Equity Flows in Uncertain Times: the Role of Heterogeneous Information

Francesco Beraldi
Duke University

Alessandro Dario Lavia
Boston College

Chenping Yang
Yale University

JMP Lavia

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Motivation

- **Equity flows are large and volatile:** "Capital inflows are large, often exceeding 10 percent of a country's GDP per year. But they are also fickle, foreign investors tend to exit when a country is in financial distress." Caballero et al. (2020)

- **Uncertainty is a global driver of capital flows:** The first global factor in capital flows is highly correlated with uncertainty, Miranda-Agrippino et al. (2021).

- **Uncertainty reduces inflows quantitatively:** A 1 s.d. increase in global volatility lowers institutional inflows by **2 p.p. per quarter** (Kacperczyk et al., 2025).

- **No symmetric pattern across countries:**
  - Capital does not retreat uniformly, Caballero et al. (2020).
  - Higher U.S. uncertainty raises global risk premia and triggers capital outflows from emerging markets, Akinci et al. (2023).

*Does **information heterogeneity** across countries explain asymmetries in GFC?*

Motivating Evidence

Snapshot of the Paper

Theory

- Multi-country portfolio model with heterogeneous information costs
  - **Standard countries:** domestic information advantage.
  - **Information havens:** no domestic advantage.
- Predictions
  1. Uncertainty amplifies **relative forecast precision** across investors.
  2. Domestic information advantages imply **negative aggregate inflows** in uncertainty.
  3. Investors with a relative information advantage generate **positive bilateral inflows**.

Empirics

- **Validate** the three theoretical predictions empirically, combining the following datasets:
  - **Consensus Economics:** 18 advanced economies, domestic vs. foreign forecast errors.
  - **Equity inflows:** 46 countries (1997–2022, monthly) + bilateral flows (annual).

Key Contribution and Literature

What we know

- **Global Financial Cycle:** uncertainty reduces foreign equity inflows, except in safe havens. Miranda-Agrippino & Rey; Caballero & Simsek; Akinci & Kalemli-Ozcan.
- **Information home bias:** domestic agents forecast more accurately, explaining the so called **equity home bias** puzzle. Mondria; Coibion & Gorodnichenko; Bordalo et al.; De Marco et al..

This paper

- Builds on Van Nieuwerburgh & Veldkamp: investors choose signal precision.
- Uses a non-uniform **convex quadratic information cost** that varies across countries.
- Introduces **information havens** and links precision to aggregate and bilateral flows.
- **Tests empirically** the predictions of the model, proving existence of information channel.

Asymmetric response to inflows emerges from heterogeneous information costs.

Equity Inflows: Definition and Data

Equity inflows: Net purchases of domestic equities by foreign investors (BoP definition).

- **Aggregate inflows:** total foreign net purchases into country k.
- **Bilateral inflows:** net purchases from country i into country k.

- De Crescenzio and Lepers (2025): 47 countries, monthly aggregate inflows (1997–2022).
- **JRC–ECFIN Finflows:** bilateral equity flows (2000–2020).

Equity Inflows and Uncertainty: Country Analysis

For each country i, we estimate:

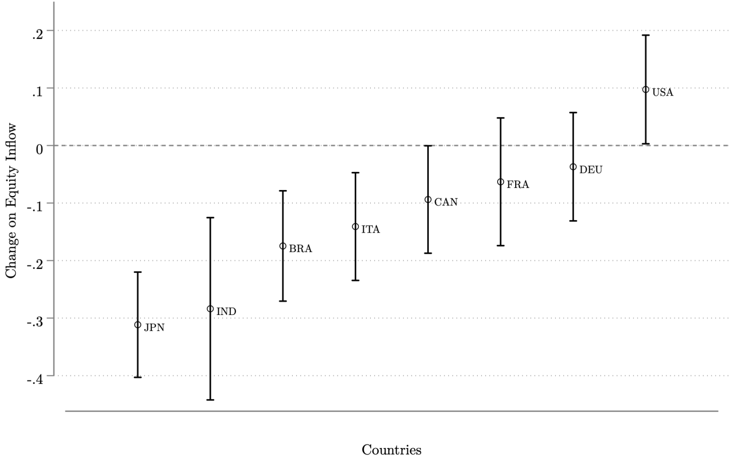
$$\text{EIF}_{i,t} = \alpha_i + \beta_i \text{VIX}_t + \delta X_{i,t} + \gamma \sum_{z=1}^{4} \text{EIF}_{i,t-z} + \varepsilon_{i,t}$$

- β_i measures the sensitivity of equity inflows to global uncertainty.
- Controls $X_{i,t}$ include GDP growth, exchange rate changes, and bond inflows.

- Most countries: $\beta_i < 0 \rightarrow$ retrenchment when uncertainty rises.
- United States: $\beta_i > 0 \rightarrow$ no retrenchment; relative resilience.

Capital Flows Description | Uncertainty Description

Equity Inflows and Uncertainty: Country Analysis



Robustness Checks

1. US vs RoW. US vs RoW
2. Alternative measures of financial uncertainty:
   - JLN Index. Financial Uncertainty
   - Country Specific Uncertainty. Country Specific Uncertainty
3. Entire Country Sample. Country Sample.
4. Extreme Events. Extreme Events

Theoretical Framework

Model Setup

- N countries, each with one risky asset with payoff r_k.
- Investors: mass 1/N per country, initial wealth W_0.

- Common prior on payoffs:
$$r_k \sim \mathcal{N}(\mu_k, \sigma_k^2).$$

- Two types of investors in each country k (assume $\kappa \to 1$):
  - Unsophisticated (fraction κ): use the prior only.
  - Sophisticated (fraction $1-\kappa$): may acquire information.

