya

Permission constraints affect the use of data in urban governance at the point of access, analysis, and application. In Kenya, prior to 2013, local health data was collected and used by the national Ministry of Health, which operated most local-level health facilities. Because local health care was a national responsibility, that data was not generally available to local governments where Ministry of Health facilities were located (Luoma et al. 2010). As a result, local governments were not able to use that data when making planning and budgeting decisions, such as whether to invest in extending sewer networks into informal slum settlements. The new Kenyan Constitution, adopted in 2010 and implemented in 2013, created a new level of government, the county, which took on responsibilities of both lower and higher levels of government disbanded by the Constitution. One responsibility devolved to counties was the delivery of health services and access to primary health data. Counties such as Nakuru County (home to the fourth-largest city in the country, Nakuru City) now have access to information about the incidence and concentration of disease outbreaks related to poor sanitation. The county's public health officer has begun pressing the county assembly to allocate more resources to sanitation in slum areas based on data showing that sanitation-related diseases drive the county's health performance.[a]

The case of Nakuru also demonstrates how reconfiguring institutions related to access to and analysis of data may not be sufficient to affect data-driven policy changes on the ground. Particularly in settings where national legal frameworks are new, under development, or unclear, higher-level decisionmakers may skirt the intent of the law, creating de facto permission constraints on subordinate actors. Even though the Nakuru County Ministry of Health now has excellent neighborhood-level epidemiology data and a good understanding of the supplies and medicines needed to respond to local health challenges, the Kenyan national Ministry of Health recently pressured county governments into accepting a Ministry-negotiated contract for medical supplies.[b] The national-level authority stepped into what would otherwise be a county-level decision and required the county to accept its vision of what supplies were needed. This de facto permission constraint prevented Nakuru from making its own evidence-based decisions about what medical supplies it needs to deliver services to its citizens.

Case study based on Edwards et al. (2015).

[a] Author interviews with county budget officer, county public health officer, and independent civil society stakeholders in Nakuru. Information collected during a study on sanitation service delivery that faces similar constraints, as presented in Edwards et al. (2015).

[b] Edwin Mutai and Brian Wasuna. "Counties Get May 6 Ultimatum for Health Equipment Contract," *Business Daily*, March 18, 2015, http://www.businessdailyafrica.com/Counties-ultimatum-for-health-equipment-contract/-/539546/2657214/-/gwjcok/-/index.htm.

Analysis

Assuming city governments have access to the data they need, there are still permission-related constraints on a city's capacity to convert data into useful knowledge. These constraints are primarily driven by vertical governance issues. Does the city have sufficient authority to raise revenue and assign resources to improve data capacity? Does it have administrative control over its own human resources? City officials who want to govern on the basis of evidence need employees capable of turning data into knowledge. In practical terms, this means that city governments need the autonomy and discretion to hire employees and compensate them well enough to retain them, as the skills needed to convert data into knowledge are in high demand in both the public and the private sectors.

Some countries afford cities the flexibility needed to attract and retain qualified staff. However, in many countries and particularly in the developing world, city administrative personnel fall under the national civil service system and are frequently managed by the central government. Central officials may not give much priority to data use at the local level. Pay scales are typically low, and attracting and retaining competent staff can be challenging. Moreover, when a local decisionmaker does have access to qualified staff, they may be at the mercy of a centralized authority that may reassign those staff on an ad hoc basis.

Horizontal governance constraints also affect a city government's ability to analyze data effectively. Siloed administrative structures can impede the sharing of analytically talented staff between departments. Similarly, while one department head may see the value in analyzing data to improve performance, others may not or may even feel threatened by performance analytics. Horizontal constraints may also crop up when some functions are local government responsibilities while others remain at the national level. The uneven decentralization of responsibility can isolate talented, skillful, national-level employees of one department from their local-level colleagues who live and work in the same city.

External legal constraints, especially information privacy laws, can also limit data analysis. The tension between privacy laws and data-driven decisionmaking is particularly pronounced in the context of health policy, where elaborate ethical and legal standards have evolved over time to strike a balance between protecting patient privacy and improving health care delivery. Domestic information privacy laws are less prevalent in developing countries,[10] where laws governing use of personal data for policymaking remain poorly defined, constraining the use of data for urban governance.[11] Safeguarding the privacy of personal data is essential to the SDG agenda, but with reasonably crafted legislation, that goal does not have to be in conflict with effective data use in achieving the other SDGs. Experts in

several countries have learned how to use aggregated and anonymized data from program records on individuals for highly productive analyses while rigorously protecting the confidentiality of that data (Petrila 2014).

Application

When city governments have permission to access data they need and the capacity to convert that data into useful knowledge, they may still face permission constraints in applying that knowledge to governance. As discussed above, circumstances vary among city governments, and not all have the authority to allocate resources within their jurisdictions. Key aspects of what we consider "urban governance," such as the provision of basic services or the design and implementation of urban plans, may be controlled by national ministries or regional departments. Depending on the national legal framework, local authority to allocate resources necessary for urban services like water, sanitation, and electricity may range from total control to total passivity. In cases where functions are split between levels of government, such as when a city government is responsible for public transportation and a regional government is responsible for metropolitan planning, adequate lines of communication and sharing of data can be the difference between successful implementation of the service (smooth commutes) and failure (urban gridlock, choked suburban highways).

