

Credit, Financial Conditions, and Monetary Policy Transmission

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JAN 5, 2018

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Motivation

Models of the macroeconomy often ignore the financial sector

Monetary policy and financial conditions affect output growth – interest rate channel

Financial frictions affect transmission channels – balance sheet and bank lending channels

High credit and asset valuations predict recessions and financial crises (Borio and Lowe, 2002; Schularick and Taylor, 2012)

Combined lead to weaker recoveries (Jorda, Schularick and Taylor, 2013)

This paper

We show the effects of financial conditions and monetary policy on macroeconomic performance depend nonlinearly on nonfinancial credit

Quarterly US data, 1975:Q1 to 2014:Q4

Threshold VAR model of the macroeconomy with financial conditions and monetary policy

- Include nonfinancial credit as a financial vulnerability, motivated by theoretical and empirical literature
- High vulnerabilities, imbalances, leave the economy more vulnerable to negative shocks
- Threshold VAR allows for nonlinear dynamics depending on nonfinancial credit

We analyze the economy's response to shocks to financial conditions and monetary policy when nonfinancial credit is high or low

Key empirical results

Economic performance depends on nonfinancial credit

- Credit is a channel through which financial conditions affect the economy

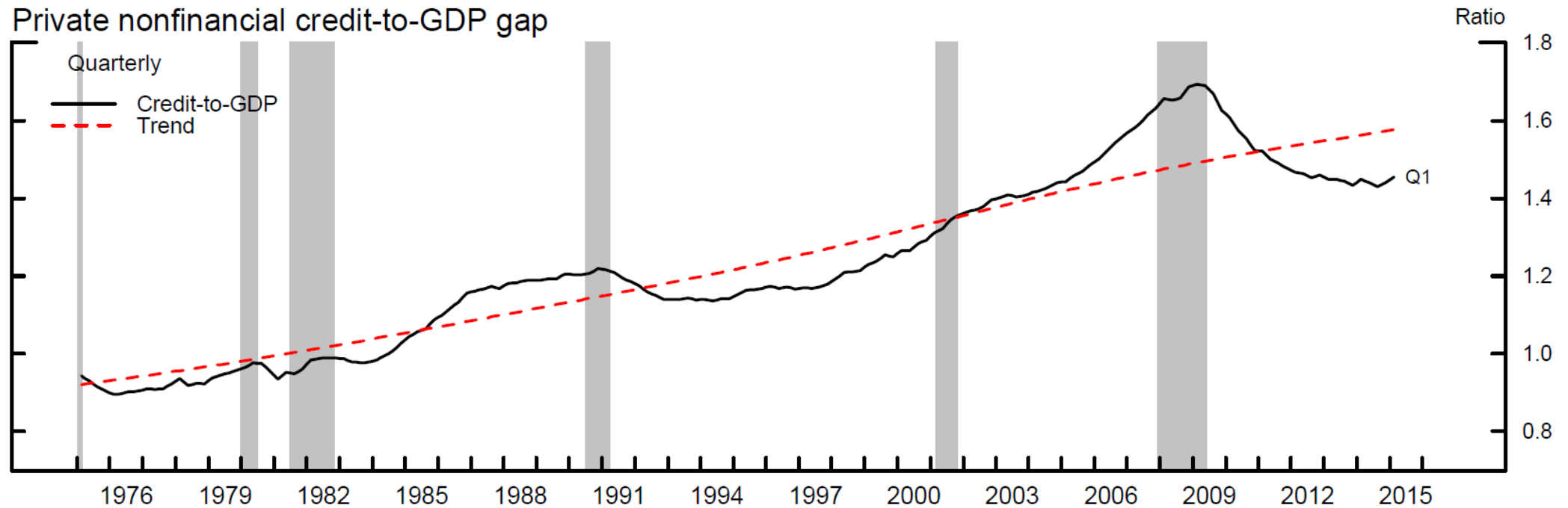
Financial conditions effects are nonlinear, and depend on the credit-to-GDP gap

- Looser conditions lead to an expansion when the credit gap is below trend, but makes the economy more prone to recession in the medium-term when the credit gap is above trend
- Credit-to-GDP gap is the difference between credit-to-GDP and an estimate of its long-run trend

Monetary policy effects are nonlinear

- Monetary policy shocks have no effect on output and inflation when the credit gap is high
- Shocks do not depress risk appetite when the credit gap is high
- Using Hanson-Stein (2015) framework, less transmission to far future yields when the credit gap is high

