

Rebuilding America's Infrastructure: Lessons from Abroad

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The Collaboratory for Research on Global Projects at Stanford University is a multidisciplinary center that supports research, education and industry outreach to improve the sustainability of large infrastructure investment projects that involve participants from multiple institutional backgrounds. Its studies have examined public-private partnerships, infrastructure investment funds, stakeholder mapping and engagement strategies, comparative forms of project governance, and social, political, and institutional risk management.

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Bridges collapsing, highways cracking, levies breaching, state power grids failing. The American Society of Civil Engineers recently gave America's infrastructure a grade of "D" and estimated that the nation needs to spend over \$1.6 trillion in the next five years. Our roads, ports, dams, water systems, highways, power plants, airports, schools, etc. are all in desperate need of new investment. Our infrastructure has been badly neglected and has been allowed to deteriorate for far too long. We are clearly living off of our inheritance to the point where much of our infrastructure is significantly below the world class standards we have come to expect.

The full statistics on the state of the situation, while striking, are beyond the scope of this article. But, we can gain a degree of perspective on these issues through the eyes of a friend from India who recently visited the Midwest and confessed his shock at the state of the infrastructure he saw. Chinese authorities are actively worrying that our west coast ports are insufficient to their future exports to the U.S. and are contemplating new port facilities in Canada and Mexico. The contrast with the improvements abroad is self evident to any American traveler. And what are foreign visitors to think when they enter the "gateway" city of New York only to enter via an airport and access roads that are reminiscent of those in emerging countries? We have come a very long way indeed since our infrastructure was the envy of the world.

Unless the situation is addressed now, it will only continue to get worse as America's population is expected to grow by 50% in the next forty years. Americans are also commuting more and more as businesses move out of metropolitan regions bringing with it a major redistribution of the population. As is, Americans now spend 3.5 billion hours stuck in traffic. Clearly, our roads have not kept pace with these developments. Moreover, world container traffic (container shipping changed everything) is growing by 10% per year requiring huge "inter-modal" road and railroad networks across state lines to keep pace with demand. The Panama Canal expansion in 2014 will result in an explosion of traffic in New Orleans which neither the city, the state or the region can now cope with. Unfortunately, the needed infrastructure is nowhere in sight.

Virtually every American who thinks about these issues will readily acknowledge that the nation's infrastructure is in need of a much greater level of spending. But there is not enough domestic discussion about how to fix the situation beyond how much money we need to throw at the problem. Although it is only a portion of the problem, the principal question today is: how are we to pay for these much needed infrastructure projects without raising taxes?

In very large part, the deterioration has been a result of the reluctance of all levels of government to impose higher levels of taxation to pay for much needed maintenance and expansion. With massive and rapidly growing budget deficits at all levels of government, previously unimagin-

able national debt levels, an economy on the edge the steepest downturn in seventy years, and a hobbled financial system, how will the needed funds be raised? As Washington readies for the new Obama administration, other more immediately pressing priorities seem to be once again crowding out discussions on the relatively prosaic subject of infrastructure.

2008 FINANCIAL AND ECONOMIC CRISIS

The ongoing infrastructure crisis we are facing is now crashing into the current financial and economic crisis, each making the other worse. Most states and municipalities are quickly cutting infrastructure programs already on the drawing boards at a time when such programs are desperately needed to stimulate the broader economy. States as diverse as California and New York are actively seeking emergency federal assistance. California is projecting a deficit of \$16 billion while New York is facing a \$47 billion deficit over the next three and a half years. Indeed, the Governor of New York recently appealed to Congress for an immediate rescue package for all fifty states similar to the rescue package recently granted to the nation's banks.

With virtually every economist projecting that the recession we are already in will be both deep and long, new taxes are very much out of the question. The Federal government has already thrown roughly \$8 trillion to get the economy going again. On top of that, the Federal government is facing rapidly mounting political pressure to provide new stimulus packages for battered automobile companies, mortgage holders, and quasi-financial institutions, etc. Our national budget deficit could easily hit one trillion dollars next year while our national debt level has already hit the recently unimaginable ten trillion dollar level.

The rapidly mounting political pressures make a new stimulus package all but inevitable. But most economists are in agreement that stimulus packages (beyond the core safety nets) rarely work effectively. Timing is one issue as the funds rarely arrive when needed – if at all. Moreover, experience has shown that when stimulatory tax rebates are issued (as they were as recently as earlier this year, for example) people typically either save the rebate or pay down their credit cards, a defensive move that has little stimulatory impact.

