Phoenix Miracles in Emerging Markets: Recovering without credit from Systemic Financial Crises

Guillermo Calvo *
Alejandro Izquierdo *
Ernesto Talvi **

IADB* and CERES**

November 10, 2006

IMF Seventh Jacques Polak Annual Research Conference

The views expressed in this paper are those of the author(s) only, and the presence of them, or of links to them, on the IMF website does not imply that the IMF, its Executive Board, or its management endorses or shares the views expressed in the paper.
Phoenix Miracles in Emerging Markets:

Recovering without credit from Systemic Financial Crises

Rebound

Really a Phoenix?

What finances the rebound?
PHOENIX MIRACLES: OUTLINE

I. Phoenix Miracles: Anatomy

II. Empirical Tests

III. Evidence from Micro Data
FOCUS

- We study the anatomy of post-collapse recoveries in financially integrated emerging markets (EM), i.e., how economies emerge from output collapses that occurred during episodes of systemic sudden stop (3S).
- We define 3S as a period characterized by a significant rise in the cost of international financing and a collapse in capital inflows that affects a large set of EM countries at about the same time.
- Our conjecture is that financial factors are key in explaining output collapse, and that financial “re-engineering” is key to understand trade-offs between liquidity and future growth.
MOTIVATION

“Phoenix Miracle” in Argentina
(s.a. GDP, II. 1998=100)
THE SAMPLE

➢ **Sample**
Countries that are tracked by JP Morgan to construct its global Emerging Market Bond Index, or global EMBI (31 countries, integrated to world capital markets).

➢ **Period**
1980-2004

➢ **Definition of Output Collapse**
An output contraction in excess of 4.4% from peak to trough (the median of the sample)

➢ **Definition of 3S (systemic sudden stop)**
Periods characterized by a significant rise in the cost of international financing and a collapse in capital inflows that affects a large set of EM countries at about the same time

➢ **Results**
22 3S output collapses (out of 83 output contraction episodes)
  • Large cumulative output contraction, greater than the median
  • Coinciding with a 3S interval
Systemic Sudden Stop, 3S

3S is the union of the following two (overlapping) time intervals:

1. **Global Sudden Stop Interval:**
   Rise in aggregate spreads (EMBI+) exceeding two standard deviations above the mean

2. **Country-specific Sudden Stop Interval, SS:**
   Period that contains a SS signal (a fall in capital inflows exceeding 2 std. deviations below the mean), in which the fall in capital flows exceeds 1 standard deviation
Episodes of Systemic Sudden Stops (3S)

Capital Market Conditions for EMs

Fed Fund Rate

US Monetary Contraction

EMBI Spreads

Tequila Crisis

Asia-Russian Crises

Effective Federal Funds Rate (%)

EMBI Sovereign Spread (Bps over US Treasuries)
## Systemic Capital Market Turmoil and Output Collapses 1980-2004

