THE PROCYCLICAL EFFECTS OF BANK CAPITAL REGULATION

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Overview

1. Procyclicality as a macroprudential challenge
2. Procyclicality induced by bank capital regulation
3. A model-based assessment
4. Dampening the procyclicality of Basel II in practice

1. Procyclicality as a macroprudential challenge

- Important lesson extracted from the current financial crisis:
  Need to adopt a more macroprudential approach
- Traditional microprudential approach:
  - Macro and system-wide phenomena taken as given
  - Focus on the risk of failure of each individual financial intermediary (=*bank*)
- Macroprudential approach = better understanding + regulatory/policy treatment of...
  - Build-up of systemic risk (common exposures, propagation channels)
  - Various channels of interaction between the financial health of banks and the macroeconomy

Sources of procyclicality in banking

- **Fundamental sources**
  1. Impact of cycle on investment opportunities and credit demand
  2. Impact of cycle on risk profile of candidate borrowers
- **General amplifiers**
  1. Impact of cycle on bank profits (+ equity issuance difficulties)
  2. Procyclical rules and standards of practice
     (a) Fair value accounting + rules based on accounting figures
     (b) Margins calls / haircuts
     (c) Ratings-based and VaR-based risk management
     (d) Compensation practices (?)
  3. Capital requirements, especially if risk-based

4. Misperception of risk (disaster myopia, cognitive dissonance) (?)
5. Asset price bubbles (exogenous?)
6. Monetary policy (?)

- **Crisis-specific amplifiers**

1. Panic and contagion in deposit and interbank markets
2. Maturity mismatches
3. Fire sales ($\longrightarrow$ liquidity-in-the-market pricing)
4. Strategic behavior of large players (?)

[Main effects of the amplifiers:

– Capital-driven credit crunches

– Procyclical risk-taking (by preference or by capacity)

– Liquidity spirals (funding liquidity $\rightleftarrows$ market liquidity)]

2. Procyclicality induced by bank capital regulation

- Now top in agenda for financial regulation reform, possibly because:
  - Genuine importance
  - Close connection to central microprudential regulatory tool
- Potential instance of micro/macro inconsistency:

  Good design from perspective of individual (or cross-section of) banks may have undesirable aggregate, time-series properties
- Main argument:
  - Regulation imposes minimum capital to (risky-weighted) assets ratio γ
  - Capital K feeds from retained profits & equity issuance
  - New equity is hard to raise (costly, time-consuming process, esp. in bad times)

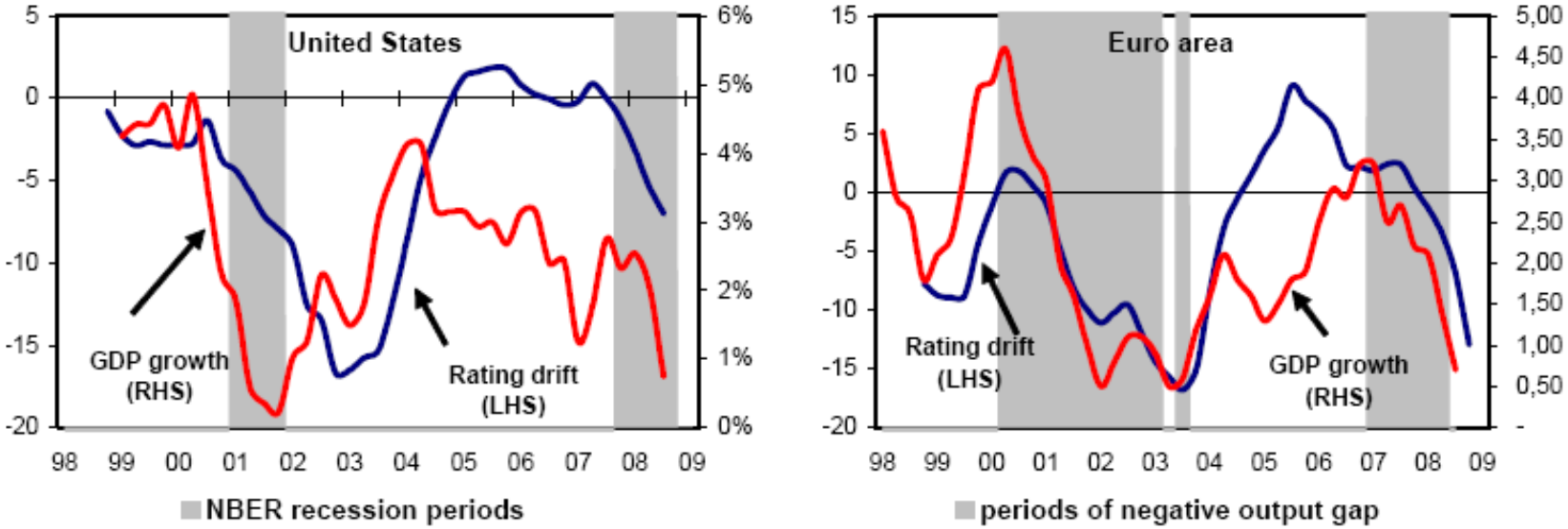
- For fixed K, capital requirements impose an upper limit on risk-weighted assets (say, loans L):

