

Mind the Gap: An Analysis  
of  
Possible Solutions to America's Infrastructure Crisis

by

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## **The Infrastructure Gap**

The United States is facing a massive infrastructure gap. As former Secretary of Transportation Ray LaHood has stated, “our infrastructure is on life support”<sup>1</sup>. The American Society of Civil Engineers (ASCE) assigns US infrastructure collectively a grade of D+<sup>2</sup>, and the World Economic Forum ranks US infrastructure 12<sup>th</sup> globally<sup>3</sup>. A substantial percentage of nearly every infrastructure category -- from dams to airports -- is in poor condition. The Highway Trust Fund, which provides much of the funding for highways, mass transit, and storage tanks, is being depleted (the Department of Transportation projects that the fund will be insolvent by the end of August)<sup>4</sup>. Nevertheless, there is currently no passed legislative plan to mitigate the problem.

Infrastructure is a broad term that has various classifications. The American Society of Civil Engineers splits infrastructure into the following categories: water and the environment, public facilities, and transportation. Water and the environment includes dams, drinking water, hazardous waste, levees, solid waste, and wastewater. Public facilities, include public parks, schools, and energy. The category of transportation is composed of aviation, bridges, inland waterways, ports, railroads, and mass transit.

The recommended total amount of spending across all infrastructure categories to close the gap is \$3.6 trillion by 2020, according to the ASCE. Admittedly, the ASCE has some inherent bias, but even the Senate Budget Committee cites the organization as a

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<sup>1</sup> Falling Apart: America's Neglected Infrastructure. Dir. Steve Kroft. Perf. Ray LaHood. CBSNews. CBS Interactive, 23 Nov. 2014. Web. 12 May 2015.

<sup>2</sup> "2013 Report Card for America's Infrastructure." 2013 Report Card for Americas Infrastructure. American Society of Civil Engineers, 2013. Web. 12 May 2015.

<sup>3</sup> Schwab, Klaus. The Global Competitiveness Report. Geneva.: World Economic Forum, 2014. 2014. Web. 2015.

<sup>4</sup> "Highway Trust Fund Ticker." Department of Transportation. N.p., n.d. Web. 13 May 2015.

credible source. It is important to note that this \$3.6 trillion figure is only the cost of repairing and building infrastructure. It does not include, and should be weighed against, the economic and social costs of inaction.

One example of a social cost is traffic congestion. Forty-two percent of America's major urban highways remain congested, costing the economy an estimated \$101 billion in wasted time and fuel annually. Likewise, the 32% of America's major roads that are in poor or mediocre condition, cost U.S. motorists \$67 billion a year, or \$324 per motorist, in additional repairs and operating costs. Deteriorating surface transportation infrastructure alone will cost the American economy more than 876,000 jobs and suppress the growth of its GDP by \$897 billion by the year 2020.

The public safety issues associated with deterioration, the primary motivations for many to demand additional funding, are also apparent. Roadway conditions are a significant factor in approximately one-third of all U.S. traffic fatalities. More than 30% of bridges have exceeded their 50-year design life, and the US Government has stated that there are 70,000 bridges that have been deemed structurally deficient<sup>5</sup>. In the words of former Secretary LaHood, this means that the bridges can be classified as "dangerous"<sup>6</sup>.

The costs that have been mentioned only scratch the surface as to the economic penalty of not investing in infrastructure today. These costs are associated with the maintenance of existing infrastructure, and do not address the gain of potential GDP growth that would result from an updated and expanded infrastructure base. The focus of

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<sup>5</sup> "2013 Report Card for America's Infrastructure." 2013 Report Card for Americas Infrastructure. American Society of Civil Engineers, 2013. Web. 12 May 2015.

<sup>6</sup> Falling Apart: America's Neglected Infrastructure. Dir. Steve Kroft. Perf. Ray LaHood. CBSNews. CBS Interactive, 23 Nov. 2014. Web. 12 May 2015.

this thesis paper will be primarily on highways, and the solvency crisis of the aforementioned Highway Trust Fund, which has an estimated shortfall of \$167 billion from 2015 to 2024<sup>7</sup>. Like the above costs, this figure does not capture the costs of highway system expansion but rather just projected maintenance costs of those highways that specifically benefit from the fund. The actual costs to improve American highways would be much higher. In terms of spending on roads the United States spends a relatively small percentage of GDP compared to global competitors, which has many implications for the future (see Exhibit 1 in Appendix). As a result of my research and analysis I have concluded that the optimal long-term solution to close America's infrastructure funding gap is to keep in place an existing tax, the gasoline tax, and to phase in a new type of tax known as the vehicle-miles traveled tax (VMT).

## **Current and Proposed Taxes**

Historically, almost all of road infrastructure in the United States has been funded by governments. The funding takes place by directly using tax revenue or by issuing municipal bonds. Municipal bonds will be repaid using direct revenues from a project (e.g. revenue bonds that rely on toll revenues) or will be repaid by using the general taxing authority of a municipality or larger government (general obligation bonds). One important tax levied by Federal and State governments to pay for road transportation is the gasoline tax.

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<sup>7</sup> Samuelson, Robert. "Three Myths about the Highway Trust Fund." Washington Post. The Washington Post, 9 July 2014. Web. 12 May 2015.

## **The Gasoline Tax**

The current Federal gasoline tax in the United States is 18.4 cents a gallon. It has not been raised since 1993. Funds raised from the Federal gasoline tax flow to the Federal Highway Trust Fund mentioned earlier, and are used primarily to support road construction (particularly interstate highways). Accompanying, federal gas taxes, are state gas taxes, which are reflected in the price consumers pay at the pump. On average, state gas taxes add 30.45 cents to the price of a gallon, as of April 2015<sup>8</sup>.

While state gas taxes were implemented to support infrastructure financing, in recent times these funds have been allocated for other purposes. Texas for example, spends 25% of fuel-tax revenue on education programs, and Kansas has allotted some of its gas tax revenue to pay for Medicaid and schools. In addition to this, many states are allocating a majority of the revenue raised from gasoline taxes in recent fiscal years to cover interest payments on bonds that financed past infrastructure projects. New Jersey, New York, and Washington, are just a few examples of states that fall into this category<sup>9</sup>. The shortfall the states are experiencing when it comes to funding their own infrastructure, has served to only increase reliance on the Federal government, as some of the funds from the Federal Highway Trust Fund are disbursed to the states.

Many states have been raising less revenue via state gas taxes than predicted, largely due to the increased fuel efficiency of vehicles. Given the infrastructure gap, an obvious solution seems to be to raise the Federal gas tax. To contextualize the state of the current gas tax it is worth noting that the 18.4-cent tax represented about 40% of the cost

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<sup>8</sup> "Gasoline Tax." Gasoline Tax. American Petroleum Institute, n.d. Web. 12 May 2015.

<sup>9</sup> "States Siphon Gas Tax for Other Uses." WSJ. N.p., n.d. Web. 12 May 2015.

of a gallon of petroleum in 1993. The gas tax now represents about 12% of the price of a gallon of petroleum.

Simply put the gas tax has not been able to meet the rising costs of roads and mass transit (see Exhibits 2 and 3 in Appendix)

. Congress for the last decade has dealt with the shortage in two ways. The first is to use general revenues and accounting devices to partially cover the gap. The second is one of the very reasons for the infrastructure crisis: The Congress has delayed the maintenance of many roads, bridges, etc.

The incentive to raise the gas tax now has increased, given that gasoline prices in the United States are at five-year lows. Gasoline prices in the United States have declined by about \$1.40 per gallon since June 2014. In terms of price per gallon of gasoline, US gas prices are amongst the lowest in the world. In fact only 8 of the 61 countries studied in a Bloomberg report have lower gasoline prices. In terms of affordability (gasoline prices adjusted to cost of living) there are only 5 countries that have more affordable gas prices; Four of the 5 are OPEC members<sup>10</sup>.

An increase in the federal gas tax of 35 cents per gallon would result in the United States earning roughly an additional \$50 billion in revenue per year. This is projected to be enough to close the expected gap of the Highway Trust Fund in years to come and to cover maintenance costs of infrastructure that should have been fixed previously. At current gasoline prices, consumers would still be paying over \$1 less per gallon than they were in June of last year<sup>11</sup>.

