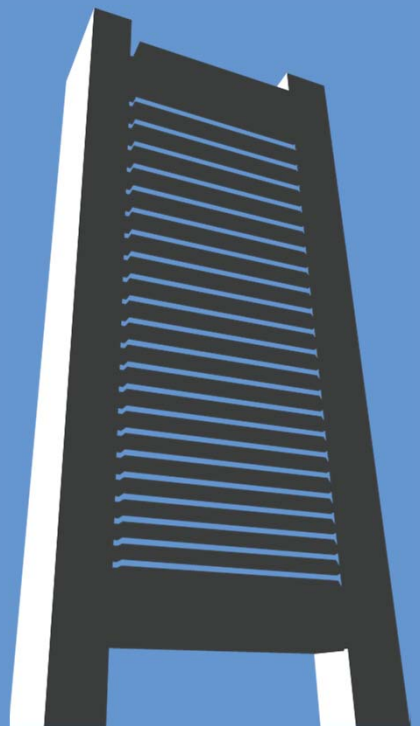
FEDERAL RESERVE BANK OF BOSTON™



Some Unpleasant Stabilization Arithmetic

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Stabilization Policy

- Before the Great Recession – primary countercyclical tool was monetary policy
  - The greater likelihood the effective lower bound (ELB) is reached in the future is a challenge for monetary policy
  - Limitations on future monetary policy actions make other countercyclical tools potentially more important
- For any countercyclical tool, policymakers must be willing and able to use them

Role of Buffers

- Monetary policy buffers – limited
  - Low productivity, slow population growth, low inflation rate – buffer relative to ELB limited
  - Nontraditional monetary policies remain controversial and could be politically difficult to deploy in the future
- Fiscal policy buffers – limited
  - Debt/GDP likely to rise over next 10 years
  - Many states have less financial capacity after the Great Recession
- Regulatory buffers – have been raised

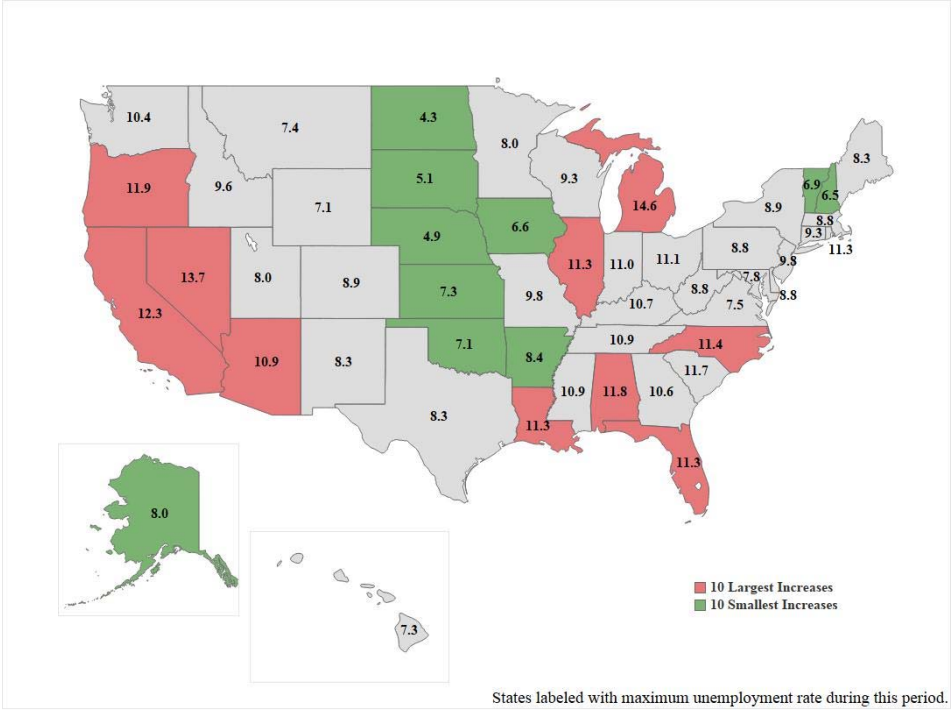
Recent Work in this Area

- Romer and Romer (2017, 2018) – International evidence that a lack of fiscal and monetary policy buffers impedes economic recovery
- This paper similar in spirit
  - Focus on states – similar institutional characteristics
  - Can examine state and regulatory responses

Paper Outline

- Highlight variation across states
- Risks to hitting ELB – implications for monetary policy buffer
- Role of other buffers – state, federal, bank regulatory
- Impact of changing buffers
- Simulate potential state impact on personal income of depleted buffers

