BAFFI RESEARCH CENTER

Working Paper Master Theses Series

Dilemma not Trilemma?

The Global Financial Cycle and Japan (1997–2023)

Giovanni Biasucci | 2025

Università Bocconi
BAFFI
Centre on Economics, Finance and Regulation

Dilemma not Trilemma?

The Global Financial Cycle and Japan (1997–2023)

Giovanni Biasiucci[*†]

December 2025

Submitted to the Department of Economics,

in partial fulfillment of the requirements for the degree of

Master of Science in Economic and Social Sciences

Abstract

Financial integration through cross-border capital flows has limited the ability of individual economies to insulate themselves from global shocks, as the growing synchronicity of international capital movements defines the Global Financial Cycle. However, the cycle can be more amplified for certain economies. Japan offers a compelling case: it is one of the three reserve-currency issuers, the largest foreign holder of U.S. Treasuries, and a central location for global carry trades. The study employs a regime-dependent framework that conditions the transmission of the cycle through U.S. monetary policy shocks on two global-risk regimes to assess their impact on credit in Japan across banks and non-bank intermediaries, using disaggregated credit data by type and lender from 1997 to 2023. The evidence proves the mirroring effect: changes in Japanese liquidity mirror global liquidity conditions. We find three main results. First, exposure to external shocks is asymmetric, as non-bank financial intermediaries exhibit greater sensitivity and act as amplification channels. Second, U.S. monetary tightenings contract domestic credit, particularly in a low-risk global regime. Third, after 2009 credit from foreign banks has become more procyclical with the cycle. The study suggests that monitoring financial institutions by their sensitivity to global conditions can provide guidance for macroprudential policy, reflecting that the Mundell–Fleming trilemma has evolved into a dilemma.

Keywords: Capital Flows, Financial Cycles, Liquidity, Monetary Policy, Risk, Japan

JEL classification: E5,F02,F33,F36,G15

---

[*] The author thanks Professor Donato Masciandaro as thesis supervisor for his guidance and support. The author is also grateful to Professors Ippei Fujiwara and Hibiki Ichiue for their valuable comments and suggestions at various stages. The author further acknowledges colleagues at the World Bank Prospects Group, whose discussions provided inspiration for several ideas developed in this project. The author started working on the project before joining the World Bank. The views expressed herein are thus entirely those of the author and do not necessarily reflect the position of the World Bank. Any errors that remain are solely the responsibility of the author.

[†] Bocconi University; World Bank, Prospects Group. 1776 G St NW, Washington, DC 20006. Contact: gbiasiucci@worldbank.org.

Contents

1 Introduction

What if no country could shield itself from a global economic storm? What if one drop of rain in one country could soak every economy in the same way? But then if countries are all inside the same climate sphere, how much do country-specific seasonal factors matter? Substitute *crisis* for *storm* and *economic shock* for *rain* and the questions capture today's most pressing macroeconomic issue. Against the realities of a highly integrated global financial system, economic insulation from external shocks may no longer be feasible.

Financial integration can be modelled as a *golden straitjacket* (Friedman, 1999). One can ask how golden the jacket is or how strait it is (Obstfeld et al., 2005), and the second question addresses the trade-offs of financial integration. These trade-offs are most evident in cross-border capital flows (Forbes and Warnock, 2012; Bruno and Shin, 2015; Goldberg, 2023) through which external shocks are transmitted. The objective of the study is to understand how increased financial integration through capital flows has limited the ability of individual economies to insulate themselves from external—hence global—shocks. Assessing the effectiveness of such insulation is crucial amid rising macroeconomic risks and policy-making under uncertainty about global financial conditions.

The starting point of financial integration was capital mobility (Einchengreen, 1996) and the realized counterpart of mobility is capital flows. The study of capital flows yields two propositions. First, since the Great Financial Crisis, risk-based taxonomies single out cross-border bank credit[1] as the component of capital flows most prone to destabilize macro-financial equilibria (Jorda et al., 2012; Bruno and Shin, 2015; Aldasoro et al., 2018). Second, the marginal sensitivity of economies to cross-border flows (and external shocks) has increased (Forbes and Warnock, 2021; Goldberg, 2023; Avdjiev et al., 2025). These two empirical regularities have drawn attention to the synchronicity in international capital movements (Rey 2013, 2014; Cerutti et al., 2017; Jordà et al., 2018; Scheubel and Stracca, 2019;

[1] In 2011, the Committee on the Global Financial System (CGFS) defined global liquidity as the *ease of funding*—hence cross-border credit—in global financial markets (BIS, 2011)

Miranda-Agrippino and Rey, 2021)—labelled the *Global Financial Cycle* (GFCy) (Rey 2013), a multi-layered system made by global risk and U.S. monetary policy. And it is capital flows that transmit the cycle (Degasperi et al., 2023; Avdjiev et al., 2025).

We put forward the proposition that the cycle is more amplified for certain economies. Japan offers a singular laboratory to study the cycle through data on bank credit to and within Japan. First, as one of the three reserve currency issuers (IMF, 2025) and owing to its monetary history, Japan has sustained the highest level of cross-border capital mobility in Asia (Chinn and Ito, 2006; updated), coupled with an economic growth model that has long defied the *Asian myth* (Krugman, 1998). This structural openness has made Japan sensitive to the phenomenon of carry trades (Bruno and Shin, 2015). Also, the significance of the context is amplified by Japan's shift in monetary policy in August 2024—the first in a decade—, followed by the rapid unwind of leveraged yen-funded positions (BIS, 2024). Second, Japan is still the largest foreign holder of U.S. Treasuries (U.S. Department of Treasury, 2025), tying its monetary conditions closely to U.S. monetary policy.
If validated, our findings reveal first that changes in Japanese liquidity (credit) mirror global liquidity patterns—what we call the *mirroring effect*; and, second, whether and to what extent Japan can buffer itself against external shocks.