- Sophisticated investor i can obtain signal precision $\tau_{ik,s}$ at a convex cost
$$\theta_{ik}\tau_{ik,s}^2.$$

- Information costs θ_{ik} vary across (i,k), capturing heterogeneity across investors.

Unsophisticated vs Sophisticated Investor | Alternative Specification | Convergence: Proof

Period 2: Portfolio Choice and Equilibrium

- In the second period, investor i optimally chooses asset holdings $\{x_{i,k}\}_{k=1}^{N}$ to maximized expected utility over the next period:

$$\max \mathbb{E}_i[W_i] - \frac{\eta}{2}\mathbb{V}_i[W_i]$$
$$s.t. \quad W_i = \underbrace{r^f W_0}_{\text{safe baseline wealth}} + \underbrace{x_i'(r - r^f p)}_{\text{excess payoff from risky assets}}$$

- r is the vector of risky asset payoffs, which are *iid*.
- r^f is the risk-free return (disciplines risky asset demand).
- p are the risky asset prices.
- η is the risk aversion coefficient.

Period 2: Unsophisticated Investors Portfolio Choice

Unsophisticated investors do not acquire information

- They rely only on the common prior.
- Optimal demand for asset k:

$$x_{i,k}^U = \frac{\mu_k - r^f p_k}{\eta \sigma_k^2}$$

- Demand depends only on prior mean and variance.

Market clearing

- Risky asset supply is normalized to 1.
- Since unsophisticated investors have mass $\kappa \to 1$, they determine prices.

$$\sum_{i=1}^{N} \int_U x_{i,k}^U dU = 1$$

Equilibrium price

$$p_k = \frac{\mu_k - \eta \sigma_k^2}{r^f}$$

Period 2: Sophisticated Investors Portfolio Choice

After observing private signals, investors update beliefs

- Sophisticated investors receive private signals and update priors:

$$r_k \sim \mathcal{N}(\mu_k, \sigma_k^2) \quad \Rightarrow \quad \hat{r}_{ik} \sim \mathcal{N}(\widehat{\mu}_{ik}, \widehat{\sigma}_{ik}^2)$$

- Posterior mean $\widehat{\mu}_{ik}$ and variance $\widehat{\sigma}_{ik}^2$ depend on signal precision.

Optimal risky asset demand (price-takers)

$$x_{i,k}^S = \frac{\widehat{\mu}_{ik} - \mu_k + \eta\sigma_k^2}{\eta\widehat{\sigma}_{ik}^2}$$

- Demand increases when:
  - Posterior expected return $\widehat{\mu}_{ik}$ is high
  - Posterior variance $\widehat{\sigma}_{ik}^2$ is low

Period 1: Sophisticated Investors Research Decision

Research is chosen anticipating future portfolio gains

$$\max_{\{\tau_{ik,s}\}_{k=1}^{N}} \quad \underbrace{\mathbb{E}\left[\mathbb{E}_i(W_i) - \frac{\eta}{2}\mathbb{V}_i(W_i)\right]}_{\text{Expected portfolio utility in Period 2}} \quad - \quad \underbrace{C_i(\tau)}_{\text{Information cost}}$$

- Sophisticated investors choose signal precision $\tau_{ik,s}$ to improve future portfolio decisions.
- Information is valuable because it reduces posterior risk
- Cost of acquiring information:

$$C_i(\tau) = \sum_{k=1}^{N} \frac{\theta_{ik}}{2} \tau_{ik,s}^2$$

- The cost is paid in wealth units (e.g. research expenditure), reducing net portfolio returns.
- θ_{ik} captures how costly it is for investors in country i to learn about asset k.
    - Lower $\theta_{ik} \Rightarrow$ cheaper research
    - $\theta_{ik} < \theta_{ik'} \Rightarrow$ asset k is easier to learn about

Period 1: Sophisticated Investors and Information Heterogeneity

- θ_{ik} is the cost for investors in country i to learn about country k assets

- Consider a generic country k (focus on column k):

$$\begin{bmatrix} \theta_{11} & \cdots & \theta_{1k} & \cdots & \theta_{1n} \\ \vdots & \ddots & \vdots & & \vdots \\ \theta_{i1} & & \color{blue}{\theta_{kk}} & & \theta_{in} \\ \vdots & & \vdots & \ddots & \vdots \\ \theta_{n1} & \cdots & \theta_{nk} & \cdots & \theta_{nn} \end{bmatrix}$$

$$\begin{bmatrix} \theta_1 & \cdots & \underbrace{\color{red}{\theta_k}}_{\frac{N}{\sum_i \frac{1}{\theta_{ik}}}} & \cdots & \theta_n \end{bmatrix}$$

where θ_k is the armonic average of θ_{ik}.

1. **Standard countries** have an advantage for domestic investors: $\color{blue}{\theta_{kk}} < \color{red}{\theta_k}$
2. **Information haven countries** have: $\color{blue}{\theta_{kk}} \geqslant \color{red}{\theta_k}$

Period 1: Sophisticated Investors and Optimal Research Allocation

The optimal signal precision chosen by sophisticated investors is:

$$\tau_{ik,s} = \frac{1}{2\theta_{ik}} \left(\frac{\eta}{\tau_k^2} + \frac{1}{\eta \tau_k} \right)$$

- **Research cost effect:** $\tau_{ik,s} \downarrow$ when $\theta_{ik} \uparrow$ (cheaper information $\Rightarrow$ higher precision).
- **Uncertainty effect:** precision increases with asset uncertainty σ_k ($\tau_k = 1/\sigma_k$).
  - More uncertain assets $\Rightarrow$ higher value of information $\Rightarrow$ more research.
  - *Non-uniform broad learning*: heterogeneous costs θ_{ik} imply selective broad learning when uncertainty rises, as opposed to standard convex cost functions.

