What Hinders Investment in the Aftermath of Financial Crises: Balance-Sheet Mismatches or Access to Finance?

Şebnem Kalemli-Özcan, Herman Kamil, and Carolina Villegas-Sanchez

University of Houston and NBER, IMF, University of Houston

Tenth Jacques Polak Annual Research Conference, IMF, Nov 5-6, 2009
Why are financial crises contractionary?

- Theory: A currency crisis must be expansionary since it leads to a large depreciation, increasing competitiveness.

- Empirical literature: mixed evidence depending on:
  - the severity of the crisis: currency crisis might be accompanied by a banking crisis
  - heavy reliance on foreign debt and importance of the tradable sector

- If we focus on emerging markets, financial crises seem to be mostly contractionary.

- Important to focus on emerging markets since there is a lot to be learned from their experience for the current crisis!

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Balance-Sheet and Access to Finance
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## Growth of GDP and Investment: Aftermath of the Crisis

<table>
<thead>
<tr>
<th>Year</th>
<th>Argentina</th>
<th>Colombia</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BC</td>
<td>ER</td>
<td>BC</td>
</tr>
</tbody>
</table>

### Growth of GDP, %

<table>
<thead>
<tr>
<th>Year</th>
<th>Argentina</th>
<th>Colombia</th>
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<tbody>
<tr>
<td>One year after</td>
<td>-11</td>
<td>8</td>
<td>-4</td>
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### Growth of GFKF, %

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<th>Colombia</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>One year after</td>
<td>-36</td>
<td>38</td>
<td>-38</td>
</tr>
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</table>

ER: depreciation of real ex. rate > 25%
BC: Reinhart and Rogoff (2008) definition
What does the theory propose?

Financial crises can lead to declines in investment and output due to existence of financial constraints

1. **Credit crunch (supply side):** Domestic banks cannot extend credit; foreign capital leaves
   - Firms cannot re-finance short-term debt, import intermediate inputs or undertake new investment.
   - Aghion et al. (2001); Chang and Velasco (2001); Caballero and Krishnamurty (2001); Mendoza and Smith (2006).

2. **Balance-Sheet Mismatch (demand side):** Foreign currency denominated debt inflates, firms net-worth declines
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The empirical literature is divided in two lines of research due to lack of detailed data:

- **Access to Finance**: Foreign firms outperform domestic firms during depreciations (Desai, Foley and Forbes (2008); Blalock, Gertler and Levine (2007)).

- **Balance-Sheet Effects**: Conflicting evidence by Bleakley and Cowan (2008), and Aguiar (2005).
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Our Approach

The literature suffers from an omitted variables problem

- Firms who do not have a weak balance-sheet can be foreign owned firms and therefore have better access to credit and/or

- Foreign firms with access to credit are also the ones that better match the currency denomination of their assets and liabilities.

We investigate the effect of financial crises on firm performance, **disentangling for both channels of financial frictions**
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A new database

- New database with annual accounting information for over 2100 non-financial listed companies from Argentina, Brazil, Chile, Colombia, Mexico and Peru; 1991 to 2004.
  - Sales, Investment: change in stock of physical capital (property, plant, and equipment)
  - Currency composition of assets and liabilities: from firms’ balance sheets in stock market statements
  - Exports: Income statements and custom office records
  - Foreign Ownership: Foreign if at least 50% of the equity share of the firm is foreign owned.
- Final sample: 1203 firms (sales), 632 (investment)
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Differences-in-Differences

- We want to identify how a crisis affects firm performance...