The existence of the cycle is a dramatic empirical discovery for policymakers (Borio, 2012; Borio et al., 2023; OECD, 2024) as it implies that domestic—prudential and monetary—policies become necessary but not sufficient to fully insulate domestic economies from global shocks (Miranda-Agrippino and Rey, 2015; Rey, 2015). In other words, the Mundell-Fleming trilemma no longer holds (Rey, 2015) and becomes a *dilemma*. Today, more than 140 economies possess the Mundell-Fleming setting (IMF, 2025), thus, the understanding of whether economic insulation à la Mundell-Fleming is still possible is a global policy issue. And if it can happen in Japan, it can happen elsewhere.

Our contribution to the literature is two-fold. First, we provide a systematic assessment of the main literature on capital mobility, with a granular account of the link between its

conceptualization from the Mundell-Fleming model and the empirical evidence on capital account liberalization in both AE and EMDEs. Second, we study the role of the GFCy for bank credit data in a single-country case study of Japan, estimating the dynamic effects (1) identifying the non-linearity of the relationship and the persistence of these effects; (2) modeling the regime-dependent transmission channel based on two global risk regimes (high vs. low uncertainty).

The conclusions show that the effects of the GFCy can be quantified for Japan. U.S. monetary tightenings have contractionary effects on domestic credit and these are concentrated under tranquil global financial conditions. In particular, domestic banks do not exhibit significant responses to U.S. monetary policy shocks under either global risk regime, with an even more muted role under high uncertainty. Instead, we find that the non-bank channel (NBFIs) acts as a transmission amplifier of global financial shocks for all credit categories.

2 Literature Review

2.1 Capital Mobility and The Mundell-Fleming Model

As Mundell (1963, p.475) observes:

The world is still a closed economy but its [..] countries are becoming increasingly open. The trend [..] has been manifested by increased mobility of capital.

The Mundell-Fleming model[2] was the first macroeconomic model where (1) the setting was the open economy with perfect capital mobility; (2) capital flows were explicitly treated as financial flows affected by interest rate differentials; (3) capital flows constrain the use of both monetary and fiscal policy.

Setting the stage, during the period in which Fleming and Mundell formulated their models, Keynesian open-economy analysis was primarily influenced by James Meade. Meade (1951) argued that achieving full employment and price stability at home (internal balance) must be coordinated with maintaining a balanced balance of payments (external balance). He demonstrated that any domestic policy must account for its potential international repercussions. Meade's analysis of the effects of both monetary and fiscal policies was concerned on the differential effects on internal and external balance, and he regarded differences between monetary and fiscal policies as of secondary importance and relevant mainly to the capital account.

Fleming (1962) built upon Meade's analysis to investigate how a country's choice of exchange rate regime influences the effectiveness of fiscal and monetary policies (MP) in regulating domestic output. He argued that MP is more effective under floating exchange rates in absolute terms, but also relative to a fiscal policy action of a given size. These conclusions were derived from a static open-economy Keynesian IS-LM model augmented with a relation

[2]The term Mundell-Fleming model is used to refer to a group of articles that includes Mundell (1961a, 1961b, 1962, 1963) and Fleming (1962) (Mundell, 2001).

between capital flows and the domestic interest rate:

$$C = C(R) \tag{1}$$

where C is net[3] import of capital and R is rate of interest. The effects of changes in money supply (dM) on output (dY) when the exchange rate is fixed (subscript 01) are clear from equation (2):

$$\left(\frac{dY}{dM}\right)_{01} = \frac{-X_r R_v Y}{M^2} \times \left[\frac{1}{1 - X_n(1 - T_y) - \frac{X_r R_v}{M}}\right] \tag{2}$$

where X_r refers to the sensitivity of net exports to interest rates and R_v refers to the sensitivity of interest rates to MP. Considering only the first term of the equation, both parameters are negative, thus, if MP expands, the direct effect on output is positive. Considering now the denominator, the last term considers the role of capital mobility in limiting MP effectiveness. Low interest rates determine capital outflows and depreciation. Under fixed exchange rate regime, the central bank intervenes reversing the initial MP expansion and neutralizing the impact of monetary policy on output. Thus, (1) MP works through interest rates and trade balance; (2) MP is ultimately less effective.

Under floating exchange rates (subscript 11), the relationship changes.

$$\left(\frac{dY}{dM}\right)_{11} = \frac{R_v Y(C_r - X_r)}{M^2} \times \left[\frac{1}{1 - X_n(1 - T_y) + \frac{R_v(C_r - X_r)}{M}}\right] > 0 \tag{3}$$

As clear from (3), the introduction of C_r with respect to (2) in both the numerator and denominator alters the interpretation. As $C_\mathrm{r} > 0$, an expansionary monetary policy ($dM > 0$) leads to capital outflows whenever $C_\mathrm{r} - X_\mathrm{r} > 0$. The term $C_\mathrm{r} - X_\mathrm{r}$ is positive, thus, the MP effect is amplified. Here, when the currency depreciates, the central bank does not intervene. Depreciation boosts net exports, reinforcing the effect of MP on output. Thus, (1) MP works through interest rates, trade balance, exchange rate depreciation; (2) MP is ultimately more effective.

