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EVALUATING THE IMPACT OF INFRASTRUCTURAL INVESTMENT IN THE US ON STATE AND LOCAL TAX REVENUES

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Abstract: With an investment gap of $3.7 trillion**,** according to the American Society for Civil Engineers (ASCE), US infrastructure is literally begging for help. This situation is so extensive across the US, the richest economy in the world, that the reputable ASCE has assigned. based upon evidence and trends, an unflattering letter grade of C for the nation's infrastructure. Multiform and vast challenges are omnipresent throughout the entire spectrum of infrastructures nationwide ranging from roads, bridges, dams, electric grids, rail to airports, ports, drinking water delivery systems, transit, broadband, among others. This paper attempts to explore avenues of solutions by looking into the impacts of infrastructure investments upon state and local revenues. Using times series spanning the 2009-2024 period within a vector auto-regression (VAR) framework, the study uncovers that infrastructural investments are strongly revenue-stimulative in the long run. This is an incentive for state and local governments to reassess and reorient policies toward prioritizing such investments. Doing so will durably and effectively address two woes, namely, disintegrating infrastructure and persistent revenue shortfalls, in one stroke.

Keywords: Infrastructure, Investment, Vector auto-regression. Tax revenues.

JEL Classification: H41, H54, E66.

1. INTRODUCTION

One way to jumpstart this empirical investigation is with a compelling and two-pronged question: What is the state of infrastructural investment and infrastructure the United States?

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The first facet of this question finds an answer in the following statement: "In the 2025 Report Card, the American Society for Civil Engineers (ASCE) estimates a $3.7 trillion investment gap for U.S infrastructure to reach a state of good repair."[1] The second facet portrays a rather dismal picture of the state of infrastructure in the US. Case in point, the same Report of repute assigns an overall letter grade of C for infrastructure in the US. Many domestic and foreign observers can find such a score hard to fathom for two major reasons. On the one hand, the US is by far the largest economy in the world with total output worth about $31 trillion as of 2025 (Mataloni and Pinard, 2025).[2] On the other hand, it is a stylized fact that all three levels of government in the country - namely, Federal, state, and local - spend trillions of dollars in their respective budgets through fiscal years, while incurring as well hundreds of billions of dollars in wasteful spending and inefficiencies.

A closer look at the overall C letter grade of infrastructural networks in the US highlights some insightful takeaways across states, according to the ASCE (See Table 1). No state scores a B, l*et al*one an A. The best score is C+, and it is secured by only four states. The next best grade of C is earned by 19 states plus the District of Columbia, followed by another set of 13 states that are given a C-. Three states are rated with a D+; one state gets a D, whereas Puerto Rico comes up with a D-.

The dismal picture of infrastructure nationwide seemingly reflects the abandonment of infrastructure investment, which is also referred to as social overhead capital (SOC). A quick glance at American economic history reveals that the leap forward experienced by the US economy in the 20th century was anchored a great deal in massive investment to qualitatively and quantitatively improve the depth and breadth of SOC. In turn, these efforts paved the way for a myriad of innovations, an explosion of commercial activities within and across all states along with an unprecedented number of small, medium, and large businesses created. For instance, President Dwight D. Eisenhower spearheaded the 1956 Federal-Aid Highway Act (FHWA) that was transformative for the US economy in every respect by funding the Interstate Highway System.[3] According to the US Department of Transportation's Federal Highway Administration, it is the "Greatest Public Works Project in History."[4] Originally, $25 billion – which is equivalent more than $200 billion in 2024 – was earmarked in the FHWA to construct 41,000 miles of the System. Fast forward to 2025, the funding gap for infrastructures such as roads, dams, bridges, rails, ports, airports, among others, is so staggering, as aforementioned, that it is unarguably exerting drag on economic growth in the US.[5] In other words, the full potential of the US economy in the 4th industrial revolution, or Industry 4.0, is yet to be unleashed, pending concerted efforts by Federal, state and local decision-makers to address the gap. They should elevate these efforts to the highest level of national emergency to maintain and expand US economic leadership for current and future generations. Indeed, countries such as China and India, among others, are gaining momentum and catching up, especially the former, in both absolute and relative terms.[6]

