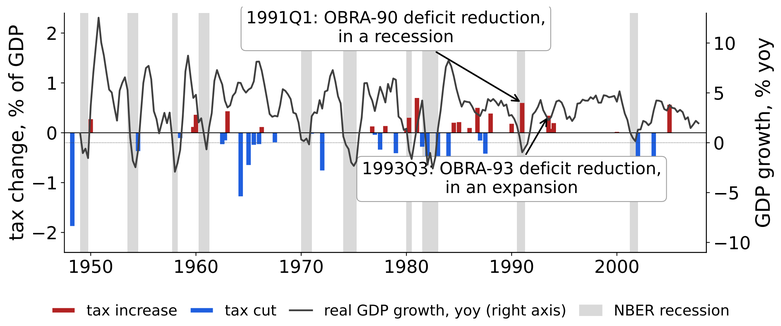
Tax Multipliers Across the Business Cycle
and the Role of Credit

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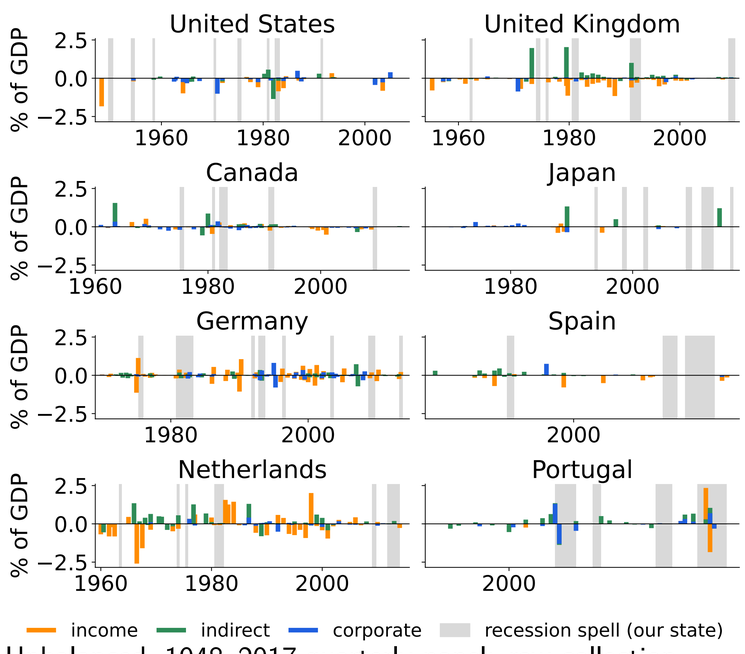
A tax increase of 1% of GDP lowers output by about 2% in expansions and a quarter of that in recessions. The attenuation is concentrated in recessions after a credit boom, where constrained households keep working.

Governments raise taxes in bad and good times



US legislated exogenous tax changes in % of GDP (Romer and Romer, 2010) and real GDP growth

Data: narrative tax shocks by tax type



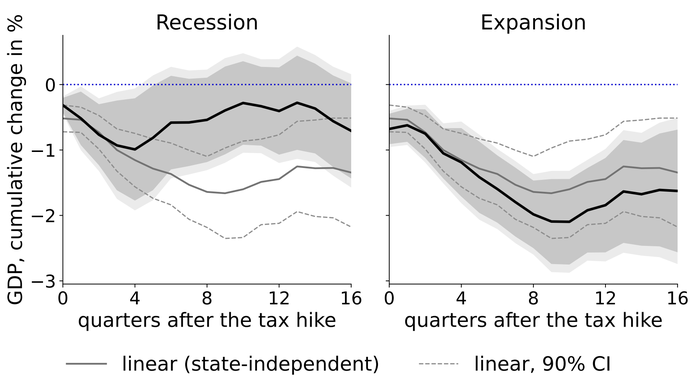
- Unbalanced, 1948–2017,quarterly panel: raw collection, re-classified and harmonized narrative-identified exogenous series of Romer and Romer (2010), Cloyne (2013), Hayo and Mierzwa (2022), Pereira and Wemans (2015), Geenen (2017), Kato et al. (2018), Gil et al. (2019) and Hussain and Liu (2024)

