Local Fiscal Dependence and Solar Power Construction Zeal in China

County-level evidence, 2010–2020

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The usual siting problem is local resistance

Elsewhere
Renewable projects bring diffuse economic and environmental benefits but concentrated local costs.

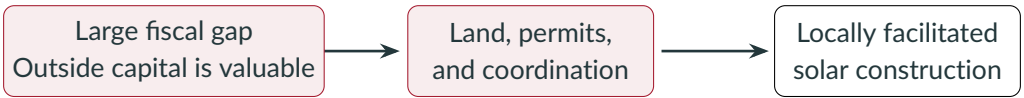
- Private owners can withhold land
- Residents organize around amenity costs
- Councils, zoning boards, and courts create veto points

China
Counties often competed to host the solar and wind projects resisted elsewhere.

- Public and collective land ownership
- Administrative control over conversion and permits
- Provincial control over scale allocation

Why did some Chinese counties pursue this investment more strongly than others?

Fiscal dependence supplies the motive; institutions supply the means

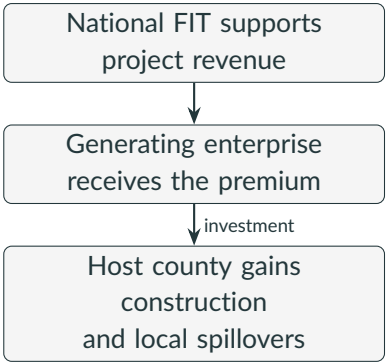


Who pays?
Generating enterprises finance and build plants; grid enterprises finance much of the connection system.

What does government provide?
Counties supply land and approvals; provinces allocate construction scale and assess consumption conditions.

Prediction: the same county builds more when its fiscal gap is larger.

The subsidy makes projects viable—but is not paid to the county



Two competing implications

Subsidy prize: fiscally constrained counties respond more when the FIT premium is larger.

Cost channel: fiscally constrained counties build more when falling technology costs make projects easier to finance.

The design compares each county with itself over time

2,346
counties

24,870
county-years

2010–20
satellite window

Fiscal pressure	Per-capita gap between county expenditure and own revenue
Construction	Newly added satellite-observed PV area per 10,000 residents
State Grid data	Solar-only project count and MW in the subsidy list, dated by scale-management year
Specification	County and year fixed effects; province-clustered standard errors; county controls

Fiscal pressure predicts economically meaningful construction

2,000
RMB increase in fiscal gap per person (1 s.d.)

+6 ha
same-year PV area in a county of 500,000

23%
of mean annual addition

	FE only	Controls
Fiscal gap per capita	0.0007***	0.0006**
	(0.0002)	(0.0002)
County + year FE	✓	✓
Province clusters	31	31
Observations	24,870	24,870

Interpretation

The estimate comes from changes within a county, after removing common annual shocks and persistent county differences.

It is an association, not an exogenous fiscal shock.

The construction result is not only a between-province pattern

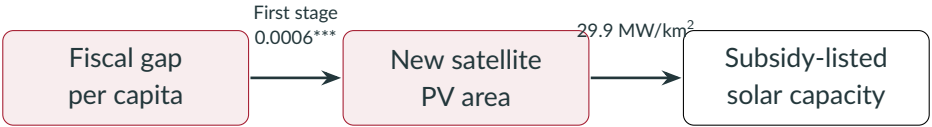
6 ha** $\longrightarrow$ **3 ha*****

Year fixed effects → Province × year fixed effects

Absorbing annual provincial allocation, grid conditions, and common policy shocks cuts the estimate by half, but it remains precise.

Fiscal-gap component	Estimate	Interpretation
Relative county gap	0.0004***	Precise differences among counties in the same province-year.
Leave-one-out peer mean	0.0009*	Suggestive province-wide association.

Construction maps into solar capacity, not project counts



- Reduced form: fiscal gap predicts subsidy-listed solar MW per capita, but not the subsidized solar project count per capita.
- IV-style Transmission: one additional km^2 of construction corresponds to 29.9 MW of listed capacity.

Falling costs matter; the FIT premium does not

Subsidy-prize prediction

Gap $\times$ FIT premium ($t-1$)

0.0024
(0.0027)

No systematic evidence that fiscally constrained counties respond more strongly to a larger premium.

