The Extensive Margin of Bilateral Financial Flows to Low-Income Countries: Entry, Persistence, and Spillovers

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Outline

# Motivation: the extensive margin is binding for LIDCs

- Sample: 59 low-income developing countries (LIDCs) as destinations; all potential source countries; annual panel 2000–2023.
- Pervasive zeros: most potential bilateral financial links are inactive in any year (e.g., portfolio equity links inactive for >85% of pairs).
- Strong persistence among active links: continuation probabilities range from 78% (portfolio equity) to 93% (ODA).
- Objective: explain *entry, persistence, and termination* of bilateral financial relationships across four flow types.
    - The allocation of capital flows across developing countries remains puzzling (Gourinchas and Jeanne, 2013).

What the paper contributes (dynamic extensive-margin gravity)

- Unified multi-flow framework: $k \in \{\text{FDI}, \text{FPI debt}, \text{FPI equity}, \text{ODA}\}$ in one triple-indexed panel (n, i, t).
- New database: most comprehensive dataset covering bilateral financial flows + macro + policy + institutional variables.
- Extensive-margin gravity with high-dimensional fixed effects:
    - source×t and destination×t effects absorb multilateral resistance (Anderson and van Wincoop, 2003; Head and Mayer, 2014) and time-varying push/pull factors;
    - dyad effects absorb persistent bilateral affinity.
- Dynamic structure: lagged own-flow and cross-flow indicators capture persistence and spillovers.
- Rare-events binary choice + bias-corrected APEs (network panel; predetermined regressors), drawing from Fernández-Val and Weidner (2016); Hinz, Stammann and Wanner (2020).

Country coverage: where are LIDCs?

IMF vs World Bank Low–Income Classification

Classification
- Both IMF & WB
- Neither
- WB Only
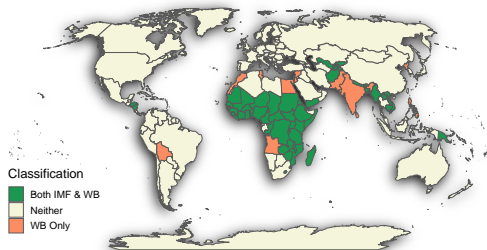
Note: IMF based on 'LIDC' classification and World Bank based of either 'Low–Income Economies' or 'Lower–Middle–Income–Economies'
Source: IMF World Economic Outlook (2023) and World Bank Country and Lending Groups (2023)

- LIDCs defined by IMF (2023 WEO classification).

- Concentrated in Sub-Saharan Africa, with clusters in South and Southeast Asia.

- Empirical focus: bilateral financial relationships *to* LIDCs.

Policy landscape: bilateral linkages expanded less for LIDCs
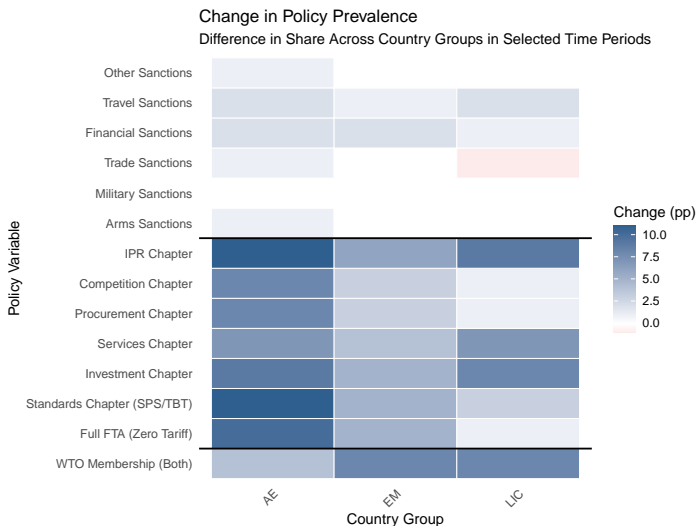
Changes in prevalence of trade/investment/sanctions linkages between 2003–2012 and 2013–2023.

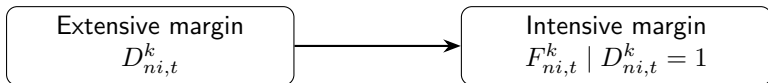# Extensive-margin facts: sparsity and persistence

- Inactive links are the norm (zeros are economic outcomes). Also prevalent in trade (Helpman, Melitz and Rubinstein, 2008).
- Descriptively, transitions are highly asymmetric:
    - activation from 0 is rare (roughly 1–5% annually, depending on flow);
    - continuation from 1 is common (roughly 78–93%).
- Implication: extensive-margin models must accommodate rare events and strong state dependence.
- High volatility (Broner et al., 2013) and it varies by type.