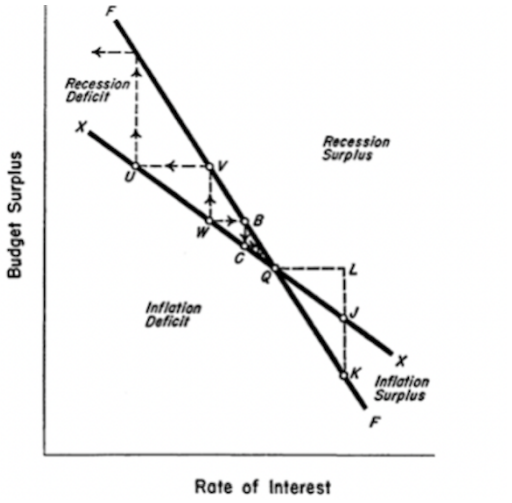
[3]Empirical evidence will show that analysis of gross rather than net flows is more effective to assess systemic macroeconomic risk (Milesi-Ferretti and Tille, 2011). Dell'Ariccia et al. (2016) and Arena et al. (2015) find that surges in gross capital inflows can predict credit booms.

Fleming did not address Meade's fundamental gap. Meade relied on static models, thus, there was no explicit equation determining the dynamic transition between equilibrium states of internal and external balance, leaving a gap between equilibrium states and institutional policies unclear. Fleming did not address Meade's fundamental gap. Alexander (1952) introduced the absorption approach, showing how changes in national wealth drive current-account imbalances. Mundell (1961a) proposed the dynamic adjustment of capital flows in response to MP. The intuition is that even with Keynesian (sticky) prices, capital flows restore international equilibrium automatically via an income-specie-flow mechanism[4]. In practice, a rise in domestic income drives adjustments—namely, capital outflows— in capital movements. This mechanism corrects the external balance, whereas fiscal policy corrects the internal balance (Mundell, 1961a). This is captured analytically in the *foreign balance schedule* (FF) which describes the combinations of interest rates and budget surpluses that ensure BoP equilibrium. With higher capital mobility, the FF curve is steeper, thus, external balance constraints become more binding when capital is more responsive to interest rates. Instead, the *internal balance schedule* (XX) represents full employment equilibrium, i.e., when domestic demand is aligned with output capacity. The two schedules (Figure 1) demarcated four zones of (dis)equilibrium, and this made possible an examination of the dynamics relevant to two different policy situations: an economy in which MP was focused on fixing the exchange rate, compared with an economy in which MP was focused on stabilizing prices.

In Figure 2, the FF curve is presented horizontal as under perfect capital mobility interest rate (r) differentials trigger immediate capital flows restoring the equilibrium, making the interest rate fixed regardless of the level of domestic demand (P).

[4]See Hume (1752) for Hume's price-specie-flow doctrine.

Figure 1: The Internal and External Balance Schedules



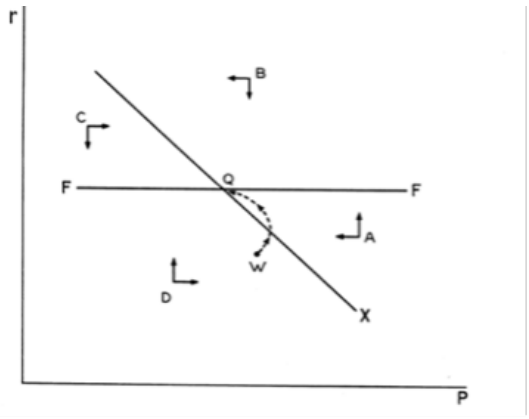
Source: Mundell (1962).

Two caveats follow. First, under a fixed exchange rate regime, the adjustment process toward equilibrium is noncyclical (Figure 2a). The economy moves toward equilibrium (point Q) in a direct path since capital mobility constraints MP independence. Second, under a flexible exchange rate regime, interest rate movements induce capital flows and, as a result, exchange rate expectations, leading to a cyclical adjustment process (Figure 2b) rather than direct convergence to equilibrium as in the previous case. Cyclical behavior arises because the exchange rate serves as the primary adjustment mechanism, indirectly affecting internal stability, e.g., inflation or GDP, through external sector dynamics like trade (im)balances. In other words, higher MP flexibility corresponds to higher macroeconomic volatility.

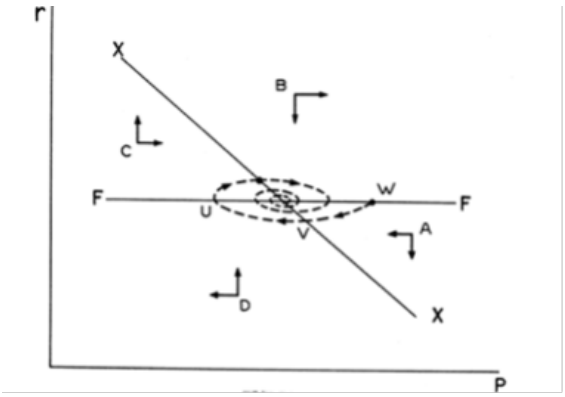
The dual analysis of Mundell's and Fleming's contributions is sufficient to understand the Mundell-Fleming model. The model is Fleming's equation combined with Mundell's policy analysis (IMF, 2002). Fleming's model is not consistent for long-run analysis of adjustment processes as the money supply cannot remain fixed, and fiscal policy cannot independently determine the equilibrium in a fixed exchange rate system with a high level of capital mobility. The appropriate monetary control variable is Mundell's nominal interest rate or domestic credit, as in Polak (1957).

Figure 2: The Adjustment Process Toward Equilibrium

(a) Fixed Exchange Rate



(b) Flexible Exchange Rate



Source: Mundell (1960).

Two final Mundellian considerations on capital mobility are as follows. First, capital mobility influences also the transmission of economic fluctuations across borders. Under fixed exchange rates, capital mobility determines the extent to which domestic booms are transmitted abroad (Mundell, 1964). The effect depends on whether rising interest rates[5] offset the increase in exports. Second, the nature of capital flows renders sterilization policies ineffective in an open economy with fixed exchange rates. The central bank can alter credit conditions, yet it is ultimately the exchange rate adjustment and not the interest rate that restores equilibrium.

