Motivation

- Substantial volatility in cross-border capital flows
  - Long history of “waves”, of booms and busts
- Can have substantial economic costs
  - Surges correlated with real estate booms, banking crises, debt defaults, inflation and currency crises
    - Aizenman and Jinjarek (2009), Caballero (2010), Reinhart and Reinhart (2009)
  - Sudden stops correlated with currency depreciations, slower growth and higher interest rates
- But can also stabilize economies
  - Evidence from recent Global Financial Crisis
- Our question: What causes these extreme movements or “waves” in capital flows?
This Paper: 3 Contributions

1. New methodology to identify capital flow episodes
   - Other work uses net capital flow proxies
   - Our methodology analyzes gross capital flows disaggregated by foreign & domestic investors

2. Evaluate relevance of theoretical models on capital flow volatility, crises and surges
   - Global versus contagion versus domestic factors
   - Relevance of recent theoretical emphasis on global factors driving GFC

3. Understand these events to guide policy responses
Outline

1. Measuring Capital Flow Episodes
   • Our approach
   • Comparison to previous work

2. Explaining the Episodes
   • The theory
   • The evidence

3. Conclusions
Measuring Capital Flow Episodes
Our Approach

• Builds on literature on “sudden stops”, similar approach in recent work on “bonanzas”
Our Approach

• More specifically, to calculate a surge or stop:
  – Let \( C_t \) be a 4-quarter moving sum of gross capital inflows from foreigners (GINFLOW):
    \[
    C_t = \sum_{i=0}^{3} GINFLOW_{t-i}
    \]
    \[
    \Delta C_t = C_t - C_{t-4}
    \]
  – A surge is when \( \Delta C_t \) increases more than 1 standard deviation above its rolling historical mean, provided:
    • \( \Delta C_t \) increases at least 2 sd at some point in episode
    • The entire episode lasts more than 1 quarter
    • Country has at least 4 years of data to calculate historic mean
  – Stop is defined symmetrically
Surges & Stops for Brazil

![Graph showing capital inflows and bands for surge and stop episodes from 1990q1 to 2010q1. The graph highlights surge episodes with yellow arrows and stop episodes with blue arrows. The x-axis represents time in quarters, from 1990q1 to 2010q1, and the y-axis represents the timeseries variable with values ranging from -100 to 100.]
Some Data Specifics

- Main data: IMF’s, IFS
  - Augment with data from country authorities
- Resulting dataset: 58 countries from 1980-2009
  - Coverage substantially better at end of sample
- Baseline definitions:
  - Gross inflows: sum of inflows of direct investment, portfolio inflows & other inflows
  - Gross (private) outflows: sum of outflows of direct investment, portfolio, and other outflows with reserve accumulation omitted
Share of Countries with a Surge

Share of countries experiencing a sudden surge episode (for TO capital flows)

- Asia
- Western Europe
- North America
- Eastern Europe
- Latin America
- Other
Share of countries experiencing a sudden stop episode (for TO capital flows)

- Lower Income
- Middle Income
- High Income
Share of countries experiencing a sudden retrench episode (for TO capital flows)
Comparison to Earlier Methodology

• Main similarities with past work:
  • Focus on periods of “extreme” capital flow movements, not daily flows
  • Define episodes versus rolling historic mean

• Main differences with past work:
  • Use capital flow data rather than current-account based proxies
  • Use data on gross flows instead of net flows
    • Also done in Broner et al (2010), Milesi-Ferretti & Tille (2010)
  • Examine more types of episodes—both sudden increases & decreases in flows driven by domestic versus foreign residents
Example: Chile

Net and Gross Flows for Chile

Net measure: indicates a “surge” of inflows from foreigners

Gross measures: show is actually a “stop” of inflows from foreigners plus a “retrenchment” by domestic citizens.
Explaining the Episodes
Theory

• Extensive literature on cross-country allocation of investment, contagion & capital flow cycles
  – “Push” or external factors
    • Includes global effects & contagion
  – “Pull” or domestic factors

• Global Factors—outside a country’s control, affects world
  – Risk/risk appetite/probability of disaster:
    • Gourio, Siemer and Verdelhan (2010), Baccheta and Van Wincoop (2010), Dedola and Lombardo (2010),
    • Recent emphasis of theoretical work on Great Recession, motivated by Rose and Spiegel (2009)
  – Liquidity/leverage/bank run models
    • Devereux and Yetman (2010), Calvo (2009), Giannetti (2007), Brunnermeier (2009)
  – Interest rates
    • Calvo, Leiderman and Reinhart (1993, 1996)
  – Growth
    • Albuquerque, Loayza, and Serven (2005)
Theory