$$K \geq \gamma L \;\Leftrightarrow\; L \leq \frac{K}{\gamma}$$

  - Basel I: $\gamma \simeq 8\%$
  - Basel II: γ is determined by a complex VaR-based formula, which is increasing in the estimated probabilities of default (PDs) and losses-given-default (LGDs) of each exposure

- In recessions:
  - Loan defaults & other losses may turn profits into losses
  - Equity issues are even more expensive than usual
  - Estimated PDs and LGDs increase
    - Basel I: Recessions $\Rightarrow \downarrow K \Rightarrow$ Effect on K/γ
    - Basel II: Recessions $\Rightarrow \downarrow K$ & $\uparrow \gamma \Rightarrow$ Stronger effect on K/γ

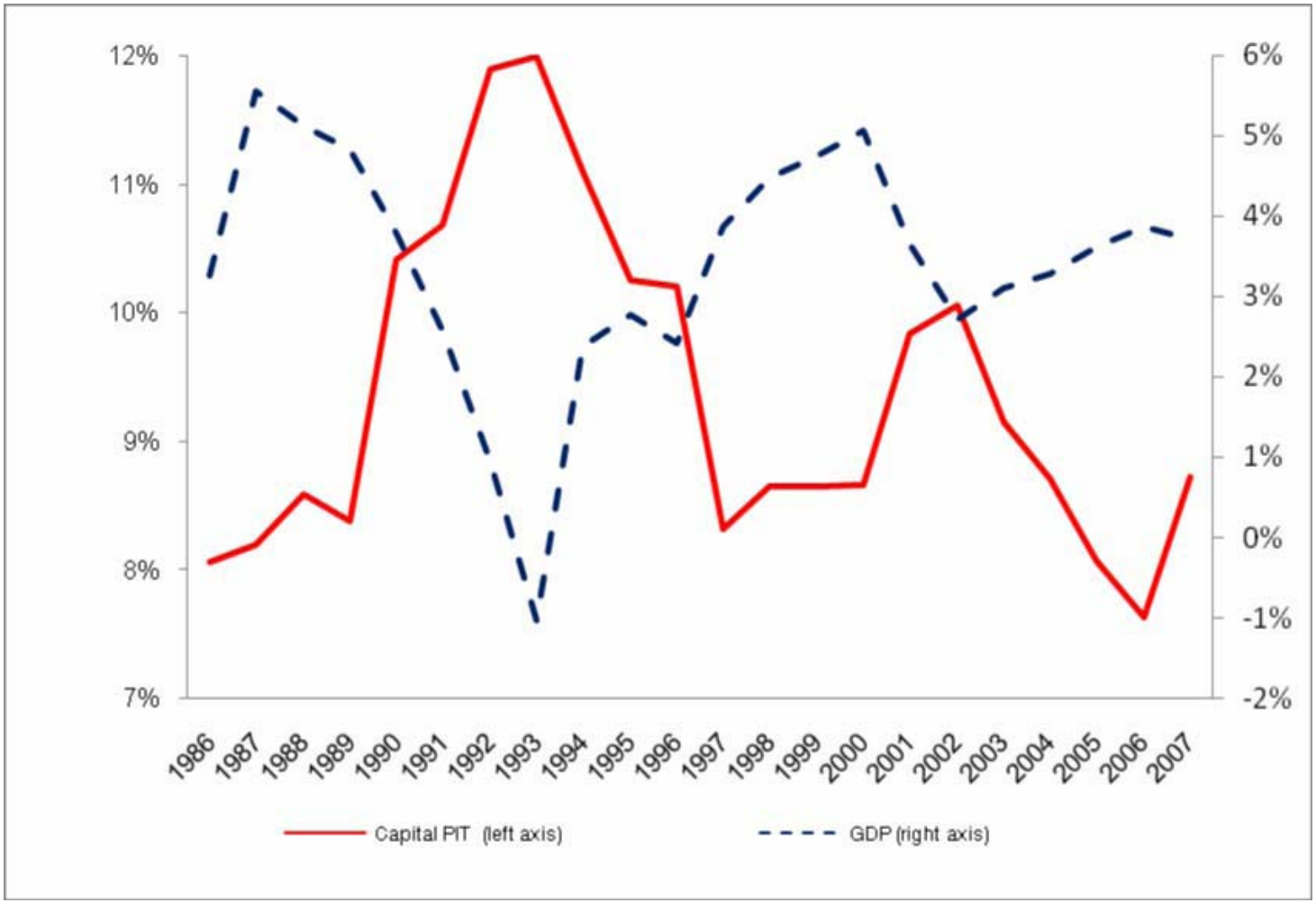
Ratings drift and GDP growth: US and euro area (1)



