



Infrastructure and the shaping of American urban geography



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ABSTRACT

During the second half of the twentieth century, the construction of freeways and major thoroughfares crisscrossed every major metropolitan area in the United States. These roadways increased national mobility and became major economic veins, transporting American goods and people. The federal and state governments' investment in these Public Works era projects left an indelible imprint on American cities, shaping their social, economic, and political geographies. Using recent data for the metropolitan region that includes Seattle and Tacoma, we illustrate the degree to which the regional economy is related to the location of the national highway system. Using this information, we further explore the degree to which infrastructure financing can be re-envisioned from an equity perspective.

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1. Introduction

The construction of the interstate system got underway in the 1950s. However, the seeds of this massive public works project were sown nearly four decades earlier. In fact, one can trace the initial ideas to the Federal-Aid Road Act of 1916. However, the full engagement with ideas about a more comprehensive system began with the New Deal Era Federal-Aid-Highway Act of 1934. Under this Act, 1.5% of state funds could be used to plan future highway construction (e.g., surveys, plans, engineering studies, economic analyses, etc.) (Congress of the United States, 1978, p.5). This was accomplished through collaboration between the U.S. Bureau of Public Roads and state highway departments. While states began their research and preparation efforts, the actual construction plans had to await the years following the second World War. The funding for such a system of highways needed further consideration and debate, particularly since a 1939 report of the U.S. Bureau of Public Roads (*Toll Roads and Free Roads*) suggested that even though “interregional highways with all necessary connections through and around cities” was necessary, it could not be financed solely through tolls (Weiner, 2013, p. 15). In other words, in its infancy, the idea of a national highway system was seen as a publicly funded project that would be constructed, maintained and

operated by the government. Fuel taxes collected from the public were expected to finance this project.

In the post-war economic boom and obsession with national security, brought on by the emerging Cold War, the final planning and construction of the National Highway System got underway. The U.S. Public Roads Administration published a report in 1944 called *Interregional Highway*, recommending the construction of “National System of Interstate and Defense Highways,” but it took until the 1956 Federal Aid Highway Act to fully authorize the implementation of this public works project. The 1944 Highway Act also directed the designation of 65,000 km (about 40,000 miles) of highways, with some 4600 km in the urban areas alone (Weingroff, 2006). This recommendation was taken up again in 1956, and by the time the system was completed, some two decades later, the total length was impressively higher.

President Eisenhower, the promoter of this project, had connected the desire for faster movement across the vast national territory with the American envy for the German Autobahns in order to frame these extensive highways as “ribbons across the land” (Weingroff, 2006). Such ribbons symbolized the widespread acceptance of Keynesian economic management at that time. Accordingly, a moderate Republican president had now joined what we might call “infrastructure Democrats” at national and state-level politics (such as Edmund G. “Pat” Brown, governor of California) to sustain and further expand the New Deal public works projects of the 1930s. Eisenhower’s vision, as articulated through his “Grand Plan,” was more comprehensive than just building a road network. In delivering the message to the

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Governor's Conference in 1954, then Vice President Nixon explained that the benefits of the imagined highway included safety, reduced traffic jams, and increased economic efficiency, not to mention the elimination of inadequacies in the case of an atomic war (Weingrof, 2006). However, in 1955, when the president submitted the \$25 billion budget for this project, Congress balked; suddenly, all previous promoters of the highway system agreed that they did not want to pay for it, arguing that everyone would benefit from it, so everyone should pay for it. With the toll model off the table, funding the system became a challenge. However, in 1956, with some tax compromises, the Act went through. This led to the creation of a "pay as you go" highway system, relying 90% on federal user fees that were collected through a gasoline tax and another 10% through state user fees (Cox & Love, 1996). It is important to note that the so-called "pay as you go" highway system did not include a business tax or user fee for firms, not even the trucking industry, which benefited tremendously from the location and use of this system. Regardless, in the end, the mandates of the 1956 Act added an additional 1600 km (to the 1944-recommended 65,000 km) and designated \$25 billion to be spent between 1957 and 1969. The aim was to meet the projected traffic demand in 1975 (Weiner, 2013 and Weingroff, 2006). The 1956 Act planned to link 90% of cities with populations of 50,000 or greater (Weiner, 2013), but also connected many smaller cities. In fact, the construction of the interstate highways continued well beyond 1969, into the 1980s. A 2008 report of the Federal Highway Administration (Federal Highway Administration, 2008) put the total National Highway System (NHS) at more than 160,000 miles (257,500 km). This includes nearly 30,600 miles (49,245 km) of rural interstate, 16,000 miles of (25,750 km) urban interstate, 82,400 miles (132,610 km) of rural and 34,100 miles (54,879 km) of urban 'other' road categories. As for investment, the gross stock of the Federal-Aid Highway capital grew to about \$186 billion dollars in 1973 and topped \$200 billion in 1980 (Keeler & Ying, 1988).

