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

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Abstract

We utilize large language models to analyze semi-structured official documents, providing a detailed and comprehensive account of daily *de jure* restrictions on balance of payment flows worldwide, over the past seven decades, since the inception of the Bretton Woods system. Our analysis uncovers the diverse instruments used to limit cross-border flows and their evolving prevalence over time. The granularity of the new measures we develop enables us to document variations in the use of these instruments across eight categories of restrictions, as well as other key dimensions such as the direction of restricted flows (inflows or outflows), the type of restriction (e.g., price-based versus non-price-based), and the countries' level of economic development. Additionally, we explore the

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motivations articulated by policymakers for adopting specific restrictions and quantify the real effects of these measures using the new high-frequency data.

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1 Introduction

The onset of the Bretton Woods system after World War II ushered in an international monetary system (IMS) characterized by a panoply of restrictions to cross-border flows. Since then, the IMS has undergone several transformations and, along with them, the tools and the strength with which policymakers have put sand in the wheels of international finance have also evolved. An illustrative example of these evolving forces was President Nixon's historic decision on August 15, 1971, to suspend the convertibility of the US dollar into gold, which was preceded by a wide array of measures aimed at curbing capital outflows, and limiting foreign credit and imports.[1] The US was not alone in imposing restrictions, with several countries implementing a range of financial restrictions aimed at controlling cross-border flows. The tide turned, however, in the 1980s and 1990s, when several countries embraced globalization and implemented market reforms and capital account liberalization, signalling a shift towards greater openness in trade and finance. The current debate around deglobalization and the reconfiguration of global supply chains have brought the topic of broader restrictions to balance of payments flows back to the forefront, highlighting the potential for renewed restrictions on cross-border flows.[2] But how can we best measure these changes in a consistent manner through time? How can we capture the breadth and depth of restrictions and liberalization across different policy levers, countries and time periods? And what insights can we gain from analyzing these transitions?

Our work aims to provide answers to these questions, offering new insights into the vast and evolving landscape of cross-border flow restrictions. By harnessing recent advances in artificial intelligence (AI) and machine learning (ML), we present a granular, systematic account of these restrictions spanning the last seven decades. Specifically, our analysis covers over 70,000 policy changes from 1950 to the present day across a broad set of countries, enabling us to trace the dynamics of cross-border restrictions with unprecedented granularity. This high-resolution account of policy

[1] Some of the measures implemented included the Interest Equalization Tax aimed at curbing capital outflows, and the Voluntary Foreign Credit Restraint Program which limited foreign credit. These measures were implemented during the Kennedy and Johnson administrations. Further import restrictions through the imposition of temporary surcharges were also added during the Nixon administration (Bordo, 2016).

[2] See for instance the Mar. 14 op ed in the Financial Times by G. Tett arguing that "Tariffs on goods may be a prelude to tariffs on money".

measures allows us not only to examine the evolution of these measures but also to delve into the underlying motivations for their imposition.

Our approach integrates state-of-the-art machine learning techniques, particularly large language models (LLMs), to extract, classify, and analyze *de jure* restrictions from official sources. We use these tools to process semi-structured text data, allowing us to categorize restrictions across various dimensions, such as foreign exchange markets, current and capital account transactions, and financial sector regulations. The results provide an unprecedentedly detailed view of the evolution of cross-border flow restrictions, enabling us to uncover granular patterns and trends that were previously difficult to track at such a scale.

The main primary source for our analysis is the International Monetary Fund (IMF)'s Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). The IMF has published the AREAER annually since 1950, in accordance with the provisions in its Articles of Agreement. It provides a detailed and comprehensive *textual* account of countries' restrictions on international transactions over all IMF member countries. As a result, it offers a valuable historical perspective on the evolution of cross-border flow restrictions across both advanced and developing economies. However, as the global financial system has grown more complex, so too have the measures reported in the AREAER. The restrictions covered span a broad range of areas—foreign exchange markets, capital flows, current account transactions, among others—and the increasing granularity of these measures has made the text both voluminous and complex, posing a formidable challenge to analyze it systematically. This is where modern machine learning techniques, LLMs in particular, prove especially useful. For they are particularly adept at processing and analyzing large volumes of unstructured text, enabling us to classify and organize the vast and diverse set of restrictions in the AREAER in a consistent way. These techniques allow us to tackle the complexities of the dataset, efficiently extracting meaningful insights and enabling a more comprehensive and accurate analysis of the evolution of cross-border flow restrictions.

To measure cross-border flow restrictions in a comprehensive and structured manner, we develop a methodology that organizes the restrictions into eight distinct dimensions or categories that have been present in the AREAERs since the first edition. These categories include: (1) foreign exchange market, (2) arrangements for payments and receipts, (3) residents and non-resident accounts, (4) imports

and import payments, (5) exports and export proceeds, (6) invisible transactions and current transfers, (7) capital account transactions, and (8) provisions specific to the financial sector. We then aggregate all categories into an integrated Balance of Payments Flows restrictions index (iBoP). The "*i*ntegrated" characteristic of our measure come from the fact that it encompasses the full spectrum of restrictions, from *direct* impediments to flows from both current and capital account transactions, to regulations that might *indirectly* impact these flows via restrictions in FX markets, in residents and non-residents accounts, and broader financial sector controls.[3]

Our approach allows us to further break down the complexities of the restrictions. In addition to categorizing them into the eight dimensions mentioned above, our methodology captures several key characteristics of the changes in regulation. These include the direction of change (whether the restriction was tightened or loosened), the type of restriction implemented (price-based, quantity-based, or administrative), whether restrictions are being applied to inflows or outflows, and the specific date of implementation. This detailed classification allows us to track not only the evolution of specific policy tools but also the dynamics of the regulatory stance over time, providing a comprehensive picture of the changing landscape of cross-border restrictions across different countries and periods.

Two separate versions of iBoP are built: one capturing changes (iBoP-C) and another one on the stance of (iBoP-S). iBoP-C quantifies changes in restrictions over time by aggregating tightening and loosening actions in the AREAER's Changes section, allowing for high-frequency tracking of policy adjustments from 1950 to 2022. It captures net changes at the country-category level at daily frequencies. In contrast, iBoP-S measures the overall level of restrictions by identifying the existence of restrictions in various subcategories from 1995 onwards. It averages binary indicators across subcategories to capture the extensive margin of restrictions, providing a broader view of the restrictiveness in BoP flows. These two indices complement each

[3]The comprehensive and integrated nature of the various categories in iBoP imply that some restrictions may not be impacting cross-border flows directly. For instance, a tax on the purchase or sale of US dollars in FX markets may deter transactions between residents and hence not directly impact cross-border flows, while indirectly deterring residents from transacting with non-residents and vice versa. Likewise, the nature of the various categories implies that we can be capturing restrictions on trade, e.g. taxes to imports, or on the financial flows linked to these transactions, e.g. limits to import payments. We believe that a comprehensive account of the various tools that have been deployed by policymakers must include these different types of restrictions. Further analysis will shed light on these differences. Since the measures allow for alternative aggregation, researchers can built alternative measures of restrictions tailored to the research question at hand.

other, with iBoP-C focusing on policy adjustments and iBoP-S offering a snapshot of the ongoing restrictiveness of measures.

The use of LLMs to classify restrictions in the AREAER follows a five-step process. First, a sample of narratives is manually coded to establish initial categories and identify key characteristics of restrictions. Next, this sample is used to train LLMs to predict classifications across a broader set of texts. The model's output is then validated and refined by cross-checking with existing classifications in the AREAER and further manual coding. This process helps address inconsistencies in reporting and improves the model's accuracy. The LLM is trained on both the manually coded data and the enhanced training set that includes existing AREAER classifications. This approach significantly reduces the reliance on manual classification, ensuring better consistency, scalability, and the ability to capture subtle nuances in the data. Our baseline classification model, adapted to the text of the AREAERs, outperforms a number of other machine learning models across all dimensions of classifications. Furthermore, it also achieves a performance comparable to human annotators along several dimensions.[4]

Five stylized facts come out from our analysis of iBoP-C. First, we find that current account restrictions were a significant policy lever, particularly in the years leading up to the collapse of Bretton Woods. This contrasts with more recent periods, which rely more heavily on capital account restrictions and financial sector provisions. Second, we document that overall trends in financial and trade liberalization have not always been linear. While countries have overall implemented more loosening than tightening measures in the past seven decades, periods of significant change in the global monetary system – notably the breakdown of Bretton Woods – saw a significant tightening of restrictions for several categories. Third, financial liberalization has occurred at an uneven pace, with higher income countries liberalizing faster and to a greater extent than lower income countries. Fourth, we find that liberalization of cross-border restrictions have primarily concerned quantity-based restrictions. Administrative-based restrictions persists among low income countries. Price-based restrictions have also followed a loosening path but relatively more modest. Fifth, we document that the liberalization trend in BoP flows has been largely driven by the more rapid pace in loosening of outflow restrictions, relative to that of inflow restrictions.

[4]For instance, in classifying direction of change, human annotators achieve an accuracy of 90.7 percent, which is comparable to our baseline model's accuracy of 87.0 percent.

A detailed examination of the subcategories of restrictions reported in the AREAER since 1995 reveals notable patterns in various restriction categories, such as foreign exchange, current account transactions, and the capital account. Foreign exchange restrictions have often focused on exchange market regulations and security-based measures, while current account restrictions have largely been price-based or administrative. Capital account restrictions have mainly targeted portfolio flows, direct investment, and credit operations. Additionally, the financial sector has seen significant policy adjustments, especially within commercial banks post-2008 financial crisis.

A preliminary analysis of iBoP-S constructed using a bottom-up approach by aggregating the stance of restrictions across 232 subcategories from the AREAER, shows a general decline in the overall level of restrictions, signaling a trend towards liberalization, consistent with the longer-run perspective provided by iBoPFRI-C. The index allows us to quantify the extent to which high-income countries tend to have fewer restrictions compared to middle and low-income countries.

In a first extension of our work, we systematically study a subset of changes in the regulation identified before and handcollect official statements to classify the motivations put forth by authorities. A total of 153 capital control measures across 41 countries were analyzed, revealing six main (non-mutually exclusive) motivations behind the imposition of these controls. The most common reasons include a fear of disruptive outflows –where measures aim to prevent capital flight during crises–, and the fear of floating –which involves managing exchange rate volatility or maintaining monetary policy autonomy. Fear of overborrowing, concerning excessive risk-taking due to large foreign inflows, is another motivation documented, while long-term goals focused on fostering financial market stability and increasing capital openness also feature in the mind of policymakers. Geopolitical considerations and miscellaneous reasons, such as tax revenue generation do come up as well, but are less frequent. Still, it is noteworthy that about 1/3 of the motivations is not linked to the state of the business cycle, which offers a fertile ground for studying the macroeconomic effects of flow-restriction shocks. Low income countries have been more likely to impose controls due to concerns about disruptive outflows or floating exchange rates. High-income countries, on the other hand, have been more concerned with overborrowing, particularly through the use of inflow controls.

We compare our newly constructed measures with those from previous studies,

specifically focusing on the works of Quinn (1997), Chinn and Ito (2006), Fernandez et al. (2016) and Ilzetzki et al. (2021), which we also describe in the literature review. Our measures co-move with those in these earlier studies. However, our index captures additional dynamics, such as the increased restrictions during the collapse of the Bretton Woods system, reflecting its more comprehensive coverage across eight distinct dimensions of restrictions. Most importantly, the new measures account for many more dimensions in the spectrum of cross-border flow restrictions, going beyond what previous studies have considered. Previous studies generally summarize restrictions with one number per country per year. We demonstrate how the trade-off between granularity and comprehensiveness can be effectively managed, offering a richer and more detailed view of BoP restrictions without losing broad coverage. This enhanced granularity allows for a detailed decomposition of the evolving trends in cross-border restrictions.

Despite these improvements upon the existing literature, our work also discusses certain limitations of our methodology, most of which are also shared with earlier works. While iBoP-C capture the frequency and direction of policy changes with greater precision, it treats all changes equally and does not account for the level of intensity. This limitation also applies to previous works like Chinn and Ito (2006) and Fernandez et al. (2016). A notable exception is the work by Quinn (1997) which classifies measures according to a subjective measure of intensity. Future extensions of our work will also leverage on LLMs to implement such classifications systematically, building on the work by Quinn (1997). Additionally, as with earlier studies, iBoP-C cannot measure the absolute restrictiveness of policies, limiting its ability to rank countries by openness. This can be done with iBoP-S since 1995 and future work will also aim at extending this coverage to 1950.

Our work is divided into seven sections, including this introduction. Section 2 provides a literature review highlighting our contribution relative to previous works. Sections 3 and 4 describe our sources and present our methodology, respectively. Section 5 presents the main stylized facts and Section 6 presents the two extensions of our work. Section 7 concludes.

2 Literature review.

Our work speaks to three separate strands of the literature. First and foremost, our work contributes to previous efforts devoted to constructing *de jure* measures of capital account restrictions. Three well-known studies that have covered a large cross-section of advanced and developing countries on a historical dimension are Quinn (1997), Chinn and Ito (2006), and Fernandez et al. (2016).[5] While the three studies share in common that they all use the same primary source, the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER), they display important differences that are worth summarizing briefly in order to better highlight our contribution.

The work by Quinn (1997) constructs indicators on capital account and financial current account regulations based upon coding of the narrative contained in the AREAER, with higher levels representing least regulated and most open regimes. It also aims at quantifying intensity in measures of capital controls through a subjective scale. The set of measures covers six categories: payment for imports; receipts from exports; payment for invisibles; receipts from invisibles; capital flows by residents; and by nonresidents. Measures of restrictions in Chinn and Ito (2006) are built with the first principle component of four binary variables from the AREAERs that capture the existence of multiple exchange rates, restrictions on the current account and capital account transactions, and the requirement of the surrender of export proceeds. Aggregated measures by country in these two studies are available on a yearly frequency from the 1950s and 1970, respectively. Importantly, neither of the two approaches distinguish across the direction or type of flows. The work by Fernandez et al. (2016) exploits a change in the AREAERs after 1995 where more information was added in an effort to reflect the increased complexity of capital control policies. This allows the authors to build more granular yearly measures that focus on capital account restrictions across different assets, while also disaggregating controls by the direction of flows and the residency of the economic agents.[6] This

[5]Other studies that have zoomed in on a subset of countries when building alternative measures are Pasricha (2012), Ahmed and Zlate (2014), Guisinger and Brune (2017), Pasricha et al. (2018), Binici and Das (2021), Acosta-Henao et al. (2025), among others. Two separate on-going studies by Baba et al. (2025) and Li (2025) also build measures on capital account restrictions based on the AREAERs. A separate work that captures *de facto* capital controls through the existence of parallel exchange markets is Ilzetzki et al. (2021). The work by Quinn (1997) has been subsenquently expanded and refined in Quinn and Toyoda (2008) and Alesina et al. (2024).

[6]This work consolidates and extends previous work from Schindler (2009), Klein (2012), and

granularity, however, comes at the cost of not extending the coverage to restrictions beyond those in the capital account and to years earlier than 1995.

Our work complements and extends these three studies along several important dimensions. First, our measures of cross-border flow restrictions are more comprehensive by covering the *entire set* of regulations in the AREAERs.[7] Concretely, our work adds the voluminous set of restrictions on flows that go beyond those related to the capital account (as in Fernandez et al. (2016)). Moreover, while Quinn (1997) and Chinn and Ito (2006) do consider some restrictions on current account flows, they do so only on a few selected items. Other dimensions that our work includes which are absent in these studies are FX market restrictions, regulation on payments and receipts, limits on residents and non-residents accounts, and measures specific to the financial sector. As our analysis documents, these are important levers that policymakers have used in practice, which ought to be included in a comprehensive historical account of cross-border restrictions.[8] Second, our work allows us to have much more granularity in the measures we build while covering the entire history in the AREAERs since 1950. This increased granularity materializes in the expanded set of eight categories of restrictions that we consider, as well as in the ability to classify the changes in restrictions by the type and direction of flow, among other characteristics that our methodology also accounts for. Moreover, the higher granularity provided by the daily frequency is a key improvement relative to the annual frequency used in all previous studies which often represents a limitation in empirical work.

Third, by netting out the number of tightening and loosening measures, we get a proxy for the intensity with which countries have enacted regulation through the use of these policy tools, which has been challenging to capture in most of the previous work.[9] Furthermore, by providing a disaggregation between price-based,

Fernández et al. (2015).

[7]The only information from the AREAERs that we consistently leave out is that pertaining to exchange rate regimes. For comprehensive accounts of exchange rate regimes see Levy-Yeyati and Sturzenegger (2003), Reinhart and Rogoff (2004), and Ilzetzki et al. (2021). We will map our measures to some of these *de facto* exchange rate regimes that the literature has studied.

[8]As mentioned before, in a strict sense, some of the dimensions considered in our work do not *directly* impact cross-border flows, e.g. restrictions on the FX market or on the financial market, as they may entail transactions of assets across residents. Arguably, they may impact them in an *indirect* way, however. As data is provided on a granular basis, users can tailor the measures to reflect more direct measures impacting flows.

[9]Netting out may be an imprecise measures for the intensity. For there may be measures that are more restrictive than others. Acosta-Henao et al. (2025) studies direct measures of intensity in capital

quantity-based and administrative measures, we document how much *de jure* policies have relied (or not) on instruments that can be more prone to adjustment along an intensive margin, as price based instruments are. Fourth, the use of a systematic approach to classify measures through an LLM distinguishes from previous work by making our measures more consistent, efficient, and replicable by others. They also make our measures much more efficient to be updated and refined in future work.

The second strand of literature to which our work contributes is the one exploring the motivations as well as the effects of capital account restrictions. The literature is much more scarce in the former than in the latter. Magud et al. (2018) is an exception, providing anecdotal evidence on the "fears" that have driven policymakers to resort to these measures. Our work complements and extends their work through a systematic analysis of country authorities' official documents, expanding the set of motivations that official records provide. While the fears in their work point to short-term rationales for authorities to implement controls, we show that policymakers can have a longer-term view of capital controls. In particular, we find a substantial share of controls are adjusted to achieve long-term liberalization objectives. This aligns with our finding on a longer historical sample of controls that show cross-border restrictions have liberalized over time.

De jure measures of capital controls have often been used to examine the impact of controls on financial stability and real exchange rates, among others, resulting in a voluminous empirical literature recently surveyed in Rebucci and Ma (2020), Erten et al. (2021) and Bianchi and Lorenzoni (2022).[10] Overall the evidence surveyed on the real effects of controls has been mixed, with some finding positive effects on financial stability and reductions in real exchange rate pressures, while others finding no effects. The lack of consensus is largely a consequence of the considerable challenges to obtaining a clear identification of such effects. The challenges arise for various reasons. On the one hand, the timing of capital controls may not be properly captured by annual indexes as those mentioned above. Moreover, such slow- moving indexes may capture whether restrictions are present or not (extensive margin), but

controls for selected EMs, but warns that doing so may bias against only a few price-based measures, a critique that does not apply to our measures as they encompass both price based and non price based regulations.

[10]The literature has also aimed at quantifying the impact of capital controls on additional variables such as long term growth, output and consumption volatility, real exchange rate effects, monetary policy independence, and international spillovers. Another useful survey covering broader macro prudential policies is Bianchi and Mendoza (2020).

can miss variations in the intensity of restrictions over the business cycle. On the other hand, there may be reverse causality and endogeneity problems, as well as omitted variables that simultaneously have an impact on both the use of capital controls and the fluctuations in the variables of interest.

In order to address some of these challenges, studies have resorted to several strategies. In a study that uses meta-analysis, Magud et al. (2018) find that capital inflow controls tend to be more effective relative to outflow controls in altering the composition of capital flows toward longer-term flows and reducing real exchange rate appreciation. A number of other studies have resorted to using higher-frequency data that better capture time variation in capital controls, at the cost of focusing on a relatively smaller sample of countries and/or time. Using quarterly data of 50 emerging market economies over 2005–13, Ghosh et al. (2017) analyze the set of policy instruments that countries employ to respond to capital inflow surges. Using quarterly information from local press releases and news bulletins for 19 emerging market economies from 2002 to 2013 and adopting a fixed-effects model, Ahmed and Zlate (2014) find that capital controls have a significant negative impact on both total and portfolio net inflows. Using monthly data from 2000 to 2008 for five EMs, Baba and Kokenyne (2011) find that capital controls are associated with a temporary decline in capital inflows and a lengthening of maturities. In an effort to directly address endogeneity problems, Erten and Ocampo (2017) use binary variables on whether countries have bilateral investment treaties with the United States or whether they signed the EU membership agreement as instruments for whether countries use various capital control measures, finding that capital controls result in a reduction in real exchange rate appreciation. In what is perhaps to highest frequency analysis until now, using weekly frequency data for 60 countries from 2009 through 2011 and employing a propensity-score matching method to address selection, Forbes et al. (2015) find that capital flow measures have a robust effect on reducing financial vulnerability but find no evidence of a significant impact on net capital inflows or real exchange rates.[11] We contribute to this strand of the literature by making use of the novel data that we construct and, in particular, exploit the daily frequency that allows for a cleaner identification. To the best of our knowledge, we are the first to use this higher frequency when documenting the use of controls on BoP flows. We

[11] Following the seminal work by Forbes (2007), an increasing body of work is resorting to microdata to assess the effects of capital controls, see the works of Alfaro et al. (2017), Andreasen et al. (2024), Fabiani et al. (2022), and Fabiani et al. (2025).

also improve upon previous work by considering the wide array of restrictions that our granular data account for.

A third and final strand of the literature that our work speaks to is the recent new and rich setups that consider the use of capital controls in conjunction with several other policies. In particular, recent analytical frameworks developed in Basu et al. (2020) and Adrian et al. (2021) have explored within an integrated policy framework, how capital control policies can be combined with an array of other tools such as macroprudential instruments as well as interventions in FX markets. Our work complements these efforts by providing empirical evidence of how policies across many dimensions of the BoP flows have intertwined. Future studies can build upon our work to continue to further expand the set of policies within an integrated framework.

3 Sources

3.1 The Annual Report on Exchange Arrangements and Exchange Restrictions

Our primary data source on financial and exchange restrictions is the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). First published in 1950, the AREAER is among the IMF's oldest and most comprehensive textual datasets, compiled annually in accordance with the IMF's Articles of Agreement. The reports systematically cover a broad range of restrictions related to exchange and trade systems, including multiple currency practices, exchange measures imposed for security purposes, and restrictions on current international payments and transfers, foreign exchange market operations, international trade, capital transactions, and the financial sector (including for macro prudential purposes).

Data sources. Data from the AREAER can be accessed through two main websites. Reports from 1999 onward are publicly available for download via structured queries on the IMF's AREAER website.[12] Reports covering earlier years (1950–1999) are available as archived PDF files from the IMF e-library.[13]

[12] Restrictions can be downloaded by year, country, and type of restriction from the IMF's AREAER website: https://www.elibrary-areaer.imf.org/Pages/ChapterQuery.aspx

[13] These annual reports can be downloaded at https://www.elibrary.imf.org.

[FIGURE 1 ABOUT HERE]

Figure 1 illustrates the format of early editions of these reports. The format of restrictions reported in these early reports differ significantly from those downloadable on the IMF's AREAER website. In particular, these restrictions tend to be described in an extended narrative and are not separated by subcategories.[14] The changing formatting of the AREAERs in the earlier years thus requires careful effort to collect and organize the data into a machine readable form.

To construct our dataset, we downloaded all historical PDF reports from 1950 to 1999 and extracted textual information on restrictions using Optical Character Recognition (OCR) software (Google Tesseract). In cases where sections were difficult to delineate clearly from OCR outputs, we applied a combination of large language model (LLM) prompts and manual verification to parse and clean the data. This processed historical dataset was then combined with structured restriction data from 1999–2022, directly downloaded from the AREAER website.

Coverage. An examination of the early editions of the AREAER depicts the widespread use of restrictions and underscores the IMF's mandate under its Articles of Agreement to monitor these restrictions closely. For example, the preface of the inaugural 1950 report states: "*We recognize the many difficulties which have caused the maintenance and spread of restrictions in international economic relations during the period of postwar transition, but if trends of improvement in the underlying world conditions continue, members should find the task of removing exchange restrictions less difficult in the future*" (IMF, 1950). The same report also explicitly mentions the IMF's commitment to annual reporting: "*Not later than three years after the date on which the Fund begins operations and in each year thereafter, the Fund shall report on the restrictions still in force*" (IMF, 1950).

The restrictions covered in the AREAER relate to capital account restrictions as well as the obligation of member countries in Article VIII, which includes restrictions on making payments and transfers for current international transfers, discriminatory currency arrangements or multiple currency practices, and restrictions on the convertibility of foreign held balances. They also cover controls on capital transfers (Article VI). Over time the AREAER's scope has shifted more on capital restrictions. Early reports also note that a proper account of the full spectrum of restrictions

[14] An important exception is the Changes section of the AREAER, which has maintain a similar consistent format over time.

required referring to trade restrictions as well: "*The Fund's interest is focused on exchange restrictions, including multiple currency practices, but it is extremely difficult to discuss them without referring to trade restrictions with which they are closely linked in many restrictive systems. Accordingly, this Report deals also with trade restrictions insofar as they are closely integrated with exchange restrictions*." (IMF, 1950). Our approach aims at comprehensively accounting for the many types of restrictions covered in the AREAERs.

[FIGURE 2 ABOUT HERE]

AREAER reports rely on inputs provided annually by member-country authorities through standardized questionnaires. The number of IMF member countries, and consequently the coverage of AREAER reports, has significantly expanded over time, reaching 197 countries in recent reports (Figure 2).

[FIGURE 3 ABOUT HERE]

Structure of AREAER reports. AREAER reports feature a rich and evolving structure, with the current editions comprising more than 14 distinct sections. Figure 3 provides a historical overview of the evolving structure of these reports. Many core sections—such as payments and receipts, imports, exports, invisibles, and capital transactions—have existed consistently since the early editions, albeit with changes in their classification and organization. Notably, the section explicitly covering policy changes has been present since the first report in 1950, forming the basis for our iBoP-C construction.

[FIGURE 4 ABOUT HERE]

Figure 4 summarizes trends in the structure and content of AREAER reports. Over the decades, reports have grown significantly in both volume and complexity. By 2022, the total cumulative text reached approximately 14 million words (Panel A). At the country level, the length of each report's section has also expanded considerably in recent decades (Panel B). Additionally, text complexity has increased, with recent reports requiring college-level comprehension or above (Panel C). A back-of-the-envelope estimate suggests that reading the entire historical content would require roughly 14 months of continuous reading.