Table 1: Infrastructure Report Card in United States and Puerto Rico[7]

Overall grade	*States[8]*
A	None.
B	None.
C+	Georgia (2024); Nevada (2025); Utah (2025); Wisconsin (2024).
C	Alaska (2025), Arizona (2020); Connecticut (2022); DC (2021); Florida (2021); Idaho (2025); Iowa (2023); Kansas (2018); Maine (2024); Maryland (2020); Minnesota (2022); New York (2022); North Dakota (2019); Ohio (2025); Tennessee (2022); Texas (2025); Vermont (2023); Virgina (2022); Washington (2019); Wyoming (2023).
C-	Alabama (2022); California (2019); Colorado (2025); Illinois (2022); Kentucky (2019); Michigan (2023); Mississippi (2024); Missouri (2018); Montana (2024); New Hampshire (2017); Oregon (2024); Pennsylvania (2022); Rhode Island (2020).
D+	Hawaii (2019); Louisiana (2017); South Carolina (2021).
D	West Virgina (2020).
D-	Puerto Rico (2019).

Source: American Society for Civil Engineers (ASCE).

Against this backdrop, this paper ventures on a path to explore ramifications of infrastructure funding on revenues generated by state and local governments. The economic rationale is straightforward. Investment potentially drives growth, which in turn spurs tax revenues through increased economic activities. This approach is taken as one acknowledges that both state and local governments are mostly facing revenue shortcomings or deficits. More specifically, this investigation is trying to assess the positive externalities of infrastructure funding upon state and local governments finances, if at all.

As it pursues its goals, this work is structured in five segments. In the next segment, the literature review is presented followed by the methodology in the third. Results and policy implications are discussed in the fourth segment. Finally, concluding remarks are underlined in the fifth segment.

2. LITERATURE REVIEW

Economic theory, through the Solow model, teaches us that capital is the epicenter of economic growth. With the term capital, it is fair to understand social overhead capital, which is the collection of physical structures and other infrastructures that constitute the bedrock of all economic activities by supporting, enabling, and promoting them. Simply put in trite language, no social overhead capital, no economic activities. This stylized fact applies to both the micro (or regional) and macro (or country) levels. Without economic activities or economic growth, state and local tax revenues suffer or collapse altogether.

In that regard, Novak (2025) describes infrastructure as the backbone of thriving communities. She stresses the foundational role played by infrastructure and economic development as drivers of sustainable growth and community prosperity. Moreover, Fosu and Twumasi (2022) investigate the link between investment and economic growth with a focus on the United States. Using principal component analysis and VAR estimation, they uncover that infrastructure spending stimulates economic growth. They find as well through an impulse-response study that innovations to investment spending have positive and persistent effects on economic growth.

Across the globe, a great deal of work has been completed to probe the impacts of infrastructure investment on the economy. For instance, Opadeji *et al*. (2023) focus on Nigeria, the economic powerhouse of West Africa. Within a cointegration and VECM framework along with a dataset ranging from 1991 to 2021, they empirically establish that infrastructure investment has a significant and positive effect on economic development.

Still in the developing world, Chowdhury and Khan (2025) check out the nexus between infrastructural growth and economic growth using evidence from Bangladesh. They consider a methodology including a principal component analysis, an auto-regressive distributive lag (ARDL), and nonlinear auto regressive distributive lag (NARDL) bound tests. They assess this framework with times series ranging from 1973 to 2020 and discover in this country that infrastructural investment has a significant and positive effect upon production activities in the country.

In an attempt to further understand this relationship between infrastructure and economic growth Iziga and Takagi (2023) push a very comprehensive study composed of 130 countries with data spanning the 1990-2015 period. Their thorough series of estimations using an autoregressive distributed lag (ARDL) model point out that infrastructure generated grouped-heterogeneity of growth across countries. This is another finding that corroborates what other scholars have discovered about the impact of infrastructural investment upon economic growth.