Providing a unified basis of analysis, the role of capital mobility was now present from a theoretical standpoint with the well-established open economy setting in the literature. Capital mobility is relevant and affects the macroeconomy via exchange rate stability[6]. This creates both monetary and fiscal policy constraints (Table 1). What remained over time of the Mundell-Fleming model is inter alia the inherent trade-off between internal and external balance. Yet, this intuition will prove to be even more relevant.

[5]In a fixed exchange rate regime, the central bank cannot freely adjust the money supply, so interest rates rise when the demand for money increases, following the domestic boom (or higher disposable income).

[6]See Mundell (2001) for historical contexts where the model can be applied, including Canada's floating exchange rate (1950s), the Reagan boom (1980s), and German reunification's impact on the Exchange Rate Mechanism (ERM) (1990s).

Table 1: Policy Effectiveness under Fixed and Flexible Exchange-Rate Systems

	Fixed Rates	**Flexible Rates**
Monetary Policy		
Effect on Employment	nil	effective
Effect on Balance of Trade	nil	effective
Effect on Balance of Payments	effective	nil
Fiscal Policy		
Effect on Employment	effective	nil
Effect on Balance of Trade	effective	nil
Effect on Balance of Payments	nil	nil

Source: Mundell (1963).

2.2 Gains and Costs of Capital Mobility

The Mundell-Fleming model has at least two drawbacks: (1) it assumes perfect capital mobility; and (2) it overlooks the granular composition of capital flows. While the model was foundational in clarifying the theoretical role of capital mobility and its potential channels of macroeconomic destabilization, subsequent research shifted toward examining how capital moved in practice. With consensus emerging on the long-term welfare (1) and risk-sharing (2) benefits of capital mobility, capital accounts were gradually opened during the 1980s and 1990s (Section 2.3). The liberalization[7] thus provided natural experiments to test the implications of capital mobility. This section provides a systematic categorization of the literature on both theoretical and empirical gains and costs of capital mobility.

The first empirical perspective examines aggregate domestic economic growth. Alesina et al. (1994) find that capital account liberalization is associated positively with growth in AE. Arteta et al. (2001) confirm this, proving the role of stronger institutions. Prasad

[7]Capital flow liberalization herein refers to the removal of measures designed to limit capital flows in line with IMF (2012).

et al. (2003) instrument for policy endogeneity and show that any growth dividend materialises only in countries with strong institutions and sound macro-policy regimes. Klein and Olivei (2008) show that AE with fewer capital controls enjoy higher annual per-capita growth rates. In contrast, Grilli and Milesi-Ferretti (1995), Manzocchi and Martin (1997) find no or weak effect on growth with a sample dominated by DE. Distinguishing by type of flow, Borensztein et al. (1998) find that in DE only openness to FDI is positively associated with growth—once human capital exceeds a critical threshold—because of FDI being drivers of technological and organizational knowledge, whereas the impact of other financial capital flows is less conclusive for both DE and EM. Also, while our current framework treats capital flows as an exogenous determinant of output, it cannot be excluded that causality runs in the opposite direction, with output expansion attracting capital.

The second perspective is related to consumption risk sharing. Kose et al. (2009) and Forbes and Warnock (2012) find limited evidence that financial integration helped improve risk sharing in DE, in contrast to no evidence at all for EM, in contrast with the theoretical conclusions of Lewis (1996). Prasad et al.(2009) confirm that, although capital mobility facilitates some degree of consumption smoothing across countries, the extent of risk sharing is not complete in DE, leaving them partially exposed to the benefits of capital mobility.

Closely related to the first perspective, the third empirical perspective considers the role of capital flows in augmenting domestic savings, thus, reducing resource constraints on capital formation. For both AE and DE, Prasad et al. (2003) highlight that gains in domestic savings—especially in saving–investment efficiency—depend on two factors: institutional quality and the sequencing of reforms. An interesting perspective is Aizenman et al. (2004) which show that DE with higher self-financing ratios—a larger share of investment funded by domestic savings—tend to grow faster and more stably, calling into question the need a priori for heavy external borrowing.

The costs are amplified for DE and reflect two dimensions: (1) financial instability and increased vulnerabilities of the domestic financial sector; (2) wealth transfers.

From a theoretical point of view, the propagation cost of international capital-mobility is well documented in open-economy New-Keynesian models. Gali and Monacelli (2005), Dev-

ereux and Yetman (2010) and Dedola and Lombardo (2012) show how movements in global interest rates and exchange rates—enabled by free capital mobility—transmit through price stickiness and financial frictions into sizable domestic output losses. This is closely related to the buildup of systemic risk because capital flows can exacerbate pre-existing vulnerabilities (Mendoza, 2010) within an economy, thereby amplifying the macroeconomic costs described above.

The vulnerability of the domestic financial sector under open capital markets has been formalized in several foundational models. Obstfeld (1994) shows that with perfect capital mobility and a fixed exchange rate, a speculative attack can exhaust official reserves and force a crisis. Rodrik (1998) also expresses his concerns. Calvo (1998) captures this in a *sudden-stop* two-period model, showing how an abrupt reversal of international capital flows—hence the sudden stop—can dry up domestic bank liquidity, triggering a sharp credit crunch. Mendoza (2010) carefully calibrates a dynamic general-equilibrium model with external-borrowing constraints to show that leveraged capital inflows amplify the procyclicality of domestic credit. The final strand of literature highlights the liquidity-transfer externality of capital outflows. When capital mobility reverses, it transfers liquid wealth abroad, resulting in deeper downturns than under closed-economy benchmarks (Gourinchas and Jeanne, 2007). This implication is particularly relevant for policy evaluation as, when stabilization policies are only partially effective —as during financial crises— this dynamic can further depress already inefficiently low levels of aggregate demand or worsen inequality across domestic income groups and between different market actors (e.g., financial institutions and domestic residents).