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<sup>10</sup> "Bloomberg Gas Price Ranking." Bloomberg.com. Bloomberg, n.d. Web. 12 May 2015.

<sup>11</sup> Sachs, Jeffrey. "Why It's Time to Raise the Federal Tax on Gasoline." POLITICO Magazine. N.p., n.d. Web. 12 May 2015.

Another benefit of the increased tax is that it would create an added incentive in the long-term to purchase more fuel-efficient cars. Of the 20 million barrels of oil consumed every day in the US, 40% is consumed by passenger vehicles. The US is the largest consumer of oil in the world<sup>12</sup>. Given that oil is a finite resource, the burning of which has detrimental environmental impacts, a policy that encourages curtailment is in the best interest of the country long-term. As Columbia University economist Jeffrey Sachs has stated “Adding 35 cents to the gas tax is equivalent to collecting a tax of roughly \$40 for every ton of CO<sub>2</sub> emitted by gasoline. This is also close to the Environmental Protection Agency’s estimate of the social cost of carbon that measures the incremental damage to the environment caused by each incremental ton of CO<sub>2</sub> emission.<sup>13</sup>”

In addition to the environmental benefits of an increased gas tax, there are other positives from an externality perspective. Not only can an increased gas tax internalize the pollution externality but it can also better reflect the price of other social costs that result from oil drilling and consumption. One example is externalities related to foreign policy. Experts often point to a few major effects of greater dependence on foreign oil. First of all, there are the costs that oil users impose on one another by driving up demand and thus the price of oil. Secondly, there is an additional cost to the economy as a whole related to the greater risk of recession in the event of an oil price shock<sup>14</sup>. A third

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<sup>12</sup> "U.S. Energy Information Administration - EIA - Independent Statistics and Analysis." Countries. N.p., n.d. Web. 12 May 2015.

<sup>13</sup> Sachs, Jeffrey. "Why It's Time to Raise the Federal Tax on Gasoline." POLITICO Magazine. N.p., n.d. Web. 12 May 2015.

<sup>14</sup> "Alternative Approaches to Funding Highways." Congressional Budget Office. N.p., 23 Mar. 2011. Web. 12 May 2015.



externality that may not be as clear to measure are costs related to defense spending to protect American oil interests in volatile parts of the world.

Furthermore, gasoline taxes are desirable from an efficiency perspective because they cost very little to implement. This is due to the fact that governments collect taxes from fuel distributors (gas stations) and drivers pay the tax when they purchase gasoline. Additionally, the fact that gasoline taxes incentivize drivers to curtail fuel use and consequently reduce the social costs associated with travel- discussed in length in the next section (such as pavement damage, noise, congestion etc.)- is an added benefit.

Nonetheless, there are major issues related to raising the gasoline tax. First of all, raising the tax is politically very difficult to do. Many lawmakers simply do not want to increase the financial burden on consumers. While the elasticity demand for gasoline in the short run is relatively small, such that a rise in gas prices will very likely result in an increase in revenue, this also means that consumers suffer precisely because they are so reliant on gasoline. The short-run, estimated price-elasticity of demand is -0.26. This means that a 10% increase in gasoline prices will result in a reduction of quantity demanded of 2.6%<sup>15</sup>.

Cars are so prevalent in the United States, with a ratio of 828 motor vehicles per 1000 people according to a 2012 report by the Department of Transportation, that the pain of a price increase will be widespread, not limited to any small group<sup>16</sup>. This only serves to make a gas tax increase even more politically challenging. Coupling this with the fact that politicians typically have short-term time horizons, where they won't

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<sup>15</sup> Espey, Molly. "Gasoline Demand Revisited: An International Meta-analysis of Elasticities." *Energy Economics* 20 (1998): 273-295. Gasoline Demand Revisited: An International Meta-analysis of Elasticities (n.d.): n. pag. Courses.washington.edu. Web.

<sup>16</sup> "Transportation Statistics Annual Report 2012." BTS Publications (Alphabetical List) | Bureau of Transportation Statistics. N.p., n.d. Web. 12 May 2015.

experience political gain from the long-term benefits (mentioned earlier) of a tax hike, means that political will is difficult to muster. This will likely remain the case given that Americans appear to be steadfastly against an increase in gas taxes to fund infrastructure. A New York Times, article from earlier this year explains that many politicians will not publicly support a gasoline tax increase due to fear of retribution from constituents. Janet Kavinsky, executive director for transportation and infrastructure at the US Chamber of Commerce stated that the gasoline tax is, “just politically not a very popular solution”<sup>17</sup>.

Another potential issue with the gasoline tax, is that it may not be able to sustainably generate a given level of revenue due to the increasing fuel economy of motor vehicles. In order to garner information about future fuel efficiency I assessed the trend of average passenger vehicle fuel economy over nearly the past 35 years. A simple linear regression allowed me to determine a linear approximation for average fuel efficiency of all cars in the United States over time. It is important to note that if one is to use the linear approximation to try to predict future average fuel economy this is based on the assumption that fuel standards will rise at a similar pace to past years. This may in fact not be true as significantly higher standards could be put in place, which would actually exacerbate the issue of gasoline tax revenue declining. The reason cars were chosen for this analysis is because they make up a significant majority of the nation’s vehicle fleet and would provide information about majority of potential gas tax revenue declines that result from better fuel economy (heavy-duty trucks for example only make up 4% of the nation’s fleet)<sup>18</sup>. It is also worth noting, that I tried regressing average actual fuel

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<sup>17</sup> Cohen, Patricia. "Gasoline-Tax Increase Finds Little Support." The New York Times. The New York Times, 02 Jan. 2015. Web. 12 May 2015.

<sup>18</sup> "Alternative Approaches to Funding Highways." Congressional Budget Office. N.p., 23 Mar. 2011. Web. 12 May 2015.

economy of all passenger vehicles in a given year against the CAFE standards (fuel efficiency standards) for new cars put in place by the government that year. The idea, of course, is that as CAFE standards increase so does fuel economy over time. The issue with this regression, and the reason it has limited predictive power is because CAFE standards stayed constant for a significant period of time (a large percentage of the sample). All of this said, the linear approximation determined, estimates that over the next 10 years, fuel economy will increase by over 20%. This means that the decline in potential gasoline tax revenue would be substantial, and that the argument that increasing fuel economy is an issue for long-term sustainability of the tax is reasonable. The regression data is presented below<sup>19</sup>:

SUMMARY  
OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.952246563
R Square	0.906773517
Adjusted R Square	0.90386019
Standard Error	0.733632611
Observations	34