Figure 1: States with the Largest and Smallest Increases in the Unemployment Rate, 2005 - 2010



Source: BLS, Haver Analytics

Table 1: Sensitivity of State to National Real Per Capita Personal Income One-Quarter Growth

1983:Q1 - 2015:Q4

	Sensitivity
	Highest
WA	1.176
CA	1.158
ND	1.150
NY	1.099
NC	1.096
	Median
	0.951
	Lowest
LA	0.713
WV	0.701
MS	0.697
AK	0.556
HI	0.495

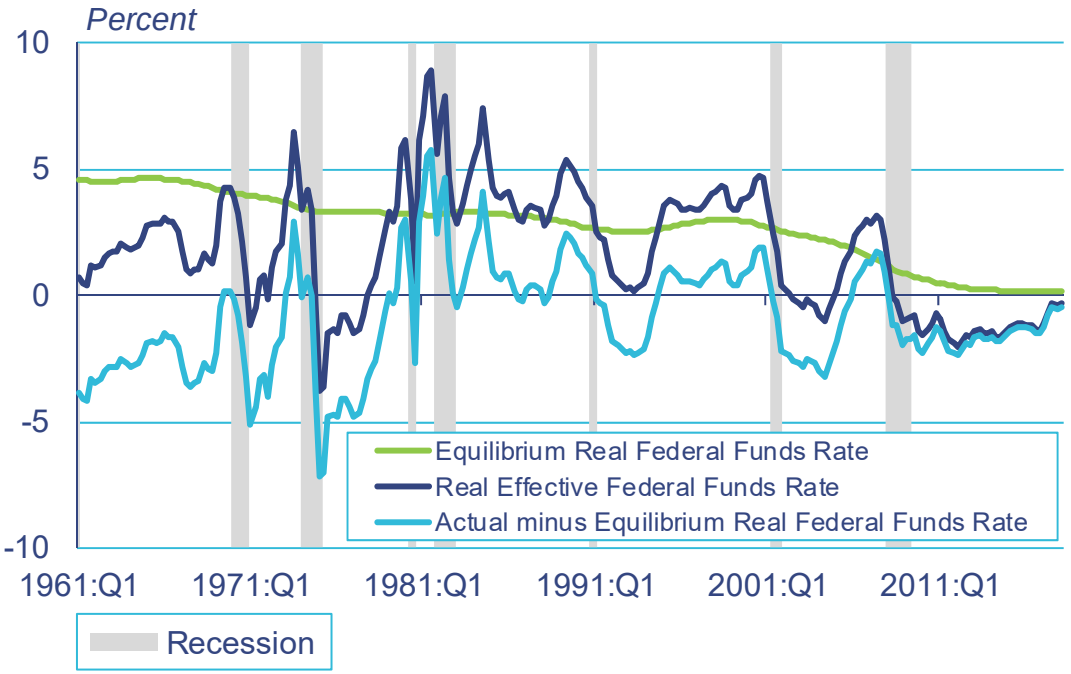
Source: BEA, Haver Analytics

Significant Variation Across States

- Characteristics across states vary substantially
  - State impact of limited policy buffers can vary substantially
- Example – if monetary policy is limited – states that are interest sensitive may not recover as quickly
- Example – exposure to fiscal austerity quite different if dependent on federal expenditures or transfers

