

## Government in Transportation

This paper is intended to show the true cost of driving and comparing this to the cost of transit. Using data, I found the cost of Transit to be less than the cost of driving per passenger mile. From this data, I propose a government shift from funding roads and other subsidies for driving to the funding of transit. Driving has had to be funded by the government since its beginning, whereas urban transit had a long history of being a money making, private industry. In this paper I show that people drive more because many of the costs of driving are external to the driver, and so he does not account for the full cost of his driving. The economically feasible transit systems in the U.S. were dismantled by governments and the auto industry in order to have wider roads and more cars. By jump starting the funding of transit it can once again be a money making industry and contribute a greater amount to our economy.

Transportation Policies affect one's way of life. If the government chooses to push one system over another it will disturb the market and make it difficult for other options to compete. Transportation could be a public good, it could be designed not to exclude people from using it, and to a certain extent it is non-rival, for one person using the transportation system does not keep another person from using it. This is not how our system is currently, because many people are excluded, 10% of U.S. households don't

have access to an automobile, while 34.2% of households have access to only one car, and without a car, one is excluded from the system.<sup>1</sup>

Transportation can affect more than just the way we get around; it can affect the way communities develop, and subsequently people's way of life. The state of life for many U.S. citizens is horrible, and the government is one of the main causes of this tough life. In the 1940s and '50s the U.S. and state governments created policies that would guarantee our current situation: sprawl and disinvestment. In the years following World War II the government created the G.I. Bill that included the Veterans Administration loan programs. These loans were given to Veterans to buy newly built homes; they were not offered for already-built homes or refurbished houses. Over 11 million new homes were bought using these loans right after the war. These loans discouraged the creation of apartments or condos, while encouraging the creation of "subdivisions" at the expense of already built communities within the cities. These new "subdivisions" were designed around the car, with little attention paid to pedestrians and transit users.<sup>2</sup> This design became possible with the creation of the Interstate Highway Act of 1956, which created 41,000 miles of interstates at the price tag of around \$50 billion in 2003 dollars. This shows the government's encouragement of road transportation and suburban growth. This Interstate program comes in part because of the appointment of Charles Wilson, the president of General Motors, to the office of Secretary of Defense, where he sold the system as an easy way to transport military vehicles in times of war. In addition to that, Francis DuPont, whose family was the largest single shareholder of GM stock, was

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<sup>1</sup> CENSUS TRANSPORTATION PLANNING PACKAGE (CTPP 2000) <http://www.transportation.org/ctpp/home/US/us.pdf>

<sup>2</sup> Suburban Nation; Andres Duany, Elizabeth Plater-Zyberk, and Jeff Speck. North Point Press, New York. 2000 p. 7-8

appointed Federal Highway Administrator. These two biased voices pushed for a system that would encourage increased automobile usage.<sup>3</sup> The development of these two government policies, in addition to many local zoning codes, pushed the development of sprawl in the U.S.

Sprawl has shaped our way of life in the U.S. and is considered the cause of many of our problems. One of biggest problems with sprawl is the destruction of the city. For example in Detroit since the 1940s the city has lost half of its population as well as jobs. This has caused the worst segregation in the U.S. because most of the white residents moved to new suburbs, while lower income minorities stayed in the city.<sup>4</sup> This has fueled racism, for people are scared of those they don't know. It has caused crime to increase and also be isolated in disproportionately minority and low income areas. The issue of sprawl and transportation has become a huge environmental justice issue, for it harms minorities and poor to a greater extent, then it does to the average citizens. The poor cannot get to jobs and so cannot remove themselves from welfare; this harms the economy because we are not using the workforce to its full extent as only 61% of people over 16 have automobiles.<sup>5</sup>

The problems don't just stop at environmental justice issues, but also extend to everyday problems like obesity. Obesity has become a huge problem for the people of America, and you can't just blame the fast food restaurants, because our reliance on the automobile has severely decreased the average exercise load of American citizens. Everyone driving everywhere decreases the amount people walk and bike around their

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<sup>3</sup> Taken For a Ride; Co-Producer/Director: Jim Kline, Co-Producer/Writer: Martha Olson

<sup>4</sup> US census Bureau [www.census.gov](http://www.census.gov)

