

Expanding the Landscape of Cross-Border Flow Restrictions: Modern Tools and Historical Perspectives

Katharina Bergant (IMF), Andres Fernandez (IMF), Ken Teoh (IMF), Martin Uribe (Columbia)
December 12, 2025; Hong Kong University

The views expressed therein are those of the authors and do not necessarily represent the views of the IMF, the Executive Board, or IMF management.

Motivation

- A key driver of **financial globalization** in the world economy: use of **cross-border flow restrictions** by countries.
 - These go beyond **capital controls**: includes import payment regulations, export proceeds requirements, FX restrictions, and more.
 - Yet measurement has remained incomplete, low-frequency, and narrow
- **Our goal**: use recent advances in AI to systematically recover the **full landscape** of cross-border flow restrictions, providing a **fresh look into the process of financial globalization** over the past seven decades.
- With rising *deglobalization* concerns, these issues remain highly relevant today.
 - "*Tariffs on goods may be a prelude to **tariffs on money***" Financial Times, March 2025.

- **Three key questions**
 - How do we **consistently measure** the wide variety of BoP flows' restrictions across countries and time?
 - How do we account for **breadth and depth** of these policies?
 - What can we learn from their **use and motivations**?
- This paper uses LLMs on official documents to build a **comprehensive** and **granular** account of *de jure* cross-border restrictions since 1950.
 - **Daily information on over 40.000 changes in BoP flows' restrictions** for all IMF member countries.
 - **New stylized facts** on use and evolution of these measures.

Key Takeaways

1. **New stylized facts: 1950–2024**

- Non-linear financial globalization trends
- Key role of current-account instruments
- Strong heterogeneity by income-groups, type of tools, direction of flows, and regions.

2. **Strong validation and comparability of AI methods**

- High accuracy vs. manual coding
- Replicates previous manually coded dataset
- Robust across intensity scaling and model variants

3. **How and why countries use restrictions**

- Measures applied in *packages*, not isolation
- Sharp increase during currency & debt crises
- Linked to institutional quality and macro-critical motivations, policy "fears"

4. **A new publicly available dataset**

- Changes (daily) and stance (annual)
- Intensity-adjusted measures + Fine-grain extensions

Related Literature

- **De jure measures of capital account restrictions:** Quinn (1997), Chinn and Ito (2006), Fernandez et al. (2016), Parischa (2012), Ahmed and Zale (2014), Guisinger and Brune (2017), Binici and Das (2016), Acosta-Henao et al (2025).
 - Expand set of restrictions w/ finer granularity in systematic and replicable way
- **Motivations and real effects of capital account restrictions:** Magud et al. (2018), Rebucci and Ma (2018), Erten et al. (2021), Bianchi and Lorenzoni (2022), Ghosh et al. (2017), Baba and Kokenyne (2011), Erten and Ocampo (2017), Forbes et al. (2015).
 - Systematic use of official documents to uncover motivations and high-frequency patterns in joint instruments and crises.
- **Combination of policy instruments:** Basu et al (2020), Adrian et al (2021).
 - Provide empirical evidence of how instruments affecting BoP are intertwined.
- **AI measurement of economic policy:** Clayton et al. (2025); Ottonello et al. (2024); Fang et al.(2025); Aruoba and Drecshel (2024); Korinek (2025); Dell (2024).
 - Apply domain-adapted LLMs to classify unstructured regulatory text on cross border flow restrictions and build high-frequency, multi-dimensional policy indicators.

Agenda

- **Sources**
- **Methodology**
- **Stylized Facts**
- **Extensions**

IMF Annual Report on Exchange Rate Arrangements and Exchange Restrictions - AREAERs (main source)

- Full historical record of regulatory changes across BoP categories
- Rich descriptive content but unstructured and heterogeneous
- Basis for all LLM classifications (1950–2024)

IMF Taxonomy (auxiliary)

- Standardized metadata on macro critical CFMs post 2012

National Sources (auxiliary)

- Decrees, Monetary Policy and Financial Stability Reports, etc.

Main Sources: The IMF's AREAERs

FIRST ANNUAL REPORT ON EXCHANGE RESTRICTIONS



INTERNATIONAL MONETARY FUND

MARCH 1, 1950

AUSTRIA

Exchange Rate System

The par value is 0.0341796 gram of fine gold per Austrian Schilling or 5 26.00 = US\$1. The official limits for the U.S. dollar are 5 25.80 buying, and 5 26.20 selling, per US\$1—rates at which the Austrian National Bank will buy or sell. The rate for the U.S. dollar fluctuates in the exchange market between these limits. Market rates for other currencies vary between limits which result from combining the official limits for the U.S. dollar maintained by Austria and such limits in force in the country of the other currency concerned. "Agreement dollars" are quoted at par with the U.S. dollar. Effective costs may deviate in switch transactions. Forward premiums and discounts are left to the interplay of market forces.

Austria accepted the obligations of Article VIII, Sections 2, 3, and 4, of the Fund Agreement, as from August 1, 1962.

Administration of Control

The Austrian National Bank administers the exchange control and issues licenses where required. Most exchange transactions pass through these Austrian banks that have been authorized to implement exchange control regulations.

The customs issue freely and without delay licenses required for imports of liberalized goods. Licenses, if required, for other imports and for exports have to be obtained from the competent ministry, viz., the Federal Ministry of Trade, Commerce, and Industry (Licensing Office) or the Federal Ministry of Agriculture and Forestry.

Prescription of Currency

Settlements with the countries with which Austria maintains bilateral payments arrangements¹ are made through clearing accounts expressed in U.S. dollars. Settlements with all other countries

¹Belgium, Czechoslovakia, Eastern Germany, Hungary, Poland, Romania, and U.S.S.R. Settlements with the U.S.S.R. are in take place in convertible currencies from January 1, 1971.

36

may be made either in convertible currencies or through Free Schilling Accounts.

Nonresident Accounts

There are two categories of nonresident accounts in schillings: Free Schilling Accounts and Blocked Accounts.

Free Schilling Accounts may be freely credited with proceeds from the sale of gold, gold coins, or convertible currencies by a nonresident to the Austrian National Bank, or to an authorized bank, as well as with payments permitted by the National Bank on the basis of a general or individual authorization. The accounts may be freely debited for payments to Austrian residents, with the exception of loans granted by nonresidents to residents, which require individual licenses. Balances may be freely converted into any foreign currency. Transfers between these accounts are free.

Blocked Accounts consist of funds that are due to nonresidents. A general license permits their use for many payments for current and capital invisibles. The transfer abroad of funds in Blocked Accounts is subject to an individual license. In most cases the licenses are granted freely if the funds belong to residents of countries with which Austria makes settlements in convertible currencies. As a result, Blocked Accounts largely represent funds due to residents of countries with which Austria settles payments through bilateral accounts.

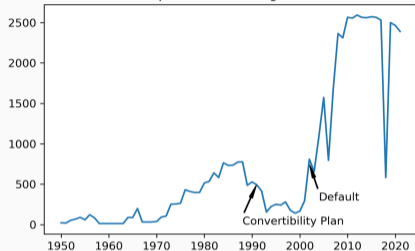
Nonresidents may also maintain Nonresident Accounts in convertible foreign currencies. These accounts may be debited for the same purposes as Free Schilling Accounts.

Imports and Import Payments

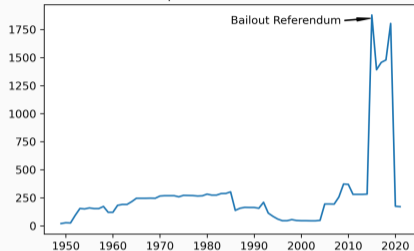
All commodities not included in the Annex to the Foreign Trade Law are free of import licensing and may be imported from any country without quantitative restriction. All goods included in the Annex require licenses. Most of these goods are free of quantitative restriction. The liberalization depends on the group of countries from which they are imported; for such liberalized goods, licenses are issued by the customs at the time of

AREAER Capital Account: Word Counts Over Time

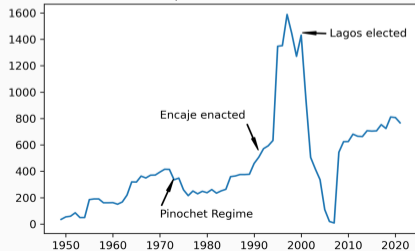
Capital Account: Argentina



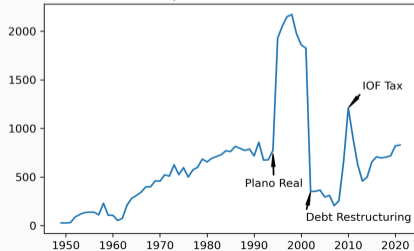
Capital Account: Greece



Capital Account: Chile

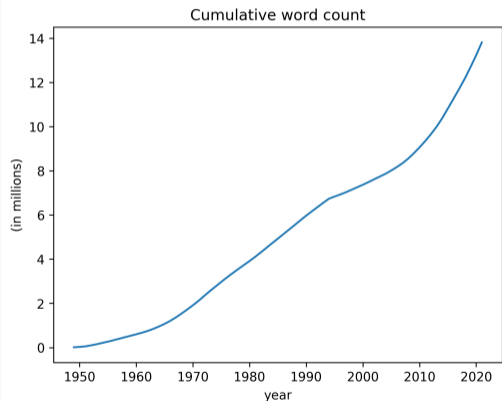


Capital Account: Brazil

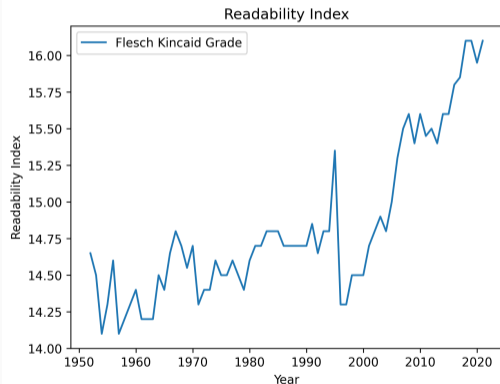


Why ML/AI tools? Address two key challenges

- Increased **volume** and **complexity** of text & Changing structure over time

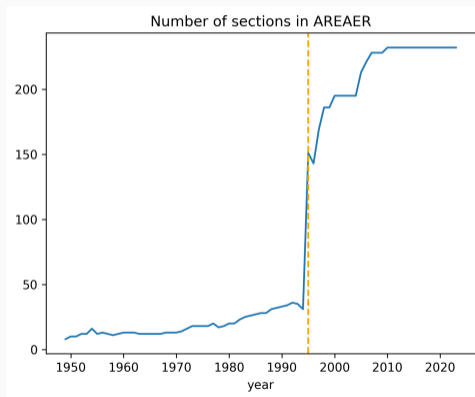


(Sample and avg. words per country)



Why ML/AI tools? Address two key challenges (cont.)