An important structural change occurred in 1995, with the text going from being largely unstructured to being semi-structured, with the number of sections expanded significantly (Panel D). These changes in the structure of the reports make machine learning methods much more suitable to the analysis to ensure efficiency and consistency.

3.2 The Capital Flow Management Taxonomy

One of the extensions of our work will document the motivations underlying capital flow management (CFM) measures. For this particular analysis, we draw on a complementary source: the IMF's Taxonomy of Capital Flow Management Measures. This publicly available source is a subset of the measures outlined in the IMF's AREAER.[15] There are a few important characteristics of these measures. First, they have been assessed by IMF staff as being macro-critical, i.e. they limit capital flows such that they significantly influence a country's present or prospective domestic or balance of payments stability. Second, and importantly, the IMF taxonomy encompasses measures discussed in published IMF staff reports since the adoption of the Institutional View on the Liberalization and Management of Capital Flows in 2012. Thus, it is important to note that, while the IMF Taxonomy includes changes to capital flow policies, it does not reflect the full stock of measures determining a country's capital account openness. Instead, it is focused on identifying new measures introduced after the adoption of the Institutional View. For measures that predate the Institutional View, the taxonomy includes only assessments of their recalibration—whether through tightening, easing, or adjustments to enforcement—and their subsequent removal when deemed necessary. If a measure was implemented before 2012 and has not been recalibrated it will not feature in the taxonomy. Given our interest in documenting the motivations behind the use of CFMs, it seems natural to start our analysis on the introductions of CFMs that have been assessed as macro-critical by others.[16]

Figure 5 presents the distribution of CFMs in the IMF's taxonomy. There are a total of 537 changes recorded, distributed as follows: 153 introductions, 111 tightenings, 222 eases, 49 removals, and 2 extensions. Our analysis on motivations will focus on the 153 introductions of new measures.

[15]The dataset can be accessed online through the IMF Data portal (https://www.imf.org/en/Data).
[16]See Binici and Das (2021) for an in-depth analysis of the measures in the IMF's CFM taxonomy.

[FIGURE 5 ABOUT HERE]

4 New Measures of Cross-Border Restrictions

Available measures of cross-border restrictions in the literature have often exclusively focused on policies that directly affect the capital account (e.g. Fernandez et al., 2016) or have only partly included restrictions in current transfers that are not disaggregated from those in the capital account (Chinn and Ito, 2006). A broader multi-dimensional approach that comprehensively accounts for the various types of measures in the AREAER that countries have employed is thus warranted.

There are at least three challenges that arise when trying to accomplish this goal. First, what categories of restrictions should one study? Second, given the large volume of text in the AREAER reports, how can this large amount of text be processed in a systematic way? Third, how can one satisfactorily account for changes in the structure of the AREAER, in a way that allows for a consistent measure of current and capital account restrictions over time and across countries? The next subsections will describe how we address these challenges.

4.1 Defining categories of restrictions

We begin with a discussion of the categories of restrictions we study. To guide our selection of categories, we focus on restrictions that affect current and capital accounts in the Balance of Payments. Starting with the 13 sections in the AREAER, we narrow and group similar topics in the AREAER into 8 relevant categories of restrictions: FX markets, arrangements for payment and receipts, resident and non-resident accounts, imports and import payments, exports and export proceeds, invisible transactions and current transfers, capital account transactions, and provisions specific to the financial sector.[17]

[17]The mapping between the 2023 AREAER and the categories is as follows. Measures on FX markets come from Sections II and III.F-H; arrangements for payment and receipts come from Section IV; resident and non-resident accounts come from Sections V and VI; imports and import payments come from Section VII, exports and export proceeds come from Section VII; invisible transactions and current transfers come from Sections IX and X; capital account transactions come from Section XI, and provisions specific to the financial sector come from Section XII. Since 1950, however, Sections have varied in number and scope (see 3). Some of the narratives that we study may describe how markets work (e.g. FX markets or the presence of multiple currency practices). In an extension we remove these descriptions and overall trends remain robust.

The categories of restrictions are defined as follows:

1. **FX markets**
   Includes (1) exchange restrictions and multiple currency practices (MCPs) maintained by a member country, (2) exchange measures on payments and transfers in connection with international transactions imposed by member countries for reasons of national or international security, (3) foreign exchange transactions subject to a special tax, fees, or other mandatory cost, (4) foreign exchange transactions subsidized using separate, non-market exchange rates, (5) restrictions imposed on foreign exchange markets.

2. **Arrangement for payments and receipts**
   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 domestically and with foreign countries, (4) regulations governing the physical movement of means of payment between countries.

3. **Residents and non-resident accounts**
   Indicates (1) whether resident accounts that are maintained in the national currency or in foreign currency, locally or 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.

4. **Imports and import payments**
   Describes the nature and extent of exchange and trade restrictions on imports. Includes: (1) foreign exchange budgets, (2) financing requirements of imports, (3) documentation requirements for the release of foreign exchange for imports, (4) import licenses and other non-tariff measures, (5) import taxes and/or tariffs, (6) state import monopolies.

5. **Exports and export proceeds**
   Describes restrictions on the use of export proceeds, as well as regulations on exports. Includes: (1) repatriation and surrender requirements for exporters,

(2) export financing requirements, (3) export documentation requirements, (4) export licenses, (5) export taxes.

6. **Invisible transactions and current transfers**
   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.

7. **Capital account transactions**
   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.

8. **Provisions specific to the financial sector**
   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). Inclusion of an entry does not necessarily signify that the aim of the measure is to control the flow of capital.[18]

In choosing these eight categories of restrictions, we exclude certain parts of the AREAER that: detail information about a country's status with the IMF (Section I in the 2023 AREAER vintage), hence is not relevant to cross-border restrictions; description of a country's monetary policy framework and exchange rate regimes (Sections III.A to III.E), which is not a focus of our measures; and restrictions on digital currencies and crypto assets (Section XIII), added only in 2022.

The comprehensive and integrated nature of the various categories aims to capture not only restrictions that impact cross-border flows directly, but also those that have

[18] A section explicitly gathering provisions to the financial sector appears in the AREAER only from 1995. The topic, however, is pervasive since the start of the AREAERs. The LLM allows to focus on the substance of the category classified despite it not appearing explicitly in the AREAERs.

more indirect implications. For instance, a tax on the purchase or sale of US dollars in FX markets, even if not directly targeted at minimizing cross-border flows, may end up deterring deterring residents from transacting with non-residents and vice versa. Likewise, these restrictions include taxes to imports, or on the financial flows linked to these transactions that indirectly impact cross-border flows through their effect on trade. As the granularity of our measure allows for alternative aggregation, researchers can built alternative measures of restrictions tailored to the research question at hand.

4.2 A machine learning approach to classifying restrictions

Our methodological approach to classifying AREAER restrictions leverages recent tools in natural language processing, particularly Large Language Models (LLMs). The decision to adopt a machine learning-based classification methodology stems from two primary challenges inherent in constructing a consistent and extensive dataset from textual narratives.

The first challenge is maintaining consistency and efficiency in manual annotation. With traditional manual annotation, differences inevitably arise due to subjective interpretations by annotators, potentially leading to inconsistencies in classification. Additionally, there is substantial changes in the AREAER structure and coverage over the seven-decade span from 1950 to 2022. This may require adjusting rules for classification to accommodate differences in the formatting of the narratives. Manually annotated labels would need to be revisited every time an adjustment is made, which can be challenging to do consistently in a large textual database. The second challenge is classifying narratives at scale. As previously noted, the amount of text describing restrictions is significant and difficult to classify at scale.

To address these challenges, we leverage large language models (LLMs) to automate and enhance the annotation process. Our methodology proceeds in several clearly defined steps. First, we generate a carefully annotated training dataset through manual coding of a sample of AREAER narratives drawn from a broad range of countries and years. Second, we validate and refine the training dataset through iterative discussions among annotators, supplemented by LLM-generated predictions, to resolve ambiguities and reduce inter-coder discrepancies. Third, we further augment this manually labeled dataset with publicly available classifications from recent AREAER reports. Incorporating existing AREAER labels significantly

expands the size of training data, improving the accuracy and robustness of our classification models. Lastly, we employ LLMs trained on this training dataset to systematically classify narratives from all AREAER reports.

4.2.1 Step 1: Manual Annotation of Labels

In the initial phase, human annotators label a sample of observations from the AREAER Changes section across five dimensions:

1. **Direction of Change (tighten / loosen / neutral)**
   Indicates whether the measure tightens or loosens capital flow restrictions. Measures that do not affect existing restrictions, or where the direction is unclear, are labeled as "neutral."

2. **Direction of Flow (inflow / outflow / neutral)**
   Specifies whether a policy measure affects capital inflows, outflows, or both. If the measure impacts both inflows and outflows equally, or its focus cannot be determined, the label is "neutral."

3. **Category of Restriction**
   Identifies which category is being restricted, such as FX markets, payments and receipts, resident/non-resident accounts, imports and import payments, exports and export proceeds, invisible transactions and current transfers, capital account transactions, or financial sector restrictions. In principle, a single measure may affect multiple categories or potentially none. [19]

4. **Type of Restriction (price / quantity / administrative)**
   Classifies whether the restriction uses a price-based instrument (e.g., taxes, duties, fees), quantity-based instrument (e.g., limits, quotas, surrender or repatriation requirements), or an administrative instrument (e.g., licensing, approval requirements). Measures can in principle combine all three types of restrictions.

5. **Numerical Information (numerical / non-numerical)**
   Indicates whether the textual description of the measure contains explicit numerical information, such as a limit on price or duration.

[19] Note that category labels are systematically available only from 1995 onward, though partial data exists for earlier years. Because detailed category labels exist in the AREAER database only from 1995 onward, we limit the "category of restriction" classification to pre-1995 observations where this dimension is missing. Post-1995 observations already provide official category labels.

4.2.2 Step 2: Review of Manual Annotations

We investigate the reliability of our manual annotations by comparing the labels assigned by two trained human annotators.[20] This analysis focuses on observations from the pre-1994 sample period, where the AREAER reports are more narrative and potentially more difficult to label consistently.

[FIGURE 6 ABOUT HERE]

Figure 6 displays two measures of agreement between the two annotators. In the left panel, the disagreement is calculated as the number of observations on which annotators assign different labels divided by the total number of observations.[21] These results show that labeling direction of change (tighten, loosen, or neutral) appears the most challenging, with a disagreement rate of 13%. The second most difficult dimension is type of restriction (price vs. non-price), which shows a 7% disagreement rate. By contrast, category of restriction has the smallest disagreement rate (3%).

In the right panel of Figure 6, we report Cohen's kappa for each dimension. Unlike simple disagreement rates, Cohen's kappa adjusts for the likelihood of chance agreement, which becomes particularly relevant if labels are imbalanced in the sample. Formally, for each dimension we calculate

$$\kappa = \frac{P_o - P_e}{1 - P_e},$$

where P_o is the observed agreement rate (i.e., the proportion of instances on which annotators agree), and P_e is the expected agreement given each annotator's individual label frequencies. Averaging kappa over all labels within a dimension yields values ranging from 0.69 to 0.84. Values greater than 0.60 reflect substantial agreement, and values exceeding 0.80 represent close to full agreement (Landis and Koch, 1977). Consequently, these results suggest that the manual annotations demonstrate a generally high degree of reliability, even in the more ambiguous pre-1994 setting.

Refining Annotator Discrepancies. Despite these relatively strong reliability metrics, some differences inevitably remain, particularly for dimensions such as direction of

[20] Annotators are college students from Columbia University with prior experience labeling restrictions in the post-1995 sample period. They regularly discussed their work in weekly discussions with the team of co-authors to ensure consistency in classification.

[21] Equivalently, we can define disagreement rate as $1 - \frac{\text{no. observations where annotators agree}}{\text{total observations}}$.

change. To address these discrepancies, we follow a two-part approach. First, any observation on which the two annotators disagree is jointly re-examined by at least one co-author with domain expertise. This step resolves discrepancies that may be due to a lack of clarity of the policy context of the AREAER entries. Second, we use a large language model (LLM) to predict labels and generate an explanation for its choices.[22] We compare these model predictions to the refined manual labels and resolve any remaining discrepancies via discussion.

[FIGURE 7 ABOUT HERE]

Figure 7 illustrates the extent to which this reconciliation process reduces disagreements between annotators and the LLM. The blue and orange bars show, respectively, the model's disagreement rate with Annotator 1 and Annotator 2; the green bars display the disagreement rate once the two annotators have resolved their differences with each other but before any comparison to the model. Notably, in many cases, the model prediction aligns more closely with one of the annotators than the other, so once annotators reconcile their own labeling decisions, the overall disagreement with the model often declines.[23]

Finally, the red bars show the post-model disagreement rate, representing labels after they are revisited in light of model predictions. While residual disagreements remain, reflecting likely errors on the model's part or rare instances where human annotators converge on a different interpretation, the overall drop indicates that combining a manual labeling approach with an assistive LLM can improve overall accuracy of manually annotated data.

Appendix Figure A5 illustrates the disagreement rates with LLM, separated by label within each dimension. In the direction of change dimension, disagreement rates decline most markedly for the "neutral" and "tighten" categories, suggesting that these labels are more frequently resolved in favor of the model's predictions once annotators and domain experts revisit the text. In contrast, the category of restriction dimension shows the greatest reduction in disagreement following expert discussions. By comparison, only minor improvements occur after introducing model predictions for this dimension. This indicates that the LLM's predictions

[22] We do not provide the model with any examples of manually coded label at this stage (zero-shot prompting). The prompts used for each label dimension are available upon request.

[23] In some cases, the disagreement rate can fall below either individual annotator's initial disagreement rate if the annotators collectively adopt a label that happens to match the model's prediction.

for this dimension, absent further finetuning, yield less accurate labels than the expert-reviewed annotations.

4.2.3 Step 3: Augmented Training Data

To develop a comprehensive training set, we combine the manually annotated labels with pre-existing labels from the post-1995 AREAER:

- Manual Annotations: The primary set of hand-labeled observations, covering all five dimensions described above. This consists of between 2000 observations (price / numerical) to 3000 observations (direction / flow) per label.[24]
- Post-1995 Category Labels: For observations after 1995, labels for categories of restrictions are already present in the AREAER.[25] We incorporate these as ground truth for that single dimension, thus expanding our labeled dataset.
- Supplementary Sections (III.A–III.E): We also include observations from post-1995 AREAER sections that do not directly relate to capital flows (e.g., exchange arrangements). These observations are labeled "neutral" for the direction and flow dimensions.

We merge these sources into a single dataset and split it into training and testing subsets. In particular, 80% of the labeled examples go to training, while the remaining 20% form a hold-out set for unbiased performance evaluation.

[TABLE 1 ABOUT HERE]

Table 1 shows the distribution of labelled observations across the five classification dimensions—Direction, Flow, Category, Price, and Numerical. The second column (No. Labels) lists the number of possible labels per dimension. The subsequent columns present the number of labeled examples used for training (Train Sample), testing (Test Sample), their sum (Train + Test), and the size of the full dataset (Full Sample).

[24] Manually annotated labels for category of restriction are replaced with labels from the AREAER in the post-1995 sample.

[25] Labels for other dimensions (i.e., direction of change, direction of flow, type of restrictions, numerical information) are not present in the AREAER.

The Category dimension has a substantially larger number of labeled examples because we incorporate post-1995 AREAER data, where official category labels were already systematically recorded. Across dimensions, labels are available for between 3.7% (Price) to 34.7% (Category) of observations.

Appendix Figures A6–A10 show the distribution of labels across various characteristics of observations. The share of labeled observations tend to be higher in the post-1995 AREAER sample period, in part because manually annotated observations are supplemented with additional observations of labels from the AREAER. Notwithstanding, the share of labeled observations broadly includes observations across different income groups and region.

4.2.4 Step 4: Training of large language models

We focus on a Domain-Adapted BERT model as our primary approach for the final prediction tasks. However, to contextualize its performance, we also consider a range of other classifiers for comparison.

Domain-Adapted BERT Although large language models (LLMs) can exhibit strong generalization, recent studies suggest that pre-training on domain-specific corpora can yield significant performance gains (Gururangan et al., 2020). Given the specialized nature of the AREAER corpus, we continue pre-training a BERT model on narratives of restrictions extracted from the entire collection of AREAER reports (1950–2022), including both stance and changes sections. Through domain-adaptive pre-training, the embeddings are specialized to AREAER-specific terminology and context, which can potentially improve classification accuracy.[26]

Comparative Models In addition to Domain-Adapted BERT, we evaluate the following alternative methods to gauge relative performance:

- Word-Count Models: TF-IDF weighted representations with classifiers, including logistic regression, random forests, and support vector machines.

[26]We used the WordPiece tokenizer from bert-base-uncased to process the text, splitting on subword units at a maximum sequence length of 128. For each 128-token chunk of the text, 20 percent of tokens are randomly masked as part of the training objective. The model is then trained on 20 epochs of the entire corpus. Perplexity, a common measure of how well a language model predicts a sample (lower is better), evaluated on a held-out sample showed a reduction from 17.28 to 2.19, indicating a substantial improvement in the model's predictive accuracy.

- Open-Source Embedding Models: We also include unmodified (i.e., off-the-shelf) BERT (438 million parameters) and Llama 3.2 (3 billion parameters) to illustrate how they perform without further adaptation to the AREAER domain.
- Closed-Source Embedding Models: Frontier systems like OpenAI's GPT are tested via in-context (few-shot) learning.

Supervised Fine-Tuning After further pre-training, Domain-Adapted BERT is fine-tuned on our labeled training set. We train separate linear classification heads for each dimension (direction, flow, category, price, numerical). We adopt similar fine-tuning strategies for the non-domain BERT and Llama. Word count models are fine-tuned with non-linear classification heads. In contrast, the closed-source LLMs rely on few-shot prompting rather than parameter updates.

4.2.5 Step 5: Evaluation of model performance

[TABLE 2 ABOUT HERE]

Table 2 reports the performance of the models along all five dimensions of labels. Across all dimensions, the performance of BERT models, both base and domain adapted, surpasses those of larger models, including GPT-4o-mini and Llama 3.2 3B. These models also tend to exceed those of word-count base model, indicating that the non-linear patterns of the text matters for its interpretation of the labels. The domain-adapted pre-trained (DAPT) model tends to perform better than the base model, although the non-adapted model marginally outperforms the adapted model when classifying the categories and numerical labels. Appendix Tables A1 to A5 considers other indicators of performance for each dimension of classification: precision, recall, F-1 scores. These alternative metrics provide a similar picture of the relative performance across models.

4.3 Constructing Numerical Measures

Having classified narratives of restrictions, the next step involves constructing our measure of balance of payment restrictions. We consider two separate measures of restrictions: a measure capturing changes in restrictions (iBoPFRI-C) and a measure capturing the stance of restrictions (iBoPFRI-S).

The change index, iBoPFRI-C, measures changes in cross-border restrictions over time, starting from 1950 until 2022. The index relies on information from the Changes section of the AREAER. As previously discussed, this section reports changes in restrictions from all sections in the AREAER at the daily level starting from 1950. Moreover, the reporting structure has remained consistent until today. After classifying these changes, our baseline measure aggregates these changes by summing all tightenings reported at the country-year-category level and subtracting all loosenings reported at the same country-year-category level. We then cumulate these net tightenings from the first year until the most recent year. Formally, for country i in year t and category c, iBoPFRI-C is given by

$$iBoPFRI_C_{itc} = \sum_{\tau \leq t} \left(\sum_{k \in \mathcal{T}_{i\tau c}} Tightening_{k,i\tau c} - \sum_{l \in \mathcal{L}_{i\tau c}} Loosening_{l,i\tau c} \right) \tag{1}$$

where $Tightening_{k,itc}$ is the k change that tightens restrictions in country i, category c and year t, and similarly $Loosening_{l,itc}$ is the l change that tightens restrictions in country i, category c and year t. The set of measures are captured in T and L, which can vary across countries, time and category. While we report results at the annual level, it is possible to construct this measure at a quarterly, monthly, and even daily level given that changes are reported at the daily frequency

While the change index, iBoPFRI-C, allows us to document adjustments to cross-border restrictions at a high frequency, it does not lend naturally to measuring the overall stance of restrictions across countries. Doing so requires knowing the initial level of restrictiveness in controls by country. As a step towards addressing these concerns, we also develop a stance index, iBoPFRI-S, that aims to capture the extensive margin of cross-border restrictions over time.

While iBoPFRI-C is constructured using the section on changes in the AREAERs, iBoPFRI-S leverages on the remaining sections that provide information on the stance of restrictions at the country-year-category level. In contrast to iBoPFRI-C, iBoPFRI-S identifies the *existence or not* of restrictions for each of the subcategories that we consider. To this end, we employ information on granular classifications of the stance of restrictions in the AREAER starting in 1995. iBoPFRI-S is then constructed as an average of binary indicators across all subcategories.[27] Formally, for country i,

[27] In the 2022 version of the AREAER, there are a total of 232 subsections of restrictions relevant to the categories we cover. Given that the structure of the AREAERs differ significantly in the pre-

category c, and year t, iBoPFRI-S is given by

$$iBoPFRI_S_{itc} = \frac{1}{N_c} \sum_{s \in \mathcal{S}_c} \mathcal{I}_{s,itc} \tag{2}$$

where $\mathcal{I}_{s,itc}$ is an indicator for whether restrictions are present in subcategory s for country i, year t, and category c and $\mathcal{S}_c$ is the set of all subcategories related to category c. Unlike iBoPFRI-C, this measure is available only at the annual frequency, given that information on the stance of restrictions is reported at this frequency in the AREAER reports.

4.3.1 Caveats and Limitations

While our measurement improves upon most of the literature in capturing the intensity and direction of policy adjustments by counting the number of reported tightening and loosening changes within each category per year, a limitation is that we weigh all reported changes equally. It can be the case that relatively minor administrative measures —e.g. changing documentation requirements— are given equal weight to substantial legislative reforms -e.g. capital requirements on the banking sector. Future work could address these limitations by incorporating intensity-based classifications, such as ordinal scales used by Quinn (1997). In addition, future refinements to our measures may incorporate the numerical information that we have systematically collected in order to build partial measures of intensity.

An important characteristic of iBoPFRI-C is that it identifies the frequency and net direction (tightening versus loosening) of policy changes rather than absolute restrictiveness. Thus, while our index accurately documents whether restrictions have increased or decreased in a given year, it cannot indicate the absolute openness or restrictiveness across countries. Consequently, this measure should not be used to rank countries by their overall restrictiveness. We address absolute openness levels with iBoPFRI-S that we have from 1995 onward. Future extensions will include a iBoPFRI-S that covers more years into the past.

Another limitation to any work that builds upon the AREAER as main source is related to the completeness and consistency of the reporting in these documents, especially given evolving reporting standards and coverage over time. Early AREAER

1995 period, this measure is available only starting from 1995. In future work, we aim to release a standardize measure that extends iBoPFRI-S from 1950.

reports, particularly before the mid-1990s, often have less detailed or potentially incomplete reporting. Consequently, earlier years may understate the frequency and scope of policy changes. Our methodology addresses this limitation by deploying large language models trained on the full set of AREAER text to classify changes. Given that the same information is used to train the model, the classification should be consistent over time. Moreover, we also carefully examine country-specific narratives in developing our training sample, including resolving ambiguous cases and ensuring that these cases are consistently labelled within our training sample.[28]

Despite these caveats, our methodology offers significant advantages. By providing comprehensive coverage of restrictions in the AREAER over seven decades, it substantially extends the historical scope beyond previous datasets while simultaneously allowing for a level of granularity in the policy actions that is far beyond of what other studies have done in terms of frequency, type, and direction of the policy actions. Moreover, our systematic classification approach greatly improves consistency, comparability, and reproducibility compared to traditional narrative analyses. This should allow researchers to draw robust insights into long-term trends and patterns of cross-border flow restrictions.

5 Stylized Facts

This section presents five key stylized facts from our new database of Balance of Payment restrictions. First, we find that current account restrictions were a significant policy lever, particularly in the years leading up to the collapse of the Bretton Woods system. This contrasts with the policy levers of more recent periods, which rely more heavily on capital account restrictions and financial sector provisions. Second, we document that overall trends in financial and trade liberalization have not always been linear. While countries have overall implemented more loosening than tightening measures in the past seven decades, periods of significant change in the global monetary system – notably the breakdown of Bretton Woods – saw a significant tightening of restrictions for several categories. Third, financial liberalization has occurred at an uneven pace, with higher income countries liberalizing faster and to a greater extent than lower income countries. Fourth, we find that

[28] As mentioned in the literature review, some studies have relied on additional sources other than the AREAERs. This, however, comes at the cost of covering a smaller sample of countries and/or time in order to remain consistent.

liberalization of cross-border restrictions have primarily concerned quantity-based restrictions. Administrative-based restrictions persists among low income countries. Fifth, we document that the liberalization trend in BoP flows has been largely driven by the more rapid pace in loosening of outflow restrictions, relative to that of inflow restrictions.

5.1 A Long-Run Perspective: 1950-2022

5.1.1 Stylized Fact 1: Current account restrictions were a significant policy lever in the years leading up to the collapse of Bretton Woods.

[TABLE 3 ABOUT HERE]

Table 3 classifies the 70,817 reported policy changes identified into the eight categories we consider. From 1950 to 2022, restrictions on the current account—those directly targeting imports and exports—represented the largest single policy category, comprising 38 percent of all reported changes. Among these, import-related restrictions were particularly prevalent. Restrictions on FX markets, including exchange taxes, subsidies, and FX regulations imposed for security reasons, form a smaller share (13.5 percent). Similarly, capital account restrictions—commonly emphasized in existing datasets like Fernandez et al. (2016)—accounted account for only 12.4 percent of all changes. Restrictions specific to the financial sector accounted for only 7.1 percent.[29]

[FIGURE 8 ABOUT HERE]

Figure 8 illustrates how reliance on each of these policy levers has varied over time. The 1970s and 1980s, for example, saw high numbers of changes to imports and import payments, reflecting the continued use of trade-oriented restrictions in the Bretton Woods and immediate post–Bretton Woods era. In contrast, the 1990s and beyond witnessed a relative rise in changes related to the capital account and the financial sector. This shift suggests that policymakers have increasingly moved

[29]The AREAER introduced the category of restrictions on the financial sector only in 2005, which could lead to under-reporting in earlier periods. Nonetheless, we do find intuitive variation in financial sector restrictions in the earlier sample period, indicating that these types of restrictions were likely reported in earlier reports. An additional 7.7 percent of entries were classified as "not applicable," referring to narratives either too vague to categorize, explicitly indicating no policy change, or relating to exchange rate arrangements and monetary policy frameworks.

from restricting trade flows (through current account measures) to adjusting the types of flows allowed or disallowed through capital account–based instruments. Appendix Figure A14 shows that this pattern remains visible even if we hold the set of countries constant to those represented in the dataset since 1960. This suggest that the variation in types of levers used over time is not driven by changes in the composition of countries.