In most organizations and certainly in government affairs, it is only during a crisis that bold and aggressive new programs can be implemented. Ironically, as study after study has shown, decision making in crisis situations typically turns out to be wrong. Yet, to borrow a phrase, a crisis

is a terrible thing to waste. Given that fine tuned measures in a crisis are rarely possible, there is a good argument that the best approach is to spend the money on something lasting.

Infrastructure is perhaps the best such target. Such projects would not only create jobs but also have the greatest and longest lasting impact on the economy. The World Bank recently concluded that "a 1% increase in a country's infrastructure stock is associated with a 1% increase in the level of GDP." The White House recently balked at this idea, saying that infrastructure projects are too long term in their implementation. While there is some truth to this proposition, it can be and it was quickly pointed out that much needed maintenance and repair services can be quickly implemented, and well planned project are already on the shelf waiting for the needed finance.

But research shows that when an economy's physical infrastructure undergoes a period of sustained neglect, or when there are bottlenecks in the economy due to insufficient infrastructure resources, that new infrastructure investments can have disproportionate economic impact for a society. The exact parameters are open to debate, but the common estimate is that for every dollar invested in well thought out infrastructure projects six dollars are returned to the broader society.

SIZE MATTERS – BUT SO DOES QUALITY

While it will certainly be helpful to have the federal government direct funds into the nation's infrastructure, the sums being discussed are hardly large enough to make more than a modest dent in the overall need. One such program for example, the Transportation Infrastructure Finance and Innovation Act (TIFRA) is currently receiving approximately ten times more applications than there is money for. The House recently approved an \$18 billion package for new infrastructure projects.

President Elect Obama suggested to the U.S. Governors that he would offer up an infrastructure program that the states could use consisting of \$136 billion worth of road, bridge, water and other projects ready in connection with the politically important economic stimulus package. There are also suggestions of even larger funds in the offing. No doubt these sums will help. In the absence of a stimulus package, infrastructure financing would undoubtedly have fallen off given the drop in federal, state and municipal tax revenues. Yet these programs are apt to be of only marginal importance for two reasons.

First, these sums are still far too small considering the size of our current needs. By way of contrast, consider the response of the Chinese government which recently announced a massive \$586 billion infrastructure program to counter the downwards pressure of this global economic crisis. These funds are earmarked to be spent in the next two years. This represents 7% percent of their GDP. That is the equivalent of the U.S. committing between \$1 trillion and \$2.4 trillion (depending on the measurement index) for the next two years given that the U.S. GDP is roughly \$14 trillion. Moreover, the latest Chinese projections suggest that overall they will be investing 12% of GDP in infrastructure over the next decade. While China is admittedly starting from much further behind, the U.S. is currently only spending roughly 2.8% of GDP.ⁱⁱ

The second issue relates to the quality of the new infrastructure spending programs. As it is, there is far too little accountability in the spending patterns in our public infrastructure projects. In the United States we have come to expect that it is the public sector that has had to bear the major portion of our infrastructure spending, particularly in the transportation and water sectors. In the U.S. 99% of such projects are publicly financed and procured under the design-bid-build model. Government entities at all levels have historically taxed and borrowed for such spending, trickling down money to the next lower levels as political favors. This has resulted in a complete scattershot approach to such spending with little if any serious consideration of the real economic impact of such projects. A recent survey of local officials found that 80% of new infrastructure projects were approved on the basis of their political popularity and not on the basis of a true cost-benefit analysis.

In some ways this is the more serious problem. In truth, on an absolute dollar basis infrastructure spending in has been slowly rising over the last two decades even though on a per capita basis and as a percentage of GDP the funds have not kept pace with absolute requirements. Nevertheless, roughly \$400 billion is spent each year on infrastructure projects in the U.S. Unfortunately the political nature of government sponsored projects results in a great deal of waste. Few economic impact studies or cost benefit analysis are ever conducted on these programs. The result is far too many highways to (almost) nowhere, unnecessary sports stadiums and underutilized facilities.

Clearly the existing patterns of funding infrastructure are not properly working. Meeting the full measure of America's infrastructure projects will require new solutions and approaches. Fortunately, however, there is a tried, true and well proven way that can be employed to help ease both our infrastructure and current stimulatory needs.

PUBLIC PRIVATE PARTNERSHIP (PPP)

For much of our history as a nation, we in America have actively employed a model for infrastructure spending that is still in active use today in many parts of the world. While we hear very little of **public-private-partnership** in the U.S., it is a phrase that is quite common around the world, especially for infrastructure projects. That phrase is exactly what it says – a much closer cooperation between these two critical sectors of society for the common good. The private sector has a very important role in infrastructure projects beyond that which we have become accustomed. Under this approach, the funding for these new projects can come one of two sources, either from the public sector or the private sector.

