

Bond Case Briefs

Municipal Finance Law Since 1971

'Moneyball' Approach To Closing the \$2 trillion Infrastructure Finance Gap.

This spring, President Trump and the Democratic leadership in Congress agreed on a number: \$2 trillion is what it will take to get America's infrastructure a passing grade. The American Society of Civil Engineers' most recent report card gave it a D+.

While the negotiation has come to a stand-still, the degradation of our roads, bridges, water distribution systems and the like, has not. Rather than wait on Washington, I believe we can begin to solve these problems now. How? The answers lie in data — specifically in emerging 21st-century financing and business models that are informed by advances in infrastructure design itself, and the valuable data it can generate.

Think of it as a “Moneyball” approach. By mining and leveraging player performance data, Oakland A's manager Billy Beane challenged conventional wisdom of scouts to outsmart richer clubs. A data-driven investment approach in undervalued players resulted in a top baseball team on a limited budget. Bear with me.

Tomorrow's smart, sensor-based infrastructure will be capable of providing new kinds of data and insights. The value of this information is increasingly starting to outstrip that of the physical infrastructure itself. Information is trumping function. Cities and towns can harness this to unlock new cash flows and equity value from improved operations or new derivative products and services.

In the U.S., public financing of infrastructure relies on 19th and 20th century models such as municipal bonds funded by tax-payers or project-specific revenue streams, revolving loans and grants. Municipal securities that cities and states issue for water, energy, industrial development and transportation projects — a diverse \$3.8 trillion market — have evolved over two centuries. But they continue to rely on taxes and fees at a time when tax revenue is decreasing, public deficits are increasing and inequality is rising.

Public-private partnerships and outright private financing might sound like reasonable alternatives, but there are obstacles. Often, the investor seeks to own the asset, but regulations can constrain that. In addition, they raise ethical questions about inequality of access to a public good.

Clearly, these models are insufficient. To close the infrastructure finance gap, we need new ideas. So, how do we rebuild our bridges, roads and water systems without raising taxes?

The Moneyball approach starts with operational performance data from infrastructure systems: Sensors on bridges monitor structural health, which informs how much capital will be needed for operations and maintenance, and by when. Pressure sensors in water distribution pipes, along with smart meters in homes and businesses, capture leak and consumption patterns.

The measurements at stormwater outflows in lakes and rivers show water quantity and quality. Add to this data from remote sensing platforms such as NOAA satellites, Google Earth and private drones to obtain new insights about green spaces in cities, soil moisture, heat signatures of industrial

plants, contaminant emissions in air and water and analytics that reveal structural deterioration.

By “twinning” infrastructure into digital assets, we can uncover informational inefficiencies that change how we value, price and invest in infrastructure.

Innovations like this inherently carry risk, but risk is often rewarded in the market. For example, variable interest rate bonds can be informed by sensor measurements and engineering models that underpin performance-based yields. They are already being used to finance green infrastructure for stormwater management. Yields are based on their impact on city flooding and water quality of discharges in rivers. Risk transfer mechanisms such as insurance and swaps have committed capital to make infrastructure more resilient and adaptive. Auctions of infrastructure-derived data to third-party service providers such as autonomous vehicle operators and electric vehicle charging systems are bringing in new cash flows.

The attractiveness of these financing instruments should not be underestimated. For investors, performance-based bonds or securities are uncorrelated to the market and can hedge volatility. For cities and towns, smart systems attract new types of financing that can bridge the funding gap, and may cost less up-front or reduce long-term maintenance costs. New designs such as smart green stormwater infrastructures could cost less than upgrading pipes and pumping stations. Flex lanes on freeways are cheaper than building additional lanes, and have similar performance.

For citizens, taxes may decrease, not only due to potentially lower lifetime cost of nimble systems, but also because the new data value streams shift cash flows towards the data markets.

Beyond all this, data-driven financing has the potential to become an equalizer. In traditional financing, wealthier communities can afford to raise taxes to pay off new bonds and maintain infrastructure. They also have higher credit ratings, so capital is cheaper. Low-income communities are left at a disadvantage. Smart financing instruments can open up cash flows that rely less on fees or taxes.

These new models often stir up privacy and cybersecurity concerns. It is important to note that structural health, performance and resiliency data tend to be operational, not personal. Bridge sensors are not collecting your date of birth or social security number. Regardless, cities such as London, Helsinki and Toronto are exploring new regulatory structures to protect privacy.

Our aging infrastructure needs attention now. Smart infrastructure systems and data-driven financing can plug financial needs, enable a new tech job market, and bridge the political divide. State treasurers and other public finance managers need to come together with infrastructure asset investors and efficient capital managers to move these innovations forward.

Let's learn to play Moneyball.

THE HILL

BY PETER ADRIAENS, OPINION CONTRIBUTOR — 07/01/19 08:00 AM EDT

Peter Adriaens is director of the University of Michigan Center for Smart Infrastructure Finance, and a professor of environmental engineering and finance.