Credit-to-GDP and trend

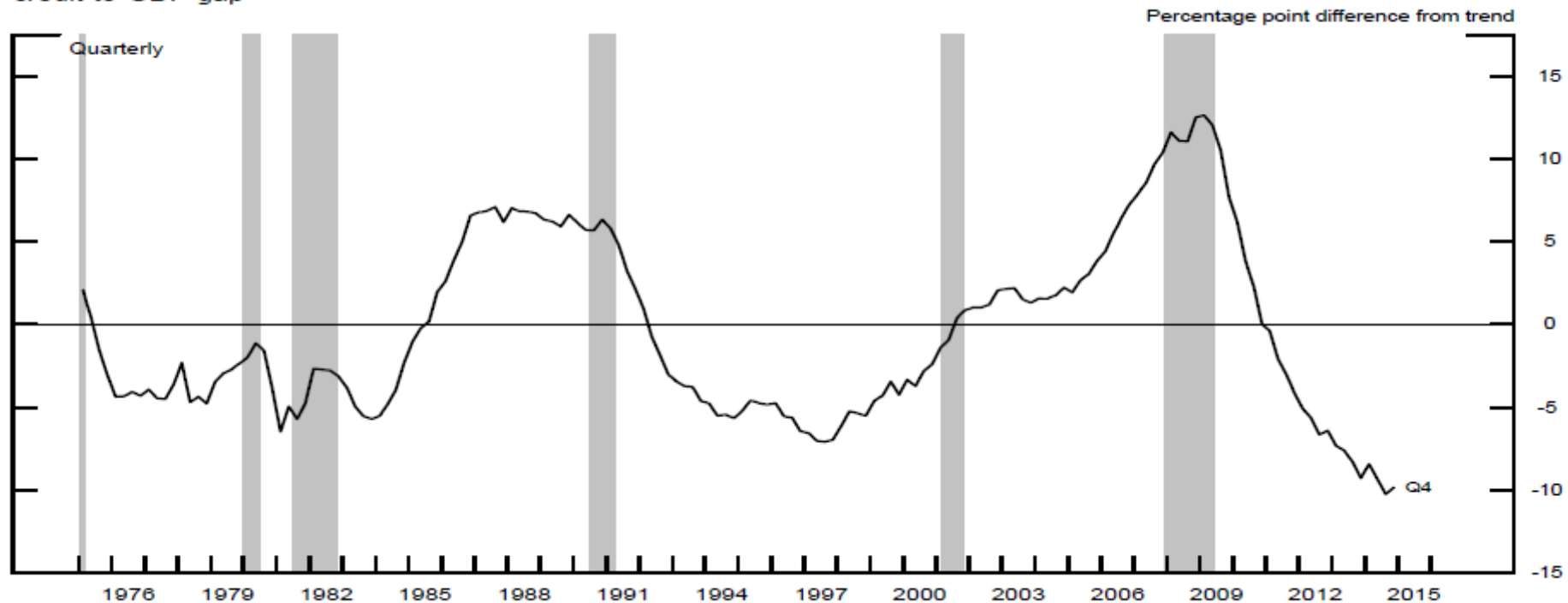


Note: Trend calculated using an HP filter with lambda = 400,000.

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

Credit-to-GDP gap

Private nonfinancial
credit-to-GDP gap



Note: Trend calculated using an HP filter with $\lambda = 400,000$.
Source: Financial Accounts of the United States, and authors' calculations.

Measuring Financial Conditions

Financial conditions reflect the ease of borrowers' access to credit

- Looser financial conditions lead to lower output gaps at four- and eight-quarters ahead (English et al, 2005)

FCIs reflect changes in equity constraints of intermediaries (He and Krishnamurthy, 2012), or endogenous risk-taking of lenders via value-at-risk constraints to low volatility (Brunnermeier and Sannikov, 2014; Adrian and Shin, 2014)

EBP (Gilchrist and Zakrajsek, 2012) is also a measure of financial conditions

Our FCI combines information from asset valuations and lending standards for households and businesses

