Macro-financial linkages:
What role for (in)congruent financial cycles?

Paul Hiebert*
Monetary and Capital Markets
International Monetary Fund

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Today's central bank roles: Are existing models up to the task?

Active debate on interplay of price stablity objective with financial stability mandate ...
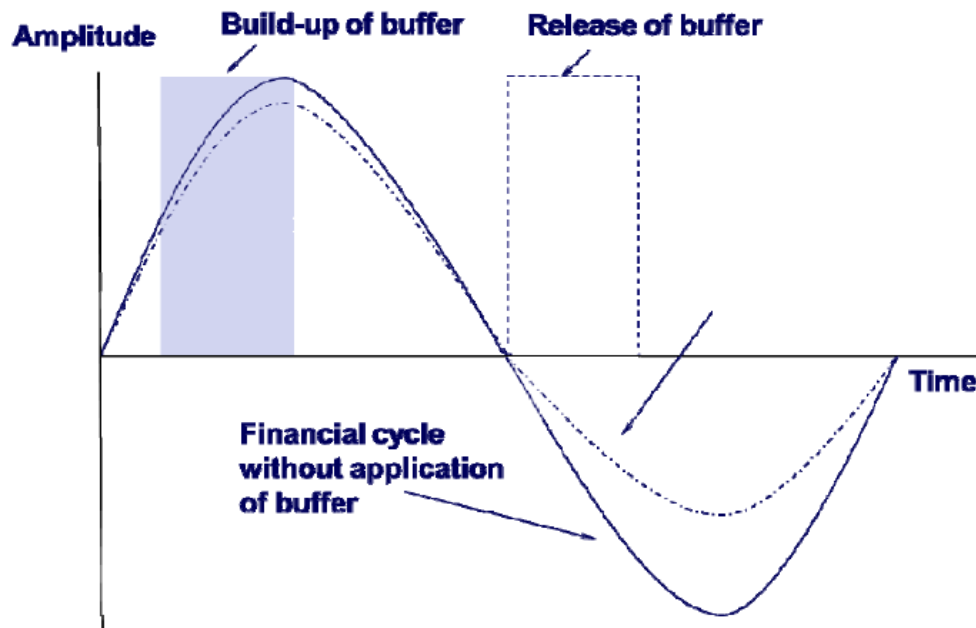
	Modified Jackson Hole consensus	Leaning against the wind vindicated	Financial stability is price stability
Monet. Policy	Framework largely unchanged. Limited effects on credit and risk taking. Blunt instrument to deal with imbalances	Financial stability as secondary objective; lengthening of horizon. Affects risk-taking. "Gets in all of the cracks"	Twin objectives on equal footing. Unblocks balance sheet impairments; avoids financial imbalances in upturns
Macro Pru	Granular and effective	Cannot fully address financial cycle; arbitrage	Indistinguishable from monetary policy
Inter-action	Limited interaction and easy separation of objectives, instruments, ...	Financial fragility affects monetary transmission and price stability	Financial stability and price stability are intimately interlinked
Issues	Coordination? Lender of last resort?	Coordination? Overburden mon. policy?	Time inconsistency problems?
Models	Svensson; Collard, Dellas, Diba and Loisel (2012)	Borio; Woodford (2012)	Brunnermeier and Sannikov (2012)

Source: Smets F (2014), "Financial stability and monetary policy: How closely interlinked?,"International Journal of Central Banking (June).

Today's central bank roles: Are existing models up to the task?

... alongside a new policy mix as authorities dabble with macroprudential policy powers

Policy domain	Objective		Systemic risk treated as
Microprudential supervision and regulation	Ensure soundness of individual financial institutions		exogenous
Macroprudential oversight	Limit systemic risk	1 - Increase resilience	endogenous
		2 - Lean against the financial cycle	endogenous

- *amplitude?*

- *duration?*

- *(a)symmetry?*

- *mere existence?!*

Three questions:

1
What are the defining characteristics of financial cycles?

2
How do financial and business cycles compare?

… within a given country?
… across countries?

