

Vulnerabilities and Cyclical Macroprudential Policies

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What information do policymakers need?

Financial vulnerability is the financial system's capacity to amplify shocks and worsen macroeconomic performance

Current assessment of financial vulnerabilities

Projection of its likely evolution

Estimates of the effects of macroprudential and monetary policies on its path


Outline of paper

We characterize the time series of measures of vulnerability and plausible macroprudential tools

We estimate VAR models of the macroeconomy and monetary policy, augmented with our proxies for vulnerability and macroprudential policies

We analyze the economy's response to shocks to our vulnerability measures and to monetary policy under various specifications

We present the results of policy simulations in reaction to a hypothetical buildup in vulnerability.

- Not forecasts of the effects of macroprudential policies – not used in history
 - But the historical correlations in the data between vulnerabilities and policies are of interest
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Preview of Findings

Vulnerabilities:

- Aggregate credit-to-GDP gap
- Subcomponents – business and nonbank credit -- predict a downturn when aggregate credit-to-GDP is already high
- Risk appetite leads the credit gap

Dynamics are nonlinear: A positive credit shock results in significant macroeconomic costs when the credit gap is high, consistent with the notion that credit booms sow the seeds of subsequent downturns

Policies:

- Monetary policy can be effective when the credit gap is low, but is not effective when the credit gap is high
- Supports a need for macroprudential policies – a sharp permanent rise in bank capital historically has reduced credit

Macroprudential policy objectives

Objective: Increase resilience of the financial system and reduce downside macro risks with cyclical macroprudential tools

Prudential regulations and supervision are procyclical

- Bank capital (Repullo and Suarez 2013);
- Margins and haircuts (CGFS Longworth report 2010)
- Stress test losses have declined amid improving economic conditions

Risk-taking channel of monetary policy can lead to buildup of vulnerabilities

- Lower interest rates leads to extensions of more risky debt, especially by banks with less capital (Jimenez et al, 2012; Dell’Ariccia, Laeven, and Suarez, 2013)
- Lower rates leads to higher asset prices and lower volatility, and eases risk management constraints (Adrian and Shin, 2009, 2011)

Measuring Financial Vulnerabilities

Judgmental assessments of cyclical vulnerabilities

- Adrian, Covitz, Liang (2013) - Financial sector leverage, maturity transformation, nonfinancial sector leverage, asset valuations and underwriting standards
- Aikman et al (2015)
- OFR, IMF, BoE

Early warning indicators identified in the research

- Credit-to-GDP (Borio and Lowe, 2002; Drehmann and Juselius, 2013)
- Asset valuations and risk appetite (Adrian and Shin, 2008)
- Interaction of asset prices and credit (Jorda, Schularik, and Taylor, 2015)
- Bank funding liabilities (Anundsen, et al 2014)

Note: Vulnerabilities are distinct from financial conditions or stress indexes

- Stress in real time, and are a combination of vulnerabilities and realized shocks

VAR specification

U.S. macro data 1975:Q1 to 2014:Q4

Log real GDP, GDP deflator, Unemployment rate

Macroprudential policies

- Tangible common equity to tangible assets at commercial banks
- Loan-to-value for residential mortgages used to purchase homes

Vulnerability measures

- Credit-to-GDP gap
 - Household vs. business
 - Bank vs. nonbank
- Risk appetite – asset valuations and lending standards
 - Household (consumer and mortgage); business credit; commercial real estate, equity market

Federal funds rate



VAR dynamics

Shocks are identified using the Cholesky decomposition with shocks ordered as in the monetary policy literature

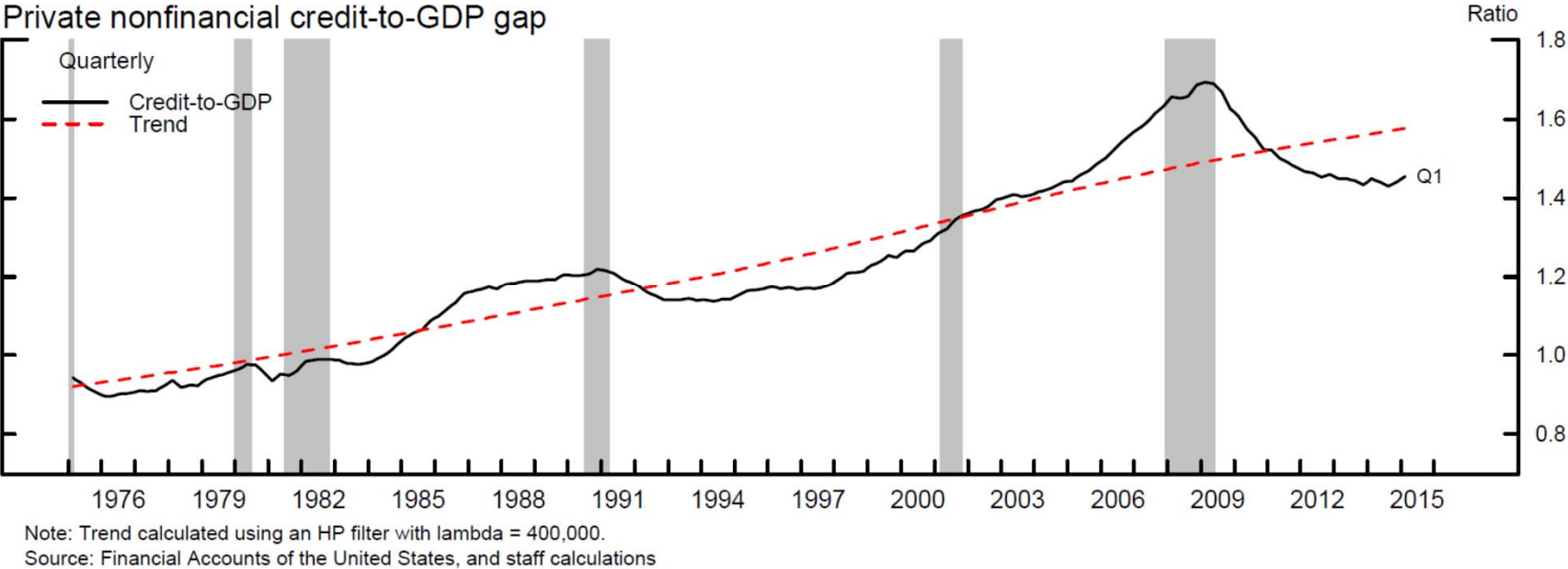
- Monetary policy reacts to all shocks in a period
- The vulnerability measure reacts to all shocks within a quarter save monetary policy
- Macroprudential policy, the unemployment rate, the GDP deflator, and real GDP react to shocks to the vulnerability measure and monetary policy with a one-quarter lag.
- Macroprudential policies would require time to implement so reasonable to have macroprudential policies react with a lag to other measures.

