MOODY'S
ANALYTICS

Getting Back in the Habit of Funding Infrastructure

BY DAN WHITE AND SARAH CRANE

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The pending shortfall in the Federal Highway Trust Fund has rekindled what has become an annual debate surrounding U.S. infrastructure spending. How much should the U.S. be spending on infrastructure to remain competitive with other countries around the world? The unanimous answer on both sides of the political spectrum, and from Washington, state houses, and mayor's offices alike, is more. How should we pay for it? That answer is much more parsimonious. The size of the problem is growing with time and, as a result, possible solutions are becoming much less palatable. Government investment in structures, defined by the Bureau of Economic Analysis as everything from roads to school buildings to transmission lines, has sharply declined as a share of the economy in the last decade, and today sits at its lowest level since records have been kept (see Chart 1). On a per capita basis, real government spending on structures is the lowest it has been since at least 1950 (see Chart 2). There are three main factors to blame.

Why we are falling behind

First and foremost, the costs of expanding and maintaining the nation's infrastructure are growing faster than the revenue streams devoted to fund them. Nowhere is this more obvious than with the relationship between transportation infrastructure and gasoline taxes. The per gallon federal fuel tax of 18.4 cents has not moved since 1993. Because the gas tax is administered per gallon, and not as a percentage of price, as with most general sales taxes, its collections do not automatically adjust with the rest of the economy. Unit taxes can only keep up with inflation if policymakers actively increase them each year, or peg the unitary amount to some measure of price gains. As a result, the purchasing power of those collections is slowly eaten away by inflation. These dynamics are also holding true at the state level, even though state policymakers have been much more proactive at raising fuel taxes. This is good for consumers, but terrible for the programs supported by the tax—in this case

Chart 1: Less Than Ever Going to Infrastructure
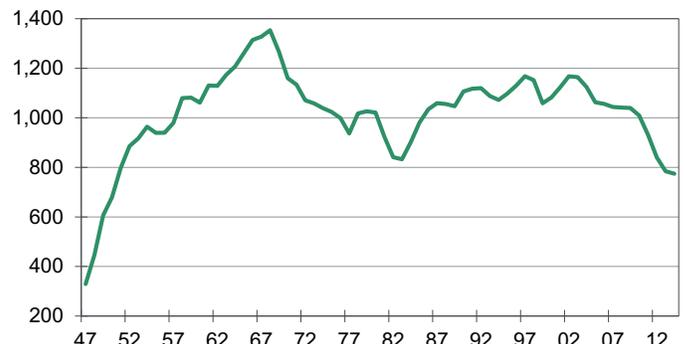Federal, state and local govt investment in structures, % of GDP

Sources: BEA, Moody's Analytics
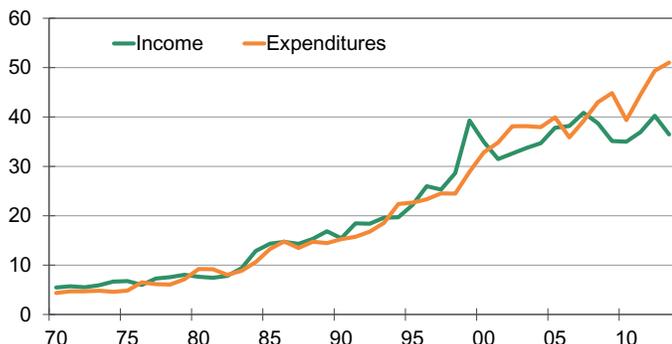
Chart 2: Least Spending Per Person Since 1950
Real government investment in structures per capita, 2009$

Sources: BEA, Census Bureau, Moody's Analytics

Chart 3: Growing Structural Imbalance
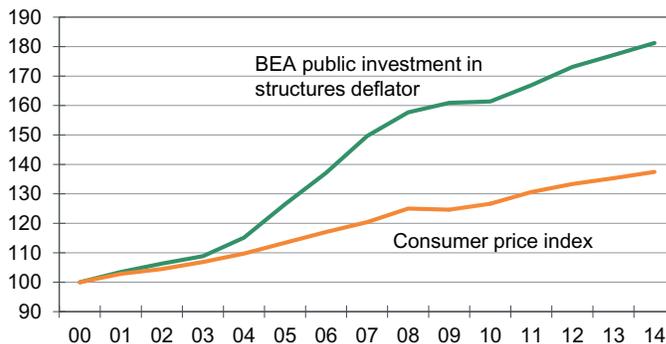Federal Highway Trust Fund, $ bil

