

Toll Roads Distribution in The United States

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1. ABSTRACT

A toll road (or toll way, turnpike, pike, or toll highway) is a roadway where drivers pay tolls (*i.e.* fees) for the use. In addition to fuel tax or general tax funds, toll collection is an alternative source of revenue generation [1]. Decision makings of a toll road may depend on a lot of factors such as regional economics, local and national policies, and even population density. It is an interesting phenomenon that there are more toll roads in the eastern part of The United States than in the western part. However, there is no discussion and analysis about this unbalanced distribution, not to say to explore the reasons behind. This paper aims to find out if it is really true that there are more toll roads in the eastern part of the U.S. than in the western part, and the reasons for national toll roads distribution through different analytical angles. The result can help in the perfection of national and state roadway network and toll roads designs in U.S., which will also be beneficial to the development and improvement of toll roads and modern highway system in developing countries and other developed countries.

Key Words: Toll Roads, Turnpike, Roadway Network, Toll Bridge, Demographic Analysis.

2. INTRODUCTION

The main body of this paper will be divided into two parts. Part one (Section 3) is a demonstration of the statement. The second part (Section 4) focuses on the exploration of the key reasons that lead to the unbalanced distribution. The research will be conducted from different angles ranging from the history, demographic distribution, to policies on toll roads design and operations. Due to the complexity of this issue and the limitation of the research scope, the identified reasons may not fully explain this phenomenon; however, this paper can at least serve as a good starting point for future research on this topic.

3. TOLL ROADS DISTRIBUTION IN THE UNITED STATES

To find out the exact distribution of the toll roads in eastern U.S. and western U.S., the most explicit way could be to count the total number of toll roads in each region and then compare. Considering the absolute number might not be representative of the description - "more", the total count of mileage is also listed for further comparison.

The raw data used in this research is from FHWA report [2].

Interstate System Toll Bridges and Tunnels

The total number and total mileage of interstate system toll bridges and tunnels are listed below (Figure 1). The proportion by number between East and West is 87%:13%; by mileage is 88%:12%.

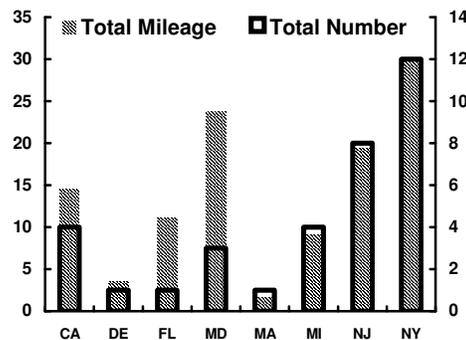


Figure 1: Interstate system toll bridges and tunnels in the U.S (Raw data source: [2])

Non-Interstate System Toll Bridges and Tunnels

The total number and total mileage of Non-interstate system toll bridges and tunnels are listed below (Figure 2). The proportion

by number between East and West is 67%:33%; by mileage is 65%:35%.

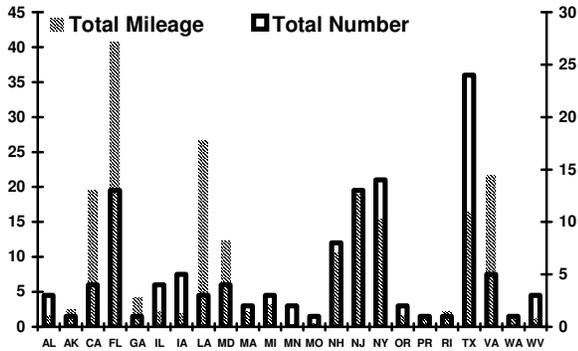


Figure 2: Non-interstate system toll bridges and tunnels in the U.S. (Raw data source: [2])

Interstate System Toll Roads

The total number and total mileage of interstate system toll roads are listed below (Figure 3). The proportion by number between East and West is 85%:15%; by mileage is 90%:10%.