Empirical strategy

$$\Delta_h y_{i,t+h} = F(z_{i,t})\left(\alpha^r_{i,h} + \beta^r_h \tau_{i,t} + \gamma^r_h L(p) X'_{i,t,h}\right) + [1 - F(z_{i,t})]\left(\alpha^e_{i,h} + \beta^e_h \tau_{i,t} + \gamma^e_h L(p) X'_{i,t,h}\right) + \mu_{t,h} + \epsilon_{i,t+h}$$

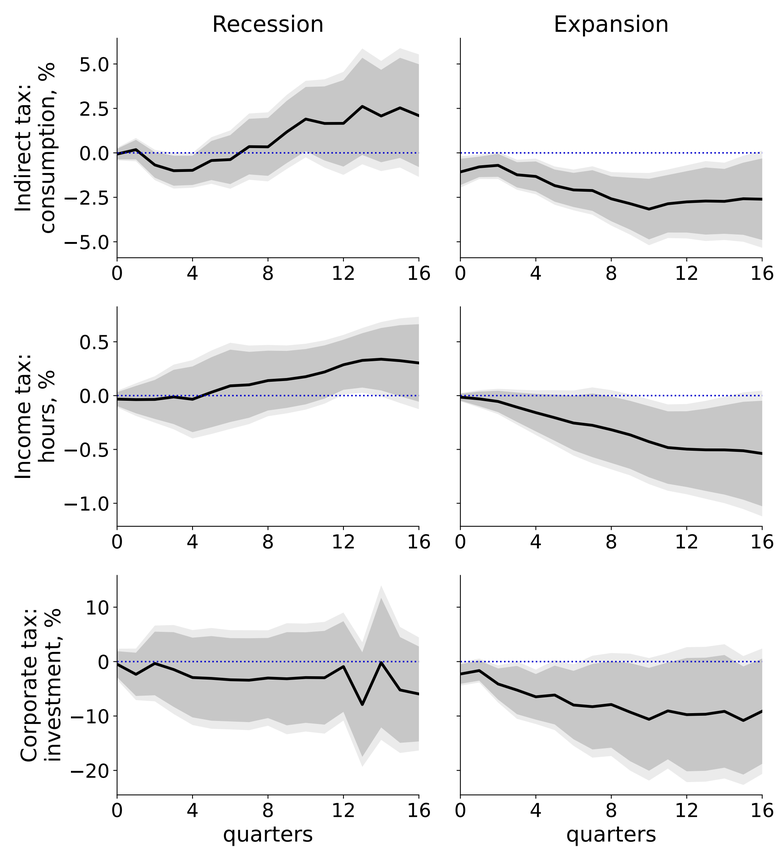
- Local projections (Jordà, 2005): response to a 1p.p. average tax rate increase, $h = 0, \ldots, 16$; four shock and dependent variable lags, country, time effects, Driscoll and Kraay (1998) SEs, sup-t tests (Montiel Olea and Plagborg-Møller, 2021)
- $F(z_{i,t}) = 1$ in a **recession spell** (Harding and Pagan, 2002): two negative growth quarters in, two positive out: t-1 dating.

Tax hikes cost most in expansions



- **Expansion:** peak -2.1 after ten quarters, persistent
- **Recession:** about a quarter; paths differ, $p = 0.002$
- **Results are symmetric** across cuts and hikes!