Note: ratings drift is equal to upgrades minus downgrades divided by the number of rated issuers (source: Moody's). GDP growth is the annualized quarterly percentage change in GDP (source: Thomson Financial).

[From: Panetta et al. (2009) "Financial Sector Pro-cyclicality:…"]

SPAIN: PIT CAPITAL REQUIREMENTS AND GDP GROWTH



[From: Repullo et al. (2009), “Mitigating the Pro-cyclicality of Basel II”]

- If banks cannot quickly raise sufficient new capital...
  - Fall in lending capacity may produce persistent credit crunch
  - Negative impact on economy may cause a feedback loop (via bank profits, PDs, and LGDs)
- In expansions, symmetric effects would allow banks' to expand their lending capacity, but final effects unlikely to be symmetric:
  - Banks can pay dividends or keep surplus capital
  - Equilibrium lending likely to be demand driven
  - Feedback effects are likely to be more limited
- Preventing capital-driven credit crunches may require...
  - Cyclical adjustment of capital requirements
  - Arranging for contingent capital injections in bad times

- Level & form of possible reforms are objects of intense debate:
  - **Macro-prudentialists**
    - Consider this an issue of great relevance
    - Would prefer to see...
      - adjustments based on rules
      - rules based on aggregate/bank indicators of credit cycle
    - Some defend going beyond the pure correction of regulation-induced effects
  - **Micro-prudentialists**
    - Play down the importance of the procyclical effects
    - Consider it a necessary evil
    - Would prefer adjustments based on...
      - supervisory discretion (Pillar 2)
      - use of (supervisory-validated?) through-the-cycle inputs

- **Sceptics**
  - Banks typically hold capital in excess of required minima
  - Binding requirements are "economic capital requirements"
  - Cyclical adjustments of regulation cannot do much

- Repullo and Suarez (2009) challenge the view that regulation-induced procyclical effects are not important
  - Banks keep *capital buffers* of realistic size in response to uncertainty on future profits, capital requirements, and difficulties to raise new capital
  - Banks wish to avoid losing profitable lending opportunities when their capital is too scarce
  - Effects on credit supply are sizeable; effects on bank solvency not

    (Call for caution on micro-prudentialists advice!)

