# Sovereign Risk and International Portfolio Dynamics

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Aitor Erce
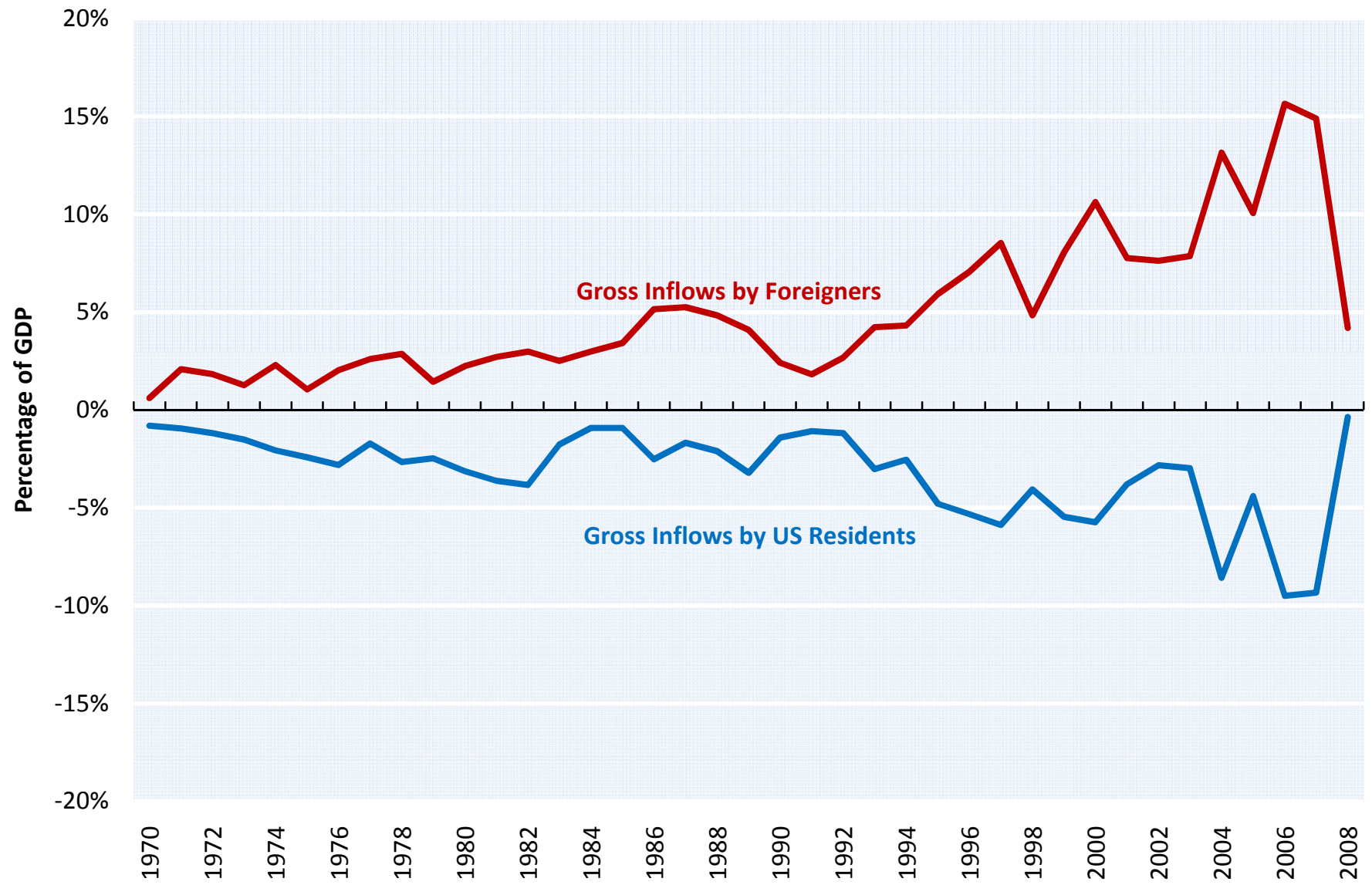*Banco de España*