This National Highway System introduced an impressive level of connectivity and substantially improved the mobility of goods and people at national, regional and local levels. Fifty years after its official 1956 birth (i.e., by 2006), 61% of the 21 billion tons of goods that moved through the nation occurred using trucks on the American national highway system (Federal Highway Administration, 2008). This translated to 65% of a total of \$15 trillion worth of goods. In terms of direct savings to the trucking industry alone, if we were to use the more modest estimate of 44% cost savings calculated by Keeler and Ying (1988), we would arrive at nearly 7 trillion dollars.

When considering other benefits, such as more rapid movement and increased accessibility to a wider market compared to rail, we begin to realize in particular how certain private sector firms are directly benefitting from this large public investment, while creating an unequal employment geography and commuter-shed. This issue becomes doubly important when we consider all non-trucking firms that benefit from the national highway system without any direct investment in its construction or maintenance. This is the topic that we investigate in this article. However, as illustrated in the next section, we will not be following the traditional examination of national or regional studies that seek to establish a relationship between highway capital stocks and economic output (or cost savings) at macro geographic levels. Using the example of the metropolitan area that spans Seattle and Tacoma, we highlight the degree to which the location of major freeways has led to the formation of a linear urban economic pattern, and how the transportation infrastructure has shaped a particular commuting pattern with significant costs, passed on to employees. Given that fuel tax is a source of highway funding, a systemic inequity becomes apparent; private firms rely on publicly

funded highways to funnel their employees back and forth across a wide urban region, while passing the externalities of long commutes and energy consumption to the public in general and to their employees in particular.

In the next section, we will provide a summary of the relevant literature. This will be followed by a discussion of our methodology, analysis and findings. We conclude by offering a number of theoretical propositions and policy recommendations.

2. Literature review

"If urban form is the bone structure of the city, then infrastructure is its arteries." Tonkis (2013): 138.

One stream of research explores the question of whether or not the people who pay for infrastructural assets actually benefit from these investments in the long run. Keeler and Ying (1988) point out that while public investments in infrastructure are productive, their benefits are poorly understood at the time the investment actually occurs. They offer one of the few retrospective cost-benefit analysis that focuses on the economic benefits of the U.S. highway system *to specific industrial sectors*. They conclude that Class I truck firms experienced particularly strong and positive effects on productivity growth between 1950 and 1970, when the interstate system fully emerged. That highway investments benefited trucking firms is unsurprising, but it does highlight linkages between infrastructure and sectoral changes. Although transport "has a multiple nature in the urban economy," then, the key impacts of highway and road infrastructure are probably on patterns of accessibility, which is "the measure of the price of gaining access to markets" (Vickerman, 2008, p. 108). Indeed, considerable research shows that a large metropolitan region's "internal" accessibility influences labor supply, firm-level efficiencies, and overall productivity (Waddell, Ulfarsson, Franklin, & Lobb, 2007). As Vickerman puts it, "accessibility is a key determinant of the transport costs faced by all city's [sic] activities and this cost of transport has a major potential impact on the economic efficiency of the [region]" (p. 109).

But this generalized statement needs refinement. Clearly, those most able to pay for highway accessibility will benefit most from Ozbaya, Ozmen-Ertekinb, and Berechmanc's (2007, p. 326) larger argument that "spillover effects are the strongest near immediate neighborhoods of the investment location." Who, though, *actually* benefits from these "spillover effects"? Which sectors, with what kinds of employees earning what kinds of wages? These questions are crucial for two main reasons suggested by the wider literature on transportation outlays and economic growth and development. First, transportation investments over long periods of time are often seen as key drivers of *specific* kinds of regional (economic and housing) growth, in part by putatively influencing land development supply regimes that in turn shape accessibility in various ways (Funderburg, Nixon, Boarnet, & Ferguson, 2010; Mejia-Dorantes, Paez, & Vassallo, 2012; Miller, Hoel, & Ellington, 2009). Second, as Chandra and Thompson (2000) have shown, highways invariably have a "differential impact" across industries; that is to say, *certain* industries will grow as a result of the reduced transportation costs associated with these long-term outlays, while others will shrink – though how much may depend upon the timing and specific context of the investment (Funderburg et al., 2010). Furthermore, Thomson (2005) suggests that investment in highways, including their expansion and improvement, will not only improve productivity in certain sectors, but also affect the redistribution of economic activities. Following Rephann and Isserman (1994) and Thompson (2005) indicates that areas receiving highways (and highway investment) are shown to experience

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