- Increased volume and complexity of text & **Changing structure** over time



Methodology: Five Steps

1. **Manual annotation of AREAER labels**

Human coders label AREAER narratives.

2. **Review and refinement of annotations**

Resolve discrepancies through expert review and LLM-assisted reconciliation.

3. **Augment training data**

Combine manual labels with post-1995 AREAER labels to construct training sets.

4. **Train domain-adapted language models**

Pre-train BERT on labels; fine-tune and benchmark against alternative models.

5. **Evaluate model performance**

Compare accuracy and precision across all labels.

- Team manually labelled a **training sample of 3000 changes in restrictions** (\approx 7.5% of sample).
 - Examples drawn from range of countries and time periods.
 - **Labels:** 8 categories, direction of change (tightening vs. loosening), direction of flow (inflow vs. outflow), types (price-based, non price-based, admin.), numerical info.
- Domain-adapted BERT **LLM customized to AREAERs**.
 - Fine-tuned on 80% of labelled examples
 - Performance tested on the remaining 20% of manually labelled examples
 - Performance exceeds other benchmarks (OpenAI GPT, LLama, word-count models)
 - **Avg. matching rate of about 85%**
 - Model accuracy comparable to human coding errors in 15% of mismatches

Evaluation of model performance

Domain-adapted BERT performs well compared to other classification models.

Label Model	Direction	Flow	Category	Price	Numerical
BERT (DAPT)	0.870	0.806	0.816	0.767	0.942
BERT (base)	0.854	0.797	0.822	0.696	0.949
GPT 4o mini	0.857	0.679	0.638	0.567	0.917
Llama 32 3B	0.854	0.742	0.761	0.658	0.899
TFIDF + Logistic Reg.	0.752	0.758	0.687	0.638	0.899
TFIDF + RF	0.738	0.734	0.546	0.600	0.919
TFIDF + SVC	0.772	0.770	0.755	0.651	0.904

Eight Different Categories of BoP Flows' Restrictions

Category	Count	Share (%)
1. FX markets	4301	10.5
2. Payments and receipts	6044	14.7
3. Resident and non-resident accounts	3131	7.6
4. Import payments	4315	10.5
5. Export proceeds	2943	7.2
6. Invisible transactions	5116	12.4
7. Capital account transactions	8032	19.5
8. Financial sector	3108	7.6
9. Overall	41126	100.0

Definitions & Examples:

Cat.1

Cat.2

Cat.3

Cat.4

Cat.5

Cat.6

Cat.7

Cat.8

Excluded Categories of Measures

We exclude four types of measures that are not the primary focus of our dataset or fall outside IMF's reporting mandate for cross-border restrictions:

- 1. Exchange-regime descriptions:** Narratives describing exchange-rate regimes or monetary policy frameworks.
- 2. National security-related measures:** Measures imposed for national-security or geopolitical reasons that are not de jure capital- or current-account restrictions (including sanctions).
- 3. Trade-related restrictions:** Measures affecting goods or services rather than the financial transactions associated with them.
- 4. Domestic macroprudential measures:** Prudential tools unrelated to cross-border flows.

- An integrated BoP flow restriction index on changes (iBoP-C) for country i , category c , year t :

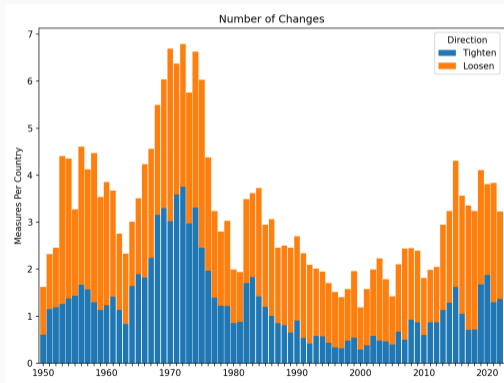
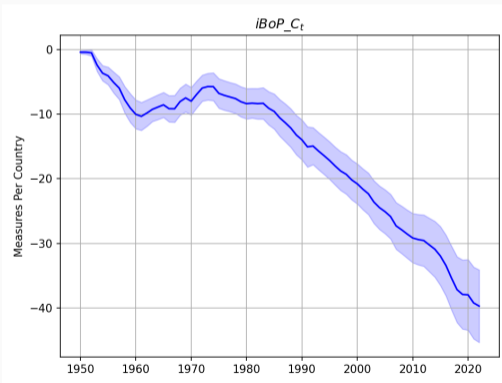
$$iBoP-C_{itc} = \sum_{\tau \leq t} \left(\sum_{k \in \mathcal{T}_{i\tau c}} Tightening_{k,i\tau c} - \sum_{l \in \mathcal{L}_{i\tau c}} Loosening_{l,i\tau c} \right)$$

where the set of measures in \mathcal{T} and \mathcal{L} , can vary across countries, time and category.

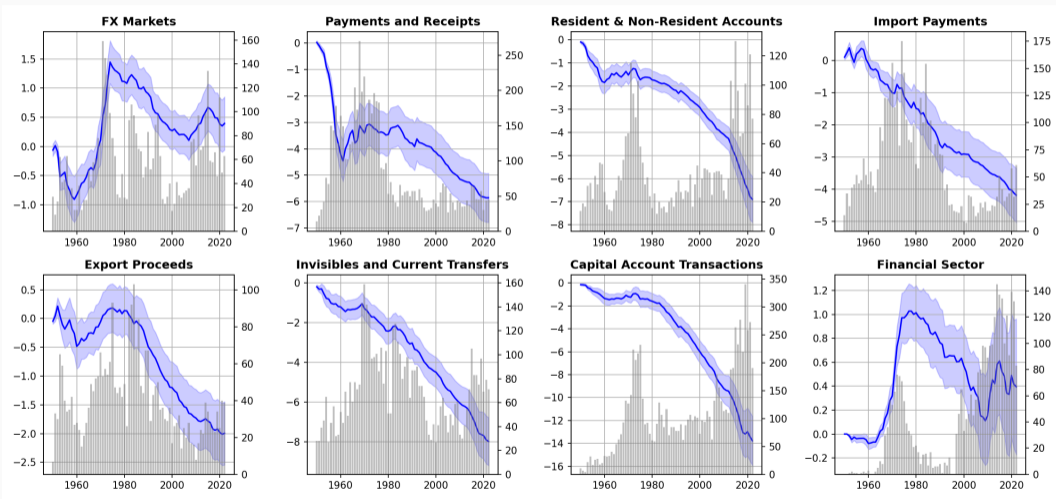
Caveats and Limitations

Stylized Fact 1: Liberalization trends have not evolved linearly

- Average country tightened in the years leading up to the breakdown of Bretton Woods, and began loosening in the mid-1980s. medians

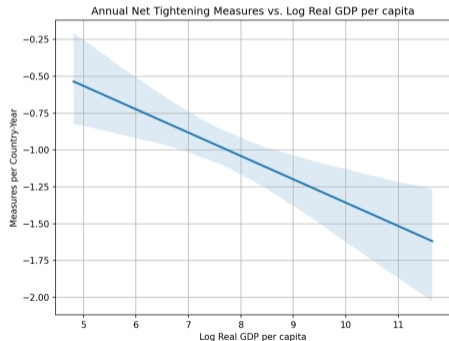
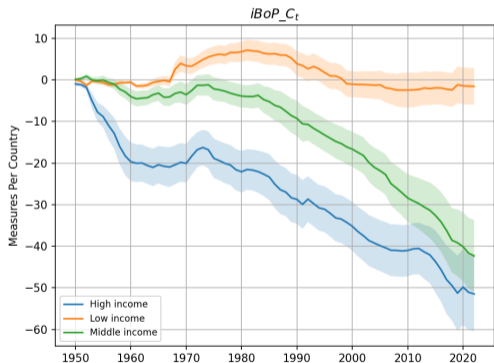


Stylized Fact 1: Liberalization trends have not evolved linearly



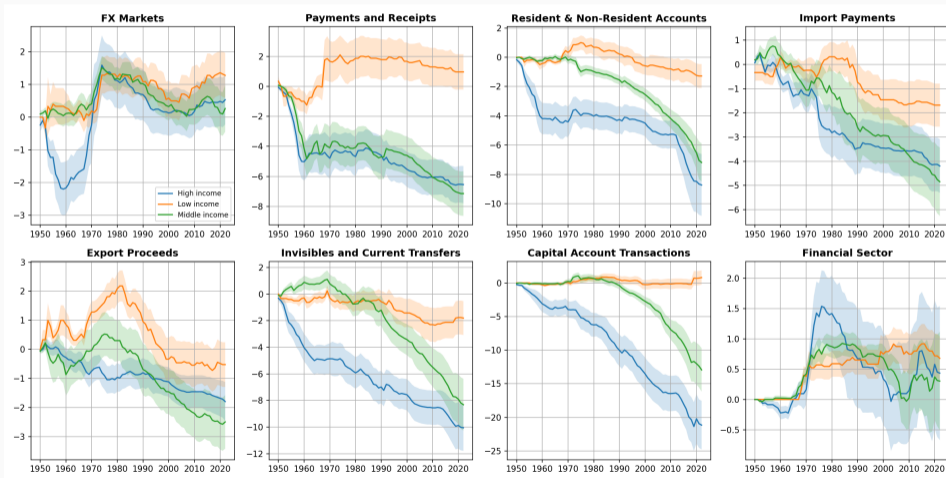
Stylized Fact 2: Differential pace of liberalization

- High income countries liberalizing faster than middle and lower income countries.