Nonlinearities by sample splits

Estimate the VAR following Giannone, Lenza, and Primiceri (2015).

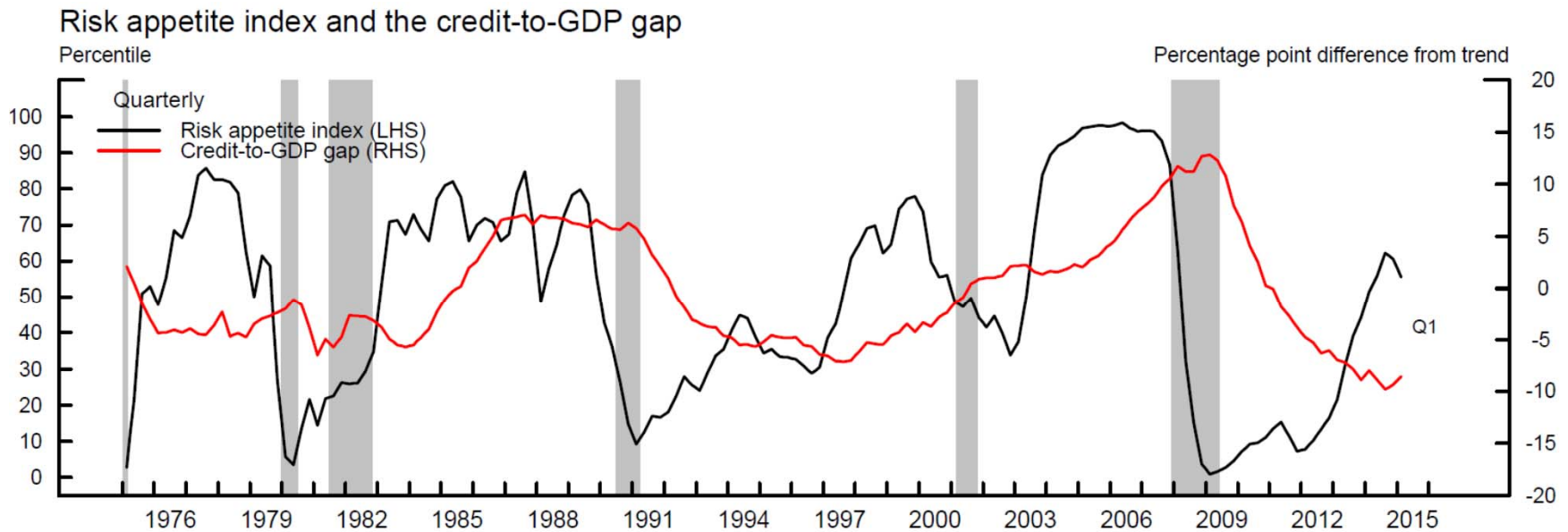
- Bayesian technique specifies a prior that each variable follows a random walk