Empirically, the description of costs is generally framed in the literature as *risks* and capital mobility is associated with capital volatility[8]. Overall changes in total capital flows deepen recessions and cut investment more in DE than in AE (Broner et al., 2013). Differentiating by flow type, when portfolio inflows stop, growth slows more in DE than in AE (Forbes and Warnock, 2012). The point around which most of the literature focuses is the level of change in capital mobility. Framed as volatility, Ahmed and Zlate (2014) show that volatility of net capital flows also reduces consumption more sharply in DE than in AE. In other

[8]Pagliari and Hannan (2017) shows that the structure of the financial system of destination also influences the volatility of capital flows.

words, one of the costs of capital account openness is inter alia the greater unpredictability of cross-border flows.

2.3 Historical Patterns of Capital Mobility

We partition the period 1870-2009 into five subperiods based on capital mobility.

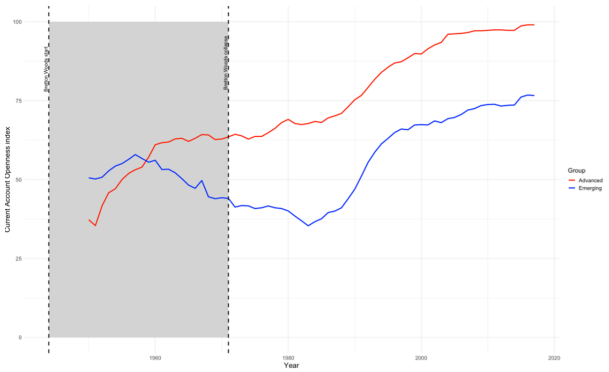
In the first subperiod (1870–1913), known as the gold standard era prior to World War I, capital movements were largely unrestricted. In the second subperiod (1918–1929), the war devastation compelled governments to assume a central role in sustaining capital flows. The third subperiod (1930–1939), characterized by the Great Depression, witnessed a collapse in capital markets, further exacerbated by the abandonment of the gold standard—beginning with the UK exit (1931) and the U.S. (1933)—and the imposition of restrictions on international financial transactions. Given the failure of the gold standard, the fourth period (1944–1971) corresponds to the Bretton-Woods era and (relative) pax Americana, during which strict capital controls were imposed to grant nations greater MP flexibility (Obstfeld, 1998) and to increase government's grips over banks and financial markets[9]. This holds particularly true for AEs (Figure 3).

The fifth subperiod is the post-Bretton Woods financial era, beginning in the 1971, when President Nixon suspended the foundational mechanism of the Gold Standard. Capital controls were gradually dismantled as a signal of a movement (back) to global financial integration (Figure 4). This openness resulted from the openness of both current account and capital account (Figure 3). The degree of *golden capital mobility* (Keynes, 1919) experienced during 1870-1913 was reached again only in the 1990s (Obstfeld and Taylor, 2017). Yet, the structure of the financial system was not adequate to contemporary economic transformations.

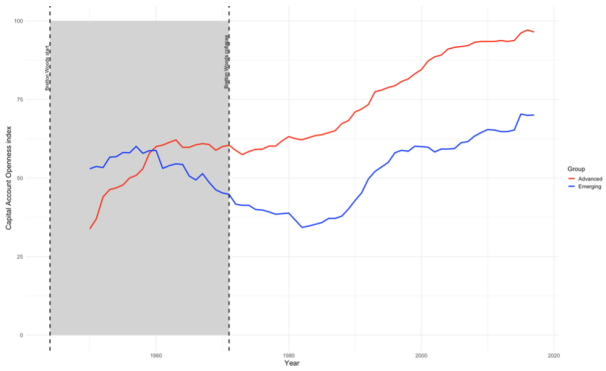
[9]See Polanyi (1944) for a critique of the contemporary market liberalism in contrast to previous laissez-faire economics.

Figure 3: Quinn's Index of Current Account and Capital Account Openness (1950–2017)

(a) Current Account



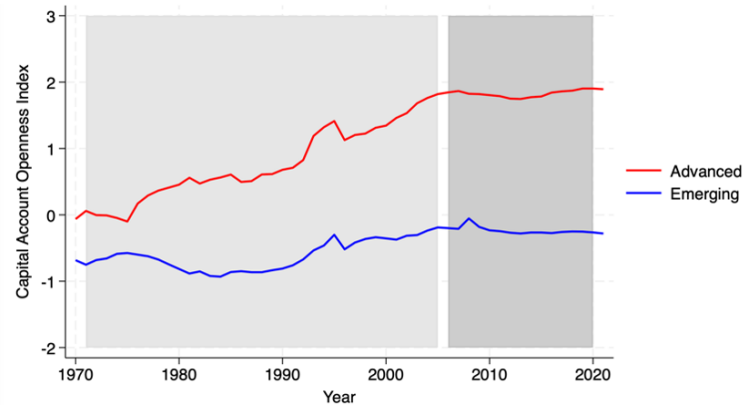
(b) Capital Account



Source: Author's elaboration based on Quinn (1997).

Note: Quinn's index of capital account openness is a quantitative measure of legal restrictions on cross-border financial transactions, based on coding information from the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER). It ranges from 0 (fully closed) to 100 (fully open) (Quinn, 1997); 2017 is the latest index update.