3
What theoretical mechanisms could explain these empirical facts?

Credit as a *necessary* element in a financial cycle

- Deep recessions follow credit booms (e.g., Jorda et al. 2013; Boissay et al. 2016)

- Lagged credit growth predicts financial crises (Schularick & Taylor 2012)

- "Credit view": source of financial instability and not only amplifier (Minsky 1977)

… but is it *sufficient*?

- Not all credit booms end in financial recessions (Mendoza & Terrones 2008; Gorton & Ordonez 2015) …

- … leveraged bubbles detrimental (Fisher 1933; Jorda et al. 2015)

- Balance sheet channel: Asset prices grease credit market frictions as collateral

  – Real estate as collateral constraint (Iacoviello 2005)

  – Equity prices and corporate bonds and their role for balance sheets (Gilchrist et al 2009 and 2012; Claessens et al. 2012 and 2011; Hubrich & Tetlow 2015; Fink & Schüler 2015)

- Cross country (mis)alignment: A global financial cycle in asset prices (Rey 2015)

See Schüler Hiebert and Peltonen (2016), "Coherent financial cycles for G-7 countries: *Why extending credit can be an asset". SSRN.*

"The following definition seems to capture what experts refer to as the business cycle:

The business cycle is the phenomenon of a <u>number of important economic aggregates</u> … being characterized by <u>high pairwise coherences</u>

This definition captures the notion of the business cycle as being a condition symptomizing the <u>common movements of a set of aggregates</u>."

- T. Sargent (1987), *Macroeconomic Theory*, p. 282 *[emphasis added]*

Coherent Financial Cycles for G-7 Countries: Why Extending Credit Can Be an Asset
Schüler, Hiebert, Peltonen (2016), SSRN http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2539717

Methodology

Step 1: Common cyclical frequencies for set of indicators (multivariate, "power cohesion")
Step 2: Composite financial cycle index with time varying weights, and filter for reference cycles

Sample
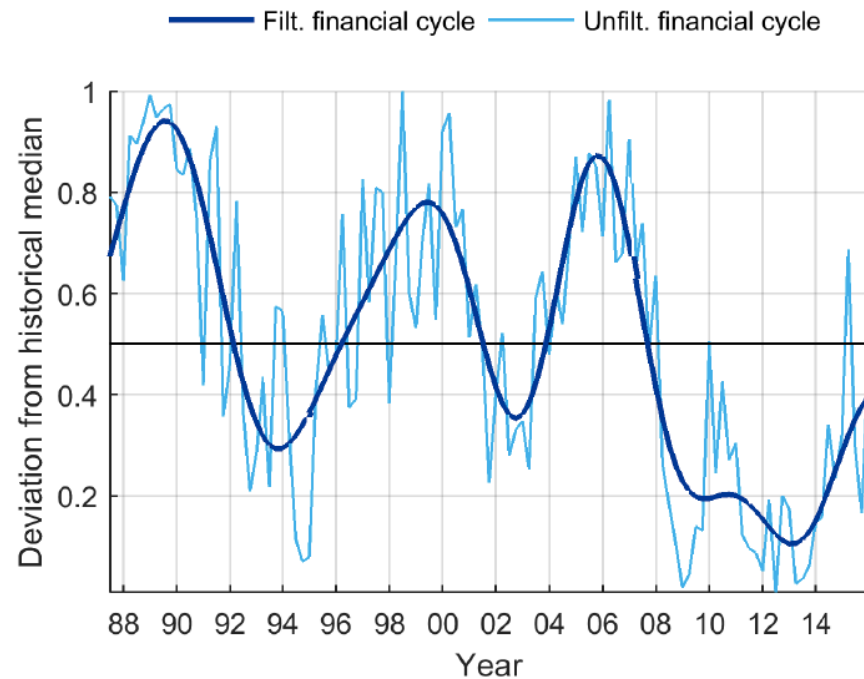
G-7 countries, 1970Q!-2013Q4 (quarterly real growth rates)

Variables

Financial cycle	Business cycle

Narrow
     Total credit (cr)
     Residential property prices (p_h)
 Broad
     Narrow +
     Equity prices (p_e)
     Corporate bond prices (p_b)
	GDP (q)
	 Consumption (co)
	 Investment (i)
	 Hours worked (h)