An easy example would be in the design, construction and operation of a toll road which the private sector would own for a pre-specified period. During that period the private sector (in close cooperation with the public sector entity) would design, finance, build and operate the road, with sufficient time to recoup their investment thru toll or user fees. At the end of that period, the road could (by pre-arrangement) remain in the hands of the private sector company and operated indefinitely under a contract with the government entity or be transferred to the government for their continued maintenance and operation. This structure is commonly known as build-operate-transfer of BOT for short. It sometimes also called DBFO, standing for Design, Build, Finance, and Operate.

Alternatively, for facilities where tolls are not practical, the government could provide a contract to pay for such a facility over an extended period of time (say fifteen years) which would relieve them from the burden of a much larger upfront payment. In this case, the government entity engages a private sector company to undertake any or all of the various aspects of building the road, including obtaining the upfront financing. The company then manages the road for a pre-specified period of time. Over the life of the contract, the government itself pays the company a predetermined sum which would allow for the amortization of the road over the life of the financing period. This is commonly referred to as an “annuity” payment structure.

Under this approach, governments work closely with the private sector to design, build, and then to operate and maintain the full range of infrastructure projects. By transferring certain risks to the private sector, governments in the UK and Canada have been able to save 15-20% of the costs of traditional project delivery over the project lifecycle and at the same time also achieve higher levels of service. These figures speak to the typically poor implementation records of traditionally procured projects. The UK’s National Procurement Office has estimated that over 70%

of traditionally procured projects in Britain were completed late and/or over budget. The associated costs represent hidden taxes on the general population.

This is not really such a new notion. Like the man who suddenly discovered he had been unwittingly speaking prose all his life, we use the private sector for such infrastructure projects all the time. Consider the power industry which was (and in many countries is still) seen as the purview of the government. We have given companies legal monopolies to generate, transmit and distribute power in every state of the Union. The price of that monopoly is close regulation. But it works quite well, especially as compared to having the government operate such facilities. Two other infrastructure segments that are dominated by the private sector in the U.S. are the railroads and telecommunications, two of the chief transportation responsibilities of governments around the world.

Governments are demonstrably not very good at providing complex goods and services. The private sector is demonstratively much better when high levels of technical and operational complexity (much less innovation) are involved. With this in mind, let U.S. use both sectors for what they are best at. Governments should do what they are best at which is providing the enabling environment, prioritizing, approving new projects, and translating public sector priorities into project output specifications. Indeed, it is the only sector of society that can do so. With that in hand, the private sector can work very closely with the public sector to deliver society's day to day needs. Hence, the phrase-public-private-partnership. The government does not abrogate its important role to protect the public interest, but shifts from "rowing" to "steering" in the delivery of projects.

Indeed, for anyone versed in international project finance, it is striking that America makes such little use this approach. BOT models are very actively used in a number of countries such as the United Kingdom (which helped pioneer this model), Australia, Ireland, Holland, Spain, France and increasingly in Canada and in many emerging countries of the world. The Canadian trend-setting PPP/BOT market has really taken off recently—with billions of dollars of social infrastructure projects delivered in Ontario and British Columbia. Moreover, it is very successfully being managed with a combination of domestic and overseas investors/contractors/financiers and a very well-managed program with enormous transparency and very efficient bid processes, which leads to rapid competition schedules and maximizes value for every taxpayer dollar.

To date, the PPP concept has spread from UK, Ireland, Holland, etc. to even the least capitalist corners of Europe as all governments begin to realize the limitations of their overall budgets and their specific infrastructure implementation and management skills. Indeed, it is also worth

stressing how far the model has gone in places like the UK and believe even in Canada where by law government departments have to consider a PPP option (using a public sector comparator cost benefit analysis) for any infrastructure procurement over a threshold level and that this applies not just to transport, water and power but to schools, hospitals, flight simulators, government buildings, etc, etc. And as the market has developed in these countries, with standard contracts and standardized bidding procedures, the cost and time to develop PPPs has fallen dramatically.

In fact, the PPP approach is now being adopted in reverse as a number of financially stressed states have begun to refinance their state infrastructure bonds by selling them off to a variety of international banks such as the Macquarie Bank of Australia. Until the current financial crisis, the volume of such financings was growing very rapidly. Beneath the simple BOT model, there are also a number of variants for how funding is collected over time to pay back the private operator's initial financing commitment.