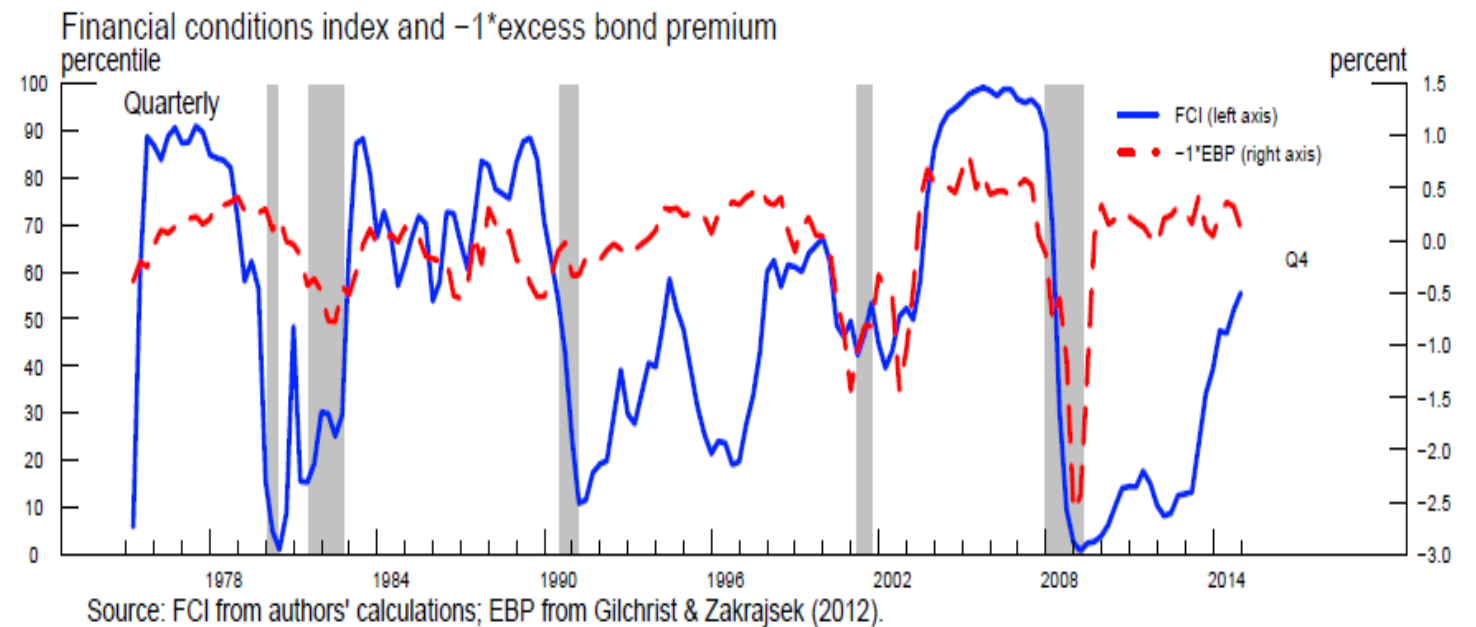
- Broader than business corporate sector
- Consistent data back to 1975

FCI and EBP

Weighted sum of normalized time series (Aikman et al, 2017)

Business sector: BBB spread, speculative-grade share of bond issuance; small business credit index; stock price-earnings ratio; real commercial real estate price growth

Household sector: residential house price-to-rent ratio; lending standards for consumer installment loans



VAR specification

Model:

- Log real GDP
- GDP deflator
- Unemployment rate
- Credit-to-GDP gap or credit-to-GDP growth
- FCI - Financial conditions (higher values are easier credit)
- FFR - Effective federal funds rate

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 (including FCI, as in Gilchrist and Zakrajsek, 2012)
- We test reversing FCI and FFR

Estimate following Giannone, Lenza, and Primiceri (2015)

- Bayesian technique specifies a prior that each variable follows a random walk, possibly with a drift
- Reduces estimation uncertainty and leads to more stable inference

Threshold VAR

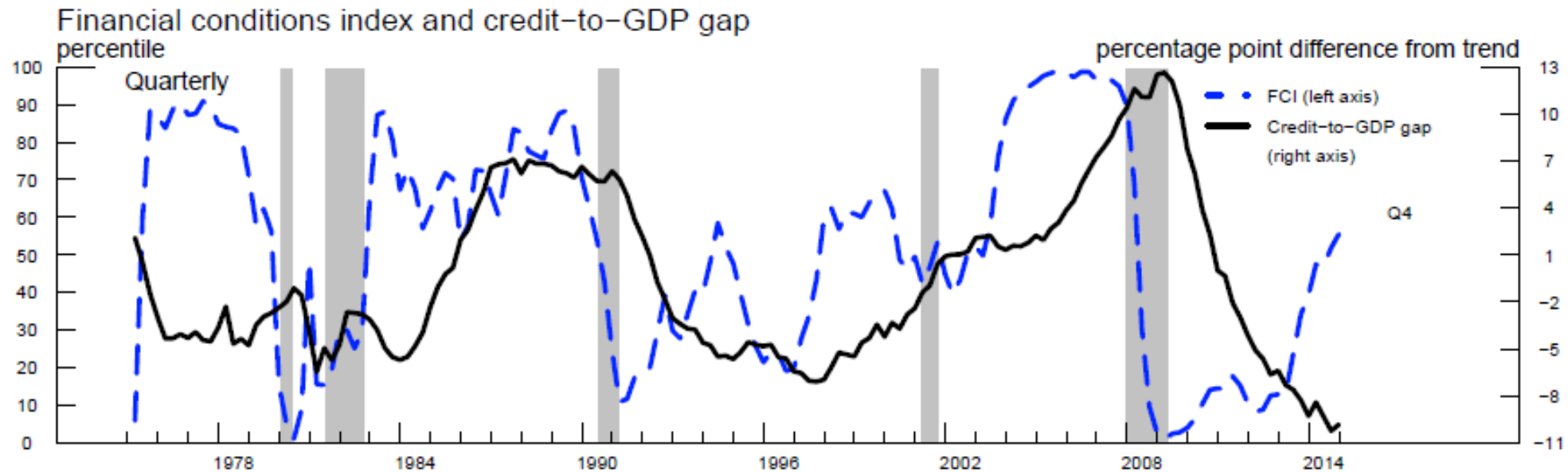
Nonlinear estimations – high vulnerability is thought to be qualitatively different because the system might be susceptible to self-fulfilling negative dynamics