Figure 2: The Actual and Equilibrium Real Federal Funds Rates

1961:Q1 - 2018:Q1



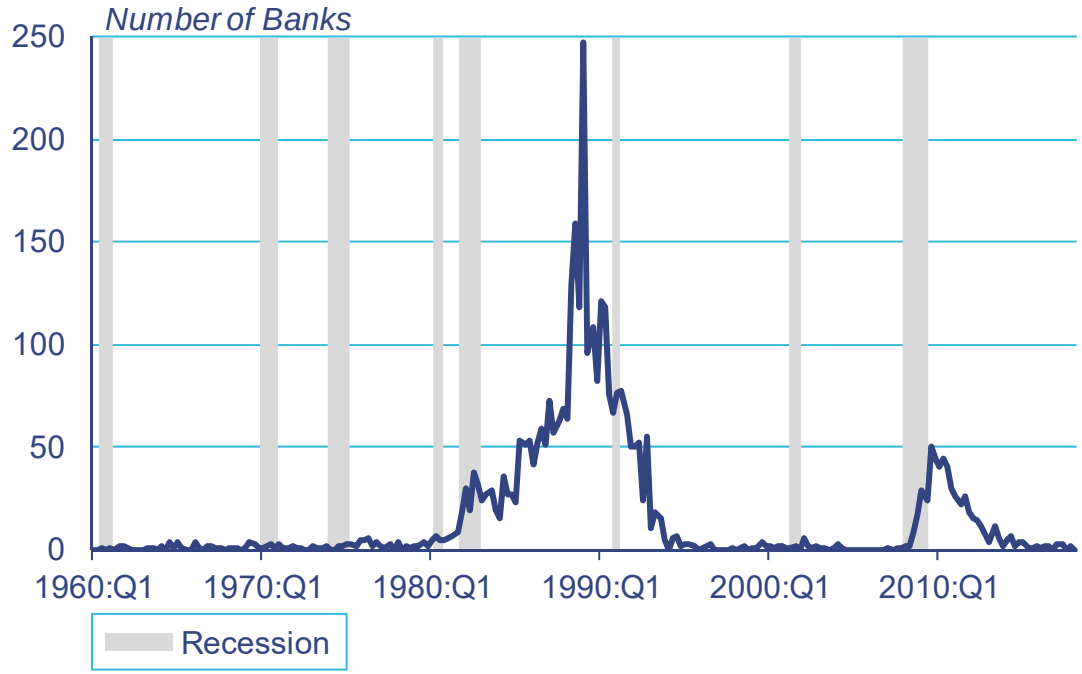
Source: Federal Reserve Board, Laubach and Williams, BEA, NBER, Haver Analytics

ELB is Quite Likely to be Binding in the Future

- Equilibrium real rate has declined and inflation rate is only 2 percent
- Monetary policy cushion is much smaller than during most of postwar period
- If downturn were to occur soon – little ability to lower the 5-6 percentage points that occurs in many recessions

Figure 3: Bank Failures in the U.S.

1960:Q1 - 2018:Q1

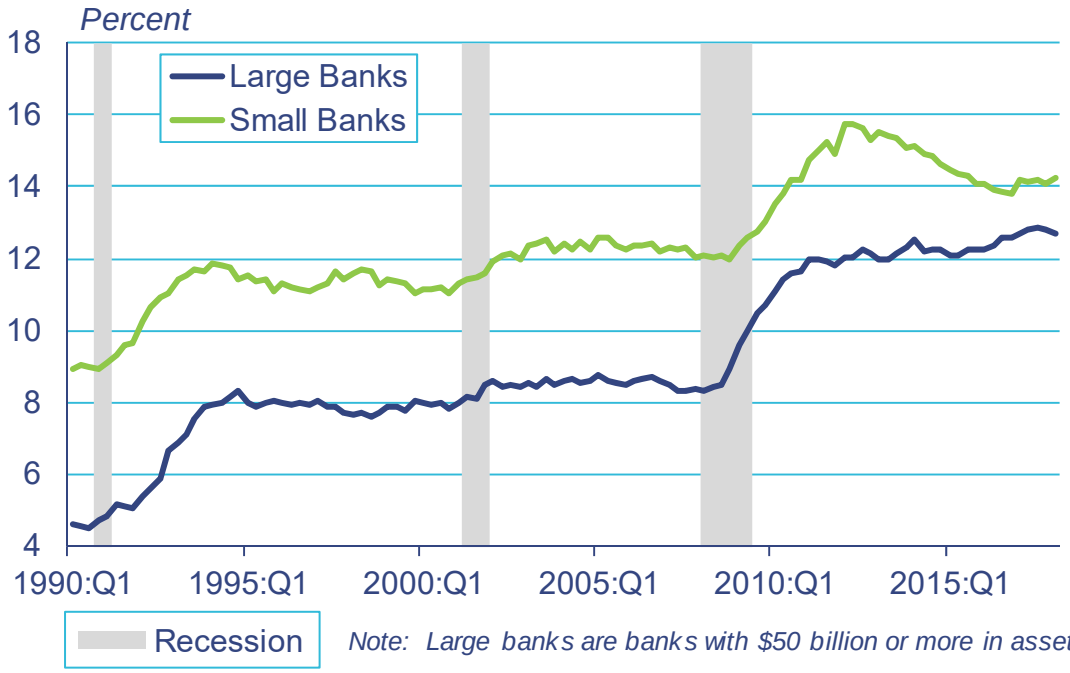


Note: Includes both failures and assistance transactions. Banks include commercial banks, savings banks, and savings and loan associations (beginning in 1980).

Source: FDIC, NBER, Haver Analytics

Figure 4: Tier 1 Risk-Based Capital Ratios at Banks by Asset Size

1990:Q4 - 2018:Q1



Note: Large banks are banks with $50 billion or more in assets.

Note: Includes OTS-regulated savings institutions as soon as they file the call report. Some began in 2011, all filed by 2012:Q1

Source: Quarterly Bank Call Reports, NBER, Haver Analytics.

