United States Government Accountability Office

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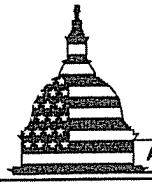
Report to the Subcommittee on Select Revenue Measures, Committee on Ways and Means, House of Representatives

January 2011

SURFACE FREIGHT TRANSPORTATION

A Comparison of the Costs of Road, Rail, and Waterways Freight Shipments That Are Not Passed on to Consumers



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Highlights

Highlights of GAO-11-134, a report to the Subcommittee on Select Revenue Measures, Committee on Ways and Means, House of Representatives

January 2011

SURFACE FREIGHT TRANSPORTATION

A Comparison of the Costs of Road, Rail, and Waterways Freight Shipments That Are Not Passed on to Consumers

Why GAO Did This Study

Road, rail, and waterway freight transportation is vital to the nation's economy. Government tax, regulatory, and infrastructure investment policies can affect the costs that shippers pass on to their customers. If government policy gives one mode a cost advantage over another, by, for example, not recouping all the costs of that mode's use of infrastructure, then shipping prices and customers' use of freight modes can be distorted, reducing the overall efficiency of the nation's economy.

As requested, this report (1) describes how government policies can affect competition and efficiency within the surface freight transportation sector, (2) determines what is known about the extent to which all costs are borne by surface freight customers, and (3) discusses the use of the findings when making future surface freight transportation policy. GAO reviewed the transportation literature and analyzed financial and technical data from the Department of Transportation (DOT), the Army Corps of Engineers (Corps), and the Environmental Protection Agency to make cross-modal comparisons at a national level. Data limitations and assumptions inherent in an aggregate national comparison are noted in the report.

GAO is not making recommendations in this report. GAO provided a draft of this report to DOT and the Corps. DOT provided technical suggestions and corrections, which were incorporated as appropriate. The Corps had no comments.

View GAO-11-134 or key components. For more information, contact Phillip R. Herr at (202) 512-2834 or herrp@gao.gov, or James R. White at (202) 512-9110 or whitej@gao.gov.

What GAO Found

Public spending, tax, and regulatory policies can promote economic efficiency in the freight transportation sector when they result in prices that reflect all marginal costs (the cost to society of one additional unit of service). These costs include private costs; public costs, such as infrastructure maintenance; and external costs, such as congestion, pollution, and accidents. When prices do not reflect all these costs, one mode may have a cost advantage over the others that distorts competition. As a consequence, the nation could devote more resources than needed to higher cost freight modes, an inefficient outcome that lowers economic well-being. Inefficient public investment decisions can result when all construction and other fixed costs are not passed on to the beneficiaries of that investment.

GAO's analysis shows that on average, additional freight service provided by trucks generated significantly more costs that are not passed on to consumers of that service than the same amount of freight service provided by either rail or water. GAO estimates that freight trucking costs that were not passed on to consumers were at least 6 times greater than rail costs and at least 9 times greater than waterways costs per million ton miles of freight transport. Most of these costs were external costs imposed on society. Marginal public infrastructure costs were significant only for trucking. Given limitations in the highway, rail, and waterway economic, financial, technical, and environmental data available for the analysis, GAO presents conservative estimates.

While freight costs are not fully passed on to consumers across all modes, a number of issues are important for decision makers to consider when proposing policy changes to align prices with marginal costs or reduce the difference between government fixed costs and revenues. Costs can vary widely based on the specific characteristics of an individual shipment, such as the geography and population density of the shipment's route, and the fuel-efficiency of the specific vehicle carrying it. Policy changes that align prices with marginal costs on a shipment-by-shipment basis would provide the greatest economic benefit, but precisely targeted policy changes can result in high administrative costs. By contrast, less targeted changes—such as charging user fees based on average costs, subsidizing more efficient alternatives, or broadly applying safety or emissions regulations—can change the overall distribution of freight across modes, but may provide fewer benefits. Although the current configuration of transportation infrastructure can limit the shifting of freight among modes, price changes can prompt other economic responses. Over the longer term, there is greater potential for responses that will shape the overall distribution and use of freight services.