Figure 4: Chinn and Ito's Measure of Financial Openness to Capital Flows (1970–2021)



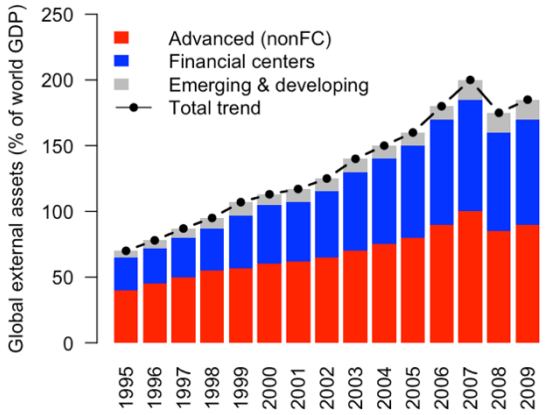
Source: Author's elaboration based on Chinn and Ito (2008).

Note: The Chinn–Ito index is a de jure measure of capital-account openness constructed from the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER). For each country-year, it codes binary dummies for exchange-rate regimes, current- and capital-account restrictions, and export-proceeds surrender requirements. The first principal component of the dummies is extracted. Higher values indicate fewer legal barriers to cross-border capital flows; missing observations are interpolated using standard linear time-series methods.

With domestic financial institutions developing and trade expanding, capital controls became harder to enforce already in the 1970s. Both Europe and the U.S. were *on the brink of a decade of phenomenal expansion which imperiously demanded wider markets through freer trade* (Ruggie, 1982). Also, the growing political power of the financial sector clearly pushed in the direction of deregulation (Rajan and Zingales, 2003).

By September 1997, the IMF's management proposed to amend the Articles of Agreement to give the Fund an explicit role in guiding countries toward more open capital accounts (IMF, 1997a). However, the optimism around financial integration through capital mobility shifted following the Asian (1997–98) and Latin America (1994-2002[10]) crises. From 1995, the de facto openness to capital flows increased steadily, mirrored by substantial growth in global external assets for both advanced economies and financial centers (Figure 5). Cross-border assets and liabilities are two faces of the same coin: one economy's gain is another's liability.

Figure 5: Evolution of Global External Assets (percent of GDP, 1995–2009)



Source: Author's elaboration based on Milesi–Ferretti (2025).

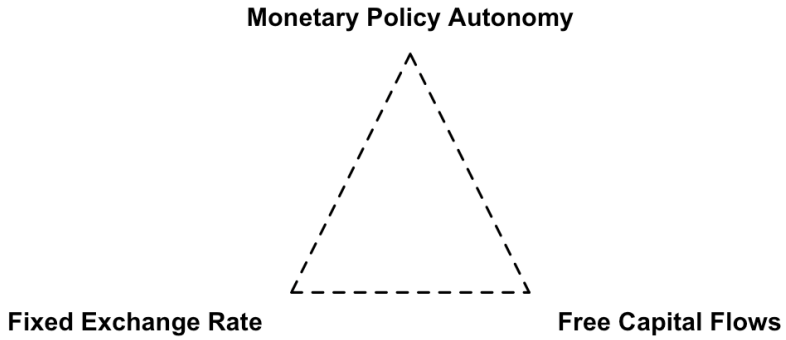
Note: The de facto index is the Milesi–Ferretti measure of gross external assets and liabilities as a share of group GDP. Income-group classifications follow World Bank and WTO (2008). *FC* denotes financial centers.

[10]Earlier debt crises in Latin America during the early 1980s, particularly the Mexican default in 1982, marked the beginning of a prolonged period of financial distress across the region, leading to the implementation of the Brady Plan in 1989 to restructure sovereign debt. The subsequent wave of crises began in 1994 with Mexico and extended through the Argentine default in 2002.

2.4 The Historical Configuration of the Monetary Trilemma

History exposes the simplifying assumptions of the Mundell–Fleming model[11] and adds the complexities it omits. The implications of the Mundell-Fleming model are referred to as the monetary trilemma or trinity (Figure 6). The objective of this section is to relate the trilemma to the historical patterns of capital mobility, revealing how much or how little insulation was ever achievable once capital accounts began to liberalize in the first half of the 1990s.

Figure 6: The Monetary Trilemma



Source: Author's elaboration based on Mundell (1960), Fleming (1962), Obstfeld and Taylor (2005).

With the general patterns of capital mobility well defined (Section 2.3), the question we pose is:

Do the facts align with the implications of the Mundell-Fleming model?

Table 2 summarizes our key findings. The pre-1914 setting promoted trade and international lending, while determining co-movement of short-term interest rates and inflation in different countries (Obstfeld et al., 2005). In practice, demand and supply in the gold market were the pendulum determining global equilibria with no independent MP. However, gold convertibility did not prevent financial instability and banking crises (Obstfeld and Taylor, 2017). In our narrative of economic insulation, the gold standard was not able to insulate

[11] Dornbusch and Fischer (1980) argue that the static assumptions failed to capture the dynamic behavior of exchange rates. Krugman and Obstfeld (1991) criticize the model for its oversimplified treatment of capital mobility.

countries[12]. World War I suspended the gold standard, but by the end of the 1920s, 80 percent of world's national currencies were again pegged to gold with widespread capital mobility until the Great Depression (Obstfeld and Taylor, 2005). In 1944, policymakers at Bretton Wood drew—or attempted to draw—a policy circle that would contain all inherent limits[13]. The results were (1) strict capital and exchange controls, under the guidance of the IMF; (2) depression of domestic financial systems; (3) some degree of MP independence. Yet, the three components together seemed to counterbalance one another. In Obstfeld and Taylor (2017, p.11) words:

Policymakers struggled with financial plumbing, trying to open the pipes for payments on current transactions to support the rebirth of global trade but close the valves for speculative capital transactions that could destabilize the system.