Bank Buffers Have Improved

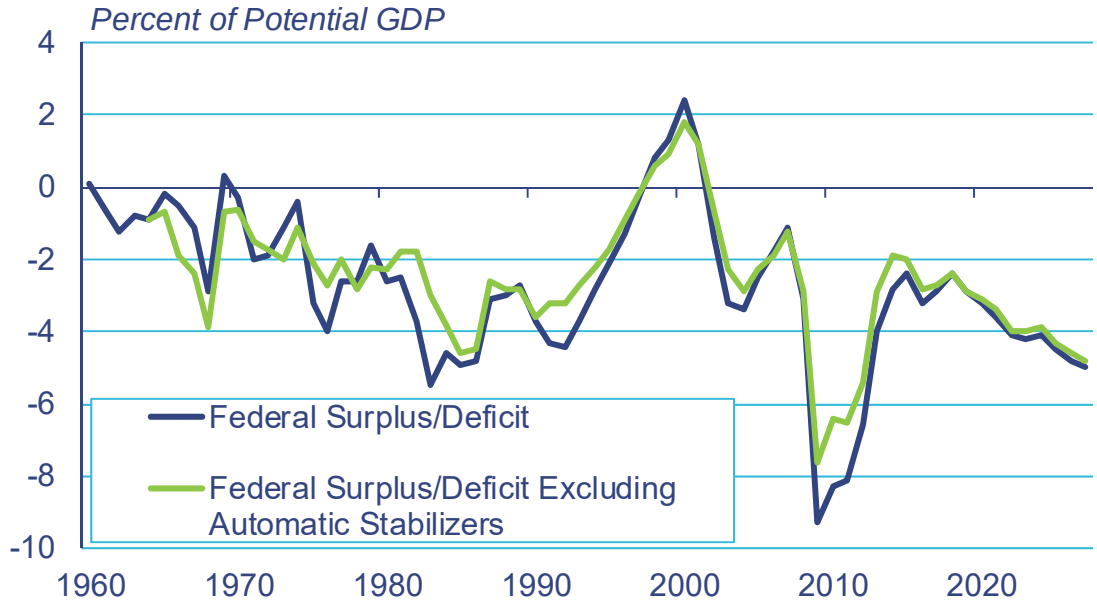
- Improvement in capital ratios is greatest for large banks
  - Concern is with banks shrinking if capital is constrained
  - Countercyclical capital buffer could help reduce this risk
- Small banks have seen less improvement in capital
- Small banks appear to be taking more risks in some areas – commercial real estate
- Significant roll back in regulations would increase this risk

Federal Fiscal Policy Buffers

- Focus on two episodes of fiscal restraint associated with persistent declines in the cyclically adjusted deficit as a percent of potential GDP
  - 1990-2000: Reflecting the Budget Enforcement Act of 1990; spending caps for discretionary spending items and pay-as-you-go requirements
  - 2009-2014: Heightened interest in controlling spending to prevent further increases in the budget deficit
- These two periods reflect political constraints (willingness), not financial constraints (ability), given the dollar's dominant role in foreign currency reserves, foreign trade invoicing, and currency denomination for cross-border lending