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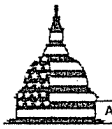
Abbreviations

BTS	Bureau of Transportation Statistics
CBO	Congressional Budget Office
CO2	carbon dioxide
Corps	U.S. Army Corps of Engineers
DOT	Department of Transportation
EPA	Environmental Protection Agency
FAF	Freight Analysis Framework
FHWA	Federal Highway Administration
NOX	nitrogen oxides
PM2.5	fine particulate matter with a diameter of 2.5 microns or less
Recovery Act	The American Recovery and Reinvestment Act of 2009
TIGER	Transportation Investment Generating Economic Recovery
TRB	Transportation Research Board
VMT	Vehicles Miles Traveled



United States Government Accountability Office
Washington, DC 20548

January 26, 2011

The Honorable Patrick J. Tiberi
Chairman
The Honorable Richard E. Neal
Ranking Member
Subcommittee on Select Revenue Measures
Committee on Ways and Means
House of Representatives

Freight shipments move over vast networks of highways, railroads, and waterways—often transported by more than one mode before reaching their final destination.[1] These networks connect and intersect, and play a critical role in providing the American public with the freight mobility needed to sustain national economic vitality and international competitiveness. According to the Department of Transportation (DOT), our surface freight transportation system connects an estimated 8 million businesses and 116 million households moving $12 trillion in goods.[2] The movement of goods involves both private and public interests from private trucking companies, railroads, and waterborne vessel operators to federal, state, and local governments. While the major freight railroad infrastructure is privately owned and operated, and port infrastructure is privately or publicly owned and operated, governments play a primary role in planning, building, maintaining, and operating highways and keeping our waterways navigable. This infrastructure is designed for multiple types of users, not just freight service providers. Governments collect taxes and tolls, which help offset transportation expenditures, but have a minimal role in the direct regulation of prices and rates. Governments also regulate various aspects of freight transportation across all modes, including pollution, safety, and, to a more limited degree, congestion.

How governments tax, regulate, and make investment decisions across modes could affect relative freight shipping prices. If government policy results in giving one mode of freight transportation a cost advantage over

[1]Pipelines are also a freight mode for transport of oil and gas, and can compete with other modes, but are not considered in the scope of this report.

[2]Department of Transportation, Bureau of Transportation Statistics, U.S. *Freight on the Move, Highlights from the 2007 Commodity Flow Survey Preliminary Data* (Washington, D.C.).

others—by, for example, ensuring that the wear and tear costs on infrastructure from users are fully recouped in one mode, but not in another mode—then shipping prices and choices made between alternative shipping options could be distorted. As a consequence, freight may be moved by a mode—for some portion or all of a trip—that imposes higher costs on the general public than might occur if such distortions did not exist. Because of your interest in the potential impact these policies can have on the freight transportation sector and beyond, you asked us to (1) describe how such policies can affect competition and efficiency within the surface freight transportation sector; (2) determine what is known about the extent to which costs are borne by surface freight users; and (3) discuss how our findings could be used when making future surface freight transportation policy.

To address these objectives, we reviewed reports issued by the Congressional Budget Office (CBO), DOT, the Transportation Research Board (TRB), and the Brookings Institution. We interviewed officials from DOT, the Army Corps of Engineers (Corps), the Environmental Protection Agency (EPA), representatives from professional research organizations and industry, members of academia, and individuals knowledgeable about freight transportation to obtain advice on economic concepts, appropriate and available data sources, methodological approaches, and views on government spending and regulatory policies. We obtained preliminary reviews about the scope, methodology, and analysis contained in this report from DOT, EPA, the Corps, as well as two members of the Comptroller General's Advisory Board—comprised of individuals with broad expertise in public policy.

We obtained, reviewed, and analyzed several datasets that can be used to estimate the revenues received from and costs imposed by users of the surface freight transportation system—federal, state, and local highways and roads; all classes of rail lines; and the inland, coastal, and Great Lakes waterways. Specifically, we identified data on federal, state, and local government revenues and expenditures on highways, railroads, and waterways from fiscal years 2000 through 2006, the time frame of Federal Highway Administration's (FHWA) ongoing highway cost allocation study. We also obtained available data on external costs associated with freight transport, including pollution, accidents, and congestion from EPA, related research from DOT, and the Texas Transportation Institute. We analyzed these data to estimate the costs at a national level that freight users impose on the public transportation infrastructure and society and the revenues collected to offset those costs. When multiple data sources

were available for our analyses, we explain why we selected one over another.

To assess the reliability of the financial and technical data collected and published by various federal government agencies—such as DOT's Highway Statistics Series; the Department of the Treasury's statistics on income, debt, and tax expenditures; the Corps' Waterborne Commerce Statistics; and Census Bureau statistics, among others—we reviewed relevant documentation about the agencies' data collection and quality assurance processes, talked with knowledgeable officials from the agencies about these data, and compared these data against other sources of published information to determine data consistency and reasonableness. We determined that the data were sufficiently reliable for the purposes of providing high-level cost and revenue estimates by mode.