3. Model-based assessment

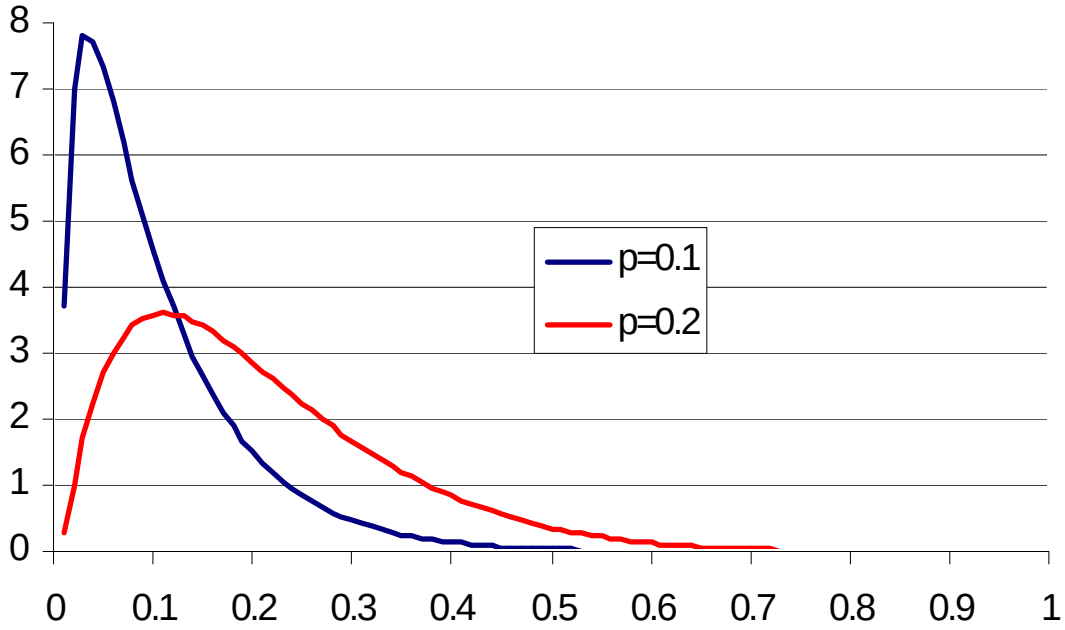
- For capital requirements to have a significant impact on aggregate credit two conditions must be met:
  - Some **banks** must find it difficult to issue equity when needed
  - Some **borrowers** must find it difficult to switch from a constrained bank to other financing sources

    [Blum and Hellwig (1995), Kashyap and Stein (2004)]

- Our *relationship banking* model captures these conditions in a way that produces a tractable OLG structure:
  - Borrowers need loans for **two consecutive periods** and become dependent on initial lenders
  - Banks with **ongoing relationships** cannot issue equity
    ($\longrightarrow$ they only access the equity market every other date)

- Other features of the model:
  - Perfect competition in market for first period loans
  - Business cycle = 2-state Markov chain for loans' PDs
    - Low default state l
    - High default state h
  - Loan losses are as in the model underlying the IRB approach
    - State of the economy determines *expected* default rate (PD)
    - *Single risk factor* determines *realized* default rate
  - ...

Density of the default rate x_t



Here: two extreme PD values, 10% & 20%
In baseline calibration: 1.1% & 3.3%

Reminder:
IRB approach of Basel II adopts target confidence level $\alpha = 99.9\%$
(capital so as to absorb losses in 99.9% quantile of this distribution)

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  - Loan losses are as in the model underlying the IRB approach
    - State of the economy determines *expected* default rate (PD)
    - *Single risk factor* determines *realized* default rate
  - Focus on **supply side**, ignoring demand-side&feedback effects
    - Expected credit rationing
    - Implications for bank solvency

Strategy for the analysis

- Dynamic optimization reduced to sequence of 2-period problems
  - Banks optimize on their first-period capital holdings k_s
    (Maximizing net present value of shareholders' expected payoffs)
  - First-period loan rates r_s found in perfectly competitive fashion
    (Zero net present value condition)
- Banks' optimal capital buffers depend on simple trade-off:

  Cost of excess capital vs. Capacity to satisfy future loan demand
- Effects of capital requirements are analytically ambiguous
  - Precaution effect: $\uparrow$future γs $\Rightarrow$ $\uparrow$buffers
  - Profitability effect: $\uparrow$future γs $\Rightarrow$ $\downarrow$profitability of future lending

  $\Rightarrow$ **Numerical evaluation** is required

Parameterization*

Baseline parameter values (*medium volatility scenario*)

a	λ	δ	q_l	q_h	p_h	p_l
0.04	0.45	0.04	0.20	0.64	3.3%	1.1%

Comments:

