



The Right Structure for the Right Incentives for Multimodal Transportation in America's Growing Megaregions

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16. Abstract Advancements in technology and changes in population demographics have caused the transportation situation of the 21st century to outgrow the legal framework made to support it in the 20th. This project analyzed the legal framework of American transportation funding in the context of modern developments and in comparison to those of Germany and China to identify where the legal framework inadequately fits modern needs. It concludes that existing funding streams disproportionately subsidize highway travel, and as a result of historical inertia do not adequately incentivize multi-modal transportation solutions for America's growing megaregions. To solve this, direct and de facto subsidies for automobile transportation must be competitively redistributed based on more forward-looking assessments of megaregional transportation needs.			
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Chapter 1. Introduction

As we enter a new era of transportation characterized by demographic and disruptive technological shifts (as millennials turn away from car ownership and driving to ridesharing systems), federal and state transportation policy will need to adapt to serve America's growing megaregions without reducing access to rural communities. Megaregions present an opportunity to accommodate equity, congestion, and mobility issues by providing an environment for multiple modes to combine to respond with flexibility to varying needs. This project analyzed current federal and state transportation funding policy and sets out recommendations amending policy criteria to more effectively allocate limited resources between transportation modes for maximum efficiency.

1.1. Project Background and Motivation

Demographic analysis has shown that American megaregions occupy less than a quarter of the U.S. total land area, but account for over two-thirds of the population and 75% of the national gross domestic product. Projections show that future population increases and economic growth will be focused within these regions. Figures 1.1 and 1.2 show identified U.S. megaregions.

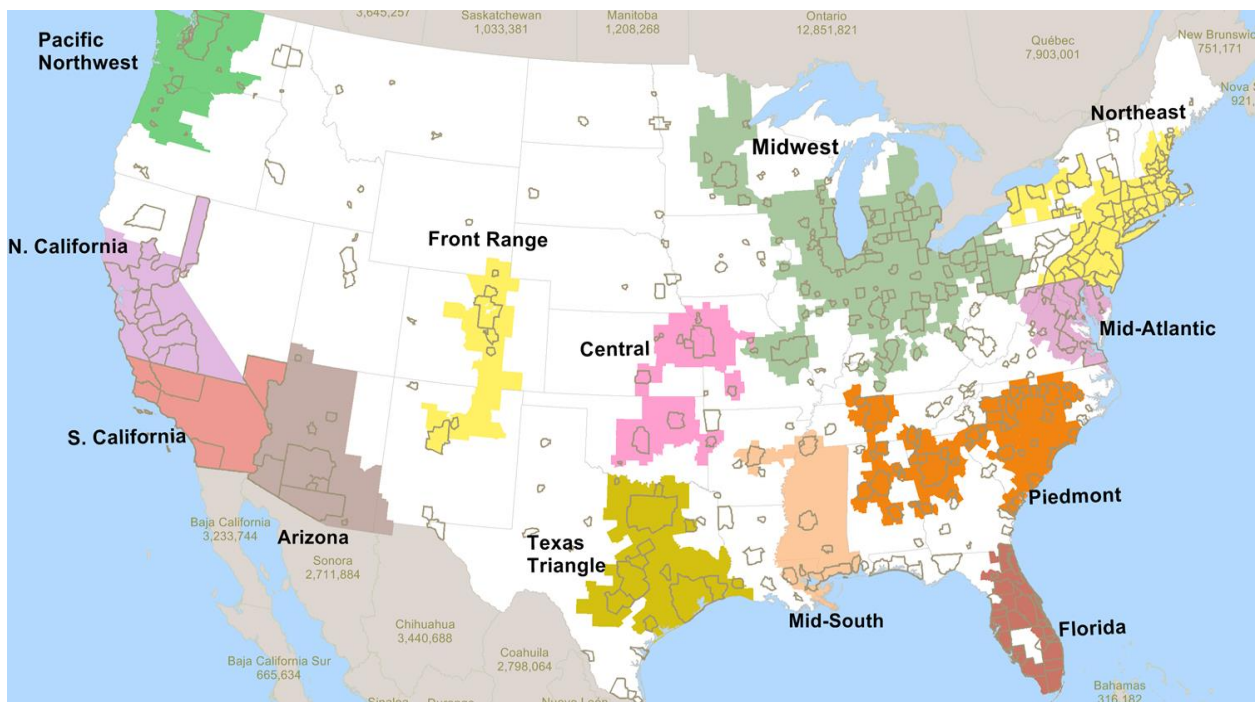


Figure 1.1: Megaregions in the U.S.

Source: FHWA

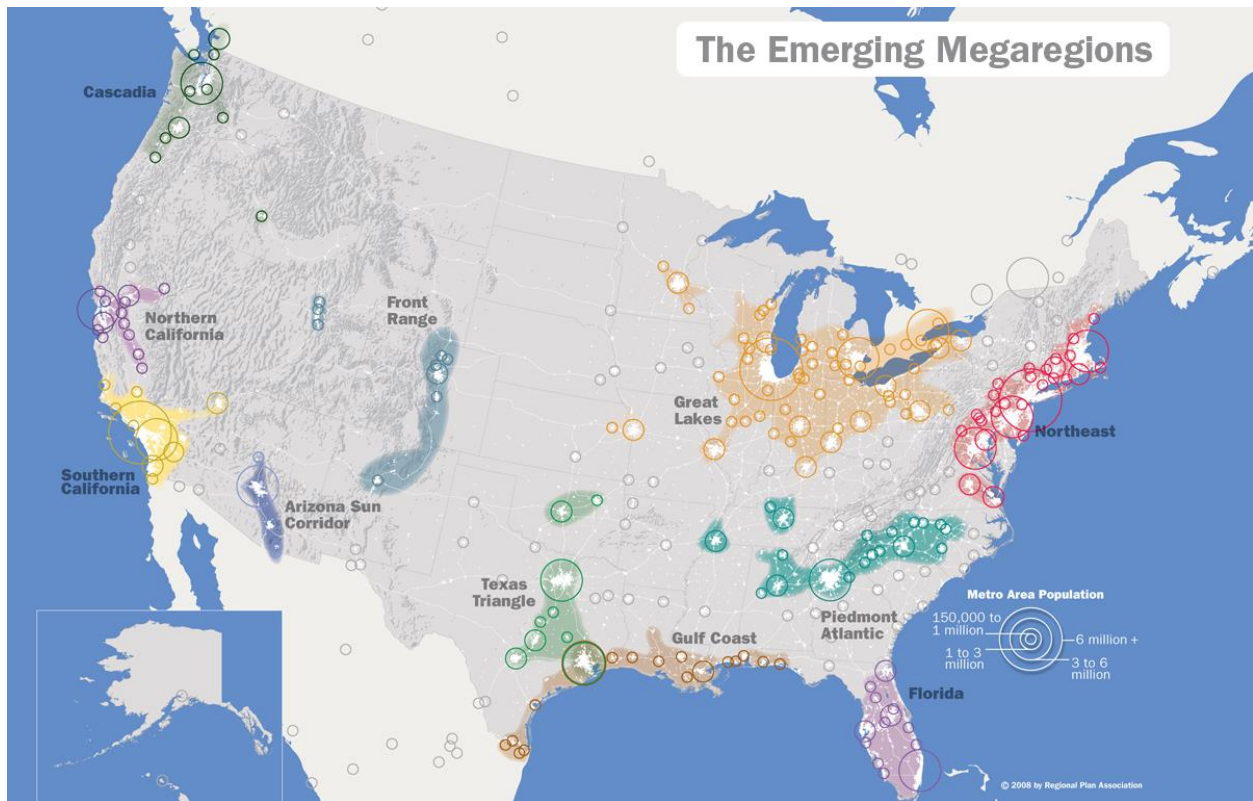


Figure 1.2: Emerging Megaregions

Source: America 2050

Since its inception, the United States has become steadily more urban. As more people live in and around major cities, the economic ties between nearby metropolitan areas are increasing. Figure 1.3 shows that 50% of the U.S. population lives within just 146 counties. Figure 1.3 also shows that these counties fall largely within identified megaregions of Cascadia, California, Arizona Sun Corridor, Texas Triangle, Central Plain/Midwest, Piedmont Atlantic, Florida, DC Virginia, and the Northeast. Dewar and Epstein argued that research was needed to focus upon the eight to ten megaregion areas of the U.S. that will house 70% of the nation's population growth and 80% of its employment growth (Dewar and Epstein, 2007, America 2050 Website). Figures 1.3 and 1.4 back up Dewar and Epstein's call, showing commuting trends and population statistics in an increasingly urbanized U.S. However, current federal and state transportation planning and financial laws and policies harken back to a less urban, less interconnected America and are not developed to encourage best practices in providing multimodal transportation options. Since the Federal-Aid Highway Act of 1956, federal policy has sought to strengthen the road network. This policy had considerable advantages in the time of its creation; more than a third of the national

population was rural, and the urban population was dispersed across many cities throughout the country.

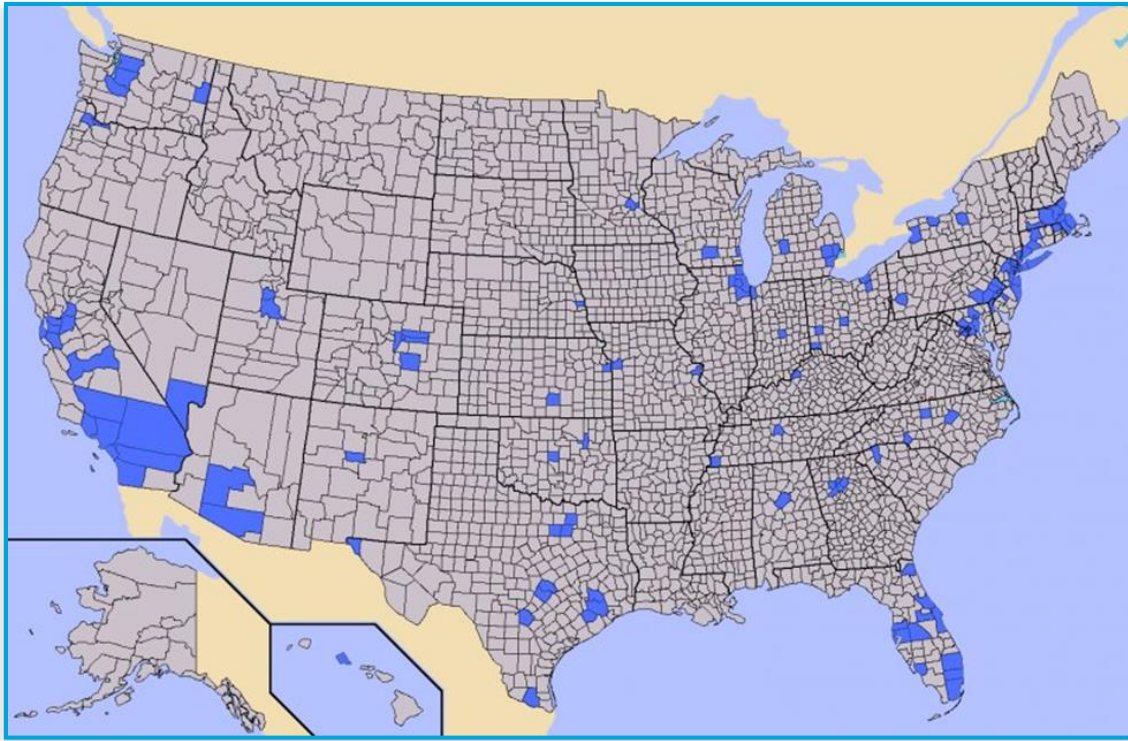


Figure 1.3: Making the Case for Megaregions—Where One-Half of the U.S. Population Lives

Source: Hickey Weisenthal, Business Insider, 2013

As noted, current transportation funding streams remain highly focused on road building and do not reflect developing transportation realities. As intercity travel along megaregion corridors grows and disparities in transportation access continue, state and federal transportation policy and funding criteria should be adapted to encourage innovative, multimodal solutions. New technologies such as autonomous vehicles are poised to disrupt existing transportation systems; the time is ripe to look at alternative transportation delivery options and to align statute, regulations, and policies to the new paradigm before us.

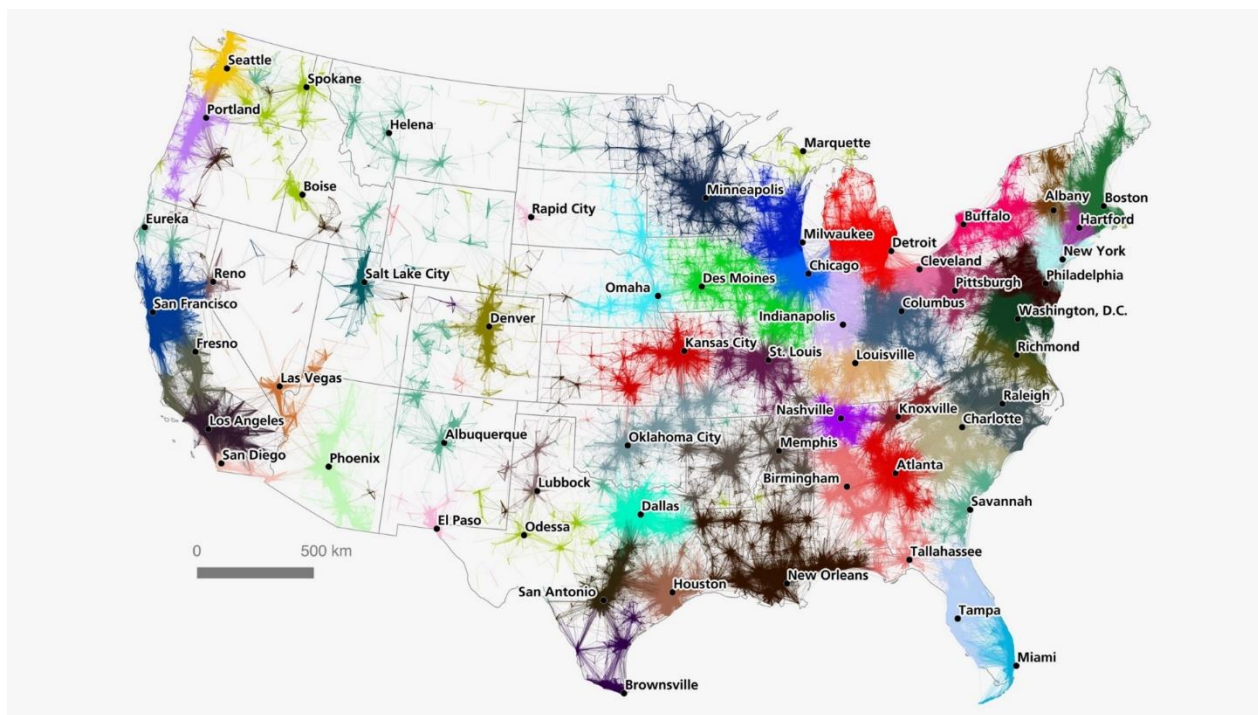


Figure 1.4: Commuting Maps in the U.S. Reveal We All Live in Megaregions, Not Cities.

Source: Aarian Marshall, Wired, 2016

In addition to urbanization, several other factors point to a need for alternative transportation methods. Studies show that new generations are more likely than their parents to prefer public transportation (Zipcar, 2010). And many cite concerns about traffic and the environmental impact of automobile travel (Zipcar, 2010). While older generations left dense city centers for the suburbs, young people are more likely to prefer living in denser conditions where they can walk, bike, or take public transit rather than drive. In addition, participation in the shared economy with bike sharing, scooters and other old transportation modes being revitalized by the use of technology apps and new methods of recharging, such as solar panels (Dutzik and Madsen, 2013). For example Figure 1.5 shows participation rates in selected U.S. bikeshare systems. Washington D.C., for example, saw 1 million rides over three years, twice the initial projections.

Improvements in communications technology make public transportation more accessible and desirable. Internet access and transportation apps allow people to easily consult transportation schedules and take advantage of public transportation options, or make use of alternative transportation options like bike-sharing or scooters (Dutzik and Madsen, 2013). Other uses of

smartphones and similar devices also make public transportation more attractive; while driving requires substantial attention, riding the bus or train presents an opportunity to use these devices.

City	Program	Year Began	Annual Members	Cumulative Miles Traveled
Washington, D.C.	Capital Bikeshare	2010	34,985 (as of May 2013)	4.1 million (as of March 2013)
New York City	Citibike	2013	71,760 (as of 8/16/13)	4.5 million (as of 8/16/13)
Boston	Hubway	2011	8,100 (as of July 2013)	1.2 million (as of July 2013)
Chicago	Divvy	2013	4,000 (as of August 2013)	325,000 (as of August 2013)

Figure 1.5: Participation in Selected U.S. Bikeshare Systems

Source: Dutzik and Madsen, 2013

Another factor policymakers must consider in addition to urbanization and advancing communication technology is the projected impact of autonomous vehicles on existing systems and infrastructure, to better accommodate the emerging ‘sharing economy’ ethos as it relates to transportation. Transit agencies are beginning to review the opportunities to automate fleets and develop platooning activities to maximize utility in providing transportation options. In addition, transport network companies are collaborating with transit agencies and the traditional original equipment manufacturers (OEMs) such as Ford, GM, Volvo, and others to develop shared transportation options (Miller, 2018). Many major transit agencies are also beginning to look at the use of automated and connected buses; Capital Metro (Austin’s transit system provider) has recently set up a test bed for an automated bus (Lee, 2018).

