Capital Flows at Risk: Push, Pull and the Role of Policy

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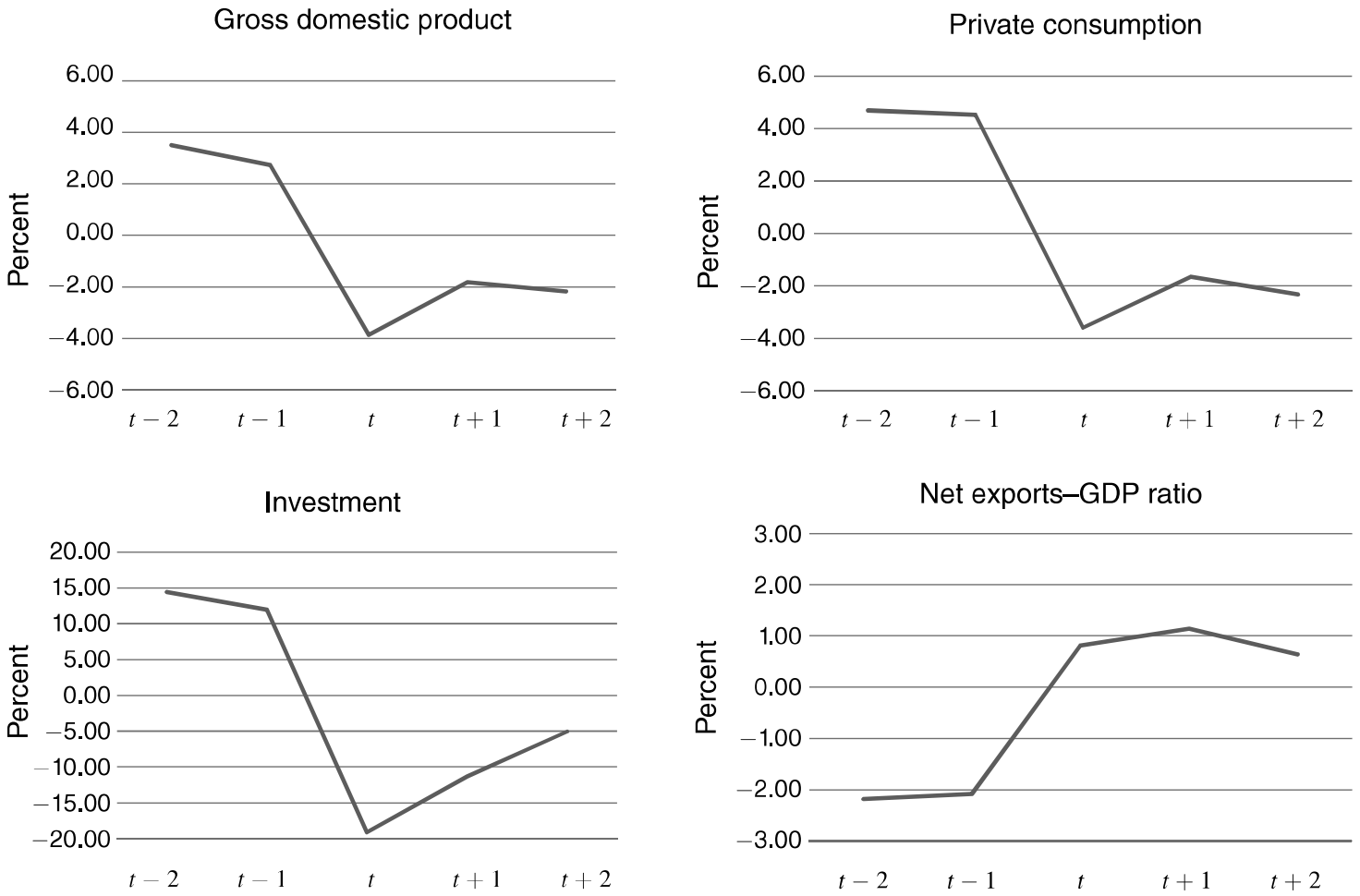
Motivation

Macro dynamics around sudden stops in EMs (Mendoza, 2010)



Motivation

- Sudden stop episodes very costly, want to understand them
- Capital flow determinants typically studied
  - within frameworks focusing on mean outcomes, or
  - considering (arbitrary) tail episodes within logit-type frameworks
- Room for richer insight by characterising entire distribution of capital flows

Our paper

- Interested in characterising the *entire distribution* of capital flows to EMs, with a focus on tail events
- What are the underlying forces 'shaping' this distribution?
  - External ('push') vs. internal ('pull') factors
- What role for policy?
  - Capital flow management, macro-pru

Methodology

- Two building blocks:
  1. Use asset prices to quantify risks facing an economy
     - Split up 'global' and 'local' components
  2. Use that information to characterise the entire distribution of capital flows to a panel of countries

     (relying on quantile regression methodology)

Literature

- Determinants of capital flows

  Calvo et al. (1993), Calvo et al. (2004), Koepke (2019)

  $\Rightarrow$ These papers typically focus on mean outcomes and/or arbitrary episodes

- Methodology: measuring financial conditions & 'revival' of quantile regression

  Miranda-Agrippino & Rey (2015), Arregui et al. (2018), Habib and Venditti (2018); Adrian et al (2016)

  $\Rightarrow$ What we do differently: split financial conditions into global and domestic; use quantile regression to study entire distribution of capital flows

- Not alone: Gelos et al (2020) and Chari et al (2020) also look at capital flows in quantile framework

Data

- Capital flows data
  - Gross capital inflows (non-resident net flows)
  - Source: IMF IFS
  - Look at portfolio flows, FDI and 'other' (banking) flows separately
  - Also have results for resident flows
- Financial variables used to measure financial conditions consistently across 43 countries (in the spirit of Arregui et al., 2018)
  - Term, sovereign, interbank and corporate spreads, long-term sovereign interest rates, equity returns and volatility, and relative capitalization of financials
  - Sources: Thomson Reuters Datastream, JPM, BofAML, Barclays, S&P, MSCI
- Policy measures
  - Capital flow management measures (Fernandez et al, 2016)
  - Macro-prudential measures (Cerutti et al, 2017)