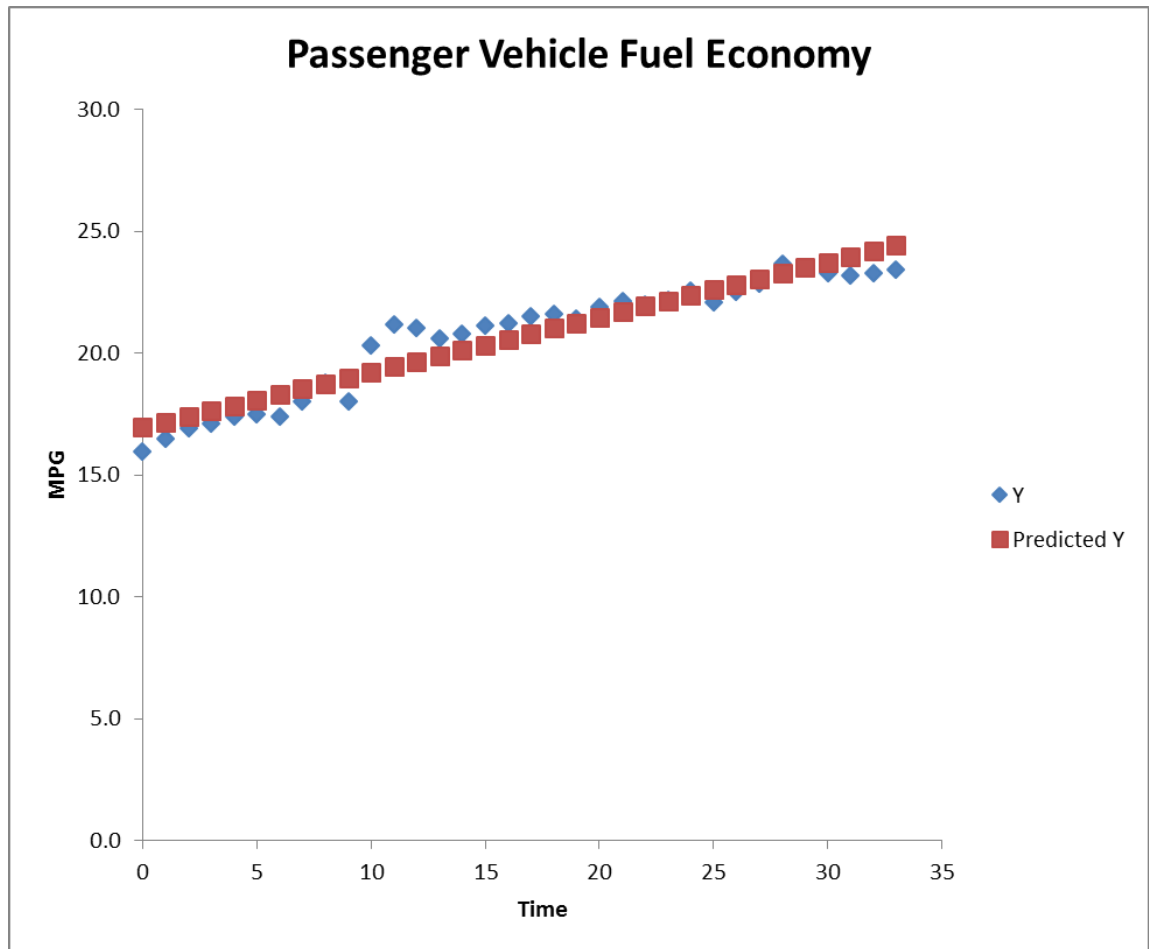
ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	167.5200385	167.52	311.2501	4.77E-18
Residual	32	17.22293786	0.538217		
Total	33	184.7429764			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	16.9438861	0.246182709	68.82647	2.37E-36	16.44243	17.44534	16.44242834	17.44534387
X Variable 1	0.226252587	0.012824452	17.64228	4.77E-18	0.20013	0.2523750	0.200130034	0.25237514

- NOTE: Time 0 = Year 1980

<sup>19</sup> Data From "Table 4-23: Average Fuel Efficiency of U.S. Light Duty Vehicles | Bureau of Transportation Statistics." Table 4-23: Average Fuel Efficiency of U.S. Light Duty Vehicles | Bureau of Transportation Statistics. N.p., n.d. Web. 12 May 2015.



In addition to the burden on consumers and potential revenue losses due to increasing fuel economy, there are other reasons why politicians argue against increased gasoline taxes. These arguments are typically that there are other forms of taxation which better capture the many externalities associated with driving, that the foreign policy issues with oil-dependence are overstated, and that the tax creates deadweight loss. Of these reasons, the first appears to be the most plausible. This is because the foreign-dependence costs are certainly severe. The Department of Energy has stated that oil price shocks and price manipulation by OPEC alone have cost the economy about \$2 trillion

over the 4 years from 2004 to 2008<sup>20</sup>. Additionally, the deadweight loss argument mentioned applies to any tax and thus is not unique to a gasoline tax.

### **Vehicle Miles-Traveled Tax (VMT Tax)**

In light of certain shortcomings of the gasoline tax, there is another tax that has been proposed by economists, policy analysts, and a small number of legislators. This tax, known as the vehicle miles-traveled tax (VMT tax), is essentially a fee charged to drivers based on how many miles they have traveled.

Often when taxes which link infrastructure funding to some sort of consumption are imposed, the costs of users' travel get conflated with costs of highway construction and maintenance. It is important to recognize that while these two costs overlap, they are different. Certain construction and maintenance costs are tied to use, and result because of deterioration that occurs as a result of highway use. Some costs such as those of aging, and weather are not linked to use. One of the things the VMT tax hopes to accomplish is capture many of the costs associated with use of roads.

In addition to costs related to deterioration of highways, any given driver's road use also imposes costs on other users, nearby non-users, the environment, and the economy (in terms of congestion, risk of accidents, noise pollution, and foreign oil-dependence). A VMT tax can be adapted to address these costs as well, which is important because estimates from various studies indicate that most highway users currently pay much less than the full cost of their travel. Federal and state fuel taxes currently produce revenue of roughly 2 cents per mile for automobiles. The Federal Highway Administration estimates that the national average cost of congestion alone,

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<sup>20</sup> "Reduce Oil Dependence Costs." Reduce Oil Dependence Costs. U.S Dept. of Energy., n.d. Web. 12 May 2015.

caused by automobile travel, is about 10 cents per mile. Furthermore, it is estimated by the Congressional Budget Office that the efficient fuel tax today without a VMT tax would be about \$1.30 per gallon of gasoline, over 6 times its current level. The CBO projects that once the fleet reaches 2016 fuel standards the estimated fuel tax without a VMT would need to be \$2.10 per gallon<sup>21</sup>.

An advantage of a VMT tax when compared to a traditional fuel tax is that most of the costs of highway use including pavement damage, congestion, accidents, noise etc. are more closely related to the amount of miles driven than the amount of fuel consumed. This is particularly true as vehicles become more fuel efficient. Another advantage of VMT taxes as compared to fuel taxes is that they can be varied and adapted to various criteria, where fuel taxes cannot. For example, VMT taxes can be imposed at different rates dependent on which roads a motorist is traveling on and during which time of day. This can help reduce traffic congestion. VMT taxes can also be imposed on different types of vehicles differently. Trucks, for example, only constitute 4% of the nation's fleet but account for an estimated 25% of all costs highways users impose on others, including almost all costs associated with pavement damage. To address these costs, the VMT tax could be imposed on trucks at a higher rate than it is on cars.

From an equity (fairness) standpoint VMT taxes are similar to fuel taxes. They are somewhat regressive in that they disproportionately affect the poor relative to the wealthy. Nonetheless, they satisfy a user-pays principle, with taxes correlated with how much a good is used. This fits one concept of distributional equity, which indicates that if

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<sup>21</sup> "Alternative Approaches to Funding Highways." Congressional Budget Office. N.p., 23 Mar. 2011. Web. 12 May 2015.

one benefits from public spending he or she should pay for it. The below graphic compares gasoline taxes and VMT taxes.

### Implications of Fuel Taxes and VMT Taxes

	Equity			Efficiency			
	User Pays	Larger Relative Burden on Low-Income People <sup>a</sup>	Larger Relative Burden on People in Rural Areas	Address Fuel-Related Costs <sup>b</sup>	Address Mileage-Related Costs <sup>c</sup>	Collection Costs	Privacy Issues
Fuel Taxes	Yes	Generally, yes	Yes	Yes	Somewhat <sup>d</sup>	Low	No
VMT Taxes	Yes	Generally, yes, but perhaps less than fuel taxes	Yes, but less than fuel taxes	Significantly <sup>e</sup>	Yes	High	Yes

Source: Congressional Budget Office.

Note: VMT = vehicle-miles traveled.

- Some low-income people do not own motor vehicles; however, they pay fuel taxes indirectly because the prices of goods they buy reflect the goods' transportation costs.
- Fuel-related costs include greenhouse gas emissions, dependence on foreign oil, and local air pollution from trucks.
- Mileage-related costs include road wear, congestion, accidents, local air pollution from passenger vehicles, and noise.
- Fuel taxes would have proportionately less effect on miles driven than on fuel use and provide minimal incentive for users to avoid congestion or increase the number of axles on trucks they purchase.
- VMT taxes would have a proportionately equal effect on fuel use and mileage but provide no incentive for users to increase fuel efficiency.

