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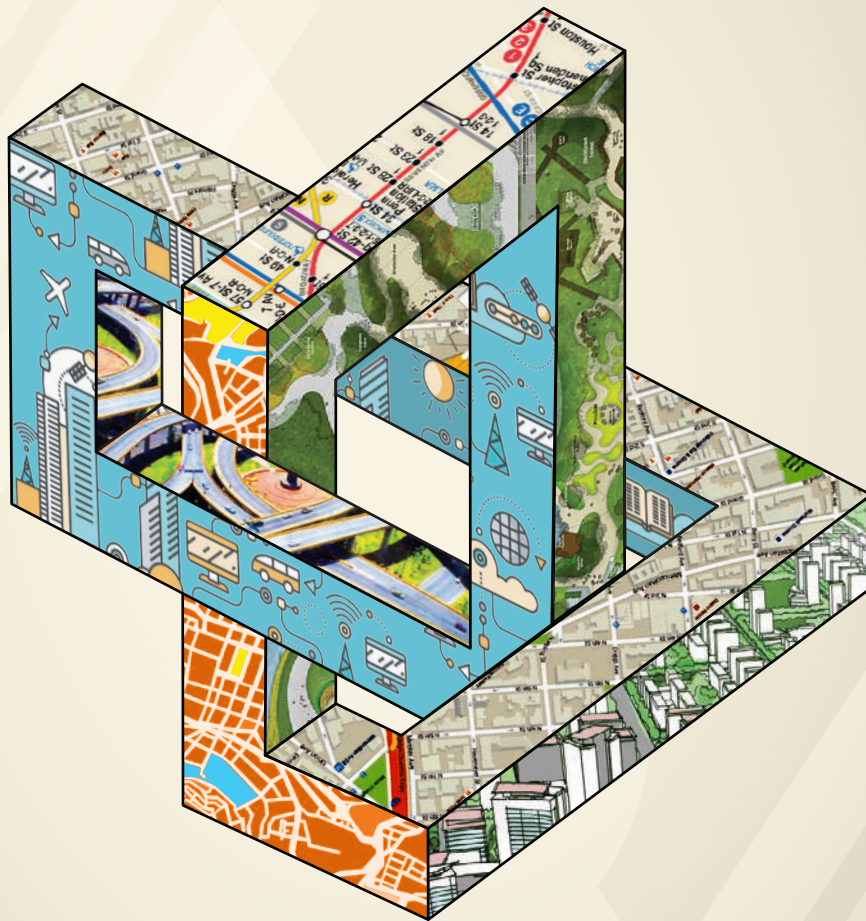
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# Steering the Metropolis

Metropolitan Governance for Sustainable Urban Development



Editors

David Gómez-Álvarez • Robin Rajack • Eduardo López-Moreno • Gabriel Lanfranchi



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## 2.8 Metropolitan Governance for Sustainable Mobility

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### Abstract

Land use and mobility interactions in the modern metropolis manifest themselves in two competing, age-old, forces: centripetal forces pulling us together into agglomerations and centrifugal forces pushing us ever further into the metropolitan hinterland. Thus, mobility is a fundamental part of urbanization and metropolitanization processes. Furthermore, mobility also serves as the core metric in defining metropolitan areas, helping identify functional urban areas. This chapter aims to elucidate some of the challenges to governing metropolises for sustainable mobility, defined by the author as the ability to provide non-declining accessibility in time. The chapter analyzes mobility governance and interrelating theories with concrete examples from the United States, Portugal, and Mexico, offering a glimpse of the complexity and posing central yet still unresolved questions. In whose ultimate interest is metropolitan mobility and who should pay for it? How related are the form of governance with the quality of the governance outcome? By what outcomes can metropolitan mobility performance be compared? Can these outcomes be meaningfully compared across metropolises? The chapter concludes noting a contradiction: while the finance system is a critical factor in determining metropolitan mobility governance, formal metropolitan mobility finance systems rarely exist. The author argues that using money to move the metropolis in the right direction offers hope, largely unfilled to date, to improve, and ultimately sustain, accessibility.

Mobility has always underpinned the concept of a metropolis, dating back to the word's Greek origins: the mother city to which colonies kept their economic, political, and cultural (mobility-enabled) ties. Throughout modern urbanization, mobility has been inherent to metropolitanization. In essence, mobility infrastructure and services have enabled the widespread intra- and inter-national migration that fuels urbanization. At the same time, mobility infrastructure and services enable the urban expansion that makes the modern metropolis—large, typically multi-jurisdictional, multi-centric economic engines. This chapter aims to elucidate some of the challenges to governing the metropolis for sustainable mobility. It illustrates the fundamental role of mobility within metropolitan dynamics, how mobility systems define metropolitan

areas, and the challenges to and examples of metropolitan mobility governance. It concludes with a suggestion that finance should play a more central role in helping to induce better metropolitan governance for sustainable mobility around the world.