Sergio Schmukler
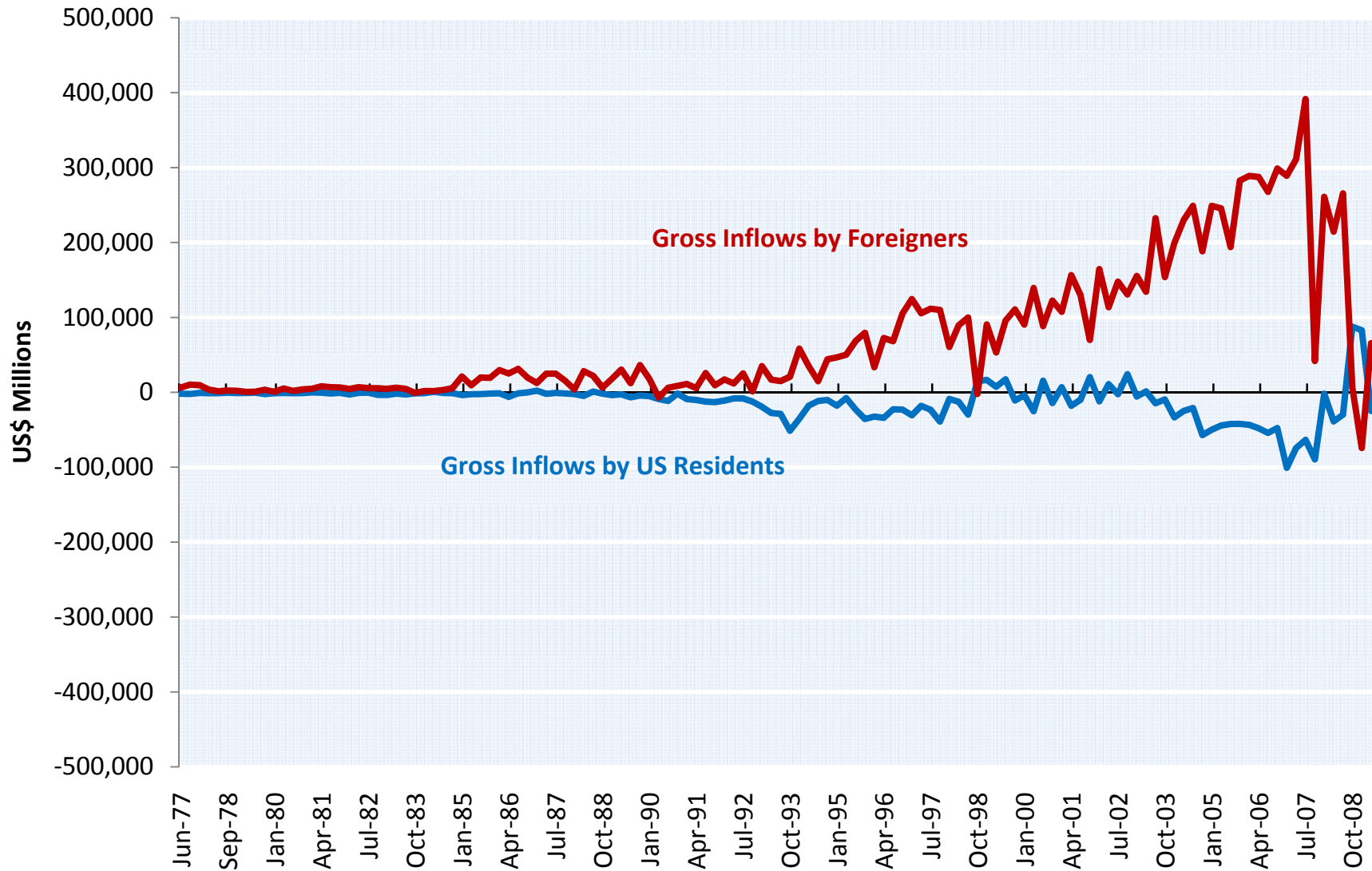*World Bank*

September 2009

VERY PRELIMINARY

# United States
## *Annual Data from IFS*



Gross Inflows by Foreigners

Gross Inflows by US Residents

Percentage of GDP

# US Gross Capital (Long-Term Security) Flows
## *Quarterly Data from US Dept. of the Treasury*



Gross Inflows by Foreigners

Gross Inflows by US Residents

US$ Millions

500,000
400,000
300,000
200,000
100,000
0
-100,000
-200,000
-300,000
-400,000
-500,000

Jun-77 Sep-78 Jan-80 Apr-81 Jul-82 Oct-83 Jan-85 Apr-86 Jul-87 Oct-88 Jan-90 Apr-91 Jul-92 Oct-93 Jan-95 Apr-96 Jul-97 Oct-98 Jan-00 Apr-01 Jul-02 Oct-03 Jan-05 Apr-06 Jul-07 Oct-08

**Objective**

- Provide stylized facts on international portfolio dynamics, for advanced and developing countries

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- Gross capital flows are larger and more volatile than net capital flows

- In advanced countries, net flows are driven mostly by gross flows by residents $(GIR)$

- In developing countries, net flows are driven mostly by gross flows by foreigners $(GIF)$

- During crises there is retrenchment: foreigners leave $(GIF \downarrow)$, residents come back $(GIR \uparrow)$

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- During crises there is retrenchment: foreigners leave $(GIF \downarrow)$, residents come back $(GIR \uparrow)$

- Interpretation: productivity shocks, sovereign risk and secondary markets, 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)

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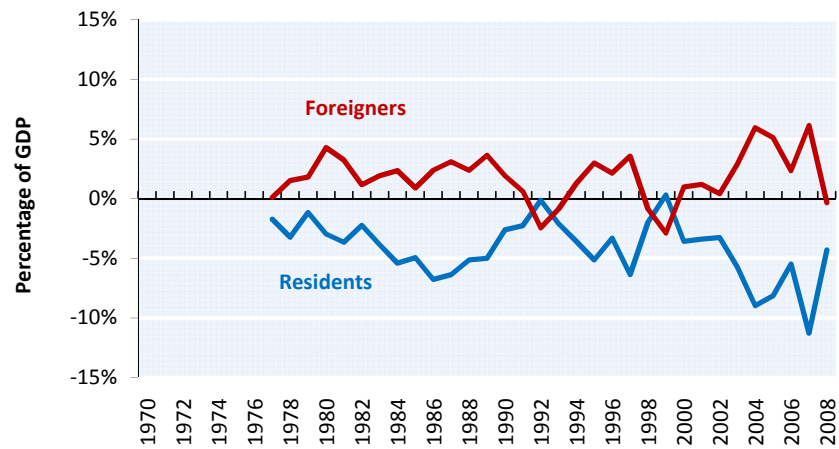  - Cowan, De Gregorio, Micco, and Neilson (2007)

