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Economic Research:

U.S. Infrastructure Investment: A Chance To Reap More Than We Sow

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In the debate about infrastructure investment in the U.S., the focus is invariably on cost--which is no surprise, given that there are dollar figures in the trillions at stake.

Less discussed--but no less important, in Standard & Poor's view--are the returns that infrastructure investment affords. And not just for lenders, who enjoy lower default rates and higher yields than they might get from investments in similarly rated corporate debt. We're talking about the multiplier effect that such investments have on an economy: Specifically, how each dollar of infrastructure spending, if allocated wisely, translates into much more than that in terms of economic growth.

Most think government spending on infrastructure gives short-term benefits to jobs and aggregate demand. However, investment in infrastructure yields long-term benefits as well, which is often overlooked when determining a project's benefits (R.O.I.). In addition to the short-term benefit of job creation, significant investments in large projects can enhance efficiency and allow goods and services to be transported more quickly and at lower costs--a longer-term reward.

Overview

- A \$1.3 billion investment in real terms in 2015 would likely add 29,000 jobs to the construction sector and will add even more jobs to other infrastructure-related industries.
- That investment would also likely add \$2.0 billion to real economic growth and reduce the federal deficit by \$200 million (constant dollars) for that year.
- After an initial increase in aggregate demand, the economy's productive capacity and output typically increase once the infrastructure is built and absorbed into the economy. That means increased growth and more job gains long after the project ended.

We found that a \$1.3 billion investment (constant dollars) added 29,000 jobs to the construction sector, and even more to the economy when we count jobs added to infrastructure-related industries. This is in line with the Federal Highway Administration (FHWA), which found that a \$1.25 billion investment supports 34,779 jobs related to the project.

In our analysis, the associated multiplier effect resulted in an additional \$2 billion to real GDP in 2015. However, the economy's productive capacity and output also likely increase once the infrastructure is built and absorbed into the economy. So the investment will likely add more jobs to the economy long after the project ended, supported by studies from the Economic Development Research Group (EDRG) and the San Francisco Fed, which found long-term gains and job growth from investment in infrastructure.

Around the world, examples abound of instances in which a large infrastructure project has had a huge effect on the flow of goods, or helped to transform an economy. The Panama Canal, opened in 1914--and now, a century later,

undergoing a massive expansion--is perhaps the finest example. The Channel Tunnel connecting France and the U.K. is another.

In the U.S., the most telling example is the U.S. Interstate Highway System, championed by President Dwight Eisenhower, who signed the Federal Aid Highway Act of 1956. While the direct economic benefits of the system are difficult to quantify, it's a safe bet that the world's second-longest highway system, with an inflation-adjusted price tag of \$400 billion to \$500 billion, has added more to U.S. GDP in the past half-century than has been spent on it. Given that an estimated one-quarter of all vehicle miles driven in the U.S. are on the interstate system, the efficiencies it provides are self-evident.

Short-Term Benefits

To truly assess the benefits of such investments, it's important that we don't fall into the trap of considering "infrastructure" to be synonymous with "roads and bridges"--or even with other transport-related projects such as rail systems, ports, and airports. The construction and refurbishment of power grids, telecommunications networks, and social infrastructure, such as schools, courthouses, and hospitals, are just as essential to an economy.

That said, probably the clearest short-term benefits can be found in highway construction. That's understandable, given we all see them on the road every day as we drive to work. In this light, job creation is the most commonly cited economic effect because it's easy to understand and offers a reference point for comparison.

In a 2007 report, the FHWA estimated that each \$1.25 billion in highway capital investment would support 34,779 jobs, with associated income of \$1.3 billion. In other words, one job directly or indirectly tied to the project is supported for each \$34,700 invested in the project. More jobs--putting more money in workers' wallets--combined with slow-to-adjust prices, makes for a direct economic boost, in line with Keynesian theory.

The FHWA is able to make estimates of the total number of jobs and employment income supported by federally funded highway improvement projects. These estimates include the direct employment of construction workers along with all of those workers who produce the inputs necessary to complete the project--steel, concrete, tar, lighting equipment, and more. The estimates also include the number of jobs supported by the consumer spending made possible from the employment income generated from the jobs the project supports.