### Mobility in Metropolises: Core Forces

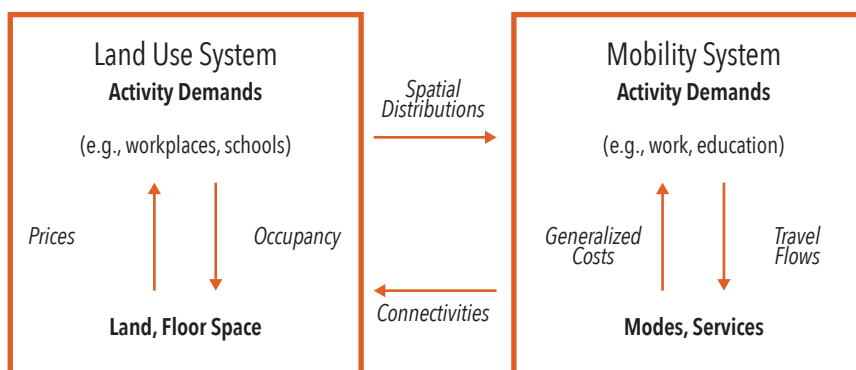
Within a metropolis, people, firms, and other institutions interact with their land use and mobility sub-systems creating accessibility, the ultimate objective of any human settlement: access to the daily needs and wants to survive and thrive. Zegras (2011) argued that maintaining this capability “to provide non-declining accessibility in time” is the fundamental operational definition of sustainable metropolitan mobility.

\*The author is grateful for useful comments on sections of this chapter from Fred Salvucci, Laurel Paget-Seekins, António Antunes, and Elisabete Arsenio.

At any spatial scale, from the block to the metropolis, examining mobility on its own presents a risk. Just as land use and mobility interact to generate accessibility, each of these sub-systems influences the other (Figure 1). The land use system, most basically, determines the locations of potential trip origins and destinations and influences the relative attractiveness of different travel modes. The mobility system, in turn, influences the relative desirability of different places and properties, positively improving connectivity, but

sometimes with negative consequences, for example air and noise pollution. A major transportation investment, such as a new highway, will change the accessibility profile across a metropolitan area and the relative land and economic development attractiveness. A major new housing development will change the mobility demand patterns of a metropolis and impact highway and public transport services. Some basic coordination between these two sub-systems, at a minimum, seems like a self-evident requirement.

**Figure 1. Theoretical Land Use–Mobility Interaction**



Source: Adapted from Cambridge Systematics, 1991.

## Mobility and Metropolitan Push/Pull

Land use and mobility interactions in modern metropolises manifest in two competing, age-old, forces: centripetal forces pulling us together into agglomerations and centrifugal forces pushing us ever further into the metropolitan hinterland.

Centripetal forces involve the general and often synergistic benefits people and firms obtain from relative proximity. For people, agglomeration can bring higher earnings, possibilities for labor specialization, bargaining power, and “insurance” against unemployment, as well as access to better quality and quantity of goods, services, educational opportunities, and social networks. For firms, centripetal benefits are partly complements to those for people and include higher marginal labor productivity (e.g., due to specialization), increasing returns on scale, higher access to labor, other inputs and final markets, as well as information

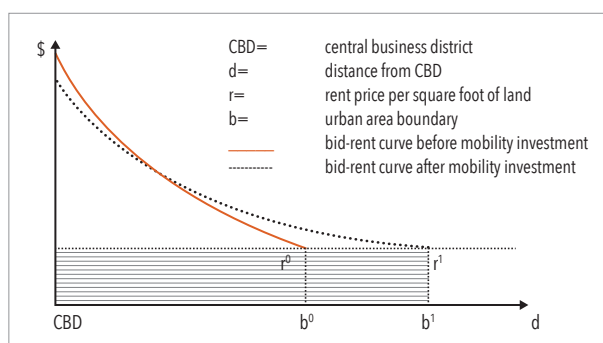
spillovers (Glaeser, 1998; Ingram, 1998; Mieszkowski and Mills, 1993).

Centrifugal forces, simultaneously, push us apart. These forces include classic negative urban externalities, such as traffic congestion and air pollution. Various forms of social, political, and related factors underlie the varying preferences of households and firms for public goods and services, as well as their willingness to pay for them, also tend to counteract metropolitan centripetal forces. This phenomenon rests at the core of Tiebout’s (1956) sorting, whereby consumer-voters choose to reside in the local jurisdictions that satisfy their public goods preferences and willingness to pay (taxes). This positive theory leads to an efficient but not necessarily equitable outcome in terms of a market for public services conditional on freedom of mobility, among other assumptions.

Basic urban economic theory captures how these forces shape the evolution of the metropolis, showing

the role of mobility and household and firm tradeoffs in terms of location, space, and travel time (and costs). Most basically, the value of land, as an immobile asset, partly reflects the relative accessibility (ease and value of movement) to/from that land, depending on the use of the land. Alonso (1964) formalizes this theory, drawing from von Thünen's seminal work from the 1820s, deriving the bid-rent function for urban location choices. By this theory, a locating agent's utility depends on consumption of a generalized good, property size, and distance to the central business district (CBD). This agent aims to maximize utility, subject to an income constraint—the resulting bid-rent function represents the amount an agent is willing to pay for rent at different locations, with different distances to the CBD (and subsequently different transportation costs), while maintaining constant utility. The model reveals a clear tradeoff between location and lot size, and can somewhat straightforwardly be adapted to firm location choice, with profit-maximization substituting for utility-maximization. By this theory, the generalized transport costs (e.g., time and money) dictate the shape of the curve (willingness to pay for proximity) and the “end” of the built-up zone (e.g., urban area boundary).

**Figure 2. The Classic Monocentric Bid-Rent Curve with a Mobility Investment**



Source: Author.