<sup>5</sup> US census Bureau [www.census.gov](http://www.census.gov), and State Motor-Vehicle Registrations, Federal Highway Administration, <http://www.fhwa.dot.gov/ohim/hs00/xls/mv1.xls>

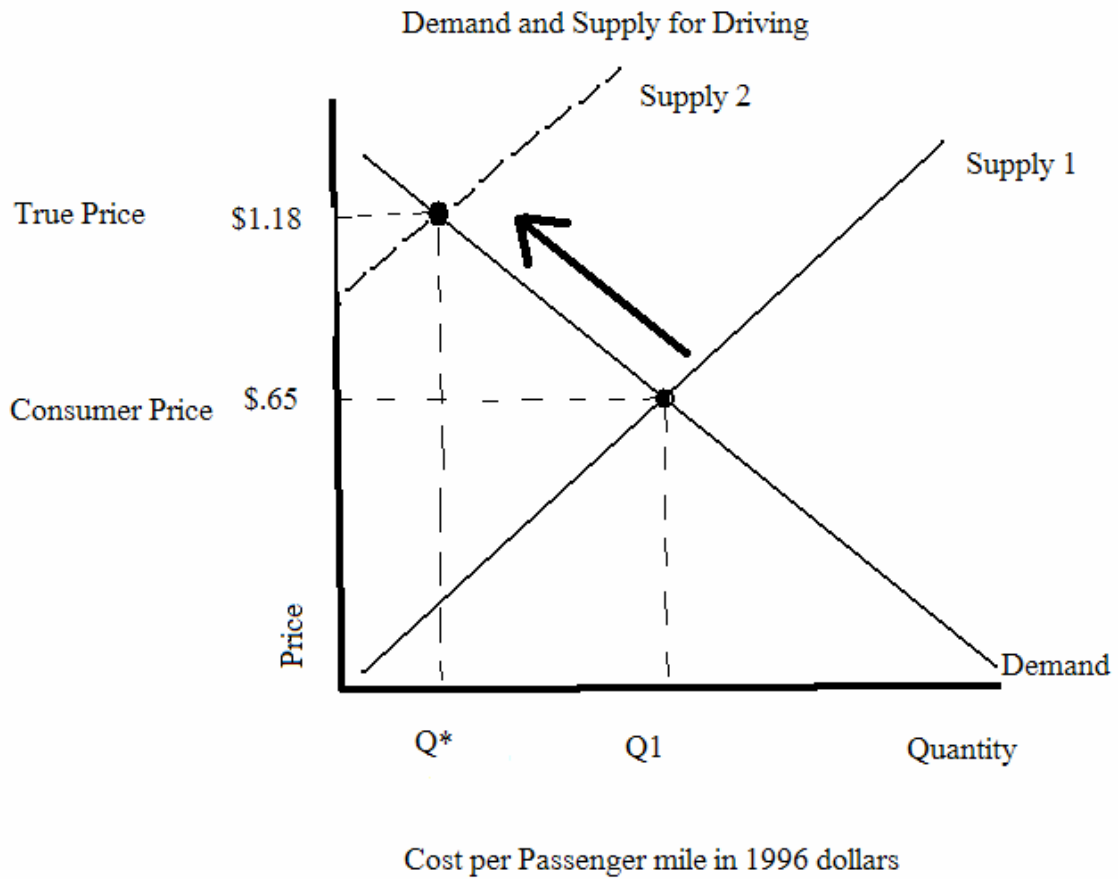
communities, add to that the fact that many subdivisions don't even have sidewalks, and the opportunity to exercise is decreased even further. This accounts for many lost hours of productivity and increased medical care costs.