Sources: FHWA, Moody's Analytics

Chart 4: Input Prices Have Skyrocketed
2000=100

Sources: BEA, BLS, Moody's Analytics

transportation spending. It is no coincidence that since the last time the federal gas tax was raised, highway, street and bridge construction jobs have grown at half the pace of the rest of the construction industry and only two-thirds the pace of the overall labor market. The Federal Highway Trust Fund has become so unsustainable as a result that the government has had to make continual supplemental appropriations from the general fund just to keep it solvent. The structural imbalance in the fund has widened to about $13 billion per year (see Chart 3).

Second, construction costs have accelerated more quickly than overall prices. This means that the U.S. has not only been investing fewer dollars in infrastructure, but those dollars also are not going as far as they once did. Infrastructure input prices, especially for items like asphalt, steel scrap and concrete, have grown twice as fast as overall prices since 2000 (see Chart 4). The Congressional Budget Office estimates that even though public spending on transportation and water infrastructure has nominally risen 44% since 2003, real spending actually declined by 9% because of faster price growth for inputs.[1] Thus even pegged to the consumer price index, funding would not have been able to keep up with demand. Growth in international demand for steel over that time resulted in prices for common scrap nearly doubling since 2003. Oil prices also advanced dramatically, though

price pressures in the energy market have eased in the last year. Higher gasoline prices and growing international demand boost prices for asphalt and cement given their energy-intensive production processes.

Finally, states and local governments have been increasingly unable to prioritize discretionary spending on infrastructure because of growing mandatory pressures from Medicaid and pensions. This has prevented them from more fully offsetting softer federal support despite increasing state gas taxes. More than three-quarters of states have a higher fuel tax levy than the federal government, but fuel taxes as a share of total state taxes have still declined from 6.7% in 1993 to just over 5% today. Meanwhile, gasoline prices have risen by about 215% over the same time (see Chart 5). More temporally, state and local government policymakers remain a bit gun-shy when it comes to borrowing in the shadow of the Great Recession. Some of this hesitancy flows from federal funding uncertainty brought on by continued budget showdowns, but in either case, many states and local governments have a great deal of unused bonding capacity despite historically cheap borrowing costs.

If policymakers across all levels of government can surmount these obstacles, both fiscal and political, and get back in the habit of investing in infrastructure, the economic benefits would be immense.

Return on investment

Infrastructure is the physical framework that connects the nation's businesses, communities and people, driving the economy and supporting the activities of daily life. Transport systems move people and goods efficiently and at reasonable cost by land, water and air; transmission systems deliver reliable, low-cost power from a wide range of energy sources; and water systems drive industrial processes as well as daily household functions. For the U.S. economy to be competitive it needs a first-class infrastructure system. Infrastructure is critical for long-term economic growth, increasing GDP, employment, household income,

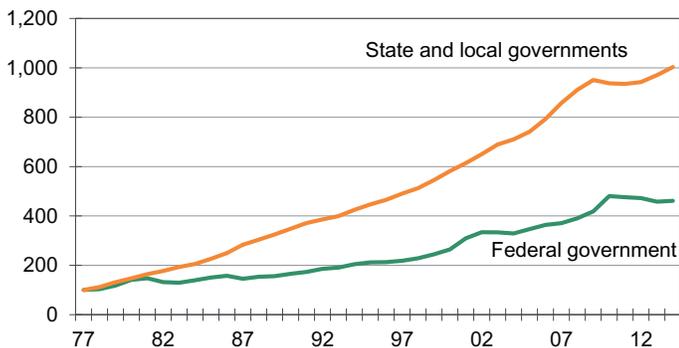## Chart 5: State Gas Taxes Not Keeping Up
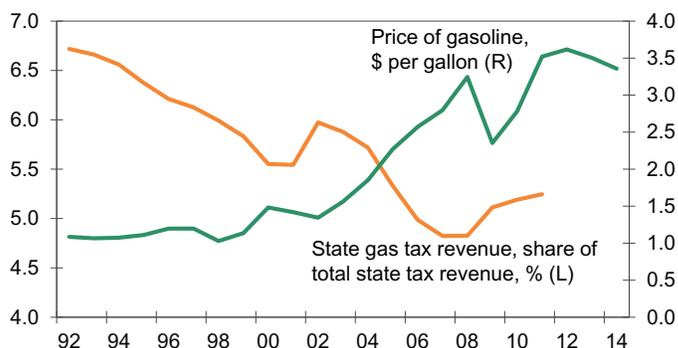
Sources: Census Bureau, EIA, Moody's Analytics