Table 2: The Historical Configuration of the Monetary Trilemma (1870-1971)

Period	**Monetary Autonomy***	**Capital Mobility****	**Fixed Exchange Rate*****
1870–1913 (1)	No	**Yes**	Yes
1918–1929 (2)	No	**Yes**	Yes
1930–1939 (3)	Yes	**No**	No
1944–1971 (4)	Yes	**No**	Yes
From 1970s (5)	Yes	**Yes**	No

* Autonomy of national monetary policy.

** Absence of capital-account restrictions.

*** Commitment to a fixed-exchange-rate regime.

Source: Author's elaboration based on Eichengreen (1992), Caramazza and Aziz (1998), and Obstfeld et al. (2004).

There were two empirical consequences of the Bretton-Woods system. First, capital mo-

[12]It is in this context that Bagehot (1973) advanced the need for a central institution to step in during crises as lender of last resort. Thornton (1802) argued that the Bank of England should provide liquidity during times of distress by lending against sound collateral—a notion that later informed Bagehot.

[13]See Schuler and Rosenberg (2013) for the Bretton Woods transcripts.

bility grew[14], with unwanted leakages to less regulated financial hubs (Eichengreen, 2008). Second, U.S. dollar accumulation as international reserves grew, but as long as Americas had sufficient gold (Triffin, 1960)[15]. The U.S. dollar's link to gold fixed at $35 per ounce (1934) weakened, reaching $100 per ounce (1974), with market perceptions of overvaluation and migration to safe-haven currencies, namely the Swiss franc and the Japanese yen. In line with the consensus on floating exchange rates established by Friedman (1953) and Meade (1955)[16], many countries shifted to *more* flexible exchange rate regimes, with some exceptions—marking the second explicit *No* in the last column of Table 2.

The trilemma imposes that countries could use MP for domestic goals with floating exchange rates and full capital mobility. Both the dimensions of flexibility of exchange rates and capital mobility increased in the decades since 1973, peaking into end of 1990s.
Table 7 shows how national interest rate policies decoupled over time from the U.S. MP. We measure MP independence using a 36-month rolling correlation between each country's policy rate and the U.S. federal funds rate, across three distinct periods: 1975–1990 captures early adjustments to floating exchange rates and residual capital controls following early debt crises; 1991–2008 reflects widespread liberalization and convergence toward open regimes; and 2009–2023 isolates the post-crisis era. Obstfeld et al. (2005) similarly employ correlations to quantify policy autonomy under differing capital control regimes. Frankel et al. (2004) apply the same methodology to assess the transmission of interest rates across currency regimes to measure monetary independence. Instead, Bordo and MacDonald (2005) test the hypothesis in a different historical setting— the classical gold standard (1880–1914)—by estimating monthly pass-through coefficients within gold-parity bands.
Between 1975 and 1990, the average rolling correlation with the U.S. federal funds rate was nearly one-half, indicating that MP remained closely aligned with U.S. interest rate move-

[14]See also Code of Liberalization of Capital Movements (OECD, 1976) to understand the obligations imposed on countries for high levels of openness.

[15]Triffin (1960) argued that if the United States corrected its BoP deficit, the result would be world deflation because gold production at $35 an ounce could not supply the monetary reserves of other countries. But if the United States continued running a deficit, the result would be the collapse of the monetary standard because U.S. foreign liabilities would far exceed its ability to convert dollars into gold on demand.

[16]They advocated for floating exchange rates for adjusting external payment imbalances and insulating countries from foreign inflationary shocks.

ments, even after adopting floating exchange rates. Canada and Japan showed particularly strong alignment, whereas Switzerland and Australia exhibited greater independence. From 1991 to 2008, correlations increased to more than one-half, driven by global financial liberalization and convergence toward similar MP frameworks. Finally, the observed drop in correlation to around 0.32 after 2009 likely reflects increased policy divergence driven by unconventional MP and negative interest rate policies (NIRP) adopted by AE, and capital controls, reserve requirements, and credit restrictions adopted by EM.

2.5 Extreme Cases of Capital Mobility: Push, Pull, Stop

This phase of analysis addresses the extreme patterns shaped by the surge in capital mobility during the 1990s. With three decades of hindsight, analyzing the peak period of capital mobility seems a natural experiment testing the theories of Section 2.1. The result is that unrestricted capital mobility contributed materially to the stalled convergence of EM growth models in Latin America and EM Asia.

The systematic buildup to the Latin America crisis (1979-1982) can be summarized in five points:

1. Large-scale capital inflows to Latin America facilitated by the recycling of petrodollar surpluses held in U.S. and European banks.

2. Use of borrowed funds to finance the debt of large-scale public investment and development projects.

3. Sharp increase in U.S. interest rates in the early 1980s under the Volcker Fed, which caused Latin American debt servicing costs to increase (from $12 billion in 1975 to $66 billion in 1982).

4. Collapse in global commodity prices and a tightening of international credit markets, followed by widespread defaults[17].

5. IMF-led restructuring programs.

[17]Mexico was the first country to default in August 1982.

By 1982, Latin America's external debt reached $315 billion—more than quadrupling from 1975—and amounting to roughly 50% of regional GDP (Reinhart and Rogoff, 2009; Federal Reserve History, 2013).

Instead, for a detailed historical overview of the Asian crisis, see Radelet and Sachs (1998) and IMF (1999). For Asia, the main issue was the overreliance on foreign capital in the form of one specific type of flow: short-term (volatile) external borrowing to finance long-term investments (Obstfeld and Taylor, 2017). Here, the five points are:

1. Reassessment by investors of economic fundamentals of EMs associated in those years with economic—or miracle (World Bank, 1993)—growth and perceived stability.