One might wonder how the market could fail to the extent that these problems exist. The market has failed because driving is highly subsidized, and so the consumer of driving consumes more than they would usually. Almost half of the cost of driving is external. Below is a supply vs. demand graph (Graph. 1,) in which we see that in the current situation the quantity demanded is  $Q_1$ , because the price that people feel they pay for driving is only \$0.65 per passenger mile, when the true price is \$1.18 when you include the external costs.<sup>6</sup> This shows that demand for driving would be much less if drivers knew the true price that driving costs. The quantity demanded would move from  $Q_1$  to  $Q^*$  and supply would move in accordance to where the new price is. For this situation the quantity demanded would be the amount people drive, and the supply would be the supply of all things needed to drive: roads, cars, fuel, insurance, land, parking, traffic enforcement, etc. We can make the demand curve downward sloping like this, because we know from past experiences, if driving becomes more expensive, people will drive less. This can be shown by looking at the two graphs (Graph. 2 & 3) below and comparing the Yearly Marginal VMT (Vehicle Miles Traveled) to the Yearly Gas prices (See Appendix for Data). These graphs show that as gas prices go up, people choose to drive less. Marginal VMT is used, because additional drivers enter the system every year, the marginal VMT will show when people choose to drive less, and when fewer people choose to enter the system. When looking at urban transportation this effect becomes

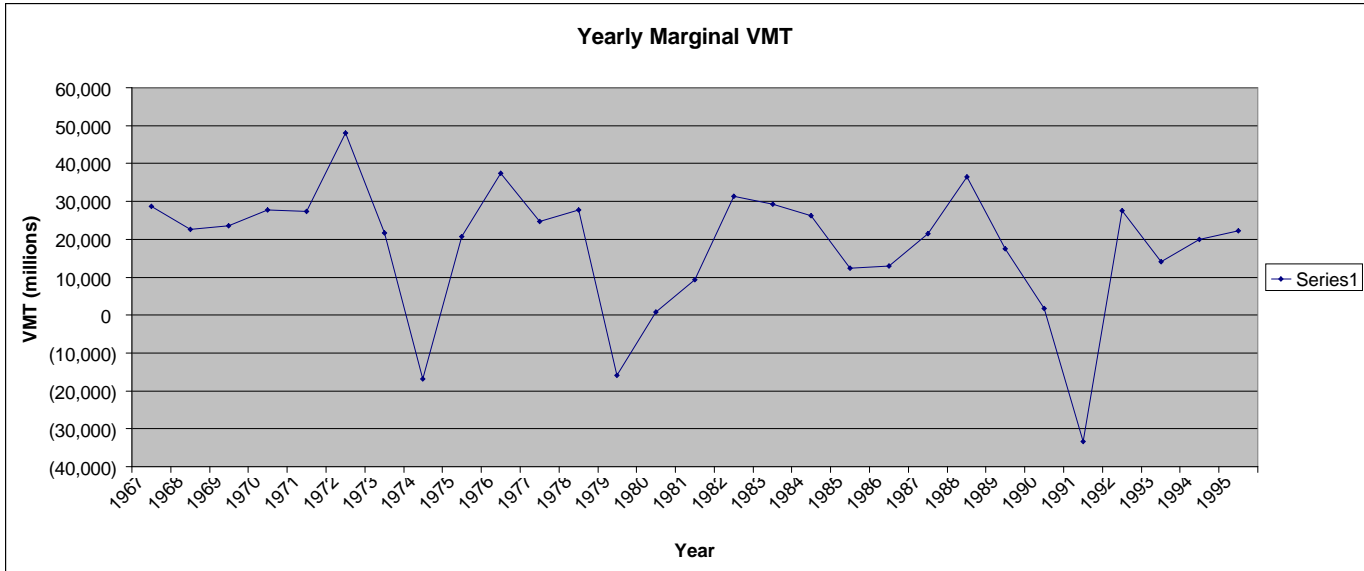
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<sup>6</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