Although restrictions on imports and import payments constitute the single largest category across the full sample, other restriction types also displayed substantial variation in earlier decades. The 1960s and 1970s, in particular, saw frequent changes to payments and receipts, which cover prescriptions of currency usage, payment agreements, and cross-border shipments of banknotes and gold. These decades coincide with the postwar transition and the consolidation of the Bretton Woods system, during which many countries scaled back wartime controls and broadened legal channels for international transactions. Finally, the data indicate a pronounced spike in FX restrictions in the 1970s, which we explore more closely in the next section.

5.1.2 Stylized Fact 2: Liberalization trends in BoP flows have not evolved linearly.

[FIGURE 9 ABOUT HERE]

Figure 9 illustrates broad trends in restrictions over time. The left panel plots the average iBoPFRI-C across countries, which captures cumulative net adjustments (tightening minus loosening) across categories. An increase implies net tightening, while a decrease indicates net loosening. The right panel plots the average annual number of changes per country, separately for tightening and loosening episodes.

The figure shows that financial liberalization has not proceeded linearly over time. Notably, from the early 1960s through the early 1980s there was a pronounced reversal towards tighter restrictions. The sharp increase in restrictions aligns closely with the breakdown of the Bretton Woods agreement in the early 1970s, a period of significant structural change in the global monetary system.

[FIGURE 10 ABOUT HERE]

When we examine each of the eight categories considered, as shown in Figure 10, the tightening trend was particularly pronounced for current account restrictions.

Restrictions on imports and import payments tightened substantially, with an average increase of approximately six net tightening measures per country by the early 1980s. Historical AREAER narratives explicitly connect these tightening measures to growing balance-of-payments pressures. For example, the 1965 report explicitly mentions the rising use of advance import deposit requirements and import surcharges to address external imbalances (IMF, 1965). Likewise, the 1963 report highlights that many developing economies adopted exchange and import restrictions as strategic responses to balance-of-payments pressures and reserve depletion concerns (IMF, 1963). Export restrictions also tightened notably, albeit later, primarily after major industrial economies moved to floating exchange rates in early 1973.

In contrast to tightening on the current account, other types of restrictions—such as payments and receipts, resident and non-resident accounts, and invisible transactions—experienced sustained liberalization throughout this period. This divergence likely reflects the differing policy objectives pursued at the time: maintaining external balance by directly restricting trade flows versus progressively liberalizing international transactional channels. Restrictions on capital account transactions, despite frequent adjustments, remained broadly balanced during these decades. Meanwhile, restrictions specific to the financial sector, formally classified by AREAER only from 2005 onward, nonetheless exhibited considerable variation during the 1970s.

[FIGURE 11 ABOUT HERE]

Figure 11 zooms into the immediate months around the Nixon Shock on August 15, 1971—the U.S. announcement suspending dollar convertibility into gold, marking the effective end of the Bretton Woods system. This announcement triggered an immediate spike in tightening measures, particularly FX market restrictions, as policymakers urgently reacted to growing currency volatility. Importantly, the figure shows restrictions on imports were already increasing prior to the announcement, suggesting early strategic efforts by countries to manage escalating trade imbalances. By contrast, restrictions on exports tightened later, reflecting policy responses emerging mainly after major industrial economies adopted floating exchange rates in early 1973.

Overall, these patterns illustrate that financial liberalization trends have not been linear. Appendix Figure A3 confirms that these trends are robust to holding constant the set of countries (89 countries) included since 1960.

5.1.3 Stylized Fact 3: Financial liberalization occurred at an uneven pace, with high-income countries liberalizing faster and to a greater extent than lower-income countries.

[FIGURE 12 ABOUT HERE]

Figure 12 explores differences in liberalization patterns across income groups. The left panel plots the cumulative iBoPFRI-C separately for high income, middle income, and low income countries. A clear pattern emerges: high income countries began liberalizing earliest, starting in the 1960s, and have maintained a steady pace of liberalization since, except for a slight reversal in the 1970s. By contrast, middle income countries initially tightened restrictions significantly during the 1970s before beginning their liberalization in the 1990s. Low income countries, which also tightened restrictions notably during the 1970s, have liberalized at a slower, more gradual pace and remain relatively restrictive even in recent decades. These patterns align closely with de facto financial globalization measures documented in Capelle and Pellegrino (2024).

The right panel complements these trends by showing the average annual number of changes per country within each income group. Consistent with the overall trend noted earlier, all income groups saw increased policy activity during the turbulent 1970s. However, middle-income and low-income countries started adjusting restrictions earlier, beginning in the 1960s, reflecting earlier balance-of-payments pressures and economic volatility. High-income experienced a sharp spike in changes around the Bretton Woods collapse in the early 1970s, highlighting their acute responsiveness to global economic disruptions. The number of changes reported by high-income countries rose again in the post-2010 period, corresponding to policy changes implemented following the 2008-2009 Global Financial Crisis.

[FIGURE 13 ABOUT HERE]

Figure 13 decomposes these trends through each of the eight categories. High-income countries led in liberalizing capital account restrictions, followed sequentially by middle income, while low-income countries liberalized only marginally. Similar sequencing is observed for restrictions on invisibles and current transfers, as well as resident and non-resident accounts. Interestingly, despite broadly liberalizing, high-income countries showed distinct episodes of tightening—especially in financial

sector restrictions during the 1970s—reflecting targeted policy responses to market volatility. Additionally, high-income countries exhibited persistent tightening in restrictions on exports and export proceeds relative to middle- and low-income countries. Given the absence of initial restriction-level data, however, these differences in cumulative adjustments may still mask lower absolute restrictiveness levels among high-income countries compared to middle- and low-income countries.

5.1.4 Stylized Fact 4: Quantity-based restrictions have liberalized over time, while administrative requirements persists particularly among low income countries.

[FIGURE 14 ABOUT HERE]

Figure 14 decomposes restrictions into three categories: price-based, quantity-based, and administrative-based restrictions. Price-based restrictions directly alter the costs of transactions. These include taxes, fees, tariffs, subsidies, and interest premiums. Quantity-based restrictions limit the volume or amount of transactions and encompass quotas, caps, bans or suspensions, and surrender or repatriation requirements. Administrative restrictions impose procedural or institutional requirments that do not directly target cost or volume, such as licenses, authorization requirements, reporting requirements, maturity requirements, holding period requirements, or bilateral payments agreements.

The left panel shows that most liberalization over time has occurred in quantity-based restrictions. These measures were progressively loosened, particularly from the 1980s onward. By contrast, administrative restrictions were tightened in the 1960s and 1970s and saw little subsequent liberalization. Price-based restrictions have also followed a loosening path but relatively more modest. The right panel confirms that the bulk of policy changes recorded in the AREAERs pertain to quantity-based restrictions.

[FIGURE 15 ABOUT HERE]

Figure 15 further disaggregates the evolution of restrictions by type and income group. We observe notable patterns of heterogeneity. First, the sequencing of liberalization in quantity-based restrictions mirrors the aggregate trend: high income countries liberalize first, followed by middle income and then low income countries.

Second, price-based restrictions also experienced some liberalization, particularly among middle income countries, though the scale of adjustment was more modest. Finally, administrative requirements were widely used in both middle and low income countries in the earlier decades. When middle-income countries began loosening these measures in the mid-1980s, low-income countries did not experience a comparable relaxation of administrative requirements.

5.1.5 Stylized Fact 5: Outflow restrictions have liberalized more rapidly than inflow restrictions

Our dataset allows us to classify restrictions according to the direction of capital flows they affect. Broadly, we distinguish between outflow restrictions—measures limiting funds exiting a country—and inflow restrictions—measures limiting funds entering a country. For capital account transactions, the classification of inflows and outflows follows the conventions established by Fernandez et al. (2016).[30] For current account transactions, we classify restrictions impacting imports and import payments as outflow restrictions, whereas restrictions affecting exports and export proceeds are categorized as inflow restrictions. Consistent with IMF convention, repatriation and surrender requirements are treated as outflow restrictions. In ambiguous cases, we determined flow direction through case-by-case analysis. Restrictions related to FX markets, for instance, are often classified as neutral since they typically affect both inflows and outflows simultaneously. Similarly, restrictions in the financial sector, which could affect transactions between residents and do not directly target cross border flows, are also classified as neutral.

[FIGURE 16 ABOUT HERE]

Figure 18 provides insights into these directional trends, particularly focusing on capital account transactions (left panel), where flow direction can be most clearly classified. Notably, while both inflow and outflow restrictions liberalized significantly post-1980, outflow liberalization proceeded more rapidly and extensively. This pattern is consistent when examining the cumulative net tightening across all categories (right panel), suggesting that countries have generally been quicker and

[30] Restrictions on purchases locally by non-residents and sales or issuance abroad by residents are classified as inflow restrictions, whereas restrictions on sales or issuance locally by non-residents and purchases abroad by residents are classified as outflow restrictions.

more willing to loosen restrictions on outflows compared to inflows. The earlier tightening of outflow restrictions observed during the 1960s and 70s aligns closely with previously discussed trends in import and import payment restrictions.

[FIGURE 17 ABOUT HERE]

Figure 17 further breaks down these directional trends by income groups. Liberalization of inflow restrictions has proceeded similarly across income groups, reflecting common international pressure and agreements toward openness to foreign investment. By contrast, the liberalization of outflow restrictions demonstrates a clear sequencing pattern: high-income countries began liberalizing first, followed subsequently by middle-income countries, with low-income countries liberalizing more gradually.

5.2 Comparison with previous work

This section presents a comparison of the measures we build with those coming from previous studies. Concretely, we focus on the three main studies discussed in the Literature Review (Quinn and Toyoda 2008, Chinn and Ito 2006, and Fernandez et al. 2016)[31] and we also include the measure in Ilzetzki et al. (2021). The latter measure is built as the fraction of countries with dual, multiple or parallel exchange rates.[32]

Figure 22 presents the time series in the five measures, including ours, for which we use the average country measure from the eight dimensions that we consider; and Table 5 presents the correlation in all. When computing these descriptive statistics, we pool the data across countries. The appendix presents the average correlations on a country-by-measure basis. The most salient feature that comes out of these statistics is that our new measure commoves with the ones in previous studies, but the correlation is not perfect. In fact, all correlations are above 0.9 with the exception

[31]When computing statistics with the measures put together by Quinn (1997) we use simple averages between the current and capital account measures to make it more comparable to ours. Likewise, when using the measures by Fernandez et al. (2016) we use the most aggregate measures that averages inflow and outflow restrictions.

[32]This index also draws on the IMF's AREAER complimented with the publications by Franz Pick over 1946-1998 and Pick and Sedillot (1971). It assigns a value of 1 to a country in each year when any one of three criteria is met. First, the country has an official (*de jure*) dual market for foreign exchange. Second, the country has a *de jure* system of multiple exchange rates. Third, there is an informal parallel market (whether tolerated or illegal) and the parallel market has a premium of 10 percent or more within a 12-month moving window. The index takes a value of zero in any year when none of these three criteria is met.

of the index in Fernandez et al. (2016), which is understandable given that the latter narrowly focuses on capital account restrictions. It is also noteworthy that our index captures more an increase in restrictions surrounding the collapse of Bretton Woods than the others. This partly reflects the fact that, as mentioned before, the new measure captures more comprehensively the extent to which alternative measures captured in the eight dimensions that we cover were being deployed. Lastly, it is notable that all indices capture the relaxation of controls that took place following the mid 1980s. The granularity in the new measures will enable users to decompose the drivers of these dynamics into the many dimensions that our measures encompass.

[FIGURE 22 ABOUT HERE]

[TABLE 5 ABOUT HERE]

5.3 A More Granular View of the Past Three Decades: 1995-2022

We next examine a more granular breakdown of restriction subcategories in the AREAER to further understand specific policy tools countries have employed. While the AREAER has consistently reported broad categories, detailed subcategory information is systematically available only from 1995 onward, and even then, comprehensive classification was not consistently reported until after 2016.[33]

[TABLE 4 ABOUT HERE]

Table 4 presents this refined classification, from which several notable patterns can be observed. Within FX restrictions, countries frequently employed measures related to exchange market regulations and security-based restrictions, although a sizeable fraction (around 14 percent) remained too general to classify precisely and thus fall into "other FX restrictions."

For current account transactions, restrictions on imports and import payments predominantly relied on price-based measures—such as tariffs and taxes—and administrative controls, notably licensing requirements and documentation or financing conditions. In contrast, restrictions on exports and export proceeds primarily consisted of repatriation and surrender requirements, whereas export taxes (or subsidies) consists a smaller share of export-related restrictions.

[33] Appendix Figures A15 to A19 compare the frequency of reported and model-predicted changes by subcategory.

In the capital account, a significant share of policy adjustments targeted controls on portfolio flows—covering transactions in equities, debt securities, and derivatives—followed by direct investment and credit operations. Around 14 percent of capital account changes were classified under "other controls on capital transactions" due to insufficient specificity. Restrictions specific to the financial sector have predominantly focused on measures targeting commercial banks, accounting for a substantial share (74 percent) of reported adjustments within this category.

[FIGURE 18 ABOUT HERE]

Figure 18 presents a selected set of subcategories. First, we see that while imports tariffs or taxes have fallen broadly over time, we also see a commensurate rise in import licenses and other non-tariff measures. Second, we also see diverging trends in restrictions specific to the financial sector. While restrictions on commercial banks have significantly tightened following the 2008-09 Global Financial Crisis, restrictions on pension funds have been gradually loosened over time. Appendix Figures A20 to A24 plot the overall trends for all subcategories in our database.

5.4 Overview of the Stance Index, iBoPFRI-S

Having discussed the key stylized facts from the Changes index, iBoPFRI-C, we turn to providing an overview of the Stance index, iBoPFRI-S. Unlike iBoPFRI-C, which captures *changes* to restrictions in cross-border flows, the Stance Index focuses on capturing the extensive margin of cross-border flow restrictions. In its preliminary form, iBoPFRI-S is available only at the annual frequency starting from 1995, but subsequent work will increase the coverage and the frequency.

iBoPFRI-S is constructed using a bottom-up approach that aggregates the stance of restrictions along each subcategory of restrictions. The subcategories follow the classification of restrictions in the AREAERs, and covers a total of 232 distinct subsections. The stance of each subcategory of restriction takes a value of 0 or 1, with 0 indicating no restriction and 1 indicating a restriction in place. For subcategories where information is not available – either because the subcategory was not present in the AREAERs or because countries did not report information about the stance of the restriction – the stance is set to missing or n.a. The stance of restriction is predicted using the narrative of restrictions when available, or the stance provided in the “Status” column of the AREAER when not available.

Our bottom-up approach takes into account the nested structure of the subcategories. In particular, we compute the average stance of subcategories at the most granular level, and then proceed to compute the average of subcategories at the next level until we arrive at the average stances for the eight categories of restriction.[34] This approach is similar to that taken by Fernandez et al. (2016) for capital account restrictions, but extended to the additional seven categories of restrictions that we consider in the AREAER.

[FIGURE 19 ABOUT HERE]

Figure 19 plots the average stance of restrictions across all countries. This measure takes the average of restrictions across eight categories.[35] The figure shows that the overall stance of restrictions has declined, a trend towards liberalization that we can also observe from the changes index, iBoPFRI-C.

The right panel decomposes iBoPFRI-S by income group. We see that cross-border flow restrictions are overall less restrictive for high income countries than they are for middle or low income countries. Middle and low income countries have broadly similar stance of restrictions. This feature of iBoPFRI-S is qualitatively consistent with the stance of restrictions from Fernandez et al. (2016), which captures only restrictions to capital account transactions.

6 Extension

6.1 Motivations

The imposition of capital controls has been a topic of significant academic interest, but there remains a notable gap in the literature regarding a systematic, empirical account of *why* controls are introduced. While existing models of optimal capital controls emphasize motivations like overborrowing for the use of inflow controls (see Bianchi and Mendoza (2018)), or to coordinate foreign investors not to run in case

[34] For instance, the stance of controls on bonds or other debt securities are computed as the average of controls on purchases locally by non-residents, sales or issuance abroad by residents, sales or issuance locally by non-residents, and purchases abroad by residents. Missing values are ignored when computing averages.

[35] We report the stance starting in 2000, given that the stance of restrictions are often missing in the years from 1995 to 2000. The stance of restrictions for these years are available to researchers interested in constructing a more granular index.

of a crisis with outflow controls (see Chang et al. (2024)), there is limited evidence on the actual reasons behind capital control measures as justified by government officials.

We systematically account for the official motivations in a subset of the measures considered. Our starting point is the work by Magud et al. (2018) who provide anecdotal evidence on the fears that drive policymakers to impose controls on cross-border flows.[36] To systematically explore the motivations for capital controls, we rely on a narrative approach utilizing official documents. Specifically, we analyze capital flow management (CFM) measures as categorized in the IMF taxonomy described before. This implies that we focus on the subset of measures labeled as "macro-critical" by IMF staff post-2012. This includes 153 individual measures across 41 countries, spanning advanced economies, emerging markets, and developing economies.

Our approach involves a manual search for official statements from governments regarding the motivations behind these measures. These statements were sourced from speeches, financial and monetary stability reports, IMF Article IV consultations, social media (e.g., Twitter), and other relevant channels. In total, we found official statements for 138 of the measures (90%), from which we identified motivations for 117 (76%). For the remaining measures, we supplemented our findings using ChatGPT to extract motivations.

We identify six primary motivations behind capital control measures, based on our systematic analysis of official records. While some measures are motivated by a single reason, others may reflect overlapping motivations, as capital controls often address multiple concerns simultaneously. Below is a detailed explanation of each of the six categories:[37]

- **Fear of Overborrowing**. This category refers to the concern that large foreign inflows may encourage excessive risk-taking, fuel asset-price bubbles, and create vulnerabilities to sudden withdrawals. These measures are often introduced either proactively (ex-ante) or reactively during a surge in inflows to prevent financial instability.

[36] Their work highlights four fears: fear of exchange rate appreciation; fear of hot money; fear of large inflows; and fear of loss of monetary autonomy.

[37] Our classification expands the four fears in Magud et al. (2018) framework to capture a broader range of economic, geopolitical, and long-term considerations. While Magud et al. (2018)'s fears of appreciation and loss of monetary autonomy overlap with our fear of floating, their fears of large inflows and of hot money bear resemblance to our fears of overborrowing and of disruptive outflows.

- **Fear of Disruptive Outflows**. Policymakers may introduce capital controls to prevent large-scale outflows, particularly during times of crisis or heightened financial uncertainty. These measures serve as precautionary measures to safeguard a country's foreign reserves or to stabilize the financial system. In some cases, they are used to mitigate the effects of capital flight during periods of economic turmoil.

- **Fear of Floating**. The fear of exchange rate volatility is a significant motivation for capital controls. This category encompasses multiple concerns, including a fear of exchange rate volatility leading to uncertainty in the economy; fear of appreciation, which can harm export competitiveness; fear of depreciation, which may reduce purchasing power or increase the burden of foreign-denominated debt. Lastly, any measure aimed at supporting a pegged exchange rate or maintaining monetary policy autonomy in the face of capital mobility would enter into this category.

- **Geopolitics**. Capital controls may also be motivated by political or geopolitical considerations. These measures are often driven by national security concerns, including military conflicts or international sanctions. Governments may impose controls to restrict the flow of capital for strategic reasons or to comply with international mandates.

- **Long-term Goals**. Some capital controls are not reactive to short-term economic pressures but are instead aimed at long-term goals, such as fostering the stability and depth of domestic financial markets, or increasing capital account openness. These measures are designed to strengthen investor confidence and increase the resilience of the financial system, often leading to greater international connectedness over time. Despite regulating capital flows, these controls may de facto increase openness by fostering a more stable environment for investment.

- **Miscellaneous**. This category includes measures that do not fit neatly into the above classifications. Motivations for these measures include increasing tax revenues, or addressing other unique economic conditions not covered by the other categories.

Figure 21 reveals several key trends in the motivations behind the imposition

of capital controls from our systematic analysis. The most common reasons for imposing restrictions are driven by concerns about disruptive outflows or volatile currency movements with 37% of the cases found to have this characteristic. This is followed by a fear of floating (31%) and of overborrowing (22%). Long term goals not associated to business cycles are next with 20% of cases, and geopolitcs and miscellaneous are the less frequent motivations with 13% and 3%, respectively.[38] It is notable, therefore, that about 1/3 of the motivations is not linked to the state of the business cycle, which offers a fertile ground for studying the macroeconomic effects of flow-restriction shocks later on.

Figure 20 explores how the motivations are related to income levels across countries, types of tools, direction of the flow, and the *de facto* exchange rate regime from Ilzetzki et al. (2021). Fears of floating and of disruptive outflows are more pervasive in low and middle income countries. Fear of overborrowing, in contrast, is more pervasive in high income countries (panel a). Bans and limits are the two types of controls mostly used across all the motivations, with the exception of taxes, which is the most used in the case of fears of overborrowing. Surrender and repatriation requirements are the second most relevant type in the case of fears of disruptive outflows (panel b).

Fears of disruptive outflows, fear of floating, and geopolitical drivers are have more characterized by measures on outflows. While fear of overborrowing disproportionally impact more inflow controls, as expected. Long-term goals are equally distributed among types of flows (panel c). Lastly, fears of overborrowing are more frequent in freely floating countries. "Freely falling" cases, as defined by Ilzetzki et al. (2021), are more pervasive when fears of floating and of disruptive outflows are identified (panel d).

[FIGURE 21 ABOUT HERE]

[FIGURE 20 ABOUT HERE]

6.2 Intensity in Cross-Border Flow Retrictions

PENDING

[38] As mentioned, the 6 types of motivations are not mutually exclusive, hence the percentages do not add to 100.

6.3 Use of Cross-Border Flow Retrictions

PENDING

6.4 Additional Robustness Analysis

PENDING

7 Conclusion and Next Steps

In this paper, we set out to provide a detailed, systematic account of cross-border flow restrictions over the past seven decades, using modern machine learning techniques to analyze semi-structured official documents. By developing a new, high-resolution measure of restrictions, the iBoPFRI, we were able to document the evolution of policies that have shaped the international monetary system, tracing changes across different countries and time periods with unprecedented granularity.

Our analysis reveals five key stylized facts. First, we find that the landscape of cross-border flow restrictions has shifted from a focus on current account restrictions during the Bretton Woods era to a more significant reliance on capital account restrictions and financial sector measures in recent decades. Second, the process of financial liberalization has been non-linear, with periods of both loosening and tightening of restrictions. Third, liberalization has occurred at different paces across countries, with high-income countries generally liberalizing faster than low-income ones. Fourth, quantity-based restrictions have dominated liberalization efforts, while administrative controls remain common in lower-income countries. Lastly, the loosening of outflow restrictions has been more prominent than the liberalization of inflows.

Looking forward, there are several promising avenues for extending our work. One potential extension is to further refine the intensity of restrictions, building on existing methodologies to better capture the real impact of policy changes. Expanding the coverage of our stance index further back in time will also enhance the comprehensiveness of our analysis. Another extension can look at the use of the various policy instruments that the new dataset quantifies and their interaction with crises. Lastly some refinements to the measures can be explored by removing macro-prudential measures, as well as other regulations that directly impact do-

mestic transactions and other trade related measures. These future extensions will allow us to gain an even deeper understanding of the dynamics of cross-border flow restrictions and their implications for the international monetary system.

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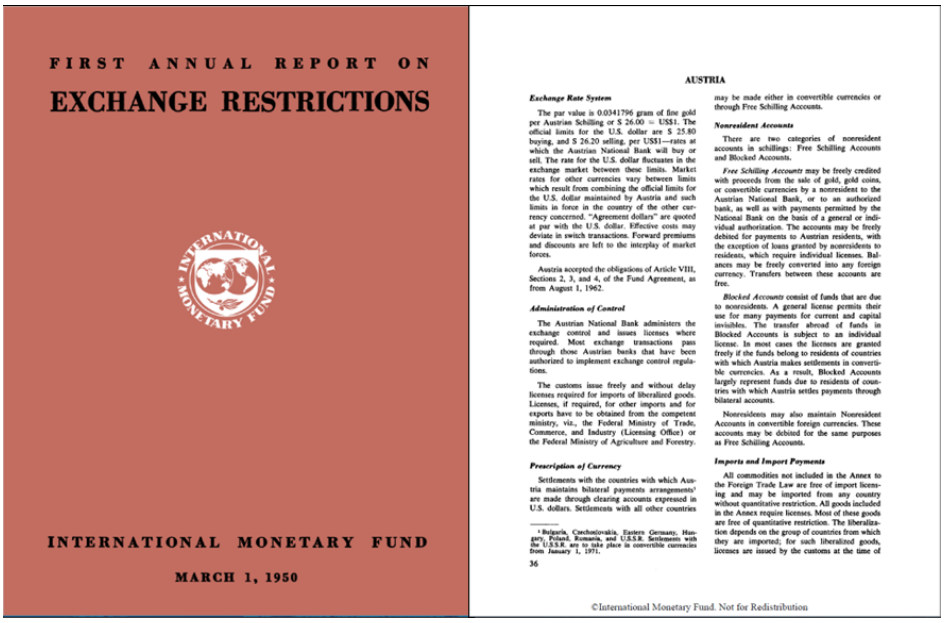
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Figures and Tables



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 S 26.00 = US$1. The official limits for the U.S. dollar are S 25.80 buying, and S 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 those 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 arrangements[1] are made through clearing accounts expressed in U.S. dollars. Settlements with all other countries 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

[1] Bulgaria, Czechoslovakia, Eastern Germany, Hungary, Poland, Rumania, and U.S.S.R. Settlements with the U.S.S.R. are to take place in convertible currencies from January 1, 1951.