Measuring V: Credit-to-GDP



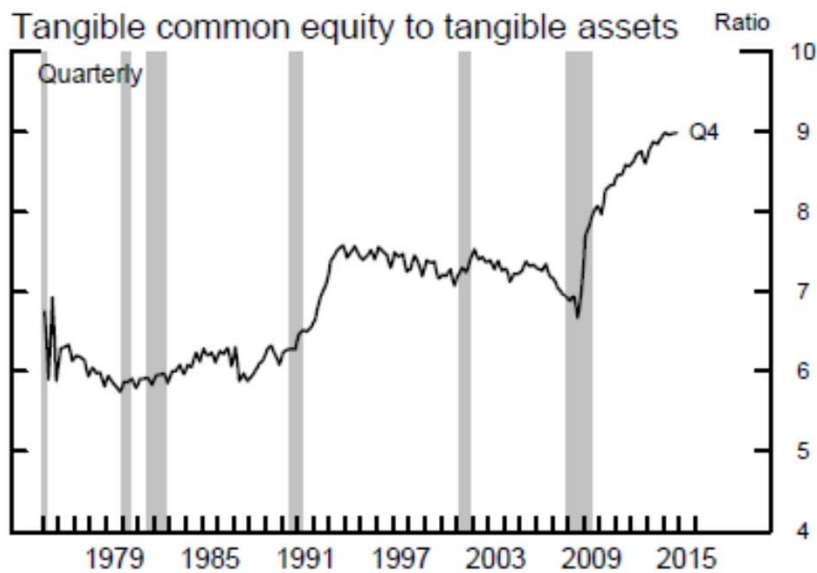
Risk appetite

Leads the credit gap, strongest correlation is 8 quarters
May capture financial leverage not in the credit gap

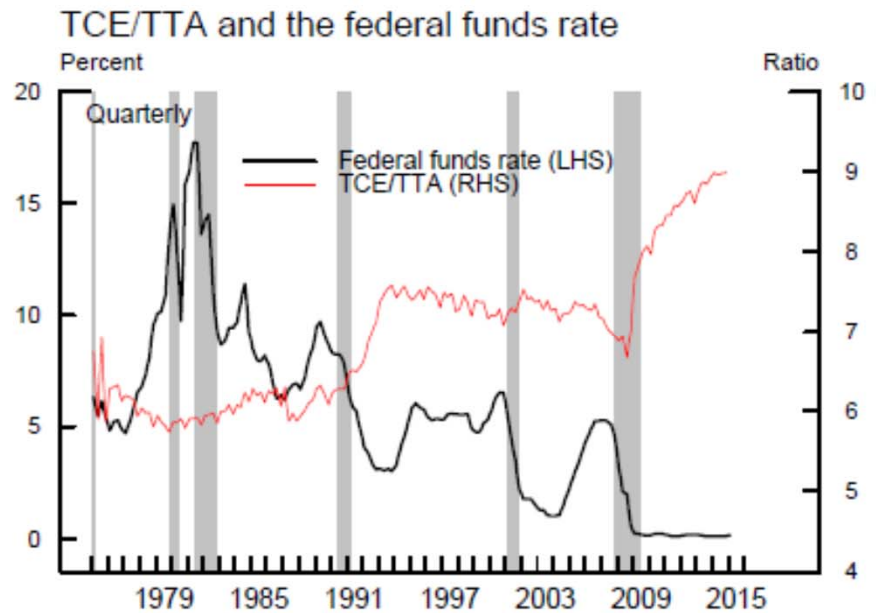


Note: The figure presents the risk appetite index and the private nonfinancial credit-to-GDP gap. Gap is calculated using an HP filter with $\lambda = 40000$.
Source: Financial Accounts of the United States, and staff calculations.

Bank Capital and Federal Funds Rate



Source: Financial Accounts of the United States.



Source: Financial Accounts of the United States, and FRB.