1   Congressional Budget Office, "Public Spending on Transportation and Water Infrastructure, 1956 to 2014," March 2015
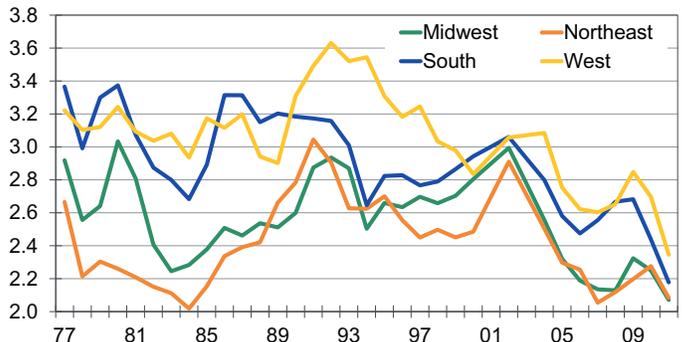
Chart 6: Federal Funding Lags the Most
Spending on transportation and water infrastructure, 1977=100

Sources: Congressional Budget Office, Moody's Analytics

Chart 7: West Leads the Way on Building
Capital expenditures on structures as a % of output

Sources: Census Bureau, BEA, Moody's Analytics

and trade. In addition to the initial economic boost from construction spending, the benefits of infrastructure investment reverberate through every sector of the economy. If a nation's infrastructure needs are not prioritized effectively, deteriorating conditions can become a drag on the economy. Numerous studies have found a positive correlation between infrastructure investment and economic growth—states and local governments that invest more in infrastructure tend to have greater productivity and attract more private investment and hiring. Studies estimate a long-term multiplier effect, or economic return on investment, of between 1½ and three times depending in part on the timing within the business cycle.[2] In addition to the direct construction activity and its economic spillover, enhanced infrastructure can also make other economic processes more efficient, yielding even greater productivity gains. The increase in economic activity can also result in higher tax revenues, helping to finance future building and maintenance.[3]

Regional declines

The burden of paying to expand and maintain the country's infrastructure is spread widely across the three levels of government. However, the data show the

pace of funding growth has been much more sluggish at the federal level. On a nominal basis, state and local government investments in infrastructure have grown more than twice as much as that of the federal government over the last 40 years (see Chart 6). This reflects in large part the federal share of highway funding, which has fallen from more than 77% in 1975 to just over 70% in the years immediately following the Great Recession. This reflects some of the difficulty the federal government has had in the last few decades keeping revenues growing at a sufficient pace to keep up with funding needs under the antiquated gas tax rate. State and local governments have been able to be much more nimble in adjusting their revenue structures to better keep up with transportation funding in particular, though funding levels have not been uniform across all regions. Some states have fallen further behind than others for various economic and demographic reasons. To gauge the regional disbursement of infrastructure spending over time, Census Bureau data provide a picture of state and local government capital expenditures back to 1977, the first year for which we have reliable data. Using a five-year moving average to control for volatility, U.S. state and local governments devoted approximately 12% of their overall spending, including investment supported by federal grants and aid, on infrastructure from 2007-2011. This was down from almost 14% over the five-year period ending in 1982 (see Table 1).
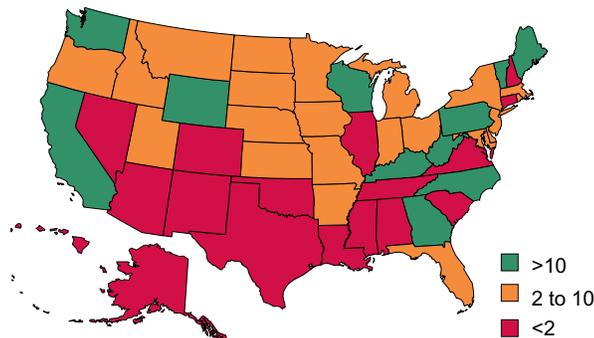
Regionally, western and southern states have spent more on infrastructure as a share of output over the last four decades (see Chart 7). This makes sense given the outperformance of those regions in economic and demographic growth over the same period. The higher level of infrastructure could be seen both as a cause and effect of such outsize growth. Also, several states, particularly in the West, cover a lot of area with fewer residents per square mile than the more densely populated Northeast or Midwest. This results in much larger infrastructure investment per capita and as a share of gross state product.