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All of this stated, the question arises: how exactly would the government impose a VMT tax? How would the miles traveled be measured? The answer involves placing electronic tracking devices in every vehicle that will be on the road. While this technology allows for many of the benefits mentioned earlier, such as being able to “price-discriminate” based upon time of day and thus reduce rush-hour congestion, there are many potential problems that arise.

One such issue, is privacy. If trackers which can determine where a particular vehicle is traveling and at what time of day (this type of tracking would provide the greatest incentive for efficient highway use) are implemented in cars, drivers are in effect

<sup>22</sup> "Alternative Approaches to Funding Highways." Congressional Budget Office. N.p., 23 Mar. 2011. Web. 12 May 2015.

sacrificing privacy, as whichever entity is monitoring this to impose taxes knows this information.

Another issue is administrative. The total costs of implementing these tracking device in cars will be large (even though the trackers themselves may not be that expensive), and the logistics of doing so daunting. One way to ensure that cars have the trackers implemented is to make the checking of trackers part of annual car inspections. Still, the time it would take to have nearly 100% of the fleet converted to using this technology would be significant.

There is also the potential that the devices would be subject to tampering or technological manipulation. This must be taken into consideration, and thus legal and technological solutions must be developed to mitigate this problem.

Furthermore, the political issues associated with a VMT tax may be greater than that of the gasoline tax. This is of course, because highway use has historically been viewed as essentially free (in terms of direct payment). If the public does not fully understand the benefits of the VMT it will be incredibly difficult for legislators to pass such a tax. In fact, Oregon Congressman Earl Blumenauer (D) is one of the only members of congress to vocally argue in favor this type of tax. His home state of Oregon has imposed a trial version of this tax.

## **Congressional Proposals**

In light of the political issues associated with raising the gas tax or imposing a miles-driven tax, lawmakers have been searching for alternatives to raise revenue to support infrastructure projects. One such alternative has been proposed by Senators



Barbara Boxer (D) and Rand Paul (R). The proposal called, the *Invest in Transportation Act of 2015* , has the following provisions:

**Boxer-Paul Proposal**

1. It extends the Highway Trust Fund and prevents cuts to transportation programs.
2. It allows companies to **voluntarily** return their foreign profits to the United States at a tax rate of 6.5%. This rate only applies to repatriations that exceed a given company's average repatriation in recent years. The rate also only applies to funds that were earned in 2015 or earlier. Companies have up to 5 years to complete the transfer.
3. It ensures that a portion of repatriated funds will be used for increased hiring, wages and pensions, research and development, environmental improvements, public-private partnerships, capital improvements, acquisitions. The proposal includes the stipulation that funds cannot be spent on increases in executive compensation, or on increases in shareholder dividends or stock buybacks, for three years after the program ends.
4. It states that all tax revenue from repatriation programs will be transferred into the Highway Trust Fund.
5. Companies that invert (re-incorporate overseas) must repay the tax incentive with interest.

The proposal essentially aims to circumvent the political issues of raising the gasoline tax on common consumers, by attempting to create an incentive for corporations

to pay a tax that will support infrastructure projects. A white paper from Senator Boxer's office states that estimates of similar proposals have predicted that those proposals could increase GDP by anywhere from \$178 billion to \$440 billion, and create between 1.4 and 3.5 million jobs<sup>23</sup>.

This idea certainly seems enticing at first, but when an analysis of the long-term costs of such a proposal is conducted, the proposal looks much less attractive. This proposal essentially equates to a tax holiday, and the nonpartisan Joint Committee on Taxation has said that tax holidays would generate revenue initially but would cost billions of dollars long-term. The analysis said this plan would generate \$20 billion initially but ultimately cost the federal government about \$96 billion, as companies would have more incentive to keep their profits abroad and wait for another tax holiday<sup>24</sup>.

### **Delaney Proposal**

A somewhat similar proposal to the Boxer-Paul proposal is that of Maryland Congressman John Delaney (D) and New York Congressman Richard Hanna (R). Delaney and Hanna's bipartisan proposal, named the *Infrastructure 2.0 Act*, also attempts to solve the Highway Trust Fund solvency crisis by using international corporate tax reform. The act has the following provisions:

1. Under the Act, existing overseas profits accumulated by U.S. multi-national corporations would be subject to a **mandatory**, one-time 8.75% tax, replacing the deferral option and current rate of 35% on repatriated profits.

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<sup>23</sup> St. "Boxer-Paul "Invest in Transportation Act"." Boxer-Paul "Invest in Transportation Act" (n.d.): n. pag. Web.

<sup>24</sup> Laing, Keith. "Paul, Boxer Team up on Transportation Funding." The Hill. N.p., n.d. Web. 12 May 2015.

2. The act would raise \$120 billion for the Highway Trust Fund, enough to meet the funding gap at increased levels for six years.
3. It would raise \$50 billion to capitalize the American Infrastructure Fund (AIF) which is a new financing mechanism for transportation, water, energy, communications and education projects. Leveraged to \$750 billion, AIF financing (loans, bond guarantees and equity) is available to state and local governments. The leverage of course means that the \$50 billion would serve as capital upon which the bank can borrow and lend or which can serve as a guarantee on defaulted bonds. The American Infrastructure Fund was first proposed in Rep. Delaney's bipartisan Partnership to Build America Act<sup>25</sup>.
4. The act would implement a \$25 million pilot program to create regional infrastructure accelerators (which are essentially non-profit organizations tasked with developing standards for private sector participation, sharing best practices in infrastructure development, finance, and operations, pre-screening projects to evaluate the advantages and disadvantages of traditional and alternative financing and procurement approaches, readying and connecting projects with private capital, etc.)
5. The legislation establishes a bipartisan and bicameral commission that is tasked with developing a solution for permanent solvency of the Highway Trust Fund.
6. The Act creates an 18 month deadline for international tax reform. To encourage action, the legislation includes a forcing function: if reform is not enacted, a fallback international tax package would be implemented. Under this option, for Active Market Foreign Income, a company would pay a 12.25% tax to the U.S. on overseas profits if they are currently paying no tax and a 2% tax to the U.S. if they are already paying the

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<sup>25</sup> "Information on The Partnership to Build America Act (H.R. 2084)." Congressman John Delaney. N.p., 20 Mar. 2013. Web. 12 May 2015.

OECD average of 25% abroad, with a sliding scale in-between. This would essentially end deferral.

As stated on Congressman Delaney's website, "The Infrastructure 2.0 Act frees the estimated \$2 trillion in overseas earnings to return to the United States, spurring private sector re-investment and growth. The Infrastructure 2.0 Act provides six years of HTF solvency, providing immediate certainty to the private sector and policymakers. This pro-growth fallback reform package would end deferral, reduce anti-competitive over taxation, decrease taxes for companies paying fair rates abroad but increase taxes for companies in tax havens. This would eliminate the lock-out effect and allow for the free flow of profits back to the United States<sup>26</sup>."

The Delaney proposal will definitely raise more in terms of funding than the Boxer-Paul proposal. Assuming the legislation would be effective in taxing the nearly \$2 trillion in foreign profits currently held overseas, this would raise an estimated \$170 billion in revenue, which is enough to close the Highway Trust Fund gap for about 6 years and create a type of infrastructure bank. The Committee for a Responsible Federal Budget praises the proposal stating:

"Delaney's proposal is fiscally responsible: it appears to raise enough revenue to offset the HTF shortfall and fund an infrastructure bank...the proposal recognizes this solution is only a band-aid for both the issues of tax reform and infrastructure spending, and puts processes in place to accomplish both. In addition, the increased infrastructure spending and more efficient tax code would boost long-

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<sup>26</sup> "Delaney to Introduce the Bipartisan Infrastructure 2.0 Act to Fix the Highway Trust Fund, Rebuild America." Congressman John Delaney. N.p., 28 Jan. 2015. Web. 12 May 2015.

term economic growth. For these reasons, the proposal is certainly worthy of consideration next Congress<sup>27</sup>.”

The primary concern for many opponents of the proposal is that the 8.75 % is too low. While the mandatory nature of the proposal ensures a substantial amount of revenue generation, the rate is still significantly lower than the 35% rate corporations currently have to pay when repatriating. Thus, the proposal in a sense rewards corporations for deferring tax payments. The lower rate however also provides corporations with a disincentive to continue exploiting loopholes to avoid paying the normal rate.

