The Recent Boom Bust Cycle:
The Relative Contribution of Capital Flows,
Credit Supply and Asset Bubbles

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In the last 15 years, the world economy went through two boom bust cycles, characterized by financial market “malfunctioning”.

Both cycles are strongly related to stock and housing price cycles:

- 'Dot.Com bubble' only resulted in a mild recession,
- Housing boom is followed by the “great contraction”.
The US plays a central role as:

- Absorber of world savings
- Major source of financial innovations.
- Originator of financial losses spreading to RoW.

Therefore we are looking at a world economy consisting of the US and the RoW.
What explains the strong increase in corporate and residential investment and the decline in the trade balance?

What explains the transmission of housing bust onto corporate investment?
The savings glut (SG) has been put forward as a possible explanation for the investment boom.

Indeed one can see a gradual decline of world real interest rates.
Since 1995 we see a more volatile stock market. Driven by fundamentals or bubbles and crashes?
Methodology and questions:

We use an estimated DSGE model for the US and the RoW to address the following questions.

What explains the stylized macro features of the most recent boom?
What explains the size of the 'great contraction'?
Explanations for the most recent boom.

Innovation in US mortgage market (securitisation/expansion of sub prime lending):
- Mayer et al. (2009): the share of non prime mortgages rose from 10% to more than 30%
  from 2003 to 2005.

Savings glut/flight to safety hypothesis:
  seek safe investment opportunities.

Monetary policy:

TFP:
- Kahn (2008): US entered a higher productivity growth regime in mid 90s.

Stock market and housing bubble:
- Shiller (2007, 2008) and Laibson et al (2009) regard subprime lending and
  savings glut as insufficient explanations for the US housing boom.
What explains the size of the 'great contraction' in 2008/09?

The starting point for our analysis of the contraction is the question:

How could corrections in housing markets and mortgage defaults have led to such strong declines of GDP in 2009?

Standard macro models seem inadequate to explain large spillovers to the rest of the economy:

• Bean (2010): Wealth effects do not explain the reduction in aggregate demand.
• Iachoviello (2010): Mortgage defaults are of a redistributive nature and therefore should not have large macro effects in standard macro models.

Can models with financial frictions generate more amplification?

• Credit constrained residential investment (Kiyotaki Moore (1997), Iacovielli (2005)).
• Limited participation in equity markets (Krishnamurthy (2009)).

How important are bursting bubbles/panics in equity markets for explaining the 2008/09 recession?

• Bubbles (Bernanke, Gertler (1999)).
Structure of the presentation

1) Model description
2) Evaluating the relevance of various hypotheses for boom and bust.
3) Present shocks as identified by the model.
4) Evaluate quantitative importance of shocks via shock decompositions.
The Model:

Open economy DSGE model: US vs. RoW (> 85% of US trade)

- Perfect international capital mobility
- Trade: Domestic and foreign goods are imperfect substitutes.
- Nominal rigidities
- Residential investment
- Monetary policy: Taylor rule
- Financial frictions and imperfections:
  1. Collateral constraints and limited equity market participation
  2. Bubbles in stock and housing market
The model’s financial flows

Saver

Bonds

Deposits

Corporate Sector

Bonds

Equity Owner

Equity

Loans

Default

Debtor

Banks + non-financial firms
Corporate sector.

Dividends

\[
div_t S_{t+1} = (Y_t - w_t N_t) - p_t^i J_t + (1 + r_{t+1}^L) L_{t+1} - (1 - s) DEF_{t+1} - (1 + r_{t+1}^{ii}) D_{t+1} - L_t + D_t - \phi (D_t - \Gamma L_t)^2 + q_t \Delta S_t
\]

Max Problem

\[
Max V_o = E_0 \sum_{t=0}^{\infty} (1 + r_{t+1}^E)^t \left[ \text{div}_{t+1} S_{t+1} \right]
- E_0 \sum \lambda_t \beta_t \left[ K_t - J_t Z_t^J - (1 - \delta) K_{t+1} \right]
\]

FOC physical capital

\[
p_t^i = Y_{k,j} + E_t \frac{(1 - \delta)}{(1 + r_{t+1}^E)} p_{t+1}^i Z_t^J Z_{t+1}^J
\]

FOC bank capital

\[
(1 - \Gamma) = \frac{(1 + r_{t+1}^L) - (1 + r_{t+1}^{ii}) \Gamma}{(1 + r_{t+1}^L)}
\]

Equity owners apply the same discount rate to physical and bank capital
Equity Owners

$$\text{Max} V_0^E = E_0 \sum_{t=0}^{\infty} \beta^{ct} U^e (C_t^e) - E_0 \sum \lambda_t \beta^{ct} \left[ q_t S_t - B_t^D - (\text{div}_{t-1} + q_t) S_{t-1} + (1 + r_t) B_{t-1}^D - p_t^C C_t^e \right]$$

$$- E_0 \sum \lambda_t \psi_t \beta^{ct} \left[ B_t^D - \chi^e q_t S_{t-1} \right]$$

(Inverse of the) stochastic discount factor for corporate investment

$$E_t \left( \frac{U_{c,t}^e p_t^e}{U_{c,t+1}^e p_{t+1}^e \beta^e} (1 - \chi_t^e) + (1 + r_t) \chi_t^e \right) = (1 + r_t^e)$$

Equity owners are financially constrained, they can only borrow from savers up to a certain fraction of their equity wealth.