Automobile travel creates significant externalities not reflected in its cost to individual drivers. Drivers benefit from businesses that provide free parking, and generate pollution without being held responsible for its effects. Car crashes kill over 35,000 Americans each year, injure millions, and cost hundreds of millions of dollars in repair costs and lost opportunities every year (Parry, 2014).

The decades-old transportation policy has a powerful inertia that has made it less responsive to changing conditions. The existing road network is substantial, and as a result can be added upon in small increments. Even where rail would be more efficient and affordable in the long term, high short-term expenses present a barrier to its implementation. Compared with roads, rail expansions become even more valuable the more preexisting routes they can connect to. High speed intercity rail benefits from access to intra-city light rail because riders can easily switch trains. The more complete the network, the more attractive it becomes to consumers. This creates a collective action problem, however, because building a single line may not be profitable unless further rail development occurs to support it. Building many rail lines simultaneously requires cooperation, and access to tremendous amounts of capital.

Countries like Germany and China have effectively created nationwide rail systems that work in conjunction with other forms of transit, walking, and cycling, and in doing so have shortened commutes and made transportation safer and more accessible. These systems have also increased economic connectivity between major cities. These successful policies can provide a source of data and inspiration to craft an effective policy for multimodal transportation in the United States.

A preliminary analysis shows that to implement a multimodal transportation system, the current method of collecting tax on fuel and applying most of the revenue to road building should be either replaced or supplemented. Supporting road building with government funding while leaving rail transit to transit agencies and private industry creates an uneven playing field upon which less efficient transportation investments can prevail over better alternatives. Leveling the field can be achieved either by reducing subsidies for automobile transportation, or by increasing subsidies for alternatives; in either case, the focus should be on incentivizing modes that present the lowest overall cost after accounting for time lost to commutes, infrastructure costs, pollution, and individual transportation expenses.

To address these issues, this project conducted a multidisciplinary analysis of transportation policies in the United States, Germany, and China. The project reviewed historical economic and legal analysis to generate a model of transportation policy that allows different modes of transportation to compete on an even playing field. To reduce inefficiencies created by policies

that favor one mode of transportation over another through an imbalance of subsidies, taxation, and regulation, this project developed recommendations and draft legislative language that could create new incentives—and flexibility—in addressing megaregion transportation issues.

Chapter 2. Automobile Ascendancy: The Present State of American Transportation Funding

Much has changed since the ascendance of the automobile as America's primary mode of transportation in the 20th century. Technological improvements, changing population demographics, and cultural developments have led to an increasing need for diversity in transportation modes. The law and policy governing their development, however, remain locked in an increasingly outdated and infirm model of subsidizing roads primarily, first, and foremost, with other forms of transportation taking a backseat. Many factors convened to create this situation; economic inertia has made road expansion cheaper in the short term, despite long-term inefficiency, and political expediency has consistently favored short-term solutions. In addition, legal constraints preventing innovation and adaptation remain on the books, with updates being delayed due to political inattention and the influence of entrenched interest groups.

This section provides an overview of the history of American transportation finance by mode, followed by a breakdown of the magnitude of government transportation funding and how it is being spent by mode. The section will then discuss how circumstances surrounding transportation have changed and will continue to change in the 21st century.

2.1 Transportation Funding Prior to 1956

The federal role within transportation policy and development was initiated in the ratification of the U.S. Constitution in 1789, which gave Congress the authority to establish post roads with post offices, as well as the power to regulate commerce between the states and with foreign nations.¹ However, the prevailing view at that time was that secondary transportation projects (e.g., projects other than post roads and offices) were outside of the scope of federal interest, and purposely excluded from Congressional authority under Article 1, Section 8 of the Constitution. Therefore, the responsibility of any and all other types of transportation projects fell within the purview of state or private control as provided by the Tenth Amendment.

¹ U.S. Constitution Article I, Section 8, Clause 3, 7.

The National Road, authorized by the U.S. Congress in 1806, was the first federally funded public highway in the nation. Beginning in Cumberland, Maryland, the highway was planned to connect the terminus of the existing public highway network from the Port of Baltimore to the commercially vibrant Ohio River at Wheeling, Virginia (now West Virginia)—providing direct access from the interior to one of the country’s busiest ports. A bitter debate over the role of federal funding for internal improvements resulted in the first policies to distribute monies to the states for public works projects viewed as benefiting the nation as a whole (Sky, 2011). The early success of the highway saw its construction extended westward through Ohio, Indiana, and Illinois before competition from the railroads caused interest to wane.

With the expansion of the U.S. during the early 1800s, western states lobbied for congressional action to fund transportation projects other than post roads to encourage interstate commerce. Most of these efforts failed due to divisions within Congress. Some factions viewed provision of cash assistance for these types of projects as a violation of states’ rights under the Tenth Amendment (Dilger, 2015). As a work-around, Congress during this time provided to states land grants that served as a tool for development of the railroads and other transportation projects. As an example, in 1823 Ohio received a federal land grant of 60,000 acres along the Maumee Road to raise revenue for the Columbus and Sandusky Turnpike (Dilger, 2015). This continued through the 1800s, as federal lands were granted to the states to be auctioned to support the development of railroads, bridges, canals, watercourse improvements, and roads that expedited the transportation of the U.S. mail and military personnel and munitions. Federal oversight and administration, according to Dilger, was minimal and states were given wide latitude for project selection (2015).

By the dawn of the 20th century, the United States was a railroad nation. In the preceding fifty years, rail barons had aggressively built a network crossing the country and linking its major cities with steam locomotives. The technology revolutionized the movement of freight across the country. Though government action assisted the construction of railroads in various ways, such as land acquisition, by and large rail transportation was owned and operated by private actors responding to market forces. In 1900, rail was by far the dominant mode of passenger and freight transportation in the country. Even at this point, however, cracks were beginning to show.

By 1906, two-thirds of rail mileage in the country was owned by just seven entities. The small number of rail companies, combined with their massive importance as employers and providers of freight and passenger service, put these companies in a position to receive substantial criticism. Populist politics, represented at the time by the powerful Granger movement, pressured politicians to reign in abuses. The progressive era saw greater suspicion of monopolistic practices, and the longstanding institution of rail became a primary target for the complaints of the day. Rail companies became subject to increasingly stringent regulations on the sorts of prices they could charge, and what routes they must continue to provide for, even at a financial loss.

Regulation alone would not have done in the railroads, because for many years they were the only form of rapid transportation readily available. It would take an alternative better than the horse and cart to take Americans away from railroad travel. On city streets, the electric streetcar took precedence over rails. The ascendancy of rail would not be fully challenged, however, until automobile transportation became a viable alternative.

When, exactly, the automobile became a viable challenger to rail is impossible to pin on a single moment. In 1917, when the federal government seized control of the rails to provide for the war effort, trucks rapidly began filling the gaps left in domestic freight networks. In that same decade, the number of registered automobiles jumped from a little less than half a million to over eight million vehicles. Organizations like the American Automobile Association (AAA) pushed for better and better roads, which got more Americans into automobiles, and perpetuated a cycle of private adoption and public infrastructure investment that continued for the rest of the century.

The next seminal date at which it could be said the federal landscape for transportation policy and funding began its evolution to what we see today is 1916. The Federal Aid Road Act of 1916 (39 Stat. 355, July 11, 1916) authorized \$75 million over five years to improve rural post roads. Funding was offered to the states on a 50:50 cost share basis, with the initial law providing that federal matches be no less than 30% or more than 50% of total project costs. Furthermore, funding was prohibited for communities with populations over 2,500 (National Sand and Gravel Association, not dated).

To receive federal funds after 1920, each state was required to establish a state highway department (the first highway departments were established in Massachusetts in 1893 and New Jersey in 1894). AAA, the American Association of State Highway Officials (AASHO), and other groups had lobbied in the preceding few years for investment in farm-to-market roads and federal assistance for roads in general (Dilger, 2008). In 1912 Congress's Joint Committee on Federal Aid in the Construction of Post Roads was tasked to consider proposals for expanding federal assistance for post roads. The Joint Committee's report in 1914 argued that federal assistance for post roads accomplished the objectives within the U.S. Constitution to establish post roads, regulate commerce, provide for the common defense, and promote the general welfare (U.S. Congress, 1914).

The Federal Highway Act of 1921 (42 Stat. 212, November 9, 1921) saw Congress face continuing discussions regarding the role that the federal government should play in surface transportation policy, given the rapid growth in automobile ownership and requests for public investment in roads. AAA advocated for a 50,000-mile federal highway system, and AASHO pushed for continued reliance on states to design and oversee program operations and the continued use of the land grant device as a supplement for road financing. Congress adopted AASHO's approach, but expanded funding to \$75 million annually in the 1921 Act. Project selection was left in state hands, grant-in aid eligibility was expanded to non-post roads, with eligibility limited to a primary system of federal-aid highways that could not exceed 75% of all roads in a state. Up to 60% of funds could be used on interstate routes. The nascent beginnings of a federal-aid interstate system were in place.

The 1944 Federal-Aid Highway Act was a three-year, \$1.5 billion program that further expanded federal reach by adding three new programs to the Federal-Aid Highway Primary System (Pub. L. NO 78-521 58 Stat, 838, Ch. 626).

1. The Federal-Aid Secondary System, comprising principal secondary and feeder routes that included farm-to-market roads, rural mail and public school bus routes, and local roads in rural counties and townships (authorized at \$150 million annually).
2. Urban extensions of the Federal-Aid Primary System in municipalities/urban places having populations of more than 5000 (authorized at \$1,225 million annually).

3. The Interstate Highway Network, to be called the National System of Interstate Highways (authorized at \$225 million annually and comprised of 65,000-kms, 40,000 miles)

The construction of American highway infrastructure, while partially reliant on fuel tax and other user revenues, benefitted substantially from public subsidies in a way that the railroads and the electric streetcars could not easily compete. Streetcar companies suffered doubly: in addition to being required to pay for their own rights-of-way, they were the victim of political campaigns to keep fares low, and union pushes to employ more workers than necessary. Eventually, most of the streetcars in the country disappeared after the execution of a vast and collusive General Motors scheme to buy them out for the sole purpose of their removal.

The highways campaign culminated in President Eisenhower's massive Federal-Aid Highway Act of 1956, which began the construction of 41,000 miles of interstate highways and set the tone for transportation policy for the rest of the century. As the highways were constructed, cars quickly became the symbol of status and independence for Americans. Stylized, fashionable, and well-advertised, cars became an American cultural icon. This car culture persists to this day, and the cultural significance of the automobile cannot be understated as a reason for its overwhelming precedence in American transportation.

After 1956, the federal government continued to authorize highway funding in much the same way for the rest of the century. Though other modes of transportation for people and freight saw some degree of resurgence closer to the turn of the millennium, from 1956 onward the 20th century was indisputably the century of the highways.

2.2 Transportation Funding Post 1956

The current picture of American transportation funding is highly complex. Federal, state, and local governments all contribute to both planning and financing transportation improvements. This section will detail how funding operates at each of these levels, in terms of quantity as well as methodology. Then, it will summarize the differences within and overarching themes of American transportation finance as a whole.

While the 1956 Federal-Aid Highway Act (P.L. 84-692, June 29, 1956) could be considered the watershed moment at which federal policy for transportation supercharged the development of highways, and helped to generate the rise of automobile ascendancy. The bill authorized \$25 billion for 13 years for the construction of the 41,000 miles of the National System of Interstate and Defense Highways, with a completion date set for 1972. This bill set the stage for 35 years of federal focus on interstate highway construction and completion. The Highway Revenue Act of 1956 also saw an increase in the federal gasoline tax, with the revenue placed into a Highway Trust Fund (HTF) dedicated to highways.

In those 35 years, Dilger notes, the states and localities focused their efforts on surface transportation policy to maximize federal assistance and minimize federal involvement in how they used federal funds (Dilger, 2015). By 1981 the Federal-Aid Highway Act had funded 539 federal grants to state and local governments and over 34 programs. Presidents Nixon and Reagan both sought changes to consolidate and amend the federal and state roles. President Nixon proposed to consolidate the 26 federal surface programs into a *special revenue sharing program*. However, this program did not gain congressional traction due to the opposition from groups associated with highway construction, who feared that such funding would be compromised. President Reagan proposed a \$20 billion swap of authorization where states would be given responsibility for funding Temporary Assistance for Needy Families (TANF) and food stamps in exchange for federal assumption of state contributions for Medicaid. This was combined with a \$28 billion trust fund to replace 43 programs in all, including all non-interstate highways and urban mass transit construction and operating grants. This \$20 billion swap was intended to not only to expedite the divestment of federal involvement in the HTF, but to continue consolidating major programs and the federal taxes supporting their continuation under the HTF (Conland and Walker, 1983).

In 1987 the U.S. Advisory Commission on Intergovernmental Relations (ACIR) recommended to Congress to *'move toward the goal of repealing all highway and bridge programs financed by the HTF except for the Interstate highway system and the bridges that supported this, the emergency highway relief program and the federal lands program'*. ACIR also recommended that Congress relinquish a share of the gas tax to enable states to finance devolved programs. ACIR's critique

and recommendations centered on a “geographic range of benefits” argument. ACIR argued that roads that served a local purpose competed with financing for roads that provide a truly national benefit. Approximate geographical ranges were recommended to support incremental devolution, so that roads that provided no ‘national benefits’ were devolved first, followed by roads that provided some national benefits to be devolved later (ACIR, 1988). ACIR may have thus inadvertently provided within its criticisms of federal aid to highway and bridge programs a rationale for megaregional-type activity. In its 1987 report, “Devolving Selected Federal Aid Highway Programs and Revenue Bases: A Critical Appraisal,” ACIR argued that interstate highways are subject to ‘spillovers’² and that the “best government for providing services is one with an appropriately large jurisdiction so that jurisdiction can encompass the externalities” (ACIR, 1987).

Post what is called the “interstate era,” federal transportation financing and policy have both seen continued changes in the subsequent highway bills. The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) significantly shifted transportation focus from the interstate era to a new view of mobility that was multimodal, cognizant of community and environmental inputs, and more flexible in its planning approach. Subsequent transportation bills—Transportation and Equity Act for the 21st Century (TEA-21) (1998); Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA:LU) (2005); Moving Ahead for Progress in the 21st Century Act (MAP-21) (2012), and Fixing America's Surface Transportation Act (FAST) (2015)—have continued the approach established under ISTEA. President George H.W. Bush used ACIR’s “geographic range of benefits” argument to propose changes in the 1991 reauthorization, which, while increasing funding by 40% for highways, recommended that interstate, primary, secondary, and urban highway programs be replaced by two programs: a 241,000-kilometer (150,000 mile) National Highway System with significance for national defense and the movement of commerce and people, and an urban and rural highway block grant for other federally funded roads (totaling approximately 716,000 miles). The Senate bill rejected this argument, and the House bill took another approach to a federalism structure for surface transport on policy by incorporating elements from the Administration’s proposal and the Senate

² ACIR defined an interstate spillover (externality) as when road benefits are not fully captured in-state. State budgetary process has little reason to value fully out-of-state benefits. A logical consequence could be underfinancing of roads with large out-of-state benefits relative to the in-state benefits.

bill. ISTEA did, however, make notable impacts in how funding could be utilized: allowing state programmatic authority to shift funds among existing programs; and granting a new role to the MPOs in using STP funds—allocating \$9 billion for urban areas with populations greater than 200,000.

In congressional discussions on ISTEA’s reauthorization, the issue of state donor/donee (e.g., return-on-investment) came to the fore, with 32 states receiving less from ISTEA than they had paid into the HTF. As a representative of these “donor” states, and in an effort to devolve much of the federal authority over programmatic flexibility to these states, Representative John Kasich (R-OH) proposed the Building Efficient Surface Transportation and Equity Act of 1998 (BESTEA) as a corollary to the Transportation and Equity /Act for the 21st Century (TEA-21 (U.S. Congress, Reauthorization of the Intermodal Surface Transportation Efficiency Act 1997)).³ This proposal, on behalf of the 32 HTF donor states, supported the long-standing argument that states and their internal decision-makers are much better able to identify surface transportation needs in their states than federal officials, and that this added flexibility for states will result in more efficient and innovative solutions to surface transportation problems. On the other hand, Representative E.G. “Bud” Schuster, then-Chair of the House Committee on Transportation and Infrastructure, opposed Representative Kasich’s BESTEA proposal on the grounds that:

“While this [bill] would simply turn things back to the states, ironically there is a greater need for us to have coordinated, tied-together national transportation systems than ever. Why? Because more people and more goods are moving interstate than ever before” (Congressional Record, 1998).

When BESTEA was proposed in 1998, states were much more fiscally secure and could support the effort, but the question of devolving programs to states remains as relevant today as it did then. Congressional STP reauthorizations under MAP-21 and the FAST Act continue to diminish the presence and influence of the Federal government on state surface transportation projects and

³ In an argument to support the 1998 BESTEA amendment, Representative Kasich argued, “If you let us keep our money and get rid of all the federal bureaucracy and all the federal rules, we’ll be able to have more highway construction.” U.S. Congress, House Committee on Transportation and Infrastructure, Subcommittee on Surface Transportation, Reauthorization of the Intermodal Surface Transportation Efficiency Act (ISTEA): Comprehensive Reauthorization Proposals, 105th Cong., 1st sess., February 12, 1997 (Washington, DC: GPO, 1997), p. 11.

programming. From a megaregional transportation perspective, federal support will continue to remain critically important as the number of “core” federal highway programs continues to shrink and as grants for large, multimodal surface transportation projects become much more vitally essential and competitive over time.