Thus, the FHWA conducts a thorough examination of all of the required construction-oriented and supporting industry employment, along with the spending patterns of those required workers, to provide the most accurate estimates of the employment that federally funded highway improvement projects support. The FHWA takes into account the different construction inputs required and the corresponding differences in employment generated by the different types of highway improvements. Different project types require different materials and services that will ultimately affect the projects' employment supported estimates--for example, one type of project may require much more labor, and therefore support more employment, than another type.

The FHWA's analysis focuses on jobs supported, not jobs created. The FHWA calculated both the number and cost of an individual's year of employment that the highway improvement project creates by converting the hours of labor into

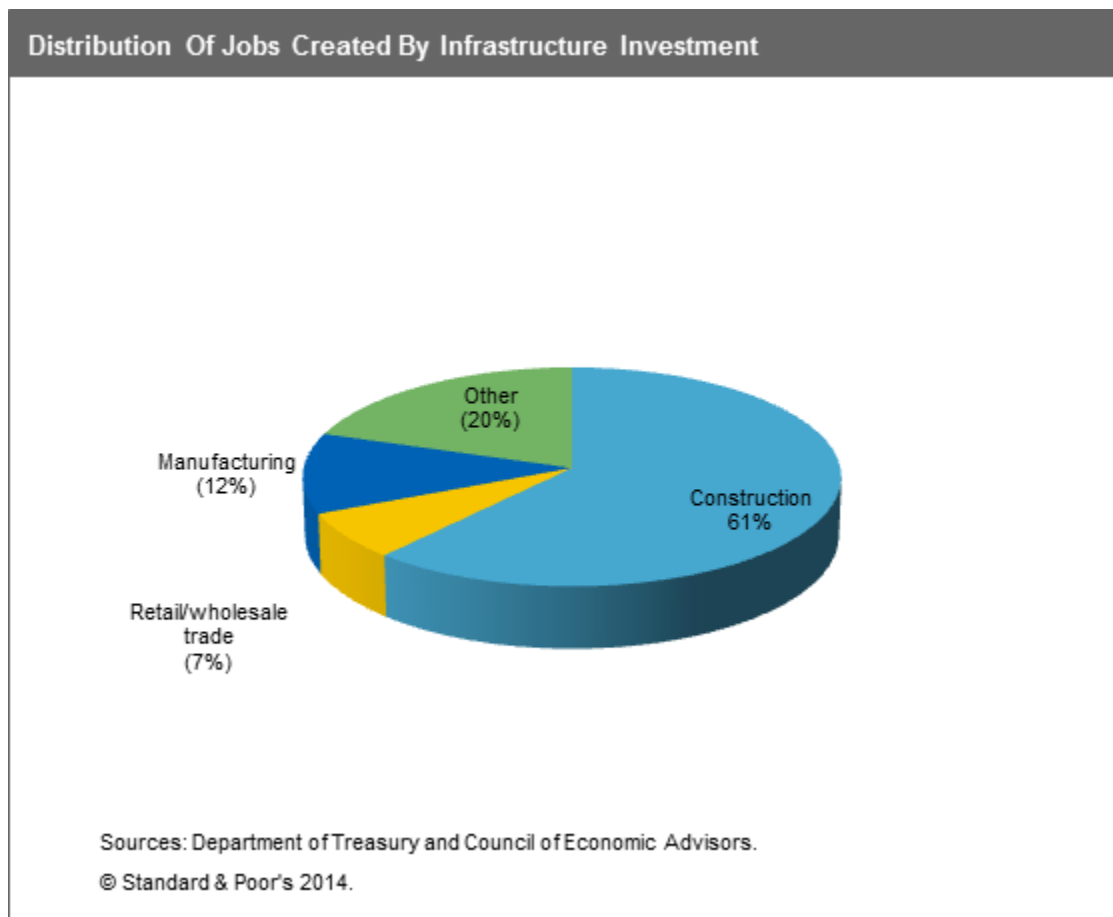
52-week periods. But that does not necessarily measure the number of jobs created; rather, it measures the number of persons that the years of employment support and the income the project produces.

Here, the time and place of highway investment likely play a key role in how many jobs are actually created. During recessions or weak recoveries (as is the case today), private construction activity is soft and unemployment in these job markets is high, so a much larger portion of the employment an infrastructure project supports would likely be jobs created. Therefore, the unemployment rate goes down.

