Discussion of “Economic Growth with Bubbles” by Alberto Martin and Jaume Ventura

Cosmin Ilut

Duke Univ.

Joint Central Bank Conference, 2011
Very nice paper! Beautiful exposition, intriguing message.

Motivation:
- we observe large swings in asset prices
- hard to reconcile with observed changes in fundamentals
- tend to comove positively with economic activity (‘generalized booms and busts’)

Model: take standard rational bubbles model and add
- 1. stochastic bubbles
- 2. financial frictions: bubbles can transfer resources from unproductive to productive investments

Main findings:
- 1. characterize bubbly equilibrium: asset valuations exceed that of fundamentals.
- 2. bubbles shocks: potentially able to generate positive comovement btw prices and activity
Non-fundamentals shocks

- Renewed interest in shocks that are not manifested in ‘fundamentals’ (technology, preference, policy)
- Some recent approaches:
  1. noise shocks
     - news shocks literature, Lorenzoni, 2009, Barsky and Sims, 2010 ...
  2. sunspots
     - Farmer, 2009, 2010
  3. higher-order beliefs shocks
     - Angeletos and La’O, 2011
  4. Knightian uncertainty (‘confidence’) shocks
     - Ilut and Schneider, 2011
- Here: stochastic bubbles (investor ‘sentiment’ shocks).
My discussion

- Go a bit through the model
- Comments:
  1. Parameterization to get the positive comovement
  2. Risk-neutrality.
  3. Policy implication: ‘fuel the bubble?’
Standard model: Samuelson-Tirole

- Problems:
  1. Deterministic bubbles
  2. Bubbles lower output (raise C and lower Investment)
     - bubbles reduce inefficient investments

- Solutions proposed by this paper:
  1. Stochastic bubbles
  2. Financial frictions: Bubbles can raise output (raise both C and I)

- Financial frictions: both efficient and inefficient investments exist

- Intuition: bubbles
  1. reduce inefficient investments, 
  2. increase efficient investments

- Overall effect on output depends on the two effects
Martin-Ventura Model

- OLG. Agents work and invest labor income when young, consume when old (risk neutral)

- Output:
  \[ F(k_t, l_t) = l_t^{1-\alpha} k_t^\alpha \]
  - wage: \( w_t = (1 - \alpha) k_t^\alpha \)

- Investment opportunities:
  - fraction \( \varepsilon \) productive (P)
  - \( 1 - \varepsilon \) unproductive (U): produce \( \delta < 1 \) units of capital with one unit of output
  - financial frictions: U are forced to make their own investments
  - aggregate efficiency of investment \( (A \equiv \varepsilon + (1 - \varepsilon)\delta) \)

  \[ k_{t+1}^{NB} = A(1 - \alpha) k_t^\alpha \]
Bubbles

- Technological properties:
  - start randomly, no initial cost
  - benefit: possibility to sell them later

- Without further structure, theory has implications for:
  - $b_t$: price of all old bubbles
  - $b_t^P$ and $b_t^U$: price of all new bubble created by P and U

- Market for bubbles:
  - owners: old (acquired when young) and young (new bubbles)
  - buyers: only young (old only consume)

- Equilibrium bubbles: a stochastic process $(b_t, b_t^P, b_t^U)_{t=0}^\infty$ st:
  - $b_t + b_t^P + b_t^U > 0$
  - a sequence for $k_t$ satisfying individual max and mkt clearing:
    \[
    E_t R_{t+1}^{bubble} = E_t R_{t+1}^K
    \]
    \[
    0 \leq b_t \leq w_t
    \]
Conditions for bubbly equilibrium

\[
E_t \left\{ \frac{b_{t+1}}{b_t + b_t^P + b_t^U} \right\} = \begin{cases} 
\delta \alpha k_{t+1}^{\alpha-1} & \text{if } \frac{b_t + b_t^P}{(1-\varepsilon)sk_t^\alpha} \leq 1 \\
\alpha k_{t+1}^{\alpha-1} & \text{if } \frac{b_t + b_t^P}{(1-\varepsilon)sk_t^\alpha} > 1
\end{cases}
\]

Implied capital accumulation:

\[
k_{t+1} = \begin{cases} 
 k_{NB}^{t+1} + (1 - \delta)b_t^P - \delta b_t & \text{if (1)} \\
 k_{NB}^{t+1} \frac{1}{A} - b_t & \text{if (2)}
\end{cases}
\]

1. Classic crowding-out: old sell bubbles to young, total inv. falls
   - bubble eliminates first U. \(\rightarrow\) in fact raises average efficiency
   - if large enough (see (2)) can then move to eliminate P

2. Reallocation effect: when in (1), young P sell to young U
   - P investments replace U \(\rightarrow\) raises total investment
   - when \(\delta = 1\), only crowding-out: \(k_{t+1} = k_{NB}^{t+1} - b_t\)
Contractionary and expansionary bubbles

- **Labels:** if throughout a bubbles episode:
  - $(1 - \delta)b_t^P - \delta b_t < 0 \rightarrow \text{'contractionary'} \quad (C)$
  - $(1 - \delta)b_t^P - \delta b_t > 0 \rightarrow \text{'expansionary'} \quad (E)$