Simultaneously, as the discussion of diminishing federal presence continues today, regions and states continue to grow in global economic importance and size. As such, traditional geographic boundaries delineated over time to support STP funding silos and programs among states and MPOs are evolving with the advent of the megaregion. In response, cities, regions, and states are continuing to develop innovative partnerships, independent of the USDOT, to compete for larger federal grants and matching funds in areas where such megaregional initiatives are politically feasible. As a result, megaregional transportation planning is often fragmented and represents local interests as opposed the greater interests of national transportation policy for improving the effective and efficient movement of goods and people.

2.2.1 Federal Transportation Spending

American transportation at the federal level works almost entirely by delegation. Funds accumulate through the federal gas tax and other user fees, supplemented by general revenues. These funds are then largely distributed to states and localities, with funds for urbanized areas being allocated according to plans generated by MPOs and funds for rural areas going through states directly. To receive federal funding, a state or locality usually must use some of its own money as well to match a percentage of the federal commitment.

Federal transportation funding comes largely from highway user fees (fuels and vehicle taxes), amounting to 57.2% of USDOT’s \$73 billion surface transportation budget in 2015 (FHWA, 2017). Over 81% of the highway user revenue is applied directly to highways, with transit and long-distance passenger and freight rail taking up most of the remainder (FHWA, 2017).

Figure 2.1 shows the trend in transit versus highway funding identified in the Surface Infrastructure Financing Commission’s 2009 report. Transit funding had stayed relatively stagnant since 1992, while highway funding had increased from under \$30 billion in 1992 to \$42 billion by 2009. Part

of this emerged as a consequence of the highway bill SAFETEA-LU, which had as its major push a goal to spend down the highway trust fund to allocate receipts on much needed highway infrastructure projects.

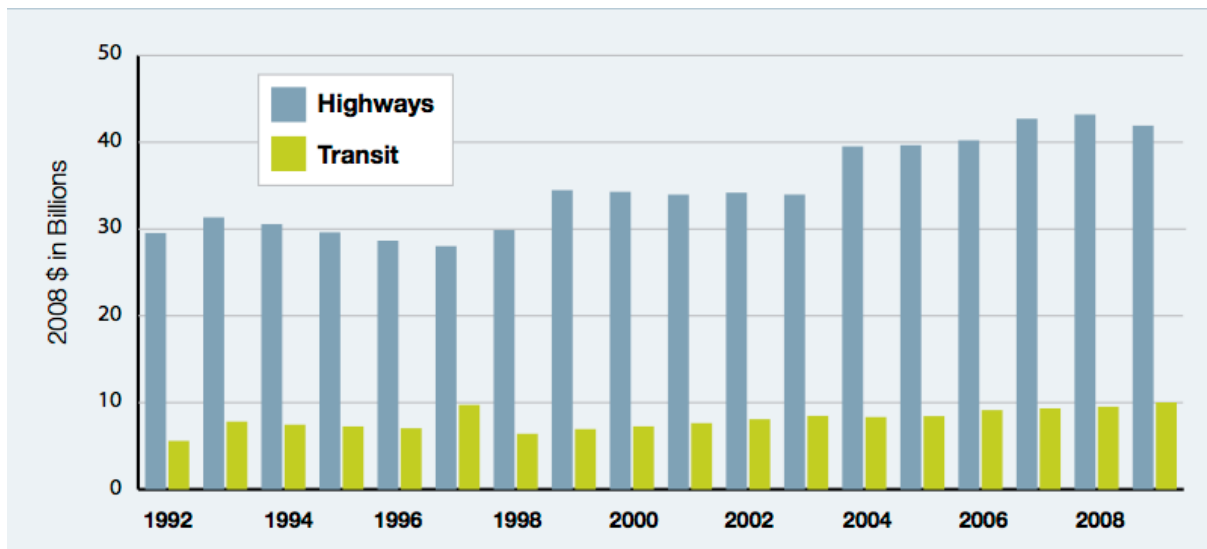


Figure 2.1: Highway vs. Transit Budget Authority Since 1992

Source: National Surface Transportation Infrastructure Financing Commission, 2009

The federal government spends less than the states on transportation overall, and relies more heavily on user fees. As a result of spending substantially less, and delegating its spending to states and localities (albeit through MPOs), the federal government has limited influence on transportation spending, making it difficult to lead American transportation in new directions. Short- and long-term transportation plans made by MPOs using federal guidelines, and funded through federal matching funds such as the Surface Transportation Block Grant program, provide the primary vector of federal influence on transportation in the country.

Politically, the federal government has the greatest flexibility in changing the direction of transportation policy. At the level of state and especially local government, transportation decisions often become heavily politicized. Politicians representing smaller communities have greater incentives to make transportation decisions that provide instant gratification to the electorate. At the federal level, however, the politicized issues tend not to be transportation oriented, and transportation policy spends less time in the limelight. In addition, because federal transportation spending is almost entirely delegated through administrative agencies and MPOs, the federal government is seen as less accountable for any given policy.

To effectuate multimodal, megaregion-focused transportation planning in the current system, the federal government has several tools. The USDOT has substantial persuasive authority, as the nation's largest nexus of transportation research and expertise; recommendations from USDOT carry weight on their own. Beyond simple recommendations, USDOT has a substantial amount of grant money over which it exercises varying degrees of control. Some, like TIGER grants, are almost entirely discretionary, while others, like the Surface Transportation Block Grant, follow formulas. Even within grants which leave USDOT little discretion, some power is delegated to metropolitan planning organizations (MPOs), federally created organizations which develop transportation plans and allocate federal funding in urbanized areas. The USDOT has agenda-setting powers for the MPOs, and the MPOs themselves can be further empowered by acts of Congress.

While the federal government has traditionally preferred to delegate ground-level transportation decisions, it has access to more substantial powers. Using the federal government's expansive commerce and spending powers, federal authorities could take a more active role in facilitating specific transportation outcomes. For any decision it makes within these powers, the federal government also has the capability to displace contradictory state and local schemes via preemption.

2.2.2 State and Local Transportation Spending

State transportation policy, by nature of the diversity between states, can be more varied than federal. However, American states tend to imitate one another and as a result transportation funding at the state level can be summarized effectively. At both the state and local level, transportation priorities divide substantially along urban/rural lines, with the priorities of rural areas and large but lightly populated states standing in stark contrast to those of cities and densely populated states.

Like the federal government, state transportation projects receive most of their funding from the gas tax. However, in the majority of American states, gas tax revenues are constitutionally required to be used only for highway purposes, with some exceptions (see, for example, Tex. Cons. Art VIII Sec. 7-a). In Texas, motor vehicle user tax revenues are divided between highways (75%) and

school funding (25%); in Pennsylvania, 100% of these revenues must go to highways and related expenses. In total, 26 states have provisions limiting most or all of motor vehicle user tax revenues to be used exclusively on highways. Owing in part to these constitutional provisions, state, and local surface transportation expenditures favor highways even more than federal ones, with 70.2% going directly to highways in 2012 (BTS, 2016). By contrast, transit received less than a third of this, accounting for just 19.6% of the total expenses. Notably, states and localities spend considerably less than the federal government as a share of total expenditures on air traffic infrastructure.

State and local transportation funding, taken in aggregate, results in a substantial subsidy for highways over other modes of transportation. In 2015, state and local governments spent \$176 million on highways, only 42% of which was supplied by state user fees (FHWA, 2015). The remainder is supplied by transfers from other state and federal sources.

States spend substantial money on highways for several reasons. One reason is that federal matching funds for highways generally provide for new construction, leaving maintenance costs entirely in the hands of the state. Coupled with a massive existing road network, the costs associated with maintenance and upkeep necessarily burden state transportation funds, reducing funds available to alternative modes.

Given the option, state and local governments do frequently use federal matching funds for highways. Several political factors contribute to these governments' reluctance to pursue other modes: proximity and accountability to constituents, many of whom struggle with highway traffic, encourages local politicians to invest in quick fixes; and road expansion provides more immediate benefit in alleviating congestion, even where investment in transit would have better long-term results. If too much of the payout for the transportation investment lies on the far side of the next election, politicians may rationally choose the less economically efficient improvement due to political concerns. Another political factor involves the benefits of collective action—transit, ridesharing, cycling, and commuter rail see increasing returns on investment as the network fills in; a light rail line will see its traffic increase significantly when it connects with other lines and commuter rails, and the presence of an effective network makes walking, cycling, and ridesharing

more effective. To achieve these transportation results requires, in addition to already politically difficult long-term planning, coordination between governmental entities. Such coordination presents a challenge for local authorities, and even for state authorities when megaregional agglomerations cross multiple state lines. Without more active federal participation, the scale in terms of time and geography for multimodal transportation networks can be too large for local authorities to interact with.

Furthermore, 26 state constitutions contain constitutional restrictions preventing the use of road-user fees on non-road infrastructure such as rail. Table 2.1 lists every state constitution containing such a provision as of 2018.

Table 2.1: States with Constitutional Gas Tax Restrictions

State	Location in Constitution	Text
Alabama	Ala. Const. Amendment 93	No moneys derived from any fees, excises, or license taxes, levied by the state, relating to registration, operation, or use of vehicles upon the public highways except a vehicle-use tax imposed in lieu of a sales tax, and no moneys derived from any fee, excises, or license taxes, levied by the state, relating to fuels used for propelling such vehicles except pump taxes, shall be expended for other than cost of administering such laws, statutory refunds and adjustments allowed therein, cost of construction, reconstruction, maintenance and repair of public highways and bridges, costs of highway rights-of-way, payment of highway obligations, the cost of traffic regulation, and the expense of enforcing state traffic and motor vehicle laws. The provisions of this amendment shall not apply to any such fees, excises, or license taxes now levied by the state for school purposes for the whole state or for any county or city board of education therein.
Arizona	Ariz. Const. Art. IX Sec. 14	No moneys derived from fees, excises, or license taxes relating to registration, operation, or use of vehicles on the public highways or streets or to fuels or any other energy source used for the propulsion of vehicles on the public highways or streets, shall be expended for other than highway and street purposes including the cost of administering the state highway system and the laws creating such fees, excises, or license taxes, statutory refunds and adjustments provided by law, payment of principal and interest on highway and street bonds and obligations, expenses of state enforcement of traffic laws and state administration of traffic safety programs, payment of costs of publication and distribution of Arizona highways magazine, state costs of construction, reconstruction, maintenance or repair of public highways, streets or bridges, costs of rights of way acquisitions and expenses related thereto, roadside development, and for distribution to counties, incorporated cities and towns to be used by them solely for highway and street purposes including costs of rights of way acquisitions and expenses related thereto, construction, reconstruction, maintenance, repair, roadside development, of county, city and town roads, streets, and bridges and payment of principal and interest on highway and street bonds. As long as the total highway user revenues derived equals or exceeds the total derived in the fiscal year ending June 30, 1970, the state and any county shall not receive from such revenues for the use of each and for distribution to cities and towns, fewer dollars than were received and distributed in such fiscal year. This section shall not apply to moneys derived from the automobile license tax imposed under section 11 of article IX of the Constitution of Arizona. All moneys collected in accordance with this section shall be distributed as provided by law.
Colorado	Colo. Const. Art. X Sec. 18	On and after July 1, 1935, the proceeds from the imposition of any license, registration fee, or other charge with respect to the operation of any motor vehicle upon any public highway in this state and the proceeds from the imposition of any excise tax on gasoline or other liquid motor fuel except aviation fuel used for aviation purposes shall, except costs of administration, be used exclusively for the construction, maintenance, and supervision of the public highways of this state. Any taxes imposed upon aviation fuel shall be used exclusively for aviation purposes.

State	Location in Constitution	Text
Georgia	Georgia Const. Art. III Sec. 9 Para. 6(b)	An amount equal to all money derived from motor fuel taxes received by the state in each of the immediately preceding fiscal years, less the amount of refunds, rebates, and collection costs authorized by law, is hereby appropriated for the fiscal year beginning July 1, of each year following, for all activities incident to providing and maintaining an adequate system of public roads and bridges in this state, as authorized by laws enacted by the General Assembly of Georgia, and for grants to counties by law authorizing road construction and maintenance, as provided by law authorizing such grants. Said sum is hereby appropriated for, and shall be available for, the aforesaid purposes regardless of whether the General Assembly enacts a general appropriations Act; and said sum need not be specifically stated in any general appropriations Act passed by the General Assembly in order to be available for such purposes. However, this shall not preclude the General Assembly from appropriating for such purposes an amount greater than the sum specified above for such purposes. The expenditure of such funds shall be subject to all the rules, regulations, and restrictions imposed on the expenditure of appropriations by provisions of the Constitution and laws of this state, unless such provisions are in conflict with the provisions of this paragraph. And provided, however, that the proceeds of the tax hereby appropriated shall not be subject to budgetary reduction. In the event of invasion of this state by land, sea, or air or in case of a major catastrophe so proclaimed by the Governor, said funds may be utilized for defense or relief purposes on the executive order of the Governor.
Idaho	Idaho Const. Art. VII Sec. 17	On and after July 1, 1941 the proceeds from the imposition of any tax on gasoline and like motor vehicle fuels sold or used to propel motor vehicles upon the highways of this state and from any tax or fee for the registration of motor vehicles, in excess of the necessary costs of collection and administration and any refund or credits authorized by law, shall be used exclusively for the construction, repair, maintenance and traffic supervision of the public highways of this state and the payment of the interest and principal of obligations incurred for said purposes; and no part of such revenues shall, by transfer of funds or otherwise, be diverted to any other purposes whatsoever.
Iowa	Iowa Const. Art. VII Sec. 8	All motor vehicle registration fees and all licenses and excise taxes on motor vehicle fuel, except cost of administration, shall be used exclusively for the construction, maintenance and supervision of the public highways exclusively within the state or for the payment of bonds issued or to be issued for the construction of such public highways and the payment of interest on such bonds.
Kansas	Kansas Const. Art. XI Sec. 10	The state shall have power to levy special taxes, for road and highway purposes, on motor vehicles, and on motor fuels. (note that this is the only provision granting power to tax motor vehicle users, thus all taxes on motor fuel, registration, etc. must go to highways.)
Kentucky	Ky. Const. Sec. 230	No money shall be drawn from the State Treasury, except in pursuance of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published annually. No money derived from excise or license taxation relating to gasoline and other motor fuels, and no moneys derived from fees, excise or license taxation relating to registration, operation, or use of vehicles on public highways shall be expended for other than the cost of administration, statutory refunds and adjustments, payment of highway obligations, costs for construction, reconstruction, rights-of-way, maintenance and repair of public highways and bridges, and expense of enforcing state traffic and motor vehicle laws.