On another note, Zhang and Cheng (2023) specifically look into a particular type of infrastructure, namely, transport infrastructure. They consider data from the United Kingdom ranging from 1970 to 2017. They apply a principal component analysis as well as a vector error correction model (VECM) to analyze both short run and long run effects of transportation infrastructure development on economic growth. The main takeaway of their investigation is that the former enhances the latter in the long run. In the short run, however, it's the opposite, as a negative and significant effect is found.

Another specific study was completed by Ma and Lin (2023), but this time on digital infrastructure. Case in point, they explore the impacts of digital infrastructure on economic transformation in 271 Chinese cities from 2003 to 2019. Using a difference-in-difference (DID) model, they derive a two-pronged result. On the one hand, they discover that construction of digital infrastructure promotes green economic development in cities. On the other hand, this green economic development is found to be more pronounced in eastern and economically advanced cities.

With China remaining their focus, Ma et. al (2025) use 31 Chinese provinces in a panel covering the 2010-2019 period to figure out if new infrastructure promotes regional economic development from the vintage point of administrative boundaries. They empirically establish, using spatial Durbin and spatial mediation effect models, that new infrastructure boosts economic growth of administrative boundaries along with evidence of a spatial spillover effect. Also, using heterogeneity tests, they uncover that information infrastructure yields the most impactful results in large provinces and in the eastern region.

3. METHODOLOGY AND DATA

3.1. Methodology

As used in numerous studies conducted elsewhere,[9] this paper's theoretical framework is based upon a vector error correction model (VECM), which is widely discussed in the literature. Engle and Granger (1987), Johansen (1995), Brüggemann *et al.* (2006), among others, have abundantly elaborated on this model.

A succinct presentation of this technique is provided below starting with a vector auto-regression of order k:

$$d_t = c_1 z_{t-1} + c_2 z_{t-2} + \ldots + c_q z_{t-k} + \varepsilon_t \quad (1),$$

where d is a (1 x g)' matrix of g endogenous variables; c is a (g x g) matrix of coefficients; ε is a (1 x g)' matrix of g residuals, and t is the time subscript. ε follows a normal distribution with mean 0 and variance Ω, i.e., $\varepsilon \sim N(0, \Omega)$. Using equation (1), the VECM form is derived:

$$\Delta d_t = \Pi d_{t-1} + \sum_{v=1}^{q-1} \Lambda_v \Delta d_{t-v} + \varepsilon_t \quad (2)$$

where ∏ is a coefficient matrix of cointegrating relationships and $\prod = -(I_r - c_1 - c_2 - \ldots - c_q)$; Λ_v is a coefficient matrix of the lags of differenced variables of d and $\Lambda_v = -(c_{v+1} + \ldots + c_q)$. ∏ can be transformed and expressed as $\prod = \alpha\beta'$, where α and β are (g x r) matrices of rank r, with $0 \le r \le g$.[10] The error correction term (ECM) is $\alpha\beta' d_{t-1}$, and α represents the speed of convergence of the dependent variable to its equilibrium value. In the present study, g = 3; that is, (i) state and local revenue (STLOCREV), (ii) infrastructure investment (INFINV), and (iii) business cycle (BUSCYC).[11]

3.2. Data

The dataset is comprised of three series spanning the 2009-2024 period. The sources for all series are the *World Development Indicators (WDI)* of the World Bank Group and the *Federal Reserve Economic Data (FRED)* of the Federal Reserve Bank of St Louis. The series STLOCREV, INFINV, and BUSCYC are respectively proxied by national totals of state and local tax revenue (NTSLREV), constant gross fixed capital formation (CGFCF), and real gross domestic product (RGDP). A specific note of clarification is in order regarding INFINV. As a matter of fact, coherent and consistent statistical data regarding nationwide investment in infrastructure is lacking.