Being aware of permission constraints is critical for understanding how best to take advantage of the opportunities presented by changes in national legal frameworks. As more information becomes available to cities, stakeholders interested in facilitating data-driven governance should pay attention to what cities are and are not allowed to do in their national contexts. A city could have the best possible data set on public health, urban infrastructure, and housing needs, but without the authority to create policy targeting these areas, data-driven local governance will remain elusive. At the same time, permission constraints are not static and can change over time with sufficient pressure. Sustained civic action in response to permission constraints can help accelerate changes at higher levels of government, as was the case in Lima, Peru (see box 2). When decisionmakers recognize permission constraints, legislation may reduce barriers to data-driven urban governance.

BOX 2

Case Studies on Permission: Lima, Peru

Poor access to water and sanitation has long been a challenge in Lima, particularly in urban slums. A series of water and sanitation projects carried out between 1999 and 2013 attempted to expand access in poor areas of the city. These projects included extensive titling reforms and subsidies for investment in new housing. In the most informal areas of the city, however, obtaining legal title was not always possible.

Despite having over $100 million in donor funding to improve access in informal urban areas, the city was prevented by national law from extending water and sanitation services to citizens without legal title. The city had the political will, the resources, and the evidence it needed to expand services to marginalized citizens, but it was not until a national legal change occurred, driven by widespread protests from community organizations, that it was ultimately able to implement the programs. Passed in 2006, Law 28687 established the municipal certificate of possession and legitimized citizen possession of land in informal urban areas where formal titles are not available. The city quickly took advantage of the new law and the resulting change in permission constraints to coordinate an expansion of subsidized water connections supported by a combination of donor, city, and household finance.

Case study based on Calderón Cockburn et al. (2015).

Incentive

Whether or not a city government has permission to access or use data is not the only constraint to adoption of data-driven governance. A second critical constraint is the issue of incentive. Why would a city government use evidence to make governance decisions in the first place? Allocating resources based on observed and proven need may be a departure from the status quo in many cities, and reallocating funds between programs may carry political costs for decisionmakers. Ideally, city officials allocate and implement budgets based on the best available information about the needs and priorities of their constituents, with particular attention to their most marginal constituents. In practice, however, decisionmakers in city governments face an array of incentives that may constrain or undermine data-driven governance.

Access

Creating or accessing data and bringing it into the realm of governance always carries a cost. Updating a local property registry means hiring workers to survey and evaluate properties around the city and report back to city hall. Tracking the condition of urban roads means sending workers out to note potholes, weather damage, and so on. In the best case, data creation can be automated or conducted through technology (e.g., smartphone apps, drones, or satellite images), but even the cheapest method of local data collection must appear somewhere in a municipal budget.[12] Moreover, most cities operate on a balanced budget, and unless new funding is made available from external sources, opting into data collection means opting out of something else.

Making that trade-off carries both a fiscal and a political cost for decisionmakers; bureaucrats may be unhappy with smaller budgets, and reallocating funds from other priorities may upset powerful constituents. Cities will only budget for data-related costs if it makes political sense to do so, and the less political influence a particular group holds, the less likely it is that data will be collected on its problems and needs. However, national governments may create incentives for city officials to collect data on underserved populations by requiring local governments to meet service delivery targets in order to retain authority over those services. See boxes 3 and 4 for examples on how data gaps reflected the lack of political influence held by low-income groups in Maputo, Mozambique, and how national reforms in Indonesia created new incentives to more effectively target public expenditures in Solo.

Case Studies on Incentive: Maputo, Mozambique

Local decisionmakers do not always have strong incentives to make data-driven governance decisions. While the value of delivering services in a cost-effective manner to needy citizens may seem self-evident, it does not always make good political sense to local leaders. Urban Institute researchers attempted to survey the status of sanitation services and finance in Maputo, Mozambique, which is governed by a city council elected from party lists and a mayor chosen by general election. Under this arrangement, city councilors represent their party rather than a geographical jurisdiction, and neighborhoods, or *bairros*, do not have direct political representation on the council. Accordingly, low-income, semiformal *bairros*, where residents cannot muster much in the way of financial campaign support, have limited influence on the allocation of public resources, and sanitation, especially in those informal areas, has traditionally been a low political priority in Maputo.

During Urban's survey of sanitation services, city officials did not have access to data as basic as the extent of current sanitation infrastructure or even the amount of money spent on sanitation-related expenditures in 2013. During a follow-up visit in 2015, however, the city revealed that it was now able to provide this information and had decided to invest additional funds in pro-poor sanitation. This abrupt about-face was driven in part by high-level political advocacy from donor groups such as the World Bank's Water and Sanitation Program. Approximately 25 percent of revenue in Maputo's 2015 budget came from international donor assistance.[a]

Case study based on Edwards et al. (2015).
[a] Unpublished data provided to the authors by officials in the Maputo office of water and sanitation.

Analysis

City governments also face competing incentives in analyzing data. Even where automation has almost eliminated the cost of accessing data, analysis requires additional expense. Municipal capacity to turn data into knowledge is sensitive to demand. If city leaders believe they do not need sophisticated knowledge to make governance decisions, they will not allocate the necessary human and financial resources.