The benefits of combining information

Financial cycle … *before* and *after* filtering
(Standardised units. 0.5 = historical median)

a. euro area

b. United States

Source: Schüler, Hiebert, Peltonen (2015), "Characterising the financial cycle: a multivariate and time-varying approach", ECB Working Paper No 1846 (September)
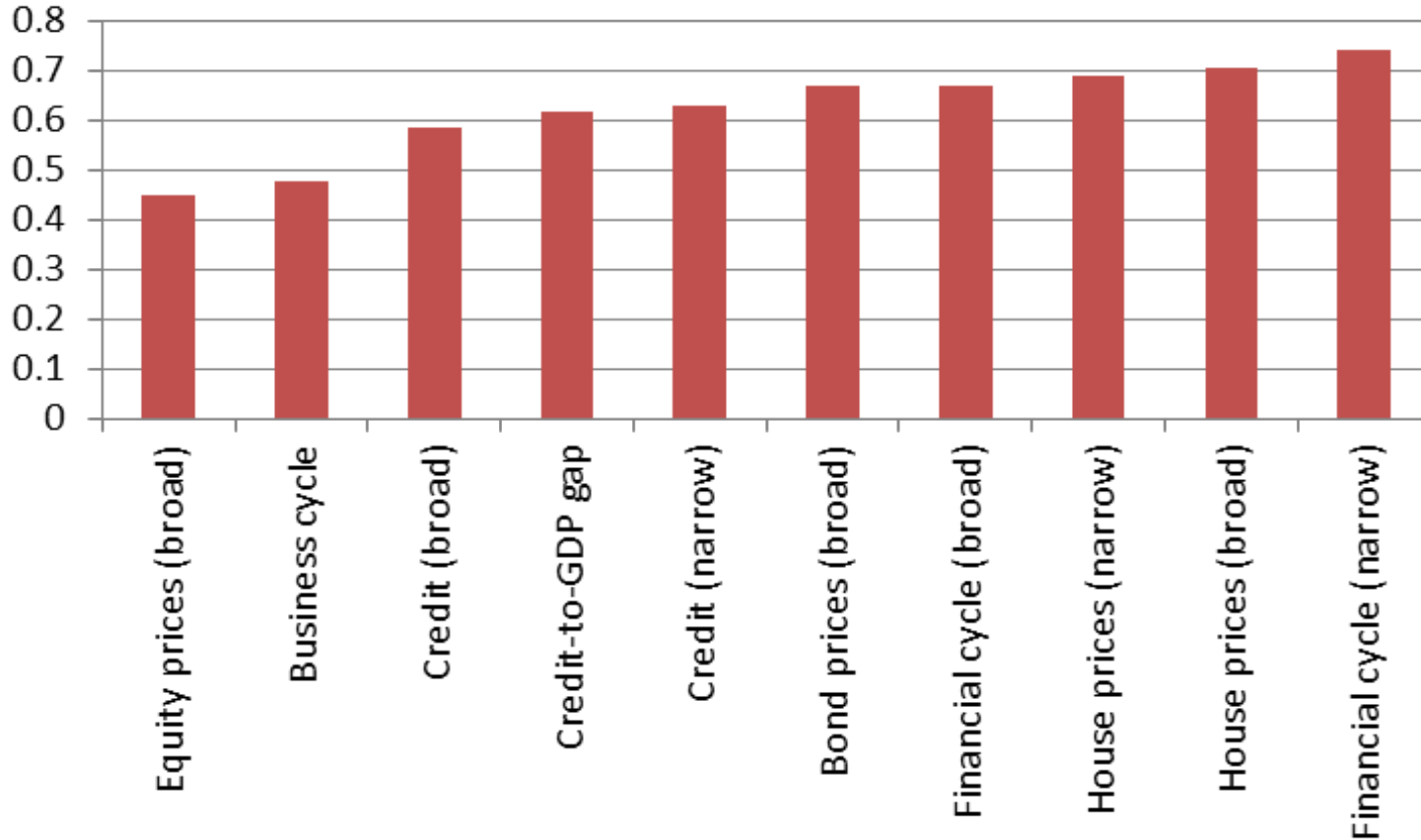
Source: Schüler, Hiebert, Peltonen (2016), Coherent Financial Cycles for G-7 Countries: Why Extending Credit Can Be an Asset – see http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2539717