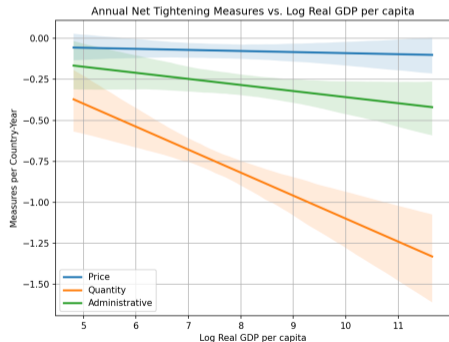
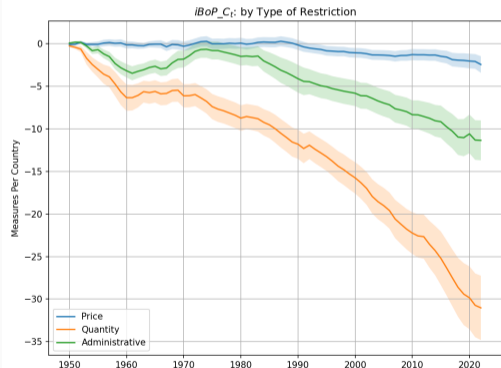
Stylized Fact 2: Differential pace of liberalization (cont.)

- Heterogeneity is robust across categories



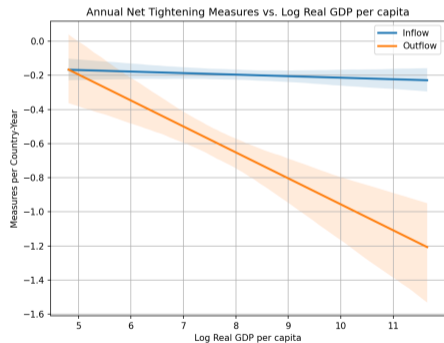
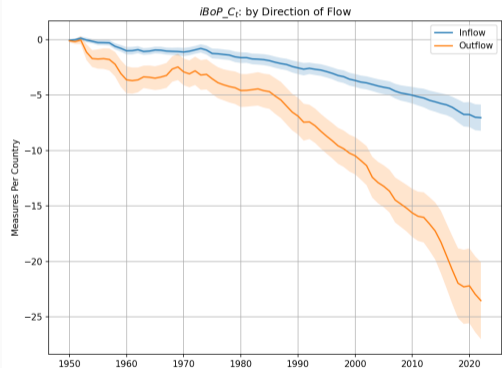
Stylized Fact 3: Type of Restrictions

- Quantity-based and administrative-based restrictions have seen progressive loosening, while price-based restrictions tend to persist. [Def.](#) [By Cat.](#)



Stylized Fact 4: Inflow versus outflow restrictions

- Outflow restrictions have liberalized more rapidly than inflow restrictions. By Cat.



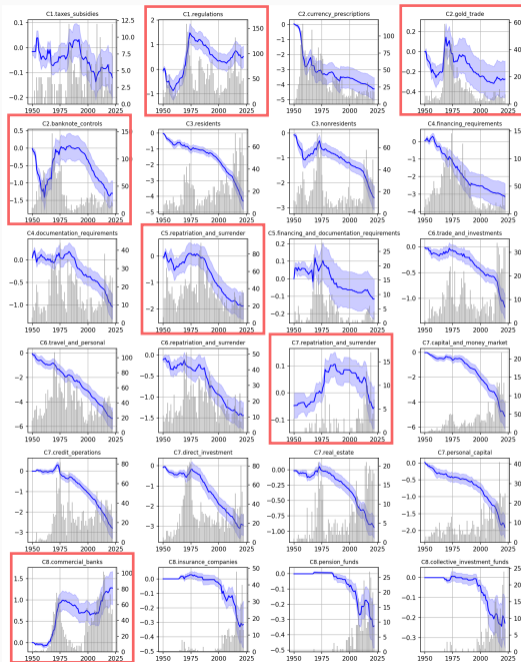
Agenda

- Sources
- Methodology
- Stylized Facts
- **Extensions**
 - More granular measures [link](#)
 - Stance index [link](#)
 - LLM approach validation [link](#)
 - Use of measures [link](#)
 - Motivations [link](#)
 - Intensity [link](#)
 - Case studies [link](#)
 - Dataset released [link](#)
 - Other robustness checks

More Granular Measures

Extensions

Subcategory	Count	Share (%)
Overall	41030	100.0
Exchange taxes and subsidies	271	0.7
Restrictions in the foreign exchange market	3968	9.7
Prescription of currency requirements	2575	6.3
Trade of gold	867	2.1
Control of banknotes	2598	6.3
Restrictions on resident accounts	1597	3.9
Restrictions on nonresident accounts	1526	3.7
Import financing requirements	3128	7.6
Import documentation requirements	1185	2.9
Repatriation and surrender requirement of export proceeds	2625	6.4
Export financing and documentation requirements	314	0.8
Invisible payments: trade and investment	771	1.9
Invisible payments: travel and personal	2962	7.2
Invisible proceeds	1381	3.4
Repatriation and surrender requirement on capital transactions	156	0.4
Capital account: capital and money market	2850	6.9
Capital account: credit operations	1777	4.3
Capital account: direct investment	2064	5.0
Capital account: real estate	507	1.2
Capital account: personal capital	669	1.6
Restrictions on commercial banks	2249	5.5
Restrictions on insurance companies	356	0.9
Restrictions on pension funds	284	0.7
Restrictions on investment and collective investment funds	213	0.5



iBoP-S measures the *existence* of restrictions (not changes). Indicates whether each subcategory of restrictions is present in a given country–year. Mirrors the AREAER’s hierarchical structure (subsections → subcategories → categories) and aggregates bottom-up. Available from 1995 onward, when granular stance reporting becomes standardized.

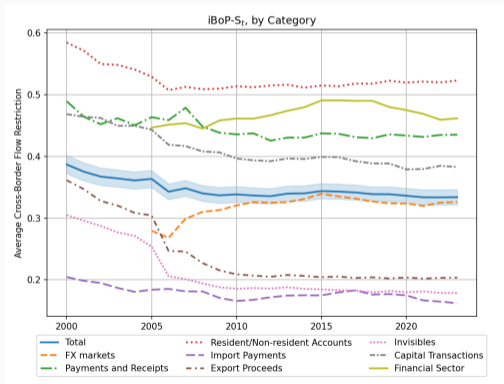
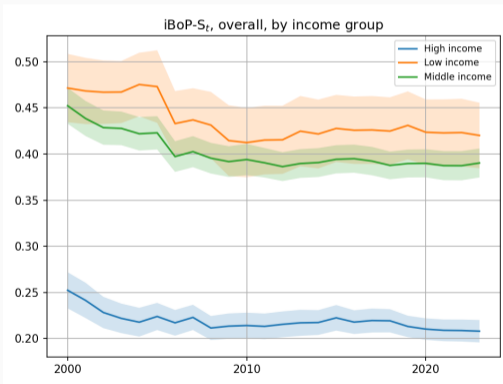
For a top-level AREAER category c :

$$iBoP_S_{itc} = \text{Stance}_{it}(c).$$

Each lowest-level node s is a binary indicator $\mathcal{I}_{s,it} \in \{0, 1\}$. For any node n with child set $\mathcal{C}(n)$:

$$\text{Stance}_{it}(n) = \begin{cases} \mathcal{I}_{n,it}, & \text{if } \mathcal{C}(n) = \emptyset, \\ \frac{1}{|\mathcal{C}(n)|} \sum_{m \in \mathcal{C}(n)} \text{Stance}_{it}(m), & \text{if } \mathcal{C}(n) \neq \emptyset. \end{cases}$$

- Openness has increased gradually over the last two decades. High income countries display lower levels of restrictiveness. By Categories



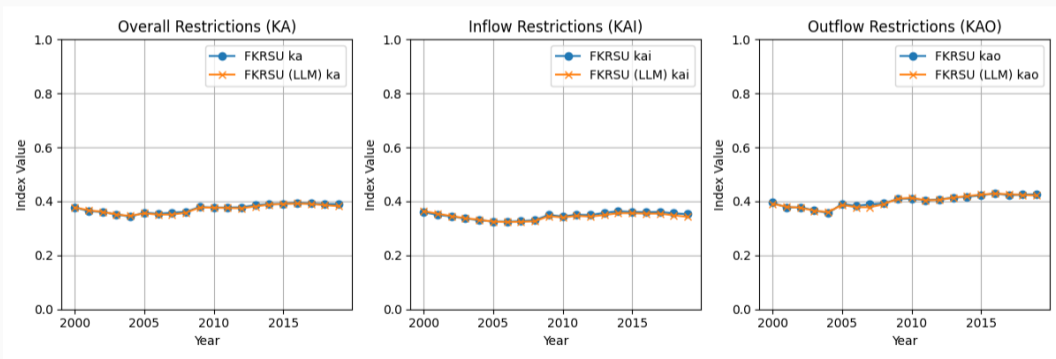
Validation of the LLM classifications

We evaluate model performance in replicating a fully manually coded dataset: Fernández, Klein, Rebucci, Schindler, and Uribe (FKRSU, 2016), which we also extend.