Providing adequate sanitation to informal settlements may not be a political priority for a council or an executive, particularly if political power in the city is not a function of popular vote alone or if voters prioritize sanitation below other services. In such cases, decisionmakers would be unlikely to prioritize the conversion of existing health and public works databases into the maps and plans needed to reduce sanitation-related disease burdens. Creating those maps and plans is not complicated in the absolute

sense, but if the public health department has no resources to train staff in GIS or related methodologies, the maps won't be produced. Further, local leaders may perceive a clear, easy-to-read map showing the concentration of disease burden and poor access to sanitation in politically marginalized areas as a threat rather than a tool.

BOX 4

Case Studies on Incentive: Solo, Indonesia

The case of Solo demonstrates how changes to national legal structures can create new incentives for data-driven governance. Indonesia's 2001 governance reforms transferred power over a wide suite of revenue and functional responsibilities from the central government to elected local governments across the country. The reforms gave local leaders power over service delivery and created strong incentives to respond directly to citizen priorities. This new dynamic of authority to act and incentive to respond represented an opportunity for driven local leaders to distinguish themselves in a newly empowered political arena.

In Solo, local government partnered with an NGO to conduct community-led mapping exercises to create data on service delivery conditions throughout the city, which the administration could then use to better target public expenditures. Solo's mayor, Joko "Jokowi" Widodo, capitalized on the success and popularity of this approach to successfully run for Governor of Jakarta and, eventually, President of Indonesia. Institutional reforms provided Jokowi not just the flexibility but the incentive to collect data on his city and allocate resources accordingly, an outreach effort he then leveraged into greater political success. The lesson is not that external actors can create the conditions that allowed Jokowi to capitalize on a new system. What advocates for data-driven governance should do is keep abreast of changing systems of incentives where local leaders may be willing to take advantage of such opportunities.

Case study based on "Access Maps and Information for Neighborhood Planning," Solo Kota Kita, accessed March 25, 2016, http://solokotakita.org/en/.

Application

A variety of incentives may influence city governments as they decide what data to use and how to apply them to governance. Politicians may prefer to use data to target public expenditures to favor their supporters. Evidence suggests that mayors facing term limits may have less incentive to make data-driven decisions than their peers facing reelection. In Brazil, researchers found that first-term mayors eligible for reelection allocated resources more efficiently and achieved better results than their term-

limited peers leaving office (de Janvry et al. 2010). Regardless of how much data is used in policy decisionmaking, public accountability, in the form of elections or transparency requirements, is a key determinant of good local governance.

At the same time, the hard budget constraints local governments face can also create incentives to improve the efficiency of resource-allocation decisions. Local governments have three sources of finance: taxes, transfers, and debt. At the end of a given fiscal year, they only have so much money to work with, particularly where national law does not permit local government borrowing, as is the case in many developing countries. Where local political power (whether elected from below or appointed from above) is contingent on improving service delivery, local governments are incentivized to allocate their resources efficiently and effectively. Data-driven policies that reduce the cost of governing can free up resources to be spent on other local priorities.

Budget constraints were certainly the primary motivation behind the almost ubiquitous automation of local government administrative records in developed countries over the past 30 years. But there is a cost to automation and, as noted earlier, powerful vested interests that opposed it. Still, mayors and agency managers saw the potential benefits and dramatic cost savings of automation far outweighed the short-term costs. Automation can improve efficiency in two ways: First, newly available data allow managers to track performance reliably and, in turn, motivate staff, target remedial efforts, and plan for the future in ways that should yield much greater payoffs. Second, it provides the basis for restructuring the work itself, assigning many administrative tasks to computers and permitting significant reductions in personnel costs.

Institutionalization

Policy decisions are made by city executives, councils, administrators, and other public servants. The decision to use data and evidence to design and implement policy is a product of the beliefs these actors have about how best to do their jobs and the incentives they face in deciding how best to manage public resources. While one administration may prioritize the use of data for governance, there is no guarantee that a city will continue to function in that manner in the future under new political leadership or after a crisis event.

Institutionalization occurs when local governments have permission to govern and continuous incentive to govern well. Stakeholders interested in promoting data-driven governance should

understand how permission and incentive interact in urban governments and should look for ways to create pressure on local and national governments to shift permissions, incentives, or both.

That pressure can come from three directions: from above, from below, and from within the relevant level of government. Pressure from above includes demands from higher levels of government that local governments utilize data and evidence in their decisionmaking processes. Pressure from below is what we think of as citizen demand and is typically channeled through civil society or exerted directly by citizens through the voting booth. Pressure from within is generated by elements of an urban government, such as departments or administrative units, that have power within the bureaucracy (substantial budgets, public support, or the endorsement of the mayor or other politically powerful figures) and incentive to push for data-driven governance (an institutional mandate, highly public commitments, close relationships with civil society, etc.).

Institutionalization is a process, not a state. When individuals, groups, or institutions exert sustained influence over the workings of the urban government, it is more likely that data-driven governance will become a permanent fixture and outlive individual administrations or fads in public administration.