A mobility improvement in relation to the CBD will lower the land value at the CBD, flatten the slope of the bid-rent curve, and extend the built-up area boundary (Figure 2). In Figure 2, if  $b$  represents a political boundary (for a local jurisdiction) and such boundaries do not change, then the basic role of

transportation infrastructure and services in inducing the multi-jurisdictionality of the modern metropolis becomes clear. Alonso (1964) conceptually extended his model beyond the monocentric assumption and to different types of transportation networks.

## Auto-mobility and Metropolitan Dynamics in the U.S.

Well before Alonso's writing, population growth in U.S. metropolitan areas had already become suburb-dominated, a process enabled by mobility, particularly auto-mobility (i.e., the private car) (Muller, 2004). By 1960, the majority of people in the United States living in metropolitan areas already lived outside the city center. In the post-war era, rapid suburbanization of employment followed households (Zimmer, 1974). Indeed, by the time of Alonso's writing, metropolises in the United States had already become polycentric, with many suburban bedroom communities being transformed into important centers of shopping, industry, and offices.

Mobility, intertwined with demographic, socio-economic, and cultural factors, played an important role. National investments in highway infrastructure were a key contributor, as was the growth in dominance of the automobile and an emergence of highly heterogeneous lifestyles, living orientations, communities, and travel demand patterns (Foley, 1974). Inter-related demand factors also mattered. For example, more women entering the workforce created more two-worker households, changing the commute demand equation with respect to household location choice. The growth of non-work travel as a share of households' total travel (Santos, McGuckin, Nakamoto, et al., 2011) also increased the importance of accessibility to a much wider range of potential destinations in the household location decision. The traditional CBD no longer created as much pull for households or for firms, and polycentricity broadly emerged (e.g., Giuliano and Small, 1991). In the United States, in any case, the centrifugal movement of people and jobs seems to have been associated with shorter average commute distances (Crane and Chatman, 2002). By the late

1960s, most of the metropolitan areas in the United States had become dominated by automobile travel, in low-density “autoland” residential areas (Foley, 1974). In 2009, automobile travel accounted for 80 percent or more of the transport in most metro areas in the United States, a figure that has remained steady since 1970 (U.S. DOT, 2009).

## Metropolis by Mobility: Definitions

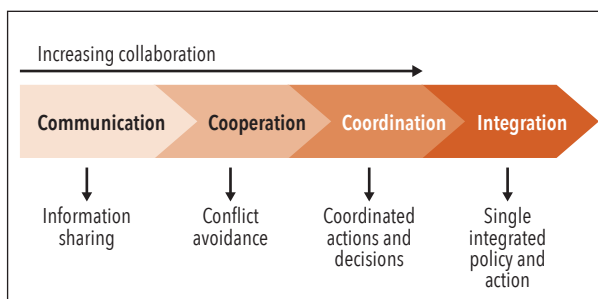
A metropolitan area can be defined politically, statistically, functionally, culturally, historically, and/or by some combination of these factors. In the end, for formal administrative and related functions, statistics play an important role in defining metropolitan extent. And, just as mobility plays a fundamental part in the urbanization and metropolitanization processes, mobility also serves as the core metric in defining metropolitan areas. In the European Union, for example, metropolitan regions (functional urban areas) are defined based on the extent of a commuting zone: if 15 percent of employed persons living in one city work in another city, the two cities are treated as a single city with commute shares calculated by the EU based on national census data (Dijkstra and Poelman, n.d.). In the United States, the Census Bureau defines the spatial scope of Metropolitan Statistical Areas according to the degree of local jurisdictions’ social and economic integration as measured by commuting ties based on the Employment Interchange Measure (EIM). Similar to the EU case, the EIM in the United States is calculated based on journey to work data from the census.

## Managing Metropolitan Mobility: Why Metropolitanism?

The need for some form of metropolitan governance for mobility should already be clear. Metropolitan mobility tends, almost by definition, to be inter-jurisdictional, crossing numerous local governments, requiring some administration below the national and provincial levels but above the municipal levels. Mobility infrastructures and services produce

horizontal (across local jurisdictions) and vertical (different levels of government) spillovers as well as intra-sectoral (e.g., network effects between buses and cars) and inter-sectoral spillovers (e.g., labor productivity, health, environment, and real estate). Metropolitan-level collaboration, of some degree, is necessary (Figure 3).

Figure 3. The Collaboration Continuum



Source: Rayle and Zegras, 2012.

## Challenges to Metropolitan Mobility Governance

Despite the need for some degree of metropolitanism in mobility, numerous challenges exist, most of which are similar to those for metropolitan governance more generally. Horizontally, and at least partially consistent with Tiebout (1956), local jurisdictions are often in political and economic competition and have few incentives to properly account for negative and/or positive spillovers associated with mobility. As metropolitan footprints grow, so do the number of jurisdictions involved. In the Metropolitan area of Mexico City, for example, over the second half of the 20th century, the number of local jurisdictions increased from 12 to nearly 60, spread across at least three states. Jurisdictional sprawl is likely associated with an increasing rate of capacity fragmentation. Some degree of higher level government incentives or interventions is necessary, but the questions of which level and how much are relevant—in whose ultimate interest is metropolitan mobility and who should pay for it?