Cost-channel prediction

Gap $\times$ global solar LCOE (Levelized Cost of Energy)

-0.0092^{**}
(0.0035)

The fiscal-gap relationship is stronger when global solar costs are lower.

Lower construction costs enable outside capital investment; the generation subsidy is not the county's marginal prize.

The contribution is the conjunction of motive and capacity

Not simply promotion incentives
Tournament accounts explain why officials pursue visible projects, but not why construction rises with fiscal pressure within the same county.

Not simply cheap solar
Falling costs explain when construction becomes feasible; fiscal dependence helps explain where local governments value it most.

Comparative implication
Local governments may value investment across political systems. Their ability to assemble land and approvals determines whether that interest becomes coordinated action.

China joins strong administrative control over entry to chronic local demand for outside resources.

Fiscal dependence turns administrative control into construction zeal

Fiscal pressure raises the value of outside investment where local governments can assemble land, permits, and coordination.

1. Within the same county, larger fiscal gaps are associated with more solar construction.
2. That construction maps into subsidy-listed solar capacity, not the number of projects.
3. Falling global costs strengthen the relationship; the local FIT premium does not.

The politics of energy investment depends on how sectoral change meets multilevel state conditions.

Main construction regression

	New PV area (km^2/10,000 residents)	
	(1)	(2)
Fiscal gap per capita	0.0007***	0.0006**
	(0.0002)	(0.0002)
Log mean wind speed at 100m		0.0016
		(0.0267)
Mean nightlight		-0.0002*
		(0.0001)
ln(population)		-0.0140*
		(0.0077)
Daylight hours		-0.0000
		(0.0000)
County + year FE	✓	✓
Controls		✓
Observations	24870	24870
Clusters	31	31
Adj. R^2	0.21	0.21

Outcome: new PV area in km^2 per 10,000 residents. Fiscal gap: thousand yuan per person. Province-clustered standard errors.

Buildup and subsidy-listed solar outcomes

	First stage		Reduced form		IV-style calibration	
	(1) National	(2) State Grid	(3) Project rate	(4) MW rate	(5) Project rate	(6) MW rate
Fiscal gap per capita	0.0006**	0.0006***	0.0003	0.0187***		
	(0.0002)	(0.0002)	(0.0004)	(0.0058)		
New PV area per capita					0.5180	29.8509**
					(0.7522)	(13.5964)
Estimator	OLS	OLS	OLS	OLS	2SLS	2SLS
County + year FE	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Observations	24870	19355	19355	19355	19355	19355
Province clusters	31	23	23	23	23	23
State-Grid first-stage robust F					8.21	8.21

The State Grid columns use solar project counts and solar MW only. The IV-style estimates are descriptive physical-scale calibrations.

Province-year absorption and leave-one-out decomposition

Panel A: Province-year absorption

	New PV area rate		Subsidized MW rate	
	(1) Year FE	(2) Province-year FE	(3) Year FE	(4) Province-year FE
Fiscal gap per capita	0.0006**	0.0003***	0.0187***	0.0151
	(0.0002)	(0.0001)	(0.0058)	(0.0094)
Year FE	✓		✓	
Province × year FE		✓		✓
Observations	24870	24870	19355	19355
Province clusters	31	31	23	23

Panel B: County-relative and provincial fiscal gaps

	(1) New PV area rate	(2) Subsidized MW rate
County gap relative to province-year peers	0.0004***	0.0184**
	(0.0001)	(0.0070)
Leave-one-out province-year gap	0.0009*	0.0194
	(0.0005)	(0.0161)
County + year FE	✓	✓
Controls	✓	✓
Observations	24870	19355
Province clusters	31	23

FIT-premium and global-cost interactions

	New PV area (km^2/10,000 residents)	
	(1)	(2)
	Baseline	Cost control
Fiscal gap per capita	0.0007	0.0003
	(0.0009)	(0.0010)
FIT premium (t−1)	0.0054	0.0102
	(0.0260)	(0.0273)
Gap per capita × FIT premium (t−1)	-0.0003	0.0024
	(0.0022)	(0.0027)
Gap per capita × IRENA LCOE		-0.0092**
		(0.0035)
County + year FE	✓	✓
Controls	✓	✓
Observations	23662	23662
Clusters	30	30
Adj. R^2	0.32	0.32

The fiscal gap is contemporaneous; the FIT premium is lagged one year. LCOE is IRENA's global utility-scale solar series.