Effectively estimate system on disjoint sets depending on whether the credit-to-GDP gap is above/below zero

We do not model transitions from one state to another

$$y_t = c^j + A(L)^j y_{t-1} + u_t^j \begin{cases} j = \text{high, if } \widehat{CY}_t > 0. \\ j = \text{low, if } \widehat{CY}_t \leq 0. \end{cases}$$

FCI and credit-to-GDP gap



Source: FCI from authors' calculations; credit-to-GDP gap from the Financial Accounts of the United States and trend calculated using an HP filter with $\lambda = 400,000$.

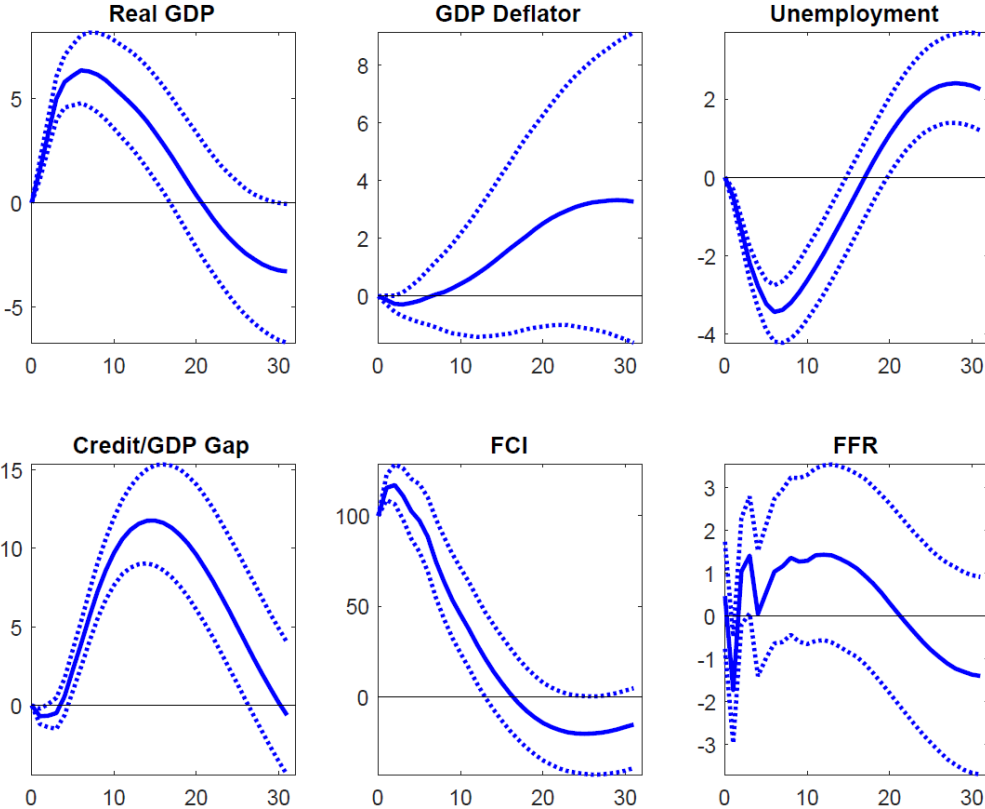
FCI has forecasting power for credit-to-GDP gap

Ratio of Root Mean Squared Forecast Errors of Bivariate VAR to AR models for Credit-to-GDP Gap, by forecast horizon

	1 quarter	4 quarters	8 quarters	12 quarters
AR (9)	0.93**	0.83**	0.81*	0.85*
AR (1)	0.76***	0.71**	0.72**	0.76**