Pressure from Above

Top-down pressure can come from national or regional governments and international stakeholders, such as development agencies or banks. National requirements for budget formats and development plans can both incentivize and, in some cases, require the use of data and evidence in budgetary and planning decisions. Since national legal frameworks are beyond the control of local governments, these pressures tend to outlast individual local administrations. Legal requirements for transparency can also provide a lasting incentive to create and publish data about performance and spending at the local level, though enforcing transparency laws may be challenging where legal institutions are relatively weak. Finally, the most powerful tool national governments have to incentivize and institutionalize data-driven governance is their control over municipal finance. Transfers from the central government are an important component of most local government budgets, and national transfer formulas can be altered to rely on local data about performance, service delivery, and key human development outcomes. That data can be collected and reported by local governments, but should be verified and audited by independent authorities.[13]

Nongovernmental stakeholders can also create top-down pressure to institutionalize data-driven governance. International stakeholders, which often have deeper pockets than domestic civil society, can wield their financial clout to create pressure for institutionalization. Development finance for national governments can shift the national operating system of permission and incentive in ways that nudge local administrations toward data-driven governance. Direct budgetary assistance from bilateral donors or multilateral lenders, for example, could be predicated on budget transparency at both the national and local level. Support for specific sectors, such as health or water, could be based not just on outcomes but on the availability of local-level outcome data. In the case of permission constraints, international stakeholders can lobby national governments to make adjustments to their decentralization framework on the basis of improved service delivery, political stability, and development outcomes. To the extent that we want to encourage data-driven governance, international stakeholders that wield political and financial power should see that power as an opportunity to identify and help address the constraints local actors face in making governance decisions.

Pressure from Below

Pressure on urban governments from below can also be effective for institutionalizing data-driven governance, although it comes with its own set of challenges. Taking the bottom-up approach assumes that there is a widely implemented legal framework that grants citizens power over their local government officials. In many countries, that legal framework takes the form of local elections, ward-level representation in local legislature, and an independent national judiciary capable of ensuring that local governments comply with the law. However, these systems can be fragile. Maputo has an elected local government, but as described in box 3, local legislators are elected from party lists rather than as representatives of geographic blocs within the city. The result is that informal settlements do not have direct representation on the city council, so no politician has a direct incentive to be concerned about these neighborhoods. Stakeholders interested in developing bottom-up demand for data-driven governance should be aware of such limitations present in local government systems and should advocate for attainable change.

In most contexts, and even in Maputo, there remain avenues for citizens to exert upward pressure on their local governments to make data-driven decisions. Local civil society organizations may lobby councilmembers while working with local media to build incentives such as positive coverage of data-driven decisions. The open-budgeting movement has had some success in getting local governments to

release budget details to their citizens, in part by institutionalizing budget transparency in national legal frameworks. Kenya[14] and Ghana[15] are two good examples of this practice. If even a modicum of performance or expenditure data is publicly available, civil society actors can analyze that data and partner with media champions or international stakeholders to draw public attention to their findings. When local organizations partner with international stakeholders to provide both the incentive to govern well and the resources necessary to change practices, it may be possible to make data-driven governance politically attractive for even unmotivated local decisionmakers.

Civil society groups can also exert pressure on local governments by collecting data and building the evidence base themselves rather than waiting for local governments to build internal capacity (or will) for data-driven governance. This approach could allow civil society groups to hold governments accountable, supplement (or challenge) official data sources, and gain influence. At first blush, such DIY strategies may seem to undermine institutionalization of data-driven governance by building capacity for data collection and analysis *outside* of public institutions. In practice, however, these efforts may lead to mutually reinforcing partnerships between independent data intermediaries and city agencies, or may prompt city governments to internalize data collection and analysis functions. See box 5 for an example of how a community organizing group in Mumbai, India, used data as a catalyst to organize slum dwellers and shape municipal policy.

Case Studies on Institutionalization: Mumbai, India

During the 1980s, the Mumbai city government was notorious for its attempts to evict slum dwellers, who represented nearly half of Mumbai's population. The Society for the Promotion of Area Resource Centers (SPARC) was formed in 1984 to advocate on behalf of slum dwellers and develop alternatives to evictions. One key strategy SPARC employed early on was to train slum dwellers to collect census-type data on their own communities ("enumerations") and provide findings from the data to government officials to facilitate the provision of services and secure rights in the face of evictions. Though early enumerations seemed threatening to some Mumbai officials, over time, SPARC recruited allies in government and developed working partnerships with public agencies. In 1989, city officials requested that SPARC conduct the first government-commissioned enumeration of informal settlements in Mumbai, setting a precedent for future resident-led enumerations in the city. SPARC's enumerations are eventually validated by Mumbai authorities and used to set and enforce municipal policies related to resettlement and service delivery.

This model of community-led enumerations of informal settlements has since spread globally through Slum Dwellers International and its "Know Your City" campaign. The group collects and consolidates data on informal settlements in over 200 cities across the Global South to advocate for upgrading and improvement of services.[a]

Case study based on Patel et al. (2012).
[a] "Know Your City," Slum Dwellers International, accessed March 25, 2016, http://knowyourcity.info/map.php#/app/ui/world.