State	Location in Constitution	Text
Maine	Maine Const. Art. IX Sec. 19	Limitation on expenditure of motor vehicle and motor vehicle fuel revenues. All revenues derived from fees, excises and license taxes relating to registration, operation and use of vehicles on public highways, and to fuels used for propulsion of such vehicles shall be expended solely for cost of administration, statutory refunds and adjustments, payment of debts and liabilities incurred in construction and reconstruction of highways and bridges, the cost of construction, reconstruction, maintenance and repair of public highways and bridges under the direction and supervision of a state department having jurisdiction over such highways and bridges and expense for state enforcement of traffic laws and shall not be diverted for any purpose, provided that these limitations shall not apply to revenue from an excise tax on motor vehicles imposed in lieu of personal property tax.
Michigan	Mich. Const. Art. IX Sec. 9	<p>All specific taxes, except general sales and use taxes and regulatory fees, imposed directly or indirectly on fuels sold or used to propel motor vehicles upon highways and to propel aircraft and on registered motor vehicles and aircraft shall, after the payment of necessary collection expenses, be used exclusively for transportation purposes as set forth in this section.</p> <p>Not less than 90 percent of the specific taxes, except general sales and use taxes and regulatory fees, imposed directly or indirectly on fuels sold or used to propel motor vehicles upon highways and on registered motor vehicles shall, after the payment of necessary collection expenses, be used exclusively for the transportation purposes of planning, administering, constructing, reconstructing, financing, and maintaining state, county, city, and village roads, streets, and bridges designed primarily for the use of motor vehicles using tires, and reasonable appurtenances to those state, county, city, and village roads, streets, and bridges.</p> <p>The balance, if any, of the specific taxes, except general sales and use taxes and regulatory fees, imposed directly or indirectly on fuels sold or used to propel motor vehicles upon highways and on registered motor vehicles, after the payment of necessary collection expenses; 100 percent of the specific taxes, except general sales and use taxes and regulatory fees, imposed directly or indirectly on fuels sold or used to propel aircraft and on registered aircraft, after the payment of necessary collection expenses; and not more than 25 percent of the general sales taxes, imposed directly or indirectly on fuels sold to propel motor vehicles upon highways, on the sale of motor vehicles, and on the sale of the parts and accessories of motor vehicles, after the payment of necessary collection expenses; shall be used exclusively for the transportation purposes of comprehensive transportation purposes as defined by law.</p> <p>The legislature may authorize the incurrence of indebtedness and the issuance of obligations pledging the taxes allocated or authorized to be allocated by this section, which obligations shall not be construed to be evidences of state indebtedness under this constitution.</p>

State	Location in Constitution	Text
Minnesota	Minn. Const. Art. XIV Sec. 9-10	<p>Sec. 9. Taxation of motor vehicles. The legislature by law may tax motor vehicles using the public streets and highways on a more onerous basis than other personal property. Any such tax on motor vehicles shall be in lieu of all other taxes thereon, except wheelage taxes imposed by political subdivisions solely for highway purposes. The legislature may impose this tax on motor vehicles of companies paying taxes under the gross earnings system of taxation notwithstanding that earnings from the vehicles may be included in the earnings on which gross earnings taxes are computed. The proceeds of the tax shall be paid into the highway user tax distribution fund. The law may exempt from taxation any motor vehicle owned by a nonresident of the state properly licensed in another state and transiently or temporarily using the streets and highways of the state.</p> <p>Sec. 10. Taxation of motor fuel. The legislature may levy an excise tax on any means or substance used for propelling vehicles on the public highways of this state or on the business of selling it. The proceeds of the tax shall be paid into the highway user tax distribution fund.</p>
Missouri	Missouri Const. Art. IV Sec 30(d)	<p>1. No state revenues derived from highway users which are to be allocated, distributed or deposited in the state road fund pursuant to either section 30(a) or section 30(b) shall be diverted from the highway purposes and uses specified in subsection 1 of section 30(b). No state revenues derived from highway users which are to be allocated, distributed or deposited in the state road bond fund pursuant to subdivision (3) of subsection 2 of section 30(b) shall be diverted from the highway purposes and uses specified in said subdivision (3).</p>
Montana	Montana Const. Art. VIII Sec. 6(1)	<p>(1) Revenue from gross vehicle weight fees and excise and license taxes (except general sales and use taxes) on gasoline, fuel, and other energy sources used to propel vehicles on public highways shall be used as authorized by the legislature, after deduction of statutory refunds and adjustments, solely for:</p> <p>(a) Payment of obligations incurred for construction, reconstruction, repair, operation, and maintenance of public highways, streets, roads, and bridges.</p> <p>(b) Payment of county, city, and town obligations on streets, roads, and bridges.</p> <p>(c) Enforcement of highway safety, driver education, tourist promotion, and administrative collection costs.</p> <p>(2) Such revenue may be appropriated for other purposes by a three-fifths vote of the members of each house of the legislature.</p>
Nevada	Nevada Const. Art. IX Sec. 5	<p>Proceeds from fees for licensing and registration of motor vehicles and excise taxes on fuel reserved for construction, maintenance and repair of public highways; exception. The proceeds from the imposition of any license or registration fee and other charge with respect to the operation of any motor vehicle upon any public highway in this State and the proceeds from the imposition of any excise tax on gasoline or other motor vehicle fuel shall, except costs of administration, be used exclusively for the construction, maintenance, and repair of the public highways of this State. The provisions of this section do not apply to the proceeds of any tax imposed upon motor vehicles by the Legislature in lieu of an ad valorem property tax.</p>

State	Location in Constitution	Text
New Hampshire	New Hampshire Const. Part 2nd Art. VI(a)	All revenue in excess of the necessary cost of collection and administration accruing to the state from registration fees, operators' licenses, gasoline road tolls or any other special charges or taxes with respect to the operation of motor vehicles or the sale or consumption of motor vehicle fuels shall be appropriated and used exclusively for the construction, reconstruction and maintenance of public highways within this state, including the supervision of traffic thereon and payment of the interest and principal of obligations incurred for said purposes; and no part of such revenues shall, by transfer of funds or otherwise, be diverted to any other purpose whatsoever.
North Dakota	North Dakota Const. Art. 10 Sec. 11	Revenue from gasoline and other motor fuel excise and license taxation, motor vehicle registration and license taxes, except revenue from aviation gasoline and unclaimed aviation motor fuel refunds and other aviation motor fuel excise and license taxation used by aircraft, after deduction of cost of administration and collection authorized by legislative appropriation only, and statutory refunds, shall be appropriated and used solely for construction, reconstruction, repair and maintenance of public highways, and the payment of obligations incurred in the construction, reconstruction, repair and maintenance of public highways.
Ohio	Ohio Const. Art. XII Sec. 5a	No moneys derived from fees, excises, or license taxes relating to registration, operation, or use of vehicles on public highways, or to fuels used for propelling such vehicles, shall be expended for other than costs of administering such laws, statutory refunds and adjustments provided therein, payment of highway obligations, costs for construction, reconstruction, maintenance and repair of public highways and bridges and other statutory highway purposes, expense of state enforcement of traffic laws, and expenditures authorized for hospitalization of indigent persons injured in motor vehicle accidents on the public highways.
Oregon	Oregon Const. Art. IX Sec. 3a	<p>(1) Except as provided in subsection (2) of this section, revenue from the following shall be used exclusively for the construction, reconstruction, improvement, repair, maintenance, operation and use of public highways, roads, streets and roadside rest areas in this state:</p> <p>(a) Any tax levied on, with respect to, or measured by the storage, withdrawal, use, sale, distribution, importation or receipt of motor vehicle fuel or any other product used for the propulsion of motor vehicles; and</p> <p>(b) Any tax or excise levied on the ownership, operation or use of motor vehicles.</p> <p>(2) Revenues described in subsection (1) of this section:</p> <p>(a) May also be used for the cost of administration and any refunds or credits authorized by law.</p> <p>(b) May also be used for the retirement of bonds for which such revenues have been pledged.</p> <p>(c) If from levies under paragraph (b) of subsection (1) of this section on campers, motor homes, travel trailers, snowmobiles, or like vehicles, may also be used for the acquisition, development, maintenance or care of parks or recreation areas.</p> <p>(d) If from levies under paragraph (b) of subsection (1) of this section on vehicles used or held out for use for commercial purposes, may also be used for enforcement of commercial vehicle weight, size, load, conformation and equipment regulation.</p>

State	Location in Constitution	Text
Pennsylvania	Penn. Const. Art. VIII Sec. 11a	(a) All proceeds from gasoline and other motor fuel excise taxes, motor vehicle registration fees and license taxes, operators' license fees and other excise taxes imposed on products used in motor transportation after providing therefrom for (a) cost of administration and collection, (b) payment of obligations incurred in the construction and reconstruction of public highways and bridges shall be appropriated by the General Assembly to agencies of the State or political subdivisions thereof; and used solely for construction, reconstruction, maintenance and repair of and safety on public highways and bridges and costs and expenses incident thereto, and for the payment of obligations incurred for such purposes, and shall not be diverted by transfer or otherwise to any other purpose, except that loans may be made by the State from the proceeds of such taxes and fees for a single period not exceeding eight months, but no such loan shall be made within the period of one year from any preceding loan, and every loan made in any fiscal year shall be repayable within one month after the beginning of the next fiscal year.
South Dakota	South Dakota Const. Art. XI Sec. 8	Object of tax to be stated--Use of vehicle and fuel taxes. No tax shall be levied except in pursuance of a law, which shall distinctly state the object of the same, to which the tax only shall be applied, and the proceeds from the imposition of any license, registration fee, or other charge with respect to the operation of any motor vehicle upon any public highways in this state and the proceeds from the imposition of any excise tax on gasoline or other liquid motor fuel except costs of administration and except the tax imposed upon gasoline or other liquid motor fuel not used to propel a motor vehicle over or upon public highways of this state shall be used exclusively for the maintenance, construction and supervision of highways and bridges of this state.
Texas	Tex. Const. Art. VIII Sec. 7-a	Subject to legislative appropriation, allocation and direction, all net revenues remaining after payment of all refunds allowed by law and expenses of collection derived from motor vehicle registration fees, and all taxes, except gross production and ad valorem taxes, on motor fuels and lubricants used to propel motor vehicles over public roadways, shall be used for the sole purpose of acquiring rights-of-way, constructing, maintaining, and policing such public roadways, and for the administration of such laws as may be prescribed by the Legislature pertaining to the supervision of traffic and safety on such roads; and for the payment of the principal and interest on county and road district bonds or warrants voted or issued prior to January 2, 1939, and declared eligible prior to January 2, 1945, for payment out of the County and Road District Highway Fund under existing law; provided, however, that one-fourth (1/4) of such net revenue from the motor fuel tax shall be allocated to the Available School Fund; and, provided, however, that the net revenue derived by counties from motor vehicle registration fees shall never be less than the maximum amounts allowed to be retained by each County and the percentage allowed to be retained by each County under the laws in effect on January 1, 1945. Nothing contained herein shall be construed as authorizing the pledging of the State's credit for any purpose.

State	Location in Constitution	Text
Utah	Utah Const. Art. XIII Sec. 5	<p>Proceeds from fees, taxes, and other charges related to the operation of motor vehicles on public highways and proceeds from an excise tax on liquid motor fuel used to propel those motor vehicles shall be used for:</p> <ul style="list-style-type: none"> (a) statutory refunds and adjustments and costs of collection and administration; (b) the construction, maintenance, and repair of State and local roads, including payment for property taken for or damaged by rights-of-way and for associated administrative costs; (c) driver education; (d) enforcement of state motor vehicle and traffic laws; and (e) the payment of the principal of and interest on any obligation of the State or a city or county, issued for any of the purposes set forth in Subsection (6)(b) and to which any of the fees, taxes, or other charges described in this Subsection (6) have been pledged, including any paid to the State or a city or county, as provided by statute.
Washington	Wash. Const. Art. II Sec. 40	<p>All fees collected by the State of Washington as license fees for motor vehicles and all excise taxes collected by the State of Washington on the sale, distribution or use of motor vehicle fuel and all other state revenue intended to be used for highway purposes, shall be paid into the state treasury and placed in a special fund to be used exclusively for highway purposes. Such highway purposes shall be construed to include the following:</p> <ul style="list-style-type: none"> (a) The necessary operating, engineering and legal expenses connected with the administration of public highways, county roads and city streets; (b) The construction, reconstruction, maintenance, repair, and betterment of public highways, county roads, bridges and city streets; including the cost and expense of <ul style="list-style-type: none"> (1) acquisition of rights-of-way, (2) installing, maintaining and operating traffic signs and signal lights, (3) policing by the state of public highways, (4) operation of movable span bridges, (5) operation of ferries which are a part of any public highway, county road, or city street; (c) The payment or refunding of any obligation of the State of Washington, or any political subdivision thereof, for which any of the revenues described in section 1 may have been legally pledged prior to the effective date of this act; (d) Refunds authorized by law for taxes paid on motor vehicle fuels; (e) The cost of collection of any revenues described in this section: <p>Provided, That this section shall not be construed to include revenue from general or special taxes or excises not levied primarily for highway purposes, or apply to vehicle operator's license fees or any excise tax imposed on motor vehicles or the use thereof in lieu of a property tax thereon, or fees for certificates of ownership of motor vehicles.</p> <p><i>Note: The final provision of the section which excludes revenue from general or special taxes not primarily for highway purposes has been construed rather broadly, allowing taxes which apply to vehicles to stand even when the revenue does not go to highways, provided the tax is not specifically targeted at vehicles</i></p>

State	Location in Constitution	Text
West Virginia	West Virginia Const. Art. VI Sec. 52	Revenue from gasoline and other motor fuel excise and license taxation, motor vehicle registration and license taxes, and all other revenue derived from motor vehicles or motor fuels shall, after deduction of statutory refunds and cost of administration and collection authorized by legislative appropriation, be appropriated and used solely for construction, reconstruction, repair and maintenance of public highways, and also the payment of the interest and principal on all road bonds heretofore issued or which may be hereafter issued for the construction, reconstruction or improvement of public highways, and the payment of obligations incurred in the construction, reconstruction, repair and maintenance of public highways.
Wisconsin	Wisconsin Const. Art. VIII Sec. 11	All funds collected by the state from any taxes or fees levied or imposed for the licensing of motor vehicle operators, for the titling, licensing, or registration of motor vehicles, for motor vehicle fuel, or for the use of roadways, highways, or bridges, and from taxes and fees levied or imposed for aircraft, airline property, or aviation fuel or for railroads or railroad property shall be deposited only into the transportation fund or with a trustee for the benefit of the department of transportation or the holders of transportation-related revenue bonds, except for collections from taxes or fees in existence on December 31, 2010, that were not being deposited in the transportation fund on that date. None of the funds collected or received by the state from any source and deposited into the transportation fund shall be lapsed, further transferred, or appropriated to any program that is not directly administered by the department of transportation in furtherance of the department's responsibility for the planning, promotion, and protection of all transportation systems in the state except for programs for which there was an appropriation from the transportation fund on December 31, 2010. In this section, the term "motor vehicle" does not include any all-terrain vehicles, snowmobiles, or watercraft.
Wyoming	Wyoming Const. Art. XV Sec. 16	No moneys derived from fees, excises, or license taxes levied by the state and exclusive of registration fees and licenses or excise taxes imposed by a county or municipality, relating to registration, operation or use of vehicles on public highways, streets or alleys, or to fuels used for propelling such vehicles, shall be expended for other than cost of administering such laws, statutory refunds and adjustments allowed therein, payment of highway obligations, costs for construction, reconstruction, maintenance and repair of public highways, county roads, bridges, and streets, alleys and bridges in cities and towns, and expense of enforcing state traffic laws.

2.2.3. Transit Case Study: Financing Statutes in the Texas Triangle

To determine if the research teams' findings matched reality, the team reviewed the formative constitutional, statutory, and regulatory provisions for funding transit in Texas. What emerged was a complex myriad of sub-sections of the Texas Transportation Code (TTC), specific to singular transit agencies, that make financing transit challenging at best and prohibitive at worst.

First and foremost in Texas is the prohibition within the Texas State Constitution on using revenues from motor vehicle registration fees and taxes on motor fuels and lubricants for anything other than highways; Article VIII, Section 7-a states:

USE OF REVENUES FROM MOTOR VEHICLE REGISTRATION FEES AND TAXES ON MOTOR FUELS AND LUBRICANTS. Subject to legislative appropriation, allocation and direction, all net revenues remaining after payment of all refunds allowed by law and expenses of collection derived from motor vehicle registration fees, and all taxes, except gross production and ad valorem taxes, on motor fuels and lubricants used to propel motor vehicles over public roadways, *shall be used for the sole purpose of acquiring rights-of-way, constructing, maintaining, and policing such public roadways, and for the administration of such laws as may be prescribed by the Legislature pertaining to the supervision of traffic and safety on such roads; and for the payment of the principal and interest on county and road district bonds or warrants voted or issued prior to January 2, 1939, and declared eligible prior to January 2, 1945, for payment out of the County and Road District Highway Fund under existing law*; provided, however, that one-fourth (1/4) of such net revenue from the motor fuel tax shall be allocated to the Available School Fund; and, provided, however, that the net revenue derived by counties from motor vehicle registration fees shall never be less than the maximum amounts allowed to be retained by each County and the percentage allowed to be retained by each County under the laws in effect on January 1, 1945. Nothing contained herein shall be construed as authorizing the pledging of the State's credit for any purpose.

This, in essence, ties the hands of the state DOT and local cities, counties and transit agencies in being able to maximize federal gasoline taxes by using the 80% match of federal funds provided with state-raised funds.

In addition, most states are prevented from enacting local and specific legislation that applies selectively to specific jurisdictions. For example, Article III, Section 56 of the Texas Constitution prohibits the legislature from enacting local and special legislation; i.e. it cannot explicitly make legislation that applies selectively to specific jurisdictions. However, the state of the practice has shown that legislators have historically circumvented these provisions using a technique called “bracketing,” in which they set ostensibly germane requirements such as population and date of creation, with the effect of create laws that do apply only to specific jurisdictions. Bracketing specifically creates classes of people or places as subject to legislation, in such a way as to make the legislation apply only in selected areas or to selected people. In effect, it circumvents restrictions against special legislation by using germane factors to define an affected class as a pretext for legislating in a particular, ostensibly forbidden area. Use of bracketing over long periods has resulted in a patchwork of policies varying by jurisdiction, reducing consistency and making cross-jurisdictional cooperation more difficult.

In transportation, this practice has been used to restrict the activities that transit agencies can conduct and, some would argue, stymie efficient multimodal transportation options. The Texas Triangle, for example, has eight separate areas within code governing transit agencies created before specific dates with specific population numbers, which restrict activities and funding streams for these agencies.

Beyond the many general justifications for prohibiting special legislation—in terms of facilitating consistency while discouraging vote trading and discrimination—bracketing presents other issues. The specified class may no longer apply as intended if changes in population occur. For example, the past thirty years have seen the rise of megaregions—a development perhaps unforeseen by the legislators of years past—and thus bracketing may impact the ability to effectively manage congestion and mobility options for megaregions. Alternately, new areas and populations may

become subject to such legislation due to changing demographics. Even carefully crafted bracketed legislation can create ambiguity about who or what it affects.

Part of the problem may be a lack of substantial interest in litigating these issues. Special treatment of individual classes and locales can frequently benefit those classes and areas. The harms of this sort of legislation are anticipated to be disbursed more widely, by those falling outside the bracketed areas. Also harmed are those who would benefit from a megaregional planning perspective, one promoting conformity between jurisdictions. In these cases, there may also be issues of standing.

