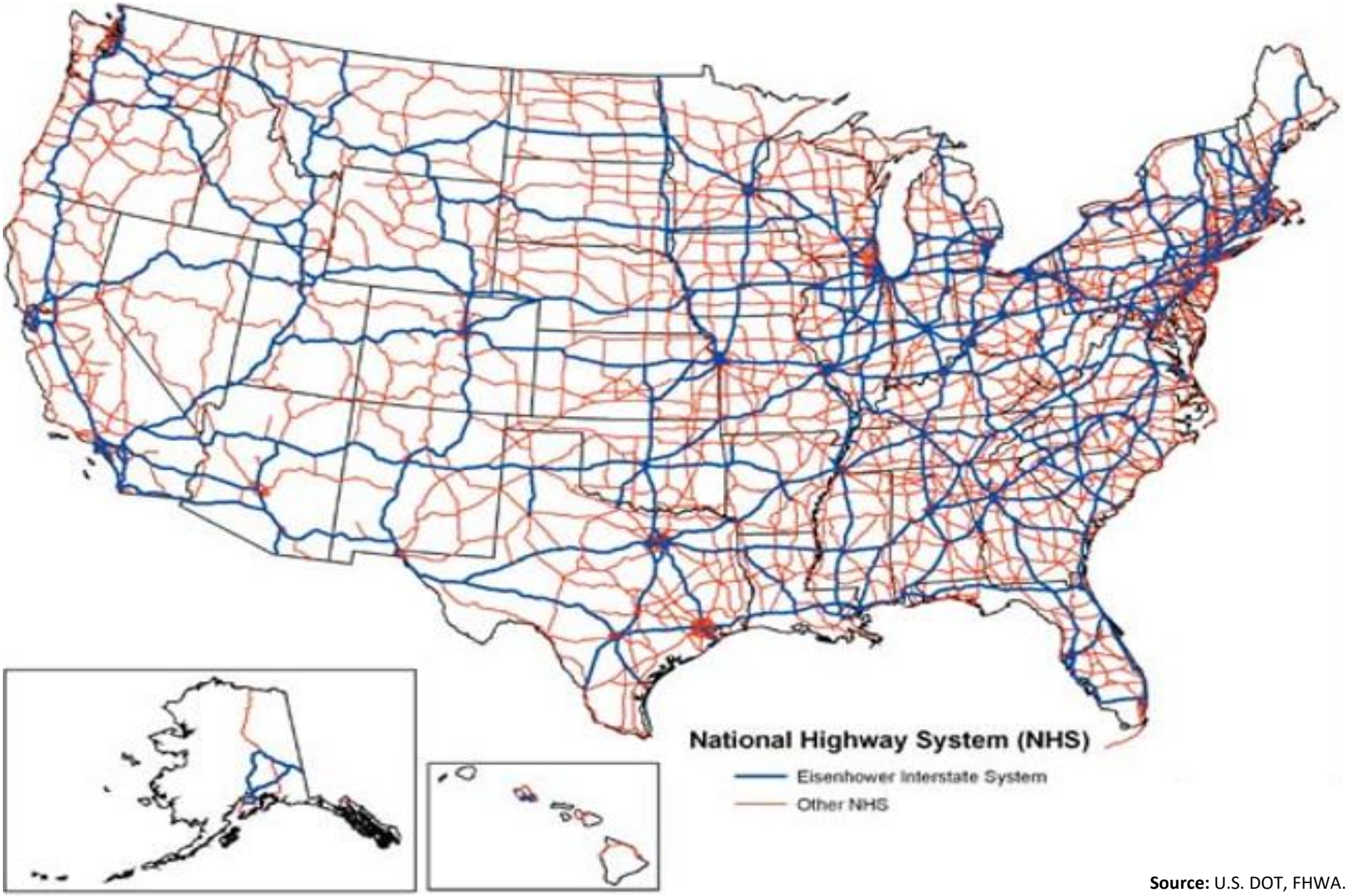
Maintaining Maintenance:
The Real Effects of Financial Reporting for Infrastructure

Ryan McDonough
Claire Yan
Rutgers Business School—Newark and New Brunswick

July 2021

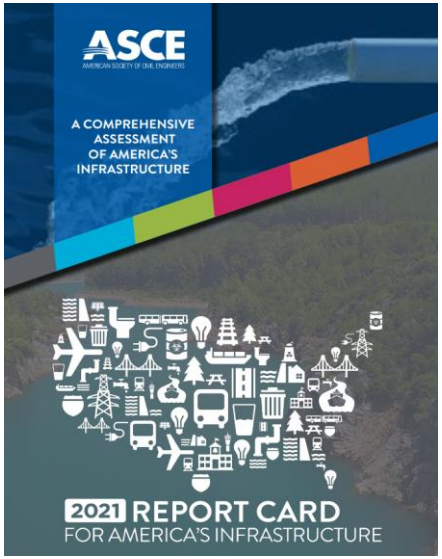
10th Annual Municipal Finance Conference

Public Roads and Bridges



Source: U.S. DOT, FHWA.