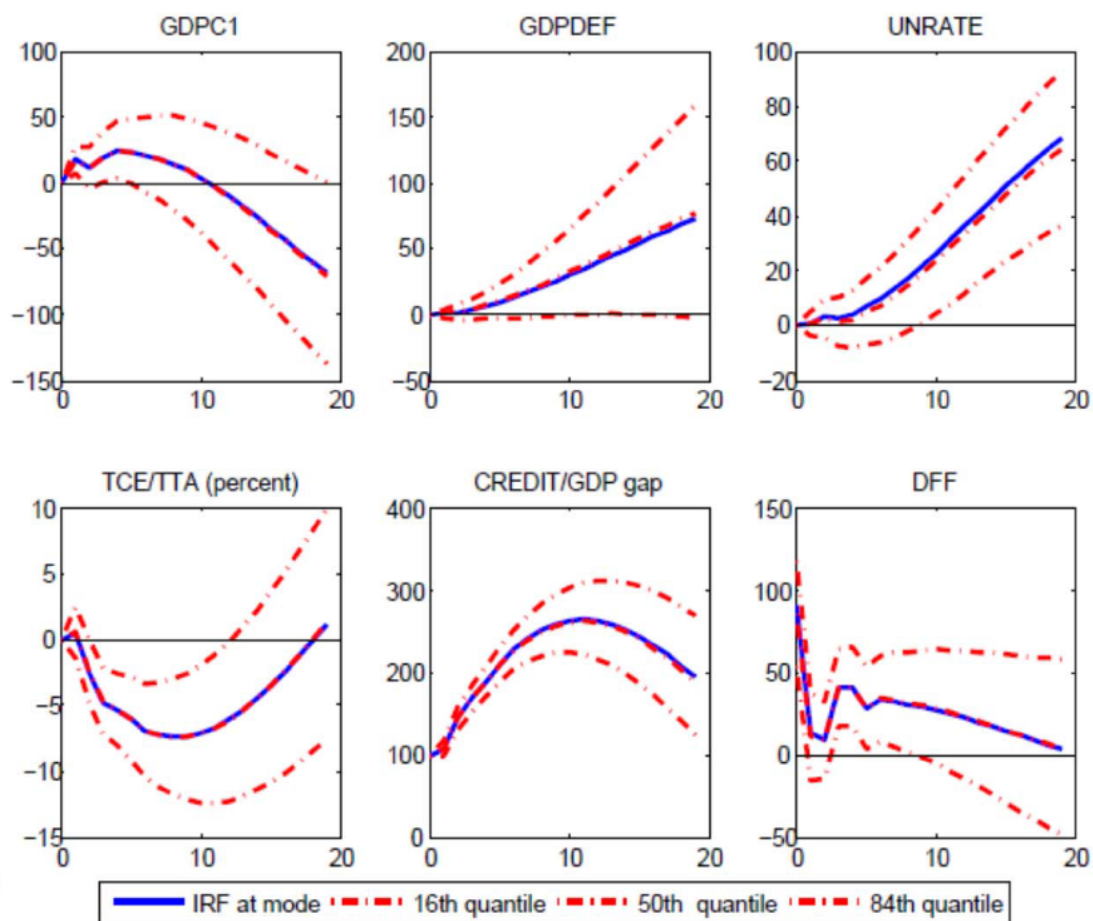
Credit gap: High and Low

Federal funds rate

Subsample	N	Avg.	Decreases		Increases	
			N	Avg change	N	Avg change
High: Credit gap > 1	61	4.74	18	44	18	87
Low: Credit Gap < -1	89	6.7	33	23	28	43

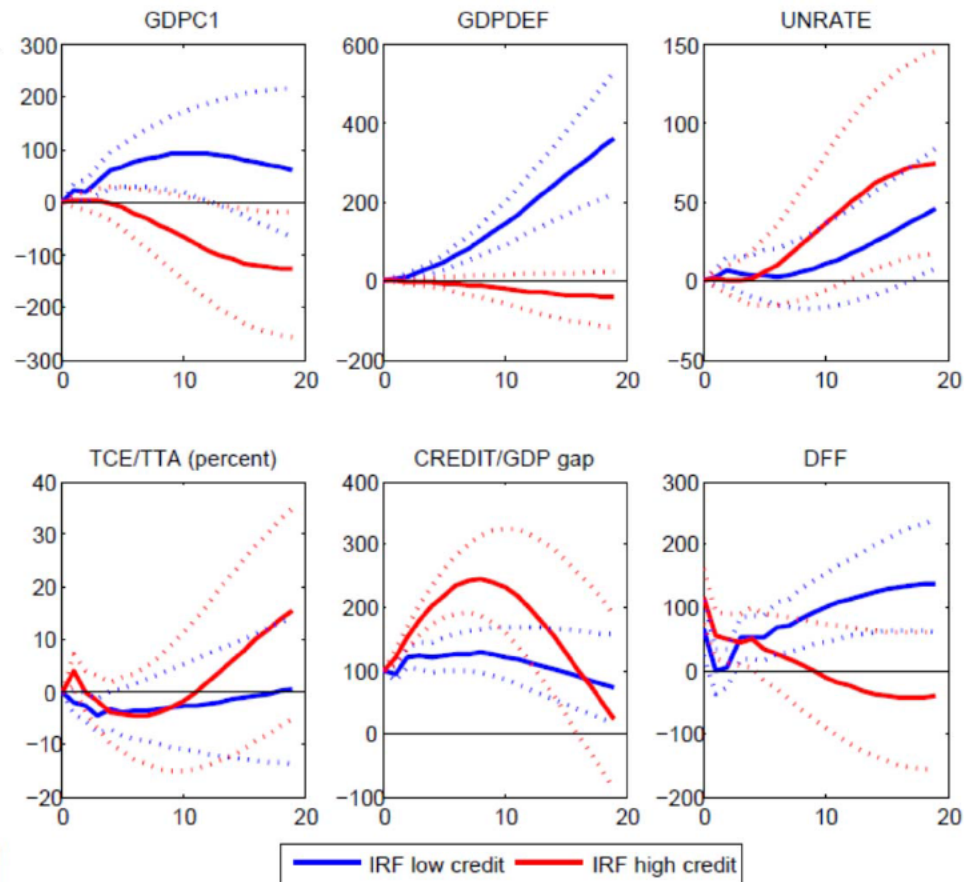
Note. Table reports the quarterly average effective federal funds rate (percent) in quarters in which the credit-to-GDP gap is above 1.0 and in quarters in which the gap is below -1.0. Quarters in which this rate changes by more than 25 basis points in absolute value are also reported as well as the average change in those quarters. Changes are reported in basis points.