It can go the other way, too. If the unemployment rate in the construction sector is low, chances are that many of those jobs will be filled by workers leaving other jobs, so the unemployment rate would likely move lower. But given the unemployment rate in the construction sector is well above our precrisis lows, it's likely that many of the jobs infrastructure spending supports are also jobs created--and with that, less people unemployed.

This bolstering of employment is especially important given that the U.S. is now in its fifth year of recovery from the Great Recession. Unemployment is still far higher among workers who would benefit most from increased infrastructure investment (construction, manufacturing, and work indirectly tied to the investment) than it is for the general populace.

Chart 1

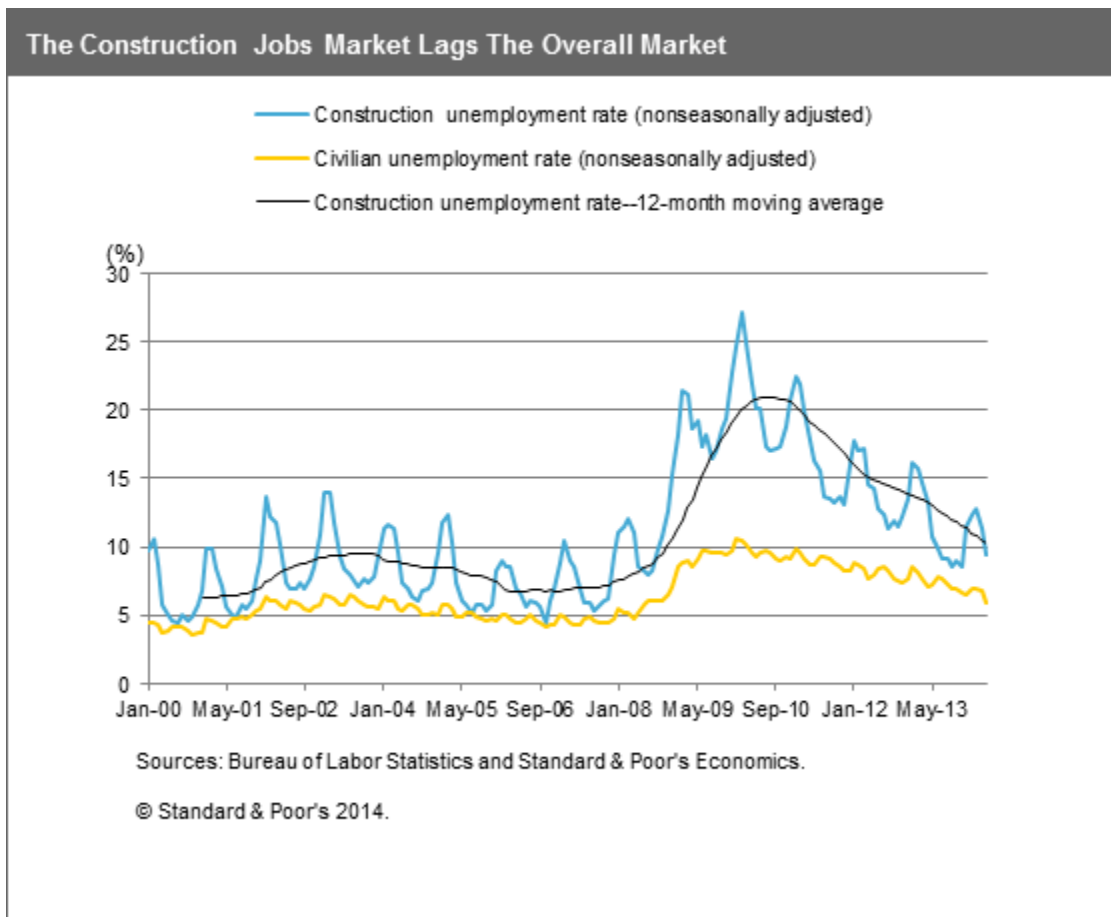


The American middle class, which suffered disproportionately during the recent economic slump, would benefit most from investing in transportation infrastructure because it creates what are traditionally middle-class jobs. The Council of Economic Advisors and Treasury Department's March 2012 study estimated that 61% of the jobs directly created by investing in infrastructure would be in the construction sector, 12% would be in manufacturing, and 7% would be in the retail and wholesale trade sectors. Almost nine out of 10 of those jobs would be defined as middle-class, or those paying between the 25th and 75th percentile of the distribution of wages. (As we'll explore more deeply below, average American households would enjoy the knock-on benefit of lower transportation costs.)