THE INFORMATIONAL CONTENT OF ASSET PRICES

The informational content of asset prices

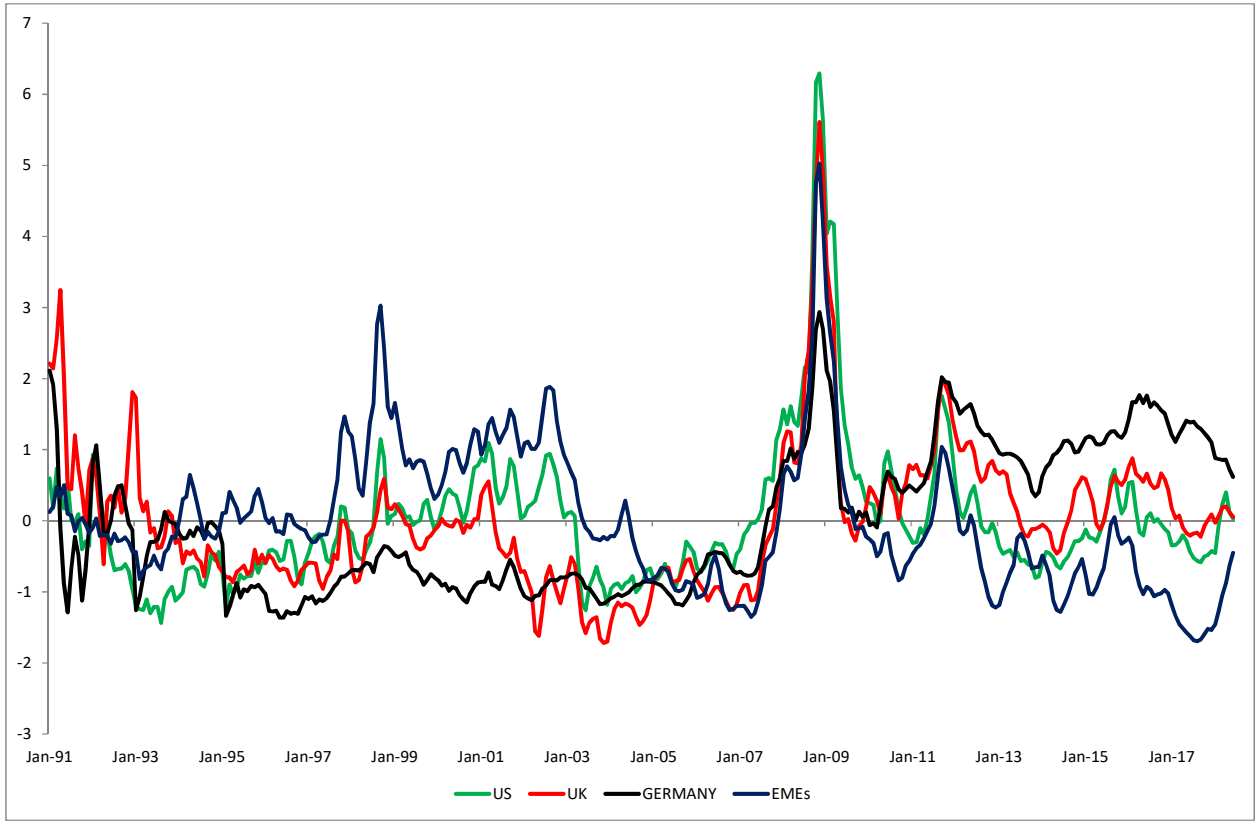
- Capital flows are function of economic outlook and risk environment
- Want measure of risks facing an economy
  - Which metric to focus on?
    - Literature has identified several (growth, debt, bank health, US MP)
    - Very few degrees of freedom in quantile context
- Short-cut: rely on asset prices
  - forward looking
  - embed (risk-adjusted) expectations of outlook
  - can be thought of as information aggregation devices
- Still, similar question: which asset prices to focus on?
  - Construct summary measure of financial conditions (country-time)

The informational content of asset prices

- Want summary measure of financial conditions (proxy of 'ease of access to finance')
- Measure common variation in a set of asset prices (for given country)
  - Consider term, sovereign, interbank and corporate spreads, long-term sovereign interest rates, equity returns and volatility, and relative capitalization of financials
  - Extract the first principal component; that's our **Financial Conditions Index** (simplification of Koop Korobilis 2014's TVP-DFM with 'macro cleaning')
- Do this for 43 countries

The informational content of asset prices

Financial Conditions Indices



- FCIs display a high degree of cross-country co-movement. Global average is meaningful.

The informational content of asset prices

- High degree of co-movement across FCIs
- Interesting in capital flows context:
  - Push- and pull-type components could contain differential information
- Consider a 'global' FCI and country-idiosyncratic FCIs
  - Global FCIs as first principal component / global average ('push') Plot
  - Country-idiosyncratic FCIs as OLS residuals ('pull')

CAPITAL FLOWS AT RISK

Capital flows at risk

- Does the information embedded in asset prices help us characterise the *entire distribution* of capital flows?
- Explore this by:
  - Relying on quantile regression methodology
  - Allowing for different role of push- and pull-type factors

Capital flows at risk

Quantile regression

- Standard (OLS) regression provides an estimate of the conditional mean of a variable of interest
(given a set of covariates)

Capital flows at risk

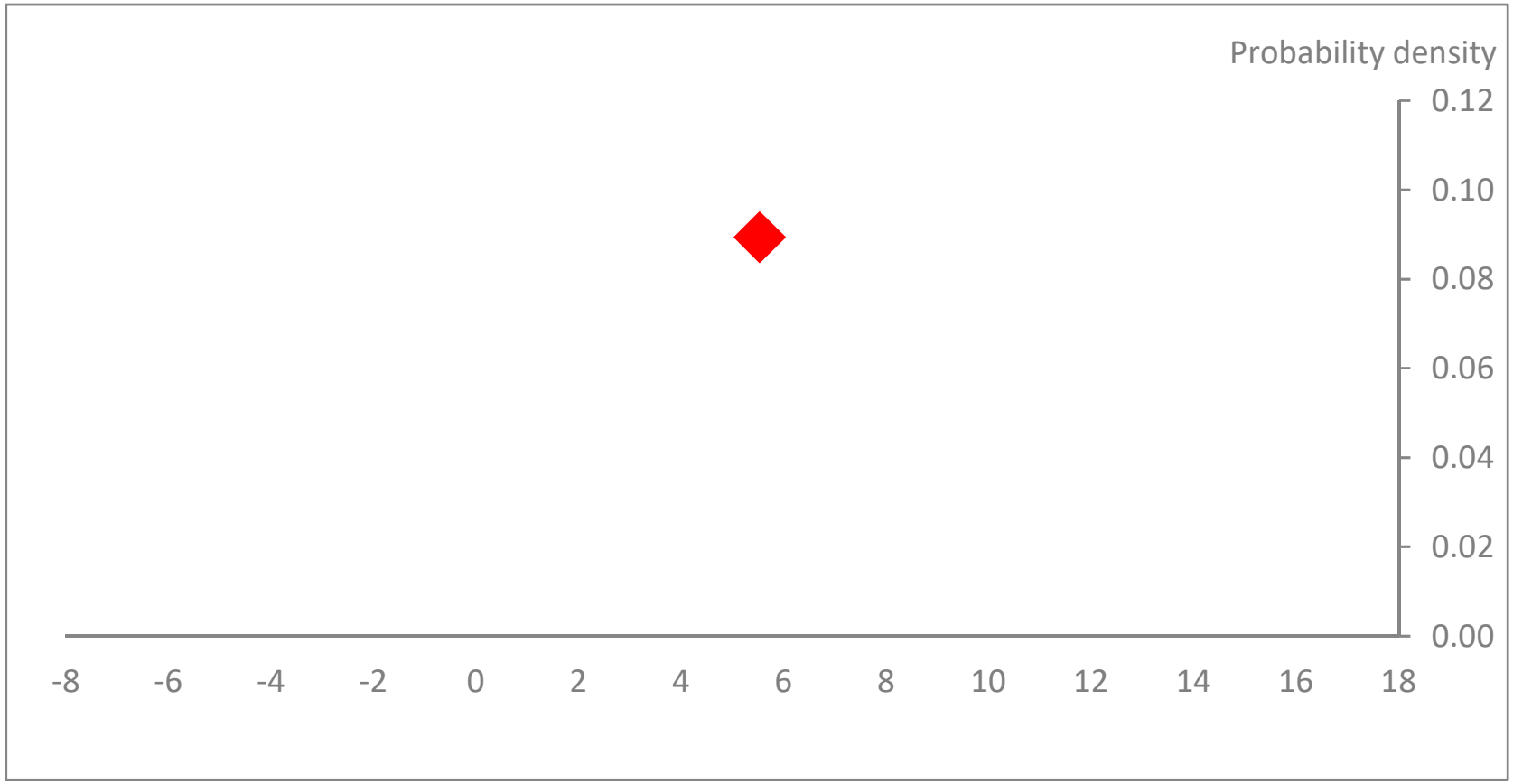
Quantile regression

- Standard (OLS) regression provides an estimate of the conditional mean of a variable of interest
(given a set of covariates)