Special legislation prohibitions have the potential to foster the sort of conformity necessary to facilitate multi-jurisdictional transportation planning.

To give a concrete example, within the Texas Triangle the practice of bracketing has specifically and substantially affected Texas transit policy by setting different rules for different municipal transit authorities. For example, Chapter 451 of the TTC sets specific policies for Capital Metro, the transit agency serving Austin and the surrounding areas. However, the text does not mention “Capital Metro” or “Austin” specifically. Instead, it uses the classification of a “transit agency confirmed before July 1, 1985 and with a population less than 850,000.”⁴

Texas has a long history of bracketing in legislation, and the Texas Supreme Court has weighed in on the issue, saying that a law is not prohibited “merely because it only applies in a limited geographic area.”⁵ However, the legislation “must be broad enough to include a substantial class and must be based on characteristics legitimately distinguishing such class from others with respect to the public purpose sought to be accomplished by the proposed legislation.”⁶

⁴ Tex. Trans. Code § 451.061 (d-1). The language of the statute seems to suggest that once Austin’s population exceeds 850,000, it will no longer be in effect. This threshold was not reached in the 2010 census but almost certainly will be in 2020.

⁵ See *Maple Run at Austin Mun. Util. Dist. V. Monaghan*, 932 S.W.2d 941, 945 (Tex. 1996).

⁶ *Id.*

While the Texas Supreme Court has sometimes given force to the special legislation clause of the Texas constitution, many statutes remain in full force despite a lack of compliance with these standards, often because no one has attempted to litigate them. The aforementioned example of Capital Metro is just one of many bracketed provisions that may not pass constitutional muster.

As noted, within TTC are 10 different types of special districts and mass transportation districts, and a high-speed rail compact that can be utilized to fund, construct, maintain, and operate transit (light rail, heavy rail, bus, and other) within freight right-of-way, on dedicated right-of-way, and within the traditional highway right-of-way activities. These include:

- Freight Rail Districts (FRD) (Chapter 171)
- Rural Rail Transportation Districts (RRTD) (Chapter 172)
- Intermunicipal Commuter Rail Districts (ICRD) (Chapter 173)
- Commuter Rail Districts (CRD) (Chapter 174)
- Regional Mobility Authorities (RMA) (Chapter 370)
- Metropolitan Rapid Transit Authorities (MRTA) (Chapter 451)
- Regional Transportation Authorities (RTA) (Chapter 452)
- Municipal Transit Departments (MTD) (Chapter 453)
- Municipal Mass Transportation Systems (MMTS) (Chapter 454)
- Southern High Speed Rail Compact (Chapter 462)

Table 2.2 shows the main transit type entities typology, including their political and taxing authority, composition and structure, authority to partner with other entities, and other key elements that could be utilized to create multi-modal megaregion mobility options. Table 2.3 shows the composition of these agencies, with the counties, service areas, and MPOs that are affiliated.⁷

⁷ Accessed from:

<https://www.dart.org/about/dartreferencebookmar17.pdf>
<http://www.viainfo.net/about-via/> and <https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/60011.pdf>
http://www.viainfo.net/wp-content/uploads/2017/08/2016_ComprehensiveAnnualFinancialReport.pdf
http://www.viainfo.net/wp-content/uploads/2017/08/2016_ComprehensiveAnnualFinancialReport.pdf
https://www.capmetro.org/service_maps/service_area.aspx
<https://www.ridemetro.org/MetroPDFs/FinancialAuditInformation/Budgets/FY18-Business-Plan-and-Budget.pdf>
<https://www.regionalserviceplanning.org/coordination/presentations/02-11-2016/tdp-city-of-waco.pdf>

In addition, TTC also provides a certain amount of authority to the Texas Department of Transportation (TxDOT), as seen in sections on:

- Powers and Duties of Department of Transportation Regarding Mass Transportation
- State Financing of Public Transportation

The complexity of financing public transportation can even be seen in the area in which public transportation is housed within the TTC: The State Financing of Public Transportation at *Transportation Title 6: Roadways*, Subtitle K Mass Transportation Chapter 456 State Financing of Public Transportation. There are no titles within TTC for generalized public transportation, mass transportation, or transit. Chapter 456 provides the following definition of public transportation:

“transportation of passengers and their hand-carried packages or baggage on a regular or continuing basis by means of surface or water, including fixed guideway or underground transportation or transit, other than aircraft, taxicab, ambulance, or emergency vehicle.”

The TxDOT Transportation Commission administers the formula and the discretionary programs that are provided within the chapter (456.002). Each public transportation program (except passenger rail) is a grant program for public transportation projects. In looking at the agencies are created within the Texas Triangle megaregion, and their formation powers the largest transit agencies with more than 2 million boardings per year are the following:

- Capital Metro in the Austin region (formed under Chapter 451 as a MRTA in 1985)
- DART in the Dallas Fort Worth region (formed under Chapter 452 as an RTA in 1973)
- Trinity Metro in Fort Worth (formed under Chapter 452 as an RTA in 1983)
- Metro in the Houston region (formed under Chapter 451 as a MRTA in 1978)
- VIA in the San Antonio region (formed under Chapter 451 in 1977)

Table 2.2: Composition, Structure, and Taxation Ability of Various Transportation Authorities in Texas

Type of Authority	Political Authority	Taxation and Bonding Authority	Board Composition & Structure	Ability to Partner
Intermunicipal Commuter Rail Districts (ICRD)	Can be created to provide commuter rail service between two municipalities that have populations of > 450,000 and are located no farther than 100 miles apart §173.051 (a) (1) and (2). The counties and municipalities can also create a district through passage of resolutions (§174.051 (b)). Under §174.052 adjacent counties and municipalities with a population > 18,000 and public entities can also join a CRD. They can exercise power of eminent domain to acquire land and interest in land, or use of airspace (§173.159). A district may acquire, construct, develop, own, operate, and maintain intermodal and commuter rail facilities, or intercity or other types of passenger rail services, inside, or connect political subdivisions in, the district (§173.201).	Applies only to a local government (not a school district) that is a member of the ICRD can impose ad valorem taxes on real property (173.256 (a)). The ICRD may enter into an interlocal contract for financing of transportation infrastructure in the territory of the local governments within in (§173.256 (b)). Can establish transportation infrastructure zones, where local governments will pay to the ICRD an amount based on increased ad valorem tax collections attributable to the increased property values in the zone as a result of the project (§173.256 (d)). A district shall establish and maintain reasonable and nondiscriminatory rates or other compensation for the use of the facilities of the system acquired, constructed, operated, regulated, or maintained by the district (§173.207).	§173.102 sets out that board will be comprised of two public directors (appointed by the Texas Transportation Commission), elected director from the MPO of a creating municipality, one director by each creating municipality, director any authority joining, one director for each county with a creating municipality, member appointed by a public entity and a director appointed by all other directors to represent municipalities within the ICRD.	Can accept grants and loans from the U.S., state, other agencies and political subdivisions, public or private corporations or other persons (§173.253). Can contract with other political subdivision to provide commuter rail transportation §173.209

Type of Authority	Political Authority	Taxation and Bonding Authority	Board Composition & Structure	Ability to Partner
Commuter Rail Districts (CRD)	A CRD may be created to provide commuter rail service to counties along the Texas-Mexico border (174.051). Has the power of eminent domain §174.158. 174.201 may acquire, construct, own, operate, and maintain intermodal and commuter rail facilities to connect political subdivisions in the district.	Can enter into joint ownership agreements §174.154. Can issue revenue bonds §174.301. Can impose tax except property tax §174.35. Cannot impose a tax or increase a tax rate unless it is passed by voters (§174.352). Can set a sales and use tax at rates of 1) ¼ of 1%; (2) ½ of 1%; (3) ¾ of 1%; or (4) 1% (§174.353 (a)).	Board is composed of five directors appointed as: One director appointed by country judge, one director appointed by each county commissioner (§174.102)	§174.253 a CRD can make agreements and contracts with the U.S. government the state and its agencies and political sub-divisions and other persons/entities. §174.154 a CRD can make agreements with other entities for joint use of facilities.
Regional Mobility Authorities (RMA)	A RMA is a transportation entity that can be created by a municipality or a county, a political subdivision of a county, or adjoining counties, and can include a rail district, nonprofit corporation and a transportation cooperation for the purposes of constructing, maintaining and operating transportation projects in a region of the state (§370.031 (a)). Section 370.0315 allows the addition and withdrawal of counties to an RMA.	Section 370.033 authorizes RMAs to study, evaluate, design, finance, acquire, construct, maintain, repair, and operate transportation projects, individually or as one or more systems, provided that a transportation project that is subject to Subpart C, 23 C.F.R. Part 450. AN RMA can borrow money from or enter into a loan agreement or other arrangement with the state infrastructure bank, the department, the commission, or any other public or private entity. Under §370.033 (a) (3) (14). Section 370.111 authorizes RMAs to issue bonds. RMAs can impose tolls, fares, fees or other charges for use of is projects (§370.172)	The board of directors consists of representatives of each county in which a transportation project of the authority is/or is proposed to be located. The commissioners' court of each county initially forming an RMA shall appoint at least two directors to the board. Additional directors may be appointed at initial formation by agreement of counties to ensure fair representation of political subdivisions, provided that the number of directors must be an odd number. For counties added to an RMA, the RMA shall appoint at least one director. The governor shall appoint one director who serves as presiding officer and shall appoint an additional director if necessary to maintain an odd number of directors (§370.251).	Under §370.033 (f) a RMA can operate, plan, repair, construct a project for another entity, located within its jurisdiction or in an adjacent county. An authority, may agree with another entity to acquire a transportation project or system from that entity and to assume any debts, obligations, and liabilities (§370.033 (q)). An RMA cannot provide mass transit in the service area of another transit provider that has taxing authority and implemented it anywhere in the service area, unless the service is provided under an agreement §370.033 (o).

<p>Metropolitan Rapid Transit Authorities (MRTA)</p>	<p>These can be created for a municipality that has a population of more than 60,000 and is located in a metropolitan area that has a population of more than 1.9 million and is not part of a territory of another authority (§451.001).</p> <p>The MRTA is public political entity. The exercise of powers authorized to include powers in relation to a station or terminal complex, and those for a public purpose or public necessity (§451.052).</p> <p>Section 451.059 MRTA has eminent domain authority. Under §451.522 where a municipality annexes territory this becomes part of the MRTA. In addition municipalities can be added by election §451.552. The board of an MRTA can choose to not add any annexed new territory if it will create a financial hardship because the territory is not contiguous or could impair the imposition of sales and use taxes (§451.554).</p>	<p>These MRTA can impose any kind of tax except an ad valorem property tax (§451.401). Taxes cannot be imposed or created without voter approval. The board of can impose a sales and use tax at percentages set out in §451.404 (1) through (4). The maximum tax rate, including rate increase, when combined with the rates of all sales and use taxes imposed by other subdivisions who have territory in the MRTA cannot exceed 2% in any location in the MRTA. an election by an MRTA to adopt/increase a sales and tax has no effect if (1) approved on the same day when a municipality county with territory in an MRTA adopts/creates additional sales and use tax and (2) the combined rates of all the sales and use taxes > two percent (§451.405 (b)). Under §451.414 the MRTA board shall set a motor vehicle emission tax rate as a percentage of maximum tax rate for vehicle classes according to a table set out at §451.414 (a). Section 451.205 in a station or terminal complex with regional economic development facilities the MRTA can increase its sales and use tax, as long as it does not exceed rates set in §451.404 and §451.405 to plan, acquire, establish, develop and construct these facilities and terminal complex if at an election this receives a majority. 451.206 (a) (a) Revenue received from the sales and use tax at the rate equal to the amount of the rate increase adopted</p>	<p>Board can employ a general manager (§451.101). Can establish an advisory committee (§451.109)</p> <p>§451.501 (a) the board is composed of five members plus number of additional members subsection (c)-(e). (b) A MRTA created by an alternate municipality is composed of five members.</p> <p>(c) If less than 50% of principal county's population excluding population of principal municipality, reside in the MRTA, the board has two additional members.</p> <p>(d) If >50% but < than 75% of the principal county's population, excluding the population of the principal municipality, reside in the MRTA, the board has four additional members.</p> <p>(e) If >75% of the principal county's population excluding the principal municipalities population, reside in the MRTA the board has six additional members. §451.501 (a) (1) The five board members are appointed by the principal municipality. Except if the principal municipality has a population of more than 1.9 million, and then the 5 board members are appointed by the mayor of the principal municipality.</p>	<p>Can contract with any person and may accept a grant or loan from any person (§451.055 (a) and (b)). Under §451.203 a station or terminal complex can include regional economic development facilities.</p>
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Type of Authority	Political Authority	Taxation and Bonding Authority	Board Composition & Structure	Ability to Partner
		under this subchapter may be used only to finance a project described in the ballot proposition. MRTA can issue bonds §451.351		
Regional Transportation Authorities (RTA)	<p>§452.056(a)(1): RTA may plan, acquire/construct/develop/own/operate/maintain a transportation system in territory of the RTA including a political subdivisions territory; (2) contract with a municipality, county, other political subdivision to provide public transportation services outside the RTA; and (3) lease all or a part of the public transportation system to, or contract for the operation of all or a part of the public transportation system by, an operator. Has eminent domain powers (§452.059).</p> <p>The governing body of a principal municipality, the commissioners court of the county of the principal municipality, or both of these bodies, from each sub region of a metropolitan area, may agree to create, a RTA to provide public/complementary transport services in the area (§452.701).</p>	<p>An RTA can enter into agreements with municipalities to distribute its revenues (§452.055(c). Can impose fares, tolls, charges, rents, for the use of the public transportation system sufficient to produce revenue, and tax revenue and grants received by the authority (§452.061). RTA's can issue bonds (§452.351), under sub section (b) a bond which is pledged by sales and use tax must be authorized by the voters. A sub-regional authority that is created by a contiguous municipality cannot issue a bond unless it is approved by the City's governing body (c). RTA's can set a sales and use tax at rates of 1) $\frac{1}{4}$ of 1%; (2) $\frac{1}{2}$ of 1%; (3) $\frac{3}{4}$ of 1%; or (4) 1% (§452.401(a)). Increases must be confirmed at an election (§452.402). A RTA cannot adopt a sales and use tax that when combined with rates of sales and uses taxes or other political sub-divisions exceeds 2% in any location in the RTA (§452.403)</p>	<p>Executive committee is composed of 11 members: (1) 7 members from the membership of the sub regional board in the sub region that has a principal municipality with a population of more than 1.1 million according to the most recent federal decennial census; (2) 4 members from the membership of the sub regional board in the sub region that has no principal municipality with population > 1.1 million according to the most recent federal decennial census. (§452.502)</p>	<p>An RTA may contract with any person. (b) A RTA may accept a grant or loan from any person. (c) RTA may enter one or more agreements with any municipality included in the area of the authority for the distribution of the authority's revenues (§452.055). A RTA may contract with a municipality, county, or other political subdivision for the RTA to provide public transportation services outside the RTA; and lease all/part of the public transportation system or contract for the operation of all/part of the system by an operator (§452.056 (a) (2-3).</p>

Type of Authority	Political Authority	Taxation and Bonding Authority	Board Composition & Structure	Ability to Partner
Municipal Transit Departments (MTD) 453	For municipalities that do not fall under provisions of MRTA's and RTAs. MTDs are created through resolution §453.051 for cities that operates a mass transit system has a population > 50,000 and is in public interest.	§453.056 the municipality can transfer property, employees, and municipal funds to the MTD. MTDs can set a sales and use tax at rates of 1) ¼ of 1%; (2) ½ of 1% (453.401(c)). A MTD cannot adopt a sales and use tax that when combined with rates of sales and uses taxes or other political sub-divisions exceeds 2% in any location in the MTD (§453.402). Can set fares, tolls, charges, rents for use of system (§453.104). Can issue bonds (§453.302) for development of a system or maintenance of streets in municipality.	The board consists of members of the municipality that creates the MTD. Presiding officers of the municipality are the presiding officers of this board (§453.053).	Can partner with utilities and other carriers for joint use of property or establishment of through routes, joint fares of transfers of passengers (§453.405).
Municipal Mass Transportation Systems (MMTS) 454	A municipality may own, purchase, construct, improve, extend, and operate a mass transportation system to carry passengers for hire within the municipality, its suburbs, and adjacent areas (§454.001(a))	A municipality may accept a grant or loan from the United States to finance all/part of acquiring, constructing, or improving a facility or equipment for use (§454.003). Fares charged by a MMTS may be set according to a zone system or other classification that the municipality determines to be reasonable (§454.006). A MMTS through its municipality can issue bonds (§454.021 and 454.029 for additional bond issuance)	A board of trustees of a mass transportation system must consist of three to nine members, one of whom must be the mayor of the municipality (§454.004 (b)).	Under §454.026, MMTS can grant a franchise to operate the system or its property.