- Our emphasis is on high frequency dynamics instead of long-run trends

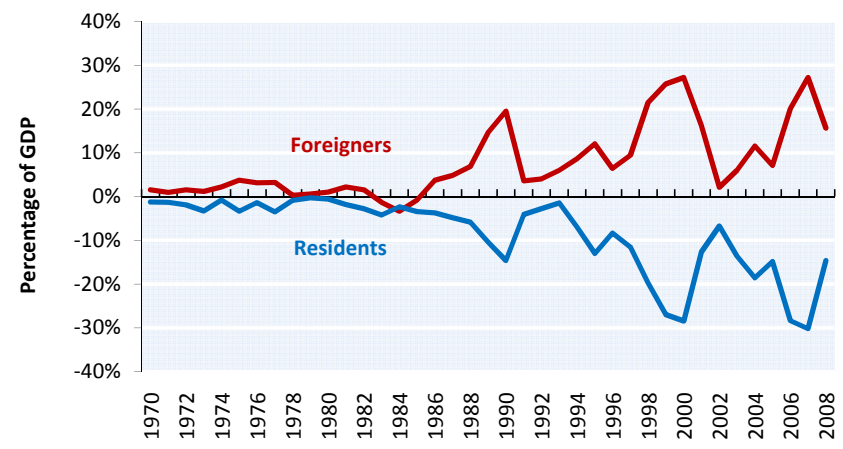Gross Capital Flows
10-Year Averages
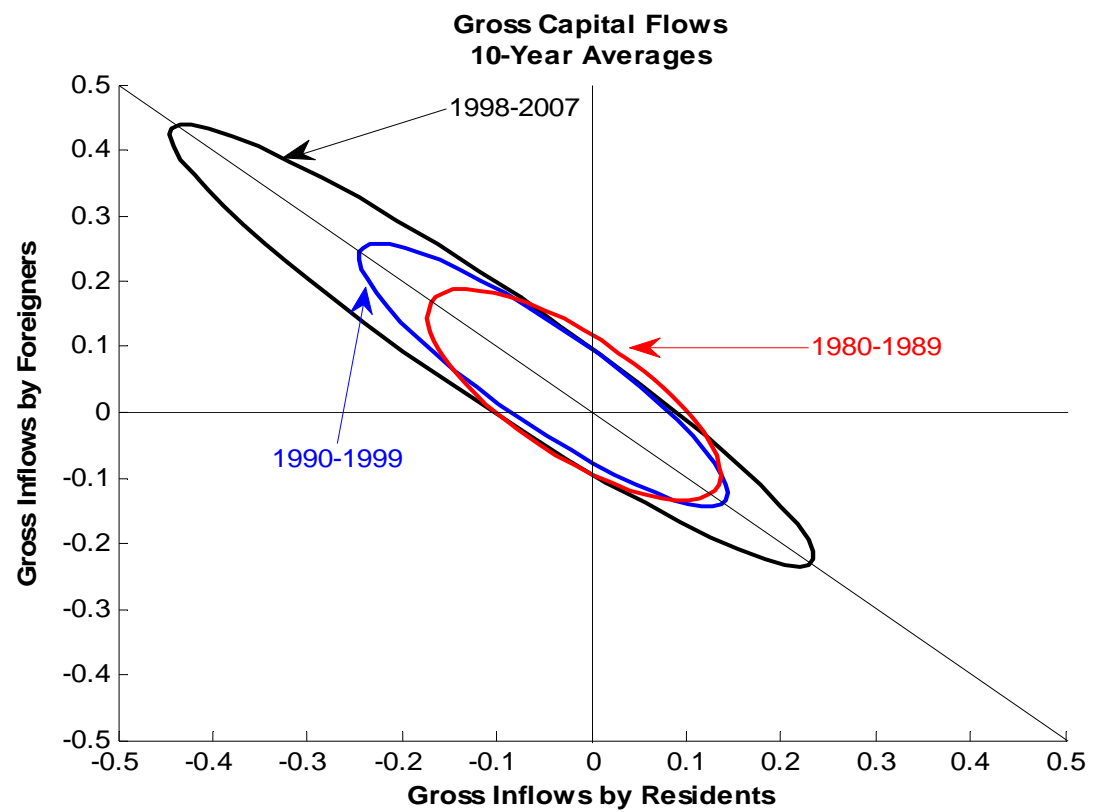
# Gross Capital Flows: Foreigners vs. Residents
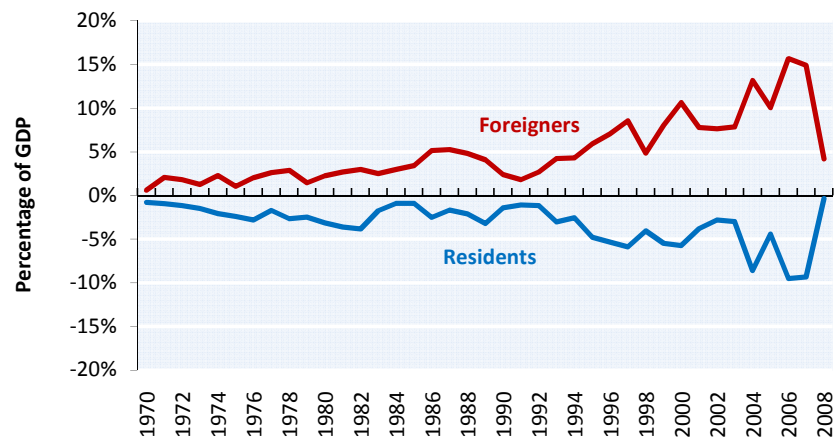
## Japan