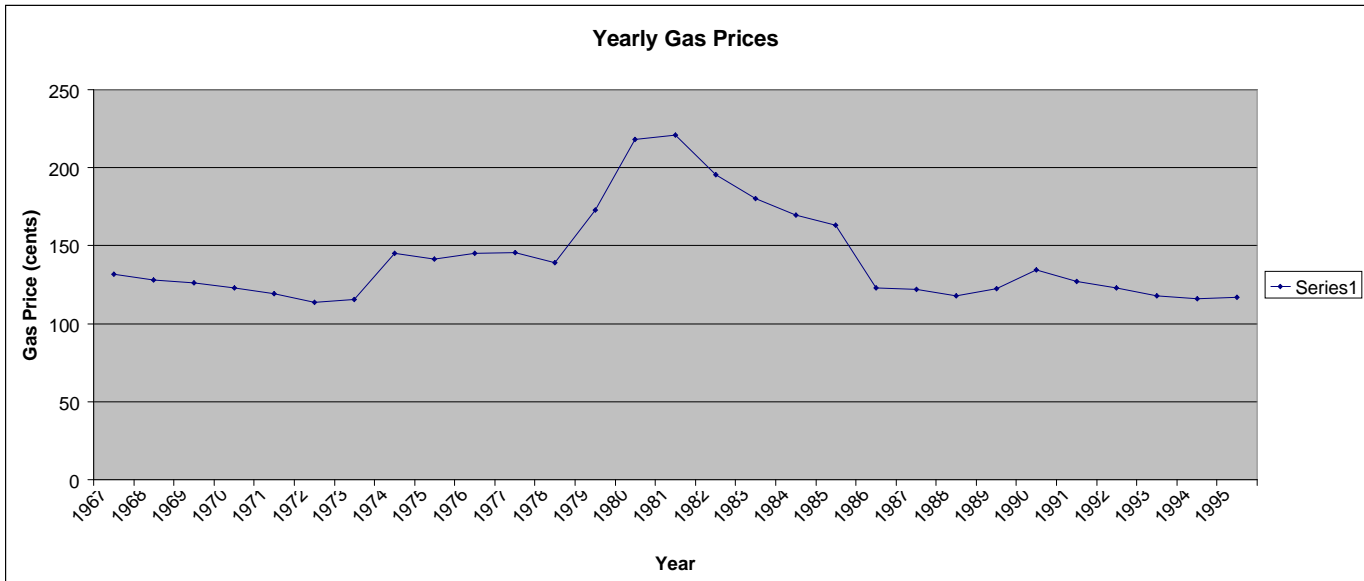
even greater than when just looking at national transportation. This is because in cities transit exists to a greater extent than in rural areas, so there are at least better options if people choose not to drive.



Graph 1



Graph 2



Graph 3

To get to this true price we must go through and look at each internal and external cost. Most of the figures come from a report written by Todd Litman (resume attached), a prominent planner and research professional in transportation areas, and executive director of the Victoria Transport Policy Institute, an independent research group. We will look at the cost of driving during urban peak times at first to get the most expensive cost of driving. The first area we will look at is the costs of vehicle ownership. Vehicle

ownership includes the cost of buying or leasing a vehicle, the cost of registering a vehicle, and insurance. The cost of the vehicle itself comes out to be around \$1,738 per vehicle year, or approximately 14.4¢ per vehicle mile.<sup>7</sup> In addition to this we must add on the other costs of ownership, to get a grand total of 20.6¢<sup>8</sup>. This figure must be divided by the number of passengers in the average car to get the value per passenger mile. The average occupancy rate is 1.1, so the cost of vehicle ownership per passenger mile is 18.7¢. The cost of vehicle operation, including gas and other materials necessary to operate the vehicle, comes out to be 14.7¢ per vehicle mile in urban peak conditions, and 13.4¢ per passenger mile.

The next big cost is time. It is hard to discuss the true cost of time, but we will use the figures straight from the Victoria Transport Policy Institute. They value a driver's time at \$6.00 an hour, and a passengers at \$4.50 an hour, because he can do some work while riding, whereas the driver must only drive (I believe these values should be higher, at least for the driver, because the average wage is \$12.00 per hour.) It also assumes an average speed of 30 mi/hr with a 16.5% congestion premium (the amount of congestion, on average, one experiences on a trip).<sup>9</sup> These numbers come out to be 23.0¢ per passenger mile in lost time. Though this cost is internal, many drivers don't think about how much time they spend driving, especially for short trips.

Crashes provide another big (and hidden) cost for drivers. The U.S. has some of the worst numbers for road accidents in the world. The cost of accidents in the U.S. makes up 5.7% of our GNP, compared to 1.3% in Denmark and Germany, 1.9% in

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<sup>7</sup> Consumer Expenditure Survey, BLS ([www.bls.gov](http://www.bls.gov)), annual report.