- Realistic values, but not intended to provide a calibration
- Transition probabilities reflect observed default cycles (high/low PD states last 2.8y/5y on average)
- PDs imply an average capital charge of 8% under Basel II:

$$\gamma_l = 6.6\% < \gamma_h = 10.5\%$$

Numerical results (i)

Loan rates and capital buffers (%)

	Rates		Capital		Buffers	
	r_l	r_h	k_l	k_h	Δ_l	Δ_h
Basel I	1.2	2.7	11.0	11.2	3.0	3.2
Basel II	1.2	2.8	11.7	12.5	**5.1**	1.9
Laissez-faire	0.6	2.1	5.1	5.3	5.1	5.3

Comments:

– Small loan rate effects

– Sizeable buffers: noncyclical under Basel I; higher in expansions under Basel II

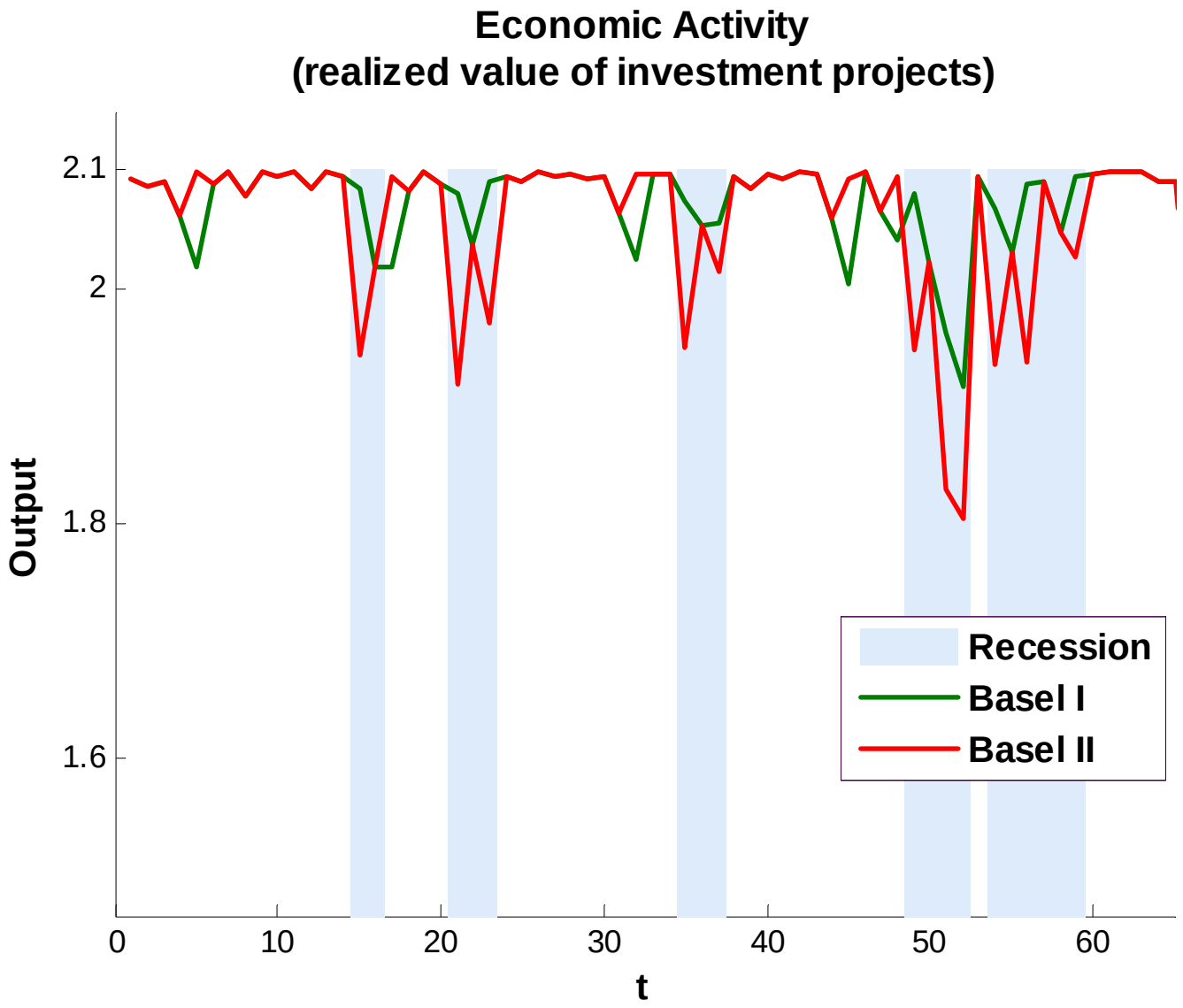
Numerical results (ii)