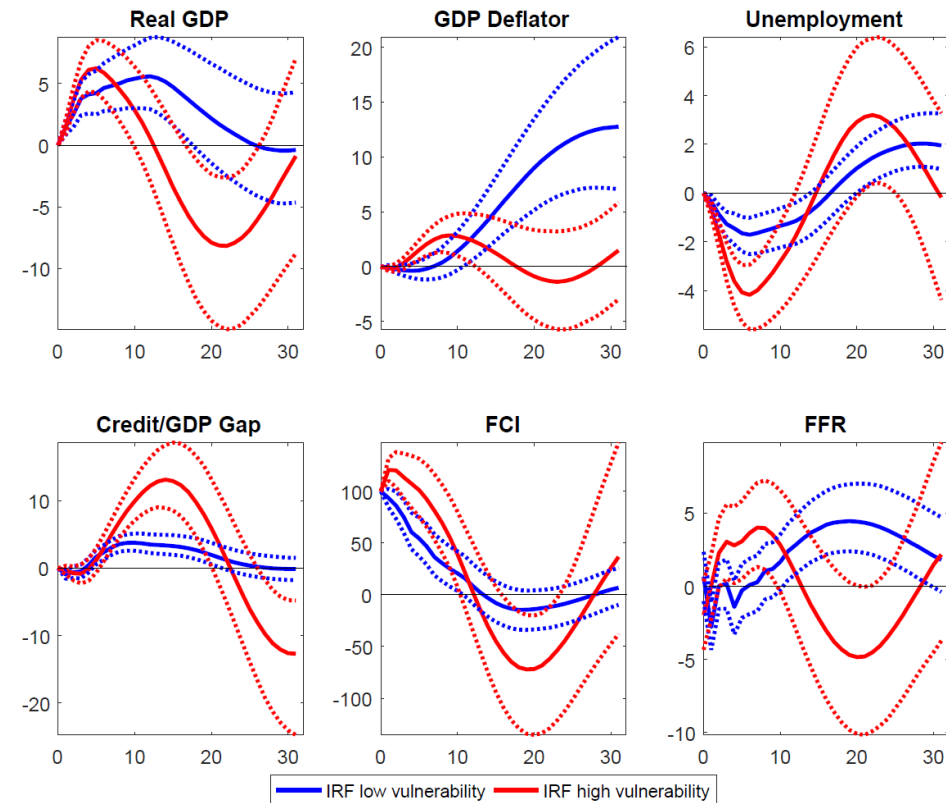
The symbols *, **,*** indicate that we can reject the hypothesis of equality between the alternative forecasts with 10%, 5% and 1% significance level.

FCI shock in a linear system

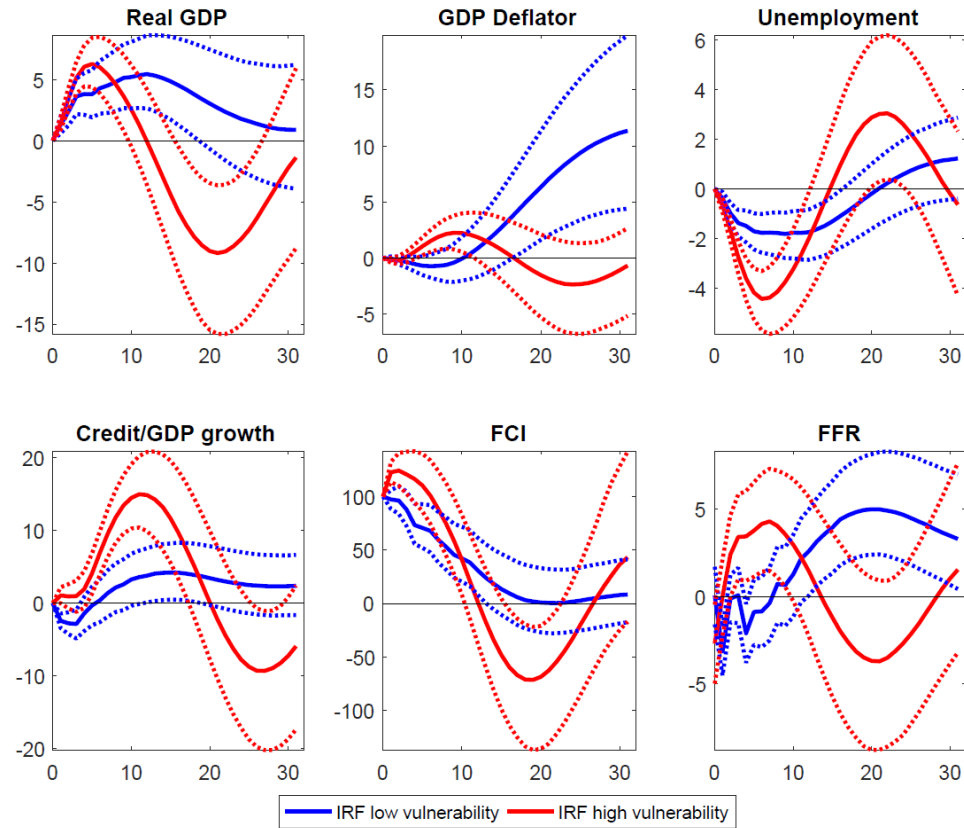


FCI shock when credit is high or low:

FCI shocks are expansionary, but suggest an inter-temporal tradeoff when credit is already high