Prediction 1: Relative Forecast Precision and Amplification

Relative forecast precision between investors in k and j:

Let $\widehat{\tau}_{kk}$ denote the posterior precision of investors in country k about asset k.

$$\frac{\widehat{\tau}_{kk}}{\widehat{\tau}_{jk}} = \frac{1 + \frac{1}{2\theta_{kk}}\,\sigma_k^4\left(\frac{1}{\eta} + \eta\sigma_k^2\right)}{1 + \frac{1}{2\theta_{jk}}\,\sigma_k^4\left(\frac{1}{\eta} + \eta\sigma_k^2\right)}$$

Amplification effect:

$$\frac{\partial}{\partial\sigma_k^2}\left(\frac{\widehat{\tau}_{kk}}{\widehat{\tau}_{jk}}\right) > 0 \quad \Longleftrightarrow \quad \theta_{kk} < \theta_{jk}.$$

- *Standard country* ($\theta_{kk} < \theta_k$): domestic investors gain relative precision if $\uparrow \sigma_k^2$.
- *Information haven* ($\theta_{kk} \geqslant \theta_k$): foreigners gain relative precision if $\uparrow \sigma_k^2$.

Prediction 2: Equity Inflows

Proposition. net inflows into country k following a $\uparrow \sigma_k^2$:

$$\text{EIF}_k = \nu_k \left(\underbrace{\frac{1}{N} \sum_{i=1}^{N} \frac{1}{\theta_{ik}}}_{\text{avg learning ability}} - \underbrace{\frac{1}{\theta_{kk}}}_{\text{domestic learning ability}} \right)$$

- θ_{ik}: cost for investors in i to learn about asset k.
- $\nu_k > 0$: scaling term.

Prediction 2 (Asymmetric Response)

- If $\theta_{kk} < \theta_k$ (domestic information advantage) $\Rightarrow \text{EIF}_k < 0$.
- Uncertainty amplifies domestic precision $\Rightarrow$ foreign retrenchment.
- **Equity inflows do not respond symmetrically across countries.**

Heterogeneous information costs generate asymmetric response of inflows to $\uparrow \sigma_k^2$.

Prediction 3: Bilateral Equity Inflows

Proposition (Pairwise Flows): net inflows from country i to k following a $\uparrow \sigma_k^2$:

$$\text{EIF}_{ik} = \nu_k \left(\underbrace{\frac{1}{\theta_{ik}}}_{\text{learning ability of } i \text{ in } k} - \underbrace{\frac{1}{N}\sum_{j=1}^{N}\frac{1}{\theta_{jk}}}_{\text{avg learning ability in } k} \right)$$

- θ_{ik}: cost for investors in i to learn about asset k.
- $\nu_k > 0$: scaling term.

Prediction 3 (Geography of Flows)

- $\text{EIF}_{ik} > 0$ if $\theta_{ik} < \theta_k$ (investors in i have a relative information advantage)
- $\text{EIF}_{ik} < 0$ otherwise
- There may be some "specialized foreign investors".

$\uparrow \sigma_k^2$ *reshapes the geography of equity flows toward relatively better-informed investors.*

Definition: Aggregate vs Bilateral EIF

Empirical Analysis

Consensus Economics: Dataset Overview

Source and coverage. Consensus Economics provides monthly macroeconomic forecasts from domestic and foreign analysts (banks, universities, research centers), covering 2006–2018. Forecaster origin follows Benhima et al (2025) and is based on headquarters' location (subsidiaries accounted for).

Countries. 20 countries are available; we retain 18 with at least two years of data: Austria, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, UK, Greece, Ireland, Italy, Japan, Netherlands, Norway, Sweden, United States.

Variables. We compute forecast errors and dispersion for:

- Long-term T-bills (10-year): $\mathbb{E}_t[\mathbf{B}_{t+12,t}]$
- Short-term T-bills (3-month): $\mathbb{E}_t[\mathbf{b}_{t+12,t}]$
- GDP growth: $\mathbb{E}_t[\Delta \mathbf{GDP}_{y+1,y}]$
- Industrial production: $\mathbb{E}_t[\Delta \mathbf{IP}_{y+1,y}]$
- Unemployment: $\mathbb{E}_t[\Delta \mathbf{UNEMP}_{y+1,y}]$

Sample Restrictions. We exclude country with less than 2 years of forecasts.

From Forecast Errors to Information Precision

Objective. Map the model's signal precision into observable forecast performance.

Forecast error. For forecaster i, variable j, country c, month t:

$$\text{FE}^2_{i,j,c,t} = \left\{ x_{j,c,t} - \mathbb{E}_{t-1}[x_{i,j,c,t}] \right\}^2$$

Construction.

- One-year-ahead forecasts only
- Trim 1% tails (outliers)
- Standardize by country and variable

Interpretation.

- Lower forecast error $\Rightarrow$ higher information precision
- Domestic vs foreign FE differences $\Rightarrow$ information advantage

This is the empirical counterpart of endogenous signal precision in the model.

Forecast Accuracy as Revealed Information Investment

Model mechanism.

- Investors choose signal precision τ_{ik} subject to heterogeneous costs θ_{ik}.
- Higher $\theta_{ik} \Rightarrow$ lower optimal precision $\Rightarrow$ noisier posterior beliefs.

Economic interpretation in the data.

- An Italian forecaster predicting Brazil faces a higher learning cost:

$$\theta_{\text{Italy, Brazil}} > \theta_{\text{Brazil, Brazil}}$$

- Lower attention, fewer local analysts, less monitoring.
- Result: higher forecast errors.

