Financial Crises and International Portfolio Dynamics

Fernando Broner  
CREI and Universitat Pompeu Fabra

Tatiana Didier  
World Bank

Aitor Erce  
Banco de España

Sergio Schmukler  
World Bank

January 2010
Some definitions

- Gross inflows by foreigners ($GIF$): Net purchases of domestic assets by foreigners

- Gross inflows by residents ($GIR$): Net sales of foreign assets by domestic agents, including CB reserves

- Net capital flows $= GIF + GIR$

- Gross capital flows $= GIF - GIR$
US Gross Capital (Long-Term Security) Flows

Quarterly Data from US Dept. of the Treasury

US Dollars (Millions)


Foreigners

Residents
Objective

- Provide stylized facts on international portfolio dynamics, for advanced and developing countries
- Emphasis on gross flows as opposed to net flows
Objective

- Provide stylized facts on international portfolio dynamics, for advanced and developing countries
- Emphasis on gross flows as opposed to net flows
- Gross capital flows are larger and more volatile than net capital flows
- In advanced countries, net flows are explained mostly by gross flows by residents \((GIR)\)
- In developing countries, net flows are explained mostly by gross flows by foreigners \((GIF)\)
- During crises there is retrenchment: foreigners leave \((GIF \downarrow)\), residents come back \((GIR \uparrow)\)
Objective

- Provide stylized facts on international portfolio dynamics, for advanced and developing countries
- Emphasis on gross flows as opposed to net flows
- Gross capital flows are larger and more volatile than net capital flows
- In advanced countries, net flows are explained mostly by gross flows by residents ($GIR$)
- In developing countries, net flows are explained mostly by gross flows by foreigners ($GIF$)
- During crises there is retrenchment: foreigners leave ($GIF \downarrow$), residents come back ($GIR \uparrow$)
- Interpretation: productivity shocks, sovereign risk, asymmetric information
Some related literature

• Theory
  – Kraay and Ventura (2000)
  – Kraay, Servén, Loayza, and Ventura (2005)
  – Devereux (2007)
  – Coeurdacier, Kollmann, and Martin (2009)
  – Devereux and Sutherland (2009)

• Empirical
  – Kraay and Ventura (2000)
  – Lane and Milesi-Ferretti (2001, 2007)
  – Kraay, Servén, Loayza, and Ventura (2005)
  – Devereux (2007)
  – Gourinchas and Rey (2007a, 2007b)
  – Cowan, De Gregorio, Micco, and Neilson (2007)
Some related literature

• Theory
  – Kraay and Ventura (2000)
  – Kraay, Servén, Loayza, and Ventura (2005)
  – Devereux (2007)
  – Coeurdacier, Kollmann, and Martin (2009)
  – Devereux and Sutherland (2009)

• Empirical
  – Kraay and Ventura (2000)
  – Lane and Milesi-Ferretti (2001, 2007)
  – Kraay, Servén, Loayza, and Ventura (2005)
  – Devereux (2007)
  – Gourinchas and Rey (2007a, 2007b)
  – Cowan, De Gregorio, Micco, and Neilson (2007)

• Our emphasis is on high frequency dynamics instead of long-run trends
## Gross Capital Flows: Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>High-Income Countries</th>
<th>Middle-Income Countries</th>
<th>Low-Income Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Std. Dev.</td>
<td>Average</td>
</tr>
<tr>
<td>Gross Inflows by Foreigners</td>
<td>12.11</td>
<td>15.18</td>
<td>5.74</td>
</tr>
<tr>
<td>70s</td>
<td>5.74</td>
<td>2.55</td>
<td>4.09</td>
</tr>
<tr>
<td>80s</td>
<td>6.68</td>
<td>4.66</td>
<td>1.63</td>
</tr>
<tr>
<td>90s</td>
<td>8.24</td>
<td>9.77</td>
<td>4.70</td>
</tr>
<tr>
<td>00s</td>
<td>25.26</td>
<td>18.05</td>
<td>7.44</td>
</tr>
<tr>
<td>Gross Inflows by Residents</td>
<td>-12.61</td>
<td>16.65</td>
<td>-4.59</td>
</tr>
<tr>
<td>70s</td>
<td>-6.88</td>
<td>3.67</td>
<td>-3.68</td>
</tr>
<tr>
<td>80s</td>
<td>-6.52</td>
<td>5.13</td>
<td>-2.28</td>
</tr>
<tr>
<td>90s</td>
<td>-7.80</td>
<td>11.26</td>
<td>-3.29</td>
</tr>
<tr>
<td>00s</td>
<td>-27.29</td>
<td>18.12</td>
<td>-8.18</td>
</tr>
<tr>
<td>Net Flows</td>
<td>-0.50</td>
<td>6.03</td>
<td>1.15</td>
</tr>
<tr>
<td>70s</td>
<td>-1.14</td>
<td>3.77</td>
<td>0.41</td>
</tr>
<tr>
<td>80s</td>
<td>0.15</td>
<td>4.65</td>
<td>-0.65</td>
</tr>
<tr>
<td>90s</td>
<td>0.44</td>
<td>5.13</td>
<td>1.41</td>
</tr>
<tr>
<td>00s</td>
<td>-2.03</td>
<td>4.09</td>
<td>-0.74</td>
</tr>
<tr>
<td>No. of Countries</td>
<td>39</td>
<td>25</td>
<td>38</td>
</tr>
</tbody>
</table>