Type of Authority	Political Authority	Taxation and Bonding Authority	Board Composition & Structure	Ability to Partner
Southern High Speed Rail Compact (SHSR) 462	The governor is authorized to execute a compact with Mississippi, Louisiana, and Alabama (§462.002).	Each party state agrees that its legislature may in its discretion make available and pay to the commission funds for the establishment and operation of the commission (Article V). Article VI The commission shall study the feasibility of providing interstate rapid rail transit service between the party states. The commission may: acquire by gift, grant, or otherwise from local, state, federal, or private sources money or property to be used for the business of the commission. Hold and dispose of money or property acquired and cooperate with public or private groups having an interest in interstate rapid rail transit service.	Membership consists of: the governor of each party state. In each state 1 representative from (A) Mississippi Energy and Transportation Board (B) Louisiana DOT (C) Alabama Department of Energy, (D) Texas DOT; and 5 citizens from each party state, appointed by the governor. The citizens appointed in Texas must reside in a federally designated high-speed rail corridor.	Article 3 provides that party states can create a joint agency known as the Southern High-Speed Rail Commission.

Table 2.3: Texas Triangle Transit Agencies' Service Areas and MPO Affiliations

Agency	Counties/Cities Served	Service Area	Population Served	Affiliated MPO	MPO Counties/ Major Cities
VIA	Bexar County, Alamo Heights, Balcones Heights, Castle Hills, China Grove, Converse, Elmendorf, Kirby, Leon Valley, Olmos Park, Shavano Park, St. Hedwig and Terrell Hills.	1226.07 square miles	1,758,210	Alamo	Bexar, Comal, Guadalupe, Kendall
DART	Addison, Carrollton, Cockrell Hill, Dallas, Farmers Branch, Garland, Glenn heights, Highland Park, Irving, Plano, Richardson, Rowlett, and University Park	700 square miles	2,264,117	NCTCOG	Tarrant, Dallas, Johnson, Ellis, McLennan, Bell, Wise, Hunt, Rockwall, Palo Pinto, Parker, Kaufman, Erath, Hood, Somerville, Navarro
CAPMETRO	Austin, Jonestown, Lago Vista, Leander, Manor, Point Venture, San Leanna, and portions of Travis County and Williamson County	535 square miles	1,163,204	CAMPO	Bastrop, Burnett, Caldwell, Hays, Travis, Williamson
METRO	Houston, Bellaire, Bunker Hill Village, El Lago, Hedwig Village, Hillshire Village, Humble, Hunters Creek Village, Katy, Missouri City, Piney Point Village, Spring Valley Village, Southside Place, Taylor Lake Village, West University Place, and unincorporated areas with Harris County, Fort Bend County	1,303	3,600,000	H-GAC	Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston, Harris, Liberty, Matagorda, Montgomery, Walker, Waller, Wharton
Brazos Transit District	Bryan/College Station, Dayton, Livingston, Nacogdoches, Liberty, Cleveland, Lufkin, Brenham, Navasota, Hearne, Madisonville, and Caldwell Montgomery Brazos, Burleson, Grimes, Leon, Madison, Robertson, Washington counties	13,000 square miles	1,235,930	Bryan/College Station, Brazos Valley Council of Governments	Brazos, Bryan, College Station

Agency	Counties/Cities Served	Service Area	Population Served	Affiliated MPO	MPO Counties/ Major Cities
Hill Country Transit District (regional transit system)	Killeen, Temple, Belton, Copperas Cove, Harker Heights, Cameron, Gatesville, Goldthwaite, Hamilton, Hico, Kingsland, Lampasas, Llano, Mason, Rockdale and San Saba and Coryell, Hamilton, Lampasas, Milam, Mills, Mason, Llano, Bell and San Saba Counties	9000 square miles		Killeen-Temple MPO	
Grand Connection Transit	Grand Prairie	81 square miles, but 100 square miles if including extraterritorial jurisdictions	On-demand service for those 60 years or older.		
Arlington Handitrain	Arlington		On-demand service for elderly and persons with disabilities	NCTCOG	
Denton County Transportation Authority (chapter 460)	Denton and Collin Counties, cities of Denton, Highland Village, and Lewisville	953 square miles	814,560	NCTCOG	
Waco Transit	Bellmead, Hewitt, Lacy-Lakeview, Robinson, Waco and Woodway, McLennan County	94.05 square miles and rural areas of McLennan County are serviced by McLennan Country Rural Transit District, created in 2015	155,152	Waco	McLennan
Transit agencies not within an MPO but still within the Texas Triangle are found in Wilson, Gonzales, Lavaca, Colorado, Fayette, Lee, Milam, Washington, Burleson, Grimes, Robertson, and Milam.					

The analysis of the Texas Triangle shows the complexity in looking at how Texas could develop a megaregional or even interregional multimodal transportation approach. A complete rewrite of the transportation code would be necessary, concurrent with a change in the current bar within the Texas constitution on using state gasoline funds for anything other than creation of highways. In addition, cities, counties, and MPOs would also need clarification within Texas local government code on the roles, responsibilities, and financing options to create a truly multimodal interregional transportation network.

2.3. Policy Impacts

Looking at the overall state of American transportation funding, several takeaways emerge. Overall, public spending on transportation has declined as a percentage of gross domestic product (GDP) over the past half century. In this same time period, total vehicle miles traveled has steadily increased for all modes. Highway user fees make up the largest proportion of government transportation funding, though a substantial amount of general revenue funding is used as well, especially at the state and local level. Governments spend most of their money on highway infrastructure, with the remainder going mostly to transit, freight rail, and aviation.

As a percentage of GDP, transportation spending declined by about 50% between 1960 and 2014 (CBO, 2015). In this same time period, vehicle miles traveled per capita has more than doubled (BTS, not dated). This reduction in spending can be traced substantially to a decrease in fuel tax revenues. While the nominal federal fuel tax has increased by a factor of 4 in the past 60 years, inflation has completely negated the increase, and the inflation-adjusted modern rate is actually smaller than the 1960 rate (Murse, 2018). In this period, average vehicle fuel economy has also improved dramatically, so governments collect less tax for every mile of wear placed on the roads.

Declining gas tax rates at the federal and state levels have had several effects. First, transportation funding has decreased overall. Second, governmental entities willing to redirect other funding to transportation, i.e., states and localities, have borne an increased share of transportation infrastructure costs. In addition, the low gasoline tax reduces the user cost of driving below the societal cost of maintaining the necessary infrastructure. This becomes even more apparent when

comparing American fuel taxes to those of other OECD (Organization for Economic Co-operation and Development) countries: The mean U.S. gasoline tax is the second lowest of all OECD countries, and less than a fifth of the median tax among them.⁸ Lower overall transportation funding, caused in large part by declining user fee revenues, has resulted in inadequate maintenance of critical infrastructure such as bridges.

In addition to not fully reflecting infrastructure costs of driving, the current fuel tax fails to impose on users a variety of external costs: environmental damage, congestion, and accident costs, if properly incorporated, would increase the fuel tax on gasoline to an average of \$1.63/gallon in the United States as of 2010.⁹ Even viewed in conjunction with registration and other user fees, total vehicle user fees do not accurately reflect to the consumer the societal cost of driving; as a result, the low fees are effectively subsidizing economically inefficient transportation choices.

This subsidy is greater than the difference between current user fees and the actual economic cost of driving, however, because highways are not exclusively funded by user fees. Governments, especially at the state and local levels, use other revenue sources to fund highway infrastructure. These subsidies, taken together, result in a cost of driving that is substantially lower than its actual aggregate economic cost.

The effect of the highway subsidy on other forms of transportation depends on the level of subsidy for other forms of transportation; if transit subsidies match highway subsidies, then prices might motivate efficient choices between the two (although even mode-agnostic transportation subsidies will have other independent effects). While the federal government does subsidize transit, it spends far more subsidizing highways.

One explanation for the gap in subsidy between highways and transit could be that far more people choose automobiles over transit for their day-to-day transportation needs. While this model of government spending can certainly be defended normatively, it results in backward-looking transportation solutions. By distributing transportation subsidies on the basis of current

⁸ Kyle Pomerleau, *How High are Other Nations' Gas Taxes?*, Tax Foundation (2015).

⁹ Parry, I, Heine, D., Lis, E., and Li, S., *Getting Energy Prices Right: From Principle To Practice* 139, International Monetary Fund (2014).

preferences, governments will naturally continue to fund existing systems and preferences regardless of whether those systems provide the best long-term transportation results, rather than allocating it such a way as to shape future preferences in accordance with the most efficient long-term transportation models.

In aggregate, American transportation investment favors automobile transportation infrastructure above all. Even so, overall investment has fallen such that critical infrastructure has not been maintained to optimum levels. At both the state and federal level, declining real per capita income from the fuel tax has contributed to the gap in funding. This gap has been closed in part by funding from other sources at the state and local level, but not the federal level. As a result, the current picture of American transportation expenditure is underinvestment, mitigated in part by state and local non-user funding.

2.4 The Future of American Transportation

The 21st century presents fundamental changes to American transportation needs. New technologies, changing demographics, and shifts in culture have resulted in a radically different transportation environment than that of fifty years ago. Ridesharing, autonomous vehicles, telecommuting, and even the advent of the smartphone have had or will have a dramatic effect on the options available to travelers. Larger, more urbanized populations living in economically interconnected megaregions present new issues with congestion and new opportunities for effective mass transit. Younger generations increasingly desire shorter commutes, walkable spaces, and environmentally friendly alternatives. To address these developments, transportation policy needs flexibility in terms of multimodality, financing, and cooperation.

2.4.1 Technological Developments and Disruptions

Possibly the most visible developments of the 21st century have been technological. Widespread smartphone adoption has made ridesharing services like Uber a real option for people in urban areas. More flexible than the old taxicab system, ridesharing opens up the ability to queue a ride in advance, and can be effectively coordinated to provide more effective coverage. The smartphone has also allowed for the use of mapping software, which allows travelers to estimate timetables

and coordinate even multimodal trips. While ridesharing has been successful in mitigating the need for parking in dense urban areas, and made car-free urban lifestyles more viable, the technology does not significantly reduce congestion on its own and has not yet reached price levels where it can be a widely adopted alternative to automobile ownership.

Autonomous vehicles technology has the potential to make ridesharing a serious alternative by substantially reducing its cost. The transition to autonomous vehicles is no longer the realm of speculation—major auto manufacturers predict introducing these vehicles to the market within the next decade (Kockelman et al, 2016). The widespread adoption of autonomous vehicles will have several effects on our transportation network. Initially, they are expected to increase congestion by reducing the attention required to drive, and thus resulting in increased usage of road space. Once these vehicles can operate without any human input, traffic burdens will also likely increase as a result of people using their vehicles remotely for tasks such as pick-ups, drop-offs, and parking.

With proper integration of ridesharing, autonomous vehicles, and transit improvements, the congestion impact of autonomous vehicles could be reduced. If a combination of walking, cycling, ridesharing, and transit can provide a time and cost-effective alternative to car ownership, per capita automobile usage could be mitigated.

Telecommuting, a technological and cultural development, can also help mitigate future congestion resulting from ownership and usage of automobiles. By allowing some workers to skip commutes a day or more a week, telecommuting can reduce the daily burden on busy roadways.

Current transportation policy has only just begun to account for these new technologies. At the federal level, the SELF DRIVE Act recently passed to guide the introduction of autonomous vehicle technology in the states. States and localities have begun passing laws regarding ridesharing companies, though this legislation rarely anticipates the rapidly approaching entry of driverless app-based taxi companies.

2.4.2 Changing Demographics

The 20th century saw massive increases in the population of the United States, coupled with increasing urbanization. So far, the 21st century has continued this trend. The American population today is more than double its mid-20th century levels. The percentage of population living in urban areas has increased from 64% to 80.7%. The larger metropolitan areas have seen the most growth, in many places blurring together into vast and interconnected megaregions. In terms of overall number, the change has been far more dramatic: more than twice as many Americans live in urban areas, from less than a hundred million to more than 250 million urban residents. Of these, over 150 million, and more than half of the total U.S. population, live in urbanized areas with over 500,000 people.¹⁰ In many cases, the newer growing cities have not developed adequate transit options, and the older cities have struggled with urban flight facilitating urban sprawl and automobile-dependent transportation.

The changes shown in the census mirror the megaregion theory when compared with the identified American megaregions. Depending on the model used, 60 to 80% of Americans live within an identified megaregion, and these megaregions also account for a disproportionate amount of the total GDP. In spite of this, megaregions occupy less than a quarter of the country's overall land area.

In light of this trend of demographic intensification, different transportation priorities take shape. In addition to the primarily urban-rural distinction of the previous century, modern transportation policy must account for increasingly frequent commutes within megaregional areas. While Eisenhower's interstate highway system created an excellent framework for somewhat infrequent intercity travel, in many areas the interstate system needs to be expanded upon to accommodate regular intercity commutes and provide mobility choices.

¹⁰ Census Bureau, United States Summary: 2010 Population and Housing Unit Counts.

2.4.3 Cultural Developments

Though densely intertwined with technological, demographic, and economic factors, an explanation of changing transportation demands would not be complete without addressing changing cultural preferences. In the 21st century, Americans are increasingly concerned with how transportation fits into their lifestyle.

As automobiles have become an increasingly mature technology, younger generations have begun to buck the 20th century trend of viewing the car as a cultural icon (Fisher, 2015). While many still view cars as symbols of status and independence, increasingly Americans have begun to desire walkability. This desire stems from several factors: concerns about staying healthy, desire to live in a more cohesive community within their city, and a lower tolerance for struggles with congestion (Davis and Ditzik, 2012). Smartphones, used for games, communication, or music, also can make a walking commute more productive than a drive.

Americans have also become increasingly concerned about their environmental impact. Cars, as a substantial source of carbon emissions, are often seen as part of the problem. While alternatives to gasoline-fueled vehicles are available, much of the power they use still originates from production methods that cause this sort of pollution. Walking, cycling, and transit all work to mitigate these issues, and as a result rank higher in the preferences of many of today's Americans.

2.5 Addressing Changes in American Transportation Needs

So far, transportation policy has not developed quickly enough to keep pace with changing circumstances. However, some positive changes have been made in the past decade to adjust to changing circumstances. FAST, the most recent federal transportation bill, made some important changes by facilitating public-private partnerships, tolling, and congestion pricing.

To address the transportation challenges of the 21st century, governments will have to address issues of congestion, urban sprawl, and equity. The best way to do this at the federal level is with grant programs, which can be applied flexibly to various modes, and are compatible with various financing schemes. At both the federal and state level, alterations must be made to create greater

parity between transportation modes, which means distributing subsidies away from highways or increasing vehicle user taxes to compensate. At the state level, legislatures should consider amending constitutional restrictions on the fuel tax. States and localities must also be prepared to make long-term investments predicated on improving transportation outcomes in the future, rather than focusing on hand-to-mouth expansions that only temporarily mitigate congestion. This will likely need to include more responsive congestion pricing schemes, and investment in transit corridors designed to encourage sustainable growth rather than greater sprawl.

As Hunn and Loftus-Otway noted in 2017,

“In order to make the most of any funding granted to megaregion development, the money must be strategically apportioned to incentivize cooperation and strategic long-term infrastructure investments. Some amount of funding could be set aside in a “Multijurisdictional Project Grant” specifically for use on projects undertaken by at least two MPOs, considering factors such as distance covered and awarding bonuses to efforts that incorporate more MPOs and other state and local governments. These grants could be apportioned to MPOs based on factors including population, but could be useable only for cooperative projects. The choice of which projects to undertake, and with whom, should be left to MPO discretion. A small portion of the funding could also be specifically reserved to directly fund planning meetings and symposia between multiple MPOs and state and local governments.

Existing grants could be altered to improve the capability of MPOs to address megaregional transportation needs; for example TIGER grants, by virtue of the executive discretion they allow, have raised concerns about political favoritism¹¹ often at the expense of backing the most innovative projects. As a result, MPOs tend to prefer the vast majority of funding to be distributed by formulas rather than discretionary grants.¹² However, for certain programs looking to test out innovative new ideas, a limited duration grant program such as the Sustainable Communities Program can be highly effective.¹³ To be effective, such a program should support a specific technology, technique, or idea for a

¹¹ Telephone interviews with North Central Texas Council of Governments (July 18, 2017); Delaware Valley Regional Planning Commission (August 11, 2017); and Maricopa Association of Governments (July 28, 2017).

¹² See *Id.*

¹³ Telephone Interview with Delaware Valley Regional Planning Commission (August 11, 2017).

limited duration, and after running its course should be transitioned to formula grants as necessary.

In addition to revising grant structures, Congress could increase MPOs' authority to work outside their individual jurisdictions. Currently, MPO spending is restricted to the urbanized area they represent.¹⁴ Combined with a specific multijurisdictional funding stream, relaxing this restriction would encourage MPOs to build transportation improvements through areas between their jurisdictions without necessarily needing the permission and cooperation of every county and municipality along the way.

¹⁴ Telephone interview with North Central Texas Council of Governments (July 18, 2017).

Chapter 3. Models of Finance Outside of the U.S.

To give context to the transportation policy of the United States, this project examined the transportation policies of Germany and China. These countries were chosen because they are large, industrialized, and have more significant public transit networks than the United States. Germany is also relevant because, like the United States, it delegates significant authority to state governments.

3.1 China's Transportation Development and Planning

The beginning of modern transportation in China was marked by China Merchants Group's purchase of China's first steam-powered boats in 1872, lagging more than 65 years behind the West. China's transportation development not only started late, but was also plagued by slow progress due to upheavals like the Cultural Revolution. Before Reform and Opening-Up in 1978, China's railway in operation was only 51,700 km, and total highway mileage was only 890,200 km. However, after Reform and Opening-Up, in just 28 years, China's operational railway mileage increased 149%, whereas highway mileage increased 388%. Today, China's railway in operation has reached 127,000 km, with high-speed railways accounting for 25,000 km, more than the rest of the world combined.