- Quantile regression allows to model the entire conditional distribution (quantile by quantile) Technical details

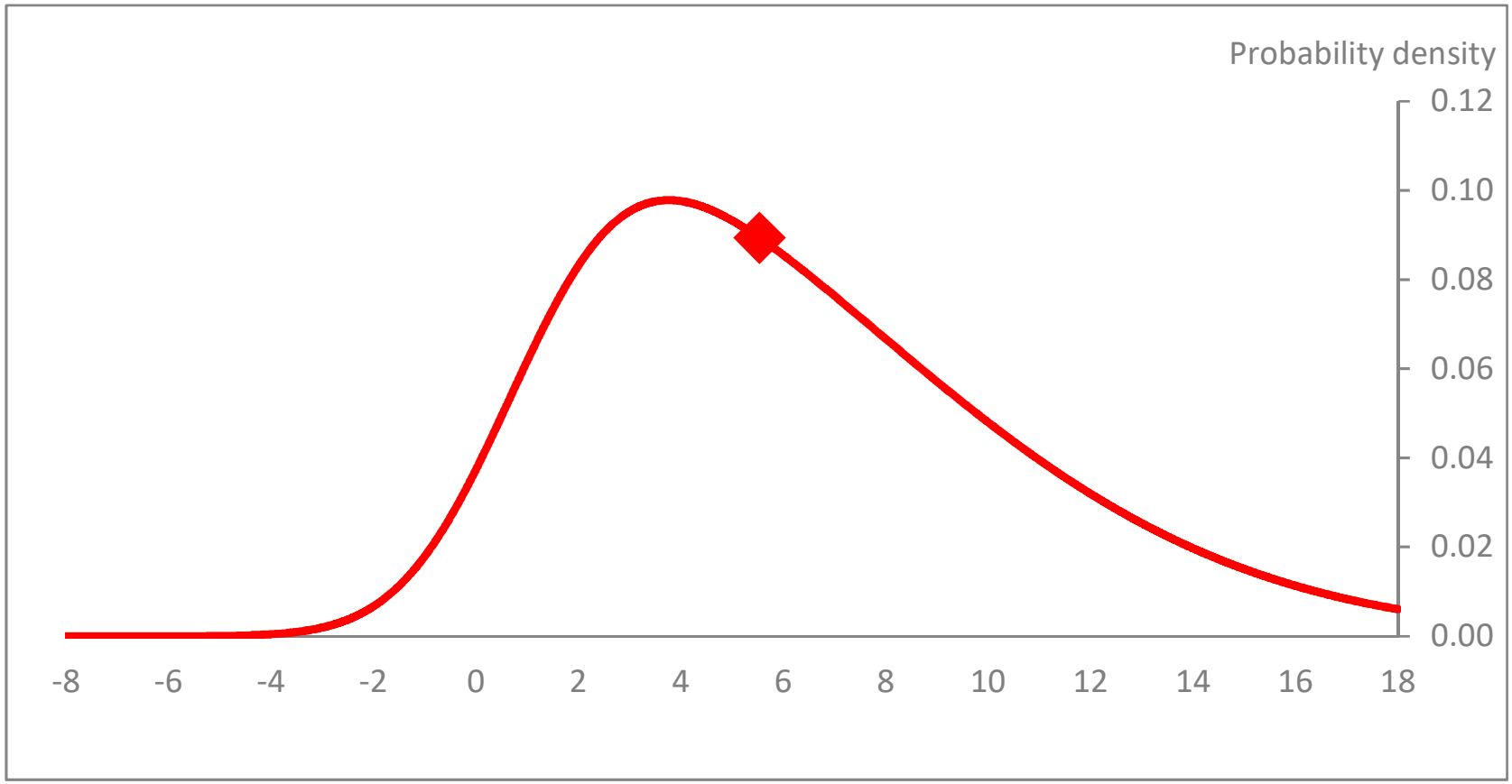
Capital flows at risk

From OLS to QR



Capital flows at risk

From OLS to QR



Capital flows at risk

Specification

- We consider the following conditional quantile model:

$$Q_{KF_{t,t+h}}(\tau|X_t) = \alpha_h(\tau) + \beta_{1,h}(\tau)GFCI_t + \beta_{2,h}(\tau)CFCI_{i,t} + \epsilon_i$$

where $KF_{t,t+h}$ is the sum of capital flows into country i between quarters t and $t+h$, $GFCI_t$ is our measure of global financial conditions and $CFCI_{i,t}$ is our measure of country-idiosyncratic financial conditions. ϵ_i is a quantile-invariant, country-specific fixed effect. Function Q computes quantiles τ of the distribution of $KF_{t,t+h}$ given X_t.

- Introduce serial correlation in residuals: block-bootstrapped standard errors
- Results unchanged if controlling for:
  - Lagged KF
  - Global and country-level GDP growth