Pressure from Within

Creating a culture of data-driven decisionmaking requires actors within urban governments capable of and interested in using data on an ongoing basis. One approach to fostering such a cultural shift is to create an executive-level position to advocate for data-driven governance across the whole of a city government, such as the New York City Mayor's Office of Data Analytics.[16] While this approach can signal a high-level commitment to data-driven governance, it is not necessarily sustainable across subsequent administrations or, if the position is not internally financed, in the absence of external funding.

A more sustainable approach is to identify departments or offices within local government that are already using data to make better decisions or have expressed a desire to start down that path. Supporting these actors in developing data sets, building analytical capacity, and incorporating findings into decisionmaking can lead to powerful demonstration effects on politicians and other departments.

Supporting cross-sector working groups that serve as bridges between related sectors, such as health and public works, can also facilitate the organic development of a culture of informed debate and evidence-based decisionmaking. It is also important to institutionalize new and persistent management processes that require data use. Box 6 highlights Baltimore's CitiStat program, which grew out of the mayor's mandate that department heads review data on program performance.

The potential to institutionalize data-driven practices can also arise from the automation of administrative records, as discussed earlier, which can create opportunities for changing the way basic tasks themselves are accomplished. Creative designs of process change in this environment can increase efficiency as staff are shifted and given new duties and some subtasks are eliminated altogether. These changes ease the path for institutionalization and may in fact make it impossible to revert to old methods.

Case Studies on Institutionalization: Baltimore, United States

When Martin O'Malley took over as Mayor of Baltimore in December 1999, the city government suffered from rampant absenteeism costing the city millions of dollars each year. Mayor O'Malley tackled this problem by implementing a data-tracking and management tool called CitiStat to track a broad range of performance indicators. Under CitiStat, managers of each city department report to city hall every two weeks to present performance data, which is then used by the mayor's office to identify underperformance and press for improvements.[a]

Use of CitiStat has been credited with several accomplishments. Pothole repair had been a notorious problem in the city; now, 97 percent of all potholes are repaired within 48 hours of notification. CitiStat also resulted in a major reduction in staff absenteeism, which in turn led to notable efficiency and delivery improvements in many city services. Budget deficits were reduced and, as a result, property taxes were lowered. In its first year alone, CitiStat saved the city $13.2 million, including $6 million in overtime pay (Perez and Rushing 2007).

Much of the data used in Baltimore's CitiStat process existed before but had never been brought together in a way that had real impact on management decisions (Perez and Rushing 2007). The key in this case was Mayor O'Malley's insistence on the new approach and willingness to follow through and ensure that it was institutionalized. This meant following the data collection and interagency review process relentlessly until it became habitual to all participants. These efforts did not absolutely ensure longevity, but they were designed to make it much harder for a subsequent administration to make drastic changes that would undo the benefits CitiStat had provided. This approach has since spread to many other city and state governments in the United States.[b]

[a] "Overview," Mayor's Office of CitiStat, accessed April 13, 2016, http://citistat.baltimorecity.gov/about-citistat.
[b] The approach is now generally termed "PerformanceStat" (see Behn 2008).

Pressure from Multiple Directions

There are instances where pressures to institutionalize sound data-driven governance can be brought to bear from several directions at once. The work of the National Neighborhood Indicators Partnership (NNIP) in the United States, with local partners now in approximately three dozen cities, provides a clear example (Kingsley et al. 2014). NNIP was founded to provide useful data to grassroots groups in low-income neighborhoods, but local partners are often supported by civic leadership coalitions in each city that see other, broader benefits as well. These coalitions might include the heads of the local community foundation, the United Way, civic-minded business groups, and so on, as well as key local and state government officials.

NNIP partners are local data intermediaries, mostly community-oriented university research institutes or other nonprofits. They regularly assemble neighborhood- and parcel-level data from a number of local public agencies (city, county, school district, etc.), bring it into one orderly system, and make the results available to all, something no individual agency was in a position to do on its own. The approach was motivated in part by the desire of civic leaders to create an ongoing data system that would live on to serve the broader community across the lives of many different city administrations; that is, so they would not have to start data collection from scratch every time they wanted to conduct a study of an important local policy issue.

Where these systems exist, they do work to hold local governments accountable, but their accomplishments are based more on their ability to facilitate collaborative work by civil society and government agency staff. The agencies generally want to cooperate and participate because it advances their own work (pressure from within). But there is also pressure from above to keep these systems running and used productively, as incentives for data use are now found in the rules of many federal and state programs, and the ongoing civic leadership coalitions have a strong interest in protecting their investment in these systems. And there is pressure from below from neighborhood groups with access to the data and the ability to use it. Box 7 presents the example of a local data system developed by one independent data intermediary in Cleveland that is used by a host of area stakeholders.

BOX 7

Case Studies on Institutionalization: Cleveland, United States

Northeast Ohio Community and Neighborhood Data for Organizing (NEO CANDO), was developed by the Center on Urban Poverty and Community Development at Case Western Reserve University to improve neighborhood policies based on real-time information on properties in Cleveland. NEO CANDO integrates vast amounts of poverty-level data from a range of local government agencies and has led to sophisticated analyses supporting decisions by municipal land banks and other public agencies and community development corporations on concrete action strategies for individual neighborhoods and buildings. The data also help the city's code enforcement staff and other special-purpose agencies and nonprofits prioritize their activities. Because the data are comprehensive and frequently updated, they can serve directly as a basis for performance management, answering questions such as: How many and what types of properties were addressed? What was the timing and cost of the work? What were the neighborhood impacts of these efforts?