Expected credit rationing in state s' (%)

	Conditional on $s \to s'$				
	$l \to l$	$l \to h$	$h \to h$	$h \to l$	Uncond.
Basel I	1.4	1.4	2.7	2.7	1.9
Basel II	0.3	**10.7**	**4.5**	0.6	2.6
Laissez-faire	2.1	2.1	5.2	5.2	3.2

Comments:

- Basel II is clearly procyclical:
  - increases rationing in $s' = h$, especially after $s = l$
  - decreases rationing in $s' = l$, especially after $s = h$
- Unconditionally, Basel II increases expected credit rationing


Economic Activity
(realized value of investment projects)
Output
2.1
2
1.8
1.6
0
10
20
30
40
50
60
t
Recession
Basel I
Basel II

Numerical results (iii)

Probabilities of bank failure (%):

	1st period banks		2nd period banks	
	$s = l$	$s = h$	$s = l$	$s = h$
Basel I	0.022	0.115	0.006	0.074
Basel II	0.014	0.054	0.014	0.019
Laissez-faire	2.080	5.210	1.023	5.721

Comments:

– Basel II makes banks safer

– Pr(bank failure) is *well below* the nominal target of 0.1%

Specific policy evaluation

- There is room for introducing *cyclical adjustments* in the requirements w/o compromising long-term solvency targets
- Consider state-contingent *confidence levels* $\{\alpha_{ss'}\}$
  - Policy 1: Mean-preserving spread with $\alpha_{lh} = \alpha_{hh}$ =99.8%
  - Policy 2: Mean-preserving spread with α_{lh} =99.8%

Expected credit rationing in state s' (%)

	$l \to l$	$l \to h$	$h \to h$	$h \to l$	Uncond.
Basel II	0.3	10.7	4.5	0.6	2.6
Policy 1	0.8	3.7	3.6	1.6	1.9
Policy 2	0.5	4.4	4.4	0.6	1.9

[Note: Pr(bank failure) $\leq$ 0.08% in all sequences]

The findings in perspective

- Under Basel II capital requirements,
  - Banks indeed choose to hold capital buffers
  - Buffers are not sufficient to fully neutralize the implications of a downturn

  $\Rightarrow$ Sizeable fall in supply of credit to bank-dependent borrowers

- Advantages of cyclically-varying feature of Basel II (preserving banks' solvency over the business cycle) are disproportionately small relative to potential credit crunch effects

- But risk-sensitivity has good cross-sectional properties
  - Alternative is not to return to Basel I
  - Alternative is to correct the procyclical effects of Basel II

4. Dampening the procyclicality of Basel II in practice

- Issues under discussion
  - Inputs vs outputs
  - Rules-based vs discretionary
  - Contingent on what?
  - How ambitious?
- I will refer to these points by offering my constructive criticism to what looks like the trend followed by the Basel Committee at the moment
  - Problems with the through-the-cycle approach
  - An alternative rules-based adjustment factor approach

- Definitely, correct the procyclicality of capital requirements
- Dominant trend
  - Full implementation of *through-the-cycle* input estimates
  - Some version of the Spanish pre-provisioning system [or other mechanisms that encourage the formation of "usable" buffers]
- Without objecting to the second part, I think that:

  Relying on through-the-cycle estimates is a mistake:

  1. Makes internal models harder to verify
  2. Expands the scope of supervisory discretion
  3. Kills the statistical interpretation of *required capital*
  4. Not clear that available data can deliver reliable through-the-cycle estimates

- My advice:

  Adjustment factor based on simple macro aggregate (GDP, credit?)