## Sweden



## United States



## United Kingdom
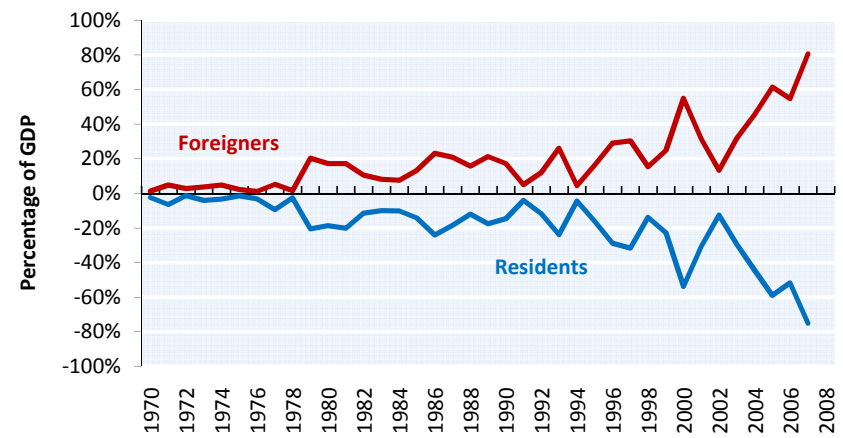
# Gross Capital Flows: Foreigners vs. Residents

## Argentina
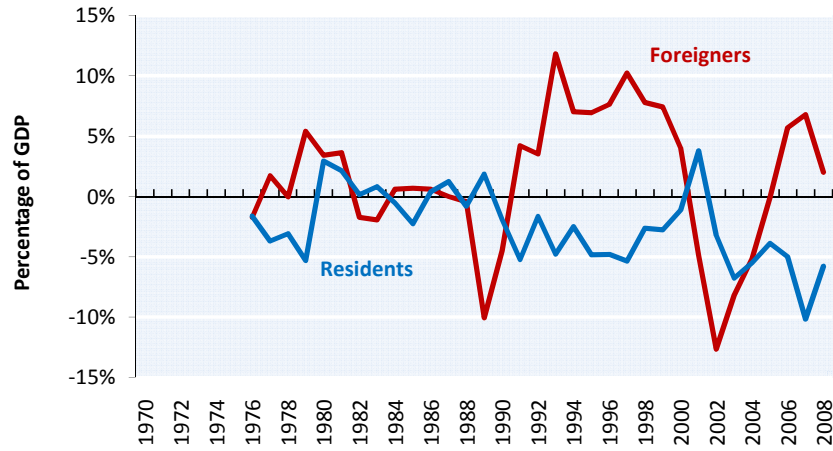


## Chile



## Thailand
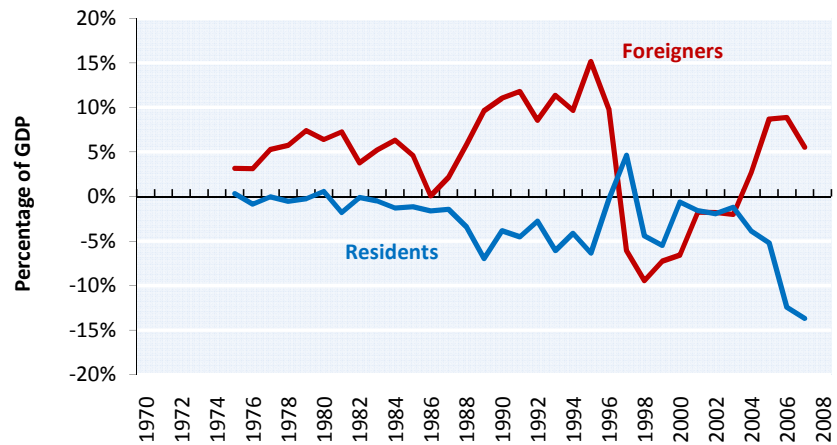


## Turkey
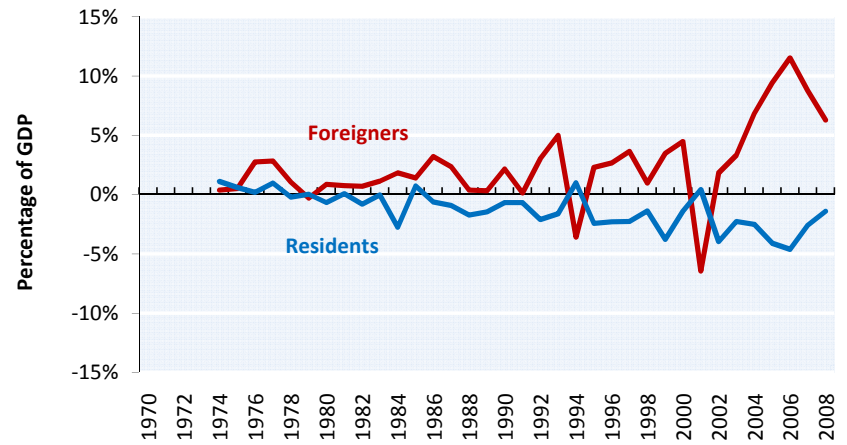
## Correlation of gross flows

- Regressions of gross flows on each other

$$GIF_{c,t} = \beta \cdot GIR_{c,t} + \alpha_t + \gamma_c \cdot t + \delta_t + \varepsilon_{c,t}$$
$$GIR_{c,t} = \beta \cdot GIF_{c,t} + \alpha_t + \gamma_c \cdot t + \delta_t + \varepsilon_{c,t}$$

where we include time dummies and country trends

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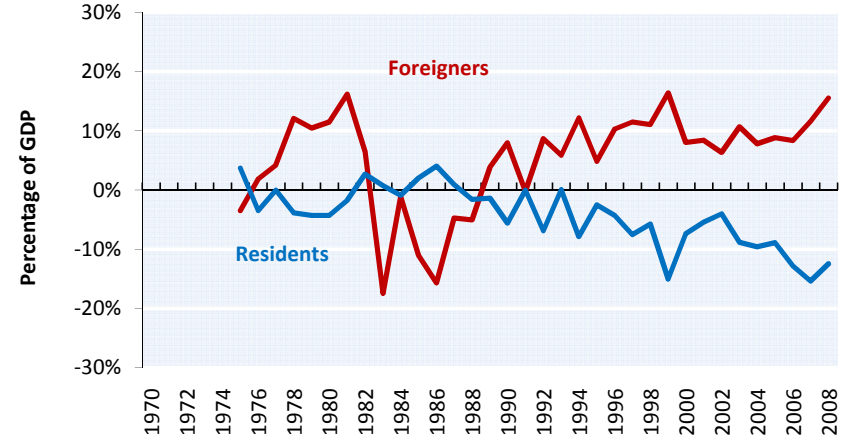
- Pooled countries by income

  - 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

## Fixed Effect Regressions

| | High-Income Countries | | Middle-Income Countries | | Low-Income Countries | |
|---|---|---|---|---|---|---|
| | GIF | GIR | GIF | GIR | GIF | GIR |
| **GIR** | -0.97*** | | -0.31** | | -0.37*** | |
| | [0.04] | | [0.11] | | [0.12] | |
| **GIF** | | -0.98*** | | -0.22** | | -0.15** |
| | | [0.02] | | [0.09] | | [0.06] |
| | | | | | | |
| **Observations** | 1,261 | 1,261 | 631 | 631 | 979 | 979 |
| **R-squared** | 0.96 | 0.96 | 0.58 | 0.52 | 0.52 | 0.49 |

Country trends, country dummies, and year dummies are included in all regressions.