Participants said that the data and the process of using information in this way have boosted collaboration and influence. Organizations all operating from the same data base, and the broad availability of that data, promoted broader inclusiveness and diminished controversy. Participants were less likely to disagree because they all had participated in the process and knew the reasoning and facts behind the choices made.

Case study based on Nelson (2014).

Implications for the Global Sustainable Development Goals

The SDGs seek a transformative urban data revolution in which city leaders are empowered and incentivized to use data to drive sustainable development. In this section, we consider how the elements of our framework can help us rethink how to achieve this goal. To begin with, our framework extends the urban data revolution discussion beyond questions of expanding data supply and improving access. Though huge data gaps on critical services and basic governance functions exist in many cities in both developed and developing countries, more data and tools to turn data into evidence are available to local public officials than ever before. Volume and diversity of data will continue to increase, and the costs associated with collecting and analyzing data will decline. This combination of persistent data gaps in key areas of urban policymaking and burgeoning data supply has inspired hope that cities in the developing world can use big data[17] to "leapfrog" stubborn urban planning challenges, meet the needs of an increasingly urban citizenry, and accomplish more sustainable growth.[18]

However, unless underlying permission constraints and incentives are addressed, simply providing local governments with the tools and resources to collect or analyze data (through technology transfer, technical assistance, and capacity building) will not lead to smarter public policy or improved local governance. Data alone does not solve urban problems, improve services, or get ahead of future challenges; people do.

Policymakers need to act on the knowledge that data generates, and will only do so when properly empowered and incentivized. We need to move beyond a celebration of data possibilities and address the thornier practicalities of data use and application. We might think of this shift as one from a call for more data on cities to more cities that use data to promote sustainable outcomes.

The SDGs can help accelerate this shift in at least three ways. Perhaps most fundamentally, the SDGs help with problem *identification*, the very first step in our framework. The SDGs provide normative standards to direct data-driven governance toward greater sustainability, inclusion, and participation at the local level. Goal 11 and its associated targets in the SDG framework provide a starting point for setting a universal agenda for sustainable urban development, but it should not end there. Cities are a nexus at which almost all of the goals and targets in the broader SDG framework converge—from poverty alleviation and economic growth to sustainable water and sanitation management and climate mitigation and adaption. As the layer of government closest to the people, local governments are best positioned to respond to and advocate for the needs of their constituents. Local governments are also often better placed to think more holistically about sustainable development relative to international or national bodies, as they can better appreciate the context-specific nature of sustainable development on the ground (Global Task Force of Local and Regional Governments 2015).

Hundreds of mayors and local leaders across the globe have already voiced support for the SDGs, at least in principle. Nearly 300 local governments joined the #urbanSDG campaign in support of Goal 11[19] and more than 60 mayors endorsed the SDGs at a special meeting at the Vatican in July 2015.[20] At the SDG Summit in September 2015, 40 mayors signed the Declaration of Cities' Commitment to the 2030 Sustainable Development Agenda (the "Mayors' Declaration").[21] To maintain this momentum and channel it toward action on the ground, the broad, global SDG goals and targets must be translated to local contexts, and local sustainability challenges must be identified, prioritized, and addressed. That is to say, the SDGs must be leveraged as a problem identification tool.

We already see promising steps in that direction. The Mayors' Declaration includes a commitment "to develop an integrated and holistic sustainable development strategy…to ensure achievement of the

SDGs in our cities."[22] And the Sustainable Solutions Development Network is working with local universities and research institutions to support local leaders in six pilot cities in developing SDG-based sustainable development plans, designing local targets and indicators, and collecting data to measure progress. These efforts should be brought to scale and embedded within the SDG implementation strategies currently being developed by the UN and partner institutions in global development.

The second way the SDGs can support a truly transformative urban data revolution is by squarely addressing the vertical and horizontal governance issues we define as permission constraints. To do so, local governments must have the ability and authority to not only access and analyze data but apply it to policies and practices that address key sustainability challenges. The SDGs can help build an enabling institutional environment at national and local levels to ensure that subnational governments have the appropriate powers and capacities to manage urban development. We recognize that decentralization of governance functions to local government is ongoing in many countries and are not making a blanket call for greater decentralization across policy domains. Rather, we suggest that, in policy contexts where fiscal, political, and administrative decentralization strategies are underway, the SDGs can facilitate a parallel process of knowledge decentralization. When these powers are decentralized, the capacity and authority to access, analyze, and apply data should accompany the authority to set policy and manage finances. The SDG data revolution must take into account the variety of vertical governance structures around the world and support more sensible and effective assignment of data collection and analysis functions to subnational levels of government.

Unfortunately, early frameworks for implementing the SDGs seem to be moving in the opposite direction, reconcentrating data collection, analysis, and reporting functions within national ministries and statistical offices. We see evidence of this in early documents describing the SDG data revolution and providing roadmaps for its finance and implementation. *A World That Counts*, a report produced by the Independent Expert Advisory Group on a Data Revolution for Sustainable Development, points to the lack of data "available at a level of disaggregation that is appropriate to policymakers trying to make decisions about local-level allocation," but its recommendations focus solely on strengthening global and national capacities to collect and analyze data on key sustainable development indicators (United Nations 2014a). Similarly, the Sustainable Solutions Development Network's report, *Data for Development: An Action Plan to Finance the Data Revolution for Sustainable Development*, focuses on strategies to strengthen the capacities of National Statistical Offices and offers a set of global and national actions but makes no mention of local or subnational data capacities, challenges, or opportunities (SDSN 2015). If these documents prove formative in implementation, the data revolution decidedly will *not* be localized.