Figure 5: Federal Surplus/Deficit as a Percent of Potential GDP

Federal Fiscal Year, 1980 - 2027



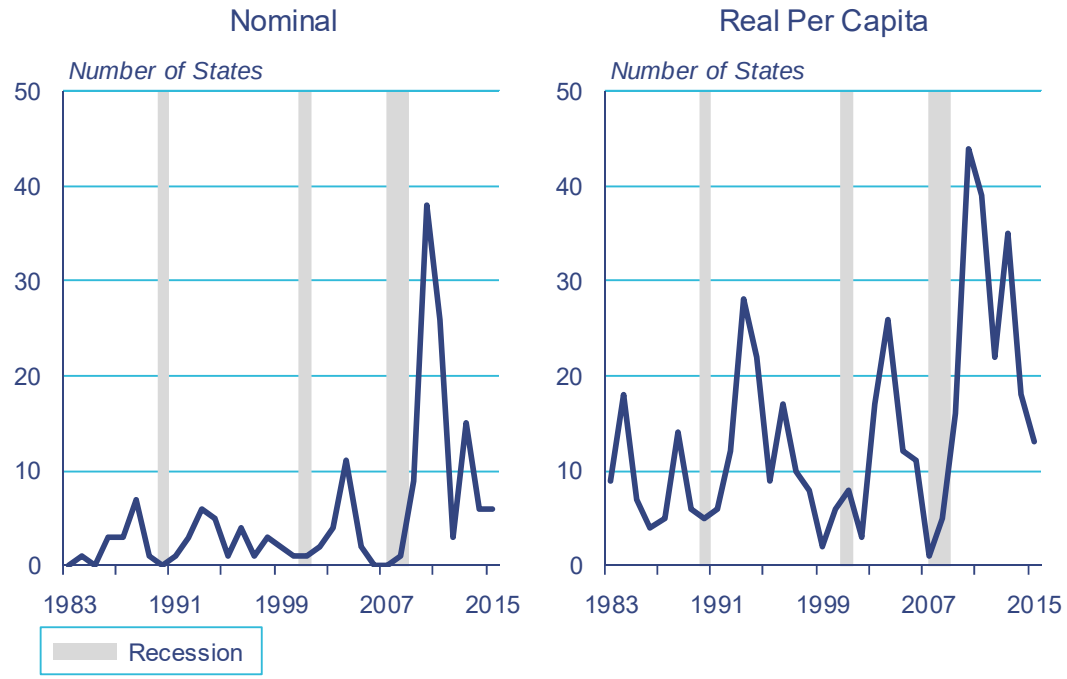
Source: CBO, Haver Analytics

State and Local Fiscal Austerity

- Must remove federal intergovernmental transfers that pass through state and local budgets in order to isolate state and local fiscal policies
- Both the need for stabilization policy and the ability of a state to provide countercyclical policy vary across states
  - Balanced budget amendments
  - State pension funding ratios (assets/liabilities)
  - Rainy day funds
  - Correlation between a state's revenues and expenditures

Figure 6: State and Local Expenditure Decreases

State Fiscal Year, 1983 - 2015



Note: Missing Data for AL, MI and TX in Fiscal Year 2015.

Source: Census Bureau's Annual Survey of State and Local Government Finances, DOL, Haver Analytics

Real Per Capita State Personal Income and the Role of Policy Buffers

- Panel regression using individual state annual data
- Real per capita personal income growth rate
- Change in state's unemployment rate
- CAMELS_345: deposit-weighted share of 3-, 4- or 5-rated banks operating in a state
  - CAMELS ratings: supervisory ratings from 1 to 5, with 1 strongest health and 5 weakest health

Monetary Policy Buffer

- Change in FFRgap using Laubach-Williams real equilibrium rate
  - Also interact FFRgap measure with HIGH and LOW interest sensitivity dummy variables based on auxiliary regressions using national employment data for 14 industries
  - Interest sensitive industries: mining; construction; manufacturing; retail and wholesale trade
  - HIGH and LOW indicators are (1,0) dummy variables based on a state's average share of employment in these interest sensitive industries (15 states each)

Fiscal Policy Buffer Indicators

- Federal austerity measure: (1,0) dummy variable for 1990-2000 and 2009-2014
- State and local austerity measure: state-specific (1,0) variable with value of one for periods when nominal state and local expenditures decline until again attain prior peak value
- Equations based on federal fiscal year data and include state fixed effects