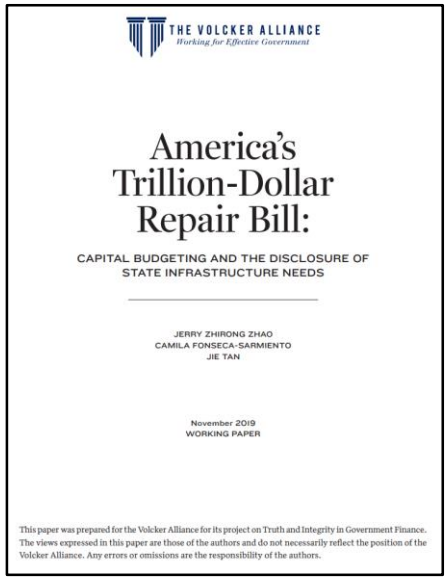
Growing Concerns About Condition and Funding

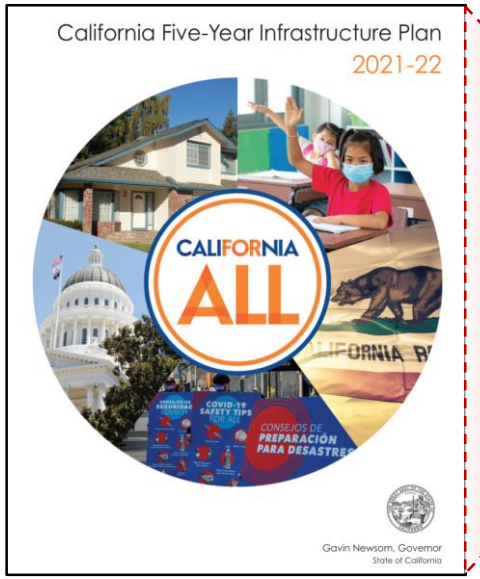


CUMULATIVE INVESTMENT NEEDS BY SYSTEM BASED ON CURRENT TRENDS, 2020 TO 2029

ALL VALUES IN BILLIONS

Infrastructure System	Total Needs	Funded	Funding Gap
Surface Transportation[1]	$2,834	$1,619	$1,215
Drinking Water / Wastewater / Stormwater[2]	$1,045	$611	$434
Electricity[2]	$637	$440	$197
Airports[2]	$237	$126	$111
Inland Waterways & Marine Ports[2]	$42	$17	$25
Dams[3]	$93.6	$12.5	$81
Hazardous & Solid Waste[4]	$21	$14.4	$7
Levees[5]	$80	$10.1	$70
Public Parks & Recreation[6]	$77.5	$9.5	$68
Schools[7]	$870	$490	$380
Totals	**$5,937**	**$3,350**	**$2,588**