This rapid expansion in infrastructure is in part a response to rising demand for roadways and public transportation associated with population growth and urbanization. From 1978 to 2016, China's population increased from 956.2 million to 1.4 billion, and urbanization rate increased from 18% to 56.1%. In addition, as real income per capita more than quadrupled between 1980 and 2010, the total number of vehicles in China increased more than twentyfold, arriving at 105.78 million in 2011. Rapid urbanization, combined with increasing vehicle ownership, put tremendous pressure on the government to grow its infrastructure and public transportation network quickly to serve the ever-rising need for mobility. This development incurred significant costs, resulting in significant government debt.

3.1.1 Multimodal Transportation

Within urbanized areas, bus service is the most widely chosen transit option. In 2016, buses accounted for 58% of all passenger traffic (Table 3.1). On average, bus service is still the most common mode of public transportation for two reasons: first, rail transit requires high upfront investment, and is thus primarily provided in major cities within each province; secondly, bus service is convenient because bus-stop density is relatively high. Across the nation, 12% of all bus routes have stops that are 300 meters apart, and 60% have stops located about 500 to 800 meters apart. However, to combat traffic congestion, the Chinese government has expanded the high-speed rail and subway systems. In 2016 alone, more than 13 new metro lines were put into operation. In addition, more passengers choose subway as intervals between departures times have steadily fallen. For instance, during peak hours, Guangzhou City metro line 3's interval between departure time is only 118 seconds (China Urban Rail Transit Association, 2017).

Table 3.1: 2016 Modal Usage in Urbanized Areas in China

2016 Nationwide Commercial Transportation	# of Passengers (billions)	%	Increase from 2015
Buses (including BRT)	74.535	58.00	-2.60
Taxi	37.735	29.36	-4.90
Rail	16.151	12.57	-15.40
Ferry	0.094	0.07	-7.20
Total	128.515		

Source: Adapted from Ministry of Transport for PRC: Exhibit 15 (2017)

Looking outside of urbanized areas and taking into consideration of rural towns and villages, which often lack the funding sources and national attention necessary to advance infrastructure, bus is by far the most common mode of transportation across China, even though railway is growing rapidly (Table 3.2).

Table 3.2: 2016 Modal Usage across China

2016 Nationwide Commercial Transportation	# of Passengers (billions)	%	Increase from 2015
Rail	2.814	14.81%	11%
Roads	15.428	81.19%	-4.7%
Waterway	0.272	1.43%	0.6%
Air	0.488	2.57%	11.8%
Total	19.002		

Source: Adapted from Ministry of Transport for the PRC Exhibit 8 (2017)

3.1.2 Roads

Transportation planning in China is highly centralized and closely coordinated between multiple levels of government. The Central Party Committee (CPC) establishes a mid-term to long-term vision for infrastructure development, which the National Development and Reform Commission (NDRC) organizes and develops into overarching development plans. Ministries and commissions at provincial and local levels propose specific plans that are aligned with national agenda and submit to NDRC for approval. To ensure that the CPC's guidance is carried out throughout the chain of command, CPC members not only serve as the heads of national agencies but also serve as co-heads of local agencies.

To understand how road system development responsibility is allocated among various levels of government, it's important to look at the classification of roads first. Roads in China are classified both technically and administratively. Technically, roads are categorized into expressway, Class I, Class II, Class III, and Class IV (Figure 3.1). Administratively, roads are identified as national, provincial, county, township, accommodation, or village. National governments are typically directly involved only in planning for national and provincial roads, which account only for roughly 11% of all roads.

Road Classification	Administration Activities	Assignment of Responsibilities
National roads	Planning	Performed by the Ministry of Transport (MOT) in conjunction with relevant central government departments and in consultation with provincial governments; plans are submitted to the State Council for approval.
	Construction, maintenance, and management	Performed by provincial communications departments (PCDs).
Provincial roads	Planning	Performed by PCDs jointly with provincial government departments in consultation with lower-level local government entities; plans are submitted to provincial governments for approval and filed with MOT.
	Construction, maintenance, and management	Performed by PCDs.
County roads	Planning	Performed by the prefecture-level government; plans are submitted to provincial governments for approval.
	Construction, maintenance, and management	Performed by county-level governments.
Township roads	Planning	Performed by county-level road authorities; plans are submitted to county governments for approval.
	Construction, maintenance, and management	Performed by township governments.

Figure 3.1: Road System Development Responsibility in the People's Republic of China

Source: Asian Development Bank (2012)

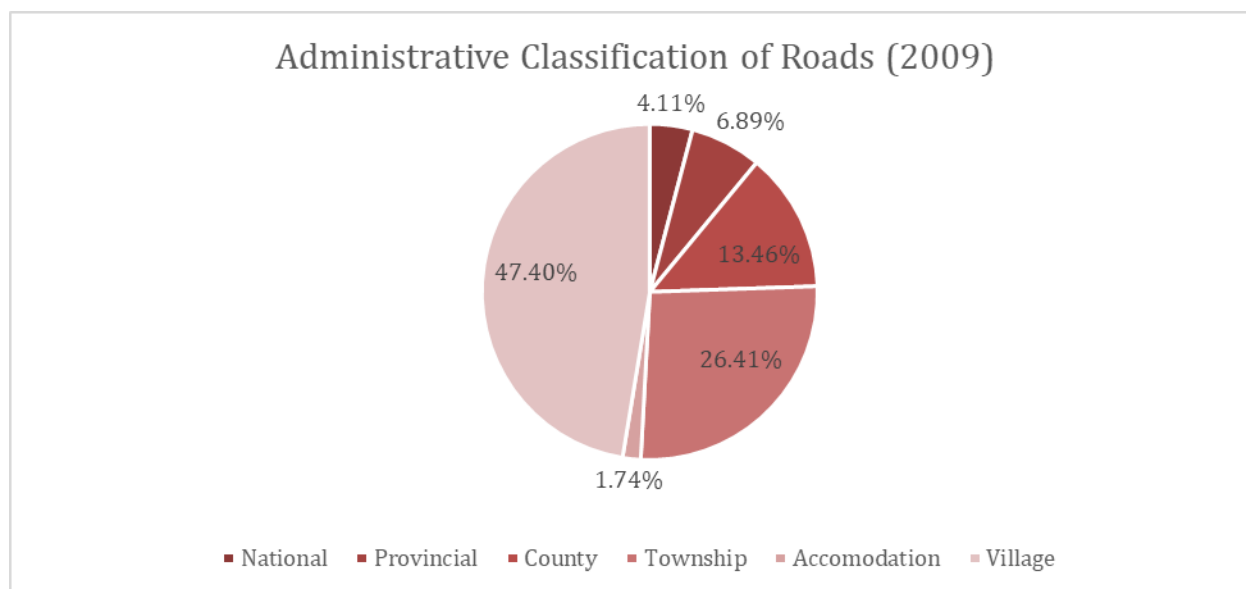


Figure 3.2: Administrative Classification of Roads in the People's Republic of China

Source: Asian Development Bank (2012 (2))

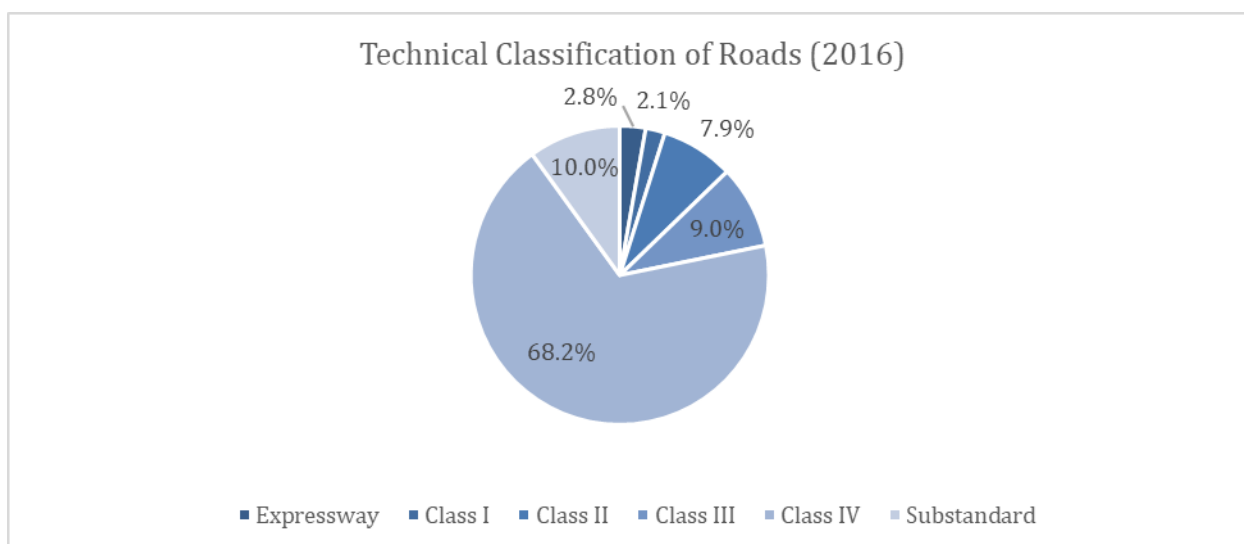


Figure 3.3: Technical Classification of Roads in the People's Republic of China

Source: Ministry of Transport of the PRC (2016)

In 2016, government expenditure for transportation reached 1049.87 billion RMB (\$159.51 billion USD), of which the central government accounted for 7.74%, or 81.21 billion RMB (\$12.34 billion), and local governments 92.26%, or 968.66 billion RMB (\$147.17 billion). The central government contributes funding through revenues from the vehicle purchase tax, which are primarily used for national or provincial roads (not village roads) and budgetary appropriations, which account for only a small share of funding for road construction. State bond revenues are included in budgetary appropriations because the central government issues local bonds on behalf of local governments, which then construct roads and assume the liability for repaying the principal and interest.

Most of the funds for road construction and maintenance were raised by local governments through general taxes, tolls, and loans. Local governments enjoy 100% of revenue from taxes like city maintenance tax and property tax, while sharing 50:50 with central government for the value added tax (VAT), and 40:60 for corporate and individual income tax. In the past, local governments obtained funding and secure bank loans with toll charges and fees such as a road maintenance fee. However, the Fuel Tax Reform in 2008 abolished six road charges and replaced local fees with increased central taxes, such as the vehicle purchase tax and motor fuel tax. The purpose of canceling local fees is to eliminate inconsistency across the nation. Prior to the reform, toll charges and the road maintenance fees differed in level among provinces. Some vehicle owners took

advantage of this loophole by registering in cities with lower fees, then bringing their cars back and driving in the more expensive cities that they actually live in, leading to an inequitable distribution of highway user fees. The fuel tax reform replaced these varying fees with a formal tax that is transparent and consistent. However, as these steady streams of revenues were removed, provincial and local governments now face increasing difficulty in meeting road construction and maintenance needs. In addition, the central government had also laid out plans for eliminating tolls on all Class II roads that were financed by debt. So far, 26 provinces had already eliminated tolls on those Class II loan repayment toll roads. Raising sufficient funds for new road expansion while meeting debt obligation and maintenance needs would inevitably be one of the greatest challenges that the Chinese government must confront.

3.1.3 Rail

According to a report published by the China Association of Communication Enterprise Management, in 2012 alone, the central government had approved 27 rail infrastructure development projects in 24 cities, requiring over 800 billion RMB (\$126.77 billion) in investment, of which the local governments covered 25 to 50% of the cost. The rest was primarily funded with bank loans. However, because the law forbids banks from directly giving out loans to government agencies, local governments would typically establish a wholly owned enterprise to secure bank loans. For instance, Beijing Infrastructure Investment Co., LTD, which leads almost all of Beijing's subway building, is controlled by a local government commission, known as the State-owned Assets Supervision and Administration Commission of People's Government of Beijing Municipality. These state-owned corporations may also issue debts, and local governments will help pay interest by transferring project-specific funds to these companies annually.

Heavy upfront investments coupled with low profit margins, due to low fare prices, make almost all rail routes in China unprofitable. On average, rail transit's internal rate of return is -2.5%. A few routes, such as Beijing line 4 and Shanghai line 1, have been able to profit because of a high volume of traffic generated by nearby transit options. For instance, because Shanghai line 1 is linked to the Shanghai train station, its daily passenger volume of 45,000 people per kilometer is much higher than the average 12,000 people per km.

A public-private partnership (PPP) is a widely sought alternative to debt financing for local governments. Beijing line 4, one of the only profitable rail routes in China, was China's first rail transit PPP project, and a classic example of successful PPP. The project was divided into part A and B. Part A, which included building the tunnel and stations, was handled by a subsidiary of the state-owned Beijing Infrastructure Investment Co., who invested 10.7 billion RMB (\$1.57 billion), covering roughly 70% of the total costs. Part B, which included building the trains and relevant signaling equipment, was handed to BJ MTR Corporation. The key to success was a reasonable allocation of risks to both parties, which were reduced through effective sharing mechanisms. For instance, the government allowed BJ MTR Corporation to request compensation or abandon the project if passenger volume is lower than estimated for three years. However, if volume is higher than expected, the government shares 50% of the ticket sales generated from the additional 10% of passenger volume. In terms of revenue from ticket sales, if actual revenue is lower than estimated, the government would compensate the private-sector partner entirely for the difference. If actual revenue is higher, however, company would need to share 70% of the additional profits with the government. This design allows a delicate balance of risks and profits between government and private capital.

3.2 Germany's Transportation Development and Planning

Germany is a federal republic like the United States. Transportation planning in Germany is much more centralized, however, with the federal government planning and funding roadway, rail, and waterway infrastructure. Federal transportation investment in Germany is divided fairly evenly between roads and railways, with 49.3% of the 2016–2030 projected funding going to roadways, 41.6% going to rail, and 9.1% to waterways (2030 Transport Infrastructure Plan, 2016).

The federal government is responsible for planning and funding federal roadway, rail, and waterway infrastructure, but in general it is up to states to construct and operate transportation infrastructure. The bulk of Germany's transportation money come from the federal purse. The German federal government plays a much stronger role in local transportation planning than its American counterpart does.

Germany imposes substantially higher user fees on motor vehicles than does the United States, though it does not have a dedicated highways fund. Instead, revenues from vehicle user taxes accrue directly to the general fund, from which they can be used to fund highways, transit, or other governmental functions. The federal government also makes tax transfers to state governments to fund state roadway construction and maintenance, in conjunction with state funds.

Every 10 to 15 years, the Federal Ministry of Transport Building and Urban Development creates the Federal Transport Infrastructure Plan (FTIP). This plan identifies federal road, railway, and water infrastructure projects that are calculated to be economically advantageous to the country. The federal government then prioritizes and funds these projects through five-year funding authorizations. While economic analyses are used to prioritize most projects, there is some evidence of political influence in project selection, particularly when it comes to investment in eastern parts of Germany over other areas.

The total level of funding provided by the most recent FTIP 2030 for the period from 2016 to 2030 is €269.6 billion (\$318.2 billion), of which roads account for 49.3%, railway accounts for 41.6%, and waterways account for 9.1% (Figure 3.4). Structural maintenance and replacement take precedence over upgrading and new construction; whereas maintenance and replacement across all three modes account for 52.52% of the budget, upgrading and new construction only account for at most 23.59%.

3.2.1 Germany's Road Network

Germany differentiates between federal, state, and municipal roads and highways. The federal trunk road network comprises around 13,000 km of federal motorways and around 39,000 km of federal highways. Most other highways and roads belong to the states, except for the road systems of major municipalities, for which said municipalities are responsible. The federation is responsible for maintaining and constructing federal highways. The states, on the other hand, have the responsibility of administering the federal highways within their territory, a task that they carry out under the supervision of the federation. This administrative responsibility includes setting up

and maintaining the agencies that administer federal highway construction and maintenance (Law Library of Congress, 2014).

	Total investment (in € bn)	Other investment (2016-2030)	Structural maintenance/ replacement (2016-2030)	Upgrading and new construction (2016 to 2030) (excluding structural maintenance/ replacement share)		Upgrading and new construction "Reserve" (as of 2031)
			Capital maintenance investment/investment in replacement infrastructure (incl. structural maintenance/replacement shares in combined upgrading projects)	Ongoing and definitely planned projects	New projects VB/VB-E	New projects VB/VB-E (with structural maintenance/ replacement share)
Federal trunk roads	132.8	12.0	67.0	15.8	18.3	19.6
Federal railway infrastructure	112.3	7.4	58.4	8.4	18.3	19.7
Federal waterways	24.5	2.2	16.2	0.9	1.8	3.5
All modes of transport	269.6	21.6	141.6	25.1	38.5	42.8

Figure 3.4: Germany's Investment in Transportation

Source: 2030 Transport Infrastructure Plan at 14 (2016)

3.2.2 Germany's Road Financing

Germany does not have a dedicated fund for building and maintaining highways. Federal highways are funded by the federation through a combination of general revenue and receipts from tolls imposed on truck traffic. The revenues from the German taxes on gasoline and motor vehicle registration accrue to the federation, but are not earmarked for highway maintenance or construction. The breakdown of federal revenue that may be used for road related purposes is as follows.