Key insight.

- Forecast performance reflects endogenous research effort.
- Cross-country forecast gaps mirror heterogeneous information costs.

Consensus forecast precision is the observable counterpart of endogenous signal precision.

From Theory to Empirics: Prediction 1

Relative precision between domestic (k) and foreign (j) investors:

$$\frac{\widehat{\tau}_{kk}}{\widehat{\tau}_{jk}} \quad \text{increases with } \sigma_k^2 \quad \Longleftrightarrow \quad \theta_{kk} < \theta_{jk}.$$

- Uncertainty amplifies domestic relative precision.
- Information gaps widen in standard countries.

Empirical Mapping.

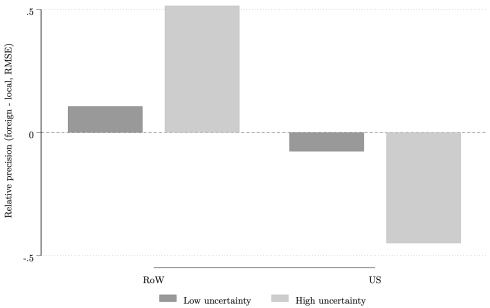
- We proxy posterior precision using forecast accuracy.
- Construct **RPDF** (Relative Precision of Domestic Forecasters).
- If RPDF rises when uncertainty increases, this is the empirical counterpart of the amplification mechanism.

Prediction 1: RPDF

- Compute forecast errors separately for domestic (d) and foreign (f) forecasters.
- Define the **Relative Precision of Domestic Forecasters (RPDF)** as:

$$\text{RPDF}_c = \sqrt{\text{FE}_c^{2,f}} - \sqrt{\text{FE}_c^{2,d}}$$

- $\text{RPDF}_c > 0 \Rightarrow$ domestic forecasters are more precise.
- $\text{RPDF}_c < 0 \Rightarrow$ foreign forecasters are more precise.



Prediction 1: RPDF and OVB

Concern: Skill vs Information

- Domestic advantage could reflect **better institutions**, not better information.
- Large global banks may systematically forecast better.
- If skill correlates with being domestic, RPDF may be biased.

Solution: Micro-level panel regression

- Use individual forecaster data.
- Include **forecaster fixed effects** (ζ_i).
- Control for country and variable fixed effects.

Isolate how uncertainty affects domestic vs foreign precision, net of skills differences.

Prediction 1: Alternative Specification

$$
\begin{aligned}
\mathrm{FE}^2_{i,j,c,t} = \alpha + \zeta_i + \tau \mathbb{1}_{\{c=\mathrm{US}\}} \\
&+ \left(\beta + \beta_{\mathrm{US}} \mathbb{1}_{\{c=\mathrm{US}\}}\right) \mathbb{1}_{\{i=d\}} \\
&+ \left(\gamma + \gamma_{\mathrm{US}} \mathbb{1}_{\{c=\mathrm{US}\}}\right) \mathbb{1}_{\{i=d\}} \times \mathrm{VIX}_t + \varepsilon_{i,j,c,t}
\end{aligned}
$$

Key coefficients

- β: unconditional domestic advantage.
- γ: effect of uncertainty on domestic precision.
- γ_{US}: differential effect for the U.S. (information haven).

Prediction

- $\gamma < 0$: uncertainty strengthens domestic information advantage.
- $\gamma_{\mathrm{US}} > 0$: no domestic advantage in the U.S.

Alternative Spcification: Uncertainty | Alternative Specification: Dispersion

Prediction 1: Alternative Specification Results

- The coefficient γ (Domestic $\times$ VIX) is **negative and statistically significant** across all specifications, ranging between **-0.02 and -0.03**.
- Interpretation: when global uncertainty increases, domestic forecast errors rise *less* than foreign ones.
- Magnitude: a 1 s.d. increase in the VIX improves domestic relative precision by $\approx$ **3%**.
- The triple interaction γ_{US} is **positive and significant**, between **0.03 and 0.08**.
- Once forecaster fixed effects are included, the U.S. effect shrinks (≈ 0.04), suggesting part of the baseline reflects institution-level skill differences.

Uncertainty amplifies domestic information advantage in most countries, but not in the US.

Prediction 1: Alternative Specification Results

	Squared Forecast Error (1)	Squared Forecast Error (2)	Squared Forecast Error (3)
Domestic	0.009	0.029	-0.010
	(0.017)	(0.047)	(0.022)
VIX	0.299***	0.281***	0.272***
	(0.028)	(0.028)	(0.028)
Domestic × VIX	-0.032**	-0.033**	-0.024*
	(0.013)	(0.014)	(0.013)
US	-0.126*	-0.103	0.000
	(0.067)	(0.065)	(.)
Domestic × US	0.083***	0.007	0.095**
	(0.017)	(0.072)	(0.031)
Domestic × VIX × US	0.079***	0.042***	0.034**
	(0.013)	(0.014)	(0.013)
N	104665	104665	104665
R^2	0.071	0.106	0.117
adj. R^2	0.071	0.104	0.115
FEs, Forecasters	No	Yes	Yes
FEs, Variable	No	No	Yes
FEs, Country	No	No	Yes