Comparison with previous work

We benchmark our indices against widely used *de jure* indicators, including Chinn-Ito, Klein-Toyoda, and Ilzetzki-Reinhart-Rogoff. This allows us to assess consistency, understand differences in scope and granularity, and highlight the value added from broader coverage and higher frequency.

- LLMs can replicate aggregate capital control indices on inflows/outflows in FKRSU, KAI/KAO near perfectly

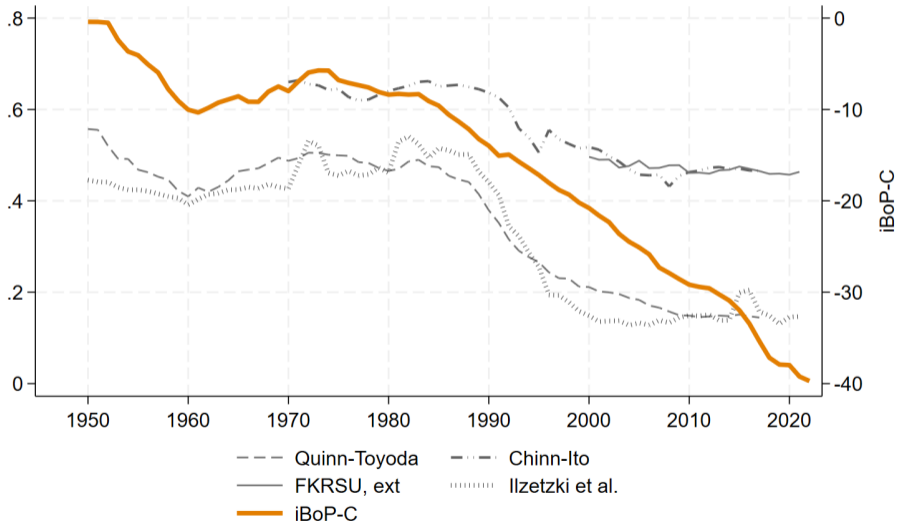


	Quinn-Toyoda	Chinn-Ito	FKRSU, ext	Ilzetzki et al.	iBoP-C
Quinn-Toyoda	1				
Chinn-Ito	0.9683	1			
FKRSU, ext.	0.8230	0.5152	1		
Ilzetzki et al.	0.9543	0.9641	-0.1212	1	
iBoP-C	0.9672	0.9413	0.8801	0.8803	1

Table 1: Comparison with other datasets mentioned in the text: Quinn and Toyoda (2008), Chinn and Ito (2006), Ilzetzki et al. (2021). "FKRSU, ext" refers to the measure by Fernandez et al. (2016) extended by our LLM as described in Section 7.1.

Comparison with previous work: Time Series

Extensions



- Countries deploy restrictions **far beyond capital controls**, using a broad toolkit across current-account, FX, and financial-sector measures.
- Understanding **how often, when, and in what combinations** these tools are used provides insight into the architecture of the international monetary system.
- We document the **intensive margin** (how many measures are adopted), the **extensive margin** (which types of measures), and **policy bundling** (joint adoption across categories).
- This informs later explorations on determinants such as **crises, institutions, and policy sequencing**.

- While 35% are bunched on the same day, 77% within 30 days, revealing pervasive *bunching*, *staggering*, and sequential policy adjustments. Bunching

Window	Single Measure	More than One Measure
± 0 days	65%	35%
± 1 days	59%	41%
± 3 days	54%	46%
± 5 days	49%	51%
± 10 days	40%	60%
± 20 days	30%	70%
± 30 days	23%	77%

Table 2: Share of measures in bunching and staggering for different horizons.

- During staggering episodes, all categories appear in combination, including strong within-category clustering, showing that countries adjust multiple levers jointly rather than relying on a single instrument.

	FX Markets	Pyts & Rcpts	NR Act.	Import Pyts	Export Pcnds	Invis Trans	Capital Act.	Fin. Sector
FX Markets	20	12	8	12	9	15	17	7
Pyts & Rcpts	9	27	11	11	7	13	17	5
NR. Acc	9	14	14	10	6	16	23	6
Import Pyts	10	12	8	22	12	17	16	4
Export Pcnds	10	12	8	16	13	15	20	4
Inv. Tra	11	12	10	15	9	19	19	4
CapM	10	11	10	11	8	15	27	8
Fin. Sector	10	9	13	7	6	11	29	15
AVG	11	14	10	13	9	15	21	7

Table 3: Conditional shares of other measures used in a staggering episode (-30 to +30 days).

Crisis analysis

$$\text{No of measures}_{i,t} = \alpha + \beta * \text{Crisis}_{i,t} + \gamma * \Delta \text{realGDP}_{i,t} + \mu_i + \mu_t + \epsilon_{i,t} \quad (1)$$

Use of cross-border restrictions and the political economy

$$\text{No of measures}_{i,t} = \alpha + \beta * \text{institutional}_{i,t} + \gamma * \Delta \text{realGDP}_{i,t} + \mu_i + \mu_t + \epsilon_{i,t} \quad (2)$$

- In crisis years, countries more than double their use of measures, especially in FX and current-account categories: looking only at capital controls gives a very incomplete picture of crisis policy.

	(1) All	(2) FX	(3) Pay & Rec	(4) NR Acc	(5) Imp	(6) Exp	(7) Inv. Tra	(8) CapM	(9) FS
Crisis Dummy	1.263*** (0.31)	0.249*** (0.06)	0.077 (0.06)	0.179*** (0.06)	0.309*** (0.07)	0.121*** (0.04)	0.168** (0.07)	0.144 (0.11)	0.014 (0.05)
Pseudo R2	0.311	0.173	0.220	0.127	0.237	0.194	0.229	0.194	0.185
Observations	7989	7989	7989	7989	7989	7989	7989	7989	7989
△ Real GDP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Use of cross-border measures during crisis - split by categories.

- Crises produce strong increases in tightenings of restrictions, and twice as much action in outflow limits.

	(1) Tightening	(2) Loosening	(3) Net tightening	(4) Inflow	(5) Outflow	(6) Net inflow
Crisis Dummy	0.728*** (0.15)	0.452** (0.21)	0.277 (0.20)	0.240*** (0.08)	0.580*** (0.19)	-0.340** (0.17)
Pseudo R2	0.269	0.256	0.148	0.239	0.237	0.183
Observations	7989	7989	7989	7989	7989	7989
△ Real GDP	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Use of cross-border measures during crisis - split by direction.

- Countries tighten cross-border restrictions during currency and debt crises, but not during banking crises — showing that only crises with external payment pressure trigger systematic policy action.

	(1) All	(2) Tightening	(3) Loosening	(4) Inflow	(5) Outflow	(6) Net inflow
Banking Crisis	0.028 (0.51)	0.352 (0.24)	-0.391 (0.34)	0.016 (0.12)	-0.053 (0.31)	0.069 (0.28)
Currency Crisis	1.507*** (0.41)	0.789*** (0.19)	0.629** (0.27)	0.243** (0.10)	0.700*** (0.25)	-0.457** (0.22)
Sovereign Debt Crisis	2.532*** (0.70)	1.586*** (0.33)	0.885* (0.47)	0.335** (0.17)	1.538*** (0.42)	-1.203*** (0.38)
Pseudo R2	0.313	0.271	0.256	0.239	0.238	0.184
Observations	7989	7989	7989	7989	7989	7989
△ Real GDP	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Use of cross-border measures during crisis - split by crisis type.

- Institutional weakness correlates with more restrictions. Election years likewise see a significant rise in policy use.

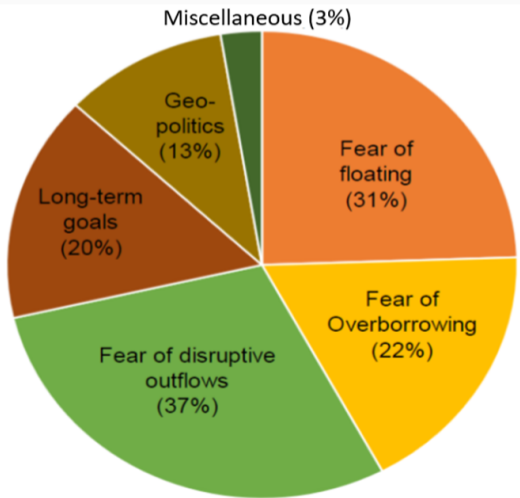
Right-Hand-Side	Any Measure	Outflow Measures	Inflow Measures	Loosening	Tightening	Time FE	Country FE
Quality of Bureaucracy	-0.085	0.054	-0.048	0.031	-0.127***	Y	
Corruption	-0.447***	-0.218***	-0.226***	-0.059**	-0.202***	Y	
Democracy accountability	0.015	0.057	0.006	0.016	-0.037	Y	
Ethnic Tensions	-0.219**	-0.153**	-0.051	-0.103***	-0.053	Y	
External Conflicts	-0.296***	-0.186***	-0.164***	-0.021	-0.105***	Y	
Government Stability	-0.218**	-0.085	-0.087	-0.060**	-0.124***	Y	
International Conflict	-0.276***	-0.177***	-0.137***	-0.061***	-0.094***	Y	
Investment Profile	-0.408***	-0.211***	-0.218***	-0.053***	-0.183***	Y	
Law and Order	-0.233**	-0.084	-0.111*	-0.042*	-0.133***	Y	
Military in Politics	-0.091	-0.015	-0.009	-0.013	-0.064**	Y	
Religious Tensions	-0.255**	-0.206***	-0.109*	-0.093***	-0.053	Y	
Socioeconomic	-0.088	-0.032	-0.054	-0.004	-0.059**	Y	
Composite Risk Index	-0.048***	-0.021**	-0.027***	-0.007**	-0.026***	Y	
Composite Risk Index	-0.085***	-0.016***	-0.035*	-0.049***	-0.043***	Y	Y
Election Taking Place	0.529**	0.250*	0.298**	0.074	0.278***	Y	

Table 7: Correlation use of cross-border measures and institutional quality/election periods.