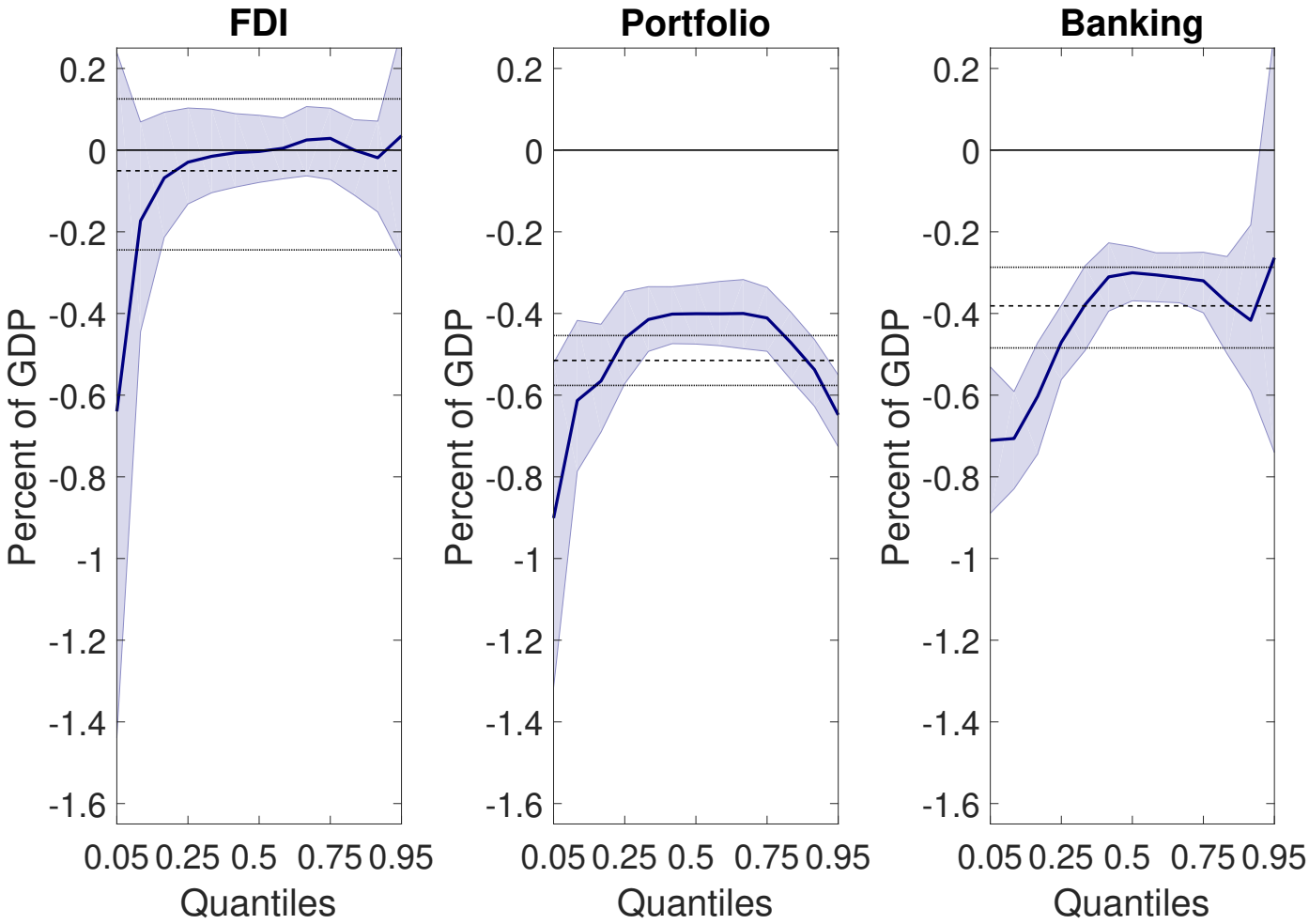
Capital flows at risk

Data

- Take this specification to a panel dataset:
  - Argentina, Brazil, Chile, Colombia, Hungary, India, Indonesia, Mexico, Peru, Philippines, Russia, South Africa and Turkey
  - 1996Q1-2018Q4