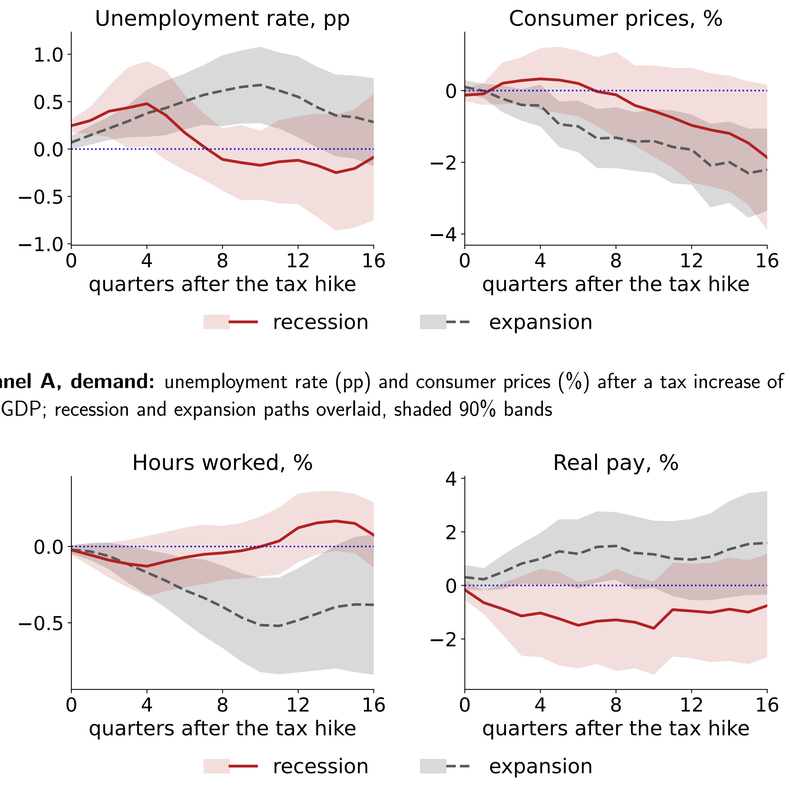
Each tax type at its margin



- Indirect → consumption, income → hours, corporate → investment: mainly in expansions
- Regime difference sharp for the household-side taxes

Demand in expansions, labor supply in recessions

- **Expansions (grey):** prices fall with output, unemployment rises, hours fall: demand contraction; labor adjusts on both margins, households can smooth
- **Recessions (red):** prices flat; unemployment rises (extensive margin) but hours hold up/increase (intensive margin)
- **Real pay** decreases: -1.3% in recessions, but increases by 1.5% in expansions!

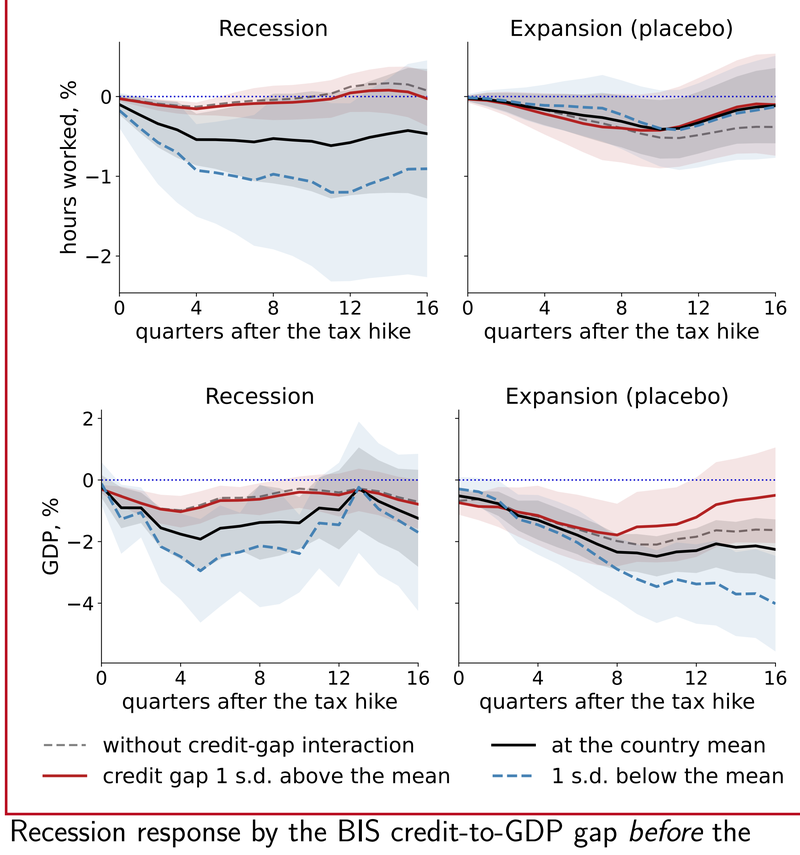


Panel A, demand: unemployment rate (pp) and consumer prices (%) after a tax increase of 1% of GDP; recession and expansion paths overlaid, shaded 90% bands