4. RESULTS AND POLICY IMPLICATIONS

It's customary to start discussions of results by catching a glimpse of the dataset's nature via some descriptive statistics. Table 2 reports some noteworthy statistical information about, among others, the mean, median, and normal distribution. As far as the latter is concerned, all series appear to be normally distributed. Additionally, a correlation analysis is provided to capture pairwise movements in datapoints among series (see Table 3). Not surprisingly, it comes out that CGFCF and RGDP are highly correlated. One effective way of enhancing the robustness of our findings is to introduce an interaction term between these highly correlated regressors.

Prior to completing cointegrating estimations, unit root tests are performed. Tables 4 and 5 show that series I(1). This is followed by Exhibit 1, in Appendix, that compiles results pertaining to three cases of cointegrating tests, which, overall, reveal that series are cointegrated at the 5% level, with either Trace or Max Eigenvalue approaches.

Table 2: Summary Statistics

	CGFCF	*RGDP*	*NTSLREV*
Mean	3.86E+12	1.90E+13	1.47E+12
Median	3.87E+12	1.89E+13	1.39E+12
Maximum	4.94E+12	2.27E+13	2.09E+12
Minimum	2.61E+12	1.59E+13	1.05E+12
Std. Dev.	6.99E+11	2.10E+12	3.49E+11
Skewness	-0.1905	0.224465	0.523186
Kurtosis	1.98799	1.920556	1.965412
Jarque-Bera	0.779555	0.911158	1.443512
Probability	0.677208	0.634081	0.485898
Observations	16	16	16

Table 3: Correlation Matrix

	CGFCF	*RGDP*	*NTSLREV*
CGFCF	1	0.987856	0.958442406
RGDP	0.987856	1	0.985022124
NTSLREV	0.958442	0.985022	1

As far as cointegration estimates are concerned they are performed through two variants of the baseline model. This process is also meant to ensure consistency and robustness of findings. Variant I includes CGFCF and RGDP regressors, whereas variant II augments variant I with an interaction term between CGFC and RGDP owing to the high correlation detected between these variables in an attempt to alleviate potential endogeneity problems.

Takeaways from cointegration estimates are two-fold and outlined in Table 6. Firstly, variant I evidences no significant impact of CGFCF on NTSLREV although the expected positive sign is found. In other words, expanding or improving infrastructure does not embellish revenue collections across states and local jurisdictions. However, variant II points to a significant and positive effect of CGFCF on NTSLREV. Specifically, any one percent increase in infrastructure spending boosts state and local revenues by about 51 percent. This is a marked progression in revenues that underscores the notably beneficial impact of infrastructure spending on public finances at state and local levels. Moreover, this occurs after controlling for business cycle fluctuations.

Let's place at this juncture a note of caution and clarification regarding the magnitude of the impacts, which at first may appear overwhelming, maybe unreasonable. However, macroeconomic rationales may be called upon to lend strong support to this finding. As a matter of fact, the multiplying effects of infrastructure spending over time further and compound consumption, public spending, and investment (both private and public), which ultimately create a snowball effect on state and local revenues.[12]

Table 4: Unit Root Tests – Ho: Unit Roots in Series (Level)[13]

	Intercept		*Trend and Intercept*	
	Statistics	*Prob.*	*Statistics*	*Prob.*
Fisher-ADF (AIC)	1.07715	0.9825	7.13674	0.3084
Fisher-ADF (SIC)	1.07715	0.9825	7.13674	0.3084
IPS (AIC)	3.15685	0.9992	-0.46789	0.3199
IPS (SIC)	3.15685	0.9992	-0.46789	0.3199
Fisher-PP	2.06084	0.914	10.1418	0.1188

Secondly, normality tests associated with variants I and II are conducted. They illustrate that the latter is a more robust variant, as residuals display a normal distribution contrary to the former (see Exhibits 2 and 3, in Appendix).