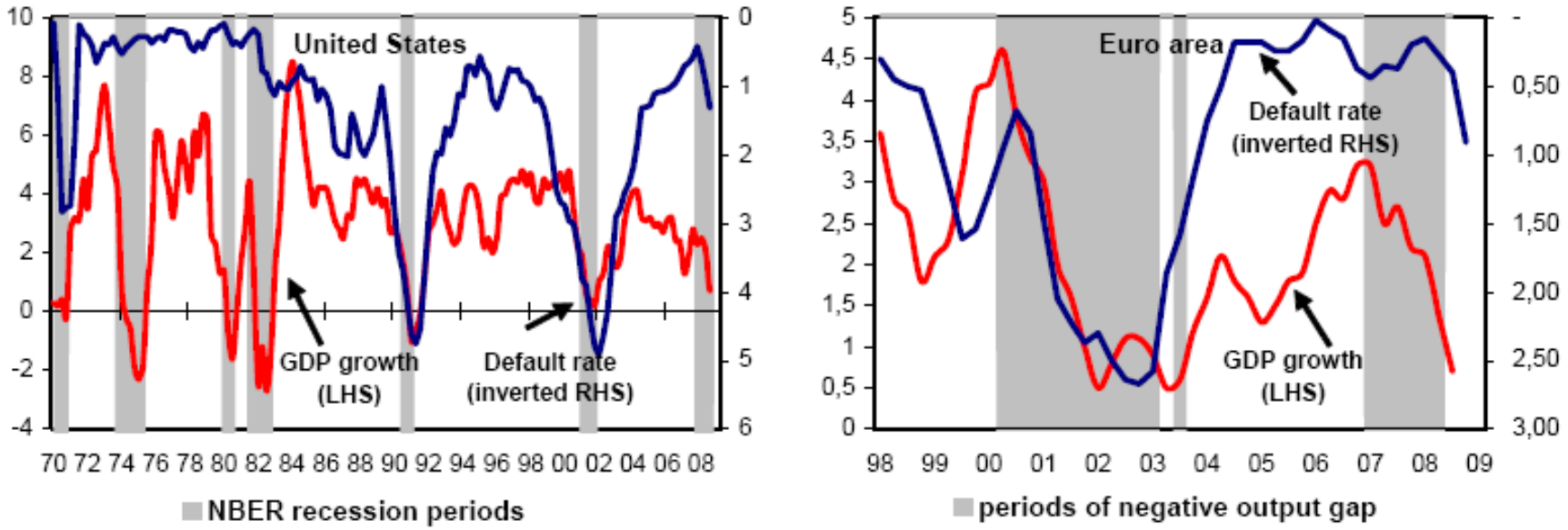
  - Richer alternatives may have virtues
  - But also many pitfalls in terms of simplicity, predictability, flexibility and manipulability
    * more complicate
    * more uncontrollably heterogeneous across jurisdictions
    * harder to re-assess or predict in real time
    * harder to recalibrate
    * more open to discussions with the industry
    * more vulnerable to "specification errors"
    * more vulnerable to "regulatory capture"

– Go for a smooth factor based on lags of e.g. GDP growth

[Moving average of quarterly growth rates]

* Tailored to specificities of credit categories & jurisdictions.
* For cross-border loans, use composite index based on borrowers' location
* With elasticities to GDP growth calibrated according to:
  1. Link between ΔGDP & relevant inputs
  2. Link between ΔGDP & credit growth
  3. Targeted "countercyclicality"

Default rates and GDP growth: US and euro area



Note: The default rate is the 12-month moving average of corporate bonds in default weighted by their nominal amount; data for the euro area refer to all non-US corporate bonds (source: Moody's). GDP growth is the annualized quarterly percentage change in GDP (source: Thomson Financial). The shaded areas for the United States are the NBER recession quarters (source www.nber.org) and for the euro area are the quarters when the euro area GDP is below its exponential trend