We also see evidence that the SDGs could reconcentrate data functions in the design of SDG progress indicators, a process still underway within the UN. One way to address the permission constraints city leaders face when attempting to adopt data-driven governance would be to link Goal 11 (on sustainable cities) with Goal 16 (on peace, justice, and strong institutions) through indicators that measure decentralization and local authority over resources. The targets under Goal 16 most relevant to this discussion are 16.6 ("Develop effective, accountable, and transparent institutions at all levels") and 16.7 ("Ensure responsive, inclusive, participatory, and representative decision-making at all levels"). Unfortunately, none of the indicators under consideration by the UN Statistics Division to measure progress under Goal 16 relate to subnational governance, despite the explicit and repeated emphasis in these targets on accountable and inclusive governance "at all levels" (United Nations Statistics Division 2015).

Finally, the SDGs can create positive incentives that help institutionalize data-driven governance in cities. The SDGs will not adequately incentivize local governments to collect, analyze, and apply data on critical urban sustainability policies simply by expecting them to "report up" to national ministries on relevant SDG indicators. Local leaders face well-documented incentives to manipulate information when reporting on progress toward national or supranational policy goals over which they have little control or ownership, especially when financial rewards or penalties are involved (Bossert 1998).[23] The indicators used to measure progress toward most of the SDGs (with the exception of Goal 11) are not designed for local governments, making direct "reporting" prohibitively costly and likely ineffective.[24] In addition, reporting up may do little to actually improve decisionmaking on the ground. More direct and enduring incentives are necessary to ensure that local leaders actually apply data to improve local policy and achieve sustainable development outcomes.

The SDGs, and the UN agencies and public- and private-sector partners supporting their implementation, can help strengthen civil society organizations that demand transparency and accountability from local governments. Civil society groups have been tapped to provide feedback on proposed goals, targets, and indicators, and to begin drawing connections across a broad range of sustainable development issues. Particularly strong global coalitions of civil society groups came together to push for Goals 11[25] and 16.[26] However, these coalitions have yet to work together, nor have their agendas intersected to push for open government reforms at the local level. These networks should recognize the important role that local governments will play in achieving SDG targets over the next 15 years and find common cause during implementation to push for local SDG plans, locally tailored indicators, and the use of data to support progress.

The SDGs can also help city governments overcome the fiscal and budgetary constraints that weaken incentives for local leaders to adopt data-driven governance. At a minimum, they can support both capacity building and peer-to-peer learning among urban leaders to develop and share lessons from data initiatives that reduce the costs of service delivery and free up resources to be spent on other priorities. Bloomberg Philanthropies' What Works Cities Initiative is attempting to do this in the United States, and the SDGs can support similar efforts tailored to developing countries.[27]

From a structural perspective, the SDGs can support capacity-building policies and financial instruments that allow local governments to raise long-term financing. Improving municipal finance was one of the commitments included in the recent "Addis Ababa Action Agenda," the outcome document of the Third International Conference on Financing for Development that established the global framework for financing the SDGs (United Nations 2015). However, the links between improving municipal finance and supporting local data capacities have not been fully developed. These should be treated as mutually reinforcing, codependent efforts; securing and repaying investments in urban services and infrastructure will require strong local-level data and reporting capacities, and a wider range of revenue-raising options will allow local leaders to redeploy resources to improve data- and knowledge-building capacities.

Conclusion

As the global population grows increasingly urbanized, city governments will assume ever-greater responsibility in addressing the challenges of poverty and inequality. To meet these challenges effectively, design efficient solutions to urban problems, and ultimately deliver on the promise of sustainable development, city leaders must base their efforts on good data and reliable evidence. While data and evidence may have been in short supply in the past, the tools and techniques for accessing, analyzing, and applying data have grown more attainable in recent years and will likely continue to do so. However, increasing data supply or analytic capacity will not address the institutional preconditions that influence whether and how city leaders select problems, prioritize them, and use data to find solutions. In the SDGs, the global development community has an opportunity to shift the focus of its data-driven governance policies and practices from capacity and supply to incentivizing efficient service delivery, transparency, and accountability. The success of the SDGs should not be measured by a head count of cities with better data, but by how many cities have used data to solve the problems their citizens face.

Notes

1. One of the most salient and oft-cited "successes" of the MDGs is that they helped build national capacities to collect data, monitor progress, and provide empirical evidence to drive policies in key areas that previously suffered from lack of consistent data. Data availability for the majority of MDG indicators improved across 174 developing countries, and the percentage of countries producing sufficient data to provide trend analysis for 16 of the 22 MDG indicators rose from 2 percent in 2003 to 83 percent in 2012. See, for example the Millennium Development Goals Report 2014 (United Nations 2014b), which describes successes in creating "reliable and robust data" that is "driving development policy decision making."