The American Infrastructure Fund (AIF), essentially creates an infrastructure bank, which would be funded by the sale of \$50 billion worth of infrastructure bonds. The bonds would have a 50-year term, would pay a 1% interest rate and would not be guaranteed by the US government. The incentive for companies to purchase these bonds is that they would be able repatriate a certain amount of overseas profits tax free for every dollar of bonds that they buy. The rate of the multiplier, i.e. the ratio of how many dollars can be repatriated for every dollar of bonds that is held, will be determined by a reverse Dutch auction. The companies could spend the repatriated funds however they choose. The AIF will have an independent board and would not be controlled by the government. Delaney has stated that the AIF would only be able to make “quantitative” decisions, meaning they would only invest in projects based upon measurements of economic and social value creation as opposed to on qualitative bases<sup>28</sup>.

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<sup>27</sup> "Delaney Combines Tax Reform and Infrastructure...With a Twist." Committee for a Responsible Federal Budget. Committee for a Responsible Federal Budget, 15 Dec. 2014. Web. 12 May 2015.

<sup>28</sup> "Information on The Partnership to Build America Act (H.R. 2084)." Congressman John Delaney. N.p., 20 Mar. 2013. Web. 12 May 2015.

Essentially, this proposal, legally takes away the ability of companies to defer taxes, and replaces this deferral option with a lower tax-rate. This legal option to defer is actually quite unique to the United States and does not exist in most developed countries. This lower rate would serve to make the US rate much more competitive with world rates, and would essentially create a minimum tax rate for firms that are keeping their funds in tax-haven countries. Another benefit of this type proposal when compared to the Boxer-Paul proposal is that it changes the future taxation system, actively creating a long-term framework to address both the infrastructure and corporate taxation issues. This said, in addition to the issues mentioned regarding the low-rate there are other issues with this proposal in that it does not directly address the actual costs associated with using the public good of highways (this will be explained in more detail later in the paper).

### **Obama Administration Proposal**

Recently the Obama administration published an infrastructure proposal in their 2016 budget, that is almost identical to the Delaney-Hanna proposal. The primary difference between the two proposals is the tax rate on foreign earnings. Under the Obama proposal it would be 14% as opposed to Representative Delaney's 8.75%. The administration predicts that this can spur \$478 billion of surface-transportation investment over six years. The Obama budget also includes a provision for a National Infrastructure Bank, similar to the AIF in Delaney's proposal<sup>29</sup>.

The budget also attempts to create new types of bonds known as America Fast Forward Bonds (which are similar to the Build America Bonds the administration created during the financial crisis), as well as new tax-exempt Qualified Public Infrastructure

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<sup>29</sup> "The President's Budget For Fiscal Year 2016." The White House. The White House, n.d. Web. 12 May 2015.

Bonds. America Fast Forward (AFF) Bonds are qualified tax credit bonds, which are taxable bonds issued by state, local, or other eligible issuers, where the federal government subsidized a significant percentage of the interest cost by granting investors annual tax credits instead of interest payments. AFF bonds would provide a 28% subsidy to state and local issuers from the Treasury Department on the interest rate of the bonds<sup>30</sup>

<sup>31</sup>. Qualified Public Infrastructure Bonds are essentially municipal bonds available for public-private-partnerships. They do not have any state borrowing caps, and would be exempt from the alternative minimum tax (AMT). Their purpose is essentially to serve as a lower-cost financing option that will spur private participation in building public infrastructure<sup>32</sup>.

## **Private Sector Participation**

Private participation in the building of infrastructure occurs in a variety of ways. One of the most commonly presented solutions to the infrastructure crisis is an increase in the use of public-private-partnerships (PPP). In general terms a public-private-partnership is a legally binding contract between a public sector entity and a private firm, where both parties agree to share the risks and rewards of an infrastructure project. The extent to which the risks and rewards are shared varies, and is largely dependent on the responsibility undertaken by each party. One form of a PPP with extensive private sector involvement is known as a DBFOM agreement. In this type of agreement private parties agree to design, build, finance, operate, and maintain an infrastructure asset for a pre-

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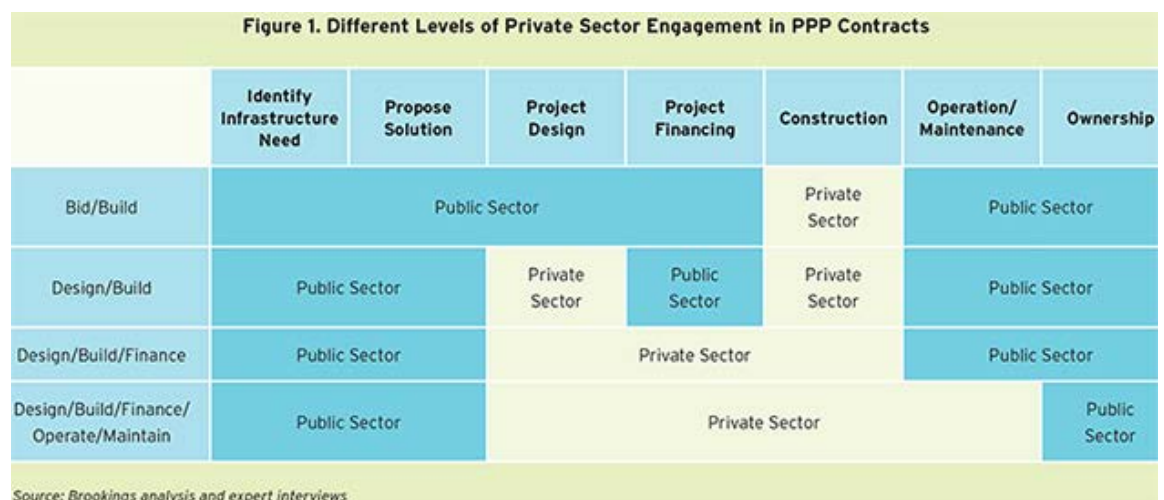
<sup>30</sup> Communications, Metro. "America Fast Forward Transportation Bonds." White Paper - America Fast Forward (n.d.): n. pag. [Http://americafastforward.net/](http://americafastforward.net/). America Fast Forward. Web.

<sup>31</sup> Sabol, Patrick, and Robert Puentes. "Building Better Infrastructure with Better Bonds." The Brookings Institution. N.p., 22 Apr. 2015. Web. 12 May 2015.

<sup>32</sup> Sabol, Patrick, and Robert Puentes. "Building Better Infrastructure with Better Bonds." The Brookings Institution. N.p., 22 Apr. 2015. Web. 12 May 2015.

determined amount of time. As a result of undertaking these responsibilities private entities earn a return in one of two ways: they can either charge tolls or fees generated from the project, or they contract to receive availability payments from the public sector. Availability payments are recurring payments that private entities earn based on the condition of the infrastructure asset.

Though it is not as popular in the United States as in foreign countries like the United Kingdom the DBFOM model has been used domestically. In the US PPP projects range from DBFOM model projects to simpler design-build projects. It is important to note that the design-build model is distinctly different from the design-bid-build model (which is not strictly considered a PPP). The design-build model has a single point of contact - one company that assumes responsibility for both designing and building the infrastructure asset. The traditionally used design-bid-build model has multiple points of contact, as separate entities are responsible for the design and construction parts of the contract. The following graphic shows varying levels of private sector involvement in PPP infrastructure projects<sup>33</sup>.



<sup>33</sup> Engel, Eduardo, Ronald Fischer, and Alexander Galetovic. "Public-Private Partnerships to Revamp U.S. Infrastructure." The Brookings Institution. N.p., 25 Feb. 2011. Web. 12 May 2015.



The primary reasons PPPs are suggested as a solution to the United States's infrastructure problems is because they: deliver projects at significantly lower costs (than traditional models), can allocate risk more effectively, improve on-time and on-budget project delivery, increase accountability for asset-performance, promote efficiency-increasing innovation, and attract new sources of capital that may otherwise not be available.