Credit shock – presages a recession

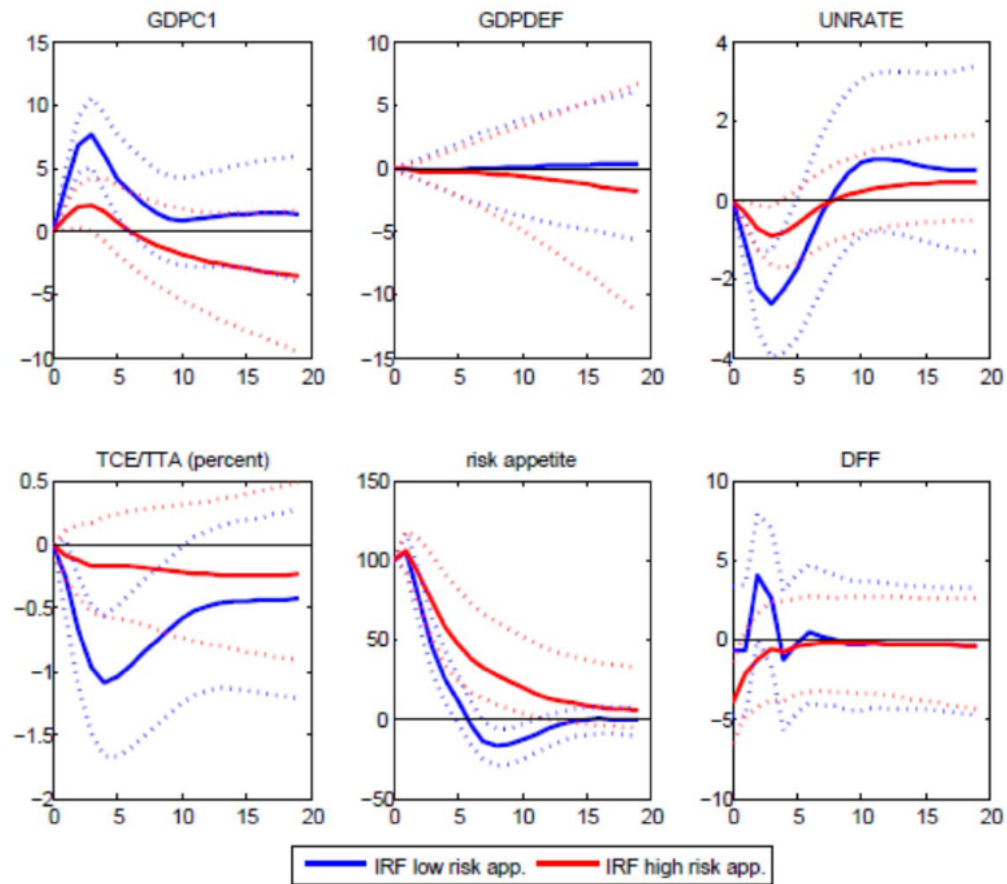


Credit shock effects are nonlinear

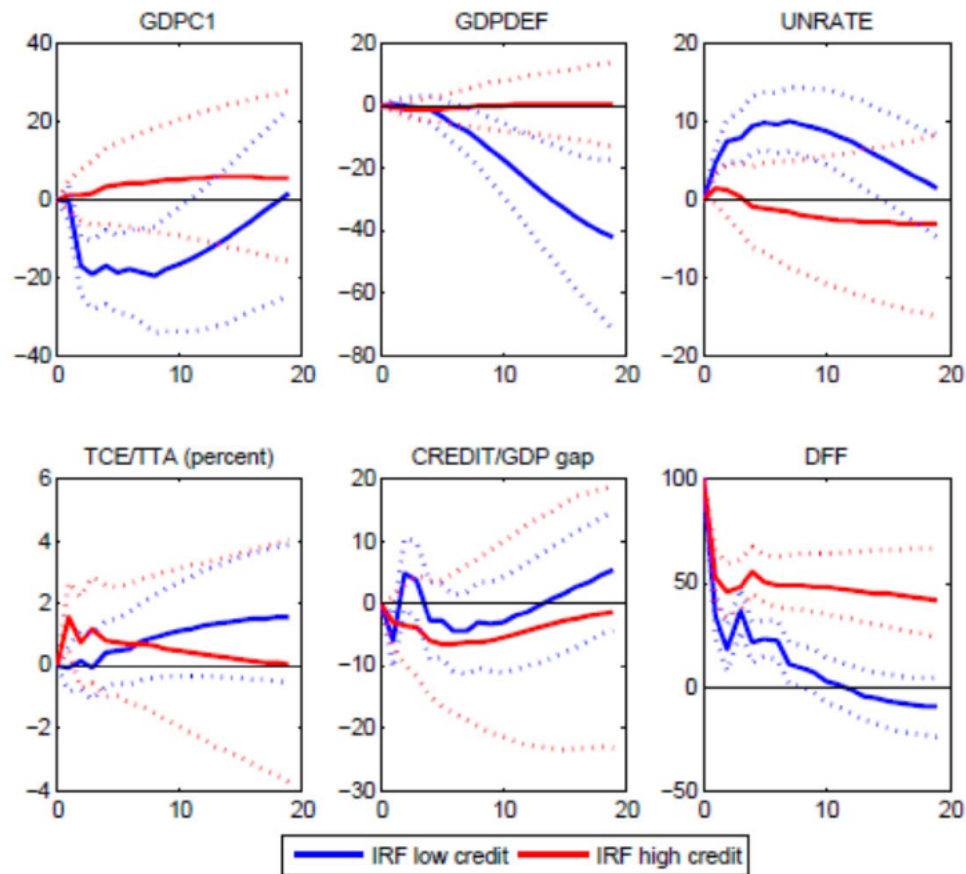
Expansion in low credit gap, recession in high credit gap



Risk appetite shock -- not a vulnerability on its own?