Robustness: Uncertainty Robustness: Dispersion

Prediction 1: Country Specific Analysis

Country-specific estimation

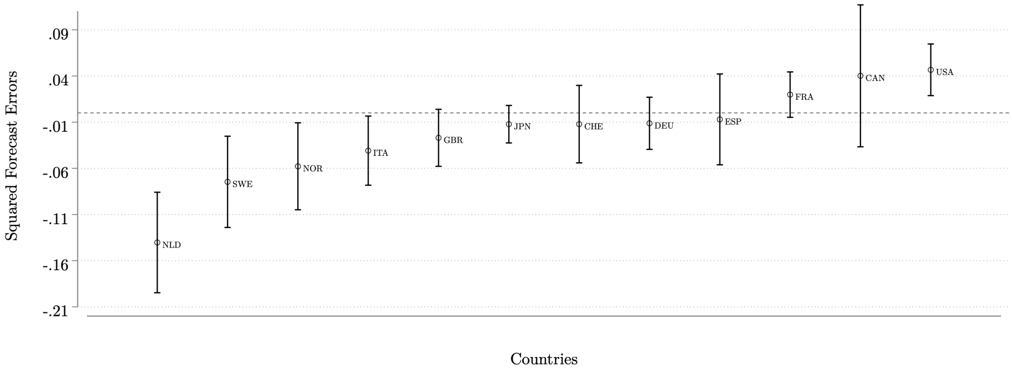
To examine heterogeneity across countries, we re-estimate the baseline regression separately for each destination c:

$$\mathrm{FE}^2_{i,j,c,t} = \alpha_c + \zeta_i + \beta_c \mathbb{1}_{\{i=d\}} + \gamma_c \mathbb{1}_{\{i=d\}} \times \mathrm{VIX}_t + \varepsilon_{i,j,c,t}$$

- β_c captures the unconditional domestic advantage in country c.
- γ_c measures how domestic relative precision changes when global uncertainty increases.
- Forecaster fixed effects ζ_i control for persistent skill differences across institutions.

We then plot the estimated γ_c coefficients across countries.

Prediction 1: Country Specific Analysis



Prediction 2: Aggregate Inflows From Theory

- Move beyond forecast precision $\Rightarrow$ study **aggregate inflows**.

$$\mathrm{EIF}_k = \nu_k \left(\underbrace{\frac{1}{N} \sum_{i=1}^{N} \frac{1}{\theta_{ik}}}_{1/\theta_k} - \frac{1}{\theta_{kk}} \right)$$

- θ_{kk}: cost for domestic investors in k to learn about their own asset.
- θ_k: world average learning cost about asset k.

- **Prediction:**
  - If $\theta_{kk} < \theta_k$: domestic investors have an informational edge $\Rightarrow$ foreign investors retrench $\Rightarrow$ negative inflows.
  - If $\theta_{kk} \geqslant \theta_k$: no domestic advantage $\Rightarrow$ foreigners do not withdraw; inflows are not negative.

Prediction 2: Specification and Results

$$\text{EIF}_{i,t} = \alpha + \xi\text{RPF}_{ii,t} + \gamma\text{EIF}_{i,t-1} + \varepsilon_{i,t},$$

- $\text{RPF}_{ii,t} = \text{FE}^2_{ii,t} - \text{FE}^2_{j\neq ii,t}$.
- $\xi < 0 \implies$ stronger domestic informational advantage reduces foreign inflows.

	Aggregate EIF (1)	Aggregate EIF (2)
RPF (iit)	-0.047**	-0.053***
	(0.014)	(0.015)
Observations	879	879
FEs, Country	No	Yes
SEs, Country	Yes	Yes
RPF (p-value)	0.010	0.007

- Coefficient $\xi \approx -0.05$, negative and significant.
- 1 SD increase in domestic relative precision $\implies$ inflows fall by $\sim$5% of a SD.
- Foreigners reduce holdings when at an informational disadvantage.

Prediction 3: Bilateral Inflows From Theory

- Move beyond aggregate inflows $\Rightarrow$ study **bilateral reallocations**.

$$\text{EIF}_{ik} = \nu_k \left(\frac{1}{\theta_{ik}} - \underbrace{\frac{1}{N} \sum_{j=1}^{N} \frac{1}{\theta_{jk}}}_{1/\theta_k} \right),$$

- θ_{ik}: cost for investors in i to learn about country k's asset.
- θ_k: global average learning cost for asset k.

- **Prediction:**
  - If $\theta_{ik} < \theta_k$: investors in i gain an informational edge $\Rightarrow$ inflows i rise.
  - If $\theta_{ik} > \theta_k$: investors in i face a disadvantage $\Rightarrow$ inflows i fall.

Prediction 3: Specification and Results

$$\text{EIF}_{ik,t} = \alpha_i + \xi \text{RPF}_{ik,t} + \gamma \text{EIF}_{ik,t-1} + \varepsilon_{ik,t},$$

- $\text{EIF}_{ik,t}$ denotes annual bilateral equity inflows from origin i to destination k.
- These flows are scaled by destination k's trend GDP and standardized within each k.
- $\text{RPF}_{ik,t} = \sum_{i \neq j} \frac{1}{\text{N}} \text{FE}^2_{\cdot,k} - \text{FE}^2_{i,k}$.
- $\xi > 0 \Rightarrow$ stronger domestic informational advantage reduces foreign inflows.

	Bilateral EIF (1)	Bilateral EIF (2)
RPF (ikt)	0.268*	0.254*
	(0.139)	(0.149)
Observations	154	153
FEs, Report Country	No	Yes
FEs, Partner Country	No	Yes
SEs, Country × Year	Yes	Yes
RPF (p-value)	0.057	0.093

- Coefficient $\xi \approx 0.2$, positive and significant.
- 1 SD increase in domestic relative precision $\Rightarrow$ inflows increase by ~20% of a SD.
- Investors in i increase holdings in k when at a relative informational advantage.