PPP projects are typically more cost-effective than the traditionally-used design-bid-build (DBB) forms of project delivery. Though the cost of capital (the return that needs to be provided to a security-holder) is generally higher than a highly-rated authority financing, other cost elements related to designing, building, operating, maintaining etc. may be significantly lower. Cost-savings can occur in PPP projects for a variety of reasons. One of the reasons that PPP projects can reduce costs is because there is continued communication across the different parts of the project, particularly if there is, a vertical integration of processes under one or two firms of everything from designing down to maintenance of a project. PPP projects can also be more cost-effective than traditional DBB projects because private companies are incentivized to look at the projects holistically and only undertake the project if they provide a profit. They also will resultantly try to use resources most efficiently and reduce costs to maximize their profit.

In a 2009 study of 114 PPPs the United Kingdom's national audit office found that 69% of the projects were delivered on time, and 65% were completed within budget. The University of Melbourne also conducted a study comparing 42 traditional procurement projects and 25 PPPs and came to the conclusion that PPPs provide much

greater cost certainty. They found that PPPs had an average cost escalation of 4% after contracts had been signed, while traditional projects had a cost escalation of 18%<sup>34</sup>.

From a risk allocation perspective, PPPs are also more effective because projects would be contracted to parties best suited to undertake a specific kind of risk. The focus on earning profits, incentivizes private sector firms to analyze potential risks before undertaking a project. Thus, private firms should not only be more informed about risks but also more likely to manage them. The fact that concession agreements for PPPs, the legal agreement for these projects, usually include stipulations with penalties for not complying with strict timelines and safety measures also helps reduce certain types of risk, as there is significant accountability.

The contractual obligations created by concession agreements also improve on-time and on-budget project delivery. Because private firms who are interested in maximizing profits will be penalized if they do not complete projects on time, timeliness improves as compared to traditional projects. Furthermore, these contracts establish a level of certainty on the public sector's maximum cost which serves to improve cost efficiency.

As far as asset performance is concerned, the reason for superior performance as compared to DBB model projects also has to do with accountability that is created as a result of concession agreements. Concession agreements usually include conditions for non-payment or deductions if a given infrastructure asset is not available for use or established performance standards are not being met.

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<sup>34</sup> "Public-Private Partnership." Bulletin of the American Academy of Arts and Sciences 37.8 (1984): 8-10. Pricewaterhouse Coopers. Web.

The fact that private companies are incentivized to reduce costs, and that the PPP process involves a competitive bidding process also serves to increase innovation, as these firms try to find better ways to create infrastructure, or ways to cut costs<sup>35</sup>.

When it comes to financing infrastructure projects, the attraction of new capital sources could have a potentially large impact on the overall state of American infrastructure, and its future. The increasing opportunity for projects to generate revenue either via tolls or through availability payments could be attractive to private capital. Whether it be shareholders who invest in infrastructure companies that actually undertake large portions of PPP projects, or institutional or retail investors that buy securities backed by toll revenues, there are a variety of ways for the private sector to invest in infrastructure assets. There may also be an argument for increased private investment in traditional municipal bonds if the benefits of these bonds has been understated, there has been an increase in the assets under management of the types of investors hungry for these bonds, or if returns have improved in recent years.

The types of investors who would find infrastructure a compelling asset class would be pension funds, life insurance companies, college and university endowments, infrastructure companies (as mentioned), and in certain cases private equity firms and hedge funds. Pension funds, life insurance companies, and endowments would potentially find infrastructure a compelling asset class to invest in because they offer a balance for their long-term obligations, stable returns, diversification, and a hedge against inflation. With trillions of dollars in assets under management these investors also serve as capital

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<sup>35</sup> Aecom. "Fostering a Larger Private Sector Role in United States Infrastructure." Fostering a Larger Private- Sector Role in United States Infrastructure (n.d.): n. pag. AECOM. Web.

sources that appear to have the potential to play a substantial role in closing the infrastructure funding gap.

Private equity firms tend to invest in infrastructure projects differently, than the aforementioned investors. They traditionally take a more active role in revenue generating projects and would own an infrastructure asset or have a stake in infrastructure companies-- i.e. they are investing in the equity of infrastructure assets. Hedge funds on the other hand would tend to invest in riskier infrastructure investments, usually acting only as passive investors.

There are a variety of reasons we have not seen more private investment in infrastructure. Firstly, the fact that investors require a return either via availability payments or tolls (the only practical ways that have been developed for investors to earn a return on infrastructure investments) is an important factor in limiting this investment. The narrow number of ways by which investors can earn a return, indicates that assets must have a significant degree of privatization; this said, wide-scale privatization is unlikely and somewhat impractical in the short run. This is because it is logistically difficult to make every US road into some form of a toll road, due to huge administrative costs, a large diversion of resources, and convenience costs.

In addition to this, privatization of all roads and the creation of a user-fee system would be very difficult to do because of political reasons (for reasons that are essentially the same as the VMT tax). Use of interstate highways for example, has been historically free (at least in terms of direct user-fees). A change of this system where users would be directly charged would be viewed as a drastic deviation from the norm and thus would be incredibly unpopular politically.

Furthermore it is quite unclear whether returns, in a PPP system where the profits of a company are directly linked to toll revenue, will be competitive with those of other asset classes. The fact that the United States has a very small sample size, with regards to surface transportation PPP projects, means that there is a great degree of uncertainty in trying to assess potential returns. In fact, most major infrastructure indices have US surface transportation constitute a very small component of the overall index (or it is not included in the index at all).

Additionally, it is important to note that while PPPs are usually beneficial, there are potential negatives associated with them. With profits as a motive, private firms may be incentivized to cut costs by cutting corners in any stage of the development process. Because observation and regulation of all the activities of a private company by the government is difficult, an asymmetric information problem arises that could lead to poorer outcomes for motorists, whether it be in terms of safety or quality associated with the public good. Moreover, because private companies are incentivized to increase profits, they may lobby government officials to support infrastructure projects that may not actually be efficient.

Nonetheless, there are certainly times when increased private involvement would be appropriate. It is theoretically possible to increase private sector investment by increasing incentives (such as tax-credits) on municipal bonds. Additionally, it would be worthwhile for a value-for-money (vfm) analysis to be conducted before deciding how an infrastructure project will be funded, built, operated, etc. This type of analysis involves an evaluation of future cash flows to determine if a project is better suited for a traditional public-procurement or a PPP. As indicated earlier, even if an infrastructure asset does not

directly generate more toll revenue than its cost, it still may be worth building due to the social benefit it provides. These cases are prime examples where an extensive PPP model would not work. Thus, it is clear that while increased private activity could ameliorate infrastructure problems, this is not a panacea.

## **Devolution**

One other potential solution that is presented to close the funding gap is called devolution. Essentially, the idea behind this is that governments should still maintain the traditional responsibilities of funding and supporting infrastructure but this should not be done at the federal level. All infrastructure assets currently controlled by the federal government should be passed on to state governments or lower levels of government. Every state can then determine how to pay for these infrastructure assets, whether it be through state taxes or user-fees.

The benefit of this type of system is that states can “get closer” to the users of infrastructure assets. The states will have more information on the best ways to raise revenue to support a given infrastructure asset, and potential costs associated with that asset (for example states will be most aware of which roads suffer from extreme traffic congestion, during which times and can thus price-discriminate accordingly). States can also make adjustments based on cost-of-living and other state-specific factors, that federal governments cannot do. Thus, the main argument in favor of devolution is that states can more effectively raise revenue, and better price-discriminate, because they have more information and an administratively easier task as far as raising taxes is considered.

This said there are multiple issues with devolution. Drivers routinely cross state boundaries, thus it would be seen as unfair if drivers who were not directly paying for a given infrastructure asset through taxes were able to fully use it. There are also numerous political concerns, as interstate highways have usually been the domain of federal governments. Furthermore, while devolution may appear to make the task of raising revenue easier, it does not in any way address the question of how best to do this is; rather, it shifts the problem to the states. Lastly, there is an issue with devolution related to competition between states. States compete to have lower tax rates than other states. This competition could lead to sacrificing infrastructure quality, as less tax revenue means less funds can be allocated to support infrastructure.