Monetary policy: Effective in low credit gap, but not in high



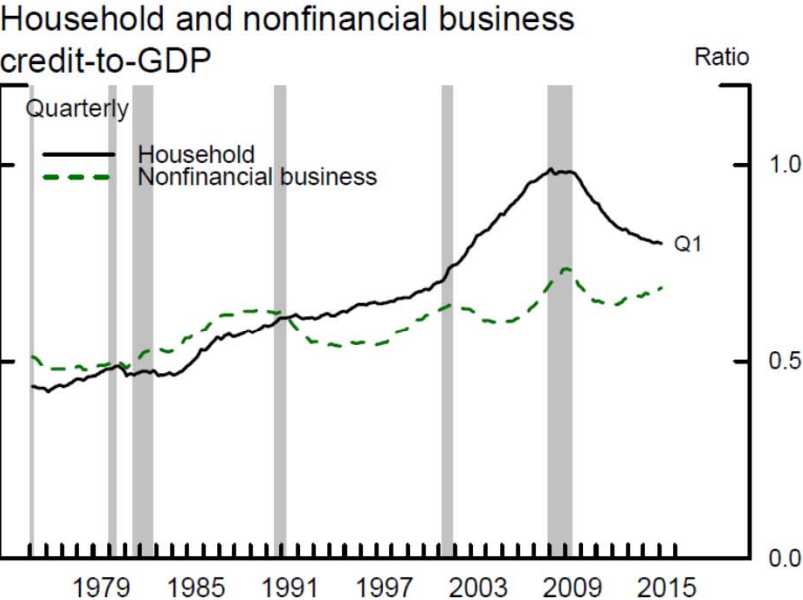
Findings from IRFs

A shock to the credit gap presages subpar economic performance with a delay when the credit gap is high; a shock to risk appetite when it is high does not

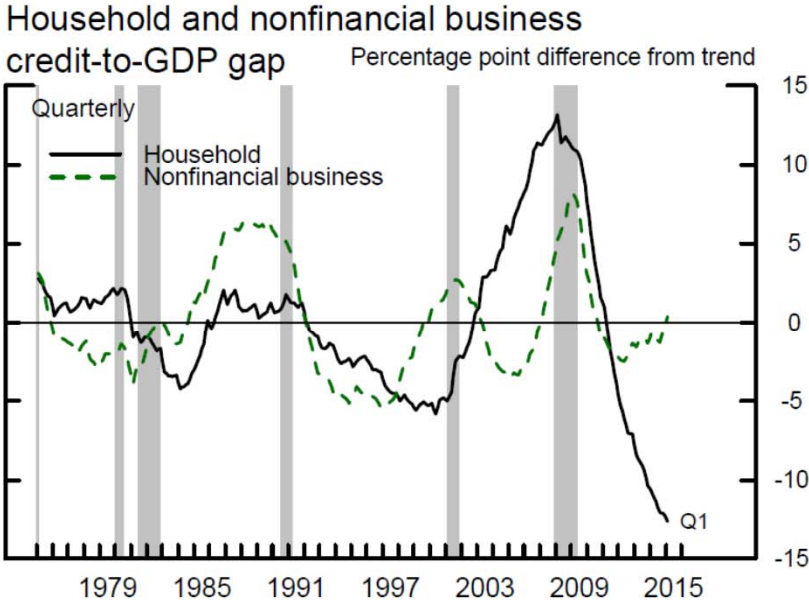
- Credit gap is a vulnerability, although risk appetite leads the gap

The effect of the monetary policy shock is nonlinear: a shock to monetary policy leads to a contraction in economic activity in low credit gap periods, consistent with lending and balance sheet channel, but not in high credit gap periods

Household and nonfinancial business – Different cycles and trends

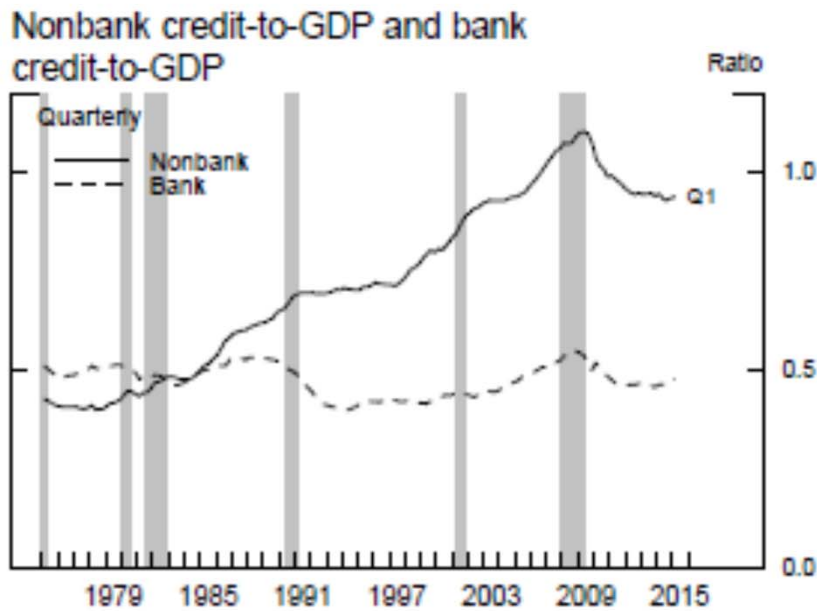


Source: Financial Accounts of the United States.