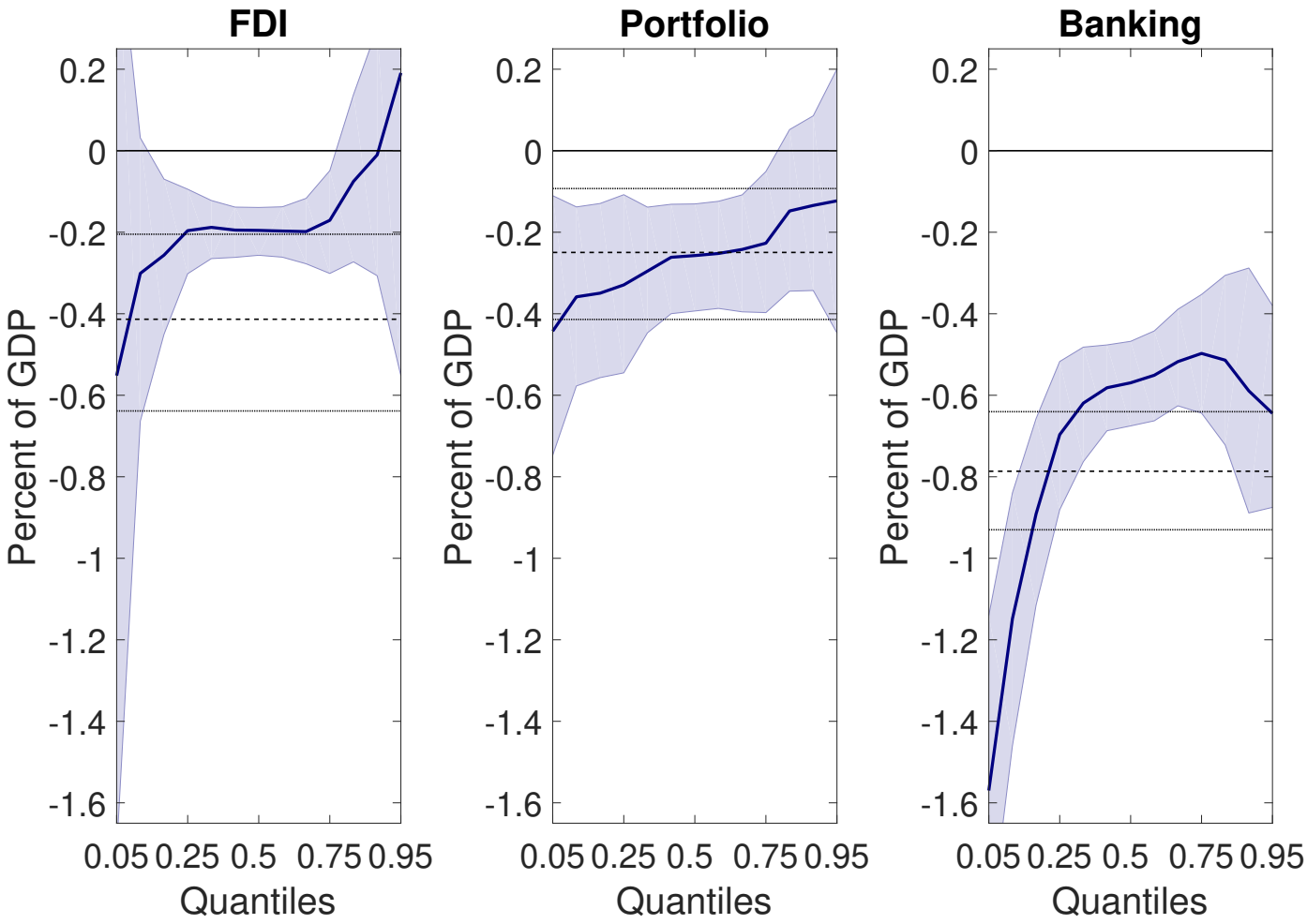
Capital flows at risk

Push factors Term-structure



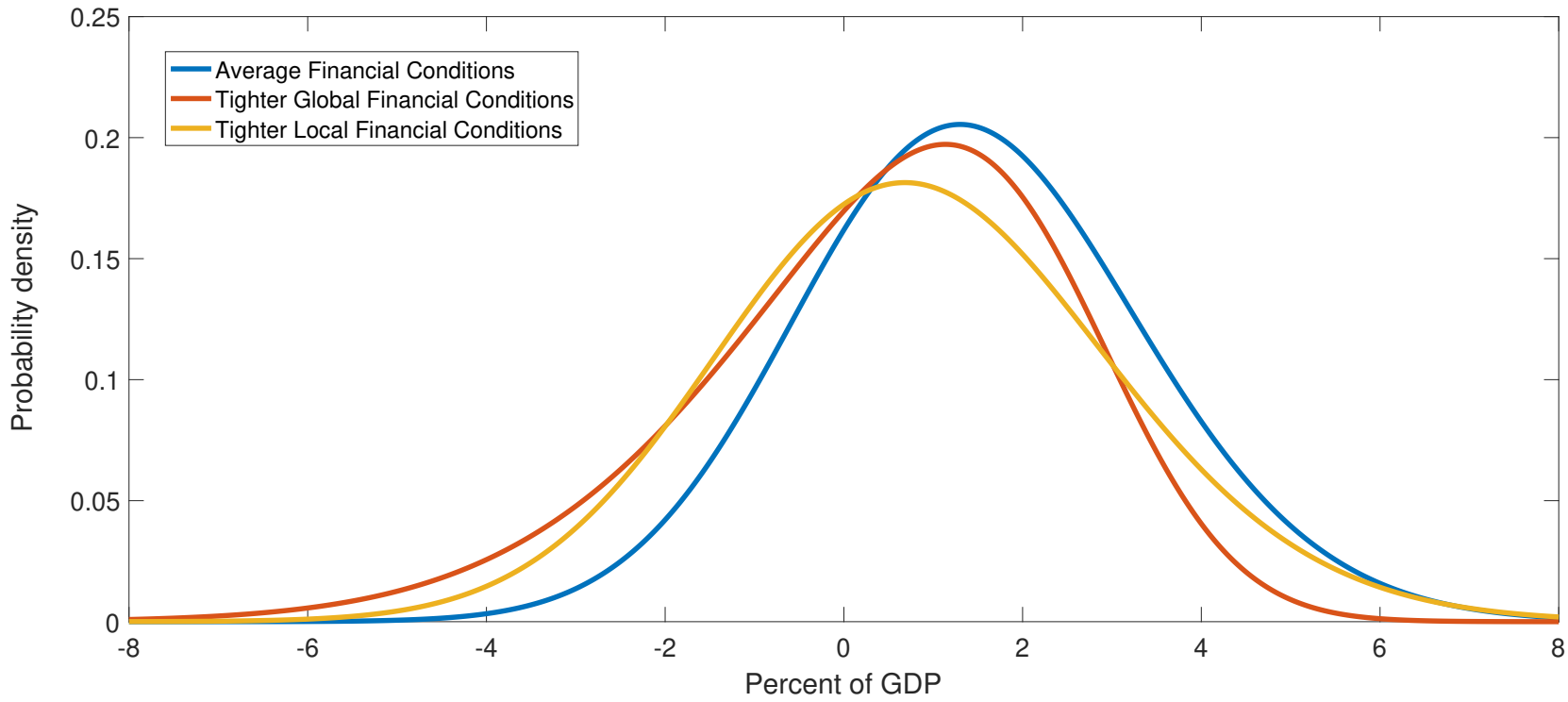
Capital flows at risk

Pull factors



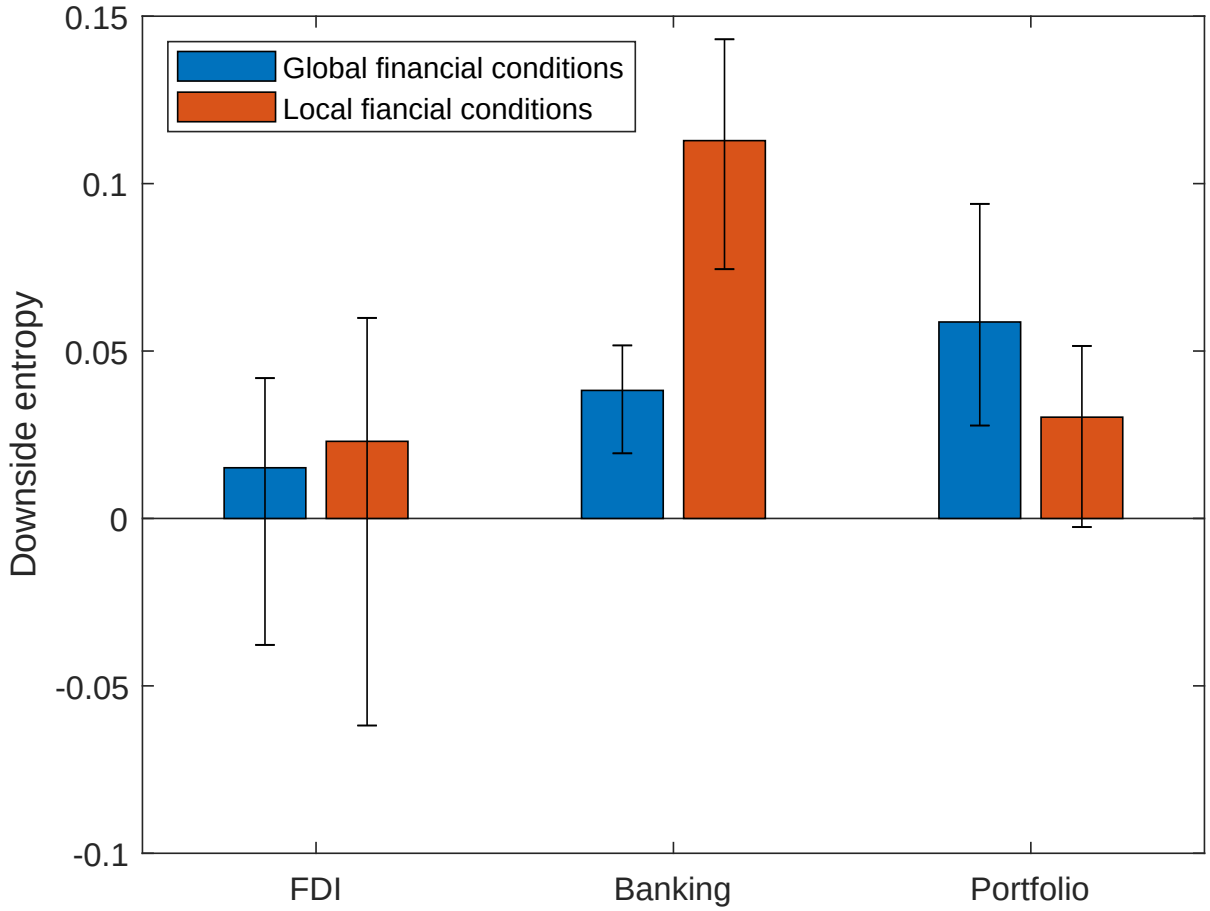
Capital flows at risk

Fitted distributions, portfolio flows Details



Capital flows at risk

Push vs. pull factors (5th percentile)