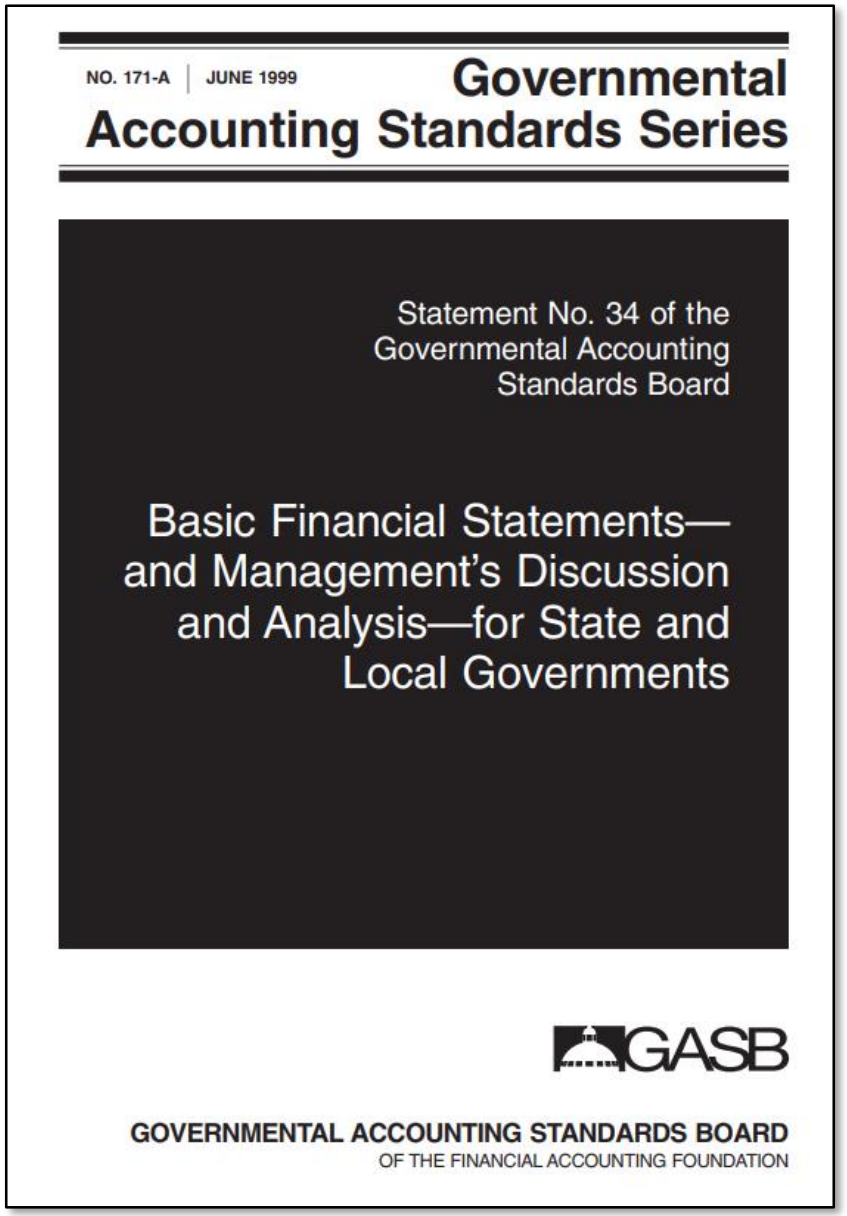


Identified Statewide Deferred Maintenance[1/]

(Dollars in Millions)

Department of Transportation	$36,200

Financial Reporting Requirements



Prior to GASB 34, state and local governments were **not** required to report general infrastructure assets in their financial statements.

Upon adopting GASB 34, governments were required to capitalize all infrastructure assets (e.g., roads and bridges) at historical cost.

GASB 34 permits two methods for reporting infrastructure assets:

- Depreciation approach.
- Modified approach.

Research Question

Infrastructure assets have relatively long useful lives; maintenance deferrals may not be immediately obvious.

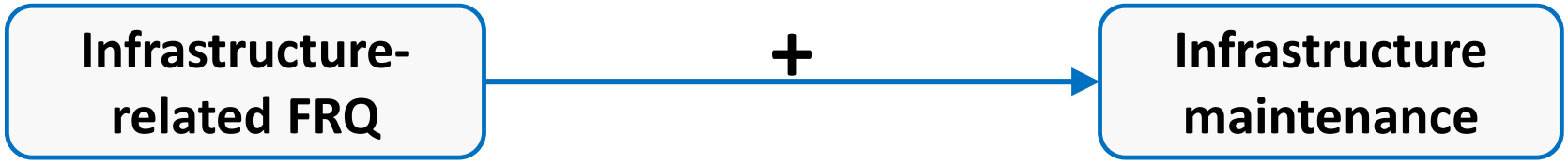
- Similarly, the effectiveness of maintenance spending is difficult to monitor and observe in the short-run.

As a result, there is a tendency to "kick the can down the road" to reduce short-term costs.

<u>Question:</u> Do governments' financial reporting policies impact infrastructure investment decisions?

Hypotheses

To the extent infrastructure-related financial reporting information is a valuable input in budgeting and investment decisions, we conjecture that higher financial reporting quality will result in less underinvestment in infrastructure maintenance [**Hypothesis 1**].



A channel through which the above link may work is through a lower propensity to enact midyear budget cuts to infrastructure spending and/or divert infrastructure-related revenues [**Hypothesis 2**].

Empirical Challenges

Measuring infrastructure-related financial reporting quality.