Table 5: Unit Root Tests – Ho: Series in Series (First Difference)[14]

	Intercept		*Trend and Intercept*	
	Statistics	*Prob.*	*Statistics*	*Prob.*
Fisher-ADF (AIC)	30.4368	0	24.1978	0.0005
Fisher-ADF (SIC)	30.4368	0	24.1978	0.0005
IPS (AIC)	-4.82294	0	-3.83434	0.0001
IPS (SIC)	-4.82294	0	-3.83434	0.0001
Fisher-PP	43.5588	0	50.6539	0

Empirical findings elicit a major policy implication. As a gentle reminder, this study was motivated by and built on the premises of the ASCE's troubling 2025 Report Card regarding the state of infrastructure in the US. With a nationwide investment gap in infrastructure evaluated in trillions of US dollars, this situation can no longer be overlooked. This is how the empirical evidence of the study comes in handy by indicating a path to creating incentives for state legislatures and decision-makers to prioritize investment in infrastructure. Indeed, investments in infrastructure considerably prop up state and local revenues in the long run. That is, these types of investments will bring about financial windfalls that will in turn help improve public finances. In the current economic environment marked by persistent deficits, this paper argues that investments in infrastructure are and can be the sustainable solution.

Table 6: Cointegration Estimates (Dependent: LOG(NTSLREV))[15]

	I	*II*
LOG(CGFCF)	0.471823	51.48107**
	(-0.43718)	(-20.1769)
	[1.07923]	[2.55148]
LOG(RGDP)	6.21179***	54.44663**
	(-0.99945)	(-19.9654)
	[6.21522]	[2.72705]
LOG(CGFCF)*LOG(RGDP)		-1.67505**
		(-0.66874)
		[-2.50477]
C	-0.21012	-0.19683
R-squared	0.942341	0.949859
Adj. R-squared	0.913511	0.914044
F-statistic	32.68643	26.52122
Log likelihood	40.39078	41.29892

Beyond the thousands of direct and indirect jobs along with local economic growth to be generated, infrastructural investments are not revenue-neutral or suppressive, but rather revenue-stimulative.

5. CONCLUSION

Infrastructural investments in the US have not kept pace over time with the nation's massive needs for maintenance, modernization, and expansion of roads, bridges, dams, electric grid, rail, airports, seaports, drinking water delivery systems, etc… This situation has earned infrastructure in the US, the world largest economy, an unflattering letter grade of C by the reputable American Society for Civil Engineers (ASCE). Searching for avenues of solutions, this research work has empirically explored the impacts of infrastructural investments upon state and local revenues. After accounting for the business cycle, it has been found that infrastructural investments are strongly revenue-stimulative in the long run. This is an incentive for state and local governments to reassess and reorient economic priorities toward such investments.

NOTES

1. Retrieved on September 13, 2025, at https://infrastructurereportcard.org/funding-and-financing-u-s-infrastructure/
2. Retrieved on December 26, 2025, at https://www.bea.gov/sites/default/files/2025-12/gdp3q25-ini.pdf
3. It's noteworthy that legislative initiatives to support road constructions were passed in 1916 and 1921, but the sheer funding scale of the FHWA in 1956 was second to none.
4. Retrieved on September 13, 2025, at https://highways.dot.gov/highway-history/interstate-system/50th-anniversary/history-interstate-highway-system
5. The full list of infrastructures considered is as follows: aviation/airports, dams, inland waterways, rail, stormwater, wastewater, bridges, drinking water, ports, roads, and transit.
6. As of 2025, China and India are respectively the second and fifth largest economies in the world, with about $19.3 and $4.7 trillion in nominal GDP. India is projected to leap over Japan for fourth place and vie neck and neck with Germany shortly afterwards for the third spot. The US remains at the number 1 spot with a projected nominal GDP of about $31 trillion in the same year.
7. For each state of interest, the year of the latest Report is in parentheses.