Flow type	Uncond. contin. prob.	Interpretation
ODA	≈ 0.93	multi-year programs / commitments
FDI	≈ 0.88	sunk costs, relationship capital
FPI debt	≈ 0.83	episodic finance, risk cycles
FPI equity	≈ 0.78	most fragile extensive margin

Framework overview: extensive vs. intensive margin

We model bilateral financial integration as a two-stage object for each flow type $k \in \mathcal{K} = \{\text{FDI}, \text{PE}, \text{PD}, \text{ODA}\}$:

- **Extensive margin:** link formation/continuation $D_{ni,t}^k \in \{0,1\}$ (whether a relationship exists).
- **Intensive margin:** flow/position $F_{ni,t}^k$ conditional on $D_{ni,t}^k = 1$ (how large it is).

$$\boxed{\begin{array}{c} \text{Extensive margin} \\ D_{ni,t}^k \end{array}} \longrightarrow \boxed{\begin{array}{c} \text{Intensive margin} \\ F_{ni,t}^k \mid D_{ni,t}^k = 1 \end{array}}$$

Key idea

Zeros in LIDCs are economically meaningful: they reflect *fixed entry costs* and *information/coordination frictions*.

Returns, variable frictions, and fixed entry costs

Investors perceive a friction-adjusted (effective) gross return:

$$\tilde{R}_{ni,t}^k = \frac{R_{it}^k}{\kappa_{ni,t}^k}, \qquad R_{it}^k > 0, \ \kappa_{ni,t}^k \geq 1.$$

We parameterize bilateral variable frictions as

$$\ln \kappa_{ni,t}^k = \boldsymbol{Z}_{ni}' \boldsymbol{\pi}^k + \boldsymbol{X}_{ni,t}' \boldsymbol{\beta}^k,$$

where $\boldsymbol{Z}_{ni}$ captures time-invariant proximity (distance, language, colonial ties, legal origin) and $\boldsymbol{X}_{ni,t}$ captures time-varying policy/integration (RTA depth, sanctions, lagged trade/services links).

- **Variable costs** (κ) scale payoffs; **fixed costs** ($f_{ni,t}^k > 0$) govern whether a link exists at all.
- With rich source×t and destination×t fixed effects, identification of $\boldsymbol{\beta}^k$ comes from *bilateral changes* (policy and integration) rather than global conditions.

Why flow types differ (econ primitives $\Rightarrow$ heter. dynamics)

Four flows differ in control, information intensity, and persistence, generating heterogeneous θ^k and cross-flow spillovers $\phi^{k\ell}$:

FDI

- Control + technology transfer; high setup and compliance costs.

- Strong relationship capital $\Rightarrow$ high persistence (θ^{FDI}).

- Can signal destination quality to portfolio investors.

Portfolio equity (PE)

- High information intensity; volatile, procyclical returns.

- Moderate persistence (learning/custody relationships).

Portfolio debt (PD)

- Pricing reflects sovereign risk/Institutions; ratings and liquidity matter.

- Episodic entry; due diligence/settlement infrastructure important.

ODA

- Donor objectives + bureaucracy; institutional inertia.

- High persistence (θ^{ODA}); may catalyze private flows.

Entry value and reduced-form index (links the micro story to estimation)

Define the conditional expected present value (EPV) of *gross operating payoffs* for a type-k link:

$$\Pi_{ni,t}^k = \mathbb{E}_t\left[\sum_{s=0}^{\infty} \beta^s \, \tilde{R}_{ni,t+s}^k \, A_{ni,t+s}^k \, \Big| \, D_{ni,t}^k = 1\right], \qquad \beta \in (0,1).$$

With $\tilde{R}_{ni,t}^k > 0$ and $A_{ni,t}^k \geq 0$, $\Pi_{ni,t}^k > 0$ and $v_{ni,t}^k \equiv \ln \Pi_{ni,t}^k$ is well-defined. We use the reduced-form decomposition

$$v_{ni,t}^k = \ln R_{it}^k - \ln \kappa_{ni,t}^k + \omega_{ni,t}^k,$$

and the entry rule with fixed costs $f_{ni,t}^k > 0$:

$$D_{ni,t}^k = \mathbf{1}\left\{v_{ni,t}^k > \ln f_{ni,t}^k\right\}.$$

Dynamics: persistence and cross-flow spillovers

State dependence (relationship capital and learning).