<sup>8</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

<sup>9</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

Finland, 3.2% in Italy, .5% in Bangladesh, and 2.0% in the UK.<sup>10</sup> The cost of accidents can be split into two parts, those which are included in the market, and those that are external. Fig. 1<sup>11</sup> shows how these values are broken up:

| <b>Distribution</b> | <b>Market</b>   | <b>Non-Market</b>  |
|---------------------|---|--|
| Internal            | Safety equipment expenditures.<br>Uncompensated property damages, lost income and medical treatment costs to users.<br>Insurance deductibles. | Uncompensated pain and lost quality of life to crash victims.  |
| Insurance           | Property damage, lost income and medical treatment compensated by insurers.   | Pain, grief and lost quality of life compensated by insurers.  |
| External            | Uncompensated property damages, lost income and medical costs to nonusers.<br>Emergency response and crash prevention expenditures.           | Uncompensated pain and lost quality of life borne by nonusers.<br>Uncompensated grief to victims' loved ones. Reduced nonmotorized mobility. |

*This table indicates how various crash costs are categorized. Some are market, others are non-market. Some are internal, others external. Insurance compensation costs are external to individuals, but internal to motorists as a group.*

**Figure 1**

Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

Here one can see that many of the costs of accidents are external, and not only are they external, but there are many costs that are non-market costs. The internal costs come out to be 5¢ per passenger mile, whereas the external costs of car crashes comes out to be 3.2¢ per passenger mile.<sup>12</sup>

The next cost is parking. The cost of parking should include the land that it is built on, the construction of spaces and the operating cost of the parking facilities. The cost of construction varies greatly whether it is a structure or surface lot. This analysis is very important, because many consumers (drivers) do not pay for parking, it happens that

<sup>10</sup> Rune Elvik. "How much do road accidents cost the national economy?" Accident Analysis and Prevention 32, 2000

<sup>11</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

<sup>12</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

only 14% of commuters pay something for parking, and only about 1% of non-commuters pay for parking.<sup>13</sup> This is one of the big reasons that consumers do not truly understand the cost of driving. For this reason most of the parking cost is external. In the U.S. there are 5 spaces for every vehicle; this costs a total of around \$3,000 a year for each vehicle, but the cost is distributed to the entire public. For example Walmart will charge more for products to supply free parking to their consumers, this harms non-drivers, for they are paying for the parking lot, but not deriving any benefit from it. With this total cost of parking, we can determine the internal and external cost of parking per passenger mile. The internal cost is 5¢ per vehicle mile or 4.5¢ per passenger mile. The external cost is more than twice the internal cost at 12.0¢ per vehicle mile or 10.9¢ per passenger mile.<sup>14</sup> This very high external cost is because very few people actually pay for parking; it is provided by employers and businesses for free to the driver.

The next cost we will look at is the cost of congestion. This cost includes increased stress, time, and pollution caused by sitting in traffic. The cost here is external for each driver, but mostly internal for drivers in general, because we do not directly pay for the cost or the harm congestion does to society, but society does have to pay for it. This cost is 17¢ per vehicle mile or 15.5¢ per passenger mile, and were found by comparing over a dozen studies by different groups.<sup>15</sup>

Roads also make up a large cost of driving. Currently user fees only cover 63% of the full cost of road construction and maintenance. The other 37% comes from general taxes.<sup>16</sup> Here is another way driving costs are externalized. This 37% extra comes out to

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<sup>13</sup> 1990 NPTS, *Summary of Travel Trends*, USDOT (Washington DC) 1992.

<sup>14</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

<sup>15</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

<sup>16</sup> *2000 Highway Statistics*, FHWA ([www.fhwa.dot.gov/ohim](http://www.fhwa.dot.gov/ohim)), 2001, Table HF-10.

be 1.8¢ per vehicle mile, but it is important to remember that other people besides drivers use roads, including bicycles and pedestrians. So by subtracting the extent the road is used for other uses, the cost of road infrastructure, in addition to what the gas tax already pays, comes out to be 1.6¢ per vehicle mile or 1.5¢ per passenger mile.

The next cost goes along with the cost of roads, because it figures out the cost of land that roads sit on. The U.S. has the highest amount of area devoted to roads per capita of most major countries, besides Canada (this is most likely because Canada is so large and sparsely populated.) The U.S. has 5 times more land devoted to roads per capita than Germany or Japan.<sup>17</sup> The current total for land value in the U.S. used by roads is \$2.18 x 10<sup>11</sup> or \$218.1 billion.<sup>18</sup> This is a significant amount of land, and the value is the greatest in the urban area, where we are focusing now. The cost per passenger mile comes out to be 2.2¢.