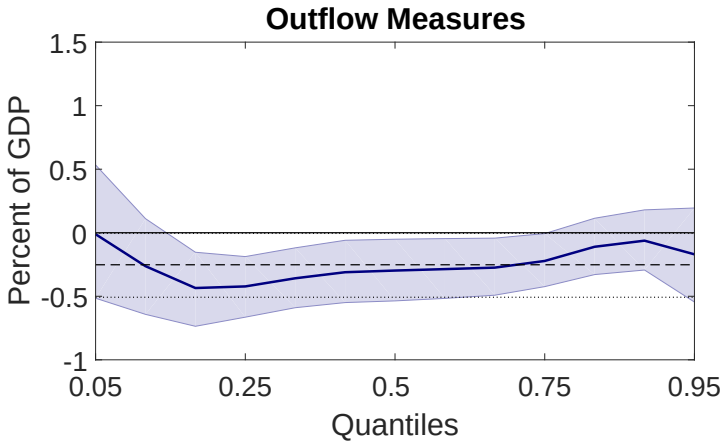
THE ROLE OF POLICY

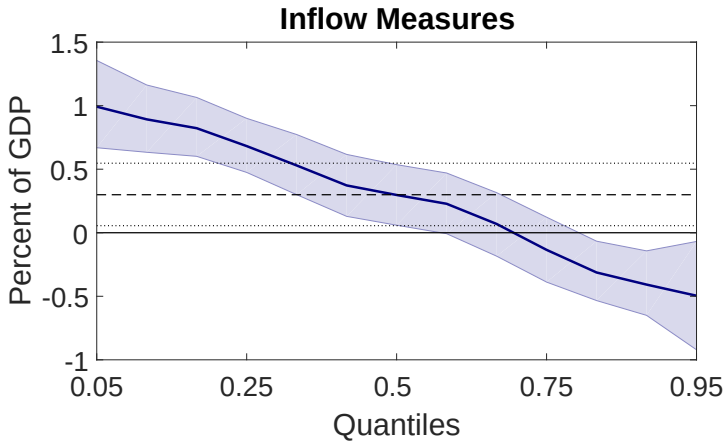
The role of policy

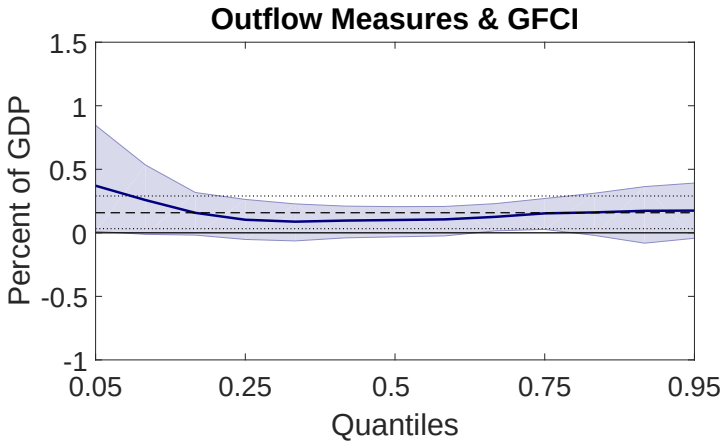
- Can policy affect the distribution of (portfolio) capital flows?
- Interested in exploring this in quantile context
- Consider effect of capital flow management measures (Fernandez et al, 2016) and macro-prudential policy (Cerutti et al, 2017)
- Use measures of policy actions, not 'shocks', so interpretation far from causal