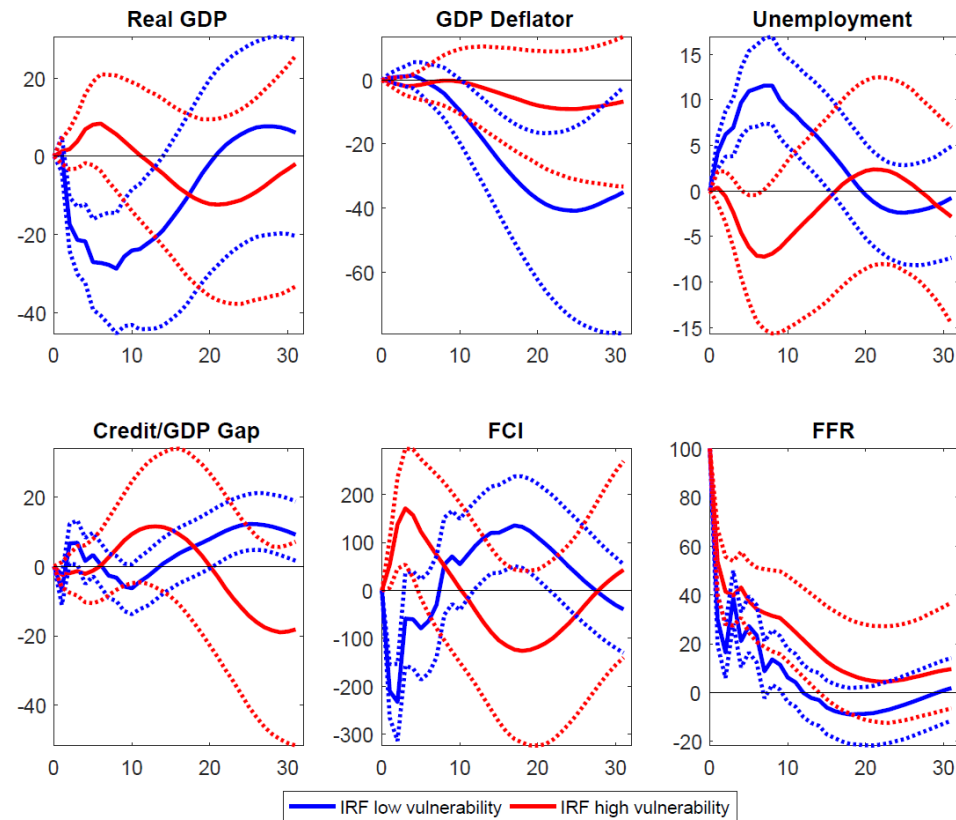
FCI shock with credit growth instead of gap: *Similar results*



Federal funds rate changes, by credit gap

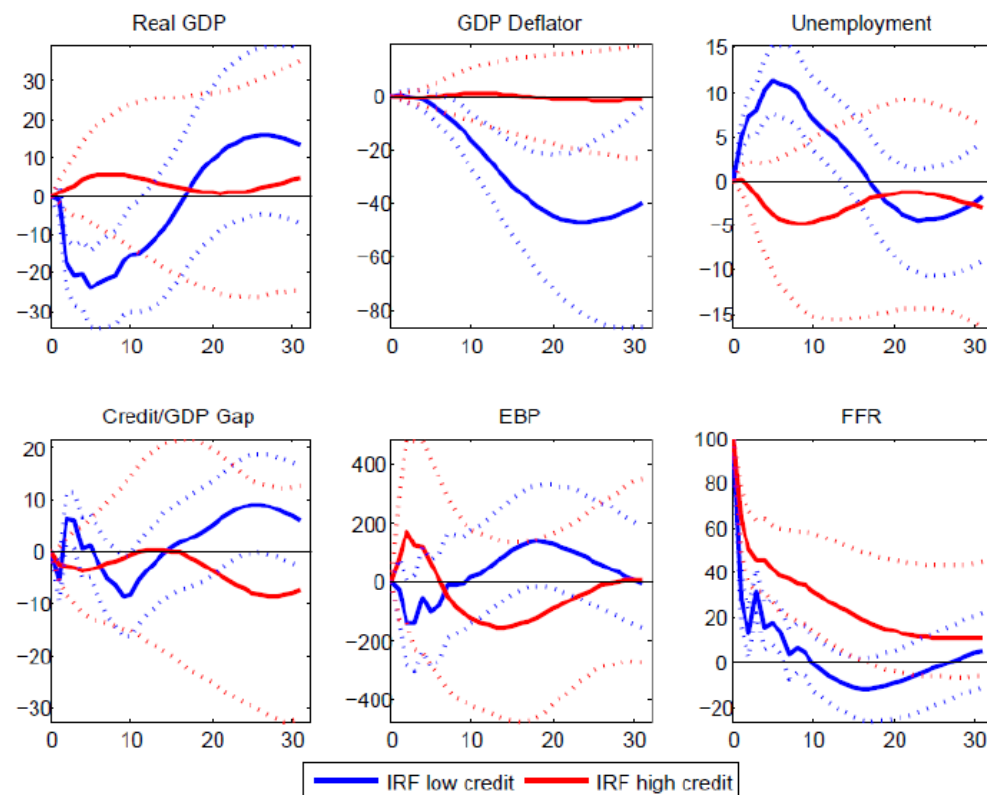
	Unchanged	Decrease	Increase
High: Credit-to-GDP gap > 0	26	20	20
Low: Credit-to-GDP gap < 0	31	30	33