Does empirically combining financial variables improve accuracy of crisis prediction?
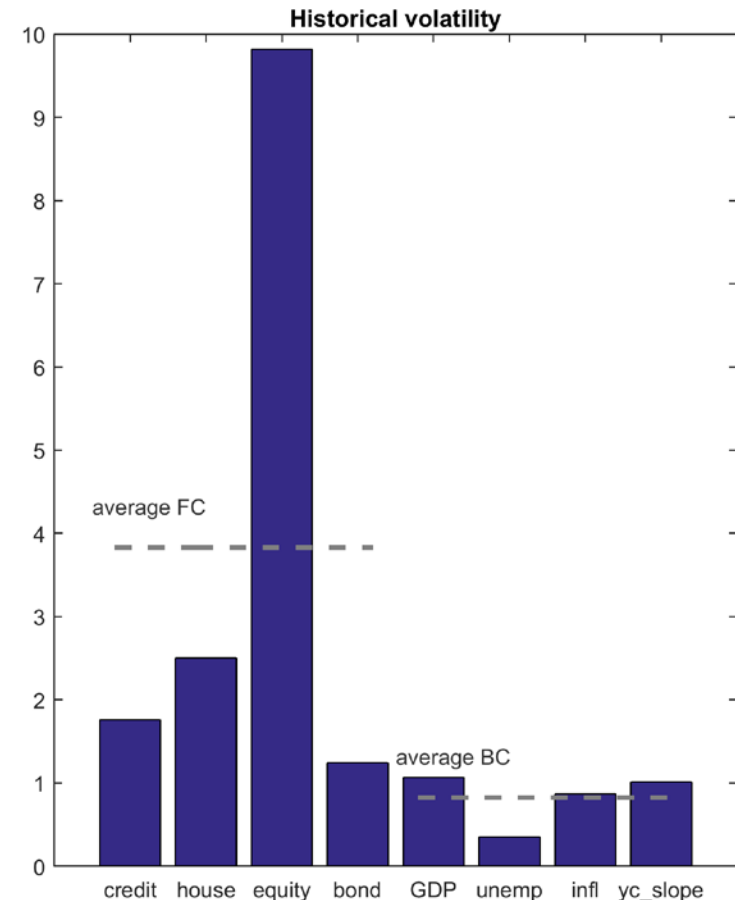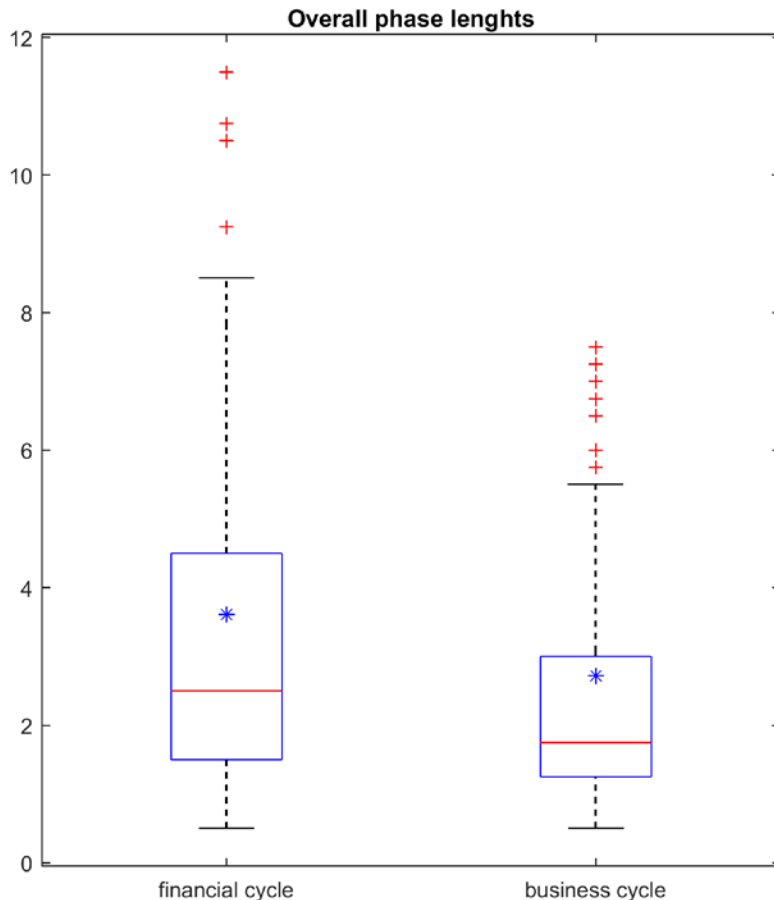*(AUROC)*