- By focusing on the channels through which crises aggravate credit constraints

- The key idea to test each channel:
  - Depreciation increases investment opportunities in the exporting sector
  - Exporters might be constrained if they hold dollar debt...
  - Or they might be constrained if they have limited access to finance
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Kalemli-Ozcan, Kamil, Villegas-Sanchez
Balance-Sheet and Access to Finance
Do exporters perform better?

\[ y_{i,c,j,t} = \beta_1 (Exports_{i,c,j,t-1} \times Post_{c,t}) + \beta_2 Exports_{i,c,j,t-1} + \phi_{j,t} + \varphi_{c,t} + \tau_t + \alpha_i + \xi_{i,c,j,t} \]  

- \( y_{i,c,j,t} \) is the outcome of firm \( i \), in country \( c \), in sector \( j \) at time \( t \) (Sales and Investment)
- \( Exports \): whether or not the firm is an exporter/volume
- \( Post \): a dummy for the year of depreciation and the year after
- \( \phi_{j,t} \) sector-year fixed effects
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Balance-Sheet and Access to Finance
Motivation

Data

Methodology

Results

Conclusion

Channels

Identification

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<tr>
<th></th>
<th>Sales Growth</th>
<th>Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td><strong>Exporter \times Post</strong></td>
<td>0.134*</td>
<td>-0.013</td>
</tr>
<tr>
<td></td>
<td>(0.07)</td>
<td>(0.01)</td>
</tr>
<tr>
<td><strong>Exporter</strong></td>
<td>-0.012</td>
<td>0.010**</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.00)</td>
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</tbody>
</table>

**DollarDebt**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>8786</td>
</tr>
<tr>
<td>Firms</td>
<td>1203</td>
</tr>
<tr>
<td>Firm Fixed-Effects</td>
<td>yes</td>
</tr>
<tr>
<td>country*year</td>
<td>yes</td>
</tr>
<tr>
<td>sector*year</td>
<td>yes</td>
</tr>
<tr>
<td>year</td>
<td>yes</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>
## Channels of Finance

<table>
<thead>
<tr>
<th></th>
<th>Sales Growth (1)</th>
<th>Investment (2)</th>
<th>Investment (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exporter × Post</strong></td>
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<td>-0.008</td>
</tr>
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<td></td>
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<td>(0.01)</td>
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| Observations              | 8786             | 5119           | 4025           |
| Firms                     | 1203             | 632            | 575            |
| Firm Fixed-Effects        | yes              | yes            | yes            |
| country*year              | yes              | yes            | yes            |
| sector*year               | yes              | yes            | yes            |
| year                      | yes              | yes            | yes            |

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**Balance-Sheet and Access to Finance**
Is there any effect of holding dollar debt?

\begin{equation}
    y_{i,c,j,t} = \beta_1 (DDebt_{i,c,j,t-1} \times Post_{c,t}) \\
    + \beta_2 DDebt_{i,c,j,t-1} + \phi_{j,t} + \varphi_{c,t} + \tau_{t} + \alpha_{i} + \xi_{i,c,j,t}
\end{equation}

- **DDebt**: share of short-term dollar denominated liabilities.
Is there any effect of holding dollar debt?

\[ y_{i,c,j,t} = \beta_1 (DDebt_{i,c,j,t-1} \times Post_{c,t}) + \beta_2 DDebt_{i,c,j,t-1} + \phi_{j,t} + \varphi_{c,t} + \tau_t + \alpha_i + \xi_{i,c,j,t} \]  

- \textit{DDebt:} share of short-term dollar denominated liabilities.
## Channels of Debt and Access to Finance

### Identification

<table>
<thead>
<tr>
<th>Sales Growth (1)</th>
<th>Investment (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dollar Debt × Post</strong></td>
<td>0.244**</td>
</tr>
<tr>
<td></td>
<td>(0.10)</td>
</tr>
<tr>
<td><strong>Dollar Debt</strong></td>
<td>-0.024</td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
</tr>
</tbody>
</table>

**Exports**

<table>
<thead>
<tr>
<th>Observations</th>
<th>7078</th>
<th>4025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firms</td>
<td>1111</td>
<td>575</td>
</tr>
<tr>
<td>Firm Fixed-Effects</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>country*year</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>sector*year</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>year</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>
### Sales Growth

<table>
<thead>
<tr>
<th>Channel</th>
<th>Estimation</th>
<th>Investment (2)</th>
<th>Investment (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dollar Debt $ \times \text{Post}$</td>
<td>$0.244^{**}$</td>
<td>-0.010</td>
<td>-0.010</td>
</tr>
<tr>
<td></td>
<td>(0.10)</td>
<td>(0.03)</td>
<td>(0.03)</td>
</tr>
<tr>
<td>Dollar Debt</td>
<td>-0.024</td>
<td>-0.001</td>
<td>-0.002</td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Exports</td>
<td></td>
<td></td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.00)</td>
</tr>
</tbody>
</table>