Conclusion

Conclusion

- Global uncertainty reshapes equity flows asymmetrically across countries.
- We provide a microfounded mechanism on how **heterogeneous information costs** determine asymmetric response along the GFC.
- When uncertainty rises, information gaps widen, leading to retrenchment in most countries and resilience in information havens.
- Using forecast precision and equity flows, we validate all three predictions of the model.

Asymmetries in GFC merge from heterogeneous information costs.

My Academic Profile

PhD Dissertation

- **JMP: Uncertainty and Capital Flows** Information frictions and heterogeneous learning costs shape global equity reallocations.
- **Customer Capital and Short-Termism** How managerial incentives distort pricing, markups, and aggregate outcomes.
- **Import Price Pass-Through in Production Networks** How shocks propagate through input-output linkages and affect firm pricing.

Common theme: micro frictions shaping aggregate dynamics.

Research Pipeline and Status

Advanced Stage - Submission Soon

- **JMP:** Capital flows under uncertainty and heterogeneous information costs.
- **Customer Capital and Short-Termism:** Micro incentives and aggregate distortions.

Intermediate-Advanced Stage (Ongoing empirical and quantitative refinement).

- Environmental risk propagation through production networks (with Elisa Luciano).
- Import price pass-through and network structure (with Mathias Klein).

Medium-Term Projects (Planned completion over the next few years).

- Inflation dynamics and policy conflicts (with Michele Boldrin).
- Bank risk-taking under prolonged low interest rates (with J. C. Wang).

Research agenda: International finance and networks, combining microfounded theory with disciplined empirical analysis.

Appendix: Introduction

Definition: Aggregate vs. Bilateral EIF

Aggregate equity inflows (country k)

Total net purchases of country k's equities by all foreign investors:

$$\text{EIF}_{k,t} = \sum_{i \neq k} \text{EIF}_{i \to k,t}.$$

- Measure whether the rest of the world increases or reduces exposure to k.
- Provide a macro indicator of k's global capital attraction.

Bilateral equity inflows (from i to k)

Net equity purchases by investors in country i of country k's equities:

$$\text{EIF}_{i \to k,t} = \text{purchases by } i \text{ of } k\text{'s equity} - \text{sales by } i \text{ of } k\text{'s equity}.$$

- Capture how a specific country reallocates its portfolio toward or away from k.
- Reveal which bilateral relationships react more strongly to uncertainty or information frictions.

Return

Appendix: Dataset Construction

Aggregate Flows I

Aggregate portfolio flows. We use monthly portfolio equity inflow data from De Crescenzio and Lepers (2025) covering 47 advanced and emerging economies (1997-2023).

Equity inflows follow the IMF BoP definition and measure the net acquisition of domestic equity by nonresidents:

$$\text{EIF}_{it} = \text{purchases by foreigners} - \text{sales by foreigners}.$$

Sample coverage. Countries span Europe, Asia, Latin America, and North America. Missing months are filled using documented linear interpolation.

Transformations. To enhance comparability, flows are winsorized at the 1st–99th percentiles and standardized:

$$Z_{it} = \frac{X_{it} - \mathbb{E}[X_i]}{\sigma_{X_i}}.$$

Return

Aggregate Flows II

Summary statistics. The following table reports descriptive statistics (in billions of \$) for monthly portfolio flows.

	Mean	SD	Median	Max	Min	N
Equity Inflows	1.01	12.93	0.01	300.34	-315.19	8774
Equity Outflows	1.73	10.98	0.04	185.50	-176.10	7161
Bonds Inflows	2.43	14.36	0.05	255.18	-403.60	9139
Bonds Outflows	1.72	9.79	0.05	174.17	-141.35	7161
Capital Inflows	3.27	18.96	0.13	443.64	-314.73	10002
Capital Outflows	2.96	14.75	0.12	298.15	-201.88	8822

Equity share. To examine the relative weight of equity, we define:

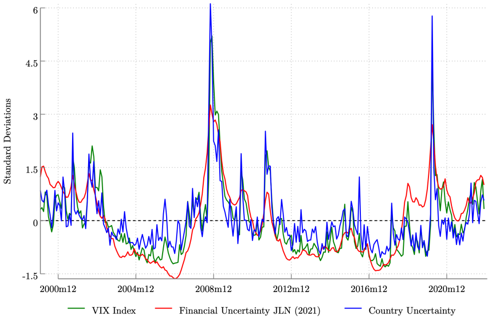
$$S_t = \frac{\text{EIF}_t}{\text{EIF}_t + \text{BIF}_t}.$$

The average value of S_t is approximately 0.47, implying equity represents nearly half of total portfolio inflows and accounts for more than half of their variance.

Return

Measures of Uncertainty I

We collect several measures of uncertainty at monthly level: the VIX index, the Jurado et al. (2015) measure of financial uncertainty (updated in 2021) and the volatility of stock market returns at country level, a proxy for country-specific VIX.



Return

Measures of Uncertainty II

	Max	Min	N
VIX Index	5.21	-1.30	311
Financial Uncertainty JLN (2021)	3.26	-1.64	311
Country Uncertainty	6.12	-1.04	311

Return

Consensus Economics I

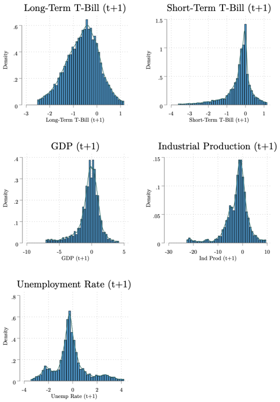
Summary statistics. The table below reports mean, median, minimum, maximum, and number of observations for all forecast series.