Source: Source: Schüler, Hiebert, Peltonen (2016), Coherent Financial Cycles for G-7 Countries: Why Extending Credit Can Be an Asset – see http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2539717

Note: Results of univariate signalling early warning exercise to predict transition into vulnerability periods 1-4 quarters ahead for G7 countries,

Financial cycles exhibit higher *amplitude* and *persistence* than business cycle cousins
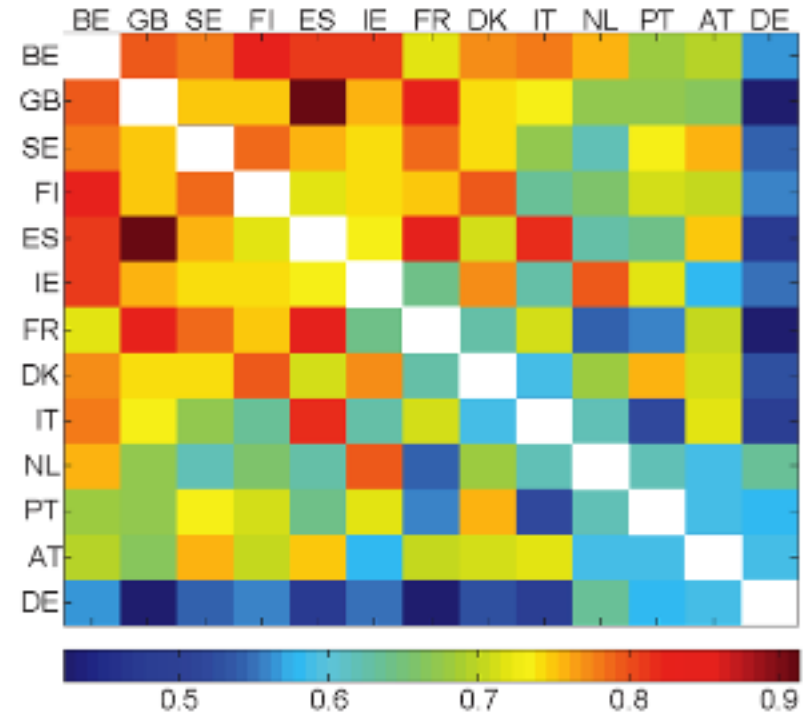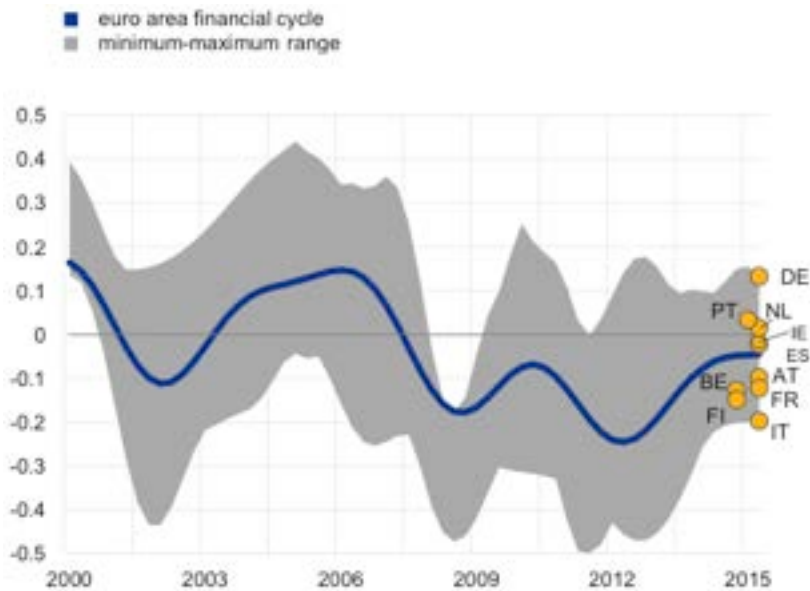