Construction would benefit the most

The recession that started in 2007 destroyed 8.7 million jobs in the U.S. in the two years through December 2009. The real estate market was hit hardest after the housing bubble burst, and about 21% of those who lost jobs were in the construction industry (Treasury, 2012). While the economic recovery has gained some traction, growth has been modest at best, and the construction sector has lagged: Construction employment remains well below prerecession levels and overall job conditions today. In April, the unemployment rate for construction workers was 9.4% (not seasonally adjusted), down from the 13.2% rate last April and 20.6% in 2010, at the height of the housing crisis. But it's much higher than the 6.7% unemployment rate for construction workers in 2006, before the housing crisis, and the overall unemployment rate of 5.9% (not seasonally adjusted) in April 2014.

Chart 2



Building more roads, bridges, and rails, or maintaining what we've got, would help provide these workers an opportunity to productively apply their skills and experience and reduce the start-up costs firms would have to pay during normal times because they already have most of skills needed. A Congressional Budget Office analysis in 2010 found that additional investment in infrastructure is among the most effective policy options for raising output and employment. And it's not just construction workers who would benefit. Road construction creates demand for grading and paving equipment; the need for raw materials such as cement, gravel, and asphalt; and roles for surveyors, engineers, and site managers, among others.

Still, while there's a clear a statistical relationship between a project's size and cost and the resulting economic benefits, this doesn't guarantee that spending more on a project leads to greater economic effects, according to a 2011 study by the EDRG. Additionally, the approval for most major highway projects involves some form of cost-benefit analysis, so projects that have a high expected costs and low expected returns are often scuttled. Nonetheless, the causal link between prudent spending on such projects and economic benefits--in both the short term and long term--are undeniable.

Longer-Term Benefits

Most would agree that a \$1.3 billion investment that supports 29,000 jobs in a sector struggling to make ends meet is promising. But is it enough to take Uncle Sam's hard earned dollars over the many other places it could go? Although the longer-term benefits to infrastructure investment are less understood, the answer is often yes.

A \$1.3 investment in infrastructures can add \$2.0 billion in growth and create more jobs in the economy. We also found that after an initial increase in aggregate demand, an economy's productive capacity and output typically also increases once the infrastructure is built and absorbed into the economy.

With headlines reminding us that our government needs to tighten its belt, does an investment in infrastructure add more to our long-term debt burden or help clean up our government's financial house? Not surprisingly, we found that more paychecks also mean \$xx billion more tax revenue for Uncle Sam. In line with our findings, the 2012 Associated Equipment Distributor (AED) report found that investing \$1.00 in highways and streets returns about \$0.35 in tax revenue to government coffers (of that, \$0.23 goes to the federal government). A number of other studies support this conclusion, finding evidence of large private-sector productivity gains from public infrastructure investments, in many cases with higher returns than private capital investment. This is not too surprising because investments in infrastructure allow goods and services to be transported more quickly and at lower costs--resulting in lower prices for consumers and increased profitability for firms.

Transportation projects can boost the economy in a number of ways, including effects on employment (not just while the project is underway), income, land use, and property values, according to the EDRG. Given that the effects unfold over time, the results aren't uniform. The EDRG study looked at 100 U.S. highway projects completed at least five years earlier and the effects on local and regional economies. The group found that 85% of the projects showed evidence of positive economic effects, and the remainder showed either no net impact or small negative effects.