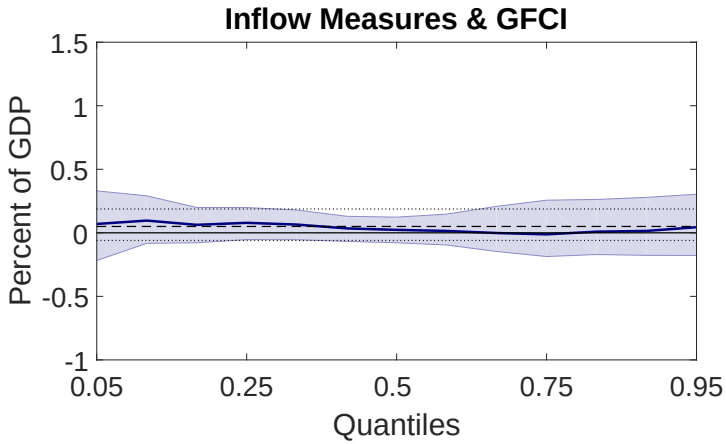
The role of policy

Capital flow management Details



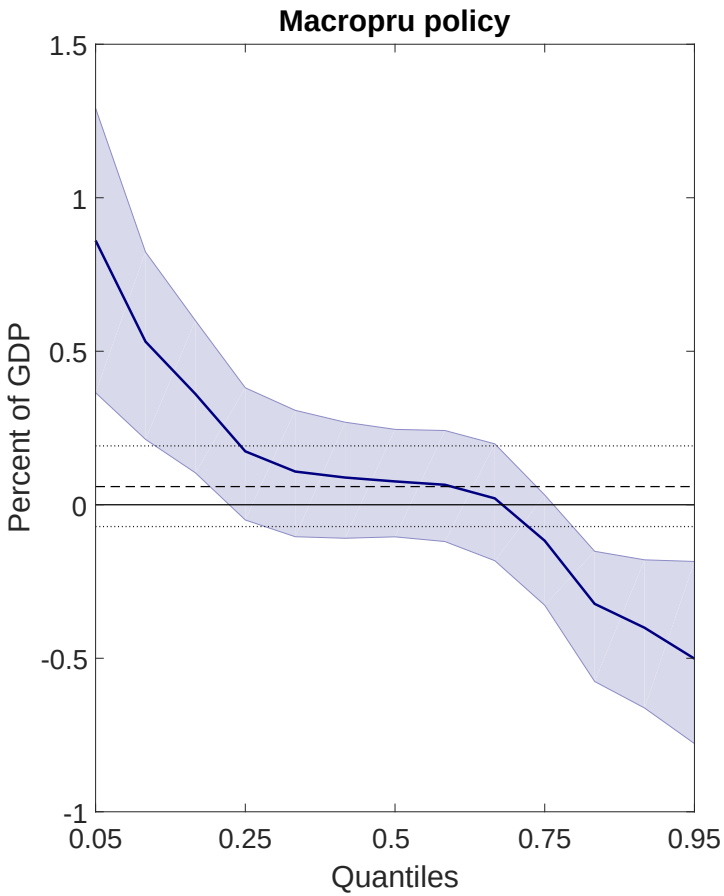


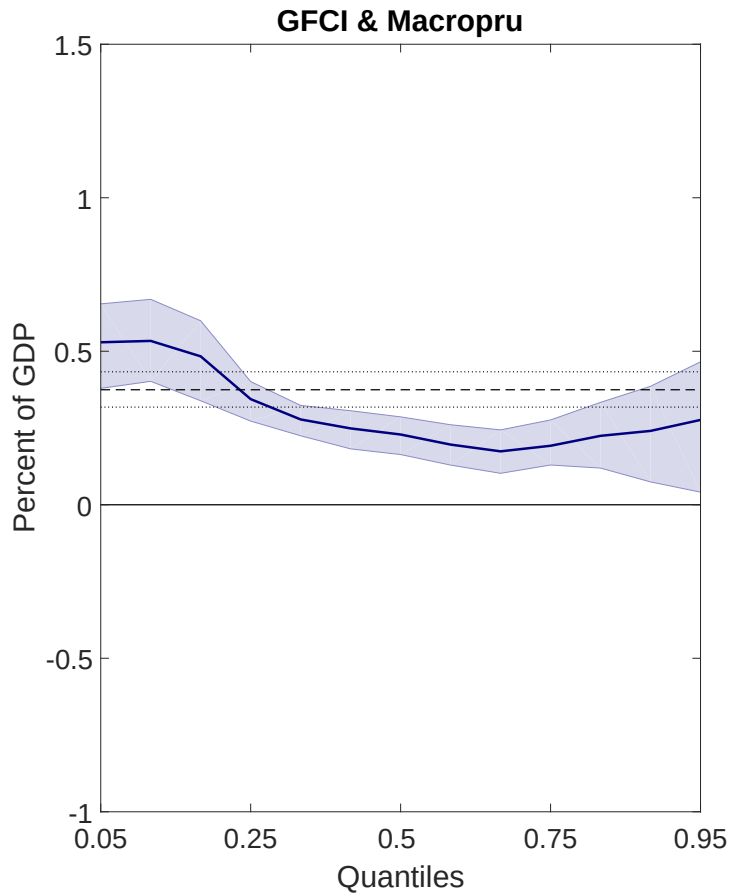




The role of policy

Macroprudential policy Details





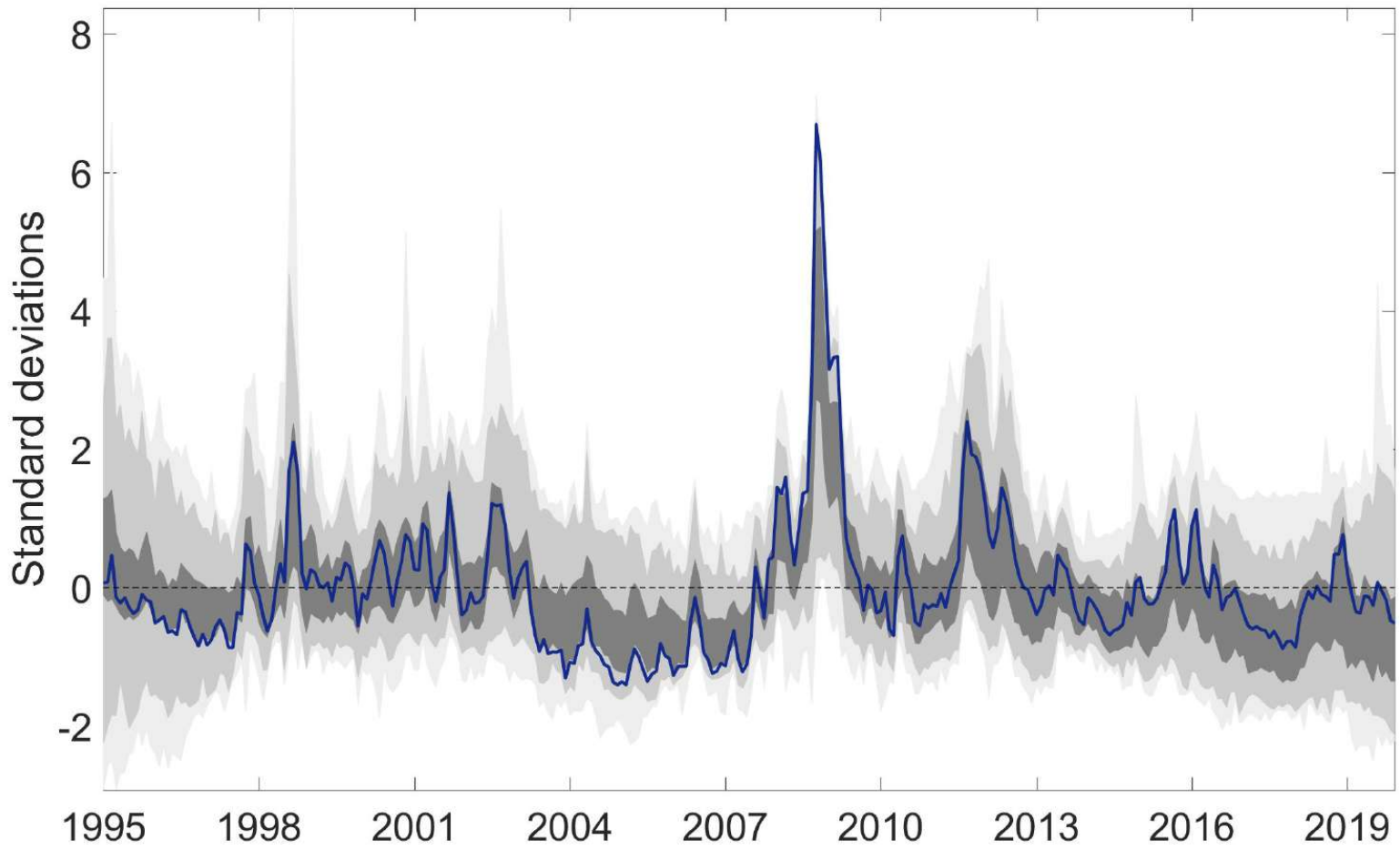
Results: taking stock

- Asset prices contain useful information for characterising the distribution of capital flows to EMs
- Push- and pull-type factors contain differential information in terms of (i) magnitude and (ii) persistence, and effects are heterogeneous across flow types
- There is some evidence of inflow control measures and macro-prudential policy being associated with lower likelihood of sharp outflows

APPENDIX

The informational content of asset prices

Global FCI Back



Quantile regression

Technical details

Given a linear model for the conditional quantile function

$$Q_y(\tau|X) = x\beta(\tau) \tag{1}$$

the quantile regression estimate $\hat{\beta}(\tau)$ is the minimiser of

$$\hat{V}(\tau) = \min_{\beta \in \mathbb{R}^p} \sum \rho_\tau \left(y_i - x_i'\beta\right) \tag{2}$$

where $\rho_\tau(u) = u[\tau - I(u < 0)]$ is the so-called check function, which penalises residuals differently depending on whether they are positive or negative. Back

Quantile regression

Technical details

Difference with respect to OLS easy to see by looking at loss functions:

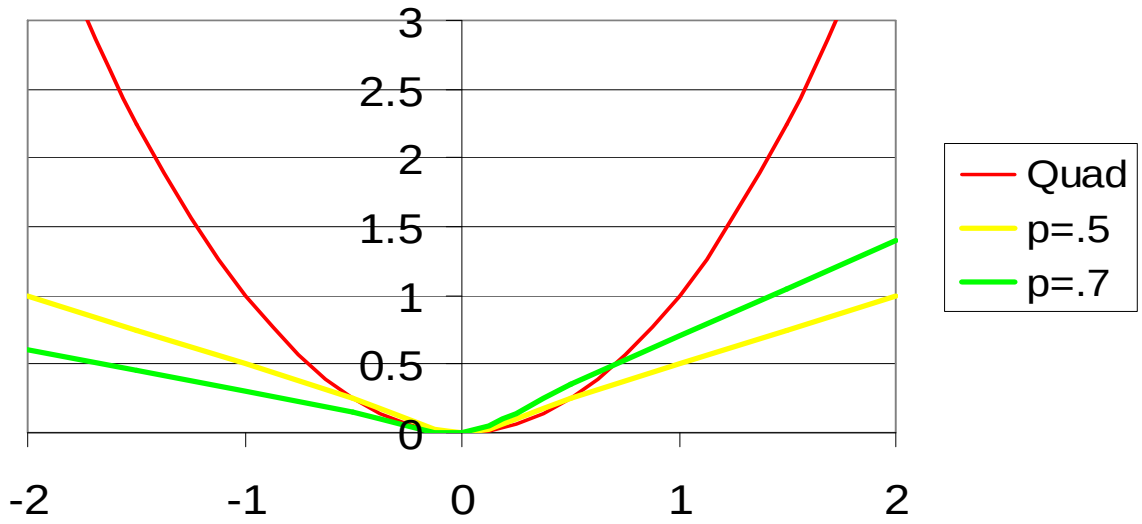


Figure: Quadratic and (asymmetric) absolute loss functions

Capital flows at risk

Fitted distributions Back

- Can fit skewed t-distribution distributions to fitted quantiles (conditional on different values of FCIs):