Source: Hiebert, Jaccard. Schüler (2016), "Financial and business cycles across euro area countries: Close relatives or distant cousins? , Paper based on presentation at First Annual ECB Macroprudential Conference (April). see
https://www.ecb.europa.eu/pub/conferences/html/20151104_mp_policy_research.en.html
"

Notes: LHS chart: Scale is in standardised units, 0.5 = historic median.
        RHS CHART: Results of univariate signalling early warning exercise to predict transition into crisis events 1-3 ahead,

Financial cycles heterogeneous across countries … though tend to cluster

Source: Schüler, Hiebert, Peltonen (2015), "Characterising the financial cycle: a multivariate and time-varying approach",
ECB Working Paper No 1846 (September)
Notes: LHS chart: Scale is in standardised units, 0.5 = historic median.
        RHS CHART: Results of univariate signalling early warning exercise to predict transition into crisis events 1-3 ahead,

Standard macro models fail to account for observed dynamics of financial cycle variables

Challenge:

Generate endogenous propagation mechanisms yielding higher *persistence* and *volatility* of financial cycle variables in a standard DSGE model still useful to study business cycles

Approach:*

Interact two mechanisms to capture data dynamics:

→ Financial frictions

→ Time-varying risk aversion

*developed in Jaccard and Schüler (2016), "Frequency domain analysis of macro-financial DSGE models", ECB Mimeo (October)

Mechanisms to capture data dynamics in DSGE model …

- ## Financial frictions*

  – Introduce credit into the analysis by assuming that firms need to pay workers and other production inputs in advance of production.

  – Capital adjustment costs to generate fluctuations in Tobin's Q.

  – Model with moral hazard in which banks take into account the borrower's willingness to reimburse:

  $$\text{Size of the loan in period t} \leq \text{NPV from operating the firm}$$

  where the NPV from operating the firm is the discounted sum of future profits.

  See credit-in-advance and incentive compatibility constraints (e.g., Gertler and Karadi 2011; Jermann and Quadrini 2012; De Fiore and Uhlig 2015).

developed in Jaccard and Schüler (2016), "Frequency domain analysis of macro-financial DSGE models", ECB Mimeo (October)