However, the South has reduced infrastructure spending as a share of output by the largest amount since 1977. This is partly a reflection of its relatively high starting point, but also a consequence of the region's stagnant gas tax rates. The average state gas tax rate across all states in 2014 was 5.6 cents per gallon higher than in 1993, the last time the federal gas tax was increased (see Chart 8). In the South, states raised their gas tax by 4.5 cents per gallon on average, the lowest among the four regions. While a few standouts such as Georgia, Kentucky, North Carolina and West Virginia have had above-average rate increases, most others raised their gas taxes by less than a penny per gallon, or did not raise them at all. The four states with higher than average increases tie at least a part of their tax to gas prices, so rates in these states automatically increase when prices rise. The biggest laggard in the South can be misleading though, as Virginia

2   Alicia H. Munnell, "How Does Public Infrastructure Affect Regional Economic Performance?," *New England Economic Review* (September/October 1990): 11-33.

3   Alfredo Pereira and Jorge Andraz, "On the economic effects of public infrastructure investment: A survey of the international evidence," *Journal of Economic Development* Vol 38 (2013), issue 4, 1-37.

Chart 8: Some States Further Behind Than Others
Change in state gas tax rate, 1993-2014, ¢ per gallon

Legend:
- >10
- 2 to 10
- <2

Sources: Tax Policy Center, Moody's Analytics

Table 1: Historical Capital Expenditures as a % of Spending

State	1977-1981 avg %	2007-2011 avg %	ppts Δ
Alabama	13.8	10.9	-2.9
Alaska	23.3	15.8	-7.5
Arizona	22.7	15.2	-7.5
Arkansas	15.2	10.5	-4.7
California	9.6	11.0	1.4
Colorado	17.8	13.5	-4.3
Connecticut	10.1	8.6	-1.5
DC	19.5	17.1	-2.4
Delaware	12.5	11.9	-0.6
Florida	18.3	14.3	-4.0
Georgia	19.7	14.6	-5.0
Hawaii	16.9	10.7	-6.2
Idaho	15.8	12.0	-3.8
Illinois	12.9	11.4	-1.5
Indiana	13.1	11.5	-1.6
Iowa	15.2	14.5	-0.7
Kansas	18.5	13.0	-5.5
Kentucky	18.6	11.4	-7.2
Louisiana	15.6	12.4	-3.2
Maine	11.6	7.0	-4.6
Maryland	16.9	9.1	-7.8
Massachusetts	10.5	8.4	-2.1
Michigan	9.9	7.5	-2.4
Minnesota	14.7	11.6	-3.1
Mississippi	14.0	11.1	-2.9
Missouri	14.3	11.5	-2.8
Montana	17.0	13.7	-3.3
Nebraska	22.2	15.8	-6.4
Nevada	19.5	16.5	-3.0
New Hampshire	13.0	8.5	-4.5
New Jersey	10.4	9.1	-1.3
New Mexico	17.5	13.0	-4.5
New York	9.8	12.5	2.7
North Carolina	14.3	11.2	-3.1
North Dakota	18.6	15.6	-3.0
Ohio	12.8	10.5	-2.2
Oklahoma	17.0	13.6	-3.4
Oregon	13.9	11.8	-2.1
Pennsylvania	9.9	10.8	0.9
Rhode Island	7.7	6.8	-0.9
South Carolina	15.2	11.6	-3.6
South Dakota	19.7	17.3	-2.4
Tennessee	14.4	9.4	-5.0
Texas	20.9	15.4	-5.5
Utah	19.8	17.6	-2.2
Vermont	10.8	7.8	-3.0
Virginia	15.2	11.5	-3.6
Washington	25.1	16.3	-8.8
West Virginia	17.1	10.8	-6.2
Wisconsin	11.5	9.7	-1.8
Wyoming	25.7	18.5	-7.2
U.S.	13.8	12.0	-1.9

Sources: Census Bureau, Moody's Analytics

overhauled its transportation funding system in 2013 by replacing the state's gas tax with an ad valorem sales tax.