The attractiveness of this approach is that it has each sector doing what it does best. The government (which is best at providing the essential enabling environment) and planning and facilitating the project is doing it's role, while the private sector is providing the core "goods and services", something it is far better suited at doing relative to government entities—especially for more technically complex assets such as ports, airports, and high-speed rail systems. At the same time, the complex risks of the project can be spread around by the private sponsor to other entities which are better suited to managing them. The project operator can either absorb the risks, or lay them off to subcontractors, lenders, insurance companies, etc. In so doing, each party is independently assessing the risks of the project, the creditworthiness of the other players in the project and the returns associated with the project.

Indeed, just such an approach is being tried on a number of transportation projects across the country without much national attention. To date, the most notable proposal to use of a BOT structure was on various segments of Interstate 69 Southern Indiana Toll Road extension which was due to commence construction in 2008. However, due to the unpopularity of this project and for a variety of other political reasons (unrelated to this structure) the project seems to have stalled out as have a number of similar projects across the U.S.

VARIATIONS ON A THEME

Beneath the simple BOT model, there are a number of variants for how funding is collected over time to pay back the private operator's initial financing commitment. One approach is very common in the UK and that is the "annuity type structure, which was alluded to above. Under this approach, the company that wins the (competitively bid) concession to build and operate an infrastructure project gets an assured return on equity typically funded out of general tax revenue. Bankers and other lenders very much prefer this structure as the lenders are not taking any market or toll risk, and thus costs of capital stay low. The government entity (federal, state or municipal) is responsible to make a series of payments at agreed intervals, whether or not the associate toll collections meet the full cost recoveries or not. The UK and India have been very successful in such arrangements, which permit the public sector to capture windfall profits should the project turn out to be unusually successful. This structure has also been very successfully in the power transmission sector of many countries.

The virtue of this approach is that there can yield 10% to 20% in cost savings to the government over the lifecycle of the project due to the greater ability of the private sector to manage certain kinds of risks. It also spreads out the payment requirement of a project over a much longer period of time. A government entity, for example, can either place a large bond financing or pay (say) \$100 million for a project in the first year or it can spread that payment over ten years thru new tax revenues much of which could come from the heightened tax base or merely a series of smaller borrowings. If it opts for the latter, the \$10 million annual payment (plus appropriate interest) significantly lowers the burden of initiating and carrying the project.

There are also the Build-Own-Operate (BOT) model and the Build-Own-Operate-Transfer (BOOT) constructs. This approach is a financing structure in which a developer designs and builds a project (such as a toll road, a port, an airport, etc.) with little or no upfront cost to the government owns and operates the new facility for a fixed period of time (say fifteen or twenty years), and then transfers it over to the government entity at a predetermined market price.

Another variant is the build-own-operate (BOO) approach which we commonly associate

with power generation. It is worth noting that the U.S. was a world leader with Build-Own-Operate (BOO) deals back in the 1800s with the power sector the railway companies. Unfortunately, we seem to have overlooked this as a model for broader applications.

It should not be too far a leap to see BOO projects being adopted in a wide variety of new projects here in the U.S. Consider, for example, the idea of a new toll road that a state would like to see one built and implemented. It can either issue a bond and contract out the work to the private

sector; after that it would collect the tolls and maintain the highway itself – the common approach across the U.S. today. Alternatively, after the appropriate competitive bidding, the government can closely supervise private sector’s construction of the project and make sure that the private sector delivers according to the pre-agreed management specifications.

In turn, the winning company could do the design work, raise the financing, implement the construction, operate the toll road, ensure its proper maintenance and get paid out via the toll revenues that are collected, or out of availability payments funded from general or specialty tax revenues. If, for societal reasons, a stretch of road is important (say for military/national security reasons – the basis of the U.S. highway system) even though the projected toll revenues are too low to ensure proper business returns, the government can kick in an appropriate payment structure – often called “viability gap” funding. This approach is commonly used in countries like India where capacity of public citizens to pay tolls is low.

The concept of the viability gap is receiving a great deal of attention in the emerging countries of the world because of the subsidy that needs to be paid, for however long or short a period. This requires a micro-economic analysis of the project and its impact on the subsequent macro-economic benefits. The gap provides an opportunity for the government to set parameters around the project on the basis of the performance and service levels. With these factors in mind the cash flows of the project can be tailored to match the specific requirements of the broader financing.