$$\ln f_{ni,t}^k = \bar{f}_{ni}^k - \theta^k D_{ni,t-1}^k - \lambda^k \ln(1 + F_{ni,t-1}^k), \quad \theta^k > 0, \ \lambda^k \geq 0.$$

Cross-flow spillovers (complements/substitutes).

$$\eta_{ni,t}^k = \mu_{ni,t}^k + \theta^k D_{ni,t-1}^k + \sum_{\ell \neq k} \phi^{k\ell} D_{ni,t-1}^\ell.$$

- $\theta^k > 0$ generates **persistence**; economic magnitude summarized via bias-corrected APEs.
- $\phi^{k\ell} \gtrless 0$ implies **complementarity/substitutability** (e.g., ODA→FDI "catalyst", FDI→portfolio "signal").

Extensive-margin gravity index (link formation)

For each flow type k, define a binary link indicator $D_{ni,t}^k \in \{0,1\}$. The systematic entry index is

$$\eta_{ni,t}^k = \alpha_{nt}^k + \gamma_{it}^k + \delta_{ni}^k + \boldsymbol{X}_{ni,t}'\boldsymbol{\beta}^k + \theta^k D_{ni,t-1}^k + \sum_{\ell \neq k} \phi^{k\ell} D_{ni,t-1}^\ell.$$

- α_{nt}^k, γ_{it}^k: time-varying source and destination forces (push/pull; multilateral resistance).
- δ_{ni}^k: persistent bilateral affinity (history, networks, deep frictions).
- θ^k: own-flow persistence (relationship capital / sunk costs).
- $\phi^{k\ell}$: cross-flow spillovers (complements/substitutes at extensive margin).

Why logit/cloglog + bias-corrected APEs

- Rare activation events imply highly asymmetric transition probabilities; cloglog is naturally suited to rare events.
- Coefficients in nonlinear FE models are hard to interpret: we resort to *average partial effects* (APEs).
- Incidental parameters in short-to-moderate T panels: we use analytical bias correction for APEs in a network panel with predetermined regressors.

Implementation	Choice in the paper
High-dimensional FE GLM	Link functions: logit (cloglog)
Bias-corrected APEs	Network panel structure
Dynamics / weak exogeneity	Bandwidth choice for spectral densities

Identification: cross-sectional vs within-dyad variation

- **Specification 1** (source$\times$t, dest$\times$t FE): identifies effects using cross-sectional variation across dyads within each year.
- **Specification 2** (+ dyad FE): isolates *within-dyad* changes over time; absorbs time-invariant gravity variables and persistent affinity.
- Policy coefficients that attenuate with dyad FE suggest selection on stable bilateral traits rather than causal short-run policy effects.

Interpretation

Cross-sectional associations are informative for *who is connected to whom*. Within-dyad variation is the more credible design for *policy changes over time*.

Result 1: persistence dominates the extensive margin (logit)

Bias-corrected APEs for the lagged dependent variable (percentage-point changes):

	ODA	FDI	FPI debt	FPI equity
Spec. 1 (no dyad FE)	15.4***	35.4***	14.1***	16.0***
Spec. 2 (with dyad FE)	7.9***	11.9***	11.0***	13.1***

- **Persistence** remains economically large even after absorbing dyad affinity.

- Interpretation: **relationship-specific capital / switching costs** are first-order for all flow types.

Result 2: informational frictions bind hardest for portfolio flows

Selected bias-corrected APEs (Spec. 1, full covariates, in percentage points):

Bilateral friction	ODA	FDI	FPI debt	FPI equity
log(distance)	-2.36***	-2.72***	-0.77***	-0.44***
log(lingdist)	-0.69	-0.53	-1.82***	-4.04***
log(cultdist)	-0.92	-5.21***	-1.02	-2.60

- **Geography** matters for all fin flows to LIDCs.

- Portfolio equity is especially sensitive to **linguistic distance** (largest magnitude & significant);

- FDI is less sensitive to language distance but strongly affected by broader **cultural distance**, based on Pellegrino, Spolaore and Wacziarg (2025).

Result 3: sanctions have heterogeneous effects across flows

Selected bias-corrected APEs (percentage points):

	ODA	**FDI**	**FPI debt**	**FPI equity**
Trade sanctions (Spec. 1)	-0.29	$+2.02$***	-0.93**	-0.22
Trade sanctions (Spec. 2)	-0.73**	$+1.67$***	-0.19	-0.10
Travel sanctions (Spec. 2)	-0.41	-1.41***	-0.07	-0.32**

- **Trade sanctions** correlate with higher FDI entry (consistent with tariff-jumping), but deter portfolio debt in cross-section.
- **Travel sanctions** reduce FDI and portfolio equity within dyads, highlighting the role of business mobility for initiating investment.