The multi-sectoral effects of mobility, which influences, for example, housing, land development, and environmental conditions, add a level of institutional and disciplinary complexity. For instance, mobility services and infrastructure have direct and indirect effects on land development and vice versa (Figure 1). Relevant responsibilities tend to be separated and often poorly coordinated within a single jurisdiction, much less horizontally and/or vertically. The effects of this sectoral segregation are likely exacerbated by disciplinary differences, including the modeling and evaluation tools used, time frames of analysis, and even methods of intervention (e.g., zoning versus infrastructure investments).

Individual planning styles, partly associated with sector and discipline, matter also because they can come into conflict, depending on technical approach, political influence, collaborative propensity, and/or advocacy perspective (Innes and Gruber, 2005). Related underlying socio-political and cultural factors play a role, such as environment versus growth conflicts; racial, ethnic, and religious differences; and philosophical perspectives on financing collective goods and societal conceptions of public versus private goods. In public finance theory, public and private goods are defined by their degree of rivalry and excludability; mobility infrastructure and services rarely fit cleanly into these dimensions. In practice, whether societies treat a certain good as public or private depends on a combination of history, culture, laws, and ideology, among other factors (Zegras, Nelson, Macário, et al., 2013).

## Metropolitanism in Mobility Governance

The possibility of achieving some form of metropolitan governance for mobility is influenced by the scale and scope of the mobility problem, the nature of the infrastructure and services, disciplinary and technocratic differences, and the need to balance potential scale-related benefits (e.g., urban rail investment) versus localized preferences (e.g., bicycling infrastructure) related to jurisdictional sorting. In considering realistic models of governance, political legacy also matters. Metropolitan governance capabilities are influenced by the form and degree of a nation's decentralization, which itself derives from a country's governing legacy, such as whether subnational governance has its origins in devolution or deconcentration (Table 1). Inman (2007) defined governance along three related institutional dimensions: number of subnational (i.e., provincial or state) governments, their policy responsibility, and their elective representation in central government. By these dimensions, Inman classified democratic countries into three basic categories: federal, such as the United States, Germany, Brazil, Canada, Switzerland, Spain, and Argentina; administratively federal (unitary with policy decentralization), such as France, Italy, Denmark, Japan, The Netherlands, and Uruguay; and unitary (without policy decentralization), such as Chile, Ecuador, Greece, Peru, Portugal, Philippines, and the United Kingdom.

**Table 1. Characteristics of Governing Systems Relevant to Metropolitan Institutionalality**

Dimension of Relevance	Deconcentration (Subnational Administration)	Devolution (Subnational Government)
Origin and legitimacy	Arms of central government	Semi-autonomous
Broad powers	Delegated powers	Elective powers
Oversight	Central ministry control	Some oversight (some linked to funding, such as conditional grants)
Decision-making autonomy	Directed by center	Elected
Revenue mechanisms	Share of national taxes, some local	Grants, local taxes and fees

Source: Derived from Smoke, 1999.

Inman (2007) found decentralized national governance to be positively associated with a nation's performance with respect to property rights, political rights, and private sector performance, and furthermore, that constitutional decentralization (i.e., provincial or state governments) protects policy decentralization. Yet metropolitan-level governance models (Table 2) seem to be

somewhat independent of national-level decentralization models. Both the United States and Canada are federal systems, for example, with similar shares of government revenue raised by non-central governments. Yet the United States is home to typically fragmented one-tier metropolitan models (e.g., Los Angeles) while Canada has consolidated one-tier governments (such as Toronto)

**Table 2. Five Models of Metropolitan Governance**

Model	Predominant Characteristics	Advantages	Disadvantages	Examples
One-tier fragmented	Large number of autonomous governments	Local government accountability and accessibility	Capturing scale economies, spillovers	Los Angeles, Geneva, São Paulo, Mexico City, Manila, Mumbai
One-tier consolidated	Single local government	Service coordination, streamlined decisions, scale efficiencies	Reduced competition, incentives, access, and accountability; geographic boundary	Cape Town, Toronto, Shanghai, Abidjan
Two-tier	Upper and lower tiers	Services and infrastructure delivered at or by the “right” scale or tier	Reduced transparency and clarity for citizens; delayed decision-making; duplicated services	London, Barcelona, Tokyo, Seoul
City-states	Shares boundaries with state or province (or nation)	Area-wide internalization of externalities; budget authority	Urban growth beyond jurisdictional boundary; political power conflicts	Berlin, Singapore, Shanghai
Voluntary cooperation	Local government administrative integration and political linkage	Metro-wide services without political amalgamation	Transparency; diverging local government objectives	Finland, Portugal, Brazil
Special-purpose districts	Service-specific regional provision	Service-specific spillover range; user-fee basis	Political accountability; inability to account for inter-service tradeoffs, coordination; potential disconnect between taxation and expenditures	United States MPOs and public transit agencies; Bogotá (Transmilenio); Manila (MMDA)

Source: Derived from Slack, 2015

Note: MPO = Metropolitan Planning Organization; MMDA = Metropolitan Manila Development Authority.

This matters to governing metropolitan mobility because mobility infrastructure and services, over time, influence the necessary geographic scope. Fifty years ago, Mexico City was essentially a city-state—historically, the Distrito Federal—but, since 2016, it has been formally known as Mexico City and equivalent to a state-level government. Most of the metropolitan area's subsequent growth, however, occurred beyond the Distrito's jurisdiction. Today, the Mexico City Metropolitan Area is a highly fragmented, one-tier governance model, which drastically impacts mobility infrastructure and service efficiencies.