Robust standard errors in brackets

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

**Conditional gross flows**

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

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- Cyclicality of gross flows: Regressions of gross flows on cyclical variables

$$Y_{c,t} = \beta \cdot X_{c,t} + \alpha_t + \gamma_c \cdot t + \delta_t + \varepsilon_{c,t}$$

  where $Y$ is $GIF$ or $GIR$, and $X$ is trade balance, net capital flows, or detrended real GDP growth (with time dummies and country trends)

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- Gross flows during crises: Event studies

$$X_{c,t} = \beta_{-2} \cdot Crisis_{c,t+2} + \beta_{-1} \cdot Crisis_{c,t+1} + \beta \cdot Crisis_{c,t} + \beta_{+1} \cdot Crisis_{c,t-1} +$$
$$+ \beta_{+2} \cdot Crisis_{c,t-2} + \alpha_t + \gamma_c \cdot t + \delta_t + \varepsilon_{c,t}$$

  where $Y$ is $GIF$ or $GIR$, and $Crisis_{c,t}$ indicates whether there was a crisis in country $c$ at time $t$ (with 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)

  – IMF (1998)

  – Reinhart and Reinhart (2008)

## Fixed Effect Regressions

### High-Income Countries

|  | GIF | GIR | GIF-GIR | GIF | GIR | GIF-GIR | GIF | GIR | GIF-GIR |
|---|---|---|---|---|---|---|---|---|---|
| Trade Balance | -3.80** | -7.18** | 3.38 | | | | | | |
| | [1.65] | [3.42] | [4.88] | | | | | | |
| Net Flows | | | | 0.31 | 0.69*** | -0.38 | | | |
| | | | | [0.20] | [0.20] | [0.40] | | | |
| GDP: Cycle | | | | | | | 0.29 | -0.64* | 0.93* |
| | | | | | | | [0.21] | [0.34] | [0.48] |
| | | | | | | | | | |
| Observations | 1,261 | 1,261 | 1,261 | 1,261 | 1,261 | 1,261 | 1,261 | 1,261 | 1,261 |
| R-squared | 0.25 | 0.26 | 0.25 | 0.25 | 0.27 | 0.25 | 0.24 | 0.26 | 0.25 |

### Middle-Income Countries

|  | GIF | GIR | GIF-GIR | GIF | GIR | GIF-GIR | GIF | GIR | GIF-GIR |
|---|---|---|---|---|---|---|---|---|---|
| Trade Balance | -4.95*** | -3.22** | -1.73 | | | | | | |
| | [1.37] | [1.40] | [2.74] | | | | | | |
| Net Flows | | | | 0.61*** | 0.39*** | 0.23 | | | |
| | | | | [0.14] | [0.14] | [0.28] | | | |
| GDP: Cycle | | | | | | | 0.09*** | 0.02 | 0.07** |
| | | | | | | | [0.03] | [0.03] | [0.04] |
| | | | | | | | | | |
| Observations | 631 | 631 | 631 | 631 | 631 | 631 | 631 | 631 | 631 |
| R-squared | 0.71 | 0.60 | 0.56 | 0.76 | 0.63 | 0.57 | 0.56 | 0.49 | 0.56 |

### Low-Income Countries

|  | GIF | GIR | GIF-GIR | GIF | GIR | GIF-GIR | GIF | GIR | GIF-GIR |
|---|---|---|---|---|---|---|---|---|---|
| Trade Balance | -4.00*** | -1.33*** | -2.67** | | | | | | |
| | [0.99] | [0.46] | [1.02] | | | | | | |
| Net Flows | | | | 0.77*** | 0.24*** | 0.53*** | | | |
| | | | | [0.07] | [0.07] | [0.14] | | | |
| GDP: Cycle | | | | | | | 0.10** | 0.00 | 0.10** |
| | | | | | | | [0.04] | [0.02] | [0.04] |
| | | | | | | | | | |
| Observations | 979 | 979 | 979 | 979 | 979 | 979 | 979 | 979 | 979 |
| R-squared | 0.58 | 0.49 | 0.52 | 0.82 | 0.54 | 0.59 | 0.50 | 0.46 | 0.50 |

Country trends, country dummies, and year dummies are included in all regressions.

Robust standard errors in brackets

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

## Event Studies: Any Crises

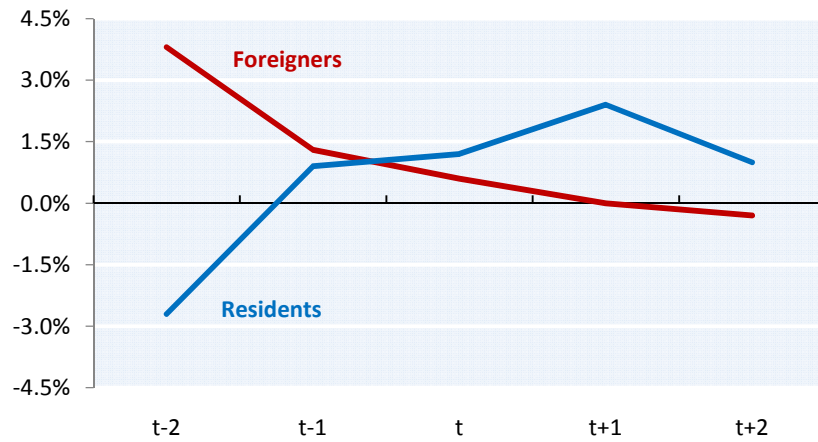| | High-Income Countries | | Middle-Income Countries | | Low-Income Countries | |
|---|---|---|---|---|---|---|
| | GIF | GIR | GIF | GIR | GIF | GIR |
| Year t - 2 | 3.8 | -2.7 | -0.1 | 0.1 | 0.2 | 0.0 |
| Year t - 1 | 1.3 | 0.9 | -0.3 | 0.2 | 0.8 | -0.3 |
| Crisis Year | 0.6 | 1.2 | -1.7** | 1.6*** | -0.9 | 0.4 |
| Year t + 1 | 0.0 | 2.4 | -1.9** | -1.0 | -2.3*** | -0.9** |
| Year t + 2 | -0.3 | 1.0 | -1.7*** | -0.3 | -1.1* | -0.4 |
| | | | | | | |
| No. of Crises | 151 | 151 | 143 | 143 | 179 | 179 |
| Observations | 1,093 | 1,093 | 531 | 531 | 827 | 827 |
| R-squared | 0.46 | 0.46 | 0.50 | 0.44 | 0.53 | 0.45 |
| | | | | | | |
| Wald Tests: | | | | | | |
| Ct vs (Ct-1+Ct-2)/2 | 1.3 | 1.6 | 9.6*** | 5.9** | 7.8*** | 0.9 |

Country trends, country dummies, and year dummies are included in all regressions.