### Observations

- Observations: 7078
- Firms: 1111
- Observation Details: Yes

### Country, Sector, and Year Details

- Country*Year: Yes
- Sector*Year: Yes
- Year: Yes

---

Kalemli-Ozcan, Kamil, Villegas-Sanchez: Balance-Sheet and Access to Finance
Identification

- Triple difference-in-difference
- The depreciation should increase the financial constraints of all firms holding dollar debt. Unless firms:
  1. Match balance sheet with revenues/assets.
  2. Access to finance
Identification

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Identification

- Triple difference-in-difference

- The depreciation should increase the financial constraints of all firms holding dollar debt. Unless firms:
  1. Match balance sheet with revenues/assets.
  2. Access to finance
Mismatch or Access to Finance?

\[ y_{i,c,j,t} = \beta_1(Exports_{i,c,j,t-1} \times DDebt_{i,c,j,t-1} \times Post_{c,t}) \]
\[ + \beta_2(Exports_{i,c,j,t-1} \times Post_{c,t}) + \beta_3(DDebt_{i,c,j,t-1} \times Post_{c,t}) \]
\[ + \beta_4 Exports_{i,c,j,t-1} + \beta_5 DDebt_{i,c,j,t-1} + \phi_{j,t} + \varphi_{c,t} + \tau_t + \alpha_i + \xi_{i,c,j,t} \]

(3)

Run for sub sample of foreign-owned and domestically-owned firms to separate the channels.
### Dep. var.: Investment

<table>
<thead>
<tr>
<th></th>
<th>Total (1)</th>
<th>Domestic (2)</th>
<th>Foreign (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exports × DD × Post</td>
<td>0.005*** (0.00)</td>
<td>0.001 (0.00)</td>
<td>0.009** (0.00)</td>
</tr>
</tbody>
</table>

*Foreign × DD × Post*

<table>
<thead>
<tr>
<th></th>
<th>Observations</th>
<th>Firms</th>
<th>Firm Fixed-Effects</th>
<th>country*year</th>
<th>sector*year</th>
<th>year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4025</td>
<td>525</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td>2478</td>
<td>394</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td>1122</td>
<td>171</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td>Total (1)</td>
<td>Domestic (2)</td>
<td>Foreign (3)</td>
<td>NonExporter (4)</td>
<td>Exporter (5)</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-----------</td>
<td>--------------</td>
<td>-------------</td>
<td>-----------------</td>
<td>--------------</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Foreign × DD × Post</strong></td>
<td></td>
<td></td>
<td></td>
<td>-0.048 (0.05)</td>
<td>0.059* (0.03)</td>
<td></td>
</tr>
</tbody>
</table>

- Observations: 4025, 2478, 1122, 1699, 1901
- Firms: 525, 394, 171, 271, 294
- Firm Fixed-Effects: yes, yes, yes, yes, yes
- country*year: yes, yes, yes, yes, yes
- sector*year: yes, yes, yes, yes, yes
- year: yes, yes, yes, yes, yes

Kalemli-Ozcan, Kamil, Villegas-Sanchez

Balance-Sheet and Access to Finance
We study the impact of large depreciations on firms’ performance accounting for two channels:

- Balance Sheet Effects
- Access to Finance

We find that foreign firms outperform domestic firms even after controlling for balance-sheet effects.

We attribute the better performance to easier access to finance.

**Big picture:** How financial constraints hinder investment is important to link financial crises to recessions.
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**Big picture:** How financial constraints hinder investment is important to link financial crises to recessions.
Robustness

- Foreign owned firms might be on a different trend: Foreign-Year effects
- Foreign investment might vary with country characteristics: Foreign-Country effects
- Results not driven by foreigners buying productive firms during crisis (Aquiar and Gopinath (2005))
- Domestic firms might have access to finance: control for ADRs
- Matching via dollar assets
- Sample of firms holding short-term dollar debt
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