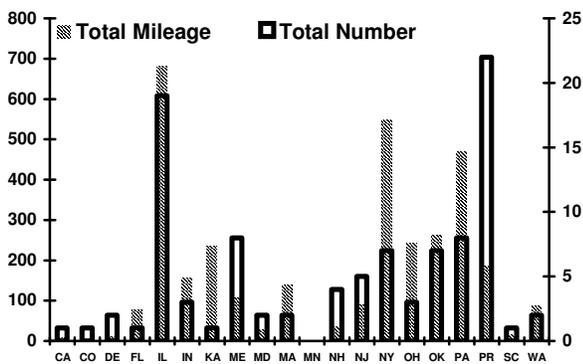


Figure 3: Interstate system toll roads in the U.S. (Raw data source: [2])

Non-Interstate System Toll Roads

The total number and total mileage of Non-interstate system toll roads are listed below (Figure 4). The proportion by number between East and West is 58%:42%; by mileage is 63%:37%.

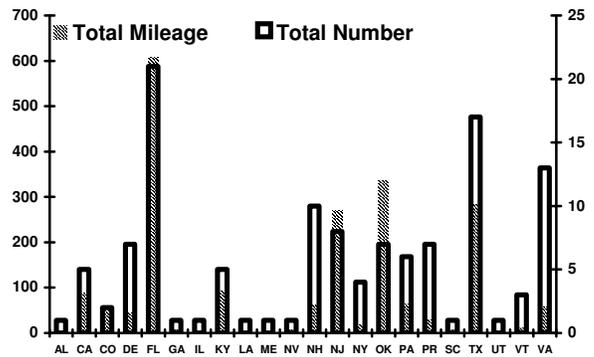
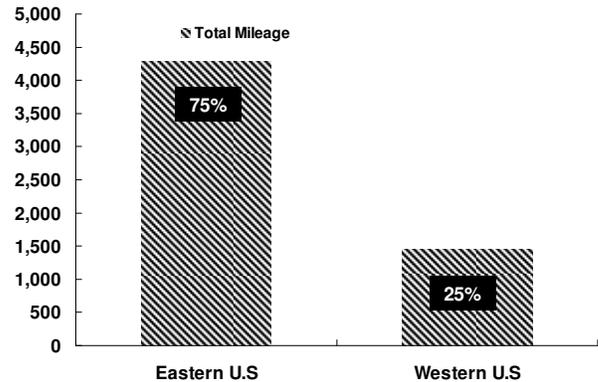


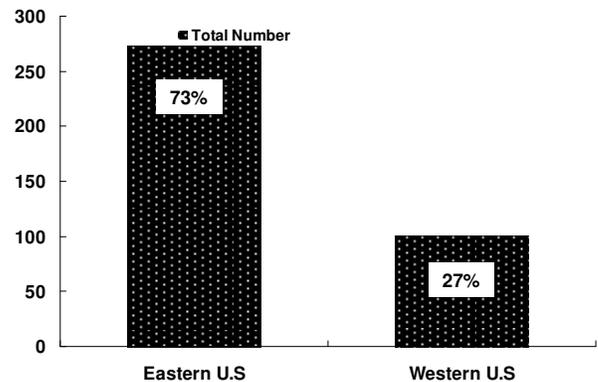
Figure 4: Non-interstate system toll roads in the U.S. (Raw data source: [2])

Conclusion

After data study, it can be concluded that no matter in terms of total mileage or total amount, there are more toll roads in the eastern part of the U.S. than in the western part. The proportion is about 75%:25% (Figure 5).



(a) Mileage comparison



(b) Total number comparison

Figure 5: Toll roads comparison between Eastern and Western in the U.S. (Raw data source: [2])

4. POSSIBLE REASONS FOR UNBALANCED DISTRIBUTION

Historical Causes

The study of the history of the development of toll roads in the U.S. may not directly answer our question, but definitely would help find some clues of this unbalanced distribution.

The first major toll road in the United States was the Philadelphia and Lancaster Turnpike, built in the 1790s, within Pennsylvania, connecting Philadelphia and Lancaster. In New York State, the Great Western Turnpike was started in Albany in 1799 and eventually extended, by several alternate routes, to the Finger Lakes region. The boom in turnpike construction began, resulting in the incorporation of more than 50 turnpike companies in Connecticut, 67 in New York, and others in Massachusetts and around the country [3].