8. 10 states were not issued a grade, but they experience alarming infrastructural challenges of "their own," according to the ASCE. These states are Arkansas, Delaware, Indiana, Massachusetts, Nebraska, New Jersey, New Mexico, North Carolina, Oklahoma, and South Dakota.
9. For instance, Adom (2025).
10. Π is of rank r. In practice, $r > 0$. If $r = 0$, there are no cointegrating relations, as no linear combinations of d_t are I(0). That also means $\Pi = 0$.
11. In practice, if a high pairwise correlation is detected between proxies of INFINV and BUSCYC, an interaction term will be introduced. In that case, $g = 4$.
12. Similar macroeconomic rationales may also be applied to understand the impacts of real output.
13. ADF, IPS, PP, AIC, and SIC, respectively, stand for Augmented Dickey-Fuller; Im, Pesaran, and Shin; Phillips-Perron; Akaike Information Criteria; and Schwarz Information Criteria.
14. Idem.
15. Figures in parentheses and brackets indicate standard errors and t-statistics, respectively. ***, **, and * show significance at the 1, 5, and 10% levels, respectively.

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APPENDIX

Exhibit 1. Cointegration tests

Case 1: Cointegrating relationship with a constant

		Trace				Max-Eigen Statistic		
Hypothesized			0.05	Prob.			0.05	Prob.
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value	Eigenvalue	Statistic	Critical Value	Critical Value
None	0.767339	38.95785	35.19275	0.0187	0.767339	20.41444	22.29962	0.0897
At most 1	0.615792	18.54341	20.26184	0.0847	0.615792	13.392	15.8921	0.1188
At most 2	0.307854	5.151409	9.164546	0.2672	0.307854	5.151409	9.164546	0.2672

Case 2: Cointegrating relationship with no deterministic terms

		Trace				Max-Eigen Statistic		
Hypothesized			0.05	Prob.			0.05	Prob.
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value	Eigenvalue	Statistic	Critical Value	Critical Value
None	0.701895	31.91995	24.27596	0.0045	0.701895	16.94432	17.7973	0.0668
At most 1	0.615017	14.97563	12.3209	0.0176	0.615017	13.36379	11.2248	0.0207
At most 2	0.108751	1.611838	4.129906	0.2397	0.108751	1.611838	4.129906	0.2397

Case 3: Cointegrating relationship with both a constant and trend

		Trace				Max-Eigen Statistic		
Hypothesized			0.05	Prob.			0.05	Prob.
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value	Eigenvalue	Statistic	Critical Value	Critical Value
None	0.940085	63.40847	42.91525	0.0002	0.940085	39.40764	25.82321	0.0005
At most 1	0.716644	24.00083	25.87211	0.084	0.716644	17.65471	19.38704	0.0877
At most 2	0.364469	6.346129	12.51798	0.4176	0.364469	6.346129	12.51798	0.4176

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Exhibit 2: Normality tests (Variant I)

Component	*Skewness*	*Chi-sq*	*df*	*Prob.**
1	2.072292	9.304517	1	0.0023
2	-0.71534	1.108706	1	0.2924
3	-0.27191	0.160187	1	0.689
Joint		10.57341	3	0.0143
Component	Kurtosis	Chi-sq	df	Prob.
1	7.108149	9.141646	1	0.0025
2	2.432556	0.174413	1	0.6762
3	2.612529	0.081322	1	0.7755
Joint		9.397381	3	0.0244
Component	Jarque-Bera	df	Prob.	
1	18.44616	2	0.0001	
2	1.283118	2	0.5265	
3	0.241509	2	0.8863	
Joint	19.97079	6	0.0028	

Exhibit 3: Normality Test (Variant II)

Component	*Skewness*	*Chi-sq*	*df*	*Prob.**
1	0.939409	1.91206	1	0.1667
2	-0.19093	0.078988	1	0.7787
3	-0.04354	0.004108	1	0.9489
4	-0.32933	0.234996	1	0.6278
Joint		2.230151	4	0.6935
Component	Kurtosis	Chi-sq	df	Prob.
1	3.688596	0.256839	1	0.6123
2	1.938168	0.610722	1	0.4345
3	2.497892	0.136561	1	0.7117
4	1.744786	0.85343	1	0.3556

Joint		1.857552	4	0.7619
Component	Jarque-Bera	df	Prob.	
1	2.168899	2	0.3381	
2	0.68971	2	0.7083	
3	0.140668	2	0.9321	
4	1.088426	2	0.5803	
Joint	4.087703	8	0.8491	