$$f\left(y;\mu,\sigma,\alpha,\nu\right)=\frac{2}{\sigma}t\left(\frac{y-\mu}{\sigma};\nu\right)T\left(\alpha\frac{y-\mu}{\sigma}\sqrt{\frac{\nu+1}{\nu+\left(\frac{y-\mu}{\sigma}\right)^{2}}};\nu+1\right),$$

where t(·) and T(·) respectively denote the probability density function and the cumulative density function of the Student t distribution. The distribution's parameters determine its location μ, scale σ, fatness ν, and shape α.

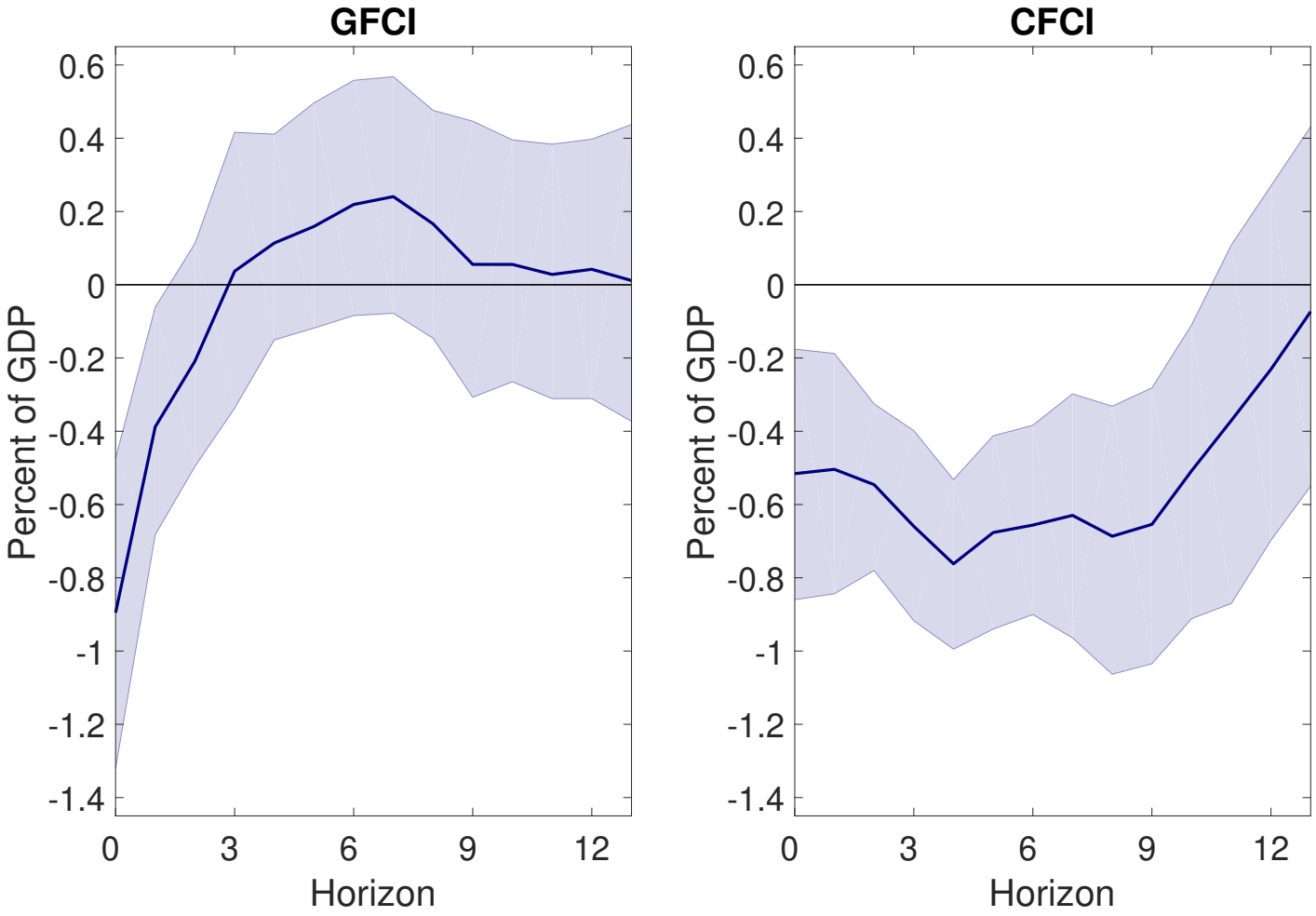
Capital flows at risk

Term structure dimension

- Interested in exploring the persistence of these effects
  - Does contemporaneous info help us characterise future distributions?
  - Focus on:
    - Portfolio flows
    - 5th percentile of the distribution (measure of 'capital flows at risk')

Capital flows at risk

Term structure dimension



Capital flows at risk

Term structure dimension Back

- Information of push-type shocks for left tail very short-lived
- Information of pull-type shocks for left tail displays persistence

The role of policy

Capital flow management

- Fernandez et al (2016) compile data on capital controls by inflows and outflows for 10 asset categories
  - We use measures relevant to type of flows considered
- Data on presence of controls, not magnitude

The role of policy

Capital flow management Back

- Consider the following conditional quantile model:

$$Q_{KF_{t,t+h}}(\tau|X_t) = \alpha_h(\tau) + \beta_{1,h}(\tau)GFCI_t + \beta_{2,h}(\tau)CFCI_{i,t} + \epsilon_i$$

$$+\beta_{3,h}KAI_{i,t-4} + \beta_{4,h}KAO_{i,t-4} + \beta_{5,h}KAI_{i,t-4}GFCI_t + \beta_{6,h}KAO_{i,t-4}GFCI_t$$

where KAI is a measure of controls on capital inflows and KAO is a measure of controls on outflows (both for portfolio flows of non-residents).

The role of policy

Macroprudential policy

- Cerutti et al (2017) compile data on the introduction of new macroprudential measures across 12 different type of instruments
- Data on number of actions, not magnitude

The role of policy

Macroprudential policy Back

- Consider the following conditional quantile model:

$$Q_{KF_{t,t+h}}(\tau|X_t) = \alpha_h(\tau) + \beta_{1,h}(\tau)GFCI_t + \beta_{2,h}(\tau)CFCI_{i,t} + \epsilon_i$$

$$+\beta_{3,h}MaPru_{i,t-4} + \beta_{5,h}MaPru_{i,t-4}GFCI_t$$

where *MaPru* is a measure of (cumulated) macroprudential policy actions.