What will it take?

The best demonstration of how far we have fallen behind as a nation on infrastructure investment is to project what it would take to get back to historical averages. To maintain public investment in infrastructure at 1.9% of real GDP over the next decade—equal to the average rate over the last 20 years—federal, state and local governments would need to boost spending by $863 billion above current levels. This compares with a baseline forecast of about 1.5% of real GDP, assuming current funding levels, which equates to an additional $86 billion averaged annually across all three levels of government, or an approximately 30% increase from 2014 levels (see Chart 9).

The economic implications of such a move would be immense. Using an economic multiplier of 1.78, in line with past research for a relatively stable point in the business cycle, we can intuit a 10-year nominal GDP impact of more than $1.5 trillion.[4] In the Moody's Analytics macroeconomic forecast model this would support an additional 12.7 million jobs over 10 years versus the baseline, a cost of about $120,000 per job.

There would also of course be offsetting negative impacts to the economy from higher taxes and borrowing costs. The largest offset would come from higher tax burdens for drivers and businesses, taking up a greater portion of disposable incomes that would otherwise be spent on other goods and services. What is more, gas taxes in particular are very regressive, hitting lower-income Americans who generally spend a greater percentage of their earnings on consumer staples like fuel, food and shelter. States with poorer populations and with longer commuting patterns would be disproportionately affected by higher gas taxes (see Chart 10). Because of the wide breadth of options proposed to fund expansion in infrastructure investment, these economic estimates account for only the benefits associated with more investment spending and do not include any offsets from higher tax rates or government borrowing to fund such an expansion.

These benefits can also be taken down to the regional and state levels using the Moody's Analytics' state forecast models, assuming each state's share of public infrastructure spending re-

4   The multiplier of 1.78 was used based upon IMPLAN multipliers for a collection of industries closely matched to the construction of civil infrastructure.
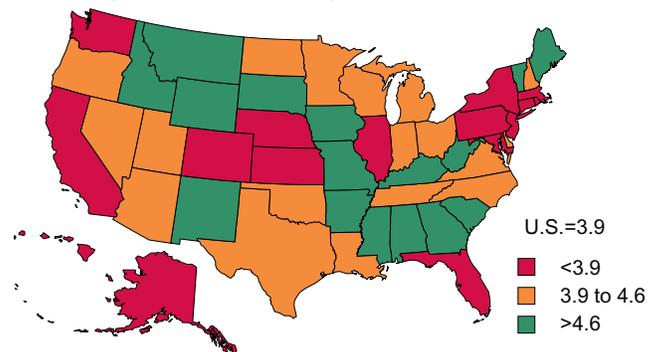
Chart 9: Getting Back on Track
Government investment in structures, % of GDP
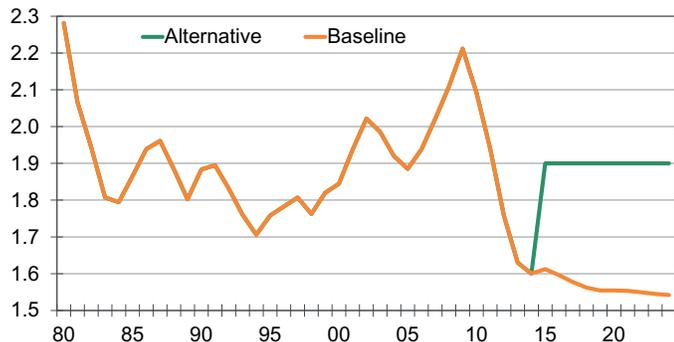
Sources: BEA, Moody's Analytics

Chart 10: Gas Taxes Hurt More in Poorer States
Gasoline expenditure share of disposable income, %, 2012

U.S.=3.9

<3.9
3.9 to 4.6
>4.6

Sources: BEA, EIA, Moody's Analytics

mains constant throughout the forecast (see Table 2).[5] The regional impact of the additional investment would be strongest in the West, which would outperform other regions in terms of employment and output gains. Employment in the West would increase by 0.9% versus the baseline over 10 years, with four of the top five states in job creation falling within its borders: Alaska, New Mexico, Washington and Wyoming. Three of these states spread relatively small economies over extremely large geographical areas. Washington, similar to New York, which takes the number five spot, is less vast from a geographical standpoint but has many important transportation linkages to the rest of the U.S. and the world. The states with the smallest job gains would be Connecticut, Massachusetts, Hawaii, New Hampshire and Rhode Island, all relatively populous states condensed in small geographical areas.