Robust standard errors in brackets
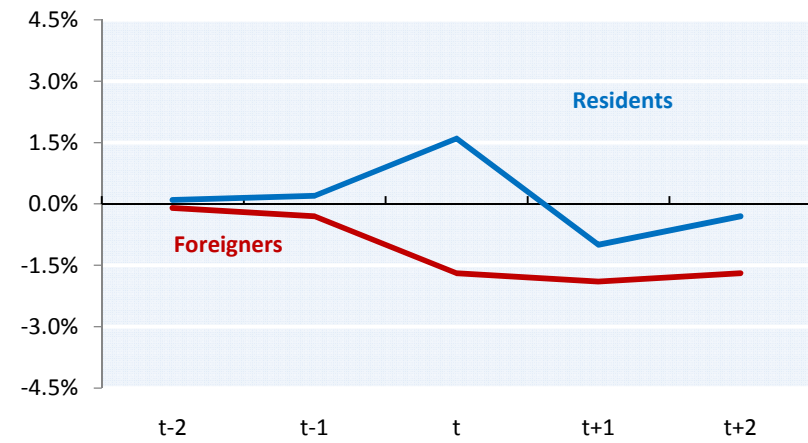
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# Event Studies: Any Crisis

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



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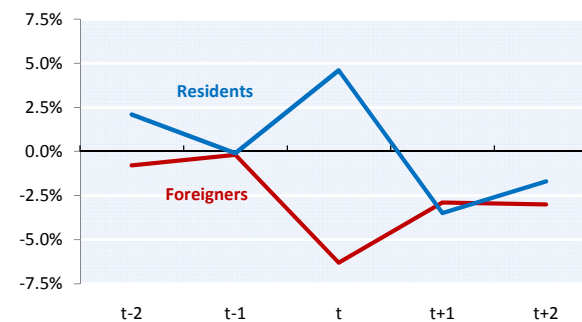


## Low-Income Countries
### *Gross Inflows*

## Event Studies: Intensity of Crises

| | High-Income Countries | | Middle-Income Countries | | Low-Income Countries | |
|---|---|---|---|---|---|---|
| | GIF | GIR | GIF | GIR | GIF | GIR |
| Year t - 2: Only 1 Crisis | 3.7 | -2.8 | 0.0 | -0.2 | -0.2 | 0.0 |
| Year t - 1: Only 1 Crisis | 1.3 | 0.9 | -0.4 | 0.4 | 0.5 | -0.2 |
| Crisis Year: Only 1 Crisis | 0.6 | 1.4 | -0.7 | 1.0* | -0.6 | 0.2 |
| Year t + 1: Only 1 Crisis | 0.0 | 2.6 | -1.6** | -0.5 | -1.8*** | -1.0** |
| Year t + 2: Only 1 Crisis | -0.3 | 1.2 | -1.6*** | 0.1 | -1.2** | -0.3 |
| | | | | | | |
| Year t - 2: More than 1 Crisis | 5.9 | -2.4 | -0.8 | 2.1 | 2.6** | -0.2 |
| Year t - 1: More than 1 Crisis | 1.4 | -1.1 | -0.2 | -0.1 | 1.6 | -0.2 |
| Crisis Year: More than 1 Crisis | 0.4 | -2.6 | -6.3*** | 4.6*** | -2.8** | 1.4* |
| Year t + 1: More than 1 Crisis | -1.5 | -2.6 | -2.9* | -3.5** | -5.6** | -0.6 |
| Year t + 2: More than 1 Crisis | -0.2 | -1.4 | -3.0** | -1.7** | -0.2 | -1.4 |
| | | | | | | |
| No. of Unique Crises | 143 | 143 | 119 | 119 | 155 | 155 |
| No. of Severe Crises | 8 | 8 | 24 | 24 | 24 | 24 |
| Observations | 1,093 | 1,093 | 531 | 531 | 827 | 827 |
| R-squared | 0.46 | 0.46 | 0.52 | 0.48 | 0.54 | 0.45 |
| | | | | | | |
| Wald Tests: | | | | | | |
| C1t vs (C1t-1+C1t-2)/2 | 1.2 | 1.7 | 1.3 | 2.2 | 2.2 | 0.3 |
| C2t vs (C2t-1+C2t-2)/2 | 1.1 | 0.0 | 17.2*** | 3.1* | 16.2*** | 2.1 |

Country trends, country dummies, and year dummies are included in all regressions.