Table 2: Real Per Capita State Personal Income Growth Rate

Federal Fiscal Year, 1983 - 2015

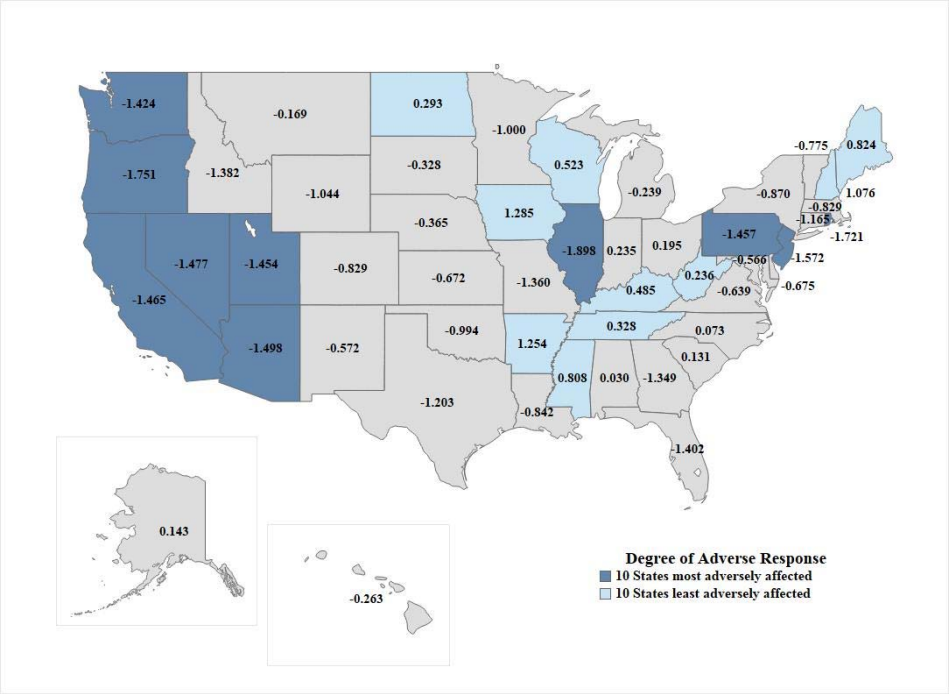
	Unweighted	Weighted	Unweighted	Weighted
L1 Change in State UR (%)	−0.644***	−0.735***	−0.661***	−0.750***
	(0.059)	(0.012)	(0.059)	(0.012)
L1 CAMELS: State 3-4-5 Share (%)	−0.014***	−0.011***	−0.016***	−0.013***
	(0.003)	(0.001)	(0.003)	(0.001)
L1 Change in Real Eff. - Equil. FFR	0.171***	0.075***	0.154**	0.057***
	(0.066)	(0.015)	(0.066)	(0.014)
L2 Change in Real Eff. - Equil. FFR	−0.249***	−0.207***	−0.255***	−0.212***
	(0.055)	(0.012)	(0.055)	(0.012)
L1 High Interest Rate Ind. Emp. Share Dummy*Ch. Real Eff.-Equil. FFR	−0.369***	−0.353***	−0.369***	−0.350***
	(0.093)	(0.021)	(0.093)	(0.021)
L2 High Interest Rate Ind. Emp. Share Dummy*Ch. Real Eff.-Equil. FFR	−0.033	−0.079***	−0.030	−0.077***
	(0.083)	(0.019)	(0.083)	(0.019)
L1 Low Interest Rate Ind. Emp. Share Dummy*Ch. Real Eff.-Equil. FFR	−0.137	−0.137***	−0.138	−0.142***
	(0.092)	(0.018)	(0.093)	(0.018)
L2 Low Interest Rate Ind. Emp. Share Dummy*Ch. Real Eff.-Equil. FFR	0.041	−0.148***	0.043	−0.150***
	(0.083)	(0.016)	(0.083)	(0.016)
Federal Austerity Dummy (1990-2000, 2009-2014)	−0.361***	−0.324***		
	(0.104)	(0.022)		
Nominal Broad Federal Expenditure Decrease Dummy			0.005	0.186***
			(0.137)	(0.031)
Nominal State & Local Expenditure Decrease Dummy	−0.282*	−0.444***	−0.365**	−0.593***
	(0.163)	(0.038)	(0.165)	(0.039)
Constant	2.307***	2.244***	2.151***	2.093***
	(0.080)	(0.017)	(0.068)	(0.015)
Total Obs.	1647	1647	1647	1647
Adj. R-squared	0.146	0.216	0.140	0.212
Change in Real Eff. - Equil. FFR: Sum	−0.078	−0.132	−0.101	−0.154
Change in Real Eff. - Equil. FFR: P-Value	0.363	0.000	0.239	0.000
High Int. Rate Ind. Emp. Share Dum*Ch. Real Eff.-Equil. FFR: Sum	−0.402	−0.432	−0.399	−0.427
High Int. Rate Ind. Emp. Share Dum*Ch. Real Eff.-Equil. FFR: P-Value	0.001	0.000	0.001	0.000
Low Int. Rate Ind. Emp. Share Dum*Ch. Real Eff.-Equil. FFR: Sum	−0.096	−0.285	−0.095	−0.292
Low Int. Rate Ind. Emp. Share Dum*Ch. Real Eff.-Equil. FFR: P-Value	0.437	0.000	0.445	0.000

Source: Authors' calculations using Federal Reserve System, Federal Reserve Board, Laubach and Williams, Census Bureau's Annual Survey of State and Local Government Finances, Census Bureau's Federal Expenditures by State Report and Consolidated Federal Funds Report, The Council of State Governments' Federal Spending in the States Report, CBO, DOL, BEA, BLS, Haver Analytics.