We look at two extreme cases:

$$\chi^e = 0: \text{fully separated national financial market.}$$

$$\chi^e = 1: \text{fully integrated financial market}$$
The qualitative match between impulse responses and stylised facts

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<tr>
<th></th>
<th>Boom</th>
<th>bust</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Domestic demand</td>
<td>Real interest rate</td>
</tr>
<tr>
<td>TP (L aug.)</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>TP (I specific)</td>
<td>$I &gt; I^H; C$</td>
<td>No</td>
</tr>
<tr>
<td>Monetary policy</td>
<td>$I &gt; I^H &gt; C$</td>
<td>Yes</td>
</tr>
<tr>
<td>Subprime lending</td>
<td>No ($I^H = C$)</td>
<td>Yes (2005/07)</td>
</tr>
<tr>
<td>Default</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Savings glut</td>
<td>$I &gt; C, I^H$</td>
<td>Yes</td>
</tr>
<tr>
<td>Flight to safety</td>
<td>$I &gt; C, I^H$</td>
<td>Yes</td>
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<tr>
<td>Housing bubble</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Stock market bubble</td>
<td>$I &gt; I^H &gt; C$</td>
<td>Yes (2005/07)</td>
</tr>
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Mortgage default shock

Debt of credit constrained households is reduced (positive wealth shock)

Equity owners bear financial loss

=&gt;reduction of distributed profits/consumption because of recapitalisation efforts.

Low current consumption increases required return on equity for corporate investment for both banks and non financial firms).

Negative effects on I dominate positive effects on IH.

With integrated financial markets (no distinction between savers and equity owners), the negative investment effect remains sizeable.
Empirical Results
TFP and ISTC: positive trend over the sample (IT boom).

Negative deviations from Taylor rule until 2006.

Lending conditions are cyclical.


House price bubble since beginning of 2000; bursts end of 2005.

Gradual shift of RoW savings, with trough in 2000.

Decline in the $ risk premium from late 90s, trough 2003.

Low defaults until 2007, then rising to unprecedented levels.
Boom:
SG and FS can explain why C increased.

Bust:
Default and housing bubble are important for relative stability of C.
Boom:
ISTP can explain the level shift of I.
SG and FS add to this upward shift.
But: Excess volatility of I.
Two bubble periods.
dot com bubble: 1997-2000
bubble in 2004-2008

Bust:
Negative risk shock in 2008/09
Bursting bubble or panic?
Correction of overinvestment (2005-2008)
or
Panic in stock markets related to Lehman brothers (Sept. 2008)?
Figure 17: Shock decomposition: log housing investment to output ratio

Boom:
FS and SG unimportant compared to housing bubble.

Bust:
Housing bust in 2006 preceeds the decline of US GDP.
Figure 18: Shock decomposition: trade balance to output ratio.

Boom:

FS > SG > I(Bubble) > IH(Bubble) > Collateral
Boom:
MP, SG and FS about equally important for explaining the fall in R. (2001-2004)
Coll, H- and I Bubble about equally important for the increase in R. (2005-2007)

Bust:
Fall in R since 2008 is largely monetary policy induced. Some contribution from defaulting loans and collateral tightening.
As the economy is approaching the ZLB monetary policy looses its power to lower R.
Boom:
FS and SG are not important for GDP growth because of offsetting effects on domestic and foreign demand.
After 2004, the stock market and housing boom supported growth in the US.

Bust:
Risk shock to investment and default are most important for the downturn in 2009.
The two most recent contractions are not caused by negative TFP shocks.
Conclusions

On the boom:
It is difficult to explain the boom in the US entirely with fundamental domestic and external factors
- SG, FS: Consumption, trade balance and real interest rate.
- ISTP: Corporate investment.

Bubbles or risk shocks are necessary to match in particular investment volatility in the US.

On the contraction:
Housing correction by itself is unimportant.

Mortgage default is a quantitatively more relevant and also better matches the stylised facts.

But: Risk shock (deflating bubble or panic) in equity markets is also important.

Also, the sum of all negative shocks made monetary policy hitting the zero lower bound which reduced the ability of MP to stabilise the economy.

Possible extensions:
One could model the RoW (or the EA) in the same detail as the US. In this case one could better trace the effect of default spillovers on the corporate sector (banks) and its implications for investment in the RoW.
Figure 19: Shock decomposition: real exchange rate growth rate.