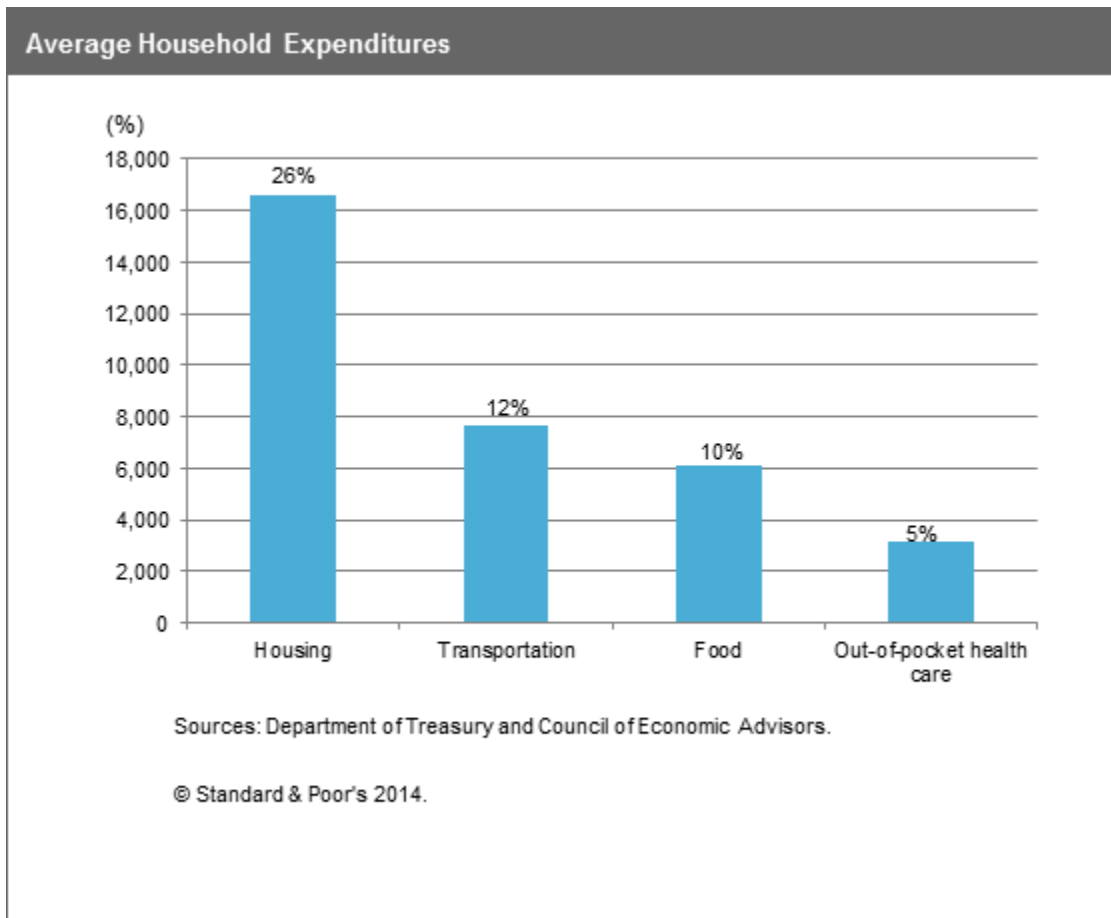
Location matters

According to the EDRG's impact study, more jobs were generated by projects in metro areas than in rural settings. Projects in economically vibrant areas with complementary infrastructure and zoning regulations tended to generate more long-term jobs than projects in areas where those factors weren't in place. That explains why projects with a coordinated economic-development efforts (involving complementary policies) generally facilitated more long-term job growth than projects that lacked local supporting policies.

Meanwhile, there's ample evidence that infrastructure investment can raise property values, reflecting an improvement in living standards. The EDRG found that property values increased by 6% in their study. With U.S. home prices still 20% under their precrisis peak (S&P Case-Shiller), we could use that extra support. Proximity to public transit typically raises the value of residential and commercial real estate, according to the Treasury report, and the EDRG research supports the view that improvement in transportation makes an area more attractive as a place to live and work. The greater demand typically leads to higher land values.

Further, well-maintained roads with adequate capacity--along with access to public transit--helps to lower traffic congestion and accident rates, which not only saves lives, but also time and money, the Treasury report says. This is especially important given that the average American family spends more on transportation than anything else, with the exception of housing. To put that in greater context, the average American annually spends more on transportation than on food, and more than twice what he or she devotes to out-of-pocket health care expenses.