Germany has a highway user tax. The revenue from this is 2.6 times higher than government road spending in 2006 (Brookings Institute. 2009). In 2016 motor vehicle tax revenue exceeded €8.9 billion (\$9.4 billion) (OECD's Database on Policy Instruments for Environment). Gas is taxed at a significantly higher rate at €0.65 per liter (\$4.47/gallon) and diesel at €0.47 per liter (\$2.08/gallon), compared to the U.S. federal tax rate at \$0.184 and \$0.244 per gallon for gasoline

and diesel, respectively. In 2016, gasoline tax duty alone generated €15.9 billion (\$16.8 billion) in revenue, while diesel generated €20.8 billion (\$22 billion).¹⁵

Since FTIP 2030 allocates €132.8 billion (\$156.8 billion) investment in federal roads from 2016 to 2030, it follows that annual investment equals approximately €9.5 billion (\$11.2 billion). However, revenues from motor vehicle tax, gasoline tax, and diesel tax are 4.8 times higher. Although not all revenue from gasoline and diesel tax will be used for transportation purposes, this still stands in sharp contrast with the circumstances in U.S., where federal fuel tax receipt is less than its total expenditure on transportation.

Germany also has an HGV (heavy goods vehicle) tolling system introduced in 2005. Since 2011, the revenue generated by the HGV tolling scheme has been used exclusively for the federal trunk roads (federal trunk roads are comprised of federal motorways and federal highways). In 2017, a total of around €4.7 billion (\$5.6 billion USD) was available from this source (Federal Ministry of Transport and Digital Infrastructure, not dated). Currently, approximately 12,800 km of federal motorways and around 2,300 km of federal highways are tolled. The HGV toll was expanded to cover the approximately 39,000 km of federal highways as of July 1, 2018. Toll rates vary according to the pollutants the vehicles emit (Federal Ministry of Transport and Digital Infrastructure, not dated).

In 2015 a new infrastructure charge went into effect. Implementation of the Act on the Introduction of Infrastructure Charging, however, has been delayed due to the initiation of an infringement procedure by the European Commission. The infrastructure charge is expected to be levied on owners of passenger cars and motor homes registered in and outside Germany alike from 2019. Total annual revenue is forecast to be around €3.9 billion (\$4.6 billion), with vehicles registered in Germany accounting for around €3.2 billion (\$3.8 billion) and vehicles not registered in Germany accounting for around €700 million of this total (\$826.7 million). The price of the annual

¹⁵ Sources for data retrieved from: <https://www.eea.europa.eu/data-and-maps/indicators/fuel-prices-and-taxes/assessment-7> and <https://www.destatis.de/EN/FactsFigures/SocietyState/PublicFinanceTaxes/Taxes/ExciseDuties/Tables/MineralOil.html>

vignette for passenger cars will be calculated based on their engine capacity and environmental performance. The rate for motor homes will be calculated based on weight and will be €16 (\$18.9) for every 200-kilogram increment of total weight up to a cap of €130 (\$153.5)¹⁶ (Federal Ministry of Transport and Digital Infrastructure, not dated).

The German states receive major parts of their budgets through tax transfers from federal level (e.g., the vehicle taxes and part of the VAT). The tax levels and the proportions received by each state are decided at the federal level but need the consent of the assembly of federal states, the “Bundesrat” (Guhnemann, 2009).

¹⁶ *Exchange Rates* 2016: used the average rate on December 31, 2016 <https://www.poundsterlinglive.com/best-exchange-rates/euro-to-us-dollar-exchange-rate-on-2016-12-31> 2017: used the average rate on December 31, 2017 <https://www.poundsterlinglive.com/best-exchange-rates/euro-to-us-dollar-exchange-rate-on-2017-12-31>

Chapter 4. Policy Recommendations

As technology, culture, and demographics develop and change, American transportation policy must adapt, lest it become increasingly obsolete. The existing system does not sufficiently address congestion problems generated by the intensification of population into urban areas, particularly within megaregional agglomerations. Low user fees and general fund subsidies currently make driving the most economical choice for many commuters who, considering the external costs, would be better off using transit. This problem has compounded over time, with artificially decreased transit ridership discouraging additional transit investment that would, itself, make transit more efficient and attractive for prospective riders.

To correct the course of transportation spending, states and the federal government must increase user fees to account for the societal costs of road travel such as congestion and pollution. In addition, both state and federal governments must seek a more equitable balance of general revenue subsidies to create a more even playing field for competitive and efficient allocation of resources between modes. For the federal government, this will require creative usage of the spending and preemption powers granted by the constitution, accompanied by increases in spending. For states, municipalities, and MPOs, this will require careful balancing of user fees and subsidies to facilitate good long-term transportation investments while preventing the burden of additional costs being placed inequitably on the poorest Americans.

This section will discuss first in economic terms, then in legal terms, how best to implement transportation policy to achieve competitive parity between transportation modes in the 21st century. The conclusion will sum up how these recommendations will synergize with future needs and technologies. A sample draft bill at the federal level was developed to showcase how a megaregion grant program could be utilized to augment current transportation policy and provide options for multimodal mobility.

4.1 Change Economic Incentives

Rebalancing economic subsidies is the most important part of facilitating a more competitive passenger transportation network in America's growing megaregions. As described in Chapter 1,

the current fuel tax does not sufficiently internalize the costs of driving, leaving externalities like congestion and pollution. Subsidies from general funds further benefit highways beyond other modes of passenger transportation, providing additional effective subsidies for automobile users. These policy problems have been compounded by inflation, which has reduced the absolute value of the fuel tax, and by improvements in fuel efficiency, which has made the fuel tax less effective at reducing miles driven. To internalize the costs of driving as accurately as possible to those who create them, policymakers should supplement the fuel tax with additional user fees such as congestion taxes; doing so would incentivize more efficient usage of roadways, and greater consideration of transportation alternatives. Additional revenue generated from these taxes should then be applied competitively to projects aimed at reducing congestion and pollution.

4.2 Preempt State Constitutional Bars on Fuel Tax Spending

State restrictions on fuel tax expenditures are a significant impediment to flexibility in addressing transportation issues. Principally, these restrictions seem responsive: more driving means more demand for road maintenance and construction, and the fuel tax provides funding, which scales to demand. This closed system of road use and road funding may be internally consistent, but it fails to account for the variety of factors influencing road usage. The current model of restricted fuel taxes fails to account for the effects of other expenditures on road usage, as well as commuters' preferences.

One fundamental objective of fuel tax spending is to increase the capacity of road networks as transportation increases. But while additional miles driven shows additional roadway congestion, the demand it reflects is for transportation more generally. Though increasing the capacity of road networks is one way to increase supply of transportation, transit investment may in some situations be more effective at reducing roadway congestion in the long run. It may also be a better choice for improving environmental preservation, safety, or other important policy objectives.

Increased use of roadways does not mean that individual commuters prefer them to other alternatives, especially where no meaningful alternatives exist. If fuel tax can be considered a form of referendum-on-roadways, many commuter votes are outside their control. This places powerful

inertia on local governments to expand even an increasingly congested and labyrinthine road network using fuel tax distributions, rather than explore alternatives that would require them to tap other funding sources.

The federal government has substantial power to free counties and municipalities from state restrictions on expenditures. Preemption is the most powerful tool in the federal arsenal. An act of congress can explicitly or implicitly overrule state policy, and even state constitutional law. While lawmakers rarely include explicit preemption clauses, often federal legislation will have sweeping impact that conflicts with state law. Where the laws conflict, the federal law always wins.

Federal courts have final authority in determining whether laws conflict. However, these courts defer substantially to the determinations of the federal agencies that enact the policies in contention. To preempt state gas tax restrictions would most likely require a new law granting more power and flexibility to MPOs at the very least. In the context of a greater grant of spending flexibility to MPOs, USDOT could use its policymaking power to carve out exceptions to state fuel tax restrictions.

Because preemption of state law can be a contentious political issue, small, specific adjustments will be more achievable. Unlike nullifying every fuel-tax restriction in an act of Congress, a small carve-out for MPOs or organizations receiving federal funds would be politically possible. Such carve-outs would not require specific preemption language, and could be created by USDOT interpretation of even mildly broader grants of spending independence to such organizations.

Increased user fees could pay for all highway maintenance costs, and still allow transportation authorities to reserve fees that help offset congestion/environmental/accident costs by improving mobility elements such as transit infrastructure and sidewalks, which will to mitigate these costs over the long term.

Vehicle user fees are substantially higher in other developed countries. These high fees translate to greater revenues and result in more funding for highways and for transit. These fees also help to mitigate the costs of driving not reflected by the market cost of vehicles and fuel.

Environmental, congestion, and accident costs are imposed on others by commuters; by setting user fees equal to these costs and redistributing the revenue to public projects that mitigate them, the system will become more equitable.

In addition to an equity benefit, such a scheme would create an efficiency benefit. Because commuter prices will more accurately reflect the entire cost of each choice, consumers will choose the most efficient mode given their unique circumstances.

4.3 Incorporate Autonomous Vehicles into Public Transit Modes

Without parking requirements, personal or shared autonomous vehicles can make portions of trips in low-density areas where transit is not feasible, and transfer travelers seamlessly into and out of transit corridors.

Suburbanization has created areas that transit cannot easily reach. Ridesharing, and eventually autonomous vehicles, would allow travelers to make the less congested suburban leg of their route in an automobile, and switch to transit to traverse the congested urban core. Currently parking costs in time and space make these sorts of multimodal trips less viable.

Current projections of autonomous vehicles reducing transit demand use current user fee levels. More substantial user fees corresponding to the real price of driving would change this math considerably, increasing the long-term viability of transit.

4.4 Create Equity

While most Americans live in urbanized areas, a substantial minority are rural. Rural areas are unsuitable for transit, and commuters often travel long distances on a daily basis. However, the low-density environment also translates to lower external costs. With fewer vehicles per square mile, environmental and congestion costs are less severe. As a result, a fee scheme that charges primarily by the mile or the gallon will have a greater impact on rural Americans despite their relatively lower external impact.

To compensate, any user-fee program should make use of technology and policy to adjust fee structures based on the locale. Increased tolling on high traffic roads in urban areas would more accurately represent disparate costs than a statewide fuel-tax increase, which would disproportionately burden rural Americans.

4.5 Language for a Model Bill

This section contains a model bill as an example of how this project's policy recommendations could be incorporated into federal law. The bill the statutory layout of a grant program, which can be added to a federal transportation bill to create a competitive grant program for multi-jurisdictional cooperative projects in megaregion areas, and thus encourage multi-modal projects.

4.5.1 Competitive Megaregional Grant Draft Bill

The example bill focusses priorities at the federal level to encourage innovation in megaregions through a competitive megaregion grant that also preempts any bars on the use of local gas tax monies for non-highway expenditures. The draft bill would be a new section in 49 United States Code.

49 U.S. Code § ## - Competitive Megaregional Innovation Grants

- a) Purpose. This section gives The Secretary the ability to encourage innovation in megaregional transportation by providing grants for innovative projects aimed at addressing congestion, cost, and equity issues presented by the increasing economic connections between urban centers.
- b) General Authority
 - 1) Grants.—The Secretary may make grants under this section for
 - A) Capital Projects
 - B) Planning

C) operating costs of equipment and facilities for use in public transportation in an urbanized area

c) Program of Projects.—Each recipient of a grant shall

- 1) make available to the public information on amounts available to the recipient under this section;
- 2) develop, in consultation with interested parties, including private transportation providers, a proposed program of projects for activities to be financed;
- 3) publish a proposed program of projects in a way that affected individuals, private transportation providers, and local elected officials have the opportunity to examine the proposed program and submit comments on the proposed program and the performance of the recipient;
- 4) provide an opportunity for a public hearing in which to obtain the views of individuals on the proposed program of projects;
- 5) ensure that the proposed program of projects provides for the coordination of public transportation services assisted under section 5336 of this title with transportation services assisted from other United States Government sources;
- 6) consider comments and views received, especially those of private transportation providers, in preparing the final program of projects; and
- 7) make the final program of projects available to the public.

d) Grant Recipient Requirements. A recipient may receive a grant in a fiscal year only if—

- 1) the recipient, within the time the Secretary prescribes, submits a final program of projects prepared under subsection (b) of this section and a certification for that fiscal year that

the recipient (including a person receiving amounts from a Governor under this section)—

- A) has or will have the legal, financial, and technical capacity to carry out the program, including safety and security aspects of the program;
- B) has or will have satisfactory continuing control over the use of equipment and facilities;
- C) will maintain equipment and facilities in accordance with the recipient's transit asset management plan;
- D) in carrying out a procurement under this section, will comply with sections 5323 and 5325;
- E) has complied with subsection (b) of this section;
- F) has available and will provide the required amounts as provided by subsection (d) of this section;
- G) will comply with sections 5303 and 5304;
- H) has a locally developed process to solicit and consider public comment before raising a fare or carrying out a major reduction of transportation, and;
- I) the Secretary accepts the certification.

e) Cooperation Requirement

- 1) To receive a grant under this section, a recipient must apply jointly with at least one other recipient which
 - A) funded some amount of the project, and;
 - B) is outside the operational area of the first recipient's metropolitan planning organization.

- 2) To be eligible for a grant under this section, a project must
 - A) serve part of an urbanized area, and
 - B) serve part of another urbanized area not administered by the same Metropolitan Planning Organization, or
 - C) serve a non-urbanized area not administered by the same Metropolitan Planning Organization.

f) Preemption

- 1) Recipients may use non-federal matching funds granted under this section for projects of any type it permits, regardless of state laws regarding transportation expenditures which
 - A) restrict the mode of transportation resources may be spent on, or
 - B) delegate funding to specific modes of transportation.

g) Government Share of Costs.—

- 1) Capital projects.—A grant for a capital project under this section shall be for 80 percent of the net project cost of the project. The recipient may provide additional local matching amounts.
- 2) Operating expenses.—A grant for operating expenses under this section may not exceed 50 percent of the net project cost of the project.
- 3) Remaining costs.—Subject to paragraph (4), the remainder of the net project costs shall be provided—
 - A) in cash from non-Government sources other than revenues from providing public transportation services;
 - B) from revenues from the sale of advertising and concessions;

- C) from an undistributed cash surplus, a replacement or depreciation cash fund or reserve, or new capital;
 - D) from amounts appropriated or otherwise made available to a department or agency of the Government (other than the Department of Transportation) that are eligible to be expended for transportation; and
 - E) from amounts received under a service agreement with a State or local social service agency or private social service organization.
- 4) Use of certain funds.—For purposes of subparagraphs (D) and (E) of paragraph (3), the prohibitions on the use of funds for matching requirements under section 403(a)(5)(C)(vii) of the Social Security Act (42 U.S.C. 603(a)(5)(C)(vii)) shall not apply to Federal or State funds to be used for transportation purposes.
- h) Undertaking Projects in Advance.—
- 1) Payment.—The Secretary may pay the Government share of the net project cost to a State or local governmental authority that carries out any part of a project eligible under subparagraph (A) or (B) of subsection (a)(1) without the aid of amounts of the Government and according to all applicable procedures and requirements if
 - A) the recipient applies for the payment;
 - B) the Secretary approves the payment; and
 - C) before carrying out any part of the project, the Secretary approves the plans and specifications for the part in the same way as for other projects under this section.
 - D) Approval of application.—The Secretary may approve an application under paragraph (1) of this subsection only if an authorization for this section is in effect for the fiscal

- year to which the application applies. The Secretary may not approve an application if the payment will be more than—
- E) the recipient's expected apportionment under section 5336 of this title if the total amount authorized to be appropriated for the fiscal year to carry out this section is appropriated; less
 - F) the maximum amount of the apportionment that may be made available for projects for operating expenses under this section.
- 2) Financing costs.—
- A) In general.—The cost of carrying out part of a project includes the amount of interest earned and payable on bonds issued by the recipient to the extent proceeds of the bonds are expended in carrying out the part.
 - B) Limitation on the amount of interest.—The amount of interest allowed under this paragraph may not be more than the most favorable financing terms reasonably available for the project at the time of borrowing.
 - C) Certification.—The applicant shall certify, in a manner satisfactory to the Secretary, that the applicant has shown reasonable diligence in seeking the most favorable financing terms.
- i) Reviews, Audits, and Evaluations.—
- 1) Annual review.—
 - A) In general.—At least annually, the Secretary shall carry out, or require a recipient to have carried out independently, reviews and audits the Secretary considers appropriate to establish whether the recipient has carried out—

- (i) the activities proposed under subsection (d) of this section in a timely and effective way and can continue to do so; and
 - (ii) those activities and its certifications and has used amounts of the Government in the way required by law.
- B) Auditing procedures.—An audit of the use of amounts of the Government shall comply with the auditing procedures of the Comptroller General.
- 2) Triennial review.—At least once every 3 years, the Secretary shall review and evaluate completely the performance of a recipient in carrying out the recipient’s program, specifically referring to compliance with statutory and administrative requirements and the extent to which actual program activities are consistent with the activities proposed under subsection (c) of this section and the planning process required under sections 5303, 5304, and 5305 of this title. To the extent practicable, the Secretary shall coordinate such reviews with any related State or local reviews.
- 3) Actions resulting from review, audit, or evaluation.—The Secretary may take appropriate action consistent with a review, audit, and evaluation under this subsection, including making an appropriate adjustment in the amount of a grant or withdrawing the grant.

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