	Mean	Median	Max	Min	N
Long-Term T-Bills ($\Delta\%$ $m, m+12$)	-0.62	-0.57	3.52	-3.76	21482
Short-Term T-Bills ($\Delta\%$ $m, m+12$)	-0.39	-0.19	2.35	-5.23	20868
GDP $\Delta\%$ ($\Delta\%$ $m, y+1$)	-0.43	-0.16	6.90	-8.60	30324
IP $\Delta\%$ ($\Delta\%$ $m, y+1$)	-2.48	-1.52	23.55	-31.11	20831
Unemployment Rate ($\Delta\%$ $y+1$)	-0.18	-0.27	5.43	-4.96	19055

Trimming. To reduce the impact of extreme observations, we trim 1.5% from each tail. Results are robust to smaller trimming (1% or 0.5%).

Consensus Economics II

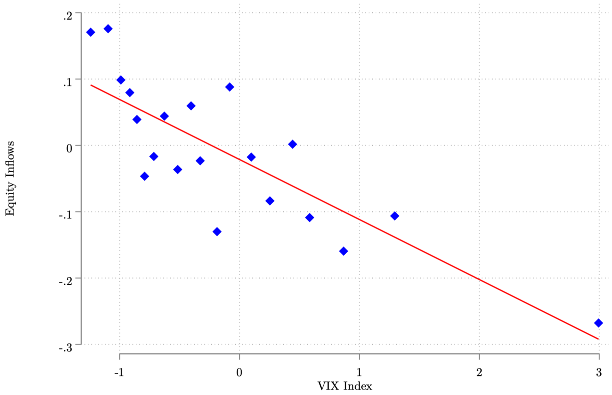
Distributional properties. The figure displays the histograms of squared forecast errors (not standardized) for all variables in our sample.



Notes: Data trimmed at 1% in both tails to reduce the influence of outliers.

Appendix: Motivating Evidence

Negative Inflows in Times of Uncertainty



Notes: Data are country-month observations (1997-2022) collected in a 20-bins scatterplot. Equity Inflows and uncertanty are measured in SD with respect to the mean of each country.

Return

Equity Inflows and Uncertainty

- Unilateral net flows: sum of flows between i and all $k \neq i$ in the 47-country sample.

$$
\begin{aligned}
\text{EIF}_{i,t} = \alpha_i + (\beta + \beta_{\text{US}} \mathbb{1}_{\{i=\text{US}\}})\, \text{VIX}_t \\
+ \delta_1\, \text{GDP}_{i,t} + \delta_2\, \text{EER}_{i,t} + \delta_3\, \text{BIF}_{i,t} + \gamma \sum_{z=1}^{4} \text{EIF}_{i,t-z} + \varepsilon_{i,t},
\end{aligned}
$$

- $\text{EIF}_{i,t}$: standardized equity inflows; α_i: country fixed effects.
- β: response to global uncertainty; β_{US}: US marginal effect.
- Controls: $\text{GDP}_{i,t}$, $\text{EER}_{i,t}$, $\text{BIF}_{i,t}$.

Equity Inflows and Uncertainty

	Aggregate EIF (1)	Aggregate EIF (2)	Aggregate EIF (3)
VIX	-0.099***	-0.108***	-0.113***
	(0.014)	(0.014)	(0.016)
VIX × US	0.161***	0.172***	0.176***
	(0.017)	(0.017)	(0.020)
GDP Δ%		0.014**	0.012*
		(0.004)	(0.005)
EER			0.034
			(0.017)
Bond Inflows			0.001
			(0.001)
Observations	7484	7349	6375
Country FEs	Yes	Yes	Yes

Alternative Measure of Uncertainty

Robustness: replace VIX with the Jurado et al (2021) global financial uncertainty index, using identical controls and estimation.

	Aggregate EIF (1)	Aggregate EIF (2)	Aggregate EIF (3)
Financial JLN (2021)	-0.080***	-0.083***	-0.085***
	(0.013)	(0.014)	(0.015)
Financial JLN (2021) × US	0.135***	0.138***	0.138***
	(0.015)	(0.015)	(0.018)
GDP Δ%		0.012**	0.010
		(0.004)	(0.005)
EER			0.036*
			(0.017)
Bond Inflows			0.001
			(0.001)
Observations	7484	7349	6375
Country FEs	Yes	Yes	Yes

Return

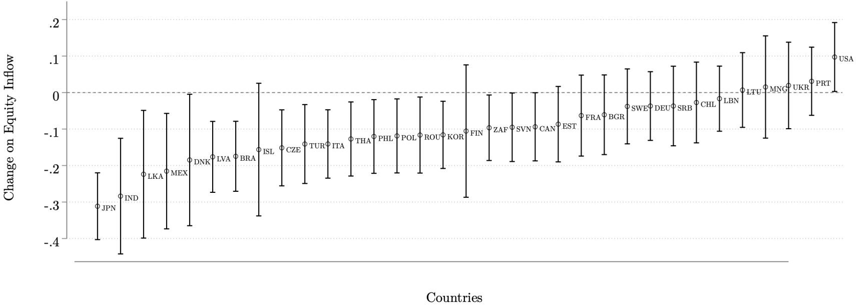
Country-Specific Uncertainty

Robustness: examine the local dimension by replacing global uncertainty with a country-specific measure derived from domestic stock-return volatility.

	Aggregate EIF (1)	Aggregate EIF (2)	Aggregate EIF (3)
Local Uncertainty	-0.134***	-0.134***	-0.130***
	(0.023)	(0.023)	(0.023)
Local Uncertainty × US	0.215***	0.215***	0.205***
	(0.024)	(0.024)	(0.029)
GDP Δ%			0.012
			(0.007)
EER			0.030
			(0.018)
Bond Inflows			-0.000
			(0.008)
Observations	3756	3756	3638
Country FEs	Yes	Yes	Yes

Return

Full Country Sample



Return

Excluding Extreme Events

Robustness: check whether the results is not driven by extremely uncertain events, by deleting any observations above 2 SD.