How can we get there?

Getting to $863 billion in additional infrastructure spending over the next 10 years is a tall order even without the current hyper-partisan atmosphere in Washington. On an annualized basis, the extra $86 billion per year breaks down to about $20 billion in federal funding versus $66 billion in state and local government funding, holding the current funding breakdown constant. The

preferred political solution in Washington leans heavily toward some form of repatriation of corporate profits held overseas. Such a move would be a more politically palatable onetime funding boost that could get us through the next election cycle but no further. Assuming even the most optimistic revenue assumptions based on the White House's Grow America proposal and several others that have been floated by members of Congress, in around five years we would be right back where we started: looking for a long-term solution, but with fewer easy options available.[6] The onetime funding available through repatriation or a transition tax would be a powerful tool to use in transitioning U.S. infrastructure spending to a long-term solution, but that is where things really get tricky.

No single long-term solution has presented itself as the obvious heir to the federal gas tax. While most agree that a long-term solution should ultimately be tied to usage, none of the budding contenders, ranging from mileage fees to carbon taxes, are quite yet ready for prime time when it comes to administrative or other practical hurdles. In actuality, it will likely need to be the states who lead the federal government in this regard. Small-scale experiments at the state level will be able to prove if a new taxing policy is capable of being rolled out at the federal level, but it will take years before policymaker comfort levels are high

enough with any of the current proposals. States and local governments can also help further offset federal weakness by continuing to embrace toll roads and other forms of public-private partnerships to make ends meet and keep infrastructure up to date. Other options at the state and local level are limited because most simply do not have the capacity under their existing tax structures to make up the difference on their own. More than three-quarters of states already levy a higher per gallon gas tax than the federal amount.

Under the White House's Grow America plan and similar congressional proposals, the federal government would cover about $26 billion of the average necessary $86 billion annual increase, leaving a $60 billion bill for state and local governments. Put in perspective, that is the equivalent to a nationwide gas tax increase of 47 cents per gallon, 2½ times the current federal levy. Given states' already-stressed budget situations, more of the solution will have to come from the federal government than it has been willing to shoulder over the last few decades (see Chart 11).

Which brings us to the only other, and least popular, option: gradually raising the federal gas tax and indexing it with a construction-specific price index to buy enough time to get to that new long-term solution. Plunging oil prices have given more policymakers cover in the last six months to suggest an increase to the federal gas tax. Raising the current levy while indexing it to inflation makes economic sense and is the simplest

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5   State-level data on infrastructure spending were obtained from the Census Bureau Annual Census of Government Finances. State-specific output multipliers were determined using state-level IMPLAN data for a collection of industries closely matched to the construction of civil infrastructure.