Chart 3



The effects of infrastructure spending vary by industry, according to a study by John Fernald, an economist at the San Francisco Fed. The study found that vehicle-intensive industries enjoyed a bigger boost to productivity from the construction of the Interstate Highway System than industries less dependent on road transportation, as one would expect ("Roads to Prosperity? Assessing the Link between Public Capital and Productivity," 1999). Nevertheless, this highlights the potential for gains in productivity through well-targeted investments, with the greatest returns coming from spending on the maintenance of existing highways, according to former Federal Reserve Governor Edward Gramlich. He found that by merely bringing road conditions up to minimum state of good repair (the so-called "fix it first" method), an extremely high rate of return could be had. It's also significant that the economic benefits vary widely by the type of infrastructure, and further investments in particular areas could have diminishing returns. Or, to quote Fernald, "building an interstate network might be very productive; building a second network may not."

At any rate, the economies of U.S. states stand to benefit greatly from infrastructure spending--in fact, typically much more than through other government expenditures. San Francisco Fed economists Sylvain Leduc and Daniel Wilson studied the effects of unexpected infrastructure grants on gross state products (GSPs) since 1990 and found that, on average, for each dollar of federal highway grants, a state's GSP increased by at least two dollars. That's much larger than the typical fiscal multiplier of federal grants of 0.5-1.5 times, according to Valerie Ramey of the National Bureau

of Economic Research. Additionally, infrastructure investments offer more value during economic busts than booms. The study by Leduc and Wilson found that the multiplier in the wake of the 2009 federal stimulus was roughly four times more than average. And the weakest economic recovery in 50 years gives us another reason to consider investing in infrastructure now.

Infrastructure spending increases the production capacity of an economy and raises productivity--theoretically leading to higher GDP, according to a 2014 report from reinsurer Swiss Re and the Institute of International Finance. The report cited studies that estimate an additional 10% of spending on projects would lead to 0.9% more output in the long run--implying an economic return of 17%. It also said that some studies indicate that core infrastructure such as transportation systems, communications networks, and utilities have a higher impact on growth relative to spending on such projects as hospitals, schools, and other public buildings.

Why We Need It

As it stands, U.S. infrastructure is in a state of deep disrepair. In its 2013 report card, trade group the American Society of Civil Engineers (ASCE) gave the U.S. a grade of D+. Sadly, this marked the first improvement (from D) since the ASCE began grading the condition of America's infrastructure in 1998. ASCE estimated \$3.6 trillion would be needed by 2020 to rectify the situation, and said that unless something is done about the backlog of projects and deferred maintenance, the cost to each American family would be \$3,100 per year in personal disposable income.

In a 2012 report, the World Economic Forum (WEF) ranked U.S. infrastructure 14th in the world, of 144, behind those of other advanced economies such as Canada, Germany, France, Singapore, and South Korea. The country's ports came in at 19th, and its roads at No. 20.

All this comes as the federal government has continued to cut back on investing in infrastructure. Even as the Obama Administration has called for increased project funding, government spending on infrastructure as a percentage of GDP has tumbled to a 20-year low of about 1.7%, according to figures from the Federal Reserve Bank of St. Louis. In this light, it's hard to see a change anytime in the near future.

Nontraditional solutions

On the bright side, Standard & Poor's believes private investors have an unprecedented opportunity to fill some of the huge gap created by public-funding shortfalls (see "Global Infrastructure: How To Fill A \$500 Billion Hole," published Jan. 16, 2014, on RatingsDirect.) With regulatory requirements limiting banks' long-term lending and the budgetary constraints burdening many governments, nontraditional lenders such as insurers and pension funds are poised take a larger share of infrastructure investment.

Such projects can be attractive to institutional investors who need to match long-term assets and liabilities--and because the transactions generally offer higher yields than lenders might get from more traditional assets such as investment-grade sovereign and corporate debt. Although deepening capital markets and the greater participation of nonbank investors can help expand private financing of infrastructure, we expect governments and banks to remain the biggest financiers of infrastructure projects, with the latter likely to step in as arrangers and facilitators, or to provide bridge financing. But we do see scope for institutional investors to increase their allocations to infrastructure

from currently low levels.

One aspect that may help draw nontraditional lenders is the relatively strong creditworthiness of infrastructure projects. Project finance transactions remained resilient during the global financial crisis in 2008-2009, even as defaults among corporate borrowers increased. In 2007, the annual default rate for global rated project finance deals was about 0.5%. In 2009, it was 0.75%. In fact, since the first rated project default in 1998, the average annual default rate for all project finance debt we rate is just 1.5%--below the 1.8% default rate for corporate issuers in the same period.