Few bus services from the surrounding suburbs are permitted to operate in Mexico City, generating massive demand for transfers (bus–bus and bus–metro), creating system inefficiencies and major user inconvenience (in 2010, approximately 2 million passengers per day made such inter-jurisdictional transfers at Mexico City transfer stations, GDF, 2011). Mexico City, with responsibility for building, operating, and financing the urban rail system (metro) has few incentives to expand services and infrastructure into the surrounding jurisdictions in the State of Mexico. Highway investments have also been

notoriously uncoordinated between Mexico City and bordering jurisdictions. Berlin, similarly, has city-state status and has unsuccessfully tried to expand its boundaries to include suburban municipalities from the neighboring state of Brandenburg (Slack, 2015). Even Singapore, a city-state nation with a dominant political party, is not immune from the challenges of metropolitan expansion. The nation's metropolitan area is spreading across the narrow Johore Strait into neighboring Malaysia. Indeed Singapore is expanding its urban rail system into Malaysia and is reportedly developing housing estates there as well. Such metropolitan growth dynamics will surely influence mobility governance in the city-state's future.

Despite the challenges, mobility also serves as a natural point for some amount of intra-metropolitan collaboration. A study of metropolitan governance in OECD countries (Ahrend, Gamper, and Schumann, 2014) found transportation to be among the three most common metropolitan governance organizations with some evidence of successful outcomes (e.g., citizen satisfaction with public transport). The OECD study, nonetheless, appears to focus on a relatively limited scope of transportation, primarily public transport authorities. This fact reveals another challenge to metropolitan transportation governance since the range of relevant planning and management responsibilities include the following:

- Planning infrastructure and services for public and private transport, roads and rails, passengers and freight, motorized and non-motorized modes
- Managing and regulating infrastructure and services, including parking, traffic, operating, and infrastructure concessions and licensing
- Designing, financing, investing in, and sometimes constructing and operating infrastructure and services
- Collaborating with relevant authorities in related sectors, including land planning and development, environmental protection, public health, and safety

Rarely, if ever, does a single metropolitan authority encompass this entire range of functions.

## United States: Metropolitan Mobility Governance in a Federal System

The United States is a longstanding federal system, with elected federal, state, and local governments. Its metropolitan areas, as defined by the Census Bureau, have long been jurisdictionally fragmented. By the late 1960s, the 227 statistical metropolitan areas already comprised an average 38 local governments (counties, municipalities, townships, not including school districts and special districts) (Campbell and Dollenmayer, 1974). Most metropolitan planning and coordination in the United States originated as incentives from state and/or national government, including federal conditional grants-in-aid (Zimmer, 1974). Some authorities emerged as Metropolitan Special Districts, designed to solve specific, area-wide service problems related to the cross-boundary benefits associated with highways or public transportation, and often given special financing capabilities (e.g., revenue from fees) (Zimmer, 1974). Such limited special districts may have had the unintended consequences of further fragmenting the metropolitan governance landscape and exacerbating inter-system externalities (e.g., highways vs. transit).

Federal transportation legislation, specifically the highway investment and finance system after World War II, gave birth to the modern metropolitan transportation planning organizations in the United States—today known as Metropolitan Planning Organizations (MPOs). A series of federal laws drove the process: the 1962 *Federal-Aid Highway Act* implicitly set the metropolitan scale for highway planning in urban areas and required planning as a condition for receiving money. By 1968, each state had to designate and empower metropolitan area entities (clearinghouses) to review projects for federal aid and coordinate these projects with plans and programs among different agencies. In the early 1970s, MPO requirements were strengthened and funded through federal highway financing (Weiner, 1992). Notably, states viewed these federally empowered MPOs as a violation of state rights by creating another level of government (Weiner, 1992). Although MPOs originated in highway funding legislation (through the Federal Gas Tax), MPOs' scopes of

planning also expanded as financing was made more flexible (e.g., for public transport investments) over the decades through new laws. Note that MPOs, defined by states, and commuting ties, defined by the federal government, do not necessarily coincide. Most MPOs are strictly transportation planning entities, carrying out the federally required transportation planning process and, in theory, determining which projects should be funded.

The Boston metropolitan area offers a glimpse of the complexity. Boston's MPO covers 101 cities and towns (the metropolitan statistical area [MSA] covers at least 130, including in the neighboring state of New Hampshire). The MPO has 22 voting members, including permanent ones from six state-level agencies and the city of Boston, as well as regional and at-large members elected by the voting cities and towns. Luna (2015) found evidence that the voting structure of Boston's MPO is unrepresentative and racially biased. The metropolitan area also has a regional (land) planning agency, covering the same 101 jurisdictions. Unlike the MPO, which has some authority as the financial gatekeeper responsible for the transport project approval process, the regional land planning agency has little more than convening power as cities and towns jealously guard their local zoning and property taxation rights. Metropolitan-level inter-sectoral collaboration between land use and transportation planning can be characterized as cooperation, at best. Operationally, greater Boston's public transportation services are offered primarily by a division of the state Department of Transportation (MassDOT), the Massachusetts Bay Transportation Authority (MBTA), which has 175 cities and towns receiving some service (MBTA began as a special district in 1964). These local jurisdictions provide some direct financial support (assessments) based on population-weighted service areas; in 2016, these assessments amounted to just 6 percent of MBTA revenues (MBTA, 2016). All highways in the metropolitan area are operated by MassDOT. Most local roads, parking, etc. are the responsibility of the local cities and towns, with some collaboration among them, such as for the area's public bike share program, jointly owned by four inner-area municipalities: Boston, Brookline, Cambridge, and Somerville. Because local governments do not have direct responsibility for public

transport and they rarely have to provide matching funds for MPO projects, their participation in the MPO generates an implied incentive to bring roadway projects to their local jurisdictions.