- Limited systematic evidence on **why** governments say they impose capital controls, despite a rich theoretical literature.
- We systematically gather **officially stated motivations** for a subset of capital control measures in IMF's CFM Taxonomy (macro-critical).
- Collect statements from speeches, **financial and monetary stability reports**, IMF Article IV consultations, social media, and other official channels.
- We identify official statements for **138 measures** ($\approx 90\%$) across 50 countries and specific motivations for 117 measures ($\approx 76\%$), supplementing gaps with ChatGPT-based extraction.
- We classify each measure into **six categories of motivations (fears)**, extending the framework in Magud et al. (2018).

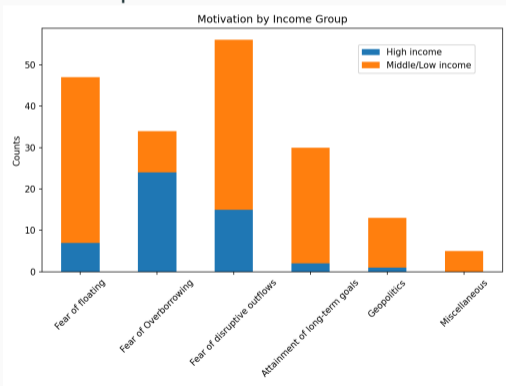
1. **Fear of overborrowing:** Concern that large foreign inflows fuel excessive risk-taking, asset-price booms, and vulnerabilities.
2. **Fear of disruptive outflows:** preventing large, destabilizing outflows that can deplete reserves or destabilize the financial system.
3. **Fear of floating:** Concern about exchange-rate volatility, including fears of appreciation, depreciation, or pressures on pegs and monetary autonomy.
4. **Geopolitics:** National security and geopolitical considerations (sanctions, conflicts, and strategic CFMs).
5. **Long-term goals:** Controls aimed at long-run objectives (market development, stability, gradual openness) rather than short-run cyclical pressures.
6. **Miscellaneous**

- Two (one) thirds of “macro-critical” CFMs motivated by cyclical (non-cyclical) reasons.

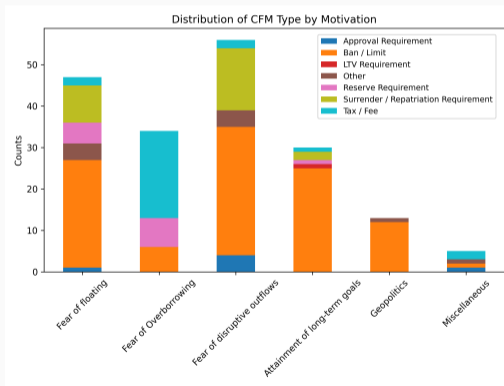


Motivations for capital flow measures (CFMs) Extensions

- LMICs emphasize disruptive-outflow and floating fears; AEs stress overborrowing. Bans/limits are pervasive; taxes link to overborrowing; surrender requirements to disruptive outflows.



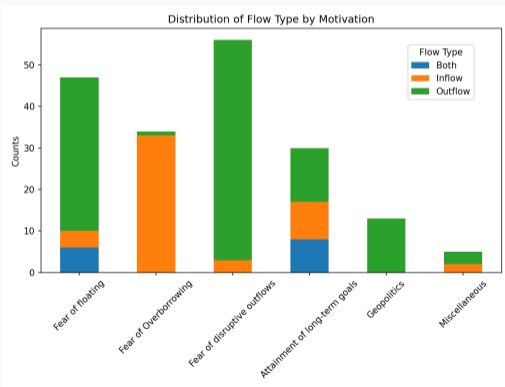
(a) By income group



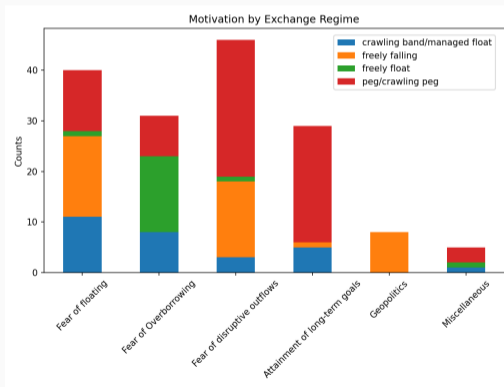
(b) By type of CFM

Motivations for capital flow measures (CFMs) Extensions

- Outflow controls stem from disruptive-outflow, floating, and geopolitics; inflow controls from overborrowing. Regime stability shapes motivations: floating → overborrowing; freely falling → floating/outflow fears.



(a) By direction of flow

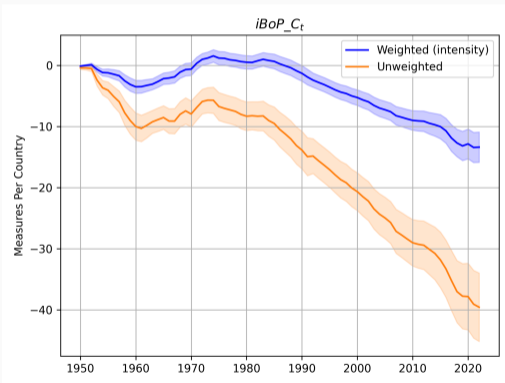


(b) By exchange regime

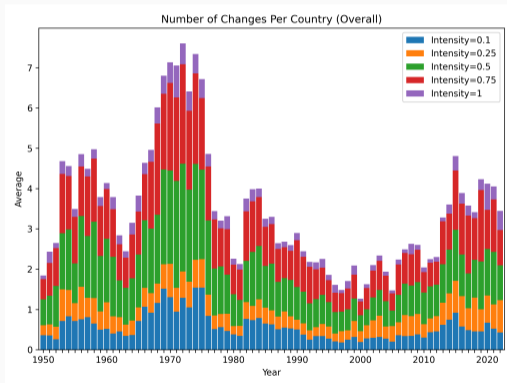
Adjusting Measures by Intensity

- **Why intensity matters:** Not all restrictions impose the same degree of constraint.
- We extend the **LLM** to **classify measures according to their intensity** level
- Follow seminal work by **Quinn (1997)**
- We **scale the iBoP-C** by a scalar (α) that takes on 5 alternative values:
 - $\alpha = 0.00$ when a **notification or documentation requirement** is needed
 - $\alpha = 0.25$ when a **tax** is levied
 - $\alpha = 0.50$ when a **quantitative limit** is imposed
 - $\alpha = 0.75$ when an **approval** is required
 - $\alpha = 1.00$ when a **ban** exists

- Non-linearities in globalization intensify, driven by the more intense use of measures (e.g. bans) in the 1970s.



(a) Cumulative net tightening, average

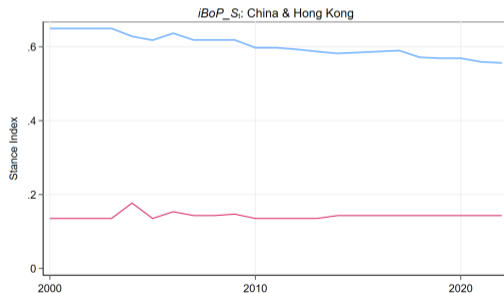
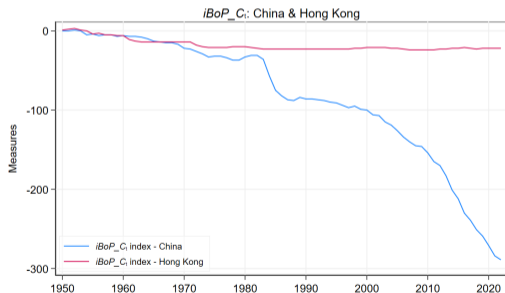


(b) Number of changes, by category of intensity

Three Case Studies

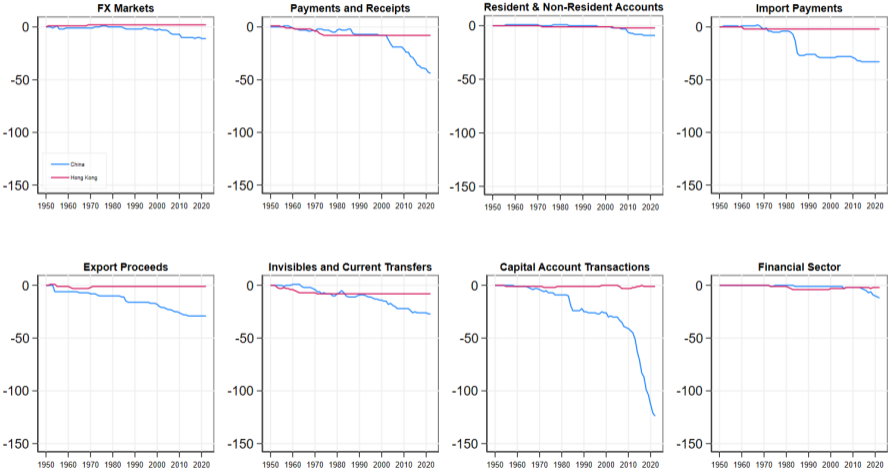
- Hong Kong and China (NOT in paper)
- World Regions (in paper)

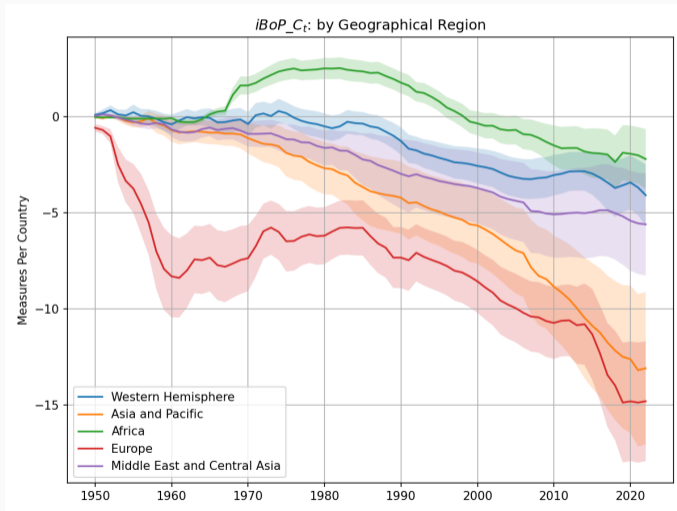
- Financial globalization in both countries, but China being more active (iBoP-C) post 2000s. Still stance (iBoP-S) reveals a more restricted stance in China.