Monetary policy shock when credit is high or low: *Effective in low credit gap, but not in high*



Monetary policy shock with EBP instead of FCI:

Similar results - Effective in low credit gap, but not in high



Why less effective monetary policy?

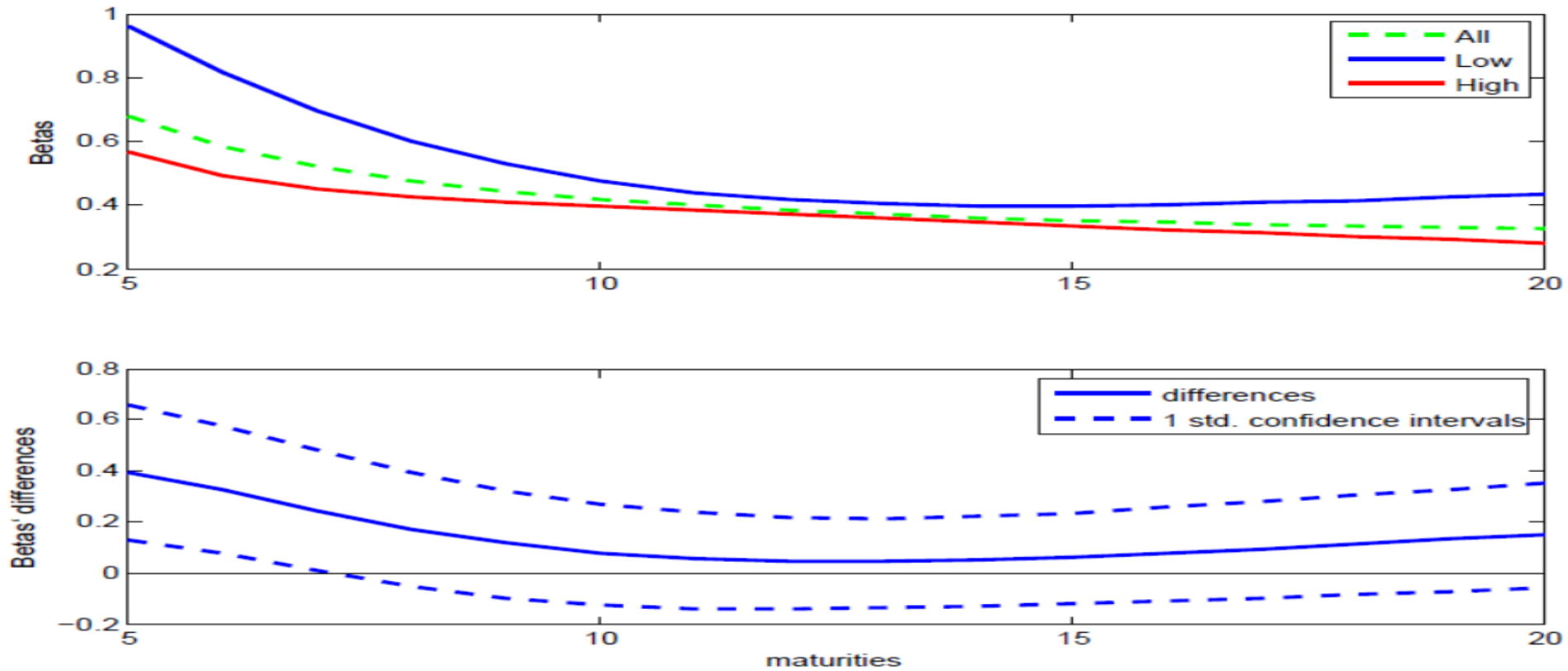
Monetary policy transmission to long rates - Hanson and Stein (2015)

- A 100 bp rise in 2-yr nominal Treasury yield leads to a 48 bp rise in the 10-yr Treasury forward rate.
- Why do long rates move so much in response to changes in short rates? Seems unlikely that investors have re-evaluated their views of the expected short rate by that much.
- Argue that a change in short rates will affect the term premium – yield-oriented investors may shift to longer maturities when rates are cut and they need to show income (because of accounting or agency)
- They support this argument by documenting a rise in holdings of longer-term securities by banks, who care more about NIMs rather than market value.