The next cost is one usually overlooked, that of traffic safety. In one estimate, Stanly Hart figured that 40% of police, 15% of fire departments and 16% of paramedic's budgets are devoted to serving automobile users.<sup>19</sup> This alone shows the importance of public safety departments' role in driving. This cost comes out to be 14¢ per passenger mile<sup>20</sup>.

Air pollution accounts for another huge cost that the driver does not bear. This along with water pollution and noise account for a cost of 7.7¢ per passenger mile.<sup>21</sup> This

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<sup>17</sup> Rea Janise Kauffman, *Paving The Planet*, Worldwatch Institute ([www.worldwatch.org](http://www.worldwatch.org)), 2001.

<sup>18</sup> Mark Delucchi, "Motor Vehicle Infrastructure and Services Provided by the Public Sector," *Annualized Social Cost of Motor-Vehicle Use in the U.S., 1990-1991*, Vol. 7, Institute of Transportation Studies ([www.engr.ucdavis.edu/~its](http://www.engr.ucdavis.edu/~its)), 1996, UCD-ITS-RR-96-3 (7), 1998.

<sup>19</sup> Stanley Hart, "An Assessment of the Municipal Costs of Automobile Use," self published graduate studies report (Pasadena) 1985, p.14.

<sup>20</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

<sup>21</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

cost could be even higher, depending on what you feel the cost of pollution is to the world. If you believe that air pollution is causing global warming and will eventually destroy the world, this cost could be infinite.

Our lack of transportation diversity in the U.S. should cost drivers money, for they are crowding out alternatives. There are several ways driving crowds out alternatives, one is that so much money is dedicated to it that, little can be spent on alternatives. Another is that driving encourages sprawl development that discourages walking, biking and taking transit. Though other forms of transportation can also crowd out alternatives, at this point there is so little alternatives to driving that an increase in alternatives will not crowd out drivers or other forms of transport to anywhere near the extent that driving does now. This lack of diversity in transportation accounts for a 5¢ cost per passenger mile.

Another cost that drivers should be responsible is our dependency on resources. We overlook this in America as being important, but that is probably why we have the lowest excise tax on gas of most major countries. The external cost of using these resources comes out to be 2.6¢ per passenger mile.<sup>22</sup> Though other forms of transport do depend on resources, their dependence is much lower per passenger, and alternative fuels like electricity, fuel cells, and natural gas can be used, which are easier to find locally.

The next cost refers to how motorized traffic harms non-motorized traffic, or discourages people from walking or biking. This comes out to be 1.4¢ per passenger mile.<sup>23</sup> As in all the VTPI numbers, they come from comparing around a dozen different studies on each cost, and using the numbers which are most consistent or by the most

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<sup>22</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

<sup>23</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

reliable sources. These costs come mostly from the increased time that non-motorized trips take, the lost quality of alternative non-motorized transit, which is caused by cars. An example of this is that with an interstate, a pedestrian has to walk several more blocks to a bridge to cross the expressway, which, in addition to taking longer, is also a very unpleasant environment in which to walk.

The last cost is one of the biggest, and that is because it is the cause of many of the problems listed in the introduction. This cost is the impact driving has on land use, and how that affects the economy. After all that was listed it is no wonder that land use impacts accounts for 6.4¢ per passenger mile.<sup>24</sup> This finishes the discussion of how we get to the full cost of driving.

These entire costs combine for the total of \$1.18 per passenger mile for peak urban conditions, which makes up 20% of all driving. For non-peak urban driving the full cost is \$.70 per passenger mile; this type of driving makes up 40% of all driving.<sup>25</sup> By averaging these two urban driving costs, we find the cost of urban driving to be \$.86 per passenger mile. This is a low estimate because it does not include the amount the U.S. has spent on wars to protect our access to oil. Many of the figures I quoted were also conservative estimates.