Case study: iBoP-C index for China & Hong Kong, by category

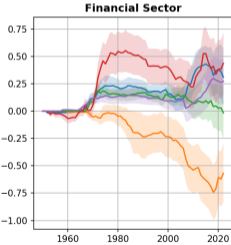
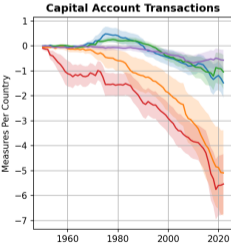
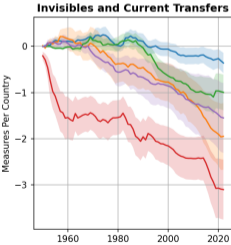
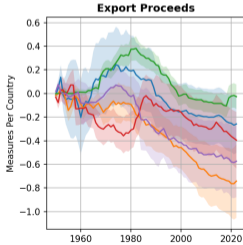
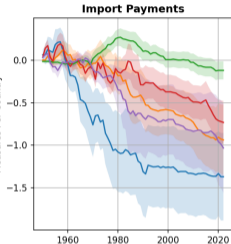
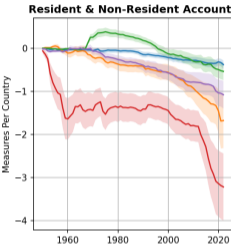
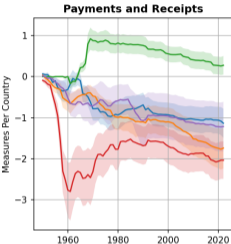
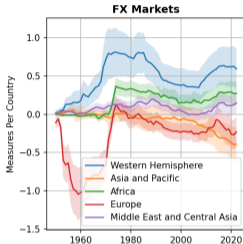
Extensions





Case study: World Regions

Extensions



Companion dataset release with five indices publicly available:

- **iBoP-C Monthly / quarterly / annual** for 190 countries, 1950–2023: Changes in cross-border restrictions through aggregating tightening and loosening policy measures (aggregate + 8/24 granular subcategories)
- **iBoP-C Intensity Monthly / quarterly / annual** for 190 countries, 1950–2023: extension of the iBoP-C where policy measures are assigned individual weights based on their intensity.
- **Daily Policy Measures** for 190 countries, 1950–2023: daily information on the individual policy measures used to construct iBoP-C.
- **iBoP-S Annual** for 190 countries, 1995–2023: overall stance of restrictions at the extensive margin.
- **FKRSU (LLM extension) Annual** for 190 countries, 1995–2023: replicates, updates and expands the dataset in Fernandez et al. (2016) using an LLM-based approach, from 100 countries to 190+

- **A case for the use of machine learning techniques to build high-frequency, multi-category records of cross-border flow restrictions spanning the decades since 1950**
 - Better understanding of the changing drivers behind the financial globalization worldwide
 - Expand the landscape of cross-border restrictions since Bretton Woods
- **Timeline for the release of the paper and dataset**
 - Clear paper to publish as NBER Working Paper in November
 - Publicly available dataset in December
- **More work ahead:**
 - Extend the Stance index since 1950 (including intensity)
 - High-frequency identification
 - Enhance measures with additional sources

Appendix

- **FX markets restrictions: Definition**

Includes (1) exchange restrictions and multiple currency practices (MCPs) maintained by a member country, (2) foreign exchange transactions subject to a special tax, fees, or other mandatory cost, (3) foreign exchange transactions subsidized using separate, non-market exchange rates, (4) restrictions imposed on foreign exchange markets. We exclude measures related to exchange rate arrangements or monetary policy frameworks.

- **FX markets restrictions: Examples**

- *Tighten*: A sliding-scale exchange tax was introduced on export proceeds from karakul, to become effective whenever the price a skin exceeded US\$8.24. (Afghanistan, 1966-03-09)

- *Loosen*: The 1% tax on purchases by resident natural persons of foreign currencies and foreign payments instruments was lifted. (Russia, 2003-01-01)

- **Arrangement for payments and receipts: Definition**

Includes (1) official requirements affecting the selection of currency and the method of settlement for transactions with other countries, (2) agreements that prescribe specific rules for payments to each other, including cases in which private parties are also obligated to use specific currencies, (3) separate rules for trading in gold with foreign countries, (4) regulations governing the physical movement of means of payment between countries. We exclude arrangements related to the use of foreign exchange among residents, the administration of control, and controls on domestic ownership of currency and gold.

- **Arrangement for payments and receipts: Examples**

- *Tighten*: The bilateral payments agreements with the People's Republic of China, Hungary, Romania, and Yugoslavia expired. (Algeria, 1975-12-31)

- *Loosen*: Gold producers in Papua New Guinea were exempted from the requirement of surrendering newly mined gold to the Reserve Bank of Australia. (Australia, 1973-04-02)

Category definitions and examples: Residents and non-resident accounts

[back to main](#)

- **Residents and non-resident accounts: Definition**

Indicates (1) whether resident accounts that are maintained in the national currency or in foreign currency abroad are allowed and describes how they are treated and the facilities and limitations attached to such accounts, (2) whether local nonresident accounts maintained in the national currency or in foreign currency are allowed and describes how they are treated and the facilities and limitations attached to such accounts. We exclude restrictions on resident accounts held domestically.

- **Residents and non-resident accounts: Examples**

- *Tighten*: Central Bank of the Argentine Republics prior authorization must be required except the customer submits an affidavit declaring that during the last 90 days as of the date of the transfer request, and also during the following 90 days, the customer had/will not arrange sales or exchanges of securities settled in foreign currency in Argentina or transfer of same to foreign depository entities. (Argentina, 2021-07-12) - *Loosen*: Residents of Colombia were authorized to open FX accounts abroad, and were granted a six-month period to legalize foreign exchange accounts held abroad through the payment of a 3% tax amnesty on the amount held abroad; after June 26, the rate of tax payment would be raised to 5%. (Colombia, 1991-06-24)

- **Import payments: Definition**

Describes the nature and extent of exchange and trade restrictions on import payments. Includes: (1) foreign exchange budgets, (2) financing requirements of imports, and (3) documentation requirements for the release of foreign exchange for imports. We exclude restrictions that directly impact the trade of goods and services (e.g., import licenses, taxes, and tariffs).

- **Import payments: Examples**

- *Tighten*: An advance deposit of 10,000 per cent was established for all imports. (Chile, 1961-12-27)

- *Loosen*: The advance deposit applying to one category of imports was reduced to 30 per cent, and that applying to two categories of imports was reduced to 10 per cent. (Colombia, 1963-05-22)

- **Export proceeds: Definition**

Describes restrictions on the use of export proceeds. Includes: (1) repatriation and surrender requirements for exporters, (2) export financing requirements, and (3) export documentation requirements. we exclude restrictions that directly impact the trade of goods and services (e.g., export licenses and taxes).

- **Export proceeds: Examples**

- *Tighten*: A temporary, mandatory surrender requirement of 10% was introduced in the afternoon session of the MICE until January 1, 1999. (Belarus, 1998-07-20)
- *Loosen*: The Central Bank announced new facilities for the financing of exports and issued lists of eligible products. (Chile, 1966-09-07)

Category definitions and examples: Invisible transactions and current transfers

[back to main](#)

■ Invisible transactions and current transfers: Definition

Describes (1) procedures for effecting payments abroad in connection with current transactions in invisibles, with reference to prior approval requirements, the existence of quantitative and indicative limits, and/or bona fide tests, and (2) regulations governing exchange receipts derived from transactions in invisibles—including descriptions of any limitations on their conversion into domestic currency—and the use of those receipts.

■ Invisible transactions and current transfers: Examples

- *Tighten*: Amounts owed by nonresidents for services and all income from foreign assets earned outside the CEMAC must be collected through a licensed bank and repatriated immediately (previously within 30 days). (Equatorial Guinea, 2019-03-01)

- *Loosen*: Authorized banks were allowed to provide foreign currency to pay up to the full amount of wages due to foreign crew members (previously, a limit equivalent to F\$10,000 a beneficiary applied). (Fiji, 2003-01-01)

- **Capital account transactions: Definition**

Describes regulations influencing both inward and outward capital flows. Includes (1) repatriation and surrender requirements, (2) controls on capital and money market securities, (3) controls on credit operations, (4) controls on direct investment, (5) controls on real estate transactions, (6) controls on personal capital transactions.