36

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Figure 1: Front cover and first page of the inaugural 1950 AREAER report.

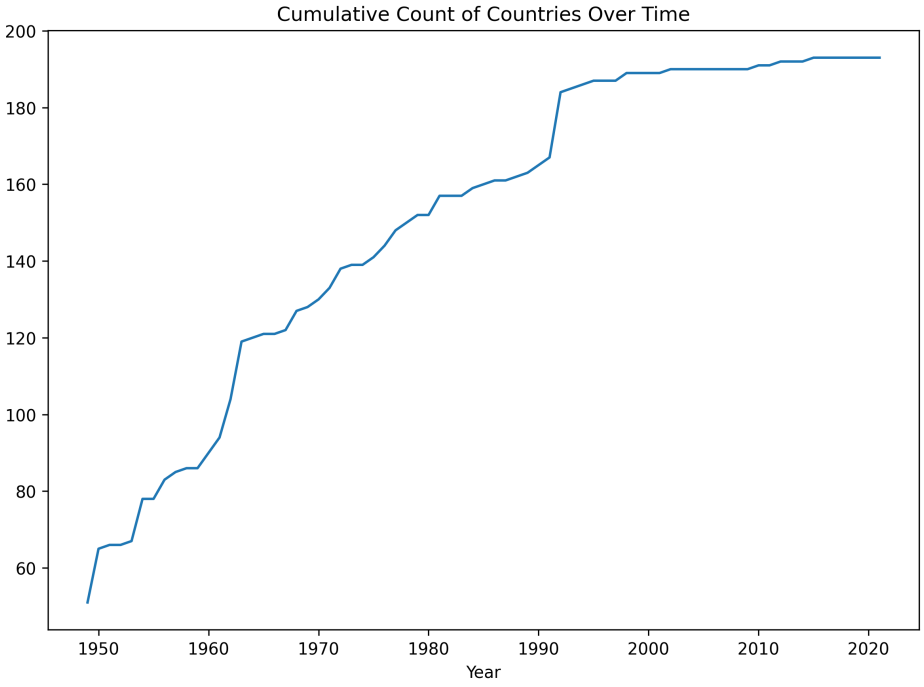


Figure 2: Number of IMF member countries covered in the AREAER over time.

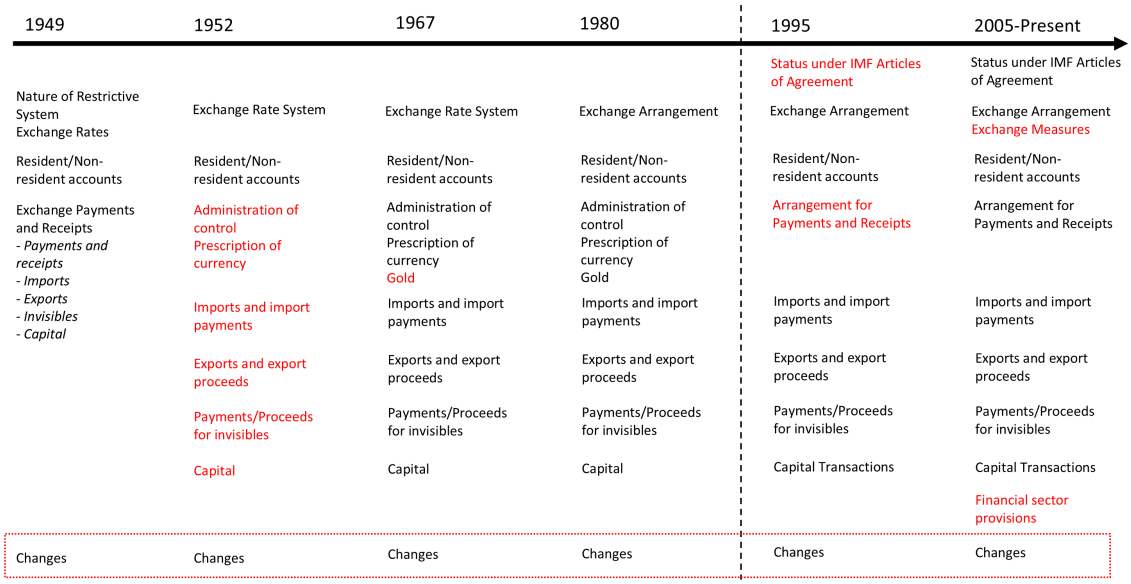


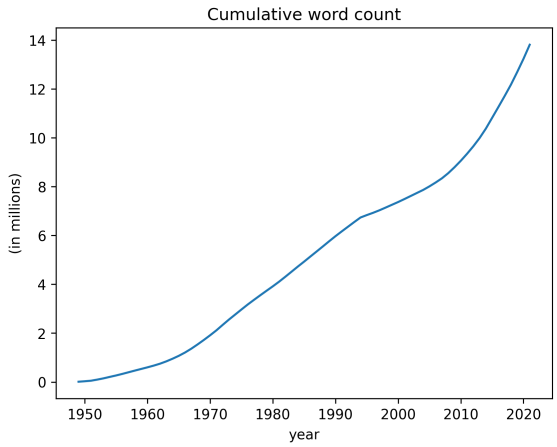
Figure 3: Sections in AREAER reports over time.

Label	No. Labels	Train Sample	Test Sample	Train + Test	Full Sample
Direction	3	2964	742	3706	70817
Flow	3	2964	742	3706	70817
Category	8	19669	4918	24587	70817
Price	3	2244	562	2806	70817
Numerical	2	2241	561	2802	70817

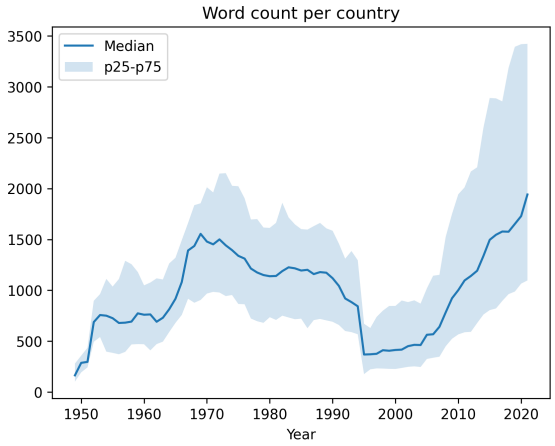
Table 1: Number of training examples by dimension.

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	0.110	0.567	0.917
Llama 32 3B	0.854	0.742	0.092	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

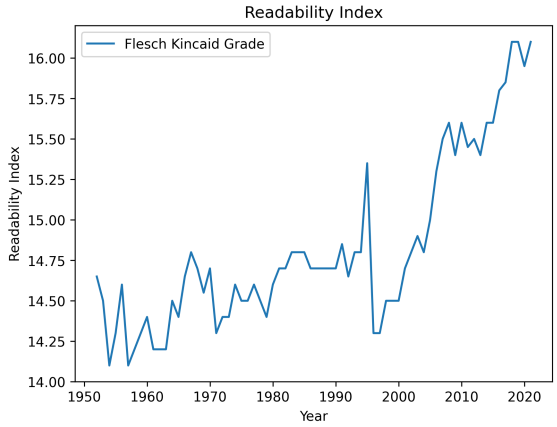
Table 2: Comparison of model performance. Performance metric reported is the model accuracy. The sample consists of a 20% randomly selected held-out sample of labeled data.



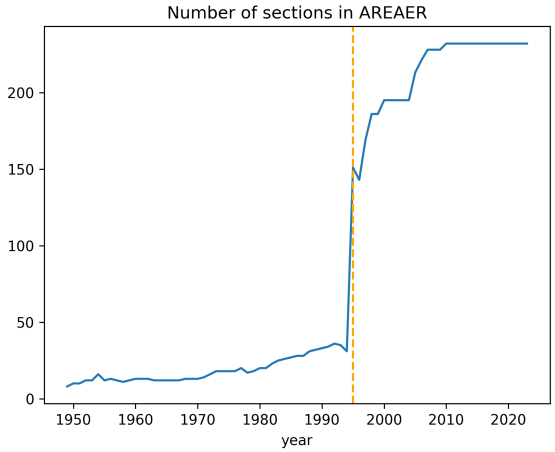
(a) Cumulative number of words in all AREAER reports.



(b) Number of words in AREAER reports per country.



(c) Readability index of AREAER reports over time.



(d) Number of sections in AREAER reports over time.

Figure 4: Overview of structure and content of AREAER reports over time.

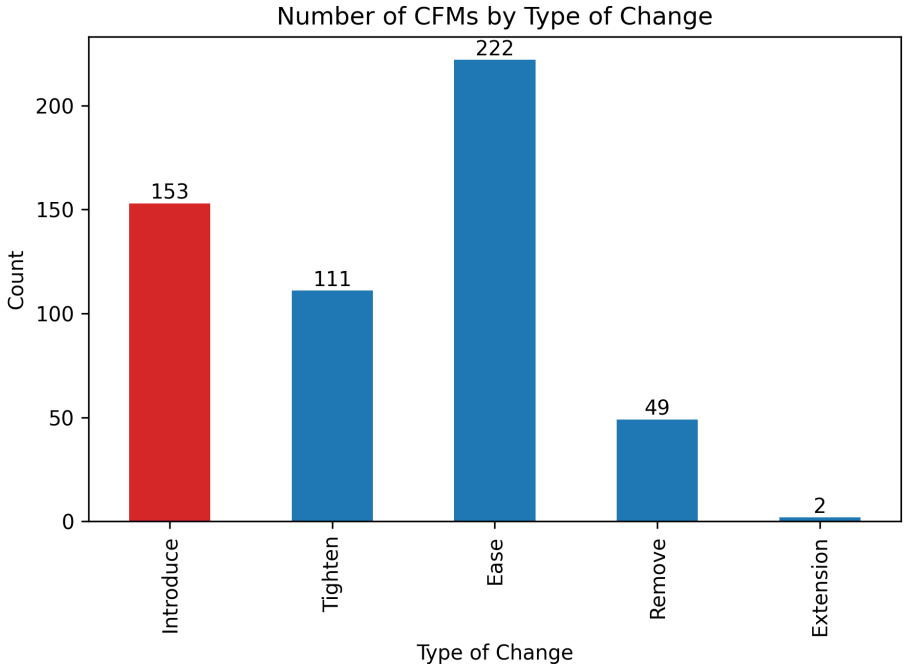


Figure 5: Number of changes in the IMF's CFM Taxonomy, by type of change.

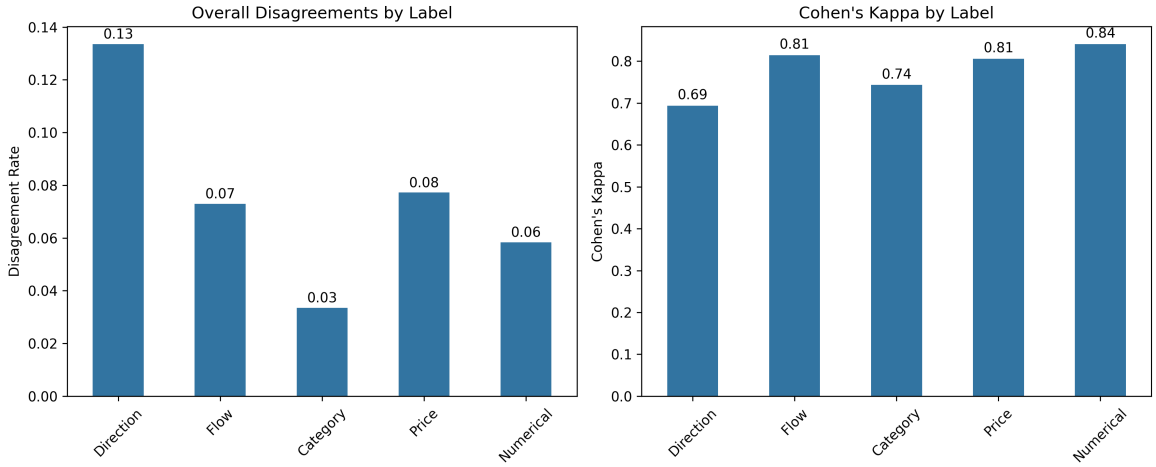


Figure 6: Disagreement rate between annotators (left) and Cohen's kappa (right) by dimension. The sample consists of observations from the pre-1994 AREAER sample.

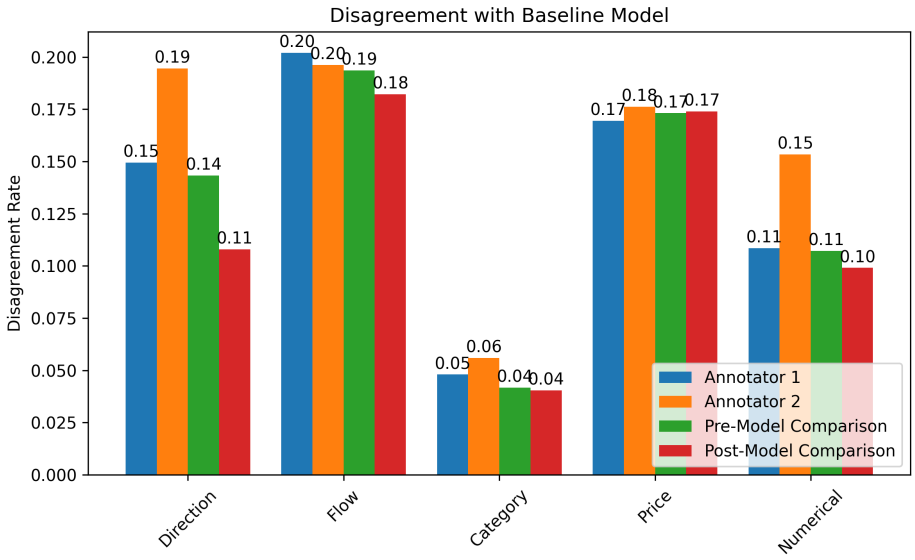


Figure 7: Disagreement rates between annotators and the zero-shot prompted LLM. "Pre-model comparison" refers to manually annotated labels after resolving disagreements between annotators. "Post-model comparison" refers to labels after resolving disagreements with the LLM. The sample consists of observations from the pre-1994 AREAER sample.

Category	Count	Share (%)
Overall	70817	100.0
FX markets	9591	13.5
Payments and receipts	6731	9.5
Resident and non-resident accounts	3454	4.9
Imports and import payments	18959	26.8
Exports and export proceeds	7792	11.0
Invisible transactions and current transfers	5087	7.2
Capital account transactions	8760	12.4
Specific to the financial sector	5010	7.1
Not applicable	5433	7.7

Table 3: Number of changes by category

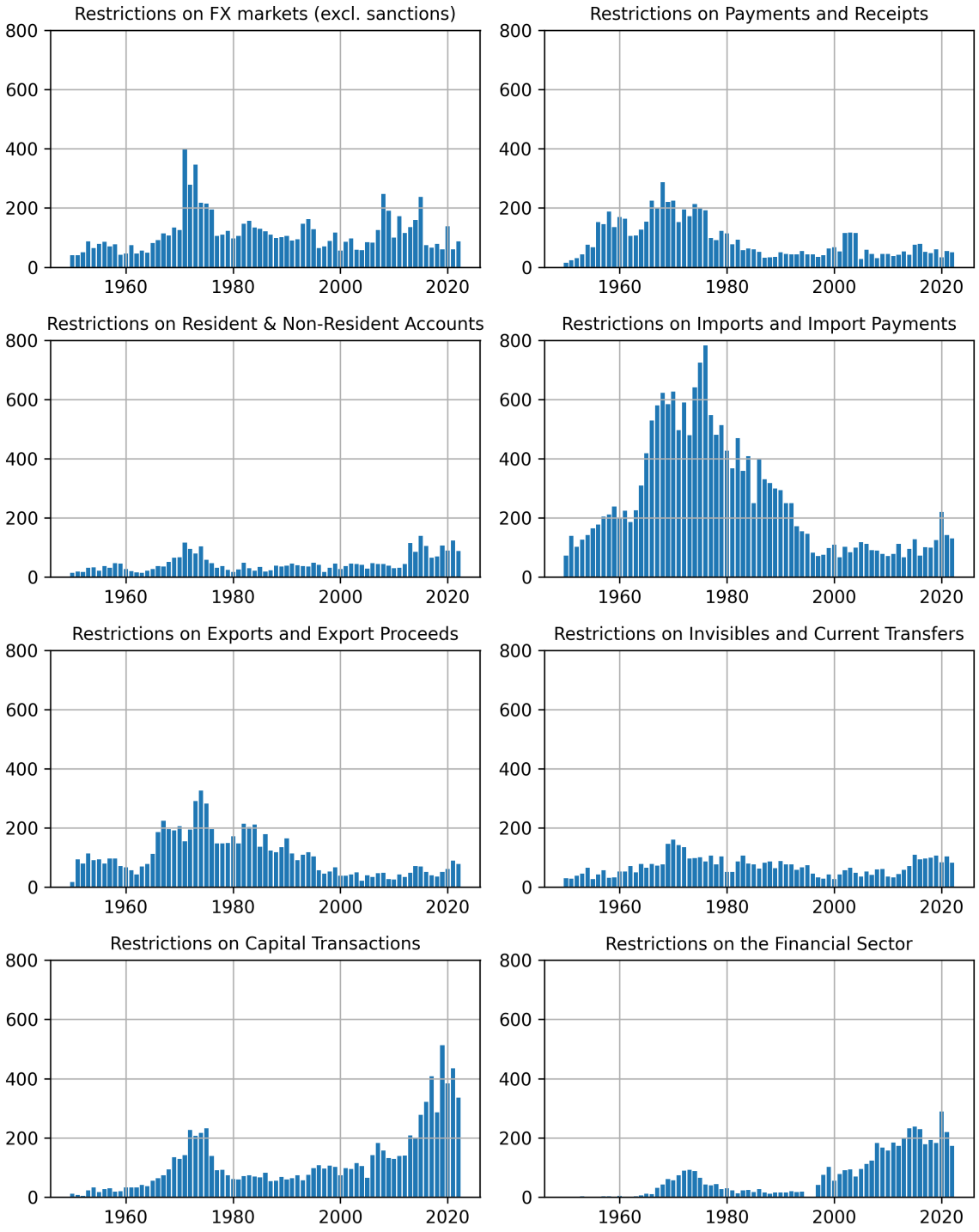
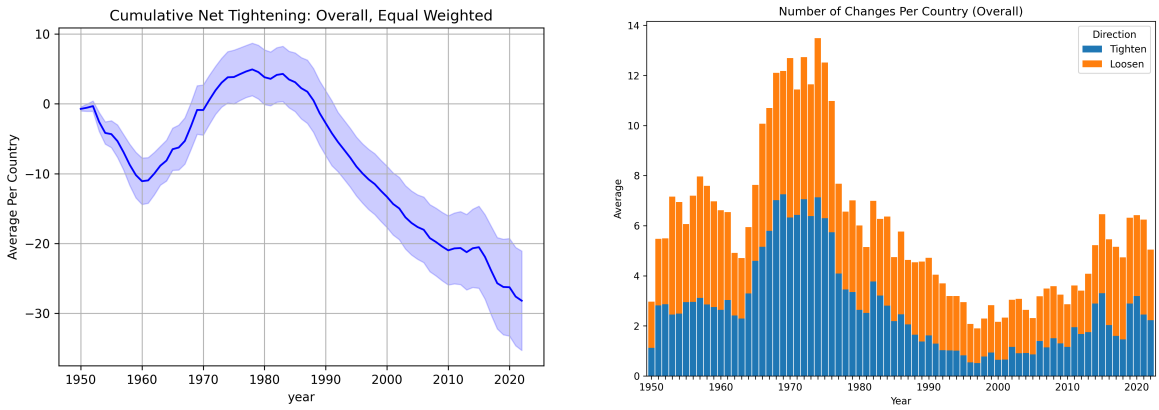


Figure 8: Number of changes by category.



(a) Cumulative net tightening

(b) Number of changes

Figure 9: Number of changes and cumulative net tightening over time. The overall category sums the number of changes and cumulative net tightening, respectively, across all eight categories by country and year. Shaded area denotes the standard error of the mean ($SD_t/\sqrt{(N_t)}$ where SD_t is the standard deviation of Changes Index across countries in year t, and N_t is the number of countries represented in the data in year t).

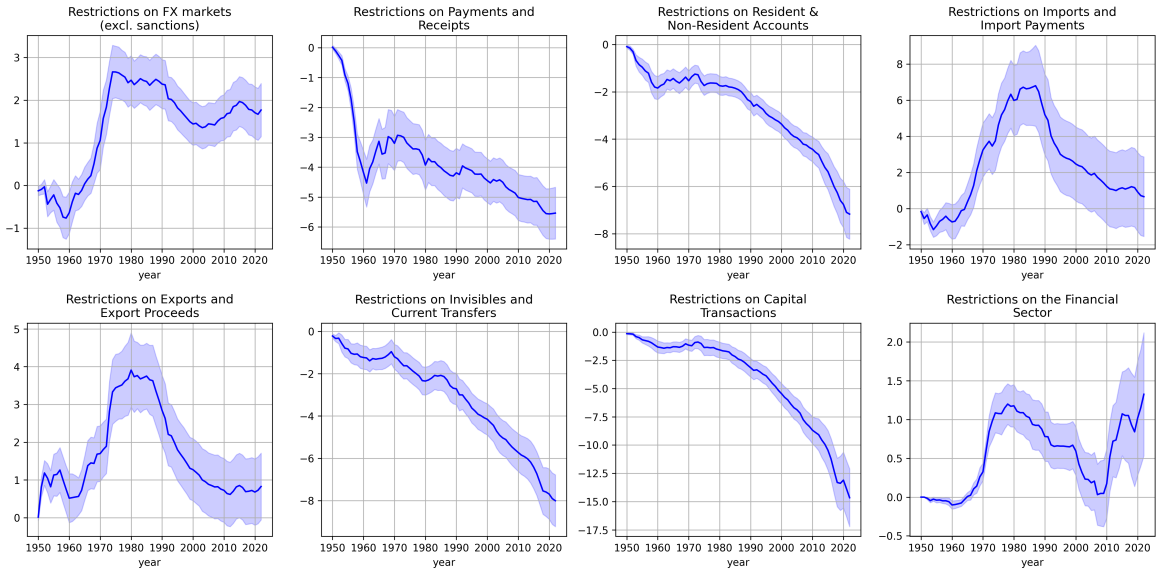
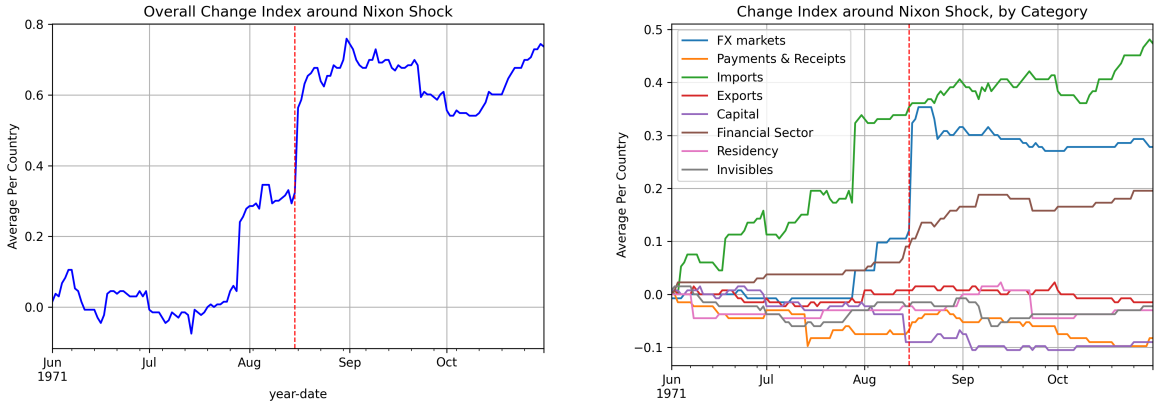


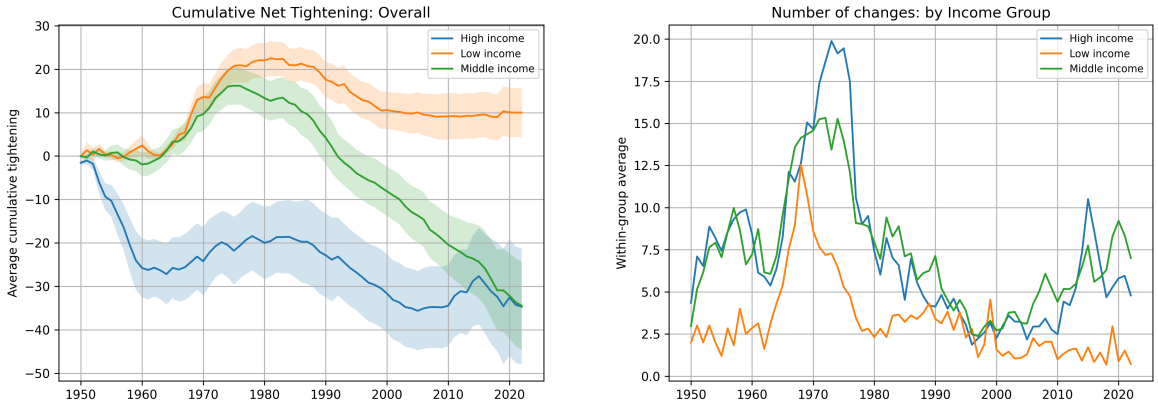
Figure 10: Cumulative net tightening per country, by category.



(a) Overall iBoPFRI-C

(b) iBoPFRI-C by Category

Figure 11: iBoPFRI-C around U.S. President's Nixon announcement suspending the convertibility of the U.S. dollar into gold, known as the "Nixon Shock". The index, which shows the cumulative net tightening of restrictions from January 1, 1971, is plotted at the daily frequency.



(a) Cumulative net tightening

(b) Number of changes

Figure 12: Average cumulative net tightening and number of changes over time, by income group. The average is computed over countries within each income group. Income groups are static and based on the 2024 World Bank Income Group Classification. The overall category sums the cumulative net tightening and number of changes, respectively, across all eight categories by country and year.