- Variation in 50 states' infrastructure reporting policies following the adoption of GASB 34.

Measuring investments in infrastructure maintenance.

- FHWA maintenance data.
- FHWA road and bridge assessments.
- Government Performance Project survey (infrastructure grades).

Identification.

- OLS, 2SLS, and DiD.
- Falsification tests.

Financial Reporting for Infrastructure

The GASB permitted two methods for reporting infrastructure:

1. **Depreciation approach** – depreciate infrastructure like other capital assets.

2. **Modified approach** – expense costs to maintain and preserve infrastructure + provide additional disclosures.

Under the modified approach, governments must:

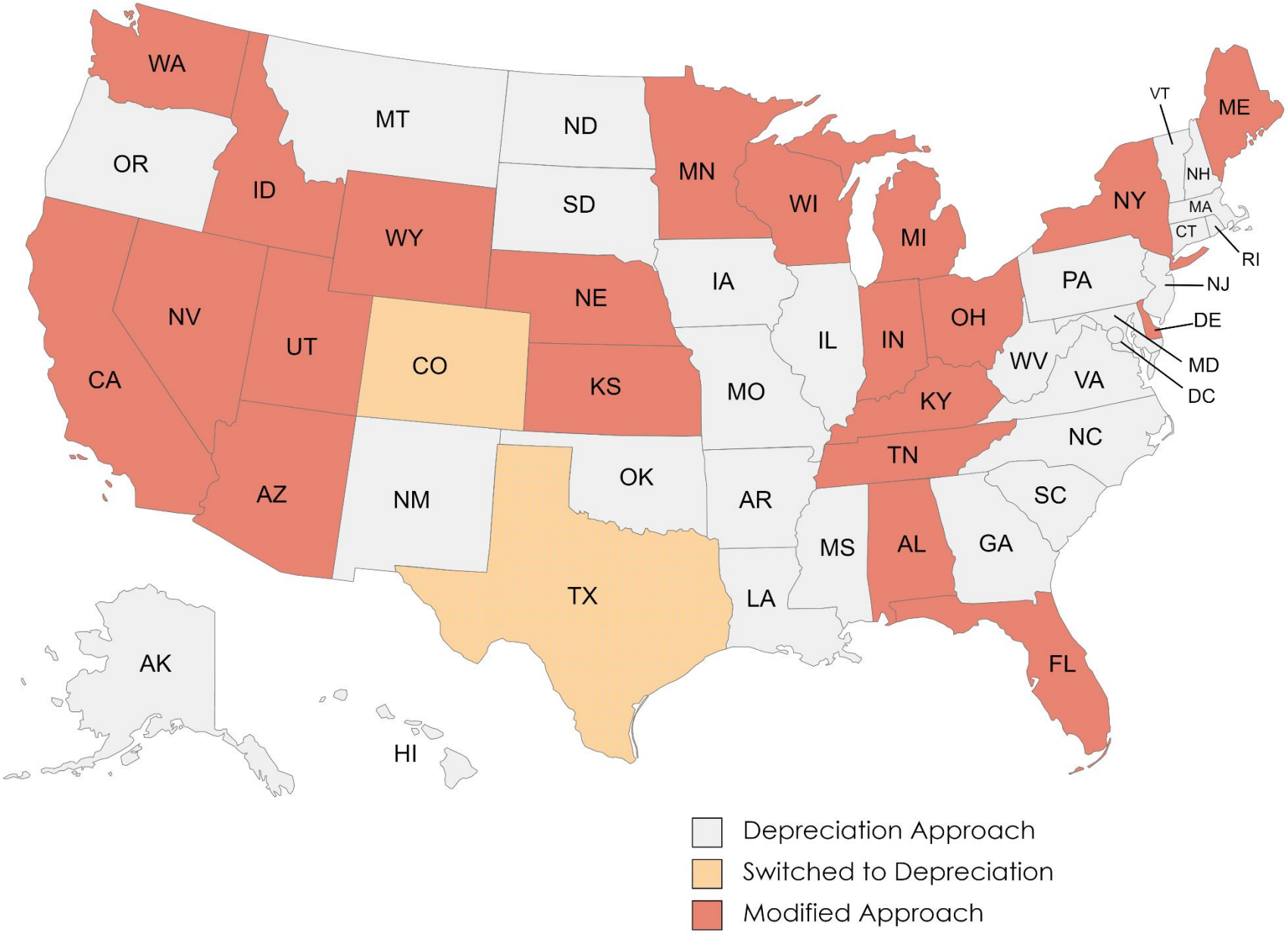
1. Track relevant infrastructure assets.