- **Capital account transactions: Examples**

- *Tighten*: Investment abroad by residents in debt securities is not authorized (Regulation No. 14-04 of September 29, 2014). (Algeria, 2014-09-29)

- *Loosen*: The maximum maturity of external loans subject to the 6% IOF rate was decreased from 1,800 days to 720 days. (Brazil, 2012-06-14)

- **Provisions specific to the financial sector: Definition**

Describes (1) regulations specific to commercial banks and other credit institutions, such as monetary, prudential, and FX market restrictions, (2) controls specific to institutions, such as insurance companies, pension funds, investment firms (including brokers, dealers, or advisory firms), and other securities firms (including collective investment funds). We exclude primarily domestic macro-prudential policy measures, including restrictions on local FX lending, purchases of locally issued securities, treatment of FX deposit accounts, reserve requirements, liquid asset requirements, interest rate controls, and credit controls.

- **Provisions specific to the financial sector: Examples**

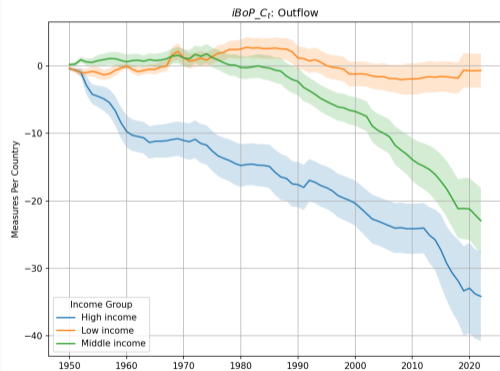
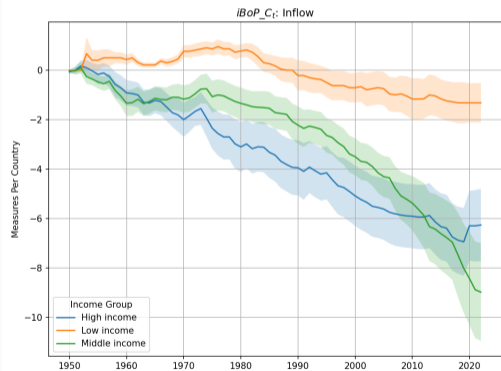
- *Tighten*: The U.S. dollar reserve requirement for foreign currency deposits was raised to 90% from 80%. (Haiti, 2012-04-16)

- *Loosen*: The limit for investments in securities, mutual fund and investment fund units, money market instruments, other negotiable financial instruments, and monetary claims and other comparable claims in foreign currency, on notification to the Central Bank of Iceland, was raised to ISK 100 million a party. (Iceland, 2017-01-01)

Stylized Fact 5: Inflow versus outflow restrictions

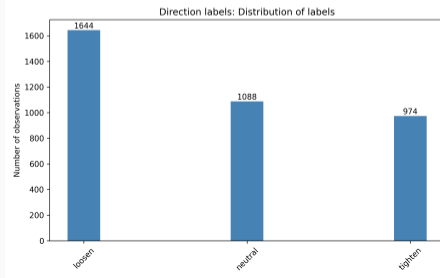
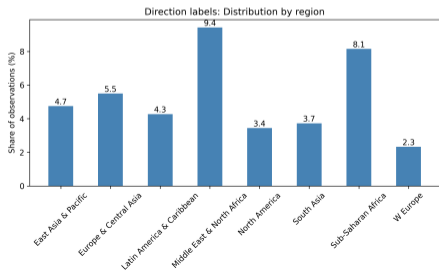
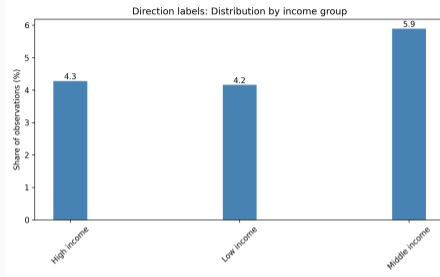
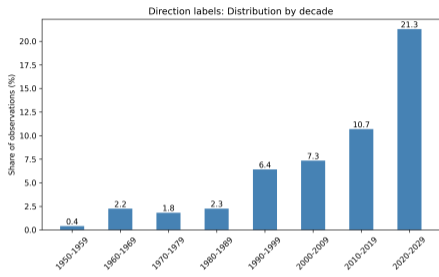
[Back to main](#)

- Inflow restrictions have liberalized at a similar pace across income groups, while outflow restrictions have liberalized faster among higher income countries.



- **Policy changes weighted equally.**
 - All reported changes are weighted equally, regardless of economic impact.
 - An extension incorporating intensity-based classifications (following the ordinal scales used by Quinn, 1997) is presented as extension.
- **iBoP-C captures adjustments, not absolute restrictiveness.**
 - Identifies frequency and direction of policy changes but not the absolute level of restrictiveness.
 - Addressing absolute restrictiveness requires initial policy stance data.
 - Provide a stance index, iBoP-S, but only from 1995.
- **Measures do not overcome missing information in raw source.**
 - Early AREAER reports (pre-1990s) may underreport restrictions due to evolving reporting standards.
 - Our machine learning approach ensures classification consistency, but do not address issue of missing information in raw source.
 - Several refinement extensions to ensure consistency of measures.

Distribution of Training Sample

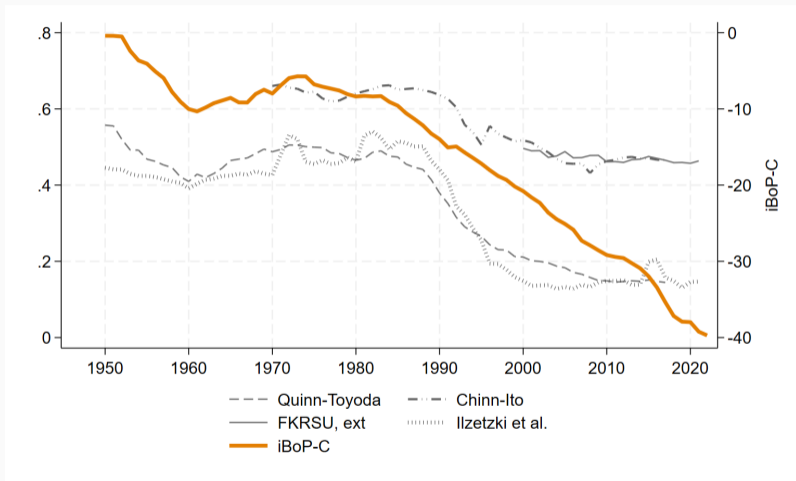


Comparison with previous work: Correlations [\(Back to Extensions\)](#)

Right-Hand-Side	Any Measure	Outflow Measures	Inflow Measures	Loosening	Tightening	Time FE	Country FE
Quality of Bureaucracy	-0.085	0.054	-0.048	0.031	-0.127***	Y	
Corruption	-0.447***	-0.218***	-0.226***	-0.059**	-0.202***	Y	
Democracy accountability	0.015	0.057	0.006	0.016	-0.037	Y	
Ethnic Tensions	-0.219**	-0.153**	-0.051	-0.103***	-0.053	Y	
External Conflicts	-0.296***	-0.186***	-0.164***	-0.021	-0.105***	Y	
Government Stability	-0.218**	-0.085	-0.087	-0.060**	-0.124***	Y	
International Conflict	-0.276***	-0.177***	-0.137***	-0.061***	-0.094***	Y	
Investment Profile	-0.408***	-0.211***	-0.218***	-0.053***	-0.183***	Y	
Law and Order	-0.233**	-0.084	-0.111*	-0.042*	-0.133***	Y	
Military in Politics	-0.091	-0.015	-0.009	-0.013	-0.064**	Y	
Religious Tensions	-0.255**	-0.206***	-0.109*	-0.093***	-0.053	Y	
Socioeconomic	-0.088	-0.032	-0.054	-0.004	-0.059**	Y	
Composite Risk Index	-0.048***	-0.021**	-0.027***	-0.007**	-0.026***	Y	
Composite Risk Index	-0.085***	-0.016***	-0.035*	-0.049***	-0.043***	Y	Y
Election Taking Place	0.529**	0.250*	0.298**	0.074	0.278***	Y	

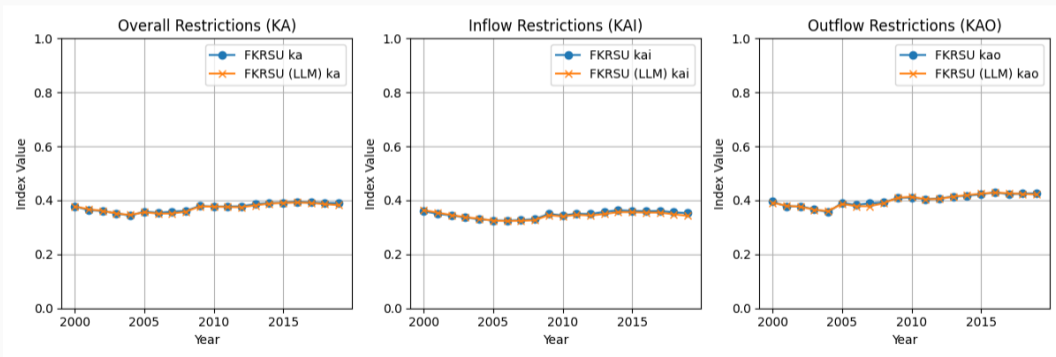
Table 8: Correlation use of cross-border measures and institutional quality/election periods.

