Credit Boom: the Good, the Bad, and the Ugly

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The views expressed in this presentation are those of the author and do not necessarily represent those of the IMF.
Financial development, growth, and crises

- **Financial deepening** both cause and effect of economic growth (Rajan and Zingales, 1998).

- However, periods of *too fast* credit growth, “lending booms,” have been associated with crises in both emerging market and advanced economies.

- Yet, only a few of booms end up in crises and evidence suggests they *contribute* to financial deepening.

- **Objective of this paper:**
  - Find a way to identify dangerous booms
  - Investigate potential benefits of “good” booms [to be done]
Paper Part of Larger Agenda at the Fund

- Several papers on related issues are work in progress at the IMF

- Study on cyclical properties of booms, looking at both macro and micro (firm data) variables (Mendoza and Terrones)

- Paper looking at bank probability of default during booms (Detragiache, Igan, Tamirisa)

- Work on U.S. sub-prime mortgage crisis: a sectoral credit boom gone bad (Dell’Ariccia, Igan, Laeven)
Credit Booms and Crises: Theory

- “Financial accelerators” (Kyiotaki and Moore, JPE 1997): an increase in value of collateralizable goods releases credit constraints. Boom fuels further wealth effects etc. Negative shocks inverts cycle, leaving banking system overexposed.

- “Institutional memory” (Berger and Udell, JFI 2004): in periods of fast credit expansion difficult for banks to recruit enough experienced loan officers (especially if there has not been a crisis for a while). This leads to a deterioration of loan portfolios.

- Lending booms and credit standards (Dell’Ariccia and Marquez, JF 2006): during expansions, adverse selection is less severe and banks find it optimal to trade quality for market share, increasing crisis probability.
Credit Booms and Crises: Evidence


- Gourinchas et al. (2001): some association between booms and crises. Many crises preceded by booms, but only some booms followed by crises. Mendoza and Terrones (WEO 2004): most episodes of extreme credit growth are associated with crises.

- However, financial deepening also associated with economic growth (Levine, Loayza and Beck, 2000, Rajan and Zingales, 1998)

- Can we tell "Good" booms from "Bad" ones?
Objective and Methodology

- Look at past credit booms and separate bad from good ones

- Make it operational:
  - Focus on contemporaneous variables only
  - Focus on commonly available data

- Provide a tool for early warning of financial distress

- Two approaches:
  - Predict bad booms in a cross-section of booms
  - Interact boom variable with other regressors in a more standard banking crises model
How to define lending booms

- Periods of significantly faster than normal credit growth
- Typically measured relative to GDP to control for inflation and economic growth. Mendoza and Terrones (2004) use real credit growth.
- Definition should be to some extent country specific and path dependent...
  - Speed and volatility of credit varies across country/time
- ...but standard enough to allow for cross-country comparison
- Link to crises: define a boom as “bad” if crisis follows within two years from its end.
How to define lending booms

- Credit-to-GDP ratio is typically trended.

- Approximate its evolution with a rolling non-linear trend (Gourinchas et al., 2001).

- Compute rolling standard deviation of deviations from trend. Allow for country/path dependent patterns (Mendoza & Terrones, 2004).

- Focus on both growth and level of credit-to-GDP ratio.

- “Lending boom” needs to meet either of these conditions:
  - deviation from trend > 1.5 times SD & growth of credit-to-GDP ratio > 10%.
  - growth of credit-to-GDP ratio > 20%.

- Alternative definition: growth of credit-to-GDP ratio > 10%.
Bad boom: Finland 1980s

Credit to GDP ratio/Trend/boomyear

Year

1970
1980
1990
2000

Credit to GDP ratio
Trend
boomyear
Good boom: Ireland 1990s

The chart shows the credit to GDP ratio and trend along with boom years from 1970 to 2000. The credit to GDP ratio increased significantly around the 1990s, indicating a strong economic boom in Ireland during that period.
Try to keep to variables that are available cross country:

- Credit to the private sector (IFS)
- Correct for breaks in the series
- Banking crisis data from Caprio et. al (2003)
- Control variables from WB and IFS
- Abiad-Mody dataset on financial sector liberalization
Stylized Facts

- Identified 135 booms in about 100 countries:
  - 104 soft landing, “good”
  - 31 precede banking distress (about 100 episodes) “bad”
  - of which 23 systemic crises (about 70 episodes) “ugly”
  - Larger numbers, but similar proportions with alternative criterion