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The Political Challenges

Two factors appear to be stumbling blocks for the BOT model. The first is the uncertainty associated with the annual budgeting cycle of most American government entities, which limits their ability to use availability payments schemes. Since budgets are voted on in yearly cycles, there is no sure guarantee that a project (however visible and important) will have long-term appropriations ensured. This “appropriations risk” is not something the lenders are willing to accept. Clearly, longer term appropriations for capital projects would need to be instituted.

The second factor seems to be the ever present tensions that exist between business and most segments of the public sector. These tensions are often compounded by the distrust between unionized public sector workers and business. California has perhaps the most extreme case in point. For many years now, the Public Employees of California Government (PECG) workers unions in California have assiduously worked to prevent the use of private sector companies in infrastructure projects in the state. Through the use of campaign contributions to opponents of and threatened retaliation against political leaders urging such collaborations, they have very effectively blocked any cooperation with the private sector. Thus, despite the extraordinary growth in California’s population and traffic patterns, the state is still operating with a system designed for a quarter of the residents they are now serving. Per capita spending on infrastructure is also steadily declining each year.

Public-private-partnerships and the BOT models are not a panacea or the silver bullet. But in some cases they can be the proper tool for the job. The answer, to our current infrastructure challenge is, in very large part, is to shift part of the burden onto the private sector’s much larger shoulders. Of course, all this depends on the existing credit market opening back up. But, having equity in deals through public-private partnerships should increase the appetite of lenders to provide debt because the equity serves as a buffer or cushion. Also infrastructure companies need to be able to borrow and invest. At the present time, these conditions are not there. But the markets will return at some point and we need to be ready for when they do. In the meantime, laying the policy groundwork for collaboration between the public and private sectors is imperative.

CONCLUSION

The time has come for U.S. to innovate with new solutions to old problems. The public coffers are today empty. With new tax revenues out of the question, it is only the private sector that can provide the much needed funds, expertise, efficiency and sustainability needed to solve America's current infrastructure crisis. Indeed, the private sector is actively looking for more infrastructure projects to invest in. In the last several years over one hundred and twenty infrastructure funds have been formed, with well over \$170 billion specifically earmarked for such long term investments.

Extending the PPP approach to transportation (as America has already done in power and telecommunications) will bring a number of key benefits: 1) it will bring in private sector funds which could potentially dwarf the figures the public sector can bring in; 2) the presence of the private sector will bring a much tighter focus. in on the cost benefit analysis of individual projects; 3) the private sector is demonstrably more efficient in its ability to bring in projects on time and under budget. 4) To the extent that the public sector is being benchmarked against private sector companies it will undoubtedly bring major cost savings to the taxpayers. Finally, 5) with the private sector carrying the load, any given project is less sustainable to having legislative pork added on.

This is not to say that implementing this approach will be easy; quite to the contrary. There are many vested interests that will find this cutting across their grain. As such, it will take strong Presidential and Congressional leadership to implement the much needed "enabling environment."

The national infrastructure bank bills that Congress is once again considering could be an important vehicle to implement a PPP approach. If money were available at the national level through the NIB, it would be imperative that states spend that money in the most efficient way (with rigorous cost benefit analyses) and leverage private sector resources. The infrastructure crisis has become a national issue requiring a national response if our economy is to continue to grow. A close and balanced working partnership with the public sector will be needed to attract the need capital in these uncertain financial times.

In the current financial/institutional crisis the private sector itself is finding it very hard pressed to borrow as the credit markets are, for intents and purposes, largely frozen. Credit will most assuredly be tight for the foreseeable future, risk appetite will be subdued, and structured finance (the essence of infrastructure/project finance) may not be back in fashion quickly. That said, it is likely that lenders will resume financing of infrastructure before they return to the corporate sectors, because infrastructure projects have more dependable cash flows and are ring-fenced so that they are not affected by other counterparties. The only way forward is for a concerted national response where the federal government can stand behind the credit requirements of the companies needed to undertake these projects.

For decades the United States has served as an example of modernity around the world and many countries were imitating its public sector successes. But now, as America comes to grips with the urgent need to upgrade its aging infrastructure, it has an opportunity to learn take a page from the international playbook. The use of these structures is not being suggested as a full replacement of the current government arrangement. But to the extent that it adds value, it can certainly take much of the pressure off the various levels of government, federal, state and municipal.

Basically the whole world seems to be riding on a PPP wave right now and it would seem a shame if the US, the home of private sector par excellence, was to miss the crest.

ⁱ Congressional Budget Office, *Issues and Options in Infrastructure Investment*, May 2008.

ⁱⁱ U.S. Bureau of Economic Analysis, Moody's Economy.com