Accordingly to the development history of toll roads, it can be seen that the very first toll road, appeared in the eastern part first and then spread to the western [4]. And during the boom of turnpike construction, the majority turnpike companies located in the eastern part. In this way, eastern already got enough edge at the first time.

Demographic Reasons

The overwhelming existence of toll roads in the eastern U.S. could either be resulted from the huge demand of highway facility or from the request to control the use of the facility. No matter which area it belongs, the population should have certain impact on this phenomenon.

Accordingly to the recent data from National and State Population Estimates by U.S. Census Bureau [5][6] (Table 1), among the top 10 states with the highest population, apart from Texas, the rest of them all locate in the eastern part. Those top 10 states represent over 50% U.S. population. For Texas, when looking back to the number of toll facilities in previous section, it is found that compared with other states in the western, and even in the eastern, more toll facilities are in Texas.

Table1: Top 10 states of U.S. population (U.S. Census 2008 [6])

Rank	States	Population 2008	Population %	Accu. %
1	California	36,756,666	12%	12%
2	Texas	24,326,974	8%	20%
3	New York	19,490,297	6%	26%
4	Florida	18,328,340	6%	32%
5	Illinois	12,901,563	4%	37%
6	Pennsylvania	12,448,279	4%	41%
7	Ohio	11,485,910	4%	44%
8	Michigan	10,003,422	3%	48%
9	Georgia	9,685,744	3%	51%
10	N. Carolina	9,222,414	3%	54%
	Total	305,986,357		

People may have concern about studying the absolute figure of population, since the measure of area may also affect the result; therefore, the study of population density was also conducted. Accordingly to the latest figure (Table 2), all the top 10 states

are in the eastern. California, being one of the biggest states in the western U.S., ranked 11th.

Table 2: Top 10 states in U.S. population density (U.S. Census 2007 [7])

Y2007	States	Population Density (Person/sq mi)
1	New Jersey	1,171
2	Rhode Island	1,012
3	Massachusetts	823
4	Connecticut	723
5	Maryland	575
6	Delaware	443
7	New York	409
8	Florida	338
9	Ohio	280
10	Pennsylvania	277

If the supply demand theory can be applied here, population distribution is definitely one of the reasons that lead to the unbalanced distribution of toll roads.

Systematic Reasons

The funding part of the toll facilities is pretty vital in toll roads study; however, due to the complicity of policies behind, this project will only cover a very small part, and leave the picture to be painted by future researchers.

In 1956, the Federal Interstate Highway program was established, funding non-toll roads with 90% federal dollars and 10% state match, which give little incentive for states to expand their turnpike systems. Funding rules initially restricted collections of tolls on newly funded roadways, bridges, and tunnels. In some situations, expansion or rebuilding of a toll facility using Interstate Highway Program funding resulted in the removal of existing tolls [8].

When checking back to the history of toll roads, the establishment of the toll way system was almost finished in the eastern U.S. before 1956. However, for the western part, the development only lasted for a few decades. Though the publish of the federal interstate program at that year would not only influence the construction of toll roads in the western U.S., definitely the western suffered more as the toll road system in the eastern part was almost completed by that time [9].

Apart from the federal policy influence, the state law makers would also influence the toll facility construction. For example, Kentucky has an extensive system of parkways, built in the 1960s and 1970s, which began as toll roads. However, Kentucky state law requires toll collection to cease once the road's construction bonds are paid off.

Other reasons also existed. One example is from those in the sparsely-populated states just east of the Rocky Mountains. There should have been turnpikes. The reason is to have those cross-country trucking firms pay for them. But there is no movement to do this, since trucking companies already pay a fuel tax in each state they drive through.

5. CONCLUSIONS

Through this paper, it has been testified that there are more toll roads in the eastern part of the U.S. than in the western part. There are both historical and demographic reasons for this unbalanced distribution. Moreover, the change of national funding policies and the difference in state laws in U.S. also directly or indirectly influence the current picture.

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