• **Contagion Effects**—outside of country’s control, resulting from circumstances in another country or group of countries (but not world); Claessens and Forbes, 2001, Dungey et al, 2011
  – Regional effects
  – Trade channels
    • Glick and Rose (1999), Forbes (2002)
  – Financial channels
    • Peek and Rosengreen (1997), Kaminsky, Lyons and Schmukler (2001)

• **Domestic Factors**—country-specific characteristics
  – Financial system size, depth and fragility
    • Recent focus of work on global imbalances
  – Capital controls, integration with global financial markets
  – Fiscal position/solvency
  – Technological shocks/TOT shocks/growth
    • Aguiar and Gopinath (2007)
Regression Analysis

- Estimate conditional probability of having a surge, stop, flight or retrenchment in a quarter

\[ \text{Prob}(e_{it}=1) = F(\phi_t, \gamma_{it}, \alpha_{it}) \]

- \(e_{it}\) is dummy=1 for each episode (surge, stop, flight, retrenchment)
- \(\phi_t\): global factors
- \(\gamma_{it}\): contagion variables
- \(\alpha_{it}\): domestic variables

- Estimation issue: cdf of \(F(.)\) is skewed (85% of episodes=0)
  - Therefore focus on complimentary logarithmic estimator (cloglog)
  - which assumes the cdf of \(F(.)\) is the extreme value distribution,
  \[ F(z) = 1 - \exp[-\exp(z)] \]

- Seemingly unrelated regression estimation to allow for cross-episode correlation in errors
- Robust standard errors, clustered by country
The Components

- **Global factor**
  - **Global risk:** VXO, VIX, quality spread, CSFB Risk Appetite index, Variance Risk Premium (VRP)
  - **Global liquidity:** growth in money supply in largest economies, private credit growth by financial institutions./GDP
  - **Global interest rates:** Avg LT rate in US, euro & Japan, just US
  - **Global productivity:** global GDP growth

- **Contagion factor:**
  - **Geographic proximity:** episode in country in same region
  - **Trade linkages:** based on bilateral trade flows
  - **Financial linkages:** based on bilateral bank exposure

- **Domestic factor**
  - **Financial market depth:** stock market cap/GDP, stock & bond mkt cap/GDP, ROE of banking system
  - **Capital controls:** general controls, intl assets & liabilities/GDP, specific controls, FX regulation, financial regulation
  - **Fiscal position:** public debt to GDP
  - **Productivity shocks:** country GDP growth relative to trend or WEO forecast
  - **GDP per capita**
Results

- **Robust results:**
  - Global risk: most consistently significant factor predicting all episodes—driven by foreigners and domestics
  - Global growth & domestic productivity shocks: significant predicting foreign capital flows (surges & stops)
  - Contagion: through financial and trade linkages significant in predicting stops and retrenchment

- **Robust non-results:**
  - No evidence that capital controls reduce incidence of episodes driven by foreigners
  - Less important role of global liquidity and global interest rates after controlling for risk
Closer Look at Risk Measures

- Measures that combined changes in economic risk (uncertainty etc) and changes in risk aversion
  - VXO, VIX, quality spread
  - Significant in predicting all episodes (except flight)

- Measures that isolate changes in risk aversion/risk appetite
  - Volatility Risk Premium (VRP)-Zhou (2010) and Credit Suisse First Boston Risk Appetite Index (RAI)
  - Significant in predicting stops by foreigners

- Suggest is changes in overall economic risk that are most important factors driving all types of capital flow episodes
  - Changes in risk appetite/risk aversion only important in driving sudden stops driven by foreigners
Conclusions

• New methodology to understand capital flow waves
  – Important to examine gross flows by type of investor
  – Very different results than traditional approach using net flows (especially for role of risk)

• Global & contagion factors most important determinants of surges, stops, flight & retrenchment episodes
  – Supports recent focus in theoretical literature on global risk
  – Little evidence supporting effectiveness of capital controls

• For policymakers seeking to reduce capital flow volatility, is an important role for global institutions and cross-country cooperation
  – Domestic policies may be better aimed at managing the volatility in capital flows (prudential regulations, etc) rather than directly reducing the volatility