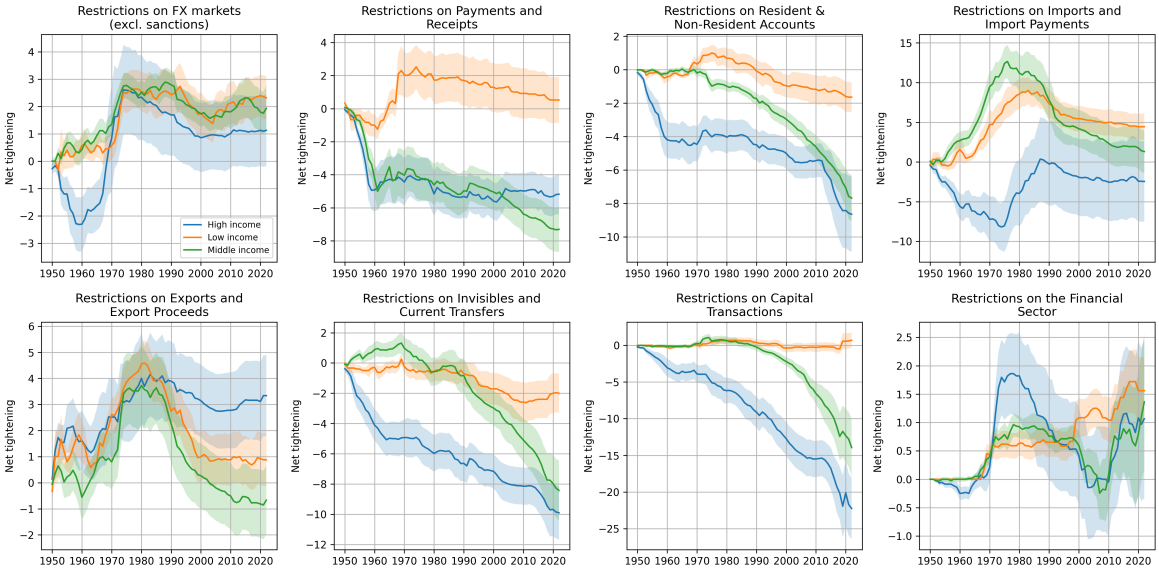
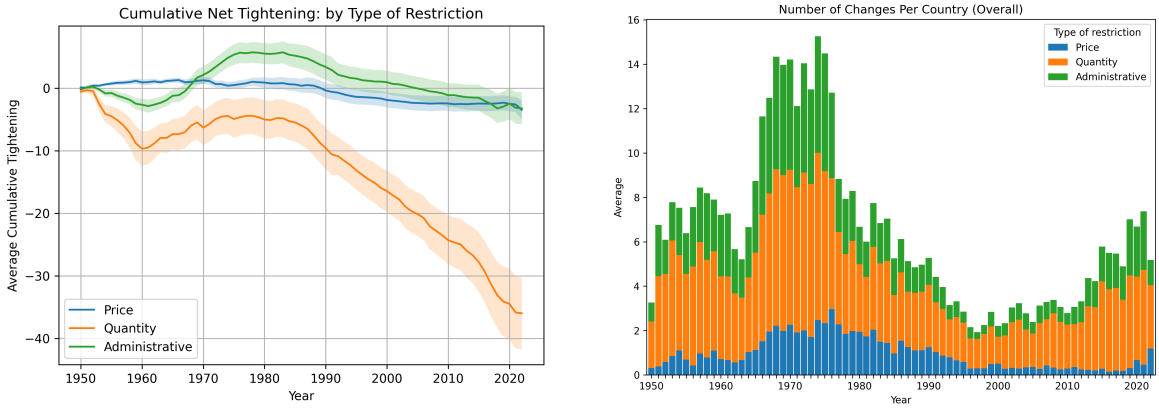


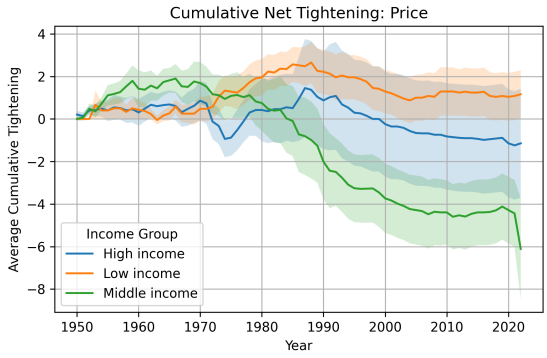
Figure 13: Cumulative net tightening per country, by category and income group. The average is computed over countries within each income group. Income groups are static and based on the 2024 World Bank Income Group Classification.



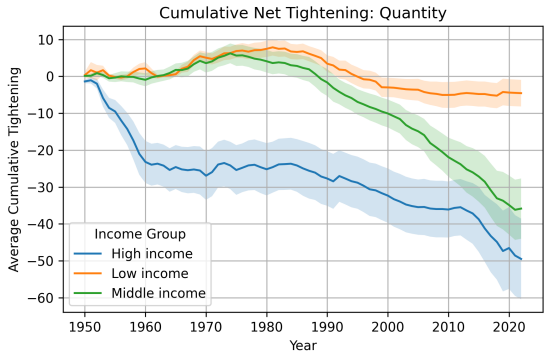
(a) Cumulative net tightening

(b) Number of changes

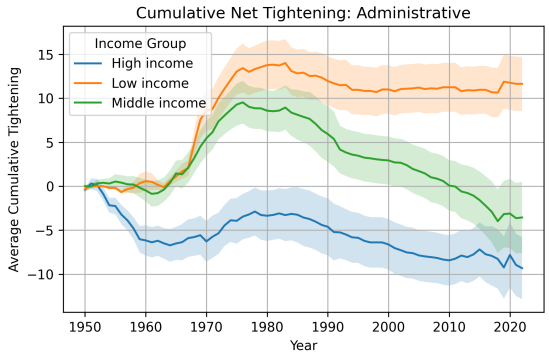
Figure 14: Average cumulative net tightening and number of changes over time, by type of restriction. The average is computed over countries within each income group. Income groups are static and based on the latest WEO classification. The overall category sums the cumulative net tightening and number of changes, respectively, across all eight categories by country and year.



(a) Price-based restrictions

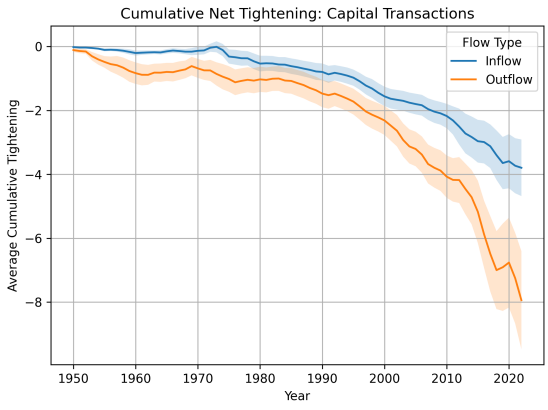


(b) Quantity-based restrictions

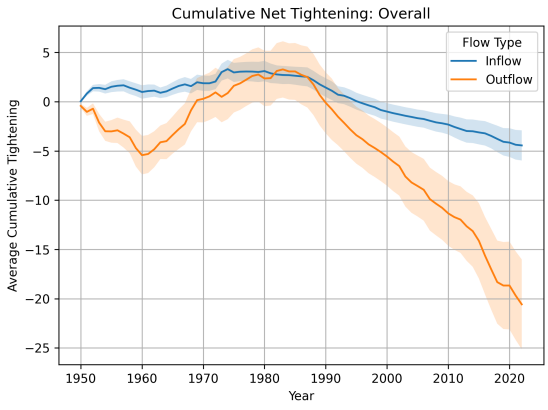


(c) Administrative-based restrictions

Figure 15: Cumulative net tightening by type of restriction and income group

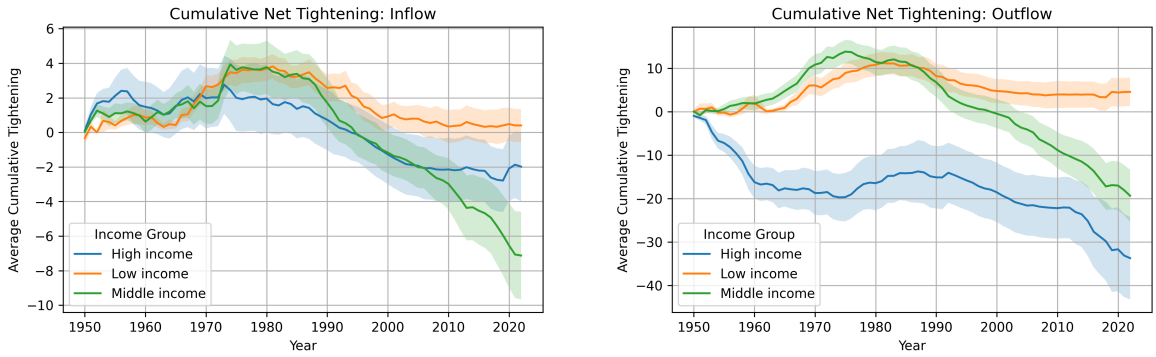


(a) Capital account restrictions



(b) Overall restrictions

Figure 16: Average cumulative net tightening, by direction of flow. The overall category sums the cumulative net tightening and number of changes, respectively, across all eight categories by country and year.



(a) Inflow restrictions

(b) Outflow restrictions

Figure 17: Cumulative net tightening by direction of flow and income group

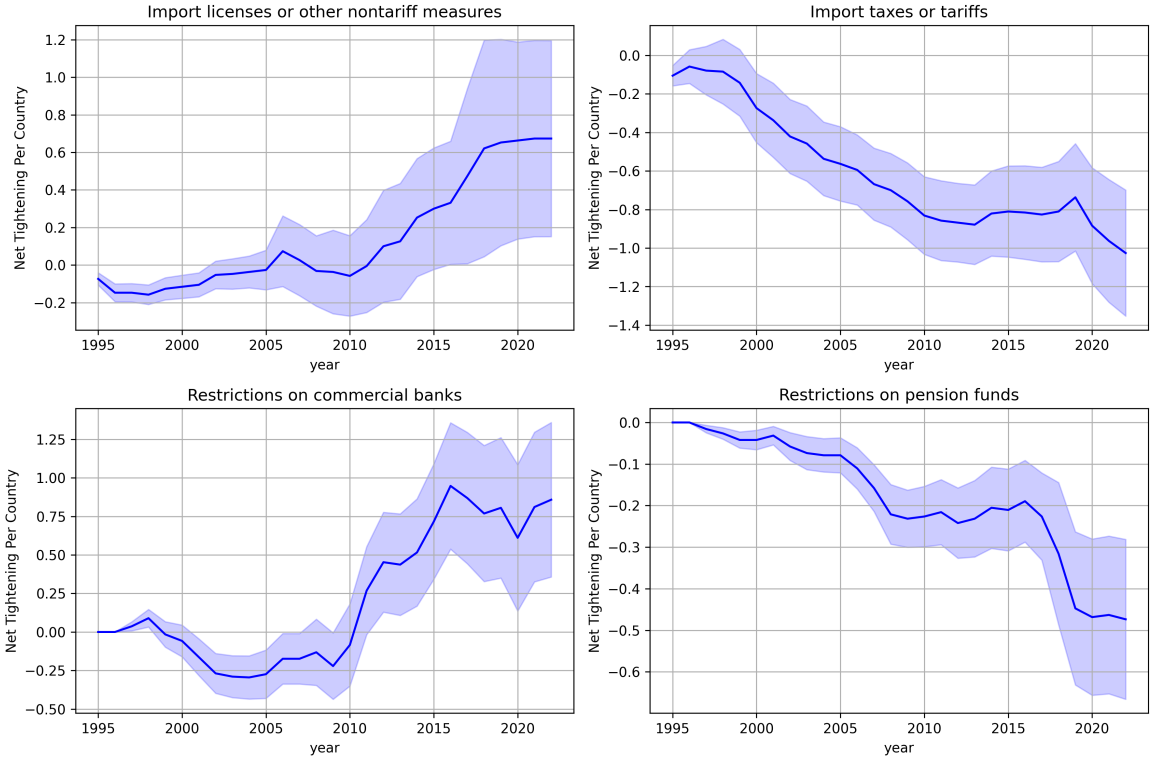
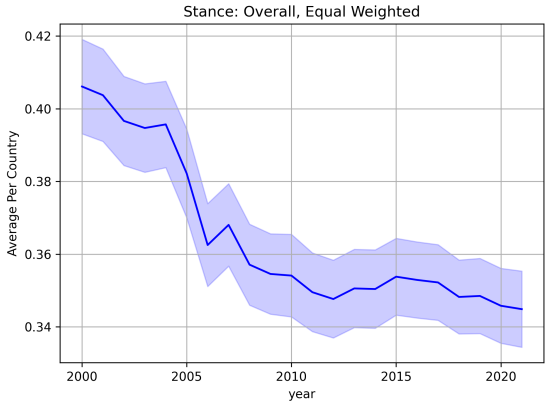


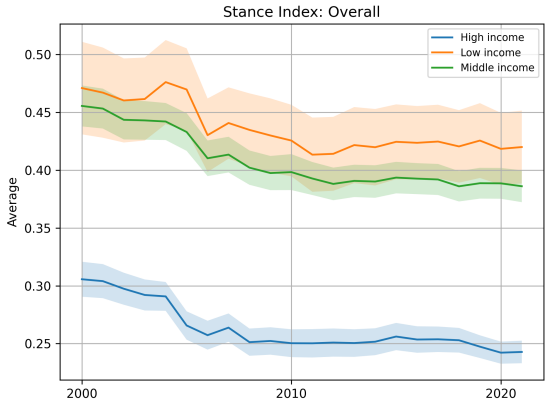
Figure 18: Cumulative net tightening per country, selected subcategories.

Subcategory	Count	Share (%)
Overall	22852	100.0
MCPs, Exchange taxes and subsidies	218	1.0
Exchange measures for security reasons	1203	5.3
Foreign exchange market restrictions	1317	5.8
Other FX restrictions	1500	6.6
Prescriptions of currency use	814	3.6
Payment arrangements, trade of banknotes and gold	1318	5.8
Restrictions on resident accounts	974	4.3
Restrictions on nonresident accounts	705	3.1
Import financing and documentation requirements	838	3.7
Import licenses and other non-tariff measures	887	3.9
Import taxes and tariffs	1154	5.0
Other imports and import payment restrictions	10	0.0
Export proceeds repatriation and surrender requirements	677	3.0
Export financing and documentation requirements	585	2.6
Export taxes	221	1.0
Payments of invisible transactions and current transfers	1430	6.3
Proceeds from invisible transactions and current transfers	294	1.3
Capital repatriation and surrender requirements	114	0.5
Controls on capital market securities	2330	10.2
Controls on credit operations	769	3.4
Controls on direct investment	802	3.5
Controls on real estate transactions	271	1.2
Controls on personal capital transactions	381	1.7
Other controls on capital transactions	776	3.4
Restrictions specific to commercial banks	2914	12.8
Restrictions specific to institutional investors	302	1.3
Restrictions specific to pension funds	266	1.2
Restrictions specific to investment firms	172	0.8
Other restrictions specific to financial sector	281	1.2

Table 4: Number of changes by subcategory



(a) Stance of restrictions: iBoPFRI-S

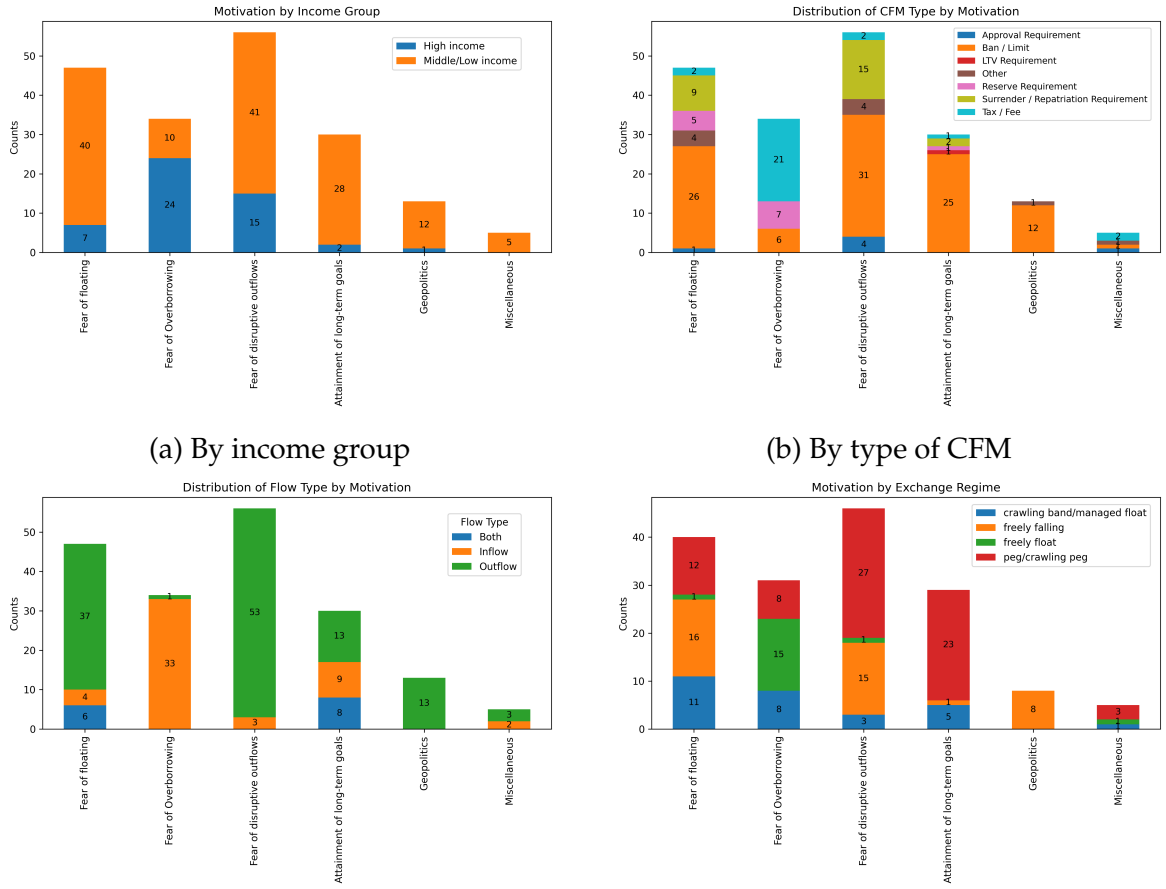


(b) Stance of restrictions by income group: iBoPFRI-S

Figure 19: Overall stance of restrictions, equally weighted and by income group. Income groups are static and based on the 2024 World Bank Income Group Classification.

	Quinn-Toyoda	Chinn-Ito	FKRSU	IRR	Our Index
Quinn-Toyoda	1				
Chinn-Ito	0.9683	1			
FKRSU	0.2668	0.4794	1		
IRR	0.9543	0.9641	0.8095		
iBoPFRI-C	0.8994	0.9643	0.2456	0.9114	1

Table 5: Comparison with other works: Correlations.



(a) By income group

(b) By type of CFM

(c) By direction of flow

(d) By exchange regime

Figure 20: Motivations of CFM policies in the Taxonomy, by income, type, direction of flow, and exchange regime.

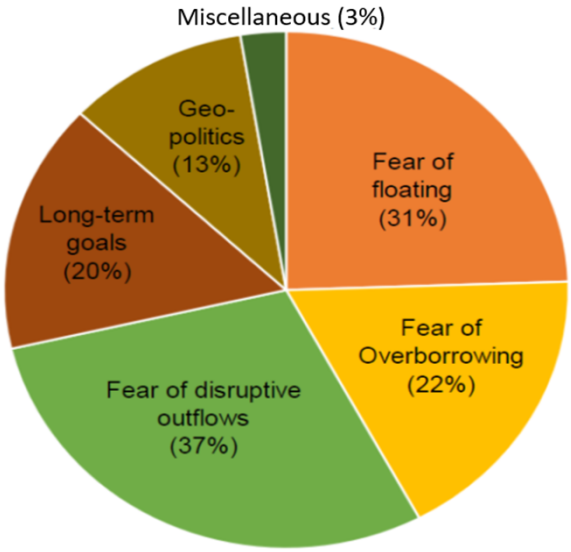


Figure 21: Motivations for use of Capital Controls.

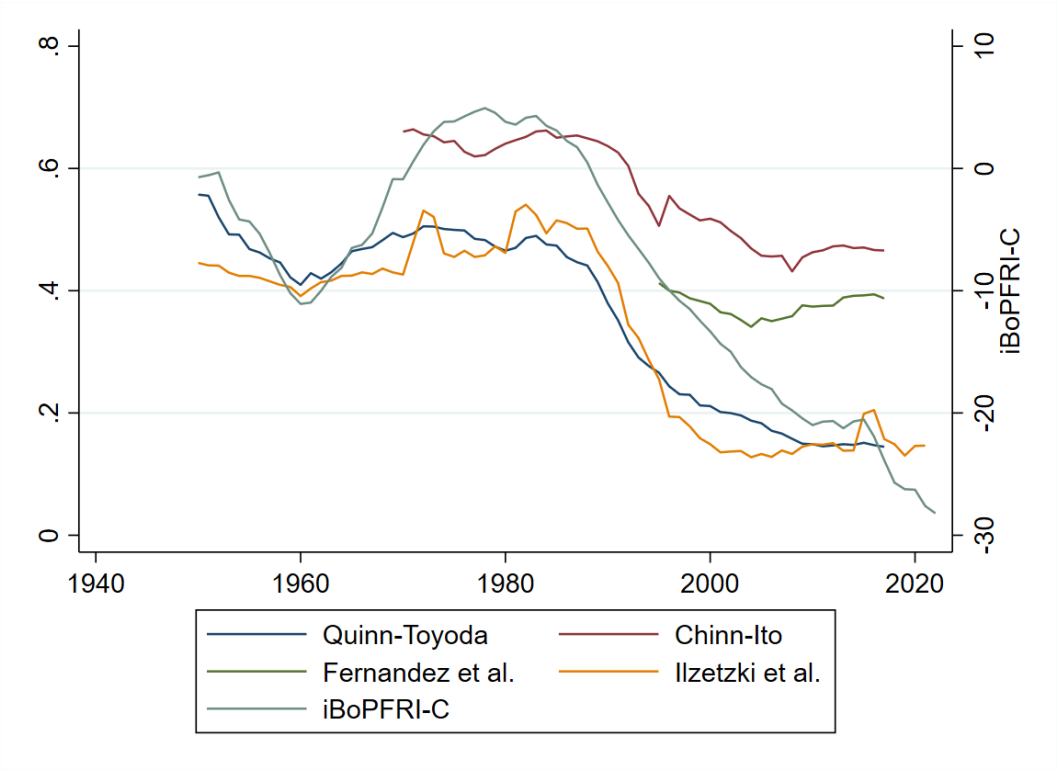


Figure 22: Comparison with other works.

Appendix

A Additional Figures and Tables

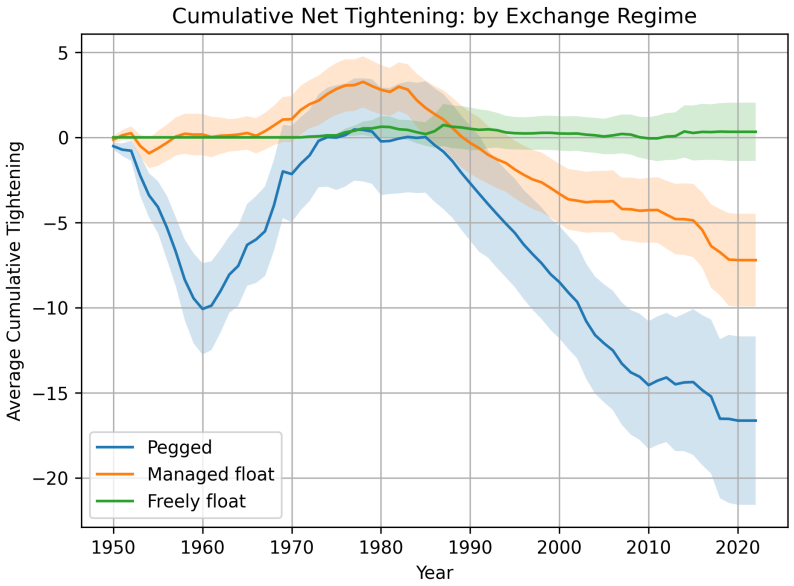


Figure A1: Cumulative tightening by exchange regime.

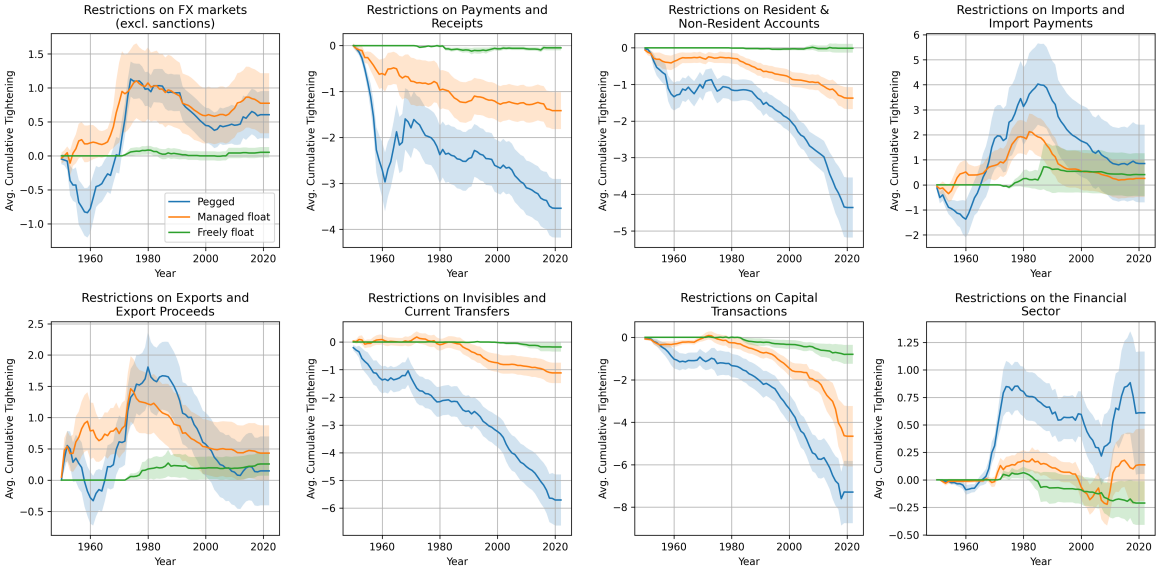


Figure A2: Cumulative tightening by exchange regime and category of restrictions.