Simulated Effects of a Moderate Recession with and without Policy Responses

- Based on column 1 estimates
- 3% increase in national UR; use estimated state "betas" to calculate increases in state URs
- FFR decline: 600 bp; equil. FFR decline: 100 bp
  - FFRgap declines by 500 bp
  - HIGH and LOW interactions produce state-specific responses to countercyclical monetary policy
- Note that typical policy responses are able to more than offset adverse shock in 16 states

Figure 7: Estimated Recession Effects

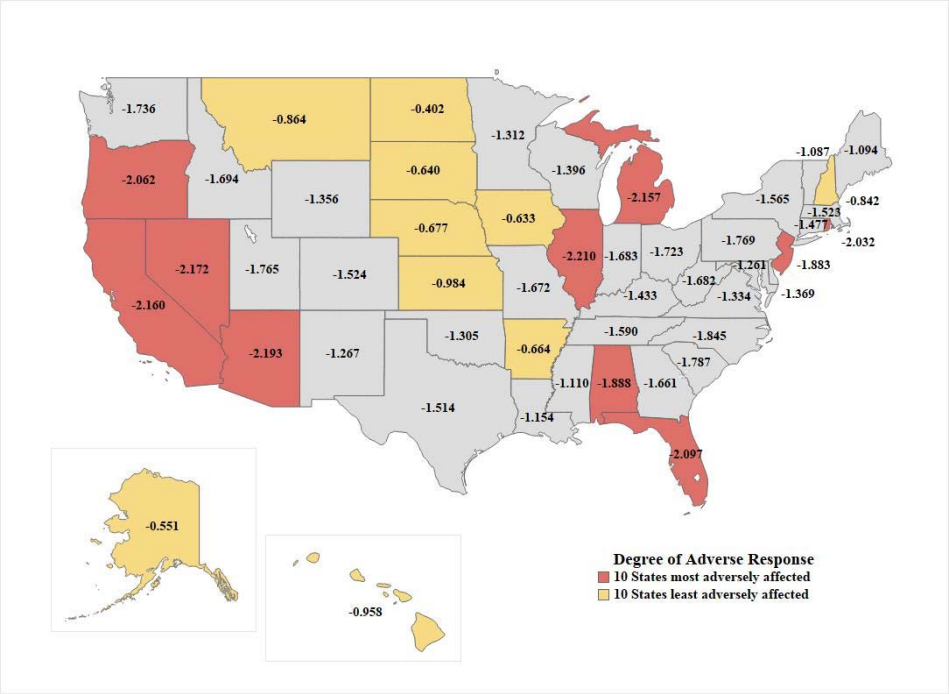


Source: Authors' calculations using Federal Reserve System, Federal Reserve Board, Laubach and Williams, Census Bureau's Annual Survey of State and Local Government Finances, CBO, DOL, BEA, BLS, Haver Analytics

Simulation with Monetary Policy Limited due to Hitting ELB

- Assume FFR at 2 percent
- Falls only to zero
- With monetary policy countercyclical response limited
  - All states now experience decline in real per capita personal income
  - Particularly large switch for many Southern states
  - Smallest declines primarily in agricultural states in Midwest

Figure 8: Typical Recession Effects with Limited Monetary Policy Response

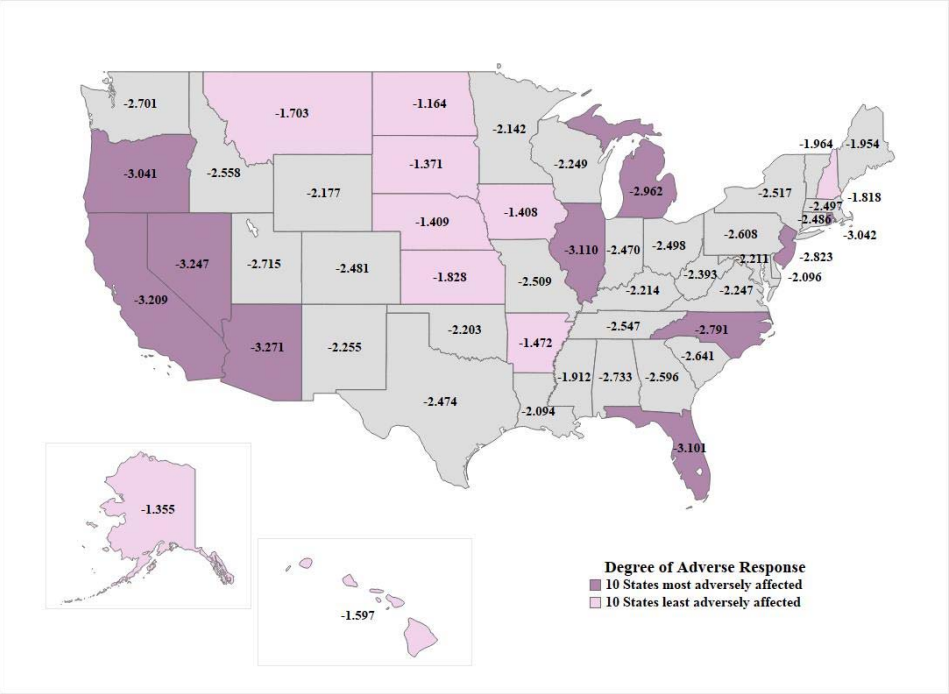


Source: Authors' calculations using Federal Reserve System, Federal Reserve Board, Laubach and Williams, Census Bureau's Annual Survey of State and Local Government Finances, CBO, DOL, BEA, BLS, Haver Analytics