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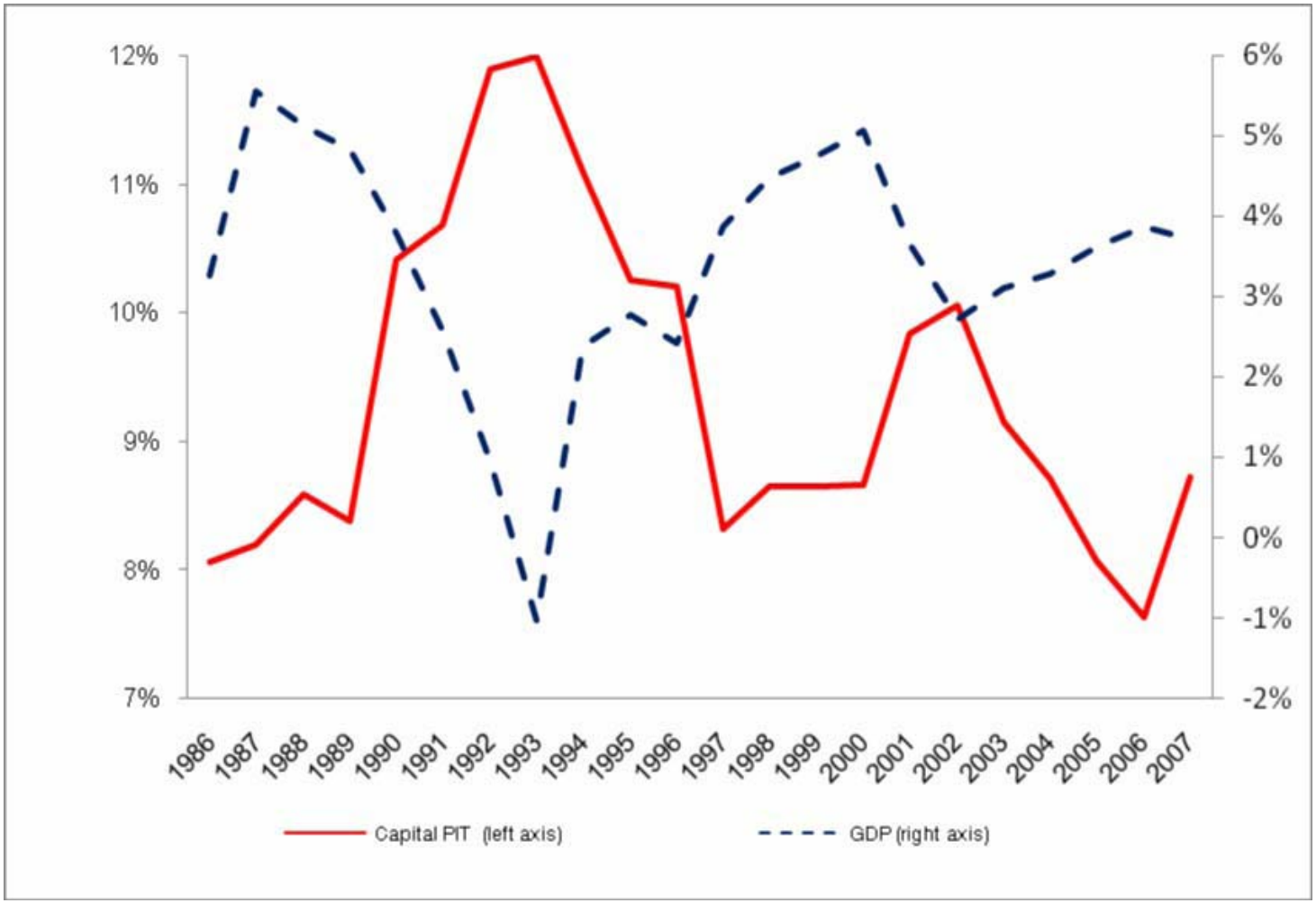

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- At this stage,
  - Start with the modest target of neutralizing regulation-induced procyclicality
  - More ambitiously, one could try to also compensate for cyclicality of bank profits, and availability/cost of equity financing
  - Leave further adjustments to the discretion of macroprudential authorities

    $\longrightarrow$ Automatic stabilizer $+$ Explicit, transparent tool for discretionary fine-tuning

- Added advantage:

  It will signal that there is an explicit tool that
  - *operates as an* automatic stabilizer *and*
  - *can be* fine-tuned *by the new macroprudential authorities*