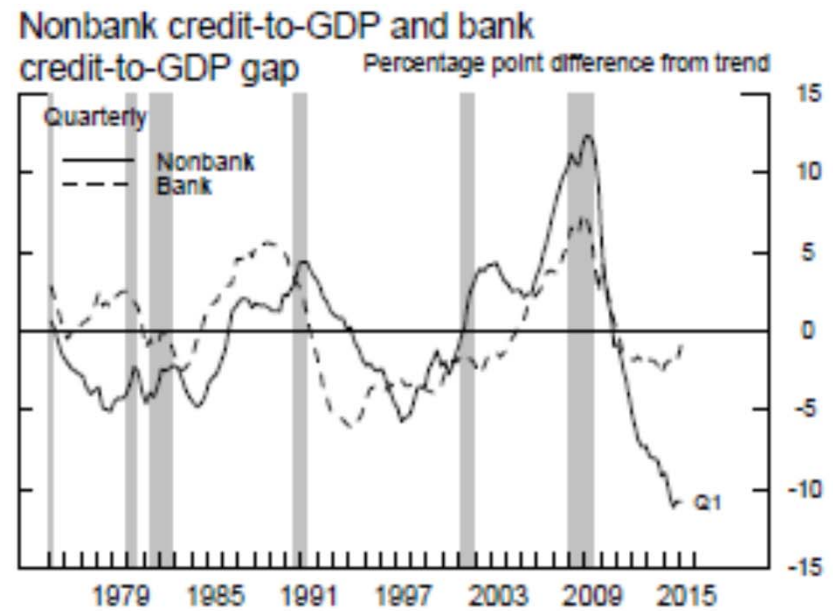


Note: Gaps calculated using an HP filter with lambda = 400,000.
Source: Financial Accounts of the United States, and staff calculations.

Bank and nonbank credit – spare tire?



Source: Financial Accounts of the United States.



Note: Gaps calculated using an HP filter with $\lambda = 40000$.

Source: Financial Accounts of the United States, and staff calculations.

Is all debt created equal?

In the U.S. context:

- Households and businesses: Borrowing by businesses not typically identified with financial crises
- Bank and nonbank: Credit provided by banks seen as qualitatively different from nonbank

When include both components, IRFs suggest:

- Business credit gap is a vulnerability – when the aggregate credit gap is high, a shock to the business credit gap is more costly than a shock to households
 - Business credit gap stays high, and economic performance declines
 - Shock to household credit gap dissipates
 - Need to pay attention to business credit
- Nonbank credit gap is a vulnerability in the same way as business credit -- less surprising

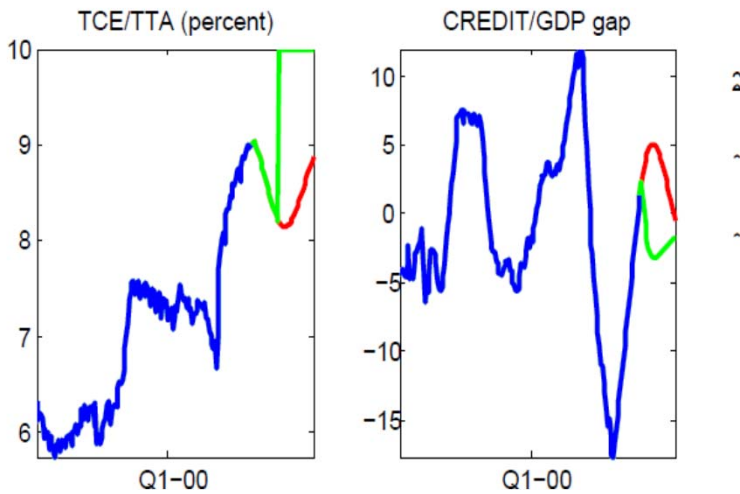
Scenario exercise

A method to characterize the estimates, and not as a prediction about the actual dynamics of the economy in response to various macroprudential policies (Lucas critique)

Credit shock increase

- No policy
- Increase in bank capital – abrupt and permanent

Credit shock and bank capital



- Endogenous expansion in credit, output, price level, and lower unemployment
- With an abrupt permanent increase in bank capital –
 - Credit-to-GDP gap falls
 - Monetary policy eases

Next steps

Identification of vulnerabilities

- Relationship between the credit gap and risk appetite
- Financial leverage
- Runnable liabilities

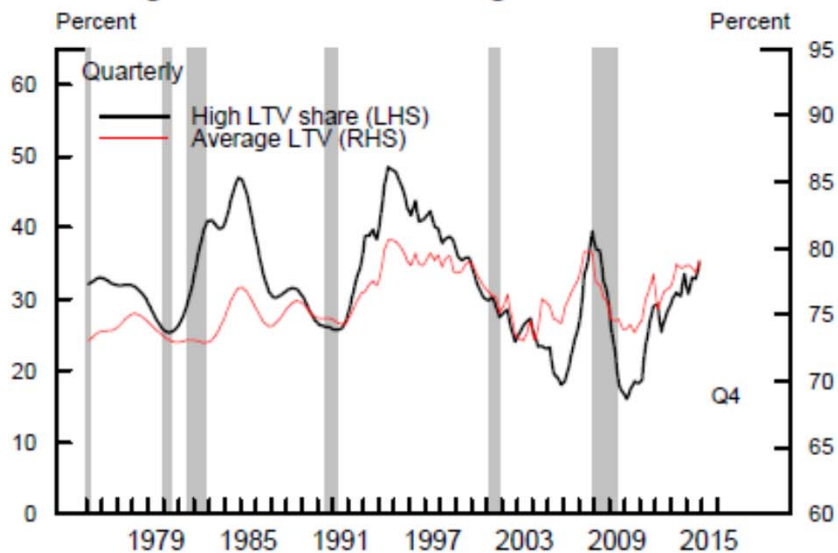
Nonlinearities: Credit cycles affect monetary policy transmission – monetary policy is effective when the credit gap is low, but not when it is high