The discussion of transit is a much easier one, for transit does not have the many external costs that driving does. Transit does not currently make up a large percentage of commuting in the U.S., but it does provide a very important service inexpensively. In 1998 there were 27.1 million riders on an average weekday in the U.S.<sup>26</sup> Currently almost 30% of all transit costs, including capital improvements, are regained through the

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<sup>24</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

<sup>25</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtpi.org](http://www.vtpi.org)

<sup>26</sup> 1998 National Transit Summaries and Trends, National Transit Database [www.fta.dot.gov](http://www.fta.dot.gov)

farebox. This is quite an amazing feat for the U.S. transit systems to do, because transit becomes more efficient the more passengers it has. Because of this when adding more passengers, the farebox would pay for a much greater extent the costs associated with running the system. If transit were allowed to compete fairly with driving, then transit could again pay for itself as it did early in the 20<sup>th</sup> century. Transit is already a more economically efficient transportation alternative to driving. We can show this by comparing the cost per passenger mile of driving, and transit. The cost per passenger mile of the every type of transit in the U.S. is \$.61 in 1998 dollars or \$.58 in 1996 dollars<sup>27</sup>. This figure includes the total operating expenses plus the total capital funds expended in 1998 divided by the total annual passenger miles. This figure is only one part of the economic reasoning for why transportation funding should be diverted towards fiscally responsible transit rather than towards roads. People might say this number is low, because it doesn't include the externalities, that were included in the development of the per passenger figure for driving. Even if these values are included, the external numbers for diesel busses, which have the largest externalities, still only account for a 4.4¢ increase in the total per passenger mile figure. This is still substantially lower than the cost of driving. In addition, transferring money from driving to transit and other alternatives would be a financial gain, in that these systems help decrease the problems driving cause. For example transit encourages investment in dense urban areas, whereas driving encourages sprawl; by having more transit we won't have the problems with land use that I listed above. The entire transit system now could live off of just the federal funding for roads; transit costs in 1998 were \$25.4<sup>28</sup> billion, whereas in 2000 federal

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<sup>27</sup> 1998 National Transit Summaries and Trends, National Transit Database [www.fta.dot.gov](http://www.fta.dot.gov)

<sup>28</sup> 1998 National Transit Summaries and Trends, National Transit Database [www.fta.dot.gov](http://www.fta.dot.gov)

funding for roads was 30.8 billion. The total expenditure for just roads in 2000, including local, state and federal funding, was \$128.5 billion.<sup>29</sup> From this I propose that all federal spending on transportation should be used on transit and other driving alternatives and so the total funding of transit would more than double. Roads can be maintained by state and local funding. Of course a new tax system would have to be put in place, because people won't be buying as much gas, and so not paying the gas tax. The benefit the national economy would receive from this would be amazing. In 2001 the economic rates of return for highways was only 4-6% whereas for transit the economic rate of return is anywhere from 8-30%.<sup>30</sup> Government spending, on anything, increases the economy; though through this example we can see that investing in transit has a greater impact than investing in roads.

This is just the economic argument in favor of a more balanced transportation system thriving on transit in urban areas. There are also many more social gains, which in turn could lead to improved economy. Several studies have shown that employees that don't sit through traffic are more productive at work, and so workers riding transit would be more productive at work. They would also be able to work on transit, or do something productive or relaxing like reading or learning. In addition to those who are currently working, those who can't hold jobs now, because transit isn't offered to them, or because transit isn't reliable, will be able to join the work force and lower unemployment rates. This will also encourage a type of growth that is fiscally responsible, unlike sprawl. For with sprawl development is built outside of the city to replace things that already exists,

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<sup>29</sup> Transportation Cost and Benefit Analysis, Victoria Transportation Policy Institute. [www.vtppi.org](http://www.vtppi.org)

<sup>30</sup> The Value Proposition for Transit Investment, Subsidy and Federal Involvement, Canada Transportation Act Review. HLB Decision Economics Inc. 2001

this is why services like schools, hospitals, and police stations close in inner cities, and open in distant suburbs. The abandonment issue in the U.S. is highly inefficient, for it wastes materials and land. Abandonment in the U.S. is unprecedented compared to the rest of the world. Transit will help the U.S. deal with this problem by encouraging the resurgence of cities and inner suburbs while discouraging sprawl development. For all of these reasons it is important to the U.S. economy and quality of life to encourage more transit and less driving.