- Bad and good booms are not alike (on average)

- Descriptive Statistics
Boom Characteristics Matter

![Graph 1: mean of badall_freq vs. categories 1-9](image)

![Graph 2: mean of badall_freq_avg_abs vs. categories 1-4, 5-8, 9-12, Over 13](image)
# Bad and Good booms: Descriptive Stats

Sub-sample of 79 booms for which all the data is available, and inflation < 100%

<table>
<thead>
<tr>
<th></th>
<th>Good</th>
<th>Bad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation</td>
<td>11.9</td>
<td>19.0</td>
</tr>
<tr>
<td>GDP growth</td>
<td>6.7</td>
<td>5.4</td>
</tr>
<tr>
<td>CA/GDP</td>
<td>-2.9</td>
<td>-3.0</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>$5675</td>
<td>$6350</td>
</tr>
<tr>
<td>Credit/GDP</td>
<td>29.7</td>
<td>38.4</td>
</tr>
<tr>
<td>ΔCredit/GDP</td>
<td>4.0</td>
<td>4.2</td>
</tr>
<tr>
<td>Duration</td>
<td>2.9</td>
<td>5.1</td>
</tr>
<tr>
<td>Openness (trade/GDP)</td>
<td>0.62</td>
<td>0.43</td>
</tr>
<tr>
<td>Supervisory Index</td>
<td>1.03</td>
<td>0.31</td>
</tr>
</tbody>
</table>
Results So Far

- Logit regressions indicate that bad booms:
  - Are larger
  - Last longer
  - Are associated with higher inflation rates
  - Occur in less open economies
  - Are accompanied by weaker bank supervision
  - Are accompanied by lower growth (weak significance)
  - Are accompanied by larger CA deficits (weaker significance)

- Coefficients are fairly consistent across boom definitions.

- Effects are *economically relevant*:
  - 1 year in duration increases crisis probability by 4 percent
## Effects are Economically Relevant

### Table 3. Marginal Effects

<table>
<thead>
<tr>
<th>Dependent variable: Probability of a crisis to occur within two years from the boom</th>
<th>Base criterion</th>
<th>Credit-to-GDP growth over 10 percent</th>
<th>HP filter over entire sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>0.04*</td>
<td>0.03**</td>
<td>0.06</td>
</tr>
<tr>
<td>Size</td>
<td>0.05**</td>
<td>0.05***</td>
<td>0.06**</td>
</tr>
<tr>
<td>Inflation</td>
<td>0.004***</td>
<td>0.004***</td>
<td>0.004</td>
</tr>
<tr>
<td>Growth (GDP per capita)</td>
<td>-1.01**</td>
<td>-0.53</td>
<td>-0.61</td>
</tr>
<tr>
<td>Current Account Balance</td>
<td>1.05</td>
<td>0.71</td>
<td>1.40</td>
</tr>
<tr>
<td>Openness</td>
<td>-0.26</td>
<td>-0.18</td>
<td>-0.31</td>
</tr>
<tr>
<td>Quality of Supervision</td>
<td>-0.24***</td>
<td>-0.22***</td>
<td>-0.41</td>
</tr>
</tbody>
</table>

Episodes of hyperinflation (over 100 percent a year average) are excluded.
A Few Words of Caution...

- While model seems stable across boom definitions, its fit is not particularly good (Pseudo $R^2$: 0.2-0.4)
  - This is to be expected in models of crises
  - Yet, caution granted when using for forecasting
  - Also, some results are not fully consistent across models

- Causality issues should be carefully considered before using results for policy analysis
  - Regressions in this paper reflect associations, not necessarily causal linkages
  - Comparative statics may not apply
To do...

- Refine logit regressions:
  - Include additional regulatory and structural variables
  - Improve data coverage
  - Try alternative models for panel approach

- Duration model?

- Consider policy response:
  - Are there policies that reduce the likelihood of bad booms?
  - Need to expand dataset

- Investigate potential benefits of “good” booms
Financial intermediation and growth
Subprime Crisis: A Credit Boom Gone Bad?

Change in Delinquency Rate 2004-2006 (in percent)

Growth of Loan Origination Volume 2000-2004 (in percent)

MSA level data
Booms and Crises

Thailand 1997

Philippines 1997

Finland 1991

Chile 1982