Data from 1970-2008. All flows are normalized by GDP.
Gross Capital Flows: Foreigners vs. Residents

Japan

Sweden

United States

United Kingdom
Gross Capital Flows: Foreigners vs. Residents

Argentina

Chile

Thailand

Turkey

Percentage of GDP

Residents

Foreigners
Correlation of gross flows

- Regressions of gross flows on each other

\[ GIF_{c,t} = \beta \cdot GIR_{c,t} + \alpha_c + \gamma_c \cdot t + \delta_t + \varepsilon_{c,t} \]
\[ GIR_{c,t} = \beta \cdot GIF_{c,t} + \alpha_c + \gamma_c \cdot t + \delta_t + \varepsilon_{c,t} \]

where we include time dummies and country trends
Correlation of gross flows

- Regressions of gross flows on each other

\[ GIF_{c,t} = \beta \cdot GIR_{c,t} + \alpha_c + \gamma_c \cdot t + \delta_t + \varepsilon_{c,t} \]

\[ GIR_{c,t} = \beta \cdot GIF_{c,t} + \alpha_c + \gamma_c \cdot t + \delta_t + \varepsilon_{c,t} \]

where we include time dummies and country trends

- Pooled countries by income
  - high income: GNI per capita > US$ 15,000 (40 countries)
  - middle income: US$ 15,000 > GNI per capita > US$ 7,500 (25 countries)
  - low income: US$ 7,500 > GNI per capita > US$ 2,000 (38 countries)
  - dropped small countries: GNI < US$ 5 billions
## Correlation of Gross Capital Flows

<table>
<thead>
<tr>
<th></th>
<th>High-Income Countries</th>
<th>Middle-Income Countries</th>
<th>Low-Income Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GIF</td>
<td>GIR</td>
<td>GIF</td>
</tr>
<tr>
<td>GIR</td>
<td>-0.83***</td>
<td></td>
<td>-0.34**</td>
</tr>
<tr>
<td>GIF</td>
<td></td>
<td>-0.90***</td>
<td>-0.26**</td>
</tr>
</tbody>
</table>

| Observations  | 1,235    | 1,235    | 632      | 632      | 980      | 980      |
| R-squared     | 0.90     | 0.90     | 0.58     | 0.54     | 0.52     | 0.49     |

Data from 1970-2007. All flows are normalized by trend GDP.
Country trends, country dummies, and year dummies are included in all regressions.
* significant at 10%; ** significant at 5%; *** significant at 1%
Conditional gross flows

- Gross inflows by foreigners and residents are volatile and negatively correlated.
Conditional gross flows

- Gross inflows by foreigners and residents are volatile and negatively correlated

- When do gross flows expand ($GIF \uparrow$ and $GIR \downarrow$)? When is there retrenchment ($GIF \downarrow$ and $GIR \uparrow$)?
Conditional gross flows

- Gross inflows by foreigners and residents are volatile and negatively correlated

- When do gross flows expand (GIF ↑ and GIR ↓)? When is there retrenchment (GIF ↓ and GIR ↑)?

- Cyclicality of gross flows: Regressions of gross flows on cyclical variables
  \[ Y_{c,t} = \beta \cdot X_{c,t} + \alpha_c + \gamma_c \cdot t + \delta_t + \varepsilon_{c,t} \]
  where \( Y \) is GIF or GIR, \( X \) is trade balance, net capital flows, or detrended real GDP growth, and we include time dummies and country trends
Conditional gross flows

- Gross inflows by foreigners and residents are volatile and negatively correlated

- When do gross flows expand ($GIF \uparrow$ and $GIR \downarrow$)? When is there retrenchment ($GIF \downarrow$ and $GIR \uparrow$)?