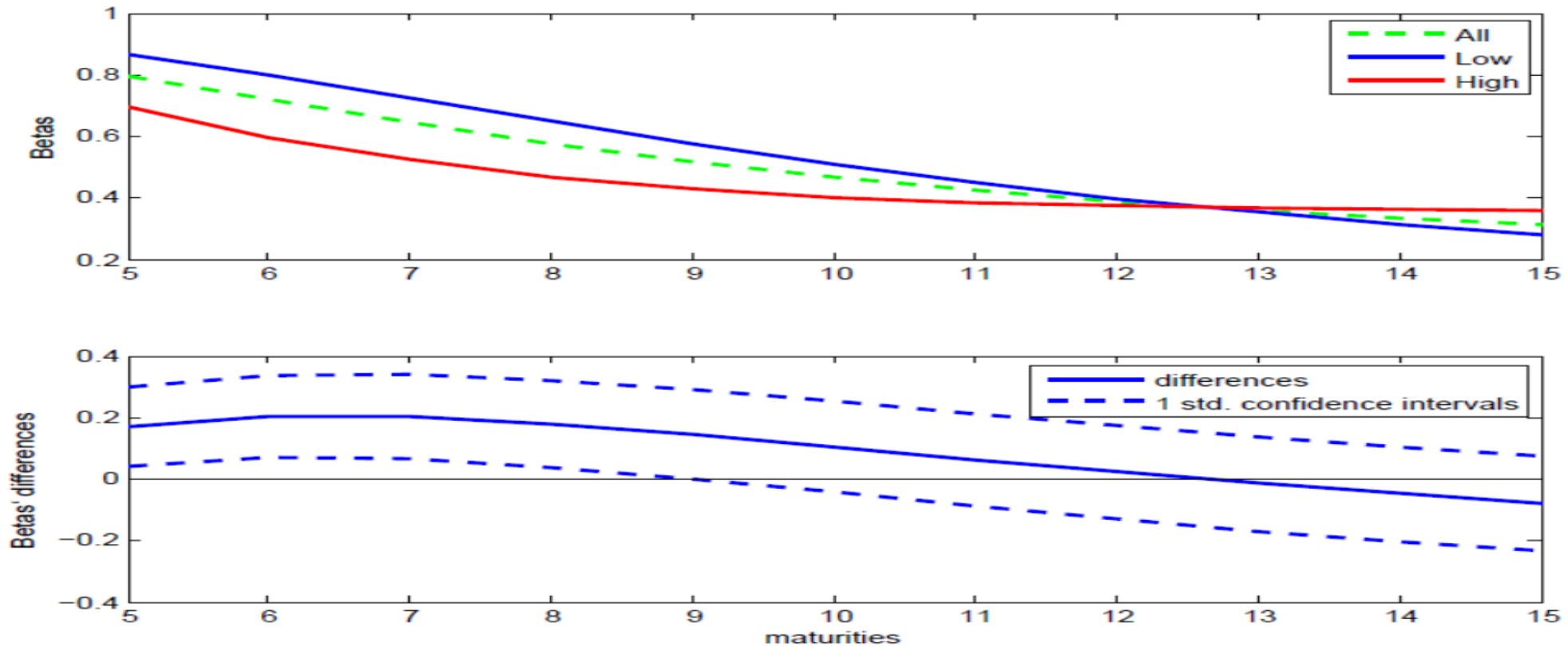
We look at whether the transmission to long rates varies between high and low credit gap states

- We find the transmission is stronger in low credit gap periods
- Could be high credit periods feature ample credit products, attenuating the need for yield-oriented investors to adjust the duration of their portfolios in reaction to changes in short-term rates

Estimated betas for distant forward real rates by credit-to-GDP gap, 1999 to 2014



Estimated betas for distant forward nominal rates by credit-to-gdp gap, 1975 to 2014



Many robustness tests

Measures of financial conditions - EBP

Alternative ordering of FCI and FFR

Measures of credit

- Credit-to-GDP growth
- (Log) Level of credit
- Credit-to-potential GDP

Sources of uncertainty

- Nonlinearities related to credit and not FCI

Summary and Implications

Findings

Nonlinear effects of financial conditions and monetary policy conditional on the credit gap or growth in credit-to-GDP

- Shock to financial conditions is expansionary, but suggests an intertemporal tradeoff with higher risks to growth in the medium-term
- Monetary policy transmission is attenuated when the credit gap is high

Implications

- Credit quantity, not just prices, has implications for real economic activity
- Macroeconomic responses are nonlinear – transmission channels may operate differently under different conditions
- Taken together, theory and policy should include credit in the transmission of monetary policy and financial conditions, and allow for nonlinear effects of shocks to economic performance.

END

Credit level

