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

Paul Hiebert*  
Monetary and Capital Markets  
International Monetary Fund  


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*Disclaimer: The views expressed in this presentation are those of the presenter and do not necessarily represent those of the IMF
The changing nature of central bank policies

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

Active debate on interplay of price stability objective with financial stability mandate ...

<table>
<thead>
<tr>
<th>Modified Jackson Hole consensus</th>
<th>Leaning against the wind vindicated</th>
<th>Financial stability is price stability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monet. Policy</strong></td>
<td></td>
<td></td>
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<tr>
<td>Framework largely unchanged</td>
<td>Financial stability as secondary objective; lengthening of horizon</td>
<td>Twin objectives on equal footing</td>
</tr>
<tr>
<td>Limited effects on credit and risk taking</td>
<td>Affects risk-taking</td>
<td>Unblocks balance sheet impairments; avoids financial imbalances in upturns</td>
</tr>
<tr>
<td>Blunt instrument to deal with imbalances</td>
<td>“Gets in all of the cracks”</td>
<td></td>
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<tr>
<td><strong>Macroe Prud.</strong></td>
<td></td>
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<tr>
<td>Granular and effective</td>
<td>Cannot fully address financial cycle; arbitrage</td>
<td>Indistinguishable from monetary policy</td>
</tr>
<tr>
<td><strong>Interaction</strong></td>
<td></td>
<td></td>
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<tr>
<td>Limited interaction and easy separation of objectives, instruments, ...</td>
<td>Financial fragility affects monetary transmission and price stability</td>
<td>Financial stability and price stability are intimately interlinked</td>
</tr>
<tr>
<td><strong>Issues</strong></td>
<td></td>
<td></td>
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<tr>
<td>Coordination?</td>
<td>Coordination?</td>
<td>Time inconsistency problems?</td>
</tr>
<tr>
<td>Lender of last resort?</td>
<td>Overburden mon. policy?</td>
<td></td>
</tr>
<tr>
<td><strong>Models</strong></td>
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The changing nature of central bank policies

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

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

<table>
<thead>
<tr>
<th>Policy domain</th>
<th>Objective</th>
<th>Systemic risk treated as</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microprudential supervision and regulation</td>
<td>Ensure soundness of individual financial institutions</td>
<td>exogenous</td>
</tr>
<tr>
<td>Macroprudential oversight</td>
<td>Limit systemic risk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 - Increase resilience</td>
<td>endogenous</td>
</tr>
<tr>
<td></td>
<td>2 - Lean against the financial cycle</td>
<td>endogenous</td>
</tr>
</tbody>
</table>

- 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 **number of important economic aggregates** ... being characterized by **high pairwise coherences**

This definition captures the notion of the business cycle as being a condition symptomizing the **common movements of a set of aggregates.**”

1 - What are the defining characteristics of financial cycles?

Coherent Financial Cycles for G-7 Countries: Why Extending Credit Can Be an Asset

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, 1970Q1-2013Q4 (quarterly real growth rates)

Variables

<table>
<thead>
<tr>
<th>Financial cycle</th>
<th>Business cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrow</td>
<td>GDP ((q))</td>
</tr>
<tr>
<td>Total credit ((c_t))</td>
<td>Consumption ((c_o))</td>
</tr>
<tr>
<td>Residential property prices ((p_n))</td>
<td>Investment ((i))</td>
</tr>
<tr>
<td>Broad</td>
<td>Hours worked ((h))</td>
</tr>
<tr>
<td>Narrow +</td>
<td></td>
</tr>
<tr>
<td>Equity prices ((p_e))</td>
<td></td>
</tr>
<tr>
<td>Corporate bond prices ((p_b))</td>
<td></td>
</tr>
</tbody>
</table>
1 - What are the defining characteristics of financial cycles?

The benefits of combining information

Financial cycle ... before and after filtering

(Standardised units. 0.5 = historical median)

a. euro area

b. United States


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


Note: Results of univariate signalling early warning exercise to predict transition into vulnerability periods 1-4 quarters ahead for G7 countries,
2 - How do financial and business cycles compare (within countries)

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


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,
2 - How do financial and business cycles compare (across countries)

Financial cycles heterogeneous across countries ... though tend to cluster

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,
3 - What theoretical mechanisms could explain these empirical facts?

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.

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

3 - What theoretical mechanisms could explain these empirical facts?

Generating model-based persistence and volatility ...

*developed in Jaccard and Schüler (2016), “Frequency domain analysis of macro-financial DSGE models”, ECB Mimeo (October)
3 - What theoretical mechanisms could explain these empirical facts?

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...)

Knowledge gap