6   U.S. Department of Transportation, Grow America, http://www.dot.gov/grow-america

Table 2: State Gains From Higher Infrastructure Investment vs. Baseline

State	Infrastructure investment, $ bil	Gross state product, $ bil	Jobs, ths
Alabama	11.2	20.2	212.3
Alaska	5.0	8.6	45.4
Arizona	19.1	33.4	295.0
Arkansas	5.5	9.8	92.1
California	116.1	200.0	1,408.1
Colorado	15.7	28.1	234.8
Connecticut	7.9	15.1	100.2
DC	5.0	5.0	43.0
Delaware	2.8	8.9	75.0
Florida	56.1	97.6	909.5
Georgia	27.1	48.2	387.8
Hawaii	3.3	6.1	31.0
Idaho	3.3	5.8	50.9
Illinois	33.9	62.4	485.6
Indiana	14.1	25.7	234.1
Iowa	9.5	16.8	163.0
Kansas	7.8	13.4	133.4
Kentucky	9.6	17.4	169.3
Louisiana	13.0	22.6	227.8
Maine	2.2	4.0	39.4
Maryland	12.2	23.2	201.0
Massachusetts	15.7	31.2	193.3
Michigan	18.1	35.5	279.9
Minnesota	15.3	28.2	198.9
Mississippi	6.7	11.9	110.6
Missouri	13.2	24.0	239.1
Montana	2.7	4.6	38.8
Nebraska	7.0	12.3	116.7
Nevada	9.2	15.9	109.4
New Hampshire	2.3	4.3	31.1
New Jersey	22.8	40.0	254.3
New Mexico	5.9	10.3	134.4
New York	84.3	146.5	1,069.6
North Carolina	21.1	38.5	398.6
North Dakota	2.2	4.1	31.4
Ohio	28.8	52.4	455.0
Oklahoma	8.8	15.5	137.0
Oregon	10.2	18.3	148.7
Pennsylvania	30.3	54.5	468.4
Rhode Island	1.8	3.3	19.5
South Carolina	11.7	20.9	208.3
South Dakota	2.6	4.6	45.3
Tennessee	12.0	22.7	213.6
Texas	73.8	130.0	1,058.1
Utah	9.0	15.5	136.8
Vermont	1.2	2.1	21.5
Virginia	18.1	32.5	313.5
Washington	27.5	47.1	375.3
West Virginia	3.8	6.8	72.3
Wisconsin	12.9	24.4	210.0
Wyoming	3.3	5.6	54.9
U.S.	862.9	1,535.9	12,683.1

Sources: Census Bureau, BEA, BLS, Moody's Analytics

Chart 11: Feds Will Need to Pick Up the Slack

% of investment in transportation and water infrastructure
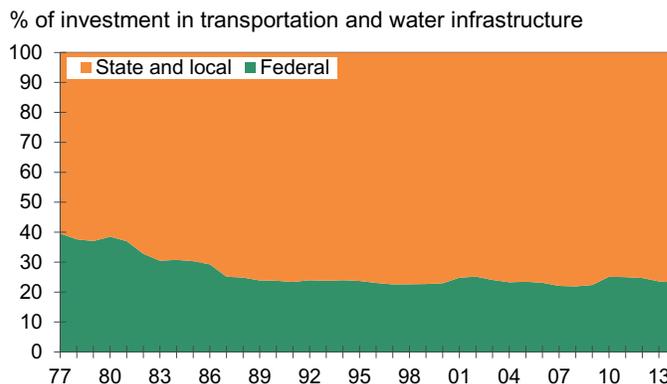
Sources: Congressional Budget Office, Moody's Analytics

and most immediate way to increase infrastructure investment, but not even oil priced at $45 per barrel will be able to make it politically palatable enough for most lawmakers. Lower prices at the pump from the drop in oil do not greatly increase the economic viability of a higher gas tax, but they do help soften the views of the electorate toward a government-sanctioned price increase on gasoline. The reason this matters is that the electorate is the primary reason an increase has not been implemented since 1993.

Voters hate gas taxes, plain and simple. In 1982, even President Reagan, with an approval rating almost 15 points higher than President Obama's current tally and a Republican Senate, had difficulty corralling enough votes for an increase. The move proved so contentious that it was met with violent protests and riots in which one person was killed. A decade later, the last approval of an increase in the gas tax arguably cost the Democratic congressional leadership and President George H.W. Bush their jobs. More recently, voters this past November in Massachusetts, a state with the 11th highest tax burden in the U.S., demonstrated that such sentiment was still alive and well by voting to repeal a law that indexed their gas tax to inflation despite the fact that it would have finally made their state road fund sustainable.

It is clear that any movement on getting back in the habit of funding infrastructure for more than a few years would require herculean political will from the president and leaders in Congress, as well as from state legislators and governors all across the country. Furthermore, any permanent fix, lasting beyond the next decade or two, would also require more than just repatriation and indexation of the gas tax. This year, it is all but assured that Congress will lack the political will necessary to pass more than another short-term fix to the Federal Highway Trust Fund, even though the dynamics of a new Congress, a second-term president, and plunging oil prices present some of the most favorable conditions for a long-term solution in quite some time. The economic benefits would be worth the risk.

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