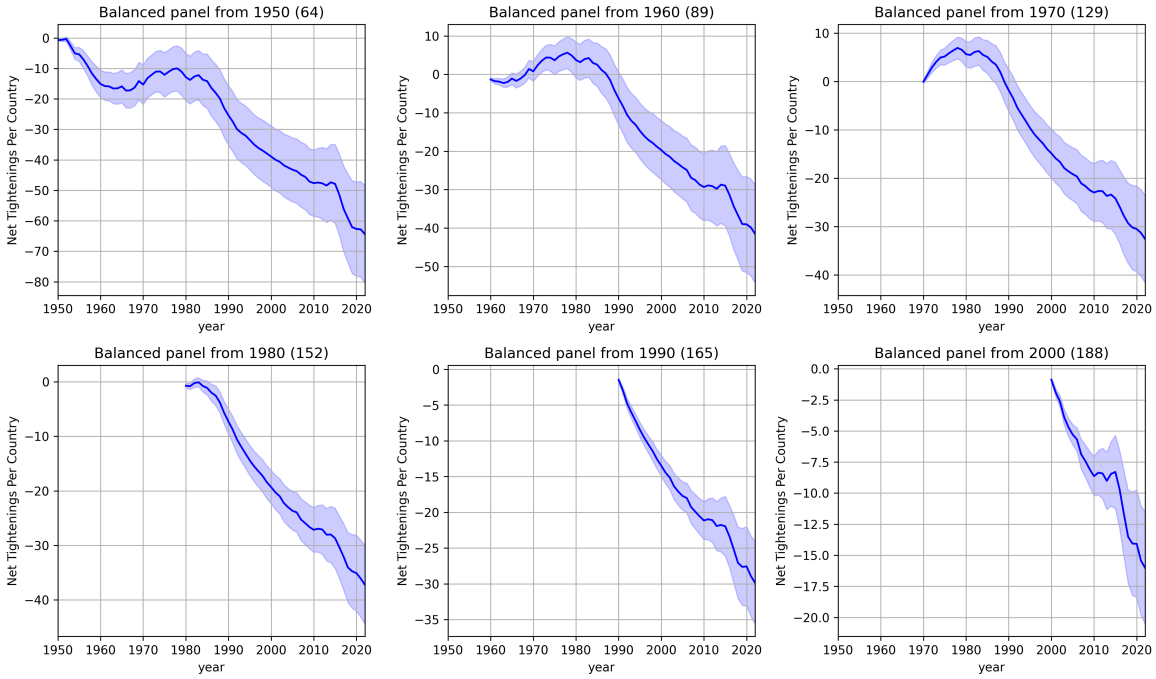


Figure A3: Cumulative net tightening, overall restrictions, balanced panel over time.

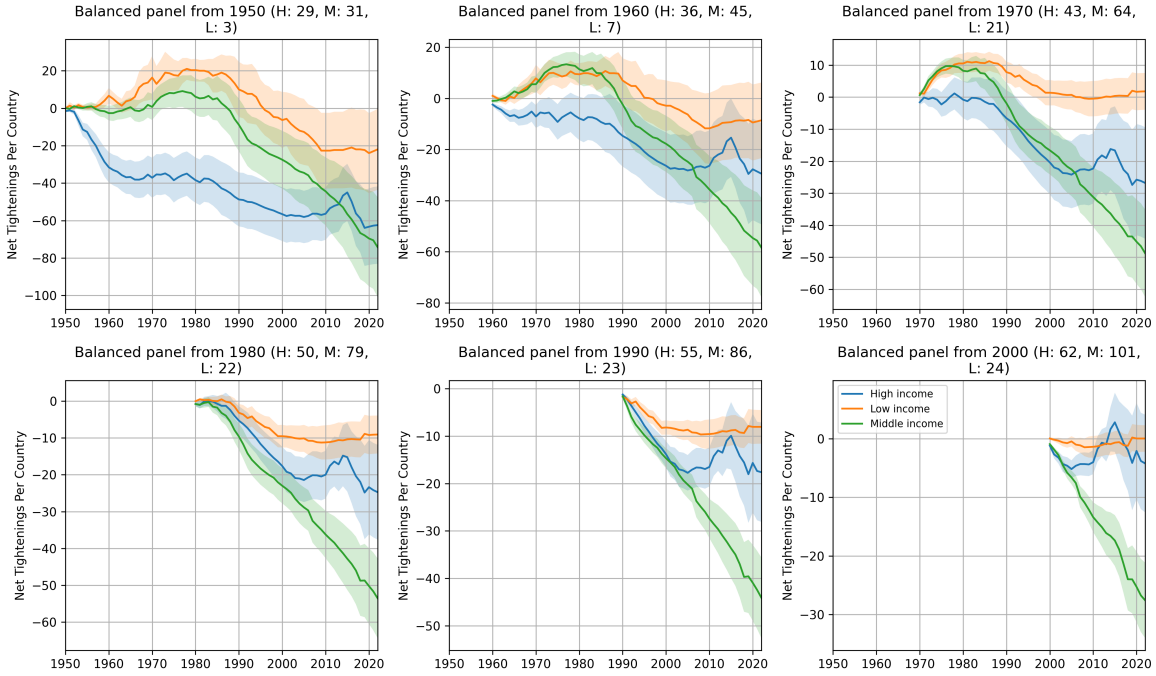


Figure A4: Cumulative net tightening, balanced panel over time, by income group.

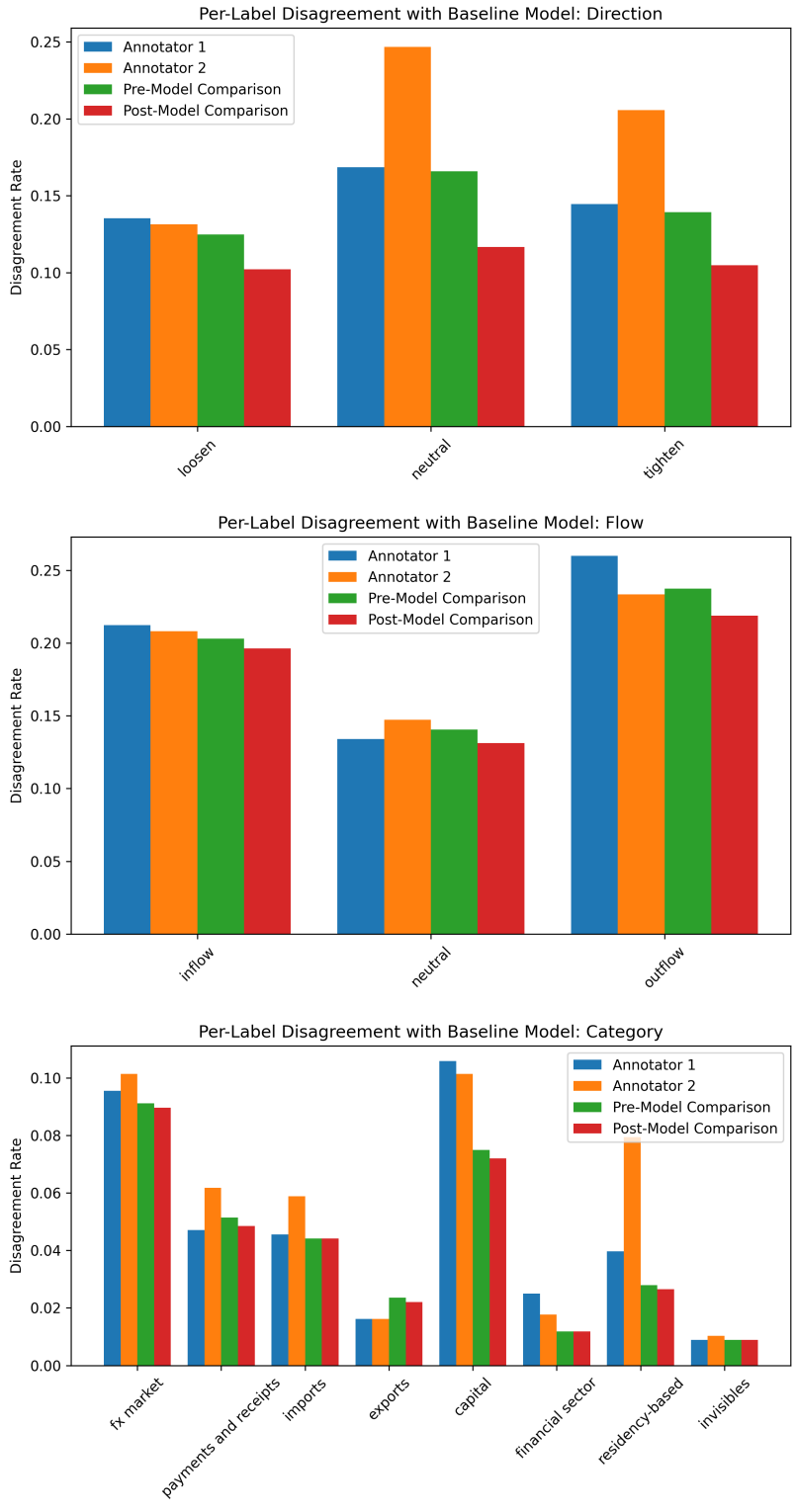


Figure A5: Disagreement rates between annotators and the LLM. "Pre-model comparison" refers to manually annotated labels after resolving disagreements between annotators. "Post-model comparison" refers to labels after resolving disagreements with LLM. The sample consists of post-1995 AREAER observations.

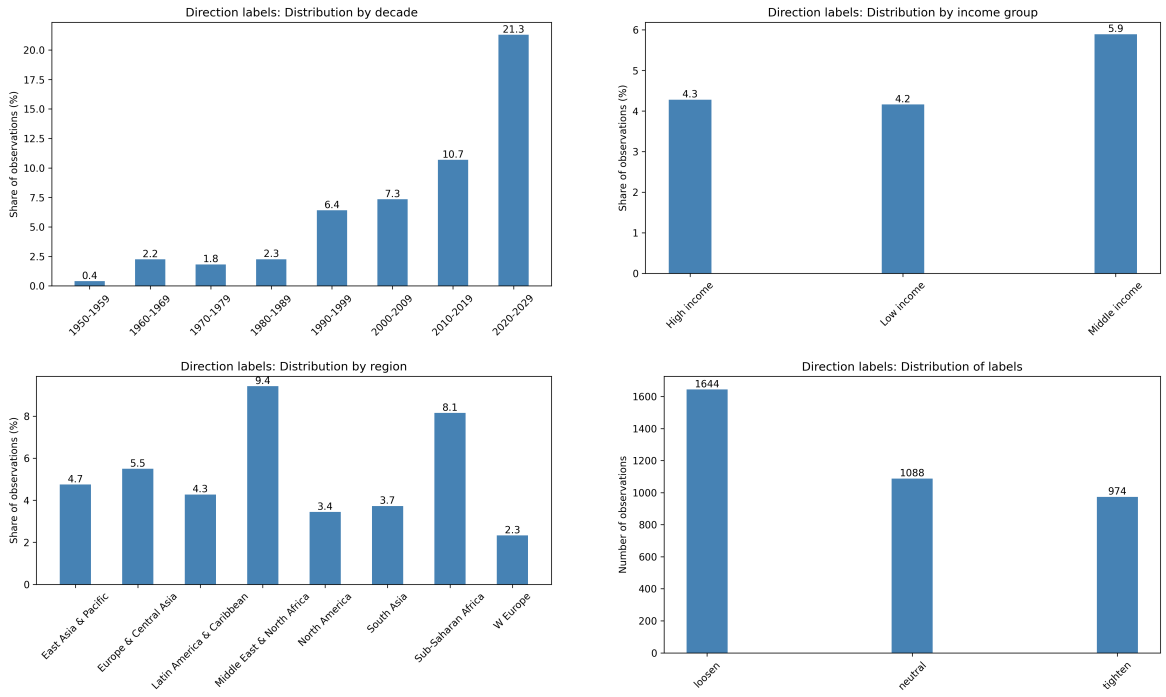


Figure A6: Distribution of labels: direction of change

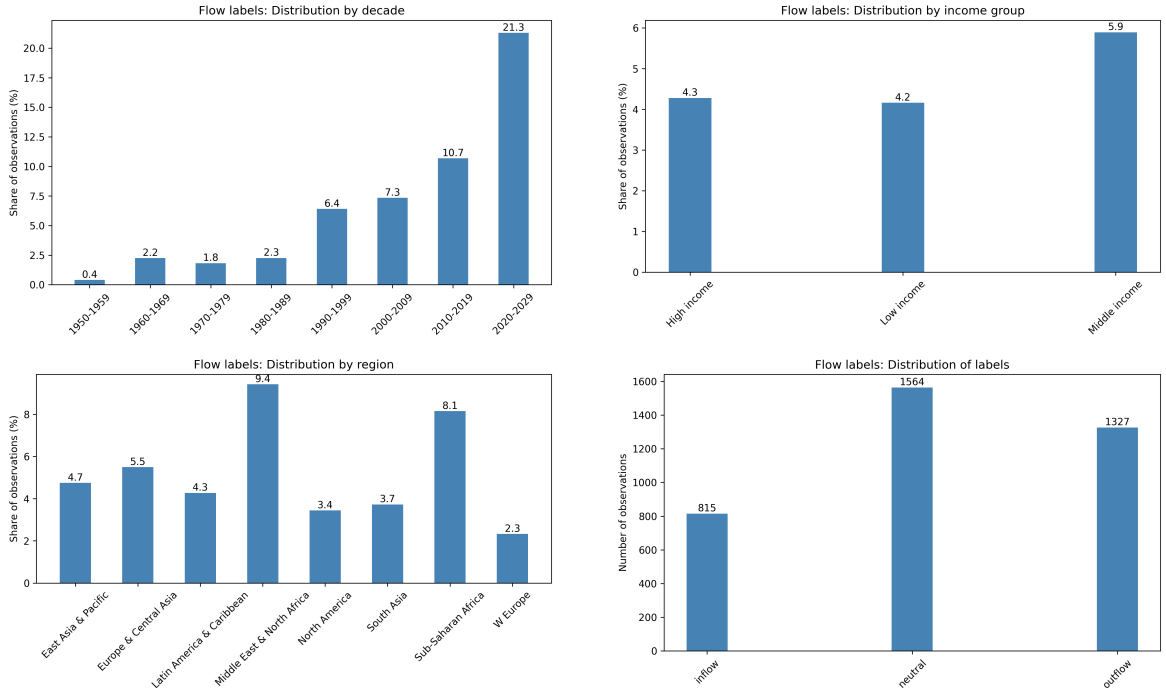


Figure A7: Distribution of labels: direction of flow

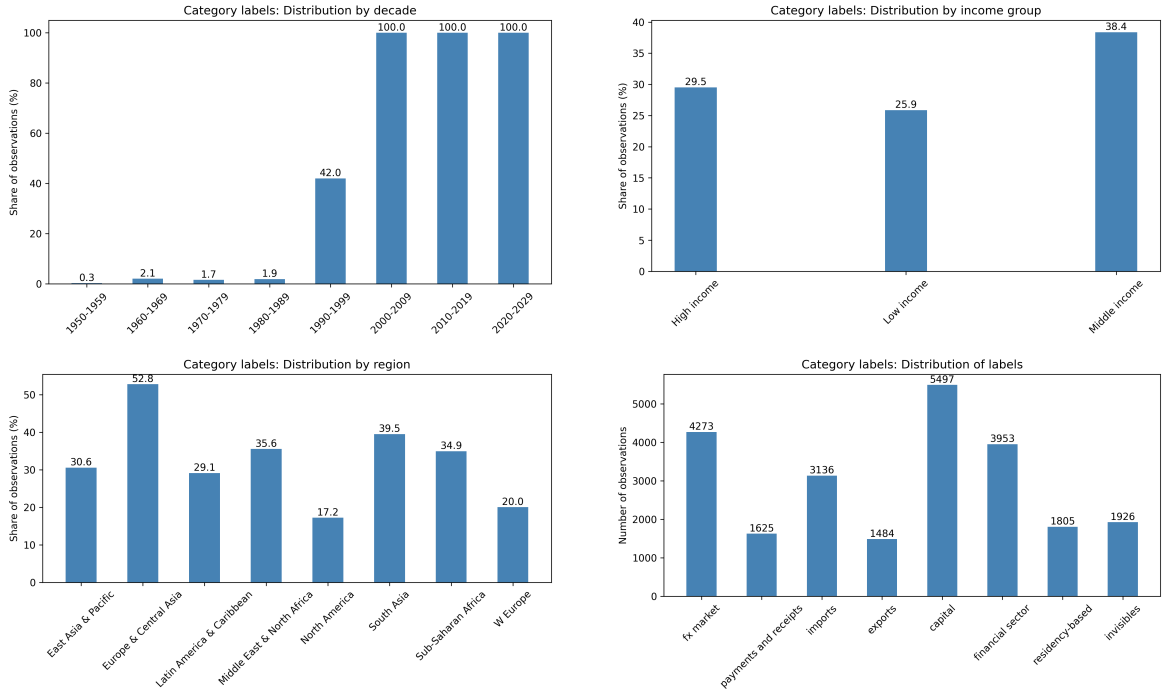


Figure A8: Distribution of labels: category of restriction

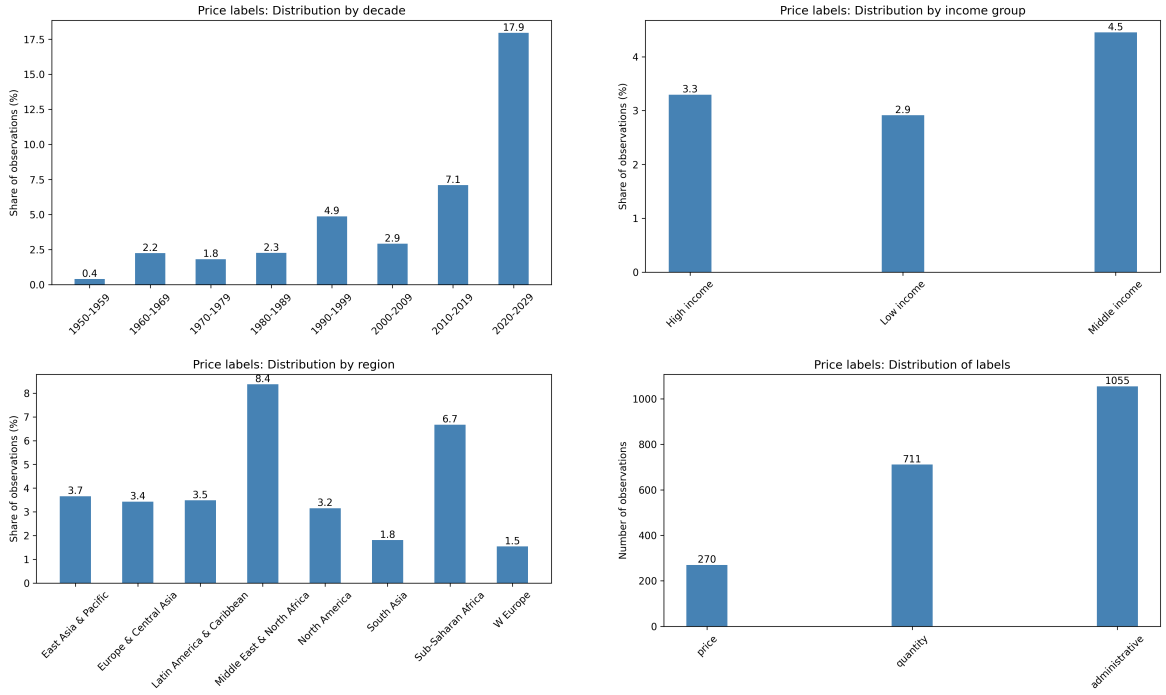


Figure A9: Distribution of labels: type of restriction

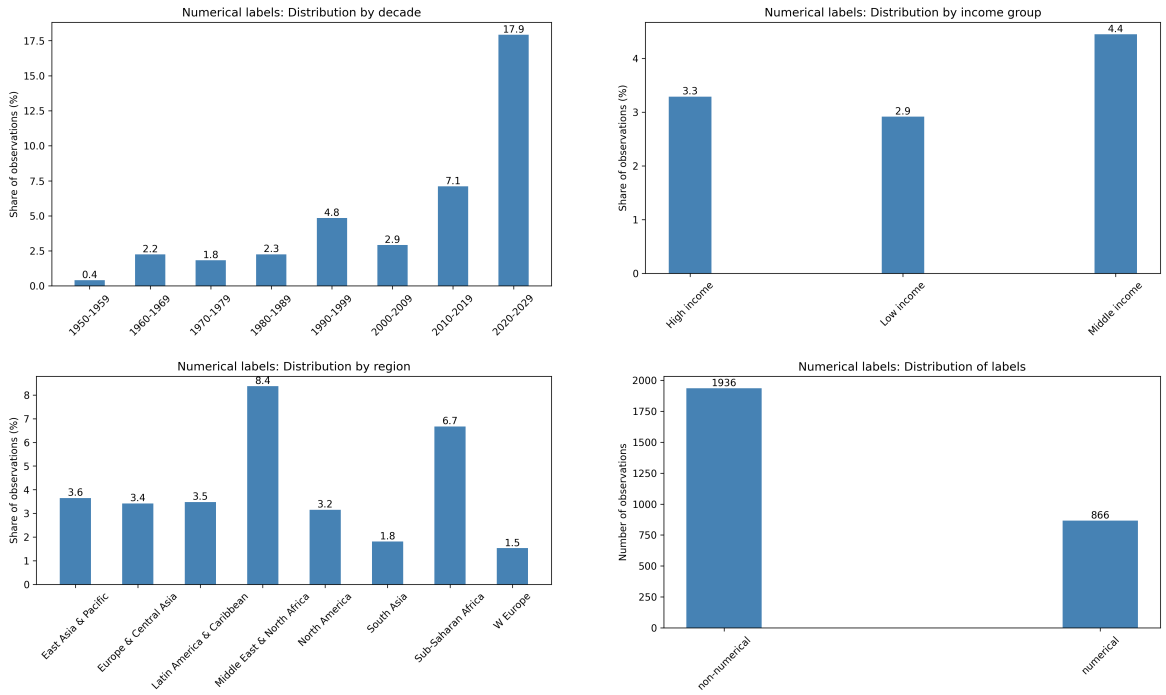


Figure A10: Distribution of labels: numerical information

Model	Accuracy	Precision	Recall	F1
BERT (DAPT)	0.870	0.832	0.796	0.812
GPT 4o mini	0.857	0.754	0.778	0.764
BERT (base)	0.854	0.781	0.808	0.792
Llama 32 3B	0.854	0.792	0.741	0.760
TFIDF + SVC	0.772	0.715	0.693	0.703
TFIDF + Logistic Reg.	0.752	0.683	0.688	0.685
TFIDF + RF	0.738	0.697	0.631	0.653

Table A1: Performance metrics: direction

Model	Accuracy	Precision	Recall	F1
BERT (DAPT)	0.806	0.803	0.787	0.794
BERT (base)	0.797	0.793	0.780	0.784
TFIDF + SVC	0.770	0.763	0.751	0.756
TFIDF + Logistic Reg.	0.758	0.747	0.733	0.738
Llama 32 3B	0.742	0.731	0.755	0.738
TFIDF + RF	0.734	0.738	0.700	0.707
GPT 4o mini	0.679	0.662	0.663	0.662

Table A2: Performance metrics: flow

Model	Accuracy	Precision	Recall	F1
BERT (base)	0.822	0.755	0.732	0.703
BERT (DAPT)	0.816	0.723	0.722	0.714
TFIDF + SVC	0.755	0.888	0.700	0.760
TFIDF + Logistic Reg.	0.687	0.608	0.611	0.605
TFIDF + RF	0.546	0.581	0.406	0.466
GPT 4o mini	0.110	0.078	0.185	0.108
Llama 32 3B	0.092	0.091	0.177	0.116

Table A3: Performance metrics: category

Model	Accuracy	Precision	Recall	F1
BERT (DAPT)	0.820	0.913	0.869	0.890
BERT (base)	0.820	0.926	0.854	0.888
TFIDF + SVC	0.782	0.924	0.762	0.829
Llama 32 3B	0.765	0.847	0.796	0.819
TFIDF + Logistic Reg.	0.762	0.911	0.773	0.832
TFIDF + RF	0.734	0.920	0.690	0.778
GPT 4o mini	0.577	0.720	0.752	0.728

Table A4: Performance metrics: type of restriction

Model	Accuracy	Precision	Recall	F1
BERT (base)	0.949	0.947	0.952	0.949
BERT (DAPT)	0.942	0.940	0.944	0.941
TFIDF + RF	0.919	0.930	0.910	0.916
GPT 4o mini	0.917	0.916	0.924	0.916
TFIDF + SVC	0.904	0.910	0.896	0.901
Llama 32 3B	0.899	0.904	0.891	0.896
TFIDF + Logistic Reg.	0.899	0.901	0.893	0.896