Simulation with All Policy Buffers Depleted at the Same Time

- Federal funds rate hits ELB
- National CAMELS_345 increases by 20 percentage points; use estimated “betas” to obtain state-specific changes
- Activate the federal and the state and local fiscal austerity dummy variables
- Unsurprisingly, outcomes for all states worsen; but not to the same degree

Figure 9: Typical Recession Effects with Limited Monetary Policy Response and All Other Buffers Depleted

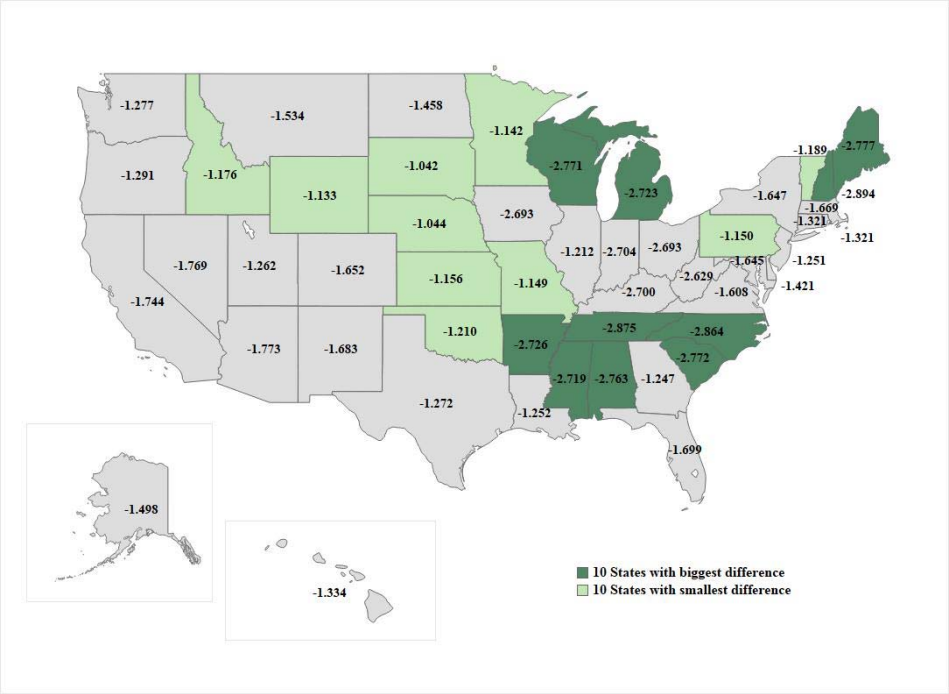


Source: Authors' calculations using Federal Reserve System, Federal Reserve Board, Laubach and Williams, Census Bureau's Annual Survey of State and Local Government Finances, CBO, DOL, BEA, BLS, Haver Analytics

Isolate Effects of Depleted Policy Buffers

- Consider differences in outcomes between situation with the usual policy responses and with all policy buffers being depleted
- Differences are large and vary substantially across states
  - Southern states now among those most severely impacted by policy buffer depletion
  - Midwestern agricultural states account for most of the states with the smallest negative deviation

Figure 10: Difference in Outcomes between No Depleted Policy Buffers and All Buffers Limited



Source: Authors' calculations using Federal Reserve System, Federal Reserve Board, Laubach and Williams, Census Bureau's Annual Survey of State and Local Government Finances, CBO, DOL, BEA, BLS, Haver Analytics

Message from the Simulations

- Not only are states differentially affected by recessions, they are also differentially affected by the extent to which policy buffers are insufficient to provide adequate countercyclical policy responses
- Differences can be quite large
- Still, effects are understated because they ignore feedback effects on UR from weak policy response
  - Feedback will magnify both size of decline in personal income growth rates and extent of divergence in economic performance across states

Concluding Comments

- In current environment, more likely that FFR will hit ELB, short-circuiting countercyclical MP
- Effects will not fall evenly on states
- Limitations on what has been the first, and often the last, resort for countercyclical policy heightens importance of establishing adequate buffers for nonmonetary policy tools
- Concerns about rising federal debt, limited state and local fiscal policy buffers, and any weakening of bank capital regulations