- Cyclicality of gross flows: Regressions of gross flows on cyclical variables
  \[
  Y_{c,t} = \beta \cdot X_{c,t} + \alpha_c + \gamma_c \cdot t + \delta_t + \varepsilon_{c,t}
  \]
  where $Y$ is $GIF$ or $GIR$, $X$ is trade balance, net capital flows, or detrended real GDP growth, and we include time dummies and country trends

- Gross flows during crises: Event studies
  \[
  Y_{c,t} = \beta_{-2} \cdot Crisis_{c,t+2} + \beta_{-1} \cdot Crisis_{c,t+1} + \beta \cdot Crisis_{c,t} + \beta_{+1} \cdot Crisis_{c,t-1} + \beta_{+2} \cdot Crisis_{c,t-2} + \alpha_c + \gamma_c \cdot t + \delta_t + \varepsilon_{c,t}
  \]
  where $Y$ is $GIF$ or $GIR$, $Crisis_{c,t}$ indicates whether there was a crisis in country $c$ at time $t$, and we include time dummies and country trends
Crisis indicators

- **External Debt Crises**
  - Reinhart and Reinhart (2008)
  - Laeven and Valencia (2008)
  - S&P’s foreign currency default

- **Domestic Debt Crises**
  - S&P’s local currency default
  - Reinhart and Rogoff (2008)

- **Banking Crises**
  - Reinhart and Rogoff (2008)
  - Laeven and Valencia (2008)
  - Honohan and Laeven (2005)

- **Currency Crises**
  - Laeven and Valencia (2008)
## Cyclicality of Gross Capital Flows

<table>
<thead>
<tr>
<th></th>
<th>High-Income Countries</th>
<th>Middle-Income Countries</th>
<th>Low-Income Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade Balance</td>
<td>GIF: -0.29**, GIR: -0.78**, GIF-GIR: 0.48</td>
<td>GIF: -0.50***, GIR: -0.33**, GIF-GIR: -0.16</td>
<td>GIF: -0.40***, GIR: -0.13***, GIF-GIR: -0.27**</td>
</tr>
<tr>
<td>Net Flows</td>
<td>GIF: 0.34, GIR: 0.66**, GIF-GIR: -0.31</td>
<td>GIF: 0.60***, GIR: 0.40***, GIF-GIR: 0.19</td>
<td>GIF: 0.77***, GIR: 0.23***, GIF-GIR: 0.53***</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.59, 0.62, 0.60, 0.60, 0.60, 0.60, 0.59, 0.59, 0.60</td>
<td>0.69, 0.60, 0.55, 0.74, 0.63, 0.55, 0.55, 0.55, 0.55</td>
<td>0.58, 0.49, 0.52, 0.82, 0.54, 0.59, 0.50, 0.46, 0.50</td>
</tr>
</tbody>
</table>

Data from 1970-2007. All flows are normalized by trend GDP. Country trends, country dummies, and year dummies are included in all regressions. * significant at 10%; ** significant at 5%; *** significant at 1%
### Gross Capital Flows During Crises

<table>
<thead>
<tr>
<th></th>
<th>High-Income Countries</th>
<th>Middle-Income Countries</th>
<th>Low-Income Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GIF</td>
<td>GIR</td>
<td>GIF</td>
</tr>
<tr>
<td>Year t - 2</td>
<td>3.7*</td>
<td>-3.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Year t - 1</td>
<td>4.1*</td>
<td>-4.8</td>
<td>0.5</td>
</tr>
<tr>
<td>Crisis Year</td>
<td>4.4*</td>
<td>-4.1</td>
<td>-1.6*</td>
</tr>
<tr>
<td>Year t + 1</td>
<td>1.7</td>
<td>3.0</td>
<td>-1.2</td>
</tr>
<tr>
<td>Year t + 2</td>
<td>1.9</td>
<td>-1.1</td>
<td>-2.0***</td>
</tr>
<tr>
<td>No. of Crises</td>
<td>49</td>
<td>49</td>
<td>105</td>
</tr>
<tr>
<td>Observations</td>
<td>1,093</td>
<td>1,093</td>
<td>531</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.46</td>
<td>0.46</td>
<td>0.50</td>
</tr>
</tbody>
</table>

Data from 1970-2007. All flows are normalized by trend GDP. Country trends, country dummies, and year dummies are included in all regressions.

* significant at 10%;  ** significant at 5%;  *** significant at 1%
Gross Capital Flows During Crises

**High-Income Countries**
*Gross Inflows*

- **Foreigners**
- **Residents**

**Middle-Income Countries**
*Gross Inflows*

- **Foreigners**
- **Residents**

**Low-Income Countries**
*Gross Inflows*

- **Foreigners**
- **Residents**
### Gross Capital Flows During Mild and Severe Crises