## **Conclusions and Policy Implications**

With all of the most feasible, potential solutions now presented the question arises: what is the answer to America's infrastructure crisis? From the perspective of an economist, it is apparent that the VMT tax and gasoline tax are the best ways to fund infrastructure.

The optimal policy would involve raising the gasoline tax in the short term, and then phasing in a VMT tax at some point over the next decade. When the VMT tax is phased in the gas tax can be subsequently reduced. The reason the VMT tax and gasoline tax should both be imposed together is that they best capture all of the costs associated with driving. The primary costs as mentioned include pavement damage, noise pollution, risk of accidents, air pollution, and congestion. Both of these taxes align with a user-pays principle, which is essentially the idea that effective public policy involves charging for use of a public good. The charges should be in line with the costs of the particular good.

The advantage of taxes that satisfy the user-pays principle and thus meet the actual costs of using a public good, are twofold. Firstly, these taxes are equitable in the sense that they charge people who use the public good, correspondingly more (as you drive more you would pay more in VMT taxes and as you consume more fuel the more you would pay in fuel taxes). Secondly, these taxes by virtue of the fact that they are charging for use of the public good, are a continuous source of sustainable revenue (provided the taxes keep in line with actual costs associated with driving). The estimated efficient taxation level that would capture the mileage-related costs of driving are between 10 and 15 cents per mile for passenger vehicles (dependent on location and other factors) and between 20 and 70 cents for trucks<sup>36</sup>. Once efficient VMT taxes are implemented the gasoline tax could be reduced to about 20 cents per gallon, and all major estimated costs would be appropriately captured by the two taxes.

None of the congressional proposals are ideal solutions to the infrastructure crisis for a variety of reasons. The Boxer-Paul proposal is obviously not an ideal solution because it does not create a recurring revenue source, does not address the actual costs associated with use of the public good that is highways, and is projected to ultimately cost the government billions of dollars. This is because, as mentioned, the proposal would create incentives for multinational corporations to continue deferring paying taxes and waiting for another tax holiday.

Both of the Delaney and Obama proposals are superior to the Boxer-Paul proposal in the sense that they implement a mandatory tax and create a recurring revenue source. They thus amount to a tax reform policy as opposed to a short-term stop gap measure.

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<sup>36</sup> "Alternative Approaches to Funding Highways." Congressional Budget Office. N.p., 23 Mar. 2011. Web. 12 May 2015.



This said, like the Boxer-Paul proposal, they do not address the actual costs associated with using infrastructure, meaning they are poor from many equity and efficiency perspectives. Firstly, they do not satisfy any user-pays criterion, where drivers should be charged in proportion to their use of a public good. Secondly, they do not manage to create taxes that reflect or are correlated with the actual costs of road use in terms of deterioration that occurs. Thirdly, they cannot be adapted to address social costs, like traffic congestion, the way the VMT tax can. Fourthly, they do not address any of the externality issues mentioned, such as pollution or foreign-policy related externalities. In essence, the Obama and Delaney proposals do not create any of the incentives and disincentives to encourage and discourage certain types of activities (such as discouraging the burning of fossil fuels, as a gasoline tax does) that would create better long-term economic and social outcomes. The proposals attempt to solve two problems, a corporate taxation problem and an infrastructure funding problem, with one sweeping measure. Unfortunately, there are likely better ways to solve both issues.

The idea of leveraging the private sector to solve the problem is certainly appealing and has some merit. If there are appropriate investment opportunities it makes sense for life insurance companies, and pension funds to invest in infrastructure projects due to time-horizon matching (infrastructure assets are long-term assets which match the long-term liabilities of these institutions). Furthermore, it makes sense to increase the prevalence of PPPs as they are proven to have many benefits over the traditional design-bid-build model. This said having PPPs undertake all aspects of an infrastructure project, particularly operation, will not be a viable solution in many cases. This is because many times infrastructure assets, will not generate the returns necessary to incentivize a private

entity to take control. The lack of returns will not only disincentivize private entities from taking an active role in operations, but will also prevent investment from passive participants like the aforementioned life insurance companies and pension funds. The returns I'm referring to will mainly come from tolls, and the issue with tolls is that they are a form of pricing that in many situations will not generate revenue that is above the costs of building and maintaining a given infrastructure asset. This said, just because the tolls cannot generate revenue that matches or appropriately exceeds costs an asset may still be worth building (when one conducts a cost-benefit analysis) because of the social value provided by it. Thus there arises a problem that the private sector cannot always solve, and explains why infrastructure in many cases is the purview of governments. Even in situations where toll revenue can justify the costs of a given infrastructure asset, wide-scale privatization may be difficult for logistical and political reasons. The conversion of interstate highways, for example, completely to toll roads, would take time and would be unpopular because people typically view use of many highways as free at least in terms of direct payments. In fact, logistically the best way to implement a wide-scale toll system would likely be the same way a VMT tax is implemented, using electronic tracking devices (this would in essence create a similar system to the VMT, however revenue would be collected by a variety of private entities versus one unified body like a government). Thus, it is clear that private participation is not a silver bullet to the problem.

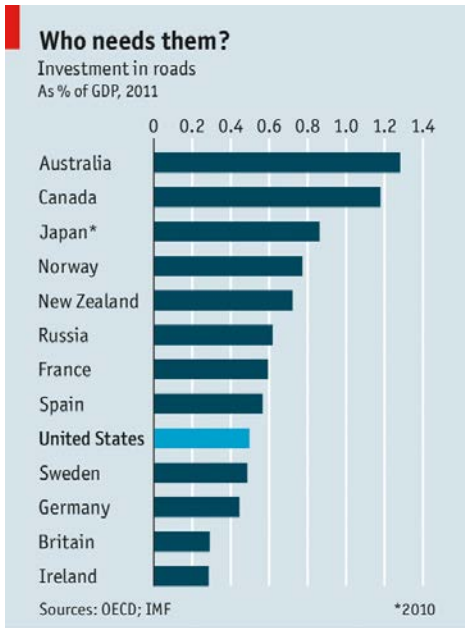
Devolution is also not an ideal solution because of two primary reasons. Firstly, it just shifts the problem from the federal government to the states and does not actually answer the question of how exactly revenue will be raised to support infrastructure.

Secondly, devolution has negative unintended consequences. States compete to have lower tax rates than other states. This competition could lead to sacrificing infrastructure quality, as less tax revenue means less can be allocated to support infrastructure. As a result, devolution is also not the answer to the problem.

When all is considered, it appears clear that a combination of a gasoline tax and VMT tax is the optimal solution to America's infrastructure crisis. Unfortunately, politics may lead to a policy choice that is not as efficient or equitable.

# Appendix

Exhibit 1)



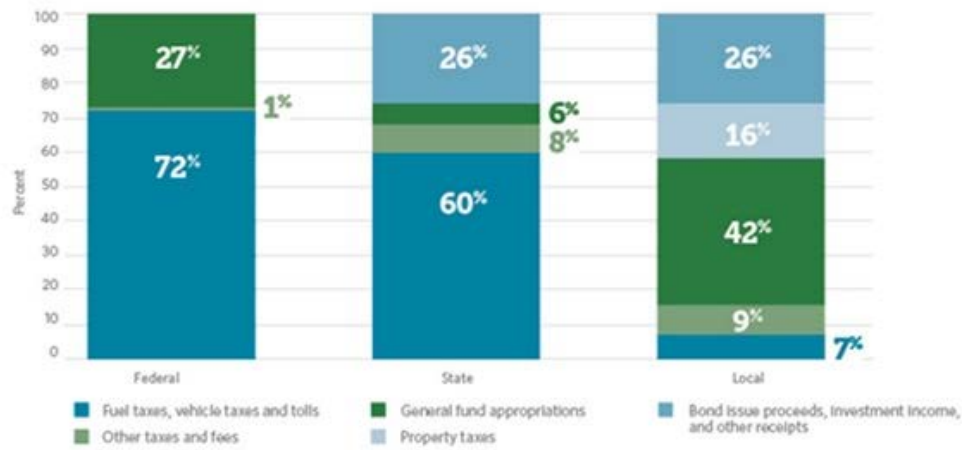
37

<sup>37</sup> "Bridging the Gap." The Economist. The Economist Newspaper, 28 June 2014. Web. 13 May 2015.