Interactions of bank capital and monetary policy



Residential LTVs

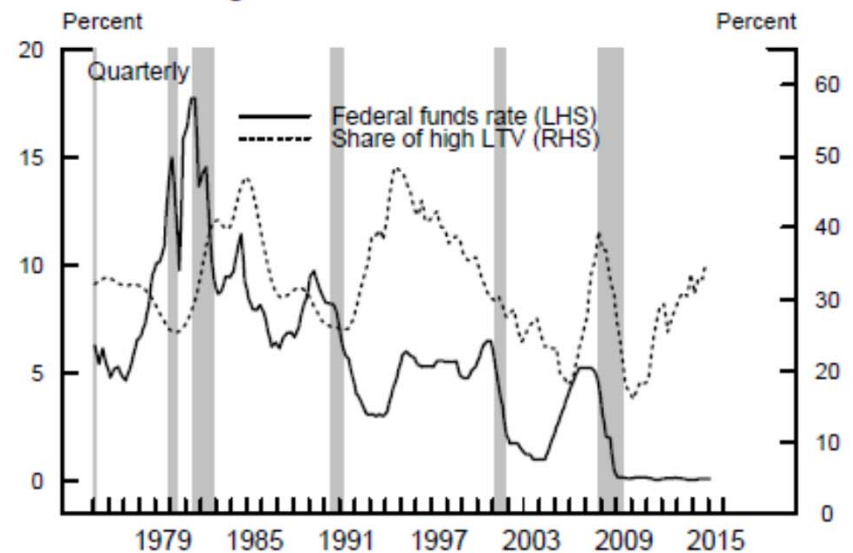
Average LTV and share of high LTV



Note: The figure presents an average loan-to-value ratio and the percentage of high loan-to-value mortgages.

Source: FHFA, MIRS, and staff calculations.

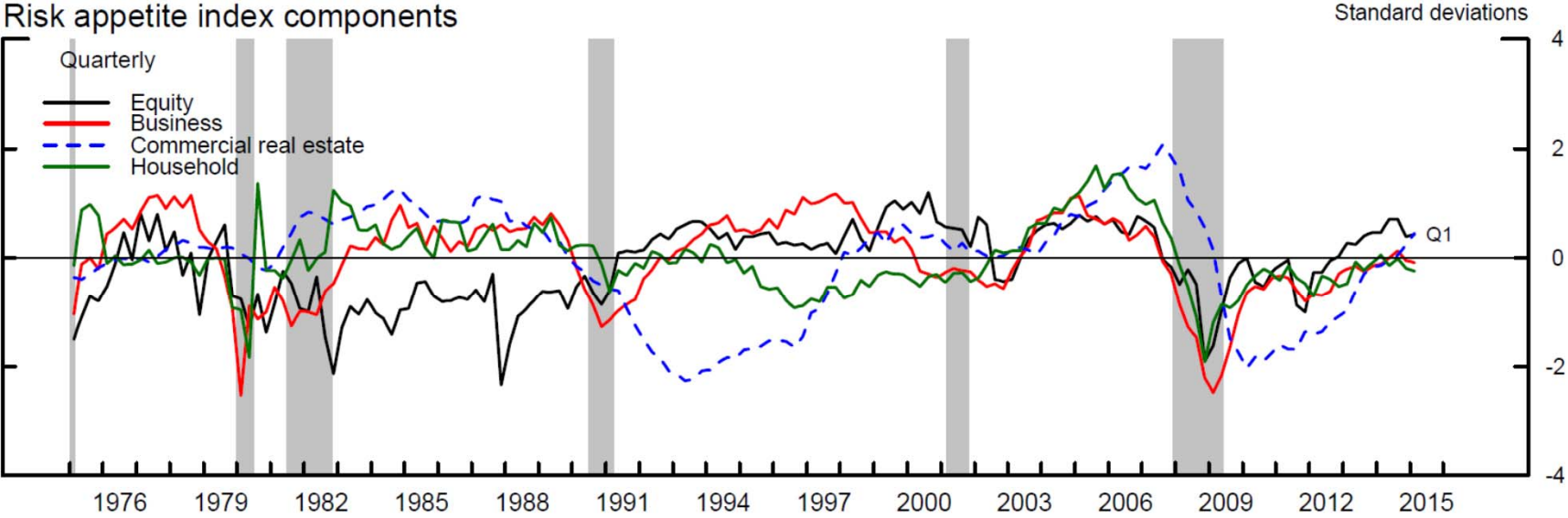
Share of high LTV and the federal funds rate



Note: The figure presents the federal funds rate and the percentage of high loan-to-value mortgages.

Source: FHFA, MIRS, FRB, and staff calculations.

Risk appetite



Note: The figure presents the component series of the risk appetite index. In computation of the index, these four components are respectively weighted by 2/10, 3/10, 2/10, and 3/10.
Source: Staff calculations.