Meanwhile, the Treasury Department pointed to Build America Bonds (BABs)--taxable municipal bonds that carry special tax credits for buyers--as a strong stimulant to infrastructure investment. State and local governments issue the bonds, and the federal government pays a 35% direct subsidy to the issuer to offset the borrowing costs associated with taxable debt. From the start of the program in April 2009 to its expiry at the end of 2010, there were 2,275 BAB issues, financing more than \$181 billion of new public infrastructure projects, with state and local governments saving an estimated \$20 billion in borrowing costs.

Because BABs are taxable debt, they appeal to a broader range of investors interested in holding municipal debt--including pension funds and other institutional investors, as well as middle-class citizens who wouldn't receive the full benefit from tax-exempt debt, the Treasury said. This is important since the taxable-bond market, at roughly \$30 trillion, dwarfs the market for traditional tax-exempt bonds, at about \$2.8 trillion. BABs are also an efficient way for state and local governments to garner federal subsidies.

Regardless of where infrastructure projects find funding, it's clear that the U.S. needs to address its chronic underinvestment or run the risk of falling further behind its peers. While the recent economic slump eased some of the burden on the country's strained infrastructure, the strengthening recovery--and with it the need to boost capacity--highlight the need for action sooner rather than later. Add to this an environment in which interest rates are at historic lows, and delay seems penny-wise and pound-foolish.

The U.S. will need to increase infrastructure spending by about one percentage point of GDP--or \$150 billion to \$180 billion annually--in coming years, with a focus on transportation and water systems, to compensate for past underinvestment and provide the foundation for future growth, according to an analysis by management consultant McKinsey & Co. This would foster economic expansion, adding 1.4-1.7 percentage points, or \$270 billion to \$320 billion, to annual GDP through 2020--on top of creating more than 1.5 million jobs in the construction sector for the duration of the investment.

Haste Makes Waste

While it's important that a significant increase in infrastructure investment occurs, it's equally crucial that it's managed reasonably. We agree with McKinsey that, too often, politics trumps prudence, and the primary criteria for project approval are political support and visibility, instead of cost-benefit analyses. Planners at all levels tend to focus on congestion and bottlenecks by building new capacity rather than considering upgrades to existing infrastructure. In any event, we believe that focusing on projects with the most advantageous returns is critical.

Many cost overruns are the result of inaccurate cost projections rather than poor execution. A more efficient approach to project approval and construction would bolster the country's infrastructure backbone, enabling growth in other sectors with a \$600 billion boost to annual GDP by 2030, according to McKinsey.

Meanwhile, there's a substantial variance in quality among different types of infrastructure in the U.S. Close to three-quarters of the shortfall in necessary maintenance is in transportation, with roads, highways, and bridges alone accounting for more than half of that need. The FHWA estimates that \$170 billion would be needed each year for the next two decades to significantly improve conditions. And the Federal Transit Administration reports that one-third of the U.S. transit system is in marginal or poor condition, meaning it is near, or has exceeded, its expected lifespan. Similarly, the country's 12,000-mile inland waterway system has suffered increasing delays despite stable usage. In part because of inadequate maintenance, the hours lost to delays in the waterways have risen threefold since 1993, to more than 160,000 hours in 2011, according to the U.S. Army Corps of Engineers.

By contrast, the country's freight-rail system, airport (with some exceptions), and telecommunications network infrastructures are in good condition, generally speaking. Railroad deregulation has increased returns on investment, improved efficiency, and drawn more private capital, the McKinsey report showed. American freight rail carriers have doubled their capital spending in the past two decades and improved productivity. Now, freight-rail transportation is twice as expensive in Germany, France, and Japan as it is in the U.S., according to the American Association of Railroads.

All told, infrastructure needs vary greatly from country to country. In Western, developed economies, refurbishment and replacement will likely eat up a larger share of the financing--bridges and tunnels along many main thoroughfares are more than a century old and having lasted well beyond their planned lifespans. In this light, a key strategy to prudent project investment involves maximizing the lifespans and capacities of existing infrastructure.

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