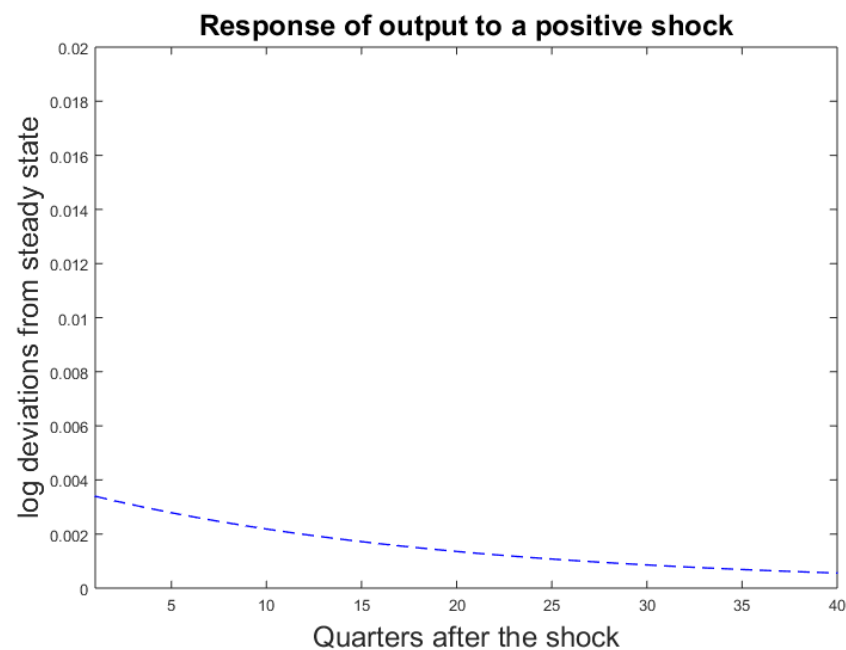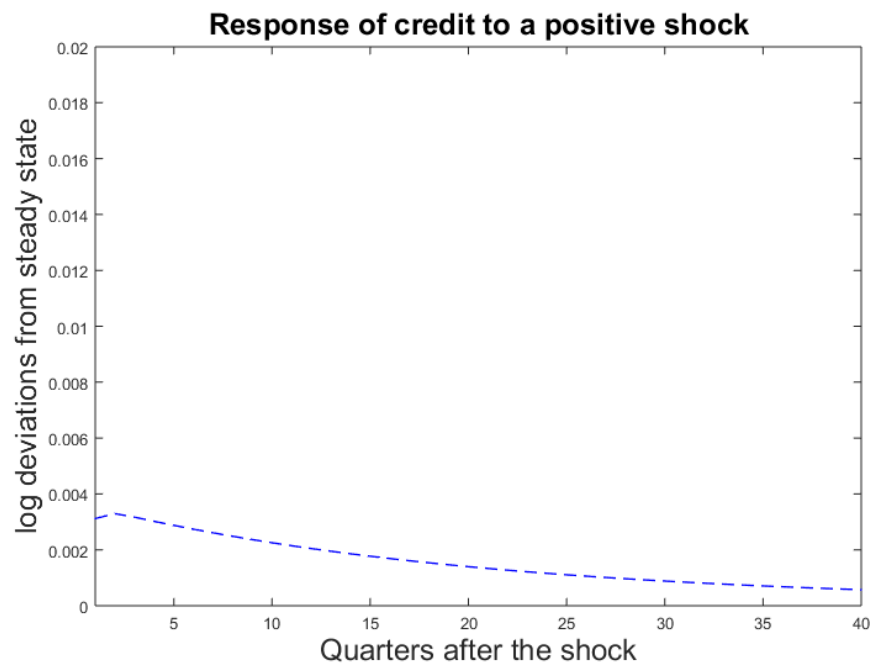## Mechanisms to capture data dynamics in DSGE model …

- **Interacting financial frictions with time-varying risk aversion**
  - The discounting of future profits opens the possibility that changes in risk aversion could influence credit creation.

  - Habit formation generates time-varying risk aversion*

  - Stochastic discount factor used to assess the firm's incentive to repay its debt *interacts* with incentive constraint.

  - Mechanism propagates and amplifies the effects of standard technology shocks.

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* See specification of habits used in DSGE models to resolve standard asset pricing puzzles (e.g., Jermann 1998; Jaccard 2014)..

*developed in Jaccard and Schüler (2016), "Frequency domain analysis of macro-financial DSGE models", ECB Mimeo (October)