Robust standard errors in brackets

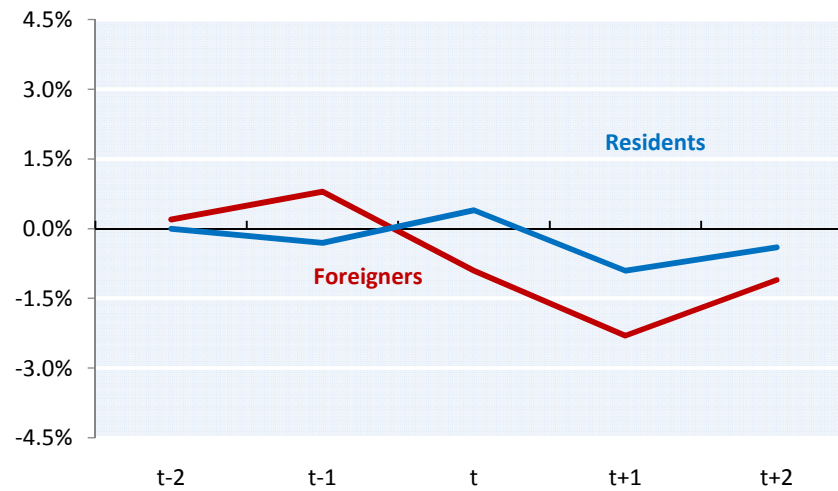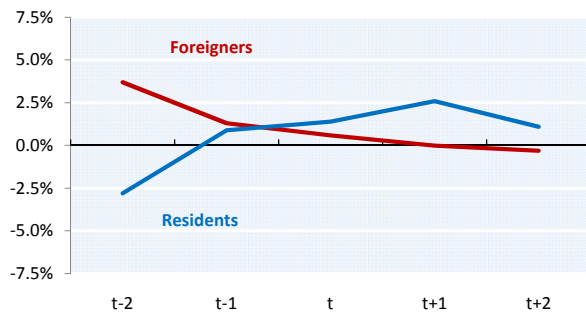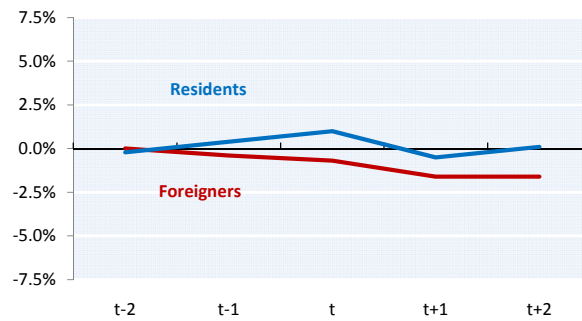* significant at 10%; ** significant at 5%; *** significant at 1%

# Event Studies: Intensity of Crises

## Only 1 Crisis

### High-Income Countries
*Gross Inflows*

Foreigners

Residents

7.5%
5.0%
2.5%
0.0%
-2.5%
-5.0%
-7.5%

t-2    t-1    t    t+1    t+2

### Middle-Income Countries
*Gross Inflows*

Residents

Foreigners

7.5%
5.0%
2.5%
0.0%
-2.5%
-5.0%
-7.5%

t-2    t-1    t    t+1    t+2

### Low-Income Countries
*Gross Inflows*

Foreigners

Residents

7.5%
5.0%
2.5%
0.0%
-2.5%
-5.0%
-7.5%

t-2    t-1    t    t+1    t+2

## More Than 1 Crisis

### High-Income Countries
*Gross Inflows*

Foreigners

Residents

7.5%
5.0%
2.5%
0.0%
-2.5%
-5.0%
-7.5%

t-2    t-1    t    t+1    t+2

### Middle-Income Countries
*Gross Inflows*

Residents

Foreigners

7.5%
5.0%
2.5%
0.0%
-2.5%
-5.0%
-7.5%

t-2    t-1    t    t+1    t+2

### Low-Income Countries
*Gross Inflows*

Foreigners

Residents

7.5%
5.0%
2.5%
0.0%
-2.5%
-5.0%
-7.5%

t-2    t-1    t    t+1    t+2

## Event Studies: Intensity of Crises

### High-Income Countries

| | GIF | | | | GIR | | |
|---|---|---|---|---|---|---|---|
| | PI | OI | FDI | Reserves | PI | OI | FDI |
| Year t - 2: Only 1 Crisis | -0.2 | 3.6 | 0.3 | 0.1 | 0.0 | -2.6 | -0.2 |
| Year t - 1: Only 1 Crisis | -0.5 | 2.0 | -0.1 | 0.7* | 0.4 | -0.1 | 0.0 |
| Crisis Year: Only 1 Crisis | -0.7 | 1.4* | -0.1 | 1.0** | 0.6 | 0.0 | -0.3 |
| Year t + 1: Only 1 Crisis | -0.1 | 0.3 | -0.1 | 0.8** | 0.0 | 1.9 | -0.1 |
| Year t + 2: Only 1 Crisis | 0.3 | -0.8 | 0.2 | -0.2 | 0.2 | 1.3 | 0.0 |
| | | | | | | | |
| Year t - 2: More than 1 Crisis | 0.3 | 6.9 | -1.3* | 3.6 | -0.8 | -5.1 | 0.0 |
| Year t - 1: More than 1 Crisis | 0.2 | 2.2 | -1.1 | 2.4* | -0.9 | -2.5 | -0.2 |
| Crisis Year: More than 1 Crisis | -0.4 | 1.6 | -0.8 | 1.1 | -0.2 | -3.3 | -0.2 |
| Year t + 1: More than 1 Crisis | -0.8* | -0.6 | -0.2 | -2.0** | -0.7 | 0.2 | -0.2 |
| Year t + 2: More than 1 Crisis | 0.6 | -0.7 | 0.0 | -1.8* | -0.8 | 1.3 | -0.1 |
| | | | | | | | |
| No. of Unique Crises | 143 | 143 | 143 | 143 | 143 | 143 | 143 |
| No. of Severe Crises | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| Observations | 1,093 | 1,093 | 1,093 | 1,093 | 1,093 | 1,093 | 1,093 |
| R-squared | 0.67 | 0.36 | 0.62 | 0.28 | 0.71 | 0.34 | 0.61 |
| | | | | | | | |
| **Wald Tests:** | | | | | | | |
| C1t vs (C1t-1+C1t-2)/2 | 1.1 | 0.7 | 0.7 | 1.8 | 2.2 | 0.7 | 0.4 |
| C2t vs (C2t-1+C2t-2)/2 | 1.3 | 1.5 | 0.3 | 0.8 | 0.7 | 0.0 | 0.1 |

Country trends, country dummies, and year dummies are included in all regressions.