2. Report on the condition of eligible infrastructure assets.

3. Demonstrate that eligible infrastructure assets are being maintained at or above the government's predetermined and disclosed condition levels.

4. Provide an annual estimate of needed preservation costs, as well as the actual amount spent each year.

Financial Reporting for Infrastructure



INFRASTRUCTURE ASSETS USING THE MODIFIED APPROACH

In accordance with GAAP, the State has adopted an alternative method for recording depreciation expense for the State's network of **roads and bridges** maintained by the Department of Transportation. Under this method, referred to as the modified approach, **the State will not report depreciation expense** for roads and bridges but will capitalize all costs that add to the capacity and efficiency of State owned roads and bridges. Generally, all maintenance and preservation costs will be expensed and not capitalized.

Roads:

- Approximately 15,000 centerline miles (~43,000 lane miles).
- NY rates the condition of the pavement based on surface condition (e.g., cracking, faulting) using a scale of 1 (very poor) to 10 (excellent).
- It is the State's intention to maintain an average condition rating between 6.7 and 7.2.

Bridges:

- Approximately 7,900 bridges.
- The State inspects components of each bridge for deterioration and ability to function properly.
- Rating of 6-7 is excellent; Rating of 1-2 is deficient, indicating need for major repairs or replacement.
- It is the State's intention to maintain an average condition rating level between 5.3 and 5.6.

INFRASTRUCTURE ASSETS USING THE MODIFIED APPROACH

Pavement and Bridge Condition Summary as of December 31:

Year	Pavement Average Surface Rating	Bridges Average Condition Rating
2015	6.92	5.30
2014	6.99	5.32
2013	6.99	5.34
2012	6.98	5.34
2011	6.87	5.35
2010	6.84	5.37
2009	6.91	5.38
2008	6.93	5.39
2007	6.86	5.41
2006	6.90	5.42

Actual Preservation/Maintenance Costs as of March 31:

(Amounts in millions)

	2016	2015	2014	2013	2012
Total roads	$ 1,100	$ 1,256	$ 1,069	$ 1,131	$ 930
Total bridges	250	289	255	201	281
Total	**$ 1,350**	**$ 1,545**	**$ 1,324**	**$ 1,332**	**$ 1,211**

Estimated Preservation/Maintenance Costs as of March 31:

(Amounts in millions)

	2016	2015	2014	2013	2012
Total roads	$ 950	$ 836	$ 764	$ 727	$ 712
Total bridges	414	345	228	146	184
Total	**$ 1,364**	**$ 1,181**	**$ 992**	**$ 873**	**$ 896**

Sample

50 State Governments: **2002–2016** (post period); **1997–2006** (DiD).

Federal Highway Administration, agency of U.S. DOT, monitors the condition of and investments in states' roads and bridges.

	Post-GASB 34 Sample		
	N	Mean	Median
Maintenance	699	1.448	1.050
Roads_%Poor	699	0.040	0.030
Bridge Meters_%SD	699	0.082	0.070
Lane Miles	699	0.009	0.007
DVMT	699	3.313	2.547
Bridge Meters	699	0.942	0.795
Federal Funds	699	5.726	5.724
High Quality Infrastructure	699	0.541	0.540
Midyear Budget Cut	400	0.150	0.000
MFT Diversions	699	0.085	0.026
GPP_Infrastructure	100	9.980	10.000

First Stage Model: Determinants of MA

Independent variables:	Dependent variable: *Modified Approach*
Financial Report Timeliness	2.477***
Biennial Budget	0.599***
Population Growth	2.495
Lane Miles	-58.849***
DVMT	0.101**
Bridge Meters	-0.064
Federal Funds	0.108
Deficit	-0.555*
Pension Funding	1.846***
TEL	0.150
BBR	0.148
High Quality Infrastructure	3.724***
Intercept	0.796
Year Fixed Effects	Yes
Region Fixed Effects	Yes
Observations	699
Pseudo-R^2	0.349
First-stage Partial R^2	0.096
First-stage Partial *F*-statistic	76.533
p-value of Partial *F*-statistic	0.000

Because unobserved state characteristics could affect both the MA adoption choice and investments in infrastructure maintenance, we begin with a two-stage model.

Two instruments for *Modified Approach:*

- Financial Report Timeliness.
- Biennial Budget Cycle.