2. "Intro," Data4SDGs, accessed March 25, 2016, http://www.data4sdgs.org/intro/.

3. See "Pilot Project to Test Potential Targets and Indicators for the Urban Sustainable Development Goal," Mistra Urban Futures, accessed March 29, 2016, http://www.mistraurbanfutures.org/en/pilot-project-test-potential-targets-and-indicators-urban-sustainable-development-goal, and Dana Boyer, Stefanie Brodie, Joshua Sperling, Eleanor Stokes, and Alisa Zomer. "Implementing the Urban Sustainable Development Goal in Atlanta and Delhi," *UGEC Viewpoints* (blog), Urbanization and Global Environment Change Project, June 18, 2015, https://ugecviewpoints.wordpress.com/2015/06/18/implementing-the-urban-sustainable-development-goal-in-atlanta-and-delhi/.

4. See our review of sanitation finance in three African cities, where we found that city leaders often did not have access to data as fundamental as how much money was spent on sanitation in the last year (Edwards et al. 2015).

5. See the collection of essays in Cytron et al. (2014). For a more skeptical take on how data is misused or misused by policymakers, see Jerven (2013).

6. "Political Economy Analysis," United Nations Development Programme, accessed March 25, 2016, http://www.undp.org/content/undp/en/home/ourwork/democraticgovernance/oslo_governance_centre/analysis_and_learning/political_economyanalysis.html.

7. For a notable exception, see Krätke and Byiers (2014).

8. Elizabeth Good Christopherson. "Confronting the Data Dilemma," Rita Allen Foundation, July 25, 2013, http://www.ritaallenfoundation.org/blogs/confronting-data-dilemma.php.

9. See also the OECD's position paper on post-2015 data monitoring (OECD 2014).

10. Claire Provost. "Poorer Countries Need Privacy Laws as They Adopt New Technologies," *The Guardian*, December 4, 2013, http://www.theguardian.com/global-development/2013/dec/04/poorer-countries-privacy-laws-new-technology.

11. "Privacy Concerns Jeopardize 'Smart' Cities," *Citiscope*, July 16, 2015, http://www.citiscope.org/citisignals/2015/privacy-concerns-jeopardize-smart-cities.

12. Some data may be available for "free" from higher levels of government, civil society, international actors, and other stakeholders. However, much of the basic data necessary for urban management and service delivery (e.g., maps of service access in informal areas) is unlikely to exist at higher levels of government or in the private or civic sectors.

13. There are serious and well-documented risks associated with top-down incentives for data reporting (Jerven 2013).

14. "Budgets," County Government of Nakuru, accessed March 25, 2016, http://www.nakuru.go.ke/nakuru-budget/.

15. "Composite Budget of Metropolitan Assemblies, Municipal Assemblies and District Assemblies in Ghana for the 2015 fiscal year," Ghana Ministry of Finance, accessed March 25, 2016. http://www.mofep.gov.gh/?q=divisions/fdu/composite-budget-of-MDAs-2015.

16. Stephen Goldsmith. "How New York City is Mainstreaming Data-Driven Governance." *Governing*, September 16, 2015, http://www.governing.com/blogs/bfc/gov-new-york-city-data-driven-governance.html.

17. Sara Agarwal and Parag Khanna. "Getting Leapfrogging Right," *Stanford Social Innovation Review*, June 27, 2014, http://ssir.org/articles/entry/getting_leapfrogging_right.

18. Gareth Willmer. "Developing World Gets City Smart," *SciDev.Net*, November 19, 2014, http://www.scidev.net/global/cities/feature/developing-world-city-smart.html.

19. "Urban SDG," Sustainable Development Solutions Network, accessed March 25, 2016, http://urbansdg.org/.

20. "In the Vatican, Mayors Launch Alliance Ahead of Pope's Visit to UN," *Vatican Insider*, July 22, 2015, http://www.lastampa.it/2015/07/22/vaticaninsider/eng/the-vatican/in-the-vatican-mayors-launch-alliance-ahead-of-popes-visit-to-un-1eOOmx8KuE19aC8rA9lAlN/pagina.html

21. Greg Scruggs. "In New York, Global Mayors Gather to Commit to the SDGs," *Citiscope*, September 25, 2015, http://citiscope.org/habitatIII/news/2015/09/new-york-global-mayors-gather-commit-sdgs

22. "A Declaration of Cities' Commitment to the 2030 Sustainable Development Agenda," Sustainable Development Solutions Network, accessed April 13, 2016, http://unsdsn.org/wp-content/uploads/2015/09/Declaration-Signed-as-of-26th-September-2015.pdf.

23. See the extensive literature on principal-agent problems associated with monitoring and information in decentralized government settings.

24. This is one of the principle findings of the studies cited in note 3.

25. Nael Pierce. "Behind the Push for an 'Urban SDG,'" *Citiscope*, August 14, 2014, http://citiscope.org/story/2014/behind-push-urban-sdg

26. Stacey Cram. "Justice 2015 Update: Goal 16's Impact," Namati, June 25, 2015, https://namati.org/news/justice2015goal16impact/.

27. "What Works Cities," Bloomberg Philanthropies, accessed March 25, 2016, http://whatworkscities.bloomberg.org

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