<table>
<thead>
<tr>
<th></th>
<th>High-Income Countries</th>
<th></th>
<th>Middle-Income Countries</th>
<th></th>
<th>Low-Income Countries</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GIF</td>
<td>GIR</td>
<td>GIF</td>
<td>GIR</td>
<td>GIF</td>
<td>GIR</td>
</tr>
<tr>
<td><strong>Mild Crises</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year t - 2</td>
<td>3.3</td>
<td>-2.9</td>
<td>1.2</td>
<td>-1.0**</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Year t - 1</td>
<td>4.2*</td>
<td>-4.7</td>
<td>0.2</td>
<td>0.9</td>
<td>0.2</td>
<td>-0.2</td>
</tr>
<tr>
<td>Crisis Year</td>
<td>4.8*</td>
<td>-4.4</td>
<td>-0.6</td>
<td>0.6</td>
<td>-1.3**</td>
<td>0.1</td>
</tr>
<tr>
<td>Year t + 1</td>
<td>2.0</td>
<td>3.2</td>
<td>-0.9</td>
<td>-0.9</td>
<td>-0.7</td>
<td>-1.0**</td>
</tr>
<tr>
<td>Year t + 2</td>
<td>2.3</td>
<td>-1.4</td>
<td>-1.9***</td>
<td>0.0</td>
<td>-0.4</td>
<td>-0.3</td>
</tr>
<tr>
<td><strong>Severe Crises</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year t - 2</td>
<td>13.8*</td>
<td>-6.6</td>
<td>0.2</td>
<td>1.7</td>
<td>2.300</td>
<td>-0.2</td>
</tr>
<tr>
<td>Year t - 1</td>
<td>5.0</td>
<td>-3.7</td>
<td>1.2</td>
<td>-0.1</td>
<td>2.8</td>
<td>-0.2</td>
</tr>
<tr>
<td>Crisis Year</td>
<td>0.2</td>
<td>-0.6</td>
<td>-5.1***</td>
<td>4.4***</td>
<td>-3.2***</td>
<td>1.4*</td>
</tr>
<tr>
<td>Year t + 1</td>
<td>-2.4</td>
<td>-2.2</td>
<td>-2.0</td>
<td>-3.1**</td>
<td>-5.9*</td>
<td>-0.7</td>
</tr>
<tr>
<td>Year t + 2</td>
<td>-3.0</td>
<td>3.8</td>
<td>-2.3</td>
<td>-2.2***</td>
<td>-0.8</td>
<td>-1.4</td>
</tr>
<tr>
<td><strong>No. of Mild Crises</strong></td>
<td>46</td>
<td>46</td>
<td>83</td>
<td>83</td>
<td>114</td>
<td>114</td>
</tr>
<tr>
<td><strong>No. of Severe Crises</strong></td>
<td>3</td>
<td>3</td>
<td>22</td>
<td>22</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>1,093</td>
<td>1,093</td>
<td>531</td>
<td>531</td>
<td>827</td>
<td>827</td>
</tr>
<tr>
<td><strong>R-squared</strong></td>
<td>0.46</td>
<td>0.46</td>
<td>0.51</td>
<td>0.47</td>
<td>0.54</td>
<td>0.45</td>
</tr>
</tbody>
</table>

Data from 1970-2007. All flows are normalized by trend GDP. Country trends, country dummies, and year dummies are included in all regressions.

* significant at 10%; ** significant at 5%; *** significant at 1%
Gross Capital Flows During Mild and Severe Crises

**Mild Crises**

**High-Income Countries**
- Gross Inflows
- Foreigners
- Residents

**Middle-Income Countries**
- Gross Inflows
- Foreigners
- Residents

**Low-Income Countries**
- Gross Inflows
- Foreigners

**Severe Crises**

**High-Income Countries**
- Gross Inflows
- Foreigners
- Residents

**Middle-Income Countries**
- Gross Inflows
- Residents

**Low-Income Countries**
- Gross Inflows
- Residents
Interpretation

- Very large negative correlation between $GIF$ and $GIR$ in high-income countries
  - puzzle?
Interpretation

- Very large negative correlation between \( GIF \) and \( GIR \) in high-income countries
  - puzzle?

- In high-income countries, net inflows are associated mostly with positive \( GIR \). In middle- and low-income countries, net inflows are associated mostly with positive \( GIF \)
Interpretation

- Very large negative correlation between $GIF$ and $GIR$ in high-income countries
  - puzzle?

- In high-income countries, net inflows are associated mostly with positive $GIR$. In middle- and low-income countries, net inflows are associated mostly with positive $GIF$

- During crises there is retrenchment: $GIF \downarrow$ and $GIR \uparrow$
  - difficult to explain solely with real shocks; negative real shocks should lead to $GIF \downarrow$ and $GIR \downarrow$
  - no evidence of fire sales of domestic assets to foreign investors
  - no evidence of domestic capital flight
  - we need shocks that affect domestic and foreign investors asymmetrically
  - sovereign risk (and secondary markets?): e.g. Broner, Martin, and Ventura (2006)
  - asymmetric information: e.g. Brennan and Cao (1997)