<table>
<thead>
<tr>
<th>Country</th>
<th>Date</th>
<th>Contraction</th>
<th>Recovery</th>
<th>Output</th>
<th>Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigeria</td>
<td>1980</td>
<td>4</td>
<td>5</td>
<td>max -21.9%</td>
<td>max -58.0%</td>
</tr>
<tr>
<td>Uruguay</td>
<td>1981</td>
<td>3</td>
<td>7</td>
<td>-20.0%</td>
<td>-56.8%</td>
</tr>
<tr>
<td>Argentina</td>
<td>1998</td>
<td>4</td>
<td>2</td>
<td>-18.4%</td>
<td>-56.3%</td>
</tr>
<tr>
<td>El Salvador</td>
<td>1980</td>
<td>2</td>
<td>10</td>
<td>-16.1%</td>
<td>-16.3%</td>
</tr>
<tr>
<td>Chile</td>
<td>1981</td>
<td>2</td>
<td>3</td>
<td>-13.7%</td>
<td>-61.2%</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1997</td>
<td>1</td>
<td>5</td>
<td>-13.1%</td>
<td>-39.0%</td>
</tr>
<tr>
<td>Peru</td>
<td>1981</td>
<td>2</td>
<td>3</td>
<td>-12.3%</td>
<td>-44.1%</td>
</tr>
<tr>
<td>Thailand</td>
<td>1996</td>
<td>2</td>
<td>4</td>
<td>-11.7%</td>
<td>-61.7%</td>
</tr>
<tr>
<td>Argentina</td>
<td>1998</td>
<td>2</td>
<td>2</td>
<td>-10.4%</td>
<td>-31.9%</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1997</td>
<td>1</td>
<td>2</td>
<td>-7.4%</td>
<td>-43.0%</td>
</tr>
<tr>
<td>Brazil</td>
<td>1997</td>
<td>3</td>
<td>2</td>
<td>-7.1%</td>
<td>-33.6%</td>
</tr>
<tr>
<td>South Korea</td>
<td>1997</td>
<td>1</td>
<td>1</td>
<td>-6.9%</td>
<td>-30.6%</td>
</tr>
<tr>
<td>Morocco</td>
<td>1994</td>
<td>1</td>
<td>1</td>
<td>-6.6%</td>
<td>-25.0%</td>
</tr>
<tr>
<td>Côte d'Ivoire</td>
<td>1992</td>
<td>2</td>
<td>2</td>
<td>-6.5%</td>
<td>max 69.9%</td>
</tr>
<tr>
<td>Ecuador</td>
<td>1998</td>
<td>1</td>
<td>2</td>
<td>-6.3%</td>
<td>-49.4%</td>
</tr>
<tr>
<td>Mexico</td>
<td>1994</td>
<td>1</td>
<td>2</td>
<td>-6.2%</td>
<td>-34.8%</td>
</tr>
<tr>
<td>South Africa</td>
<td>1981</td>
<td>2</td>
<td>1</td>
<td>-6.1%</td>
<td>-42.1%</td>
</tr>
<tr>
<td>Venezuela</td>
<td>1980</td>
<td>3</td>
<td>3</td>
<td>-6.1%</td>
<td>-47.4%</td>
</tr>
<tr>
<td>Turkey</td>
<td>1993</td>
<td>1</td>
<td>1</td>
<td>-5.5%</td>
<td>-29.5%</td>
</tr>
<tr>
<td>Russia</td>
<td>1997</td>
<td>1</td>
<td>1</td>
<td>-5.3%</td>
<td>-43.7%</td>
</tr>
<tr>
<td>Mexico</td>
<td>1981</td>
<td>2</td>
<td>2</td>
<td>-4.8%</td>
<td>-45.3%</td>
</tr>
<tr>
<td>Turkey</td>
<td>1998</td>
<td>1</td>
<td>1</td>
<td>-4.7%</td>
<td>-8.9%</td>
</tr>
</tbody>
</table>

| Mean      | 2     | 3     | -9.9%  | -42.2% |
| Median    | 2     | 2     | -7.0%  | -43.4% |

• There are 41 collapse episodes exceeding a cumulative fall of 4.4%, out of which 22 are systemic episodes

• We capture most well-known crises of the 1990s (Tequila, East Asian, and Russian Crisis), as well as episodes from the 1980s LAC Debt crisis
Output Behavior
(Average 3S Episode, annual GDP)

Collapses in EM Economies

Output Behavior
(Average 3S Episode, annual GDP)
Total Factor Productivity
(Average 3S Episode)
Collapses in EM Economies

Capital Stock
(Average 3S Episode)
Collapses in EM Economies

Employment
(Average 3S Episode)
The conditions under which the recovery materializes are extremely precarious:

- Virtually no recovery in external or domestic credit
Current Account Dynamics
(in % of GDP, average 3S episode)

Collapses in EM Economies

Collapse

Recovery

GDP

Current Account

t-2 t-1 Trough (t=0) t+1 t+2

-6,0 -5,0 -4,0 -3,0 -2,0 -1,0 0,0 1,0 2,0 3,0

-6,0 -5,0 -4,0 -3,0 -2,0 -1,0 0,0 1,0 2,0 3,0

Current Account (%GDP)
Bank Credit Dynamics
(deflated by CPI, average 3S episode)

Collapses in EM Economies

- **Collapse**
  - GDP
  - Credit

- **Recovery**
  - GDP
  - Credit

Trough (t=0)

Collapses in EM Economies
MAIN RESULTS

- The conditions under which the recovery materializes are extremely precarious:
  - Virtually no recovery in external or domestic credit
  - Very weak recovery of investment
Investment Dynamics
(average 3S episode)

Collapses in EM Economies

Collapse

Recovery

GDP

Investment

Trough (t=0)
The conditions under which the recovery materializes are extremely precarious:

- Virtually no recovery in external or domestic credit
- Very weak recovery of investment

Post-collapse recoveries in EM display striking parallels with the US Great Depression...
EM Collapses & the US Great Depression: Similarities

- Bank Credit -

Collapses in EM Economies

US Great Depression

EM Collapses & the US Great Depression: Similarities

Collapses in EM Economies

US Great Depression
EM Collapses & the US Great Depression: Similarities

- Total Factor Productivity -

Collapses in EM Economies

US Great Depression
EM Collapses & the US Great Depression: Similarities

- Investment -

Collapses in EM Economies

US Great Depression

EM Collapses & the US Great Depression: Similarities
EM Collapses & the US Great Depression: Similarities