As Boston's metropolitan mobility institutional milieu shows, related responsibilities in a typical United States metropolis rest in a host of different organizations. MPOs, the most consistently federally empowered entity across metropolitan United States, have relatively limited "thematic width" (Ahrend, Gamper, and Schumann, 2014) because they deal almost exclusively with transportation planning and project prioritization. Haynes, Gifford, and Pelletiere (2005) suggested that the typical MPO voting structure poorly reflects the regional concentration of people and jobs and that money excessively drives decision-making power, giving undue influence to the federal government. Nelson, Sanchez, Wolf, et al. (2004) found some evidence that voting structure influenced modal investment priorities, with more suburban-oriented MPO boards associated with more highway-oriented investments. Gerber and Gibson (2009) found that an MPO's extent of regionalism (share of federal monies going to regional projects within an MPO) varies according to membership composition and decision-making structure. They also found evidence of electoral parochialism: elected officials were associated with more local project funding, while public managers were associated with more regionalism. Interestingly, wealthier areas and areas with larger public transport systems had more regional-scale funding. The United States' experience with MPOs suggests that the design of governance structure matters for outputs.

## **Portugal: Metropolitan Mobility Governance in a Unitary System**

Portugal is a relatively young unitary government system. The 1976 Constitution established a framework for four levels of subnational government, although two primary levels of elected government exist in practice, central and municipal. Elected local parishes, within municipalities, play a minor administrative role.

The two autonomous regions are not included in this characterization. Metropolitan governance is limited to fragmented administrative powers, largely subsidiary to municipal governments and dependent on the central government for most financial support (Rayle and Zegras, 2013). The nation has been undergoing a relatively slow process of deconcentration and decentralization, conditioned in part by membership in the quasi-federalist EU system. Nonetheless, the nation remains relatively highly centralized in terms of spending responsibilities and tax revenue (OECD, 2017).

The nation has long struggled with creating inter-municipal governance capabilities in the two primary metropolitan areas. Various laws have defined and aimed to empower the Metropolitan Areas of Lisbon and Porto (AML and AMP, respectively). Most recently, a 2013 law further defined the AML and AMP and approved inter-municipal entities for other urbanized areas across the country. Earlier legal incarnations of the AMP and the AML did not represent metropolitan governments, *per se*. Instead, each played a convening role, with the constituent municipalities participating through a metropolitan assembly (members elected by municipal assemblies). Their respective attributions were relatively vaguely defined and they depended nearly entirely on their municipal members or central government for financing (Assembleia da República, 2008). The result was the promulgation of a mix of non-compulsory, somewhat visionary strategic documents (Schmitt, 2013). The 2013 law changes the political composition of the metropolitan areas, although the attributions and dependencies remain nearly identical (Assembleia da República, 2013).

A 2009 law established Metropolitan Transportation Authorities (AMTs), which jurisdictionally coincided with the AML and AMP but represented a separate governing structure. Zegras et al. (2013) suggested that the AMTs lacked the administrative and financial authority to metropolitanize transportation; risked exacerbating perceptions of a central government transportation finance bias toward Lisbon and Porto; might hamper broader inter-modal and intra-system management needs by focusing primarily on public transportation; remained a heavily top-down solution, evidenced by central government

dominance in the membership structure; and lacked any meaningful recourse to financial instruments. In 2015 the Portuguese government passed a law abolishing the AMTs and folding their responsibilities into the respective metropolitan governments (Assembleia da República, 2015). This may represent a promising streamlining of metropolitan governance, although only time will tell if the metropolitan institutions move beyond their strategic role toward a more fully empowered one for mobility and other responsibilities.

Given this relatively weak formal metropolitanism, some evidence of bottom-up municipal collaboration has emerged, albeit not at a fully metropolitan scale. Rayle and Zegras (2013) examined ad-hoc inter-municipal collaboration in Lisbon and Porto in the land use and mobility realms, finding that collaboration is facilitated by positive incentives (e.g., money), flexibility in the institutional system, the presence of an external catalyst, existing networks, and specific organizational characteristics. Any one of these factors is insufficient; nearly all must be present for collaboration to emerge. Even then, the existing inter-municipal collaborations reveal modest scopes. The focus of the collaboration also plays a logical role. For projects such as public transport infrastructure, with tangible, relatively short-term benefits, other factors play a modestly important role. Where benefits are more uncertain, such as for long-term planning, several supporting conditions are necessary, including an external coordinating force. Broader metropolitan coordination for land use and mobility in Portugal will likely require metropolitan governance empowered to incentivize collaboration (Rayle and Zegras, 2013). Time will tell if the new metropolitan governance structure will effectively move in this direction.

