Corporate Tax Declines and Innovation

Cross-country local projections using application-year USPTO patent outcomes

Isaac Stern, Class of 2027 | Quantitative Analysis Center Apprenticeship | Faculty Sponsor: Masami Imai

This project studies whether cross-country declines in statutory corporate tax rates are followed by increases in innovation, using a country-year panel that links tax data to application-year USPTO patents assigned by inventor country. Using panel local projections, I find delayed increases in patent counts and citation-weighted patents over longer horizons, consistent with the idea that lower corporate taxes raise incentives for innovation.

Research Question

Do corporate tax-rate declines predict later increases in innovation?

- Null: tax declines have no dynamic relationship with patenting.
- Mechanism: lower taxes raise the after-tax payoff to successful innovation.
- Key empirical object: the response path after a one-percentage-point CIT decline.

Summary of Key Variables

The baseline dataset is a country-year panel that links statutory corporate income tax rates to innovation outcomes, macroeconomic controls, and capital-account openness with a main treatment of annual corporate tax-rate decline.

The main innovation outcomes are application-year USPTO patent measures from PatentsView that measure the number and citations of patents from each country in the dataset. There are also other macroeconomic, shock, and country descriptor variables that can serve as either secondary outcomes or primary controls.

Panel Summary

Variable	N	Mean	SD
Corporate tax rate	2,424	31.24	9.92
Annual CIT decline	2,409	0.38	2.45
Log USPTO patent count	2,085	4.45	2.90
Log citation-weighted patents	2,085	6.20	3.34
Log investment share	2,424	3.07	0.42
Capital-account openness	2,424	0.55	1.55

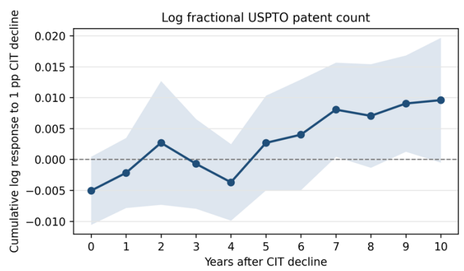
Summary statistics are country-year means and standard deviations. The broad panel covers 2,424 observations, 57 countries, and 1980–2023; the local-projection sample is smaller because ten-year horizons require future patent outcomes.

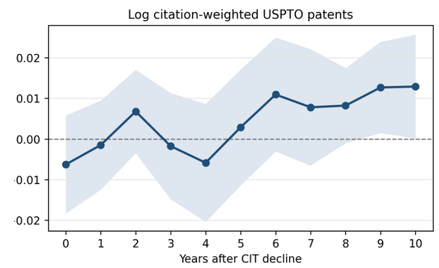
Local Projection Specification

$$
\begin{aligned}
CITDecline_{it} &= CIT_{i,t-1} - CIT_{it}, \\
\Delta_h y_{i,t+h} &= \ln(Y_{i,t+h}) - \ln(Y_{i,t-1}), \\
\Delta_h y_{i,t+h} &= \beta_h CITDecline_{it} + \Gamma_h' X_{it} + \alpha_i + \lambda_t + \varepsilon_{i,t+h}, \\
X_{it} &= \{CITDecline_{i,t-1}, CITDecline_{i,t-2}, \\
&\quad \Delta y_{i,t-1}, \Delta y_{i,t-2}\}.
\end{aligned}
$$

The coefficient β_h is estimated separately for each horizon h = 0,...,10. It measures the cumulative log change in patenting after a one-percentage-point corporate tax-rate decline, conditional on two lags of tax changes, two lags of patent growth, country fixed effects, year fixed effects, and Driscoll–Kraay standard errors.

Dynamic Response Path





The response path is not immediate. Estimates become more positive at longer horizons, especially for citation-weighted patents.

The estimates show a delayed dynamic response to a corporate tax decline. Joint horizon tests reject the null hypothesis over horizons of 0-10 years for both outcomes.

Baseline Estimates

Outcome	$h = 1$	$h = 5$	$h = 10$	N
USPTO patent count	-0.002	0.003	0.010*	1,222
	(0.003)	(0.004)	(0.005)	
Citation-weighted USPTO patents	-0.001	0.003	0.013**	1,181
	(0.005)	(0.007)	(0.006)	

Driscoll–Kraay standard errors in parentheses. Coefficients show cumulative log responses to a one-percentage-point statutory CIT decline.

Conclusion: Corporate tax declines are followed by gradual (delayed) increases in patenting.

- Evidence is strongest over the full 0–10 year horizon.
- Patent counts and citation-weighted patents move in the predicted direction.
- Mechanism is consistent with higher after-tax returns to innovation.

Data Construction

The project builds from two literatures: Devereux et al. show that countries compete over corporate tax rates, while Akcigit et al. show that tax incentives can affect patenting. I treat the cross-country decline in statutory corporate tax rates as the next setting to examine, asking whether tax cuts are followed by changes in innovation across countries.

The baseline dataset is a country-year panel built around statutory corporate tax rates. I start with the statutory tax workbook, clean it to one World Bank country-code-by-year observation, and construct the main treatment as the annual corporate tax-rate decline. I then merge country-year macro and policy files onto that key: Penn World Table adds GDP, investment, TFP, capital, employment, human capital, and trade openness; KAOPEN adds capital-account openness; and WDI adds resident and nonresident patent counts. The main innovation outcomes come from PatentsView USPTO bulk files. In Python, I link application records to patent IDs, inventor IDs, inventor locations, and forward citations. Patents are dated by application year rather than grant year, assigned to countries using inventor locations, and fractionally allocated when a patent has inventors in multiple countries. I then collapse these records to country-year fractional USPTO patent counts and citation-weighted patent counts and merge the resulting patent panel back to the tax-macro panel using wb_code × year. Next, I want to extend the analysis by comparing log-linear and Poisson patent specifications and exploring whether foreign tax measures can capture the dynamic tax-competition mechanism more directly.

Data: statutory tax panel, PatentsView USPTO bulk files, Penn World Table, KAOPEN, WDI. Literature: Devereux, Lockwood & Redoano (2008); Akcigit et al. (2022); Hsu, Tian & Xu (2014); Hall, Jaffe & Trajtenberg (2001); Jordà (2005); Driscoll & Kraay (1998).