Table A5: Performance metrics: numerical

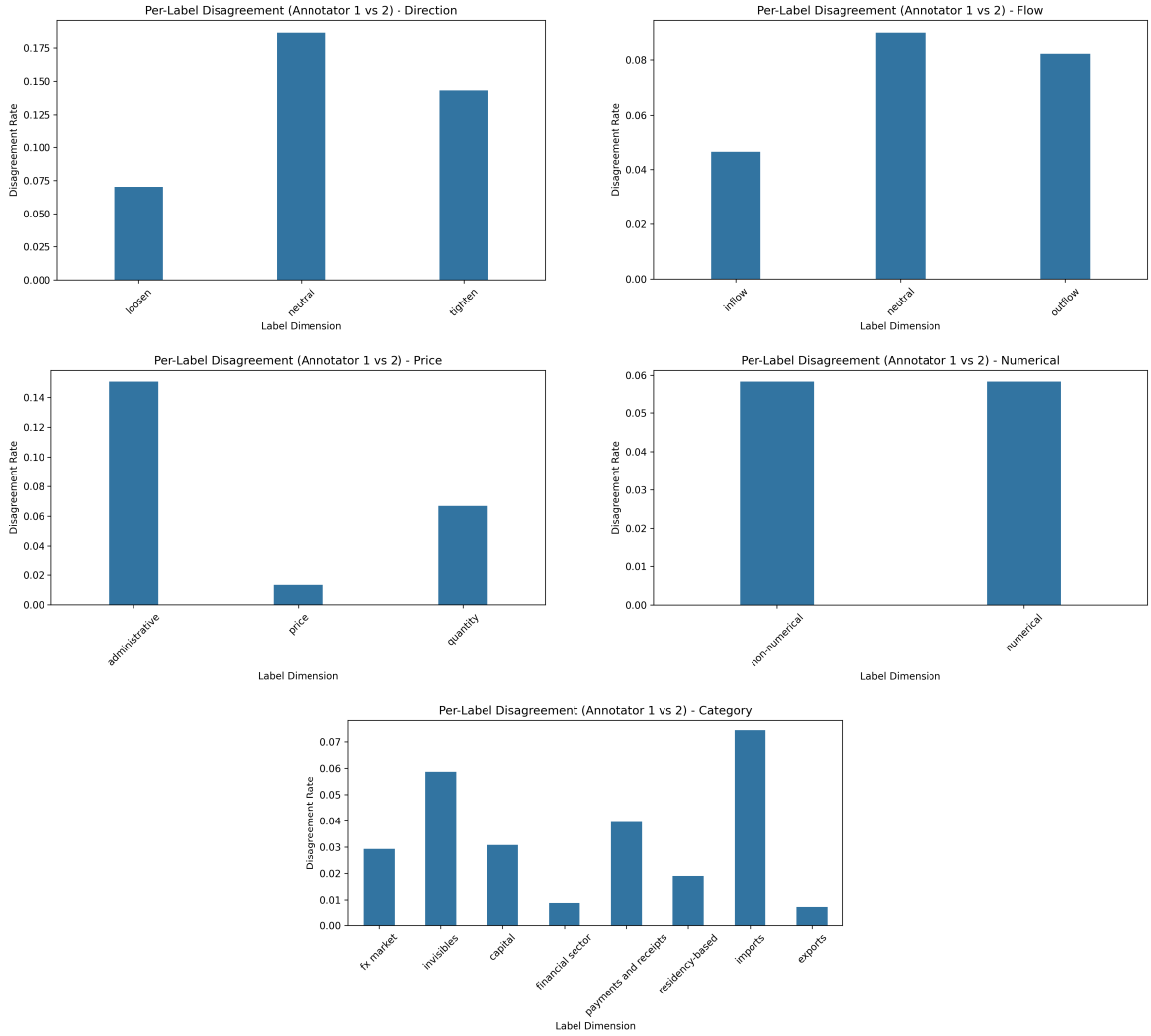


Figure A11: Annotator disagreement by label dimensions

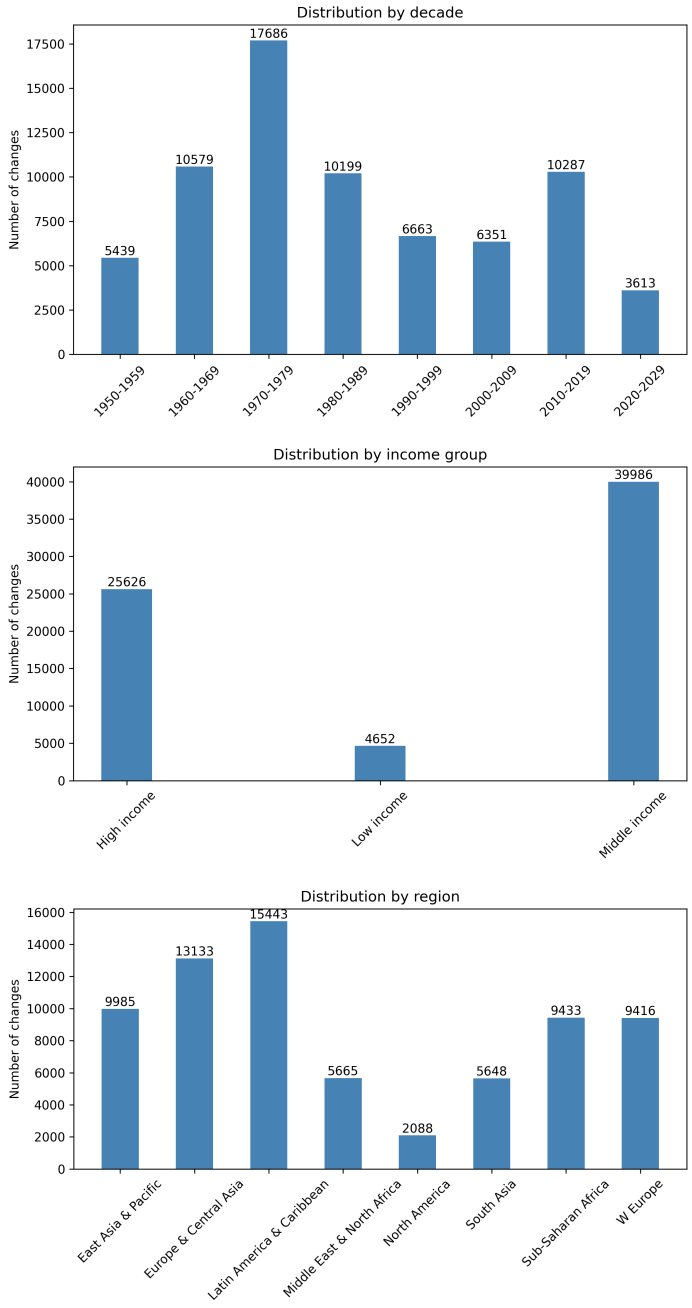


Figure A12: Number of changes, 1950-2022. Information on changes is taken from the Changes section of the AREAER report, and forms the basis of the iBoPFRI-C measure.

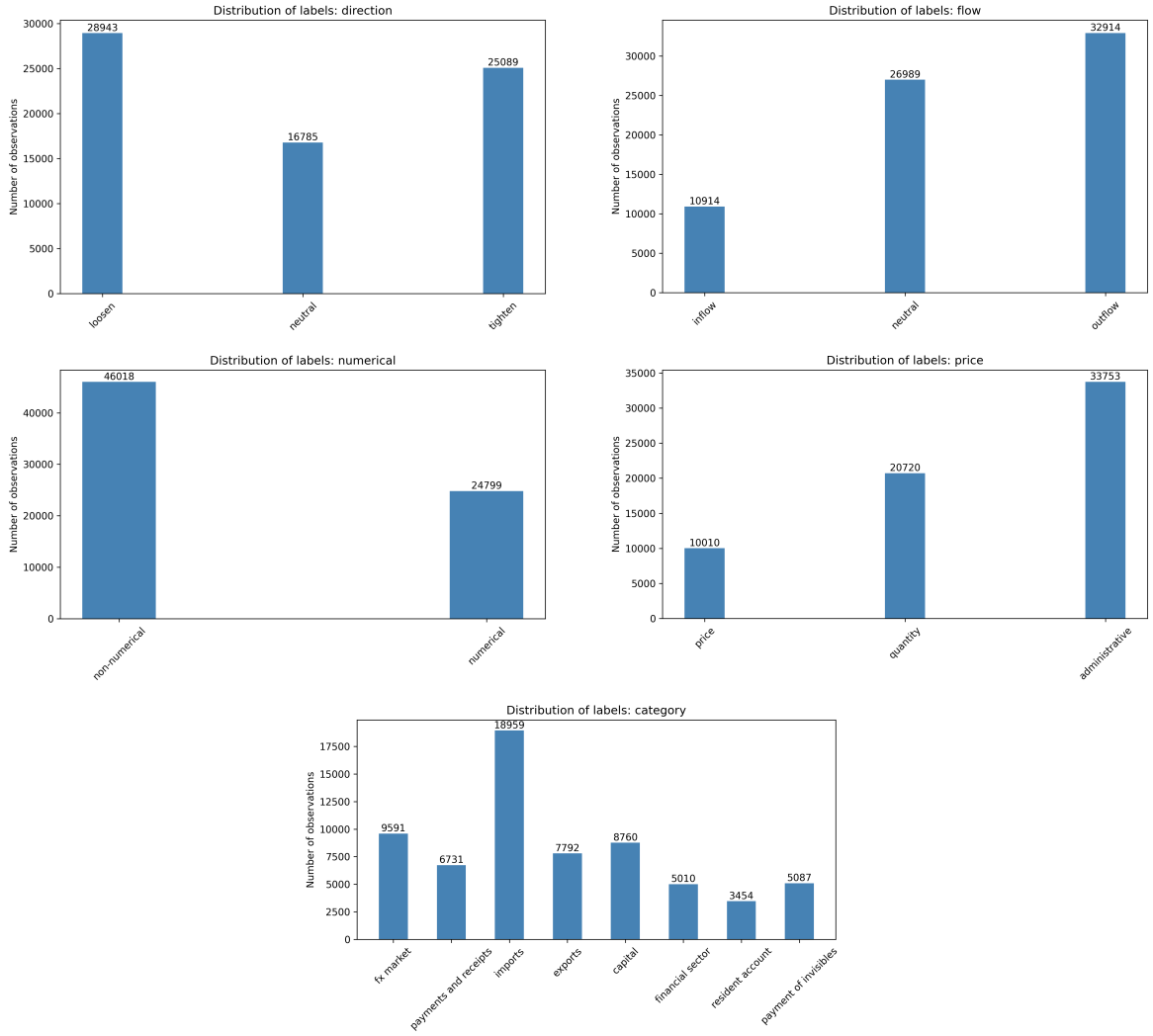


Figure A13: Distribution of labels for all changes, 1950-2022. Information on changes is taken from the Changes section of the AREAER report, and forms the basis of the iBoPFRI-C measure.

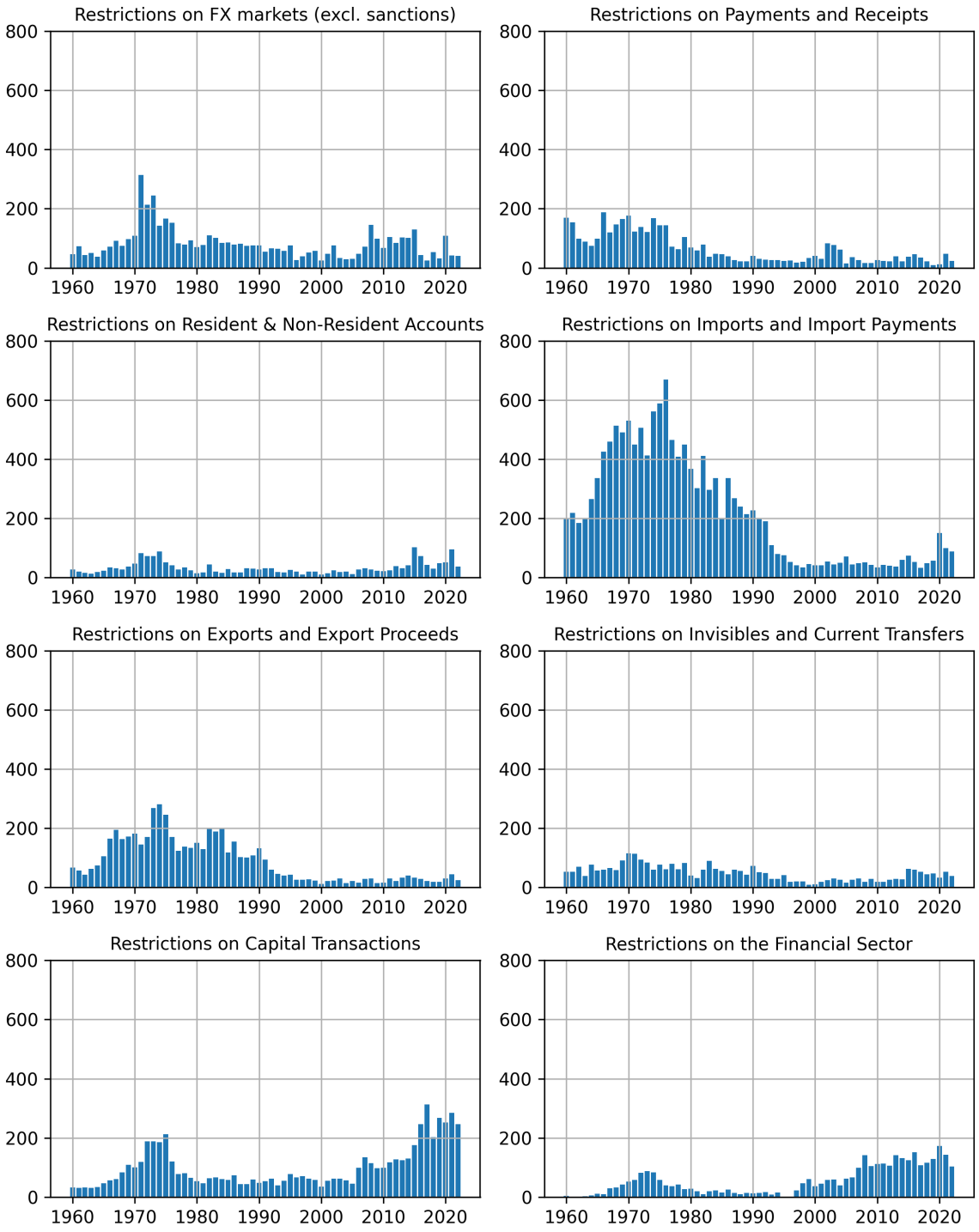
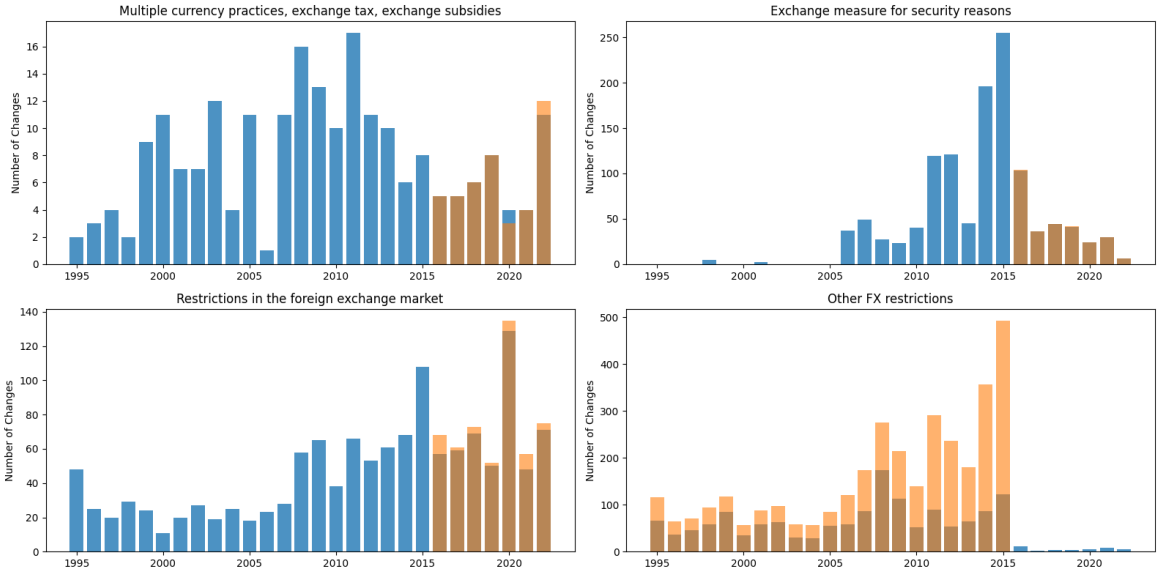
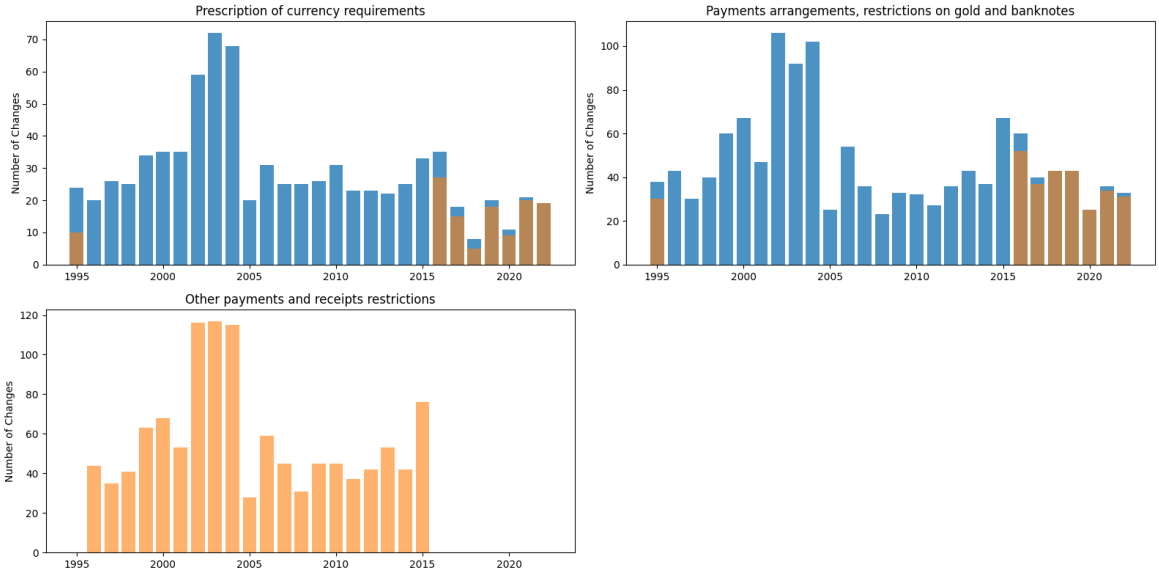


Figure A14: Number of changes by category, balanced panel of countries from 1960.

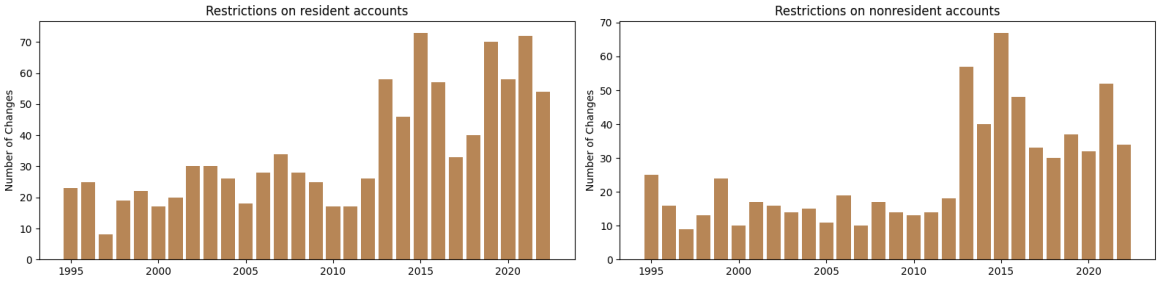


(a) FX restrictions

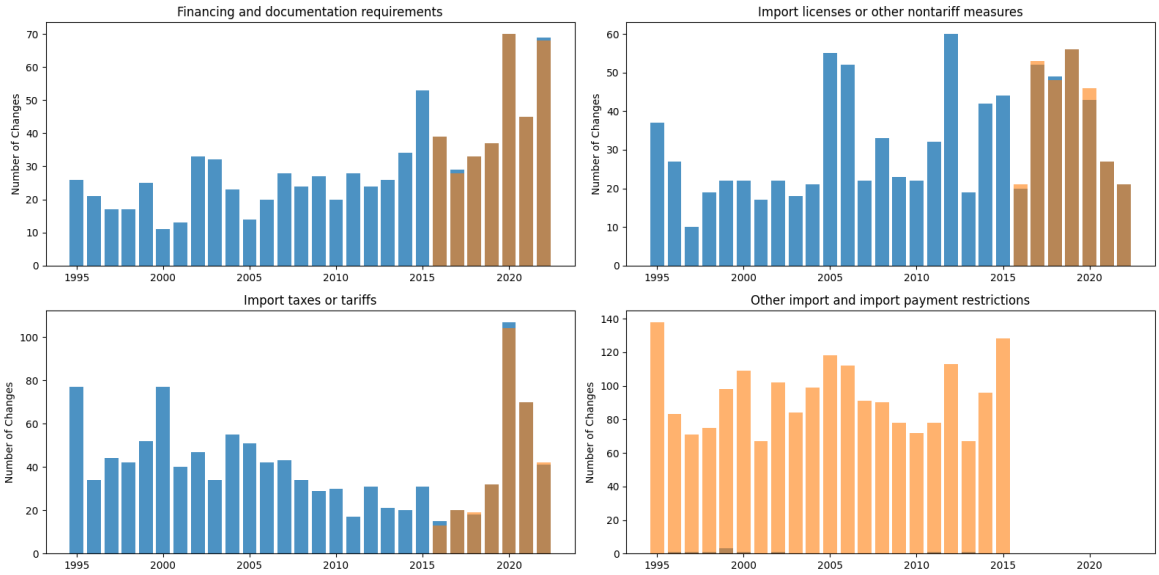


(b) Arrangement for payments and receipts

Figure A15: Number of changes by subcategories. Orange bar denotes number of changes in each subcategory as reported in the AREAER. Blue bars number of changes in each subcategory as predicted by the model.

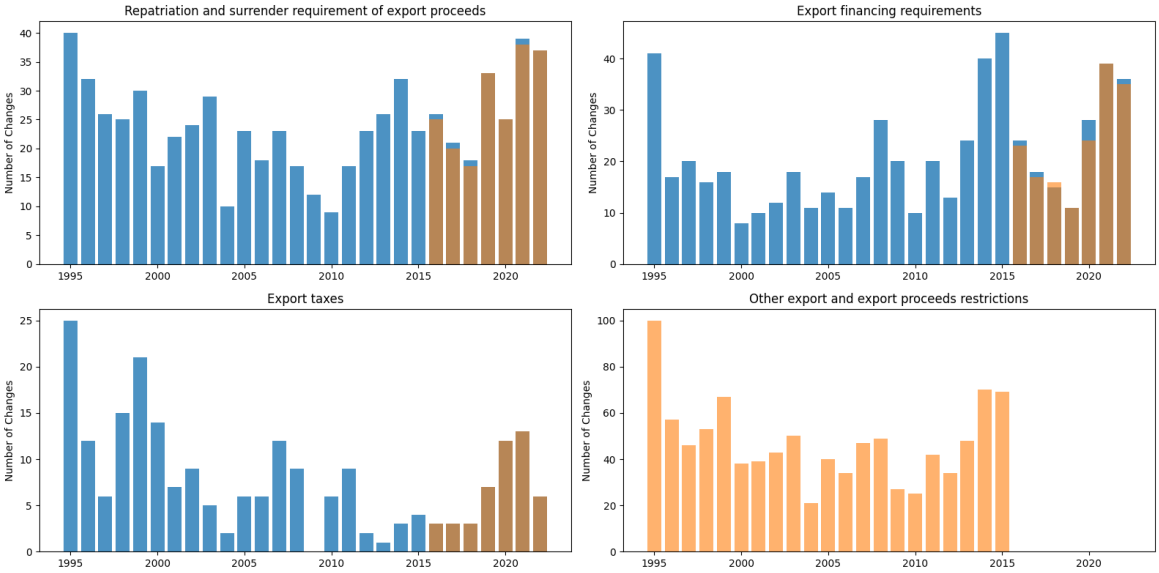


(a) Resident and nonresident accounts

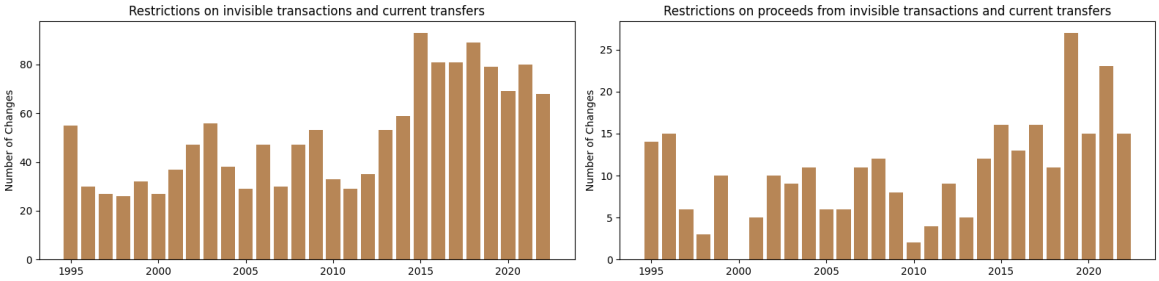


(b) Imports and import payments

Figure A16: Number of changes by subcategories (cont'd). Orange bar denotes number of changes in each subcategory as reported in the AREAER. Blue bars number of changes in each subcategory as predicted by the model.