## **Metropolitan Governance for Sustainable Mobility: A Path Forward**

The Portuguese examples of inter-municipal collaboration on land use and mobility reveal a mix of causes. Collaboration emerges, or not, due to different combinations of different factors, even when observing just two metropolitan areas in the same nation. That

collaboration does emerge still says nothing of the ultimate quality of the outcome. In the end, we are not concerned with the form of governance, per se, rather the quality of the governance outcome. How related are the two, in practice?

Answering this question requires some ability to measure performance across different governance structures. This would lend insight into whether governance matters. But, by what outcomes can we compare metropolitan mobility performance? For decades now, scholars, practitioners, advocates, and others have undertaken dozens of efforts to measure, for example, sustainable mobility. Yet, these often ambitious initiatives have not shared common definitions, much less performance indicators, making comparison across contexts difficult (e.g., Zegras, 2011). Which outcomes matter? Mode shares, emissions, financial sustainability, social rate of return? Can these be meaningfully compared across metropolises? Take a simplistic, but highly publicized measure of performance: congestion. In the United States, for example, since the early 1980s, the Texas Transportation Institute (TTI) has compiled data on urban area

congestion, producing a polemic, highly publicized scorecard, ranking metropolitan areas with the worst congestion (measured by yearly delay per automobile commuter). More recently, a mobility data company, INRIX, compiled a global ranking of cities based on roadway travel delays (peak hours spent in congestion). By this metric, Los Angeles (#1), Moscow (#2), Bogotá (#5), London (#7), and Paris (#9) are among the 10 worst global cities (Cookson and Pishue, 2017).

Congestion-based measures of metropolitan mobility performance can be problematic as they focus on roadways and, often, automobile users only. Comparability can also be a challenge, as evidenced by the differences in the 10 worst metropolitan areas in the United States according to TTI and INRIX (Table 3). More fundamentally, however, congestion-based measures focus on throughput, while the ultimate outcome of interest for sustainable metropolitan mobility is accessibility (Zegras, 2011). By one measure of accessibility, metropolitan mobility performs best in some of the United States' most congested places, including New York City, Los Angeles, and San Francisco (Table 3).

**Table 3. Top 10 Metropolitan Areas in United States with Worst Mobility (Congestion) and Best Accessibility (Accessibility to Jobs)**

Congestion (Worst Performing Metro Areas)		Job Accessibility (Best Performing Metro Areas)		
INRIX (2016)	TTI (2014)	Automobile (2015)	Public Transport (2014)	Walk (2014)
Los Angeles	Washington, D.C.	New York City	New York City	New York City
New York City	Los Angeles	Los Angeles	San Francisco	San Francisco
San Francisco	San Francisco	Chicago	Chicago	Los Angeles
Atlanta	New York City	Dallas	Washington, D.C.	Chicago
Miami	Boston	San Jose	Los Angeles	Washington, D.C.
Washington, D.C.	Seattle	San Francisco	Boston	Seattle
Dallas	Chicago	Washington, D.C.	Philadelphia	Boston
Boston	Houston	Houston	Seattle	Philadelphia
Chicago	Dallas	Boston	San Jose	San Jose
Seattle	Atlanta	Philadelphia	Denver	Denver

Sources: INRIX: Cookson and Pishue, 2017; TTI: Schrank et al., 2015; Automobile: Owen et al., 2016a; Public Transport: Owen et al., 2016b; Walk: Owen et al., 2015.

**Note:** The geographic scope of the INRIX and TTI congestion measures are not necessarily consistent. TTI apparently uses the MSA, while INRIX defines urban area based on roadway density. The accessibility values are calculated for the MSA; accessibility to jobs measures are calculated using travel time estimates for metropolitan areas and the distribution of jobs, with the number of jobs reachable weighted, decreasingly, according to travel times (essentially, a cumulative opportunities approach with a gravity-type impedance applied).

## Follow the Money?

*(The author acknowledges Taylor [2004].)*

Associating the mobility performance of metropolitan areas with governance offers an inductive way to identify good governance structures. Deductively, we can be driven by theory: effectively governing metropolitan mobility requires some capability to balance the societal benefits of scale (e.g., cross-jurisdictional infrastructure and services) with localized benefits of individual free choices. This requires coordination across jurisdictions and integration of the land use transport systems. The former is sometimes present, while the latter, rarely. Places with strong jurisdictional coordination, such as the cases of a relatively strong central government role in metropolitan areas in The Netherlands or jurisdictional integration in Singapore, run the risk of strengthening functional domains, favoring intra-disciplinary dialogue and minimizing inter-departmental collaboration (Kantor, 2006). This suggests a tension exists between horizontal and vertical collaboration and integration: centralization does not necessarily ease metropolitanization of integrated mobility governance.

Incentivizing metropolitanism in mobility might require stronger recourse to well-designed mobility finance. Bird and Slack (2007) intimated that effective metropolitan governance requires an appropriate fiscal structure. The transport finance system and related fiscal instruments profoundly influence metropolitan mobility performance and related effects such as land

development patterns, environmental impacts, and social equity (Taylor, 2004). The key elements of system financing send investment signals, project and program evaluation signals, user (and system efficiency) signals, and signals for system coordination to the relevant agencies and different levels of government. The United States' experience with national highway finance (via the gas tax) being used to induce coordinated metropolitan mobility planning and project selection through the MPO process has been marginally effective.