Comparison with previous work: Time Series [\(Back to Extensions\)](#)



Using LLM to replicate previous work

- LLMs can replicate the capital control indices on inflows/outflows in Fernandez et al (2016), KAI/KAO. Corrs are 0.91 and 0.94, respectively. (Extensions)



Adjusting Measures by Intensity

- We extend the **LLM** to classify measures according to their intensity level
- Follow seminal work by **Quinn (1997)**
- We **scale the iBoP-C** by a scalar (α) that takes on 5 alternative values:
 - $\alpha = 0.00$ when a **notification or documentation requirement** is needed
 - $\alpha = 0.25$ when a **tax** is levied
 - $\alpha = 0.50$ when a **quantitative limit** is imposed
 - $\alpha = 0.75$ when an **approval** is required
 - $\alpha = 1.00$ when a **ban** exists

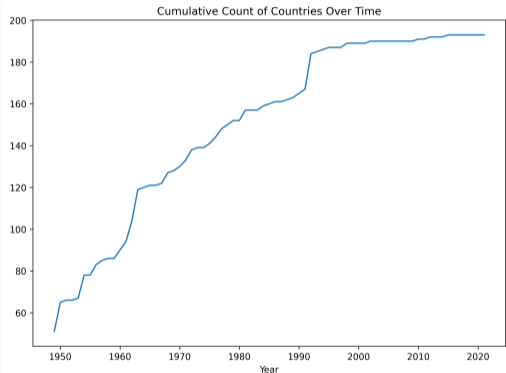
(Extensions)

Additional Measures of Restrictions

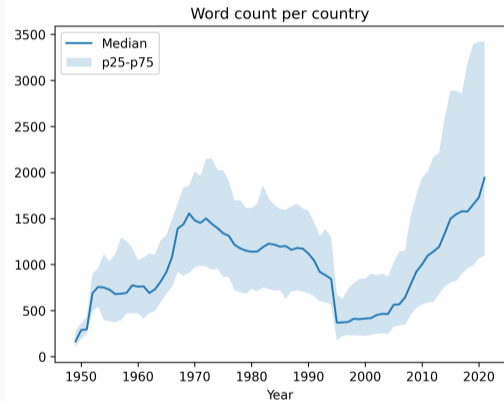
- Change Index iBoP-C captures adjustments, not absolute restrictiveness.
 - Identifies frequency and direction (tightening vs. loosening) of policy changes but not the absolute level of restrictiveness.
 - Addressing absolute restrictiveness requires initial policy stance data
- **A Stance Index, iBoP-S**

$$iBoP-S_{itc} = \frac{1}{N_c} \sum_{s \in S_c} \mathcal{I}_{itc}$$

Sample of Member Countries & Words per Country



return



Types of Restrictions

Price-based restrictions: Directly alter the cost of transactions.

Examples: taxes, fees, subsidies, interest premia, surrender and repatriation requirements, reserve requirements.

Quantity-based restrictions: Limit the volume or amount of transactions.

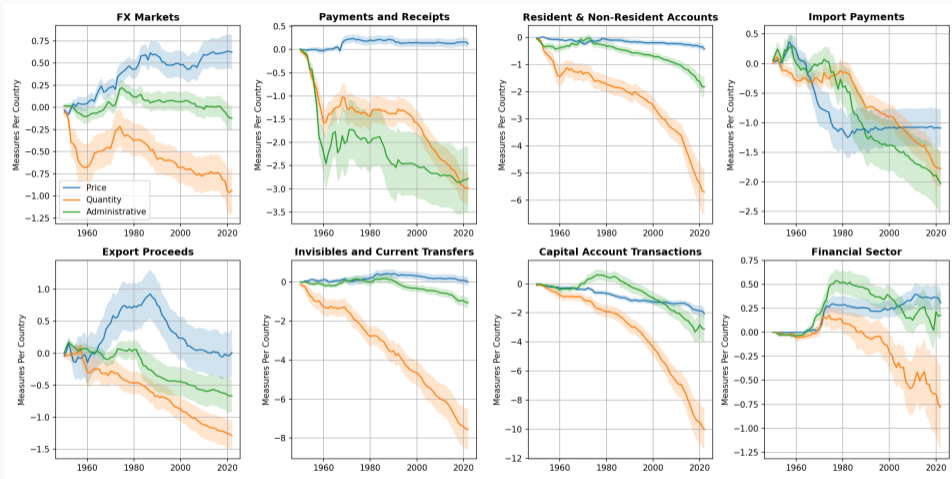
Examples: quotas, caps, bans, suspensions.

Administrative restrictions: Impose procedural or institutional requirements that do not directly target cost or volume.

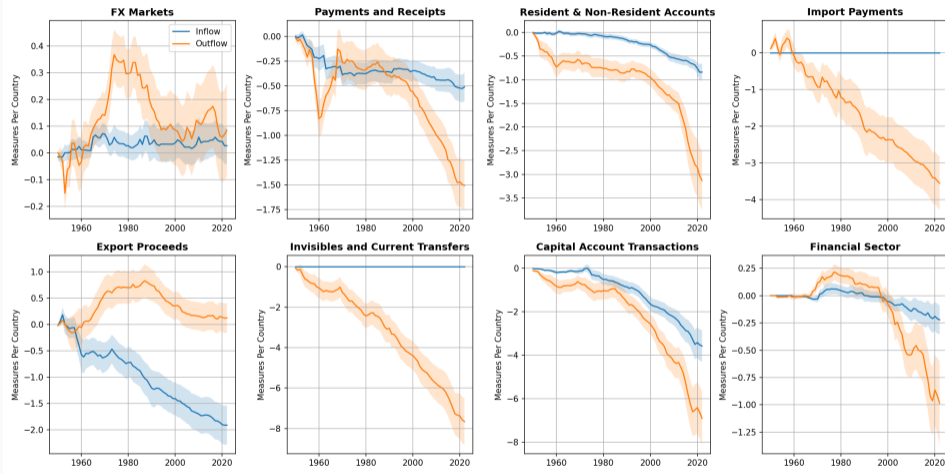
Examples: licenses, authorization requirements, reporting requirements, maturity or holding-period requirements, bilateral payments agreements.

[Return to Fact 3](#)

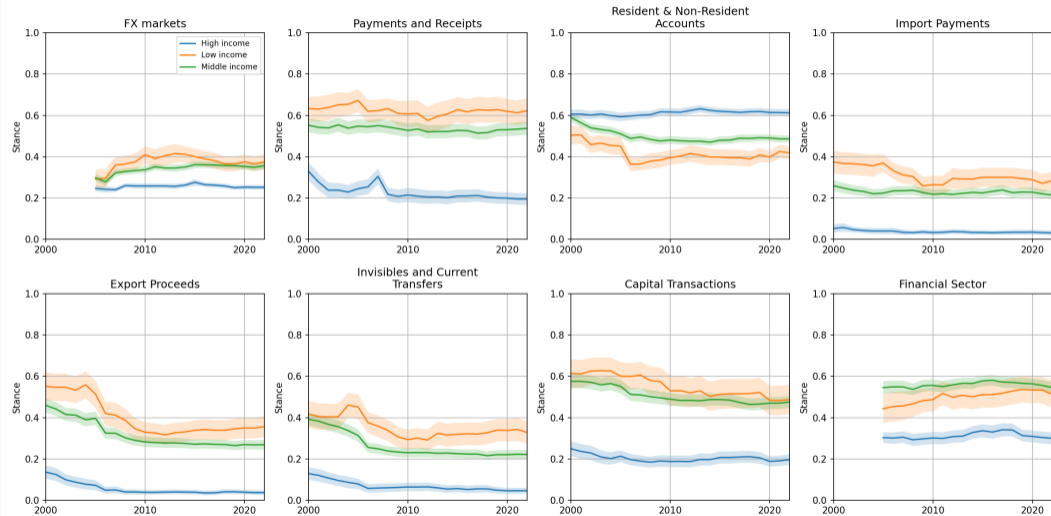
Stylized Fact 3: Differential pace of liberalization (by Cat.)



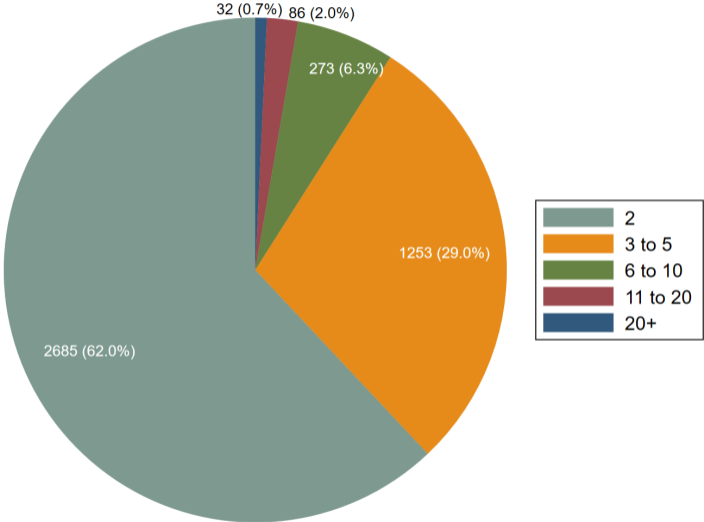
Stylized Fact 4: Inflow versus outflow restrictions



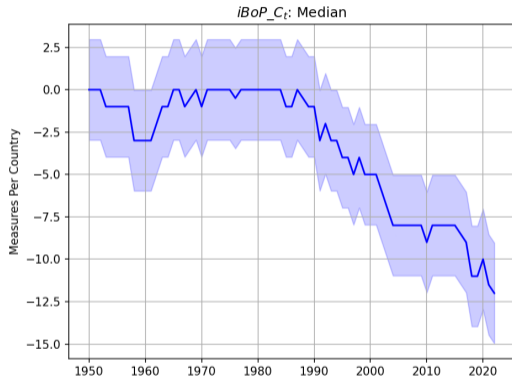
Stance Index (iBoP-S) [Return](#)



Number of measures on the same date [Return](#)



Stylized Fact 1: Medians



return