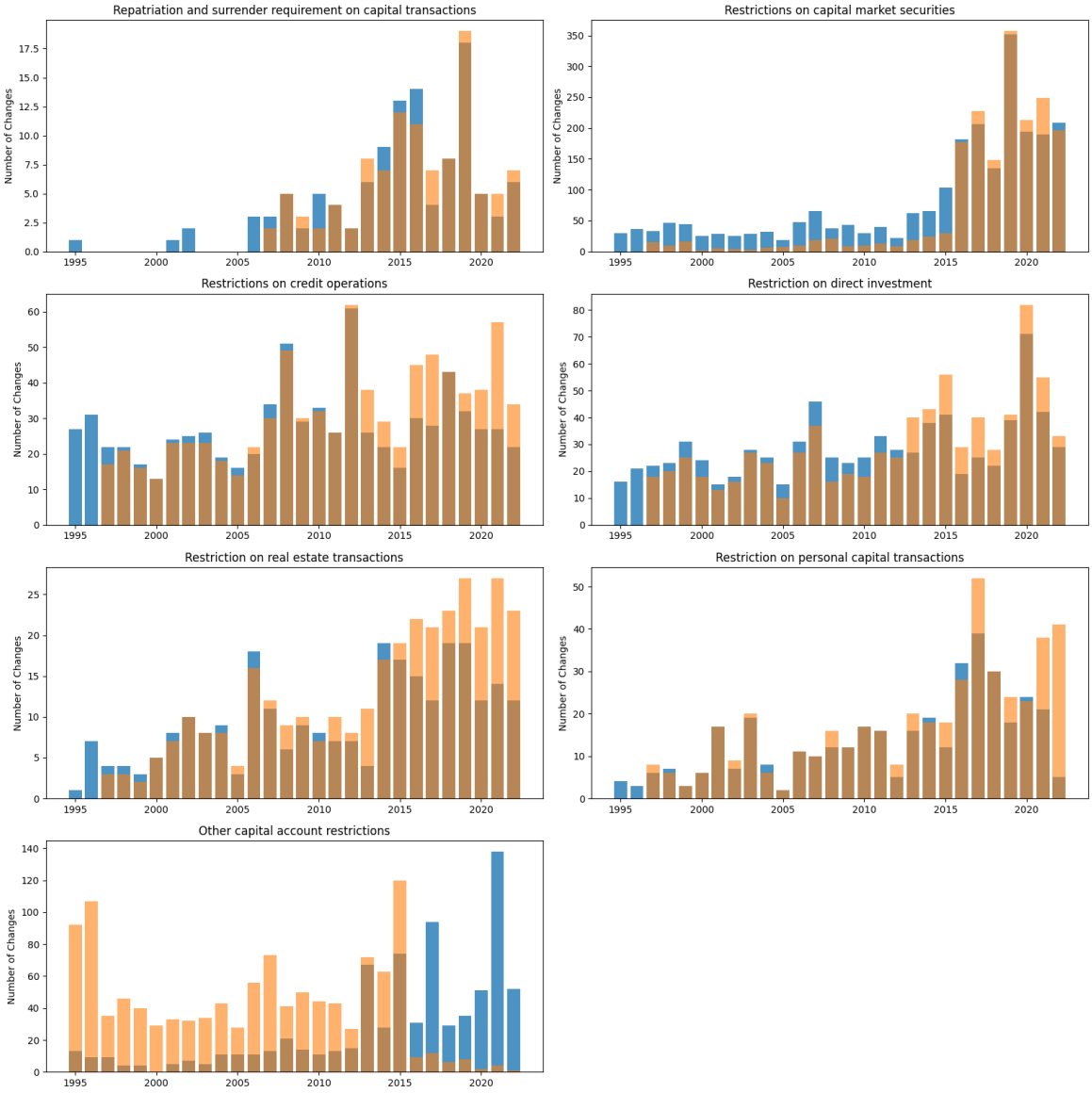


(a) Exports and export proceeds



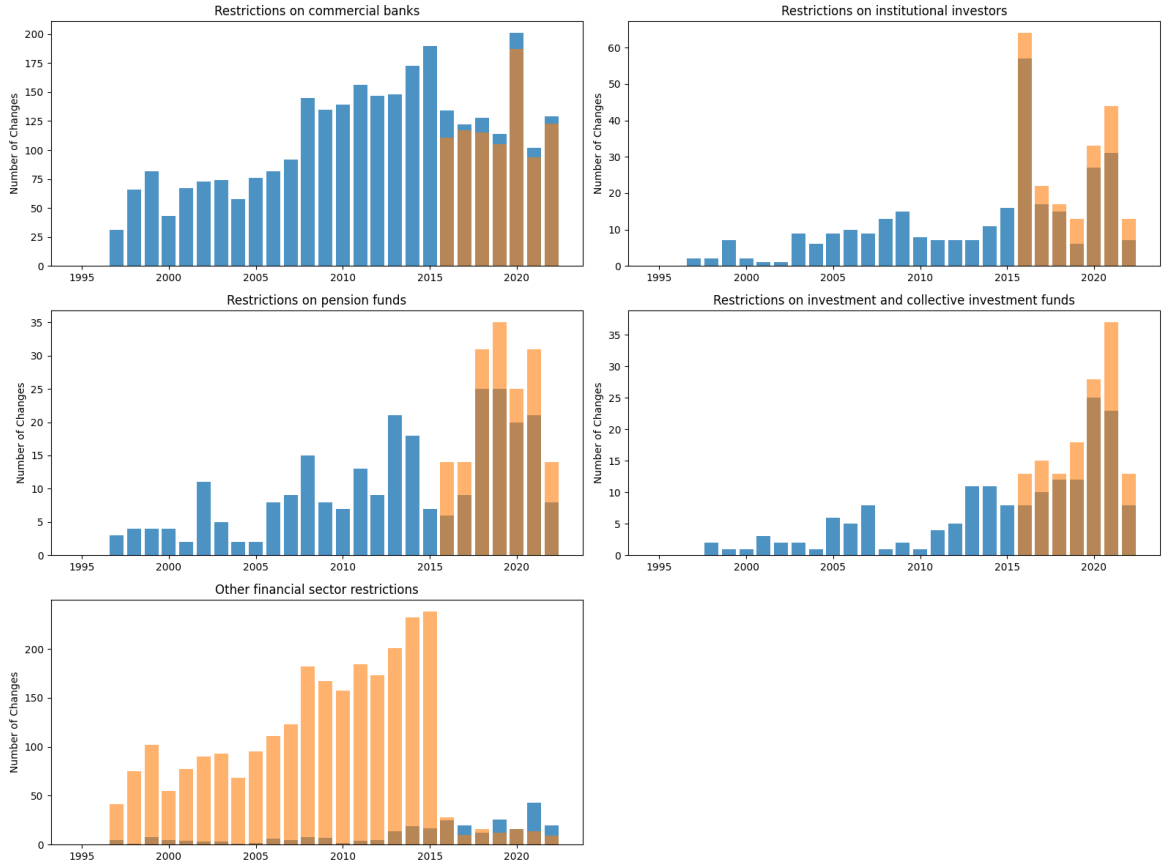
(b) Invisible transactions and current transfers

Figure A17: Number of changes by subcategories (cont'd). Orange bar denotes number of changes in each subcategory as reported in the AREAER. Blue bars number of changes in each subcategory as predicted by the model.



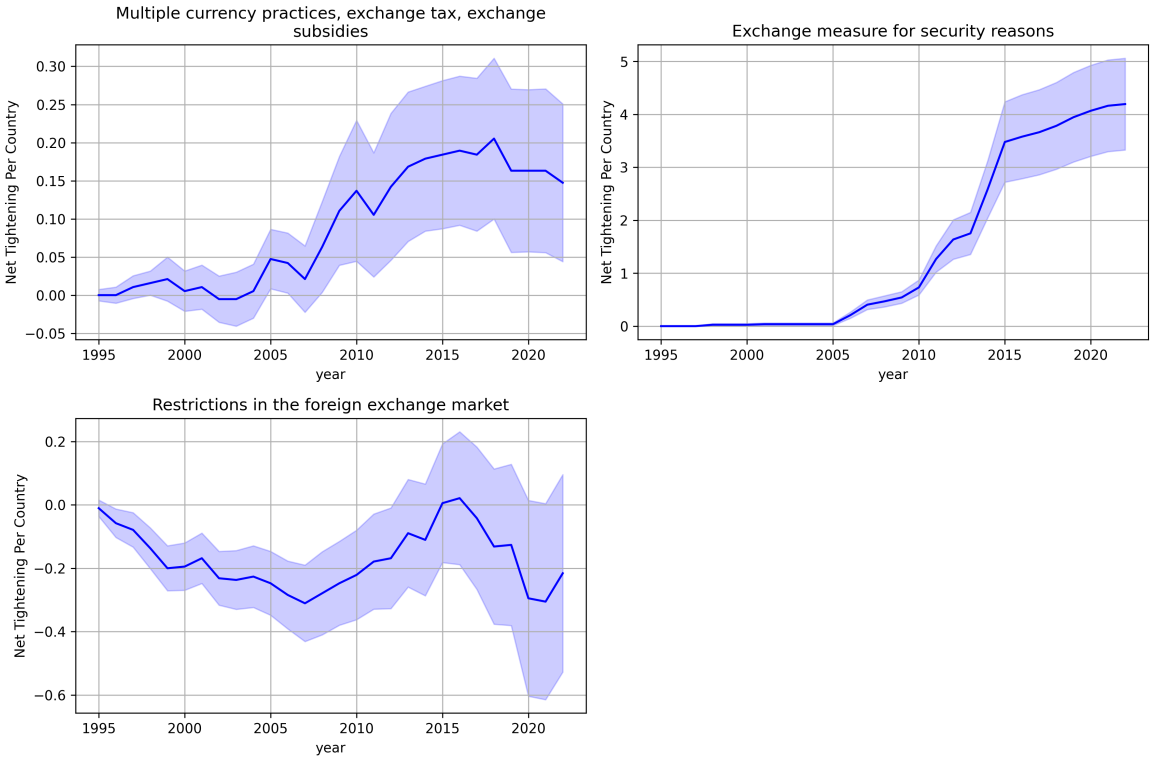
(a) Capital account transactions

Figure A18: Number of changes by subcategories (cont'd). Orange bar denotes number of changes in each subcategory as reported in the AREAER. Blue bars number of changes in each subcategory as predicted by the model.

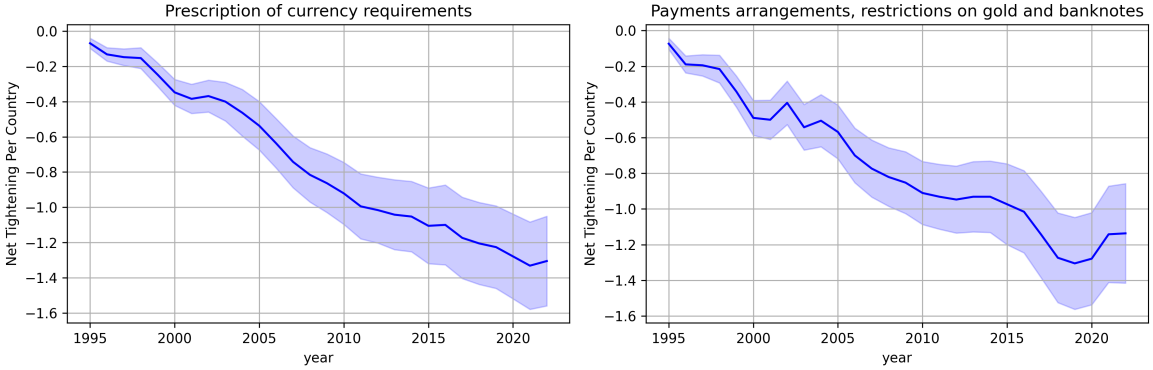


(a) Provisions specific to the financial sector

Figure A19: Number of changes by subcategories (cont'd). Orange bar denotes number of changes in each subcategory as reported in the AREAER. Blue bars number of changes in each subcategory as predicted by the model.

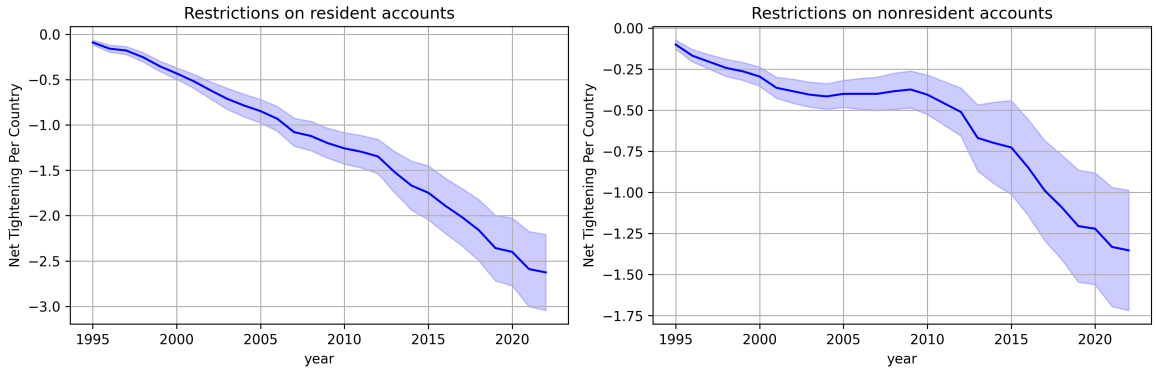


(a) FX restrictions

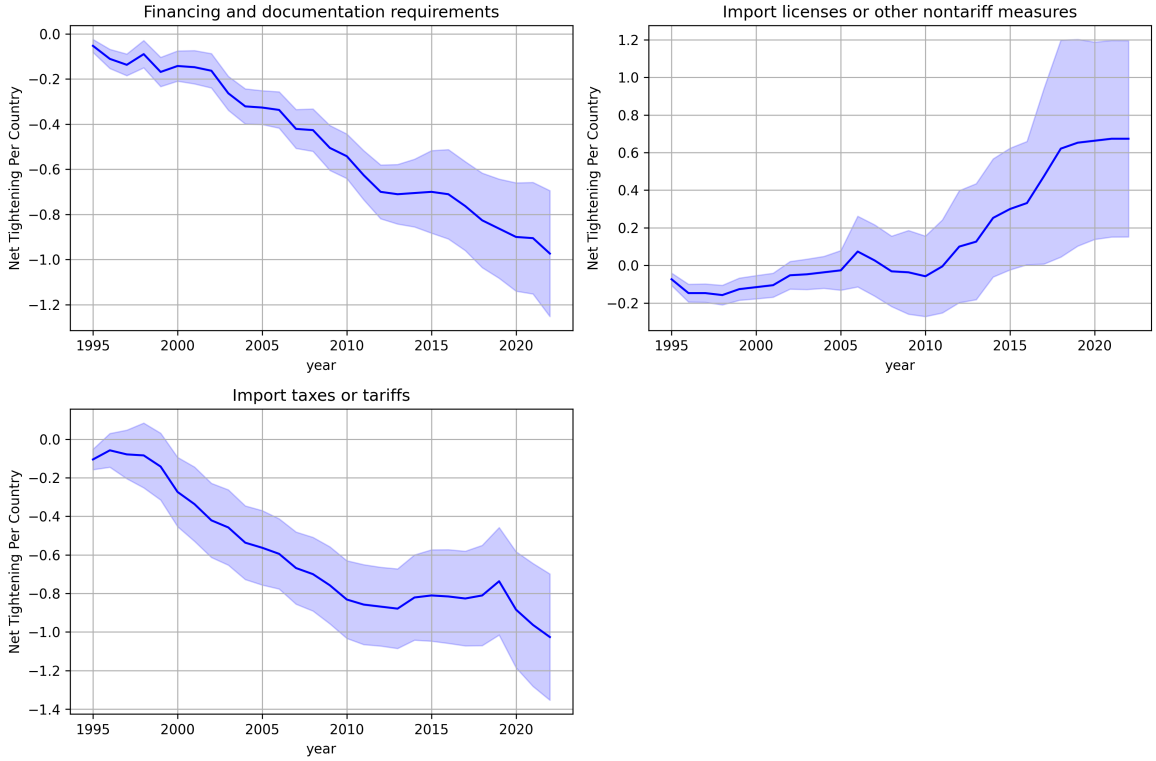


(b) Arrangement for payments and receipts

Figure A20: Cumulative net tightening by subcategories.

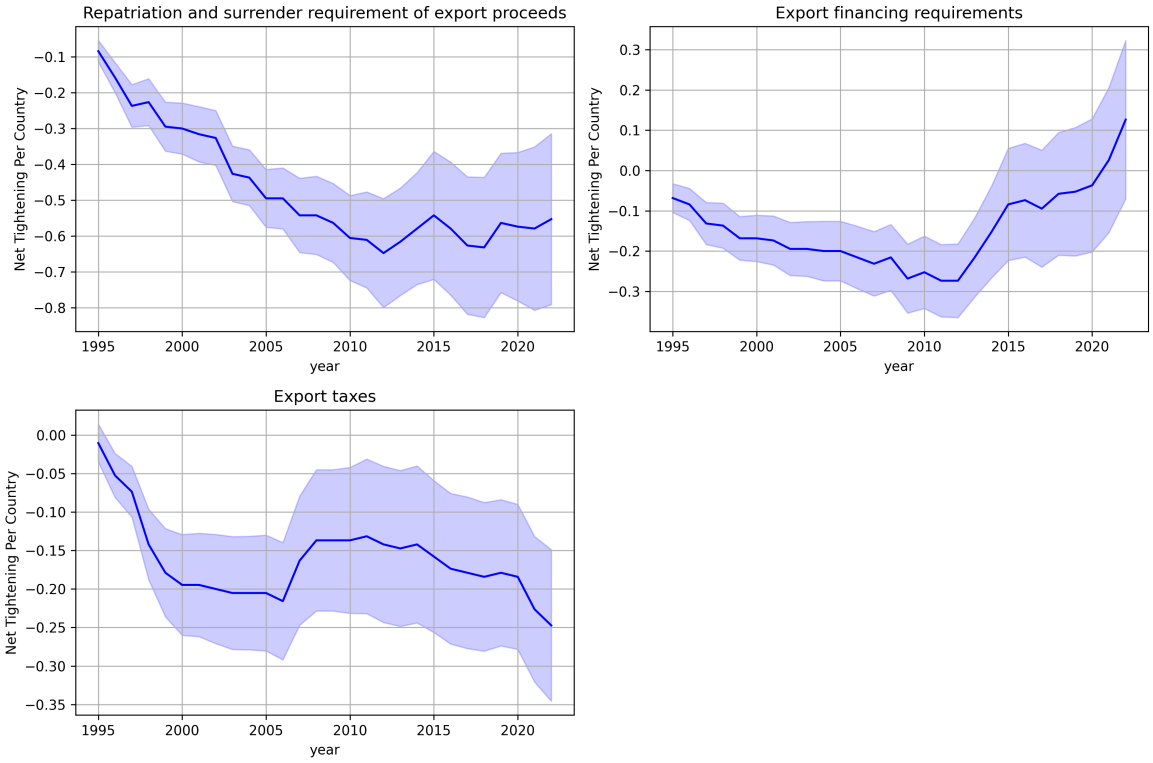


(a) Resident and nonresident accounts

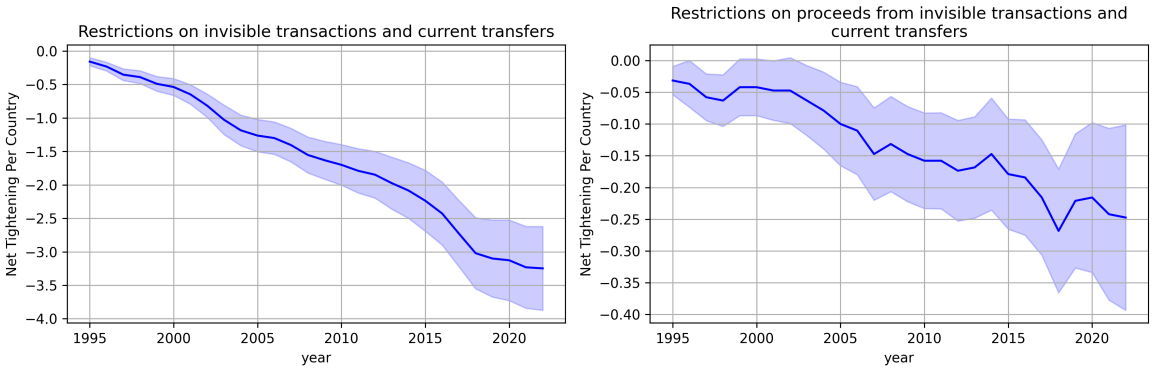


(b) Imports and import payments

Figure A21: Cumulative net tightening by subcategories (cont'd).

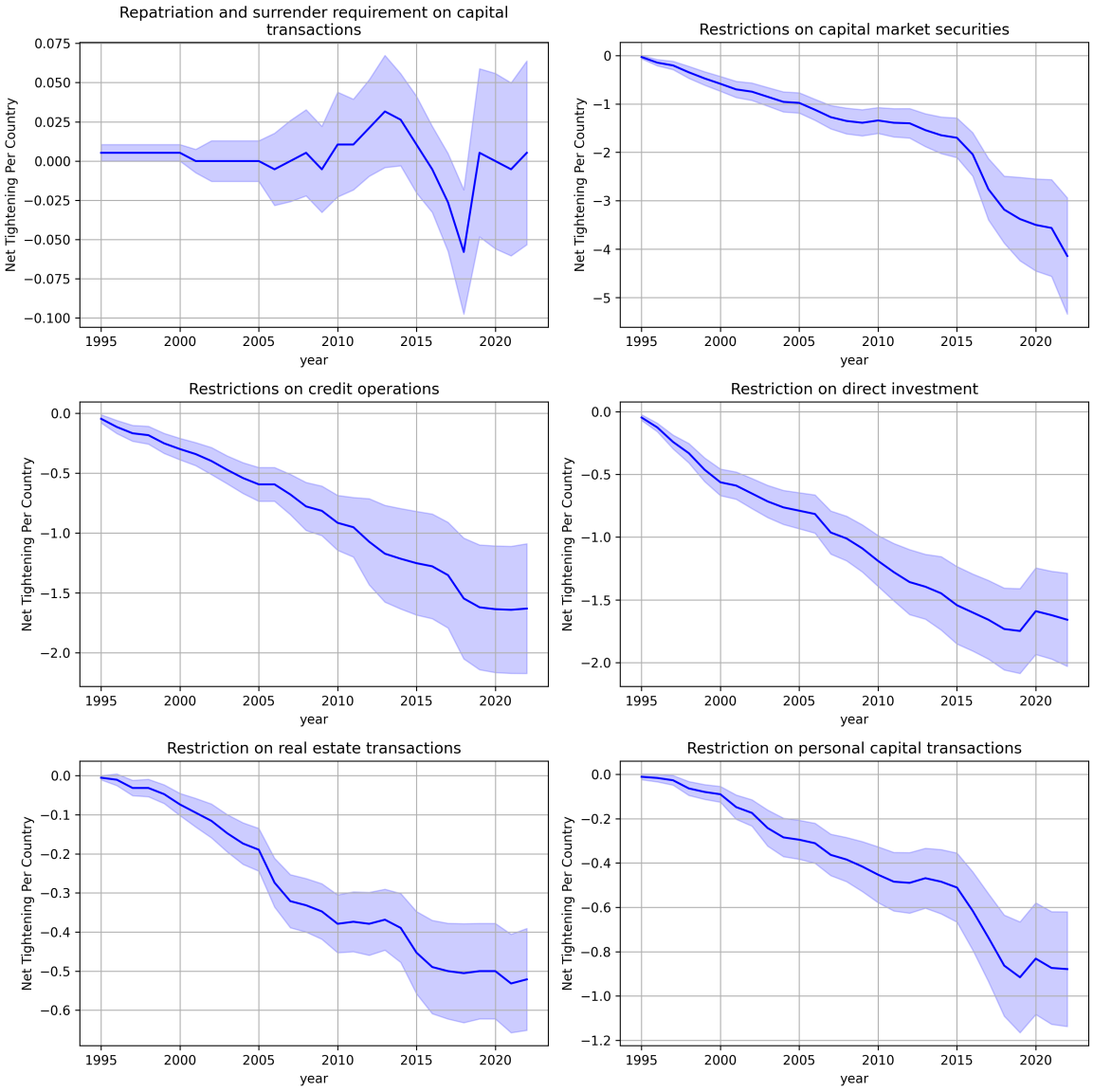


(a) Exports and export proceeds



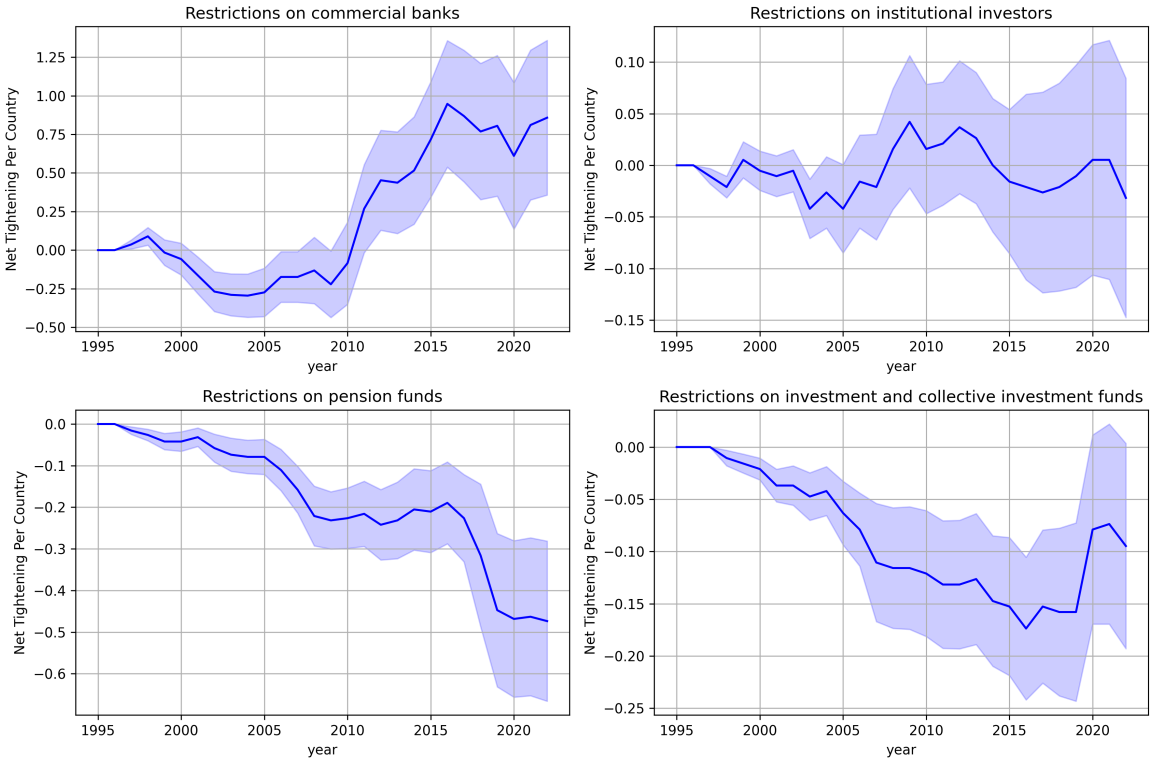
(b) Invisible transactions and current transfers

Figure A22: Cumulative net tightening by subcategories (cont'd).



(a) Capital account transactions

Figure A23: Cumulative net tightening by subcategories (cont'd).



(a) Provisions specific to the financial sector

Figure A24: Cumulative net tightening by subcategories (cont'd).