	Aggregate EIF (1)	Aggregate EIF (2)	Aggregate EIF (3)
VIX	-0.133***	-0.142***	-0.148***
	(0.019)	(0.019)	(0.023)
VIX × US	0.271***	0.287***	0.295***
	(0.022)	(0.022)	(0.028)
GDP Δ%		0.013**	0.011
		(0.004)	(0.005)
EER			0.027
			(0.018)
Bond Inflows			0.001
			(0.001)
Observations	6888	6761	5854
Country FEs	Yes	Yes	Yes

Return

Appendix: Theoretical Framework

Unsophisticated vs Sophisticated Investors

Time	$t = 1$	$t = 2$	$t = 3$
Sophisticated	Research Phase	Investment Decision	Consumption
Unsophisticated	–	Investment Decision	Consumption

Timeline of decisions: sophisticated vs. unsophisticated investors

- **Unsophisticated** investor has identical prior over r_k, for all $k \in N$. They make investment decision without making any research, just based on the prior they have.

- **Sophisticated** investor makes an investment decision after making research on the available assets. Thus they have a posterior $\hat{r}_k$, based on the signal they receive. They behave as a price taker, since $\kappa \to 1$.

Return

Price Informativeness and Unsophisticated Investors

- Prices transmit information only to the extent that investors condition on them. As shown by Banerjee (2011), when unsophisticated agents do not interpret prices correctly, their effective signal remains weak.

- Even if unsophisticated investors do not dominate the market, heterogeneous private signals imply that prices aggregate information only imperfectly, as in Grossman & Stiglitz (1980) and Veldkamp (2006).

- In our specification, unsophisticated investors have measure one for simplicity, but this is not essential. What matters is that some information remains private and is not fully inferred from prices.

- While the model does not require exogenous noise traders, some uninformed mass is necessary to prevent prices from becoming fully revealing in equilibrium.

As long as some information remains private, asymmetries persist and the channel operates.

Return

Proof of Convergence (Summary)

Key Result: As $\kappa \to 1$, all equilibrium objects converge to those of the baseline economy.

Equilibrium Price:

$$\lim_{\kappa \to 1} p_k(\kappa) = \frac{\mu_k - \eta \sigma_k^2}{r^f}.$$

Continuous in κ since the market-clearing price expression has a well-defined limit.

Portfolios: Mean–variance objective is continuous and strictly concave $\Rightarrow$ $x^*(p(\kappa))$ varies continuously with prices.

Information: Research payoff $V_i(\tau, p)$ continuous and concave $\Rightarrow$ $\tau^*(p(\kappa))$ continuous.

Conclusion: Prices, portfolios, and research choices are all continuous in κ; thus the $\kappa = 1$ economy is the well-defined limit of the general model.

Return

Appendix: Empirical Analysis

Alternative Measures of Uncertainty

	Squared Forecast Error VIX (1)	Squared Forecast Error JLN (2)	Squared Forecast Error Country (3)
Domestic	-0.010	-0.014	0.010
	(0.022)	(0.022)	(0.040)
Uncertainty	0.272***	0.315***	0.249***
	(0.028)	(0.034)	(0.038)
Domestic × Uncertainty	-0.024*	-0.037**	-0.029*
	(0.013)	(0.016)	(0.015)
US	0.000	0.000	0.000
	(.)	(.)	(.)
Domestic × US	0.095**	0.108***	0.079
	(0.031)	(0.033)	(0.044)
Domestic × Uncertainty × US	0.034**	0.047**	0.017
	(0.013)	(0.017)	(0.015)
N	104665	104665	83844
R^2	0.117	0.133	0.109
adj. R^2	0.115	0.131	0.107
FEs, Forecasters	Yes	Yes	Yes
FEs, Variable	Yes	Yes	Yes
FEs, Country	Yes	Yes	Yes

Return

Alternative Specification: Dispersion

Idea

- Instead of ex-post forecast errors, use cross-sectional disagreement.
- Larger disagreement $\Rightarrow$ lower perceived information precision.

Definition

For forecaster i, variable j, country c, month t:

$$\text{Dispersion}_{i,j,c,t} = \left\{ \mathbb{E}_t[x_{i,j,c,t}] - \bar{x}_{j,c,t} \right\}^2$$

- $\bar{x}_{j,c,t}$: cross-sectional mean forecast.
- Higher value $\Rightarrow$ more disagreement across institutions.

If domestic agents are better informed, their expectations should diverge less when uncertainty rises.

Alternative Specification: Dispersion

	Dispersion (1)	Dispersion (2)	Dispersion (3)
Domestic	-0.480	-0.189	-0.189
	(0.344)	(0.217)	(0.217)
VIX	0.951***	0.901***	0.901***
	(0.203)	(0.215)	(0.215)
Domestic × VIX	-0.311*	-0.278	-0.278
	(0.161)	(0.179)	(0.179)
US	-0.823	0.000	0.000
	(0.486)	(.)	(.)
Domestic × US	0.411	-0.236	-0.236
	(0.825)	(0.543)	(0.543)
Domestic × VIX × US	0.426**	0.403*	0.403*
	(0.164)	(0.185)	(0.185)
N	106600	106600	106600
R^2	0.017	0.059	0.059
adj. R^2	0.015	0.057	0.057
FEs, Forecasters	No	Yes	Yes
FEs, Variable	No	No	Yes
FEs, Country	No	No	Yes

Return