Robust standard errors in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%
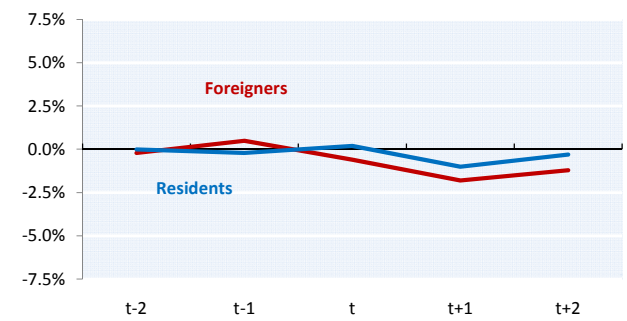
## Event Studies: Intensity of Crises

### Middle-Income Countries

| | GIF | | | GIR | | | |
|---|---|---|---|---|---|---|---|
| | PI | OI | FDI | Reserves | PI | OI | FDI |
| Year t - 2: Only 1 Crisis | 0.1 | 0.1 | -0.2 | 0.1 | -0.1 | -0.3 | 0.1* |
| Year t - 1: Only 1 Crisis | -0.1 | -0.1 | -0.2 | 0.6* | 0.0 | -0.3 | 0.1 |
| Crisis Year: Only 1 Crisis | 0.0 | -0.5 | -0.2 | 1.0** | -0.1 | -0.1 | 0.1 |
| Year t + 1: Only 1 Crisis | 0.1 | -1.3** | -0.4** | -0.4 | -0.2 | -0.1 | 0.1 |
| Year t + 2: Only 1 Crisis | -0.3 | -1.0** | -0.3 | 0.1 | 0.0 | 0.0 | 0.1 |
| | | | | | | | |
| Year t - 2: More than 1 Crisis | -0.6 | 0.2 | -0.5 | 1.6* | 0.2 | 0.3 | 0.1 |
| Year t - 1: More than 1 Crisis | -0.1 | 0.1 | -0.2 | 0.0 | 0.1 | -0.3 | 0.1 |
| Crisis Year: More than 1 Crisis | -1.4* | -4.1** | -0.8* | 3.5*** | 0.3** | 0.7 | 0.2* |
| Year t + 1: More than 1 Crisis | -1.0 | -1.0 | -0.9** | -1.9* | -0.1 | -1.6** | 0.2 |
| Year t + 2: More than 1 Crisis | -1.1* | -1.3** | -0.6 | -0.8 | -0.6** | -0.4 | 0.1 |
| | | | | | | | |
| No. of Unique Crises | 119 | 119 | 119 | 119 | 119 | 119 | 119 |
| No. of Severe Crises | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| Observations | 531 | 531 | 531 | 531 | 531 | 531 | 531 |
| R-squared | 0.19 | 0.41 | 0.61 | 0.42 | 0.40 | 0.40 | 0.45 |
| | | | | | | | |
| Wald Tests: | | | | | | | |
| C1t vs (C1t-1+C1t-2)/2 | 0.0 | 0.6 | 0.0 | 2.2 | 0.3 | 0.4 | 0.5 |
| C2t vs (C2t-1+C2t-2)/2 | 11.6*** | 8.8*** | 2.3 | 4.2** | 0.6 | 0.4 | 0.9 |

Country trends, country dummies, and year dummies are included in all regressions.

Robust standard errors in brackets

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

## Event Studies: Intensity of Crises

### Low-Income Countries

| | GIF | | | | GIR | | |
|---|---|---|---|---|---|---|---|
| | PI | OI | FDI | Reserves | PI | OI | FDI |
| Year t - 2: Only 1 Crisis | -0.1 | 0.0 | -0.1 | 0.0 | 0.2 | -0.1 | 0.0 |
| Year t - 1: Only 1 Crisis | 0.0 | 0.8** | -0.2 | -0.1 | 0.1 | -0.3* | 0.0 |
| Crisis Year: Only 1 Crisis | -0.1 | -0.9* | 0.3 | 0.6** | 0.1 | -0.5* | 0.0 |
| Year t + 1: Only 1 Crisis | -0.1 | -1.4** | -0.3 | -0.3 | 0.1* | -0.9** | 0.1 |
| Year t + 2: Only 1 Crisis | -0.3 | -0.6 | -0.3 | -0.4 | 0.1 | 0.0 | 0.0 |
| | | | | | | | |
| Year t - 2: More than 1 Crisis | 0.5*** | 2.1** | -0.1 | -0.3 | -0.1 | 0.2 | 0.0 |
| Year t - 1: More than 1 Crisis | 0.5 | 1.3 | -0.2 | 0.4 | 0.0 | -0.5 | -0.1 |
| Crisis Year: More than 1 Crisis | -0.2 | -2.4** | -0.2 | 1.6* | -0.1 | 0.0 | 0.0 |
| Year t + 1: More than 1 Crisis | -1.2 | -3.6* | -0.8** | -0.2 | -0.1 | -0.4 | 0.0 |
| Year t + 2: More than 1 Crisis | 0.1 | 0.0 | -0.3 | -2.3 | -0.1 | 1.0 | 0.0 |
| | | | | | | | |
| No. of Unique Crises | 155 | 155 | 155 | 155 | 155 | 155 | 155 |
| No. of Severe Crises | 24 | 24 | 24 | 24 | 24 | 24 | 24 |
| Observations | 827 | 827 | 827 | 827 | 827 | 827 | 827 |
| R-squared | 0.32 | 0.58 | 0.57 | 0.28 | 0.74 | 0.39 | 0.68 |
| | | | | | | | |
| **Wald Tests:** | | | | | | | |
| C1t vs (C1t-1+C1t-2)/2 | 0.1 | 8.7*** | 1.1 | 2.2 | 0.4 | 1.2 | 0.0 |
| C2t vs (C2t-1+C2t-2)/2 | 3.0* | 9.6*** | 0.0 | 2.0 | 0.3 | 0.1 | 0.4 |

Country trends, country dummies, and year dummies are included in all regressions.

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- During crises there is retrenchment: $GIF \downarrow$ and $GIR \uparrow$

    - difficult to explain solely with productivity shocks; negative shocks would lead to $GIF \downarrow$ and $GIR \downarrow$
    - we need shocks that affect domestic and foreign investors asymmetrically
    - sovereign risk (and secondary markets?) likely plays a role: e.g. Broner, Martin, and Ventura (2006)
    - asymmetric information is a possible alternative: e.g. Brennan and Cao (1997)