Result 4: RTA depth attenuates (and flips) under within-dyad identification

Bias-corrected APE for RTA depth:

	ODA	FDI	FPI debt	FPI equity
Spec. 1 (no dyad FE)	-0.05	$+0.14$***	$+0.07$**	-0.01
Spec. 2 (with dyad FE)	$+0.12$***	-0.20***	-0.14***	-0.11***

- **Cross-sectional** correlation between deeper agreements and FDI entry is **positive**.

- Within dyads, deeper agreements are associated with *lower* entry probabilities for private flows.

- **Interpretation**: selection into deep RTAs / timing and sequencing may dominate short-run effects.

Result 5: cross-flow complementarities are mostly cross-sectional

Selected cross-flow APEs (percentage points):

Channel	Spec. 1	Spec. 2
Lag ODA $\rightarrow$ FDI	$+1.17$***	-0.31***
Lag FDI $\rightarrow$ FPI debt	$+0.79$***	$+0.21$***
Lag FPI debt $\rightarrow$ FPI equity	$+0.80$***	$+0.35$***

- Some within-dyad **spillovers** remain modest for private flows (FDI $\rightarrow$ debt; debt $\rightarrow$ equity).

> "Aid as catalyst" idea
>
> Apparent "aid as catalyst" for FDI is driven by **persistent dyad affinity**; it disappears with dyad FE.

Why dynamics matter: omitting persistence distorts policy inference

- Specification 3 (no lagged own-flow; no cross-flow lags) delivers **materially different** policy APEs.
- **Mechanism**: policy variables correlate with persistent relationships and with the history of other flows.
 - Policy effects overstated by 70–80%.

Example	Spec. 2 (dynamic)	Spec. 3 (no dynamics)
Trade sanctions $\rightarrow$ FDI	$+1.67$*** pp	$+3.02$*** pp
Travel sanctions $\rightarrow$ FDI	-1.41*** pp	-2.45*** pp

Takeaways

Key messages

- Extensive-margin zeros are pervasive; persistence is large across all flows.
  - The binding constraint is **connectivity**: expanding the set of active bilateral links matters no less than scaling existing ones.
- Determinants are heterogeneous: portfolio flows are most sensitive to informational distance; FDI responds differently to policy restrictions.
  - Analysis suggests to reduce informational frictions for portfolio flows (financial reporting standards, investor protections, data availability) and facilitate business mobility and on-the-ground engagement for FDI.
- Cross-flow "complementarities" are mostly cross-sectional; within-dyad spillovers are modest.
  - 'Aid catalyzes FDI" mainly through slow-moving bilateral characteristics; analysis suggests to target underlying structural barriers as catalytic strategies.
- Dynamic, bias-corrected nonlinear FE models are essential for credible policy inference in sparse networks that describe LIDCs financial inflows.

Appendix: policy variables (level heat map)

Share of Policy Measures
Across Country Groups in Select Time Periods
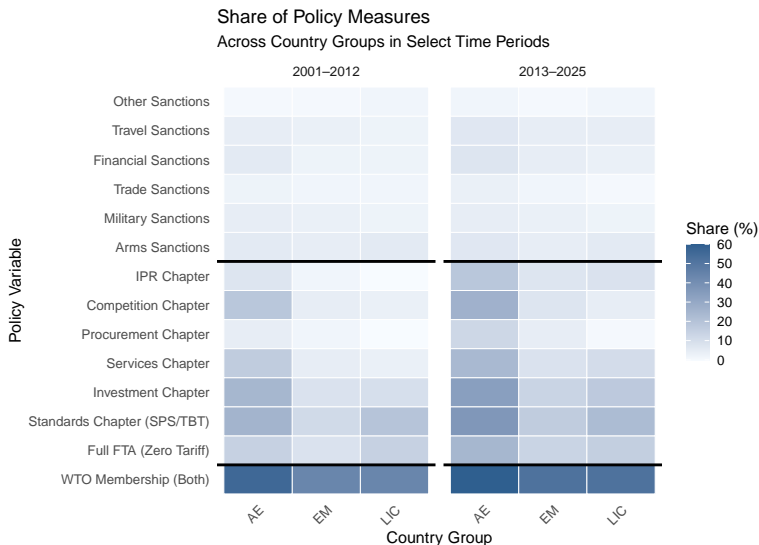
Note: Share determined by the average number of authorized policies for each financial flow observation pair in a given time period
Country Groups determined by IMF WEO 2023 Classification codes

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