Exhibit 2)

### Federal and State Highway Revenue Depends Heavily on Gas Tax and Other User Fees

Sources of highway revenue, by level of government



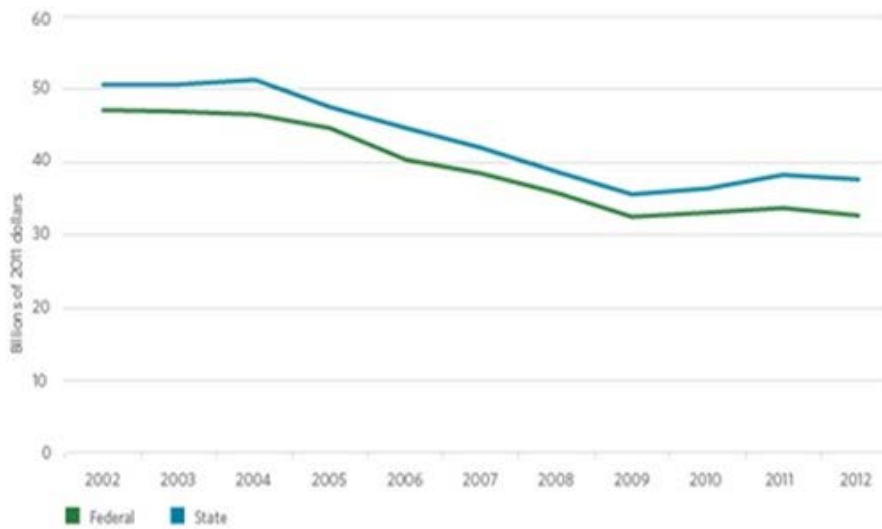
Source: Pew analysis of Federal Highway Administration data from 2011  
© 2014 The Pew Charitable Trusts

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<sup>38</sup> 1, Figure. Eight Charts and Graphs - The Pew Charitable Trusts (n.d.): n. pag. Pewtrusts.org. Web.

Exhibit 3)

### Gas Tax Revenue Has Fallen Over the Past Decade



Notes: Federal revenue is in federal fiscal years, state revenue is in state fiscal years or calendar years, depending on how states report their data to the Federal Highway Administration. All figures are adjusted for inflation. In this chart, "gas tax" refers to taxes levied on all motor fuels, including gasoline, gasohol, diesel, and special fuels.

Source: Pew analysis of Federal Highway Administration data. Inflation adjustment using Bureau of Economic Analysts' price index for state and local government investment in structures (Table 3.9.4, Line 36).

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<sup>39</sup> 1, Figure. Eight Charts and Graphs - The Pew Charitable Trusts (n.d.): n. pag. Pewtrusts.org. Web.

## Works Cited

- "2013 Report Card for America's Infrastructure." *2013 Report Card for Americas Infrastructure*. American Society of Civil Engineers, 2013. Web. 12 May 2015.
- Aecom. "Fostering a Larger Private Sector Role in United States Infrastructure." *Fostering a Larger Private- Sector Role in United States Infrastructure* (n.d.): n. pag. AECOM. Web.
- "Alternative Approaches to Funding Highways." *Congressional Budget Office*. N.p., 23 Mar. 2011. Web. 12 May 2015.
- "Bloomberg Gas Price Ranking." *Bloomberg.com*. Bloomberg, n.d. Web. 12 May 2015.
- "Bridging the Gap." *The Economist*. The Economist Newspaper, 28 June 2014. Web. 13 May 2015.
- Cohen, Patricia. "Gasoline-Tax Increase Finds Little Support." *The New York Times*. The New York Times, 02 Jan. 2015. Web. 12 May 2015.
- Communications, Metro. "America Fast Forward Transportation Bonds." *White Paper - America Fast Forward* (n.d.): n. pag. [Http://americafastforward.net/](http://americafastforward.net/). America Fast Forward. Web.
- "Delaney Combines Tax Reform and Infrastructure...With a Twist." *Committee for a Responsible Federal Budget*. Committee for a Responsible Federal Budget, 15 Dec. 2014. Web. 12 May 2015.

"Delaney to Introduce the Bipartisan Infrastructure 2.0 Act to Fix the Highway Trust Fund, Rebuild America." *Congressman John Delaney*. N.p., 28 Jan. 2015. Web. 12 May 2015.

Engel, Eduardo, Ronald Fischer, and Alexander Galetovic. "Public-Private Partnerships to Revamp U.S. Infrastructure." *The Brookings Institution*. N.p., 25 Feb. 2011. Web. 12 May 2015.

Espey, Molly. "Gasoline Demand Revisited: An International Meta-analysis of Elasticities." *Energy Economics* 20 Ž 1998 . 273–295 *Gasoline Demand Revisited: An International Meta-analysis of Elasticities* (n.d.): n. pag. *Courses.washington.edu*. Web.

*Falling Apart: America's Neglected Infrastructure*. Dir. Steve Kroft. Perf. Ray LaHood. *CBSNews*. CBS Interactive, 23 Nov. 2014. Web. 12 May 2015.

1, Figure. Eight Charts and Graphs - The Pew Charitable Trusts (n.d.): n. pag. *Pewtrusts.org*. Web.

"Gasoline Tax." *Gasoline Tax*. American Petroleum Institute, n.d. Web. 12 May 2015.

"Highway Trust Fund Ticker." Department of Transportation. N.p., n.d. Web. 13 May 2015.

<https://www.cbo.gov/sites/default/files/03-23-highwayfunding.pdf>

"Information on The Partnership to Build America Act (H.R. 2084)." *Congressman John Delaney*. N.p., 20 Mar. 2013. Web. 12 May 2015.

Laing, Keith. "Paul, Boxer Team up on Transportation Funding." *The Hill*. N.p., n.d. Web. 12 May 2015.



- "Public-Private Partnership." *Bulletin of the American Academy of Arts and Sciences* 37.8 (1984): 8-10. Pricewaterhouse Coopers. Web.
- "Public-Private Partnership." *Bulletin of the American Academy of Arts and Sciences* 37.8 (1984): 8-10. Web.
- "Reduce Oil Dependence Costs." *Reduce Oil Dependence Costs*. N.p., n.d. Web. 12 May 2015.
- Sabol, Patrick, and Robert Puentes. "Building Better Infrastructure with Better Bonds." *The Brookings Institution*. N.p., 22 Apr. 2015. Web. 12 May 2015.
- Sachs, Jeffrey. "Why It's Time to Raise the Federal Tax on Gasoline." *POLITICO Magazine*. N.p., n.d. Web. 12 May 2015.
- Samuelson, Robert. "Three Myths about the Highway Trust Fund." *Washington Post*. The Washington Post, 9 July 2014. Web. 12 May 2015.
- Schwab, Klaus. *The Global Competitiveness Report*. Geneva.: World Economic Forum, 2014. 2014. Web. 2015.
- St. "Boxer-Paul "Invest in Transportation Act"." *Boxer-Paul "Invest in Transportation Act"* (n.d.): n. pag. Web.
- "States Siphon Gas Tax for Other Uses." *WSJ*. N.p., n.d. Web. 12 May 2015.
- "Table 4-23: Average Fuel Efficiency of U.S. Light Duty Vehicles | Bureau of Transportation Statistics." *Table 4-23: Average Fuel Efficiency of U.S. Light Duty Vehicles | Bureau of Transportation Statistics*. N.p., n.d. Web. 12 May 2015.
- "The President's Budget For Fiscal Year 2016." *The White House*. The White House, n.d. Web. 12 May 2015.

"Transportation Statistics Annual Report 2012." *BTS Publications (Alphabetical List)* /

*Bureau of Transportation Statistics*. N.p., n.d. Web. 12 May 2015.

"U.S. Energy Information Administration - EIA - Independent Statistics and Analysis."

*Countries*. N.p., n.d. Web. 12 May 2015.