- Capital Stock -

Collapses in EM Economies

US Great Depression

Collapse
Recovery

Capital Stock
GDP

1929 1930 1931 1932 1933 1934 1935 1936

1929 1930 1931 1932 1933 1934 1935 1936

Collapse
Recovery

Capital Stock
GDP

- Capital Stock -
MAIN RESULTS

- The conditions under which the recovery materializes are extremely precarious:
  - Virtually no recovery in external or domestic credit
  - Very weak recovery of investment

- Post-collapse recoveries in EM display striking parallels with the US Great Depression...

- ...but also substantial differences, which are revealing when examining the causes of output collapse
EM Collapses & the US Great Depression: Differences

- CPI Inflation -

Collapses in EM Economies

US Great Depression

Collapse Recovery

- CPI Inflation -

Collapses in EM Economies

US Great Depression
EM Collapses & the US Great Depression: Differences

- Real Wages -
  (deflated by WPI)

Collapses in EM Economies

US Great Depression

Collapses & the US Great Depression: Differences
EM Collapses & the US Great Depression: Differences

- Employment -

Collapses in EM Economies

US Great Depression

Collapse Recovery

Collapse Recovery

1929 1930 1931 1932 1933 1934 1935 1936

GDP Employment GDP

t-2 t-1 t t+1 t+2
Comparison with US Great Depression

- Two main frictions have been proposed to explain the Great Depression:
  • **Sticky wages** (an increase in real wages following deflation)
  • **Fisherian Effects** (non-contingent contracts)

- 3S Collapse episodes are different in that:
  • They are **inflationary**
  • They occur with a **fall in real wages**

- This suggests that the explanation of output collapses may lie on financial factors, particularly Fisherian Effects (but in EMs through balance-sheet effects via DLD)
PHOENIX MIRACLES: OUTLINE

I. Phoenix Miracles: Anatomy

II. Empirical Tests

III. Evidence from Micro Data
Phoenix Miracles: Bank Credit, Current Account and Investment

### 3S Collapse Episodes: Average Differences
along Pre-Crisis Peaks, Troughs, and Full Recovery Points

<table>
<thead>
<tr>
<th></th>
<th>Peak to Through</th>
<th>Trough to Recovery</th>
<th>Peak To Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit/GDP</td>
<td>3.948</td>
<td>-20.014***</td>
<td>-16.768***</td>
</tr>
<tr>
<td></td>
<td>[ 5.455]</td>
<td>[ 5.542]</td>
<td>[ 7.020]</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Current Account Balance/GDP</td>
<td>5.706***</td>
<td>-1.545</td>
<td>4.161***</td>
</tr>
<tr>
<td></td>
<td>[ 1.689]</td>
<td>[ 1.078]</td>
<td>[ 1.359]</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Investment/GDP</td>
<td>-34.234***</td>
<td>20.210***</td>
<td>-23.240***</td>
</tr>
<tr>
<td></td>
<td>[ 4.202]</td>
<td>[ 6.551]</td>
<td>[ 5.030]</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

Standard errors in brackets. Number of episodes is also reported.
* significant at 10%; ** significant at 5%; *** significant at 1%

- Virtually no recovery in external (flow) or domestic (stock) credit
- Very weak recovery in investment
Phoenix Miracles: TFP, Capital Stock and Employment

<table>
<thead>
<tr>
<th></th>
<th>Peak to Through</th>
<th>Trough to Recovery</th>
<th>Peak To Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Factor Productivity</td>
<td>-9.497***</td>
<td>9.874***</td>
<td>-0.785</td>
</tr>
<tr>
<td></td>
<td>[ 1.474]</td>
<td>[ 1.719]</td>
<td>[ 1.378]</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Capital Stock</td>
<td>3.735***</td>
<td>-3.177*</td>
<td>0.639</td>
</tr>
<tr>
<td></td>
<td>[ 1.124]</td>
<td>[ 1.669]</td>
<td>[ 2.489]</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Employment</td>
<td>-2.041</td>
<td>6.533***</td>
<td>3.918</td>
</tr>
<tr>
<td></td>
<td>[ 2.313]</td>
<td>[ 1.979]</td>
<td>[ 2.314]</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
</tbody>
</table>

Standard errors in brackets. Number of episodes is also reported.