Panel B, labor: hours worked (%) and real pay per unit of output (%, real unit labor cost), same shock and states

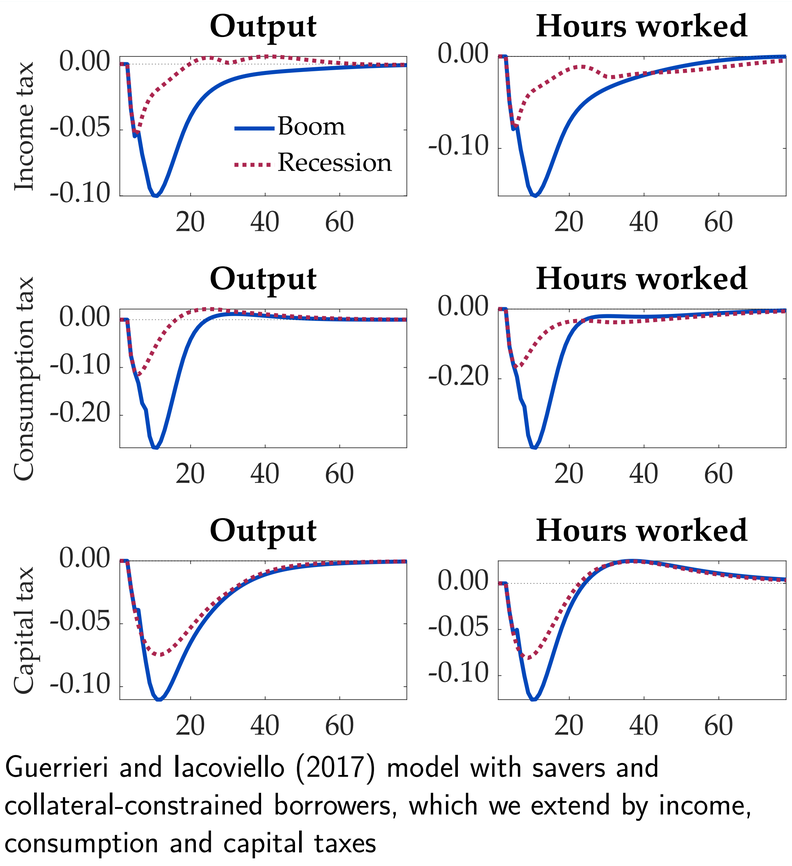
- **Why in recessions?** Households that can't smooth keep working with falling after-tax income: wealth effect offsets substitution effect
- **When do constraints bind:?** when the downturn hits households that levered up in the boom before.
- Recessions after credit boom show attenuation, other recessions look like expansions: column 3

Constraints bind after credit booms



- Recession response by the BIS credit-to-GDP gap *before* the recession; lagged gap in expansions as placebo
- **After a credit boom:** hours flat, GDP -1.0
- **Without one:** hours -0.9, GDP -2.5, just like in an expansion

Why: a model with occasionally binding borrowing constraints



- Guerrieri and Iacoviello (2017) model with savers and collateral-constrained borrowers, which we extend by income, consumption and capital taxes
- Unconstrained: smooth the income loss, cut hours. Constrained: cannot; wealth effect offsets substitution, hours hold up
- Output and hours fall less when the constraint binds; most for consumption and income taxes

Takeaways

- **When:** tax hikes cost most in expansions, least in recessions after a credit boom
- **Through what:** each tax type at its margin: in recessions labor, but only where credit constraints bind
- **Policy:** Consolidations in recessions after credit booms are less costly to GDP but may likely be more costly to welfare, other recessions cost as much as expansions. Tax cuts to increase economic activity are therefore more efficient in non-financial recessions.

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