- **Proposition 2:**

  $C \iff \alpha < (1 - \alpha) \frac{A}{\delta}$

  $E \iff \alpha < (1 - \alpha) \frac{A}{\delta} \left\{ \begin{array}{ll}
  (1 - \delta) & \text{if } A > 0.5 \\
  \frac{1}{4(1-\varepsilon)A} & \text{if } A \leq 0.5 
\end{array} \right.$

- **The higher $\delta$, the more likely to get only $C$.**
Comment 1: Parameter space

eps = 0.037037

eps = 0.074074

eps = 0.11111

es = 0.14815

es = 0.18519

es = 0.22222
region II: surely Contractionary, region III: either C or E.
Bubble shocks

- Can redefine: $x_t \equiv \frac{b_t}{(1-\alpha)k_t^\alpha}$, $x_t^P \equiv \frac{b_t^P}{(1-\alpha)k_t^\alpha}$ to rewrite:

  $$
  k_{t+1} = \begin{cases} 
  (1 - \alpha)k_t^\alpha \left[ A + (1 - \delta)x_t^P - \delta x_t \right] & \text{if } \frac{x_t + x_t^P}{(1-\varepsilon)} < 1 \\
  (1 - \alpha)k_t^\alpha (1 - x_t) & \text{if } \frac{x_t + x_t^P}{(1-\varepsilon)} \geq 1 
  \end{cases}
  $$

- Bubble shocks look like investment shocks (Justiniano et al., 2010)
- Implied consumption and aggregate welfare (identical):

  $$
  c_t = \left[ \alpha + x_t(1 - \alpha) \right] k_t^\alpha
  $$

- Positive shocks to $x_t, x_t^P$ have two effects:

1. Increase $c_t$ because old sell to young (irrespective of type of bubbles)
2. Affect $k_t$—depends on the type of bubble
   - If contractionary (i.e. $(1 - \delta)x_t^P < \delta x_t$) reduce $k_t, c_t \to 'Bad'$
   - If expansionary (i.e. $(1 - \delta)x_t^P > \delta x_t$) increase $k_t, c_t \to 'Good'$
Parameters as in the benchmark, but vary $\varepsilon$ and $\delta$

- C1: bubbly episodes never exceed U’s savings, i.e. $x_t + x_t^P < (1 - \varepsilon)$
- C2: bubbly episodes are always expansionary, i.e. $(1 - \delta)x_t^P > \delta x_t$
  
  ★ Region 1: both C1 and C2 hold; Region 2: C1 holds, C2 not
  ★ Region 3: C2 holds, C1 not, Region 4: neither holds
Comment 2: on the role of risk-neutrality

- Here assume risk neutrality.
- What if allow for risk aversion?
- Bubbles add a lot of volatility.
- When bubbles appear, to compensate for risk the required expected return on bubbles may need to be significantly larger.
  - may make conditions for bubbly equilibrium tighter.
  - reason: now bubbles must grow even faster than before.
  - but cannot grow too fast (can’t exceed savings of young)

- Implications for risk premia on bubbles?
  - may be large in economic booms driven by bubbles.
  - time-variation?

- Welfare implications: bubbly equilibrium may be welfare-reducing if account for the added volatility.
Comment 3: On the policy implications of bubbles

- Here, expansionary bubbles are ‘Good’: increase level of $c_t$
  - for example, interpret the US booms as ‘desirable’.
- A very stark policy implication: should ‘fuel the bubble’!
- A different view (Christiano, Ilut, Motto and Rostagno, 2008, 2010): news about future technology level
  - start with a (modified) RBC model. Good news about the future
    - agents work, consume and invest more
    - real interest rate jumps, price of capital ↓
  - Add nominal rigidities and a standard Taylor rule:
    - agents work, consume and invest much more than Ramsey plan (RBC)
    - $\pi \downarrow$, nominal rate ↓, ‘fuels’ asset prices ↑
- Different picture: an inefficient boom with asset price ‘bubbles’
  - bubble: asset value > PDV of fundamentals when news not realized
Figure 6: Response of Baseline and Perturbed Model to Signal Shock (Signal not realized); Perturbation = Ramsey
Optimal policy

- 'Conventional wisdom': no need to separately respond to credit/'bubbles' (Bernanke and Gertler, 1999, 2001)

- In CIMR, it’s optimal to 'lean against the boom in credit'
  - because inflation is not particularly high in the news-driven booms.
  - an inflation targeting rule fails to raise the interest rate

- In this model, optimal to sustain bubbles.

- Important to think about potentially different sources of 'bubbles':
  - some may be efficient, some not.
  - very different responses.

- How can we distinguish them?
  - they may look the same in asset prices, credit growth, macro aggregates
Conclude

- Very interesting and timely paper
- An exciting research agenda
- Thoughts: quantitative evaluation
  - what features (reasonable parameterizations) needed to get bubbles be expansionary
  - optimal policy and bubbles.
  - how to distinguish from other sources of bubbles.