* significant at 10%; ** significant at 5%; *** significant at 1%

- TFP and capital at full recovery are not significantly different from their pre-crisis levels
- Employment, though somewhat higher at recovery than at pre-crisis peak, is not statistically significant
PHOENIX MIRACLES: OUTLINE

I. Phoenix Miracles: Anatomy

II. Empirical Tests

III. Evidence from Micro Data
Firm-level financing: Pre and Post-collapse Analysis

\[
\text{Net Sales} = \text{Production Costs} + \text{Gross Fixed Investment} + \text{Net Flows to Financial Sector} + \text{Net Flows to Other Firms} + \text{Net Flows to Shareholders} + \text{Net Non-operational Flows} + \text{Other Flows}
\]
## Firm-level rebound: Pooling

### All Countries

<table>
<thead>
<tr>
<th></th>
<th>Peak</th>
<th>Recovery</th>
<th>Change (R-P)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production Costs</strong></td>
<td>86.867</td>
<td>89.488</td>
<td>2.622</td>
</tr>
<tr>
<td></td>
<td>(0.354)***</td>
<td>(0.486)***</td>
<td>(0.480)***</td>
</tr>
<tr>
<td><strong>Investment</strong></td>
<td>22.483</td>
<td>8.146</td>
<td>-14.337</td>
</tr>
<tr>
<td></td>
<td>(1.245)***</td>
<td>(0.857)***</td>
<td>(1.478)***</td>
</tr>
<tr>
<td><strong>Net flows to the Financial Sector</strong></td>
<td>-14.439</td>
<td>8.425</td>
<td>22.864</td>
</tr>
<tr>
<td></td>
<td>(1.324)***</td>
<td>(1.374)***</td>
<td>(1.855)***</td>
</tr>
<tr>
<td><strong>Net flows to Shareholders</strong></td>
<td>-3.659</td>
<td>-0.557</td>
<td>3.102</td>
</tr>
<tr>
<td></td>
<td>(0.592)***</td>
<td>(0.61)</td>
<td>(0.781)***</td>
</tr>
<tr>
<td><strong>Net flows to other Firms</strong></td>
<td>1.102</td>
<td>0.371</td>
<td>-0.731</td>
</tr>
<tr>
<td></td>
<td>(0.311)***</td>
<td>(0.34)</td>
<td>(0.45)</td>
</tr>
<tr>
<td><strong>Net Non-Operational Flows</strong></td>
<td>6.201</td>
<td>-3.312</td>
<td>-9.513</td>
</tr>
<tr>
<td></td>
<td>(1.035)***</td>
<td>(1.192)***</td>
<td>(1.541)***</td>
</tr>
<tr>
<td><strong>Other Net Flows</strong></td>
<td>1.445</td>
<td>-2.561</td>
<td>-4.007</td>
</tr>
<tr>
<td></td>
<td>(0.365)***</td>
<td>(0.935)***</td>
<td>(0.991)***</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0</td>
<td>100.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

### Investment + Flows to Financial Sector

<table>
<thead>
<tr>
<th></th>
<th>Peak</th>
<th>Recovery</th>
<th>Change (R-P)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Net Flows</strong></td>
<td>8.044</td>
<td>16.571</td>
<td>8.527</td>
</tr>
<tr>
<td></td>
<td>(0.971)***</td>
<td>(1.286)***</td>
<td>(1.590)***</td>
</tr>
</tbody>
</table>

### Investment + Flows to Financial Sector + Non-Operational Flows

<table>
<thead>
<tr>
<th></th>
<th>Peak</th>
<th>Recovery</th>
<th>Change (R-P)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Net Flows</strong></td>
<td>14.244</td>
<td>13.259</td>
<td>-0.986</td>
</tr>
<tr>
<td></td>
<td>(0.787)***</td>
<td>(0.950)***</td>
<td>(1.18)</td>
</tr>
</tbody>
</table>

### Observations

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Observations</strong></td>
<td>1040</td>
<td>1040</td>
<td>1040</td>
</tr>
</tbody>
</table>

Robust standard errors in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%
Conclusions

• Sudden Stops and Phoenix Miracles may be reflecting fundamental weaknesses in EMs domestic financial systems, which, combined with global shocks, give rise to major crises

• Output collapse episodes show that rebounds can be fast and take place in Phoenix-Miracle-like fashion

• Liquidity can be restored by a discontinuation of investment projects, so that liquidity and output increase, while investment collapses

• These processes are far from being effortless and/or costless: there are trade-offs between liquidity restoration and future growth
Phoenix Miracles
in Emerging Markets:
Recovering without credit
from Systemic Financial Crises

Guillermo Calvo *
Alejandro Izquierdo *
Ernesto Talvi **

IADB* and CERES**
November 10, 2006

IMF Seventh Jacques Polak Annual Research Conference