But without directly elected representatives and rarely with direct recourse to taxes or responsibility for investment and providing services, MPOs fall short, and the U.S. federal government continues to play an overly strong role. Fiscal federalism theory suggests that a metropolitan mobility finance system should aim for fiscal equivalence, whereby beneficiaries and payees are matched, and efficiency, where prices closely match marginal social costs, and price signals guide investment and management decisions. Prices should account for inter-system and intra-system externalities. In short, the finance system is a critical factor in determining metropolitan mobility governance, but formal metropolitan mobility finance systems rarely exist (Zegras et al., 2013). Of the typical instruments available—explicitly or implicitly—for financing metropolitan mobility, road charges (e.g., congestion pricing), public transport fares, and land-related taxes have the strongest theoretical adherence to a fiscal federalism-consistent metropolitan mobility system (Table 4).

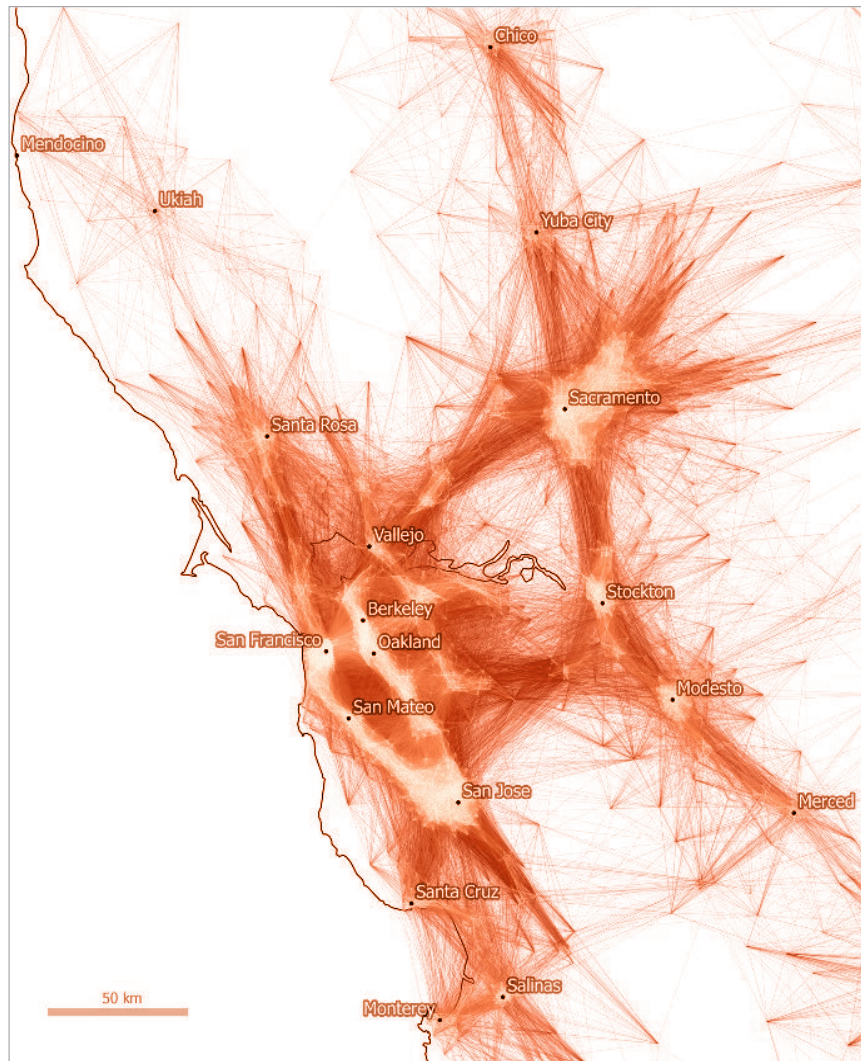
**Table 4. Fiscal Federalism: Financial Instruments for Metropolitan Mobility**

Transport Finance Instrument	Fiscal Federalism Criteria				
	Fiscal Equivalence	Efficiency	Externalities	Equity (Horizontal)	Administrative Ease
Fuel taxes	+/-	-	-	+/-	+
Other vehicle taxes, fees	+/-	-	-	-	+
Road charges	+	+/-	+/-	+/-	-
Public transport fares	+	+/-	+/-	+/-	+
General taxes: income, sales, etc.	+/-	-	-	+/-	+
Land taxes	+	+/-	+/-	+/-	+/-

Source: Zegras Jiang, and Grillo (2013).

Note: (+) meets, (+/-) partially meets, (-) mostly fails to meet criterion.

Figure 4. Journeys to Work (80 km or less) in San Francisco Bay Area



Source: Dash Nelson and Rae, 2016.

Whether better designed metropolitan mobility finance systems can lead to better metropolitan mobility governance remains to be seen. Technical barriers to, for example, efficient road charges have largely been overcome, but political barriers remain. The spatial scope of metropolitan mobility can now be precisely determined and users charged appropriately; the finance system could match the underlying patterns of demand across regions (Figure 4). Using money to move the metropolis in the right direction offers hope, largely unfilled to date. Incrementalism will prevail in most places. May sustainable accessibility ultimately arise—despite the congestion.

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- aprova o estatuto das entidades intermunicipais, estabelece o regime jurídico da transferência de competências do Estado para as autarquias locais e para as entidades intermunicipais e aprova o regime jurídico do associativismo autárquico. *Diário da República*, 1.ª série—N.º 176. Retrieved from: <http://data.dre.pt/eli/lei/75/2013/09/12/p/dre/pt/html>.
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