Table 4A: MA and Infrastructure Maintenance

$$Infrastructure\ Investment_{it} = \alpha + \beta 1 Modified\ Approach_{it-1} + \Sigma \gamma k Controls_{it-1} + \eta \text{Year FE} + \psi \text{Region FE} + \varepsilon_{it}$$

	Dependent variable: *Maintenance*	
	OLS	2SLS
Independent variables:	(1)	(2)
Modified Approach	0.238***	1.348***
	(3.758)	(4.794)
Controls	Yes	Yes
Year Fixed Effects	Yes	Yes
Region Fixed Effects	Yes	Yes
Observations	699	699
Adjusted R^2	0.464	0.300
Overidentifying Restrictions Test (*p*-value)		0.679
Durbin-Wu-Hausman Test (*p*-value)		0.000

Table 4B: MA and Infrastructure Condition

	Dependent variable: *Roads_%Poor*		**Dependent variable:** *Bridge Meters_%SD*	
	OLS	2SLS	OLS	2SLS
Independent variables:	(1)	(2)	(3)	(4)
Modified Approach	-0.005***	-0.067***	-0.011***	-0.058***
	(-2.626)	(-3.040)	(-3.960)	(-5.339)
Controls	Yes	Yes	Yes	Yes
Year Fixed Effects				
Region Fixed Effects	Yes	Yes	Yes	Yes
Observations	699	699	699	699
Adjusted R^2	0.654	0.642	0.576	0.432
Overidentifying Restrictions Test (*p*-value)		0.963		0.823
Durbin-Wu-Hausman Test (*p*-value)		0.009		0.000

Table 5B: MA and Infrastructure Maintenance

$$Infrastructure\ Investment_{it} = \alpha + \beta 1 Modified\ Approach_{it-1} \times Post_{it-1} + \sum \gamma k Controls_{it-1} + \eta \text{Year FE} + \varphi State\ FE + \psi \text{Region FE} + \varepsilon_{it}$$

Independent variables:	**Dependent variable:** *Maintenance*
Modified Approach×Post	0.159**
	(2.549)
Controls	Yes
Year Fixed Effects	Yes
Region Fixed Effects	Yes
State Fixed Effects	Yes
Observations	500
Adjusted R^2	0.799

Table 5C: MA and Infrastructure Condition

	Dependent variable:	
	Roads_%Poor	*Bridge Meters_%SD*
Independent variables:	(1)	(2)
Modified Approach×Post	-0.001	-0.009***
	(-0.209)	(-2.625)
Controls	Yes	Yes
Year Fixed Effects	Yes	Yes
Region Fixed Effects	Yes	Yes
State Fixed Effects	Yes	Yes
Observations	500	500
Adjusted R^2	0.761	0.903

Table 6: Mechanism Tests

$$Midyear\ Budget\ Cut_{it}\ /\ \text{MFT Diversions}_{it} =$$

$$\alpha + \boldsymbol{\beta 1} Modified\ Approach_{it-1} + \Sigma \gamma k Controls_{it-1} + \eta \text{Year FE} + \psi \text{Region FE} + \varepsilon_{it}$$

	Dependent variable:	
	Midyear Budget Cut	*MFT Diversions*
Independent variables:	(1)	(2)
Modified Approach	-0.369**	-0.056***
	(-2.209)	(-4.671)
Controls	Yes	Yes
Year Fixed Effects	Yes	Yes
Region Fixed Effects	Yes	Yes
Observations	400	699
Pseudo-R^2/ Adjusted R^2	0.221	0.133

Additional Tests and Robustness

Test of parallel trends assumption for DiD.

Alternative proxy: Government Performance Project survey (infrastructure grades).

- MA states receive higher grades (OLS, 2SLS, and DiD designs)

Falsification tests.

- Modified Approach is not associated with new construction.

Drop select observations.

- Results continue to hold after removing cases with unusual circumstances (e.g., switching from MA to DA, missing data, etc.).

Conclusions

Public sector financial reporting policies may influence investments in infrastructure maintenance.

- Underlying mechanism appears to be budget discipline and resource allocation decisions.

Important to the **GASB** and its constituents

Accountability | Interperiod Equity

Former GASB Member, Ed Mazur, recently stated that:

"[t]here is no single unreported or underreported number on the balance sheets of state and local governments greater than the value of deferred maintenance of infrastructure."

Comments and suggestions appreciated.

Ryan McDonough
mcdonough@business.rutgers.edu

Claire Yan
cyan@business.rutgers.edu

Thank you!