We used federal statistical databases to obtain federal, state, and local data for estimating government costs and revenues. We also used nationwide data to estimate external costs. We recognize several important limitations in our high-level analysis, such as discrepancies in ton-mile estimates and difficulties in allocating costs between freight and nonfreight users. However, we explain how we deal with such limitations throughout the report by, for example, conducting sensitivity analyses to understand changes in costs with respect to ton-miles. Further, this analysis of high-level data is limited in the sense that it can obscure variations in state spending and revenue policies, and external costs by geographical location or by type of truck, locomotive, or marine engine. Moreover, this type of high-level analysis does not consider how modes compete with one another or the services or operations within each mode that compete with one another (e.g., rail long-haul with long-distance trucking); nor does it consider the complementary nature of freight modes, wherein, freight moved by rail or waterways may also involve trucks for at least some portion of its overall journey. Consequently, the results should be viewed as representing averages across all of the marginal shipments that were made under a wide variety of different conditions in a wide variety of locations. The last section of this report discusses the limitations that such high-level analyses have on policy evaluations. Appendix I details our objectives, scope, and methodology.

We conducted our review from August 2009 to January 2011 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained

provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Overview of the Surface Freight Transportation Sector

The nation's transportation infrastructure consists of over 4 million miles of public highways and roads; over 140,000 miles of national, regional, and local railroad networks; and 25,000 miles of commercially navigable waterways over which trillions of dollars worth of freight move annually. Public roads account for the majority of our nation's transportation infrastructure mileage, reaching nearly every corner of the United States, and as a result, enable trucks to move the greatest amount of freight on a tonnage basis. However, tonnage as a measure does not capture important aspects of freight mobility across the modes, such as the distances over which freight moves. For making comparisons across the modes throughout this report, we use ton-miles as a unit of measurement. Ton-miles measure the amount of freight moved, as well as the distance over which it moves.[3] Table 1 shows the estimates and sources for ton-miles of freight moved on each mode for 2007, the most recent year that data are available. Appendix I provides more detail on our methodology for determining ton-miles used for the estimates in this report.

Table 1: Estimated Ton-Miles of Domestic Surface Freight Shipped by Mode in 2007

Mode	Ton-miles (in millions)	Source
Trucking	2,040,000	Federal Highway Administration (FHWA), Freight Analysis Framework
Railroad	1,819,633	Bureau of Transportation Statistics, National Transportation Statistics
Waterways	553,151	U.S. Army Corps of Engineers, Waterborne Commerce of the United States

Sources: DOT and the Corps as indicated.

Freight shipments can also move by more than one mode before reaching their final destination. In particular, freight moved by rail or waterways

[3]Ton-miles are determined by multiplying the aggregate weight of freight by the distance that weight is carried.

may also be moved by truck at some point to reach its final destination, as rail and waterways may not reach locations that can be reached by truck. On the other hand, trains and waterborne vessels typically have far greater capacity than does a single freight truck, so rail and waterways generally move large volumes of commodities (e.g., coal and grain) long distances that would not be feasible by truck alone. Modes often work as complements to complete a shipment. For example, a ton of grain may move from a grain elevator by rail, be transported to a port on an inland waterway, move by barge to another port on an inland waterway, and then be distributed by truck to its final destinations. A particular type of shipment known as "intermodal" is designed to move on multiple modes, using a container that can be moved from a truck to a train to a ship without handling any of the freight itself when changing modes. Such freight movements are growing and FHWA forecasts that intermodal freight will continue to increase in the future.[4]

In some cases, the modes may be substitutable for certain types of trips and will compete directly for shipments or for segments of shipments based on price and performance. For example, long-haul trucking and rail shipments may be substitutable, or short sea shipping legs can be a substitute for rail or truck shipments along coastal routes. The extent to which mode-shifting is possible in the United States is difficult to estimate and will largely be determined by the types of parameters discussed above, such as whether shipping is feasible by another mode (e.g., rail lines or waterways may not be available for some routes), or practical (e.g., sending heavy coal shipments by truck or time-sensitive shipments by rail or waterways are not practical), and by the relative prices and other service characteristics of shipping by different modes.[5] Figure 1 geographically depicts the national freight transportation infrastructure and tonnage of freight activity by mode, which provides a sense of the physical reach of each modal network.

[4]FHWA, *Freight Transportation: Improvements and the Economy*, (June 2004).

[5]A recent study estimates that about 12 percent of truck ton-miles can potentially shift to rail or waterways; see James J. Winebrake and James J. Corbett, "Improving the Energy Efficiency and Environmental Performance of Goods Movement," in *Climate and Transportation Solutions: Findings from the 2009 Asilomar Conference on Transportation and Energy Policy*, edited by Daniel Sperling and James S. Cannon (Institute of Transportation Studies, University of California, Davis, 2010).