Generating model-based persistence and volatility …
Impulse responses of credit and output to a one standard deviation technology shock
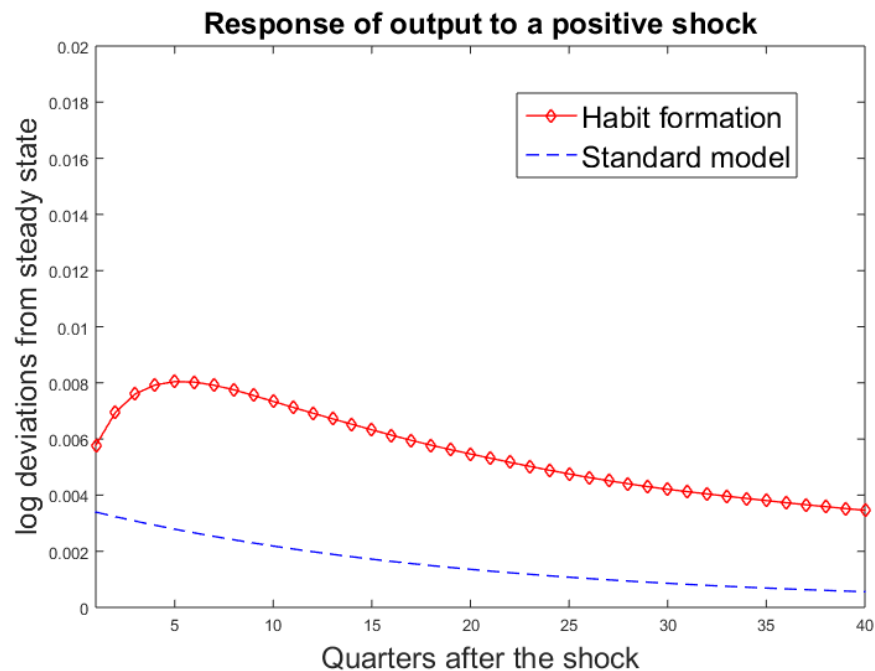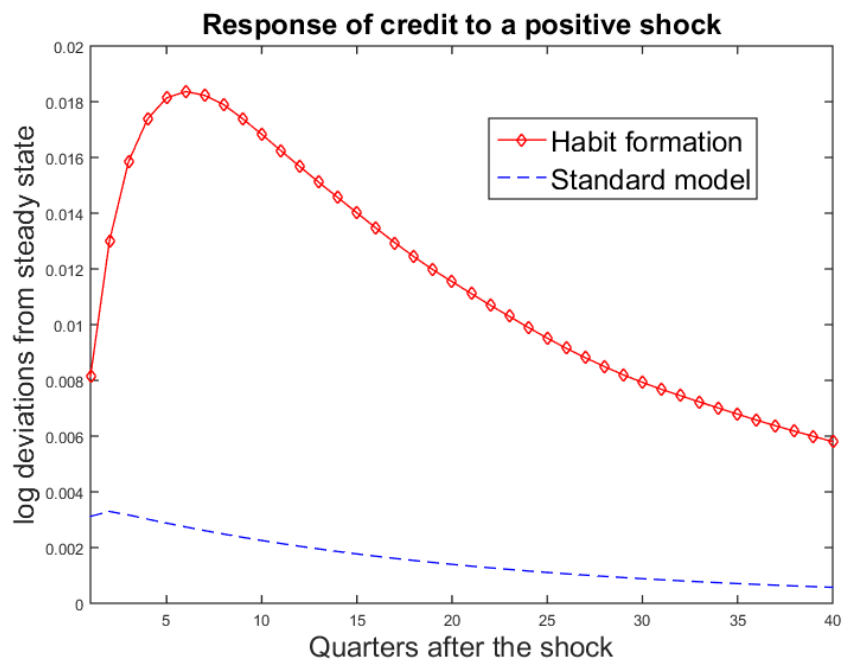

Model with *financial frictions* only (credit-in-advance and agency problems).

developed in Jaccard and Schüler (2016), "Frequency domain analysis of macro-financial DSGE models", ECB Mimeo (October)

Generating model-based persistence and volatility …
Impulse responses of credit and output to a one standard deviation technology shock

Model with *time-varying risk aversion* and *financial frictions*
… vs. standard model with financial frictions only.

developed in Jaccard and Schüler (2016), "Frequency domain analysis of macro-financial DSGE models", ECB Mimeo (October)

Three ~~questions~~ findings

1

What are the defining characteristics of financial cycles?
- ✓ Combining credit and asset prices suggests volatile and persistent financial cycles in G-7 and EU; helpful to predict systemic events

2

How do financial and business cycles compare?

… within a given country?

… across countries?
- ✓ Scope for differentiated and country specific countercyclical policies (macroprudential vs macroeconomic)

3

What theoretical mechanisms could explain these empirical facts?
- ✓ Interaction of financial frictions with time varying risk aversion (and scope for expectational errors associated with technology shocks…)