2. Realization by investors that EMs had engaged in excessive risk-taking and over- reliance on foreign capital.

3. Reversal of capital flows and increase in the supply of domestic currency in FX markets.

4. Currency depreciations without sufficient demand to absorb the excess supply.

5. Attempts to defend pegs until reserves were depleted proving the impossible trinity theory.

By 1997, over $73 billion in speculative capital had exited Asia (IMF, 1997b). It is worth noting that the liquidity crisis was not exclusively driven by global factors. Yet, although structural factors were relevant, international capital mobility played a more dominant role in the systemic aspect of the crisis. Former Singaporean prime minister Lee Kuan Yew made this point very clear. Faced with criticism from Western observers demanding structural reforms in Asia following the currency crisis, he countered by pointing out that none of them had warned against liberalizing capital flows before resolving underlying structural issues. *He was right* (Koo, 2003).

We identify two sub-strands of literature: (1) push versus pull factors; (2) extreme capital flows literature (sudden stops).

The first sub-strand of literature is as follows. Calvo et al. (1993) are the first to show that

the surge in capital inflows to EM in the 1990s stems largely from external *push*[18] factors —the U.S. recession, BoP developments, and falling global interest rates—, which account for 30-60% of the variance in international reserves and exchange rates. Chuhan et al. (1993) demonstrate that external variables account for approximately half of the bond and equity flows from the U.S. to a panel of six Latin American countries. Also, external factors explain roughly one-third of bond and equity flows into the Asian region. To address the limitation in the Calvo et al. (1993) model—which assumes that equal changes in domestic and foreign returns lead to identical effects on capital flows—, Montiel and Fernández-Arias (1996) employ an alternative allocation framework. Here, the contribution of external factors to capital inflows is a linear function of the home–abroad interest-rate elasticity, showing that low developed-economy returns pushed most 1990s EM booms. Additional discussed drivers are the international diversification of investments within major financial centers (Ahmed and Gooptu, 1993); public policies, such as inflation stabilization programs and the liberalization of domestic capital markets (Obstfeld, 1986); structural changes such as the rise of institutional investors such as mutual and pension funds in AE and deregulation of financial markets in both EM and AE (World Bank, 1997). The traditional push-and-pull framework of the 1990s is straightforward (Table 3).

The taxonomy of the drivers and their ranking depend on both the heterogeneity of capital flows and the strength of their linkages with systemic risk. Figure 3.9 decomposes quarterly net capital flows (black line) from the peak period into four heterogenous components—portfolio debt (light blue), portfolio equity (red), other flows (yellow) and direct investment (green)—for AE (left panel) and DE (right) over 1990–2011. In AE, portfolio debt and direct investment together account for most inflows, with equity inflows accentuating cyclical peaks (notably in 2006–07). DE likewise rely heavily on direct investment for their baseline inflows but exhibit even larger swings in other flows and equity around the Asian crisis and again in the lead-up to the GFC. Direct investment thus provides the most

[18]See Mendoza et al. (2009), Forbes (2010), Bacchetta and Benhima (2010), Ju and Wei (2011) for detailed understanding of pull factors such as size, depth, and fragility of a country's financial system as a determinant of capital flows from abroad (for developed financial markets) or of capital flows out of the country (for less developed financial markets).

stable channel, while portfolio and other flows drive volatility. In this sense, the cyclical shifts in capital flows can be seen as a form of financial creative destruction, (1) reallocating resources in line with perceived risk and return while (2) amplifying fragility in DE.

Table 3: Taxonomy of Capital-Flow Drivers (Push vs. Pull)

	Push Factors	**Pull Factors**
Cyclical	• Global risk aversion	• Domestic output growth
	• Low DE interest rates	• Country-risk measures
	• Balance-of-payments shifts	• Capital-account openness
	• U.S. recession	• Market liberalization
Structural	• Rise of institutional investors	• Institutional quality
	• Portfolio diversification	• Government's economic role
	• ICT advances	• Inflation-stabilization programs
	• Trade-account opening	• Domestic market liberalization
	• Financial deregulation	• Structural adjustment policies

Source: Author's elaboration based on Obstfeld (1986), Ahmed and Gooptu (1993), World Bank (1997), Bekaert et al. (2007), Mendoza et al. (2009), Forbes (2010), Bacchetta and Benhima (2010), Ju and Wei (2011), and Koepke (2015).

For the second sub-strand of literature on extreme capital flows, we adopt the classification of extreme capital flows proposed by Forbes and Warnock (2012). *Surges* are sharp increases in gross capital inflows; *stops* are abrupt declines in these inflows; *flights* capture sharp increases in gross capital outflows; *retrenchments* represent decreases in outflows. Forbes and Warnock (2012) identify 167 surge episodes, 221 stop episodes, 196 flight episodes, and 214 retrenchment episodes between 1980 and 2009. More in detail, the literature on capital flight is among the earliest, with contributions from Khan and Ul Haque (1985), Lessard and Williamson (1987), Dooley (1988). Instead, Calvo (1998) provides the first analysis of sudden stops. The definition is sharp slowdowns in net capital inflows. Yet, complementary variations of this definition include the requirement that the stop coincides with an output

contraction (Calvo et al., 2004) or that it is coupled with a sharp rise in interest rate spreads to qualify as a systemic sudden stop (Calvo et al., 2008).

It can be clearer to interpret sudden stops as consequence of BoP imbalances between countries' savings and investments, commonly known as net external assets (NEA). Persistent NEA are what global imbalances[19] refer to. Gourinchas (2012) provides a complementary framework to Mundell that clarifies the connection between NEA and BoP through national income and consumption:

$$S - I = CA = PFF + ORT \tag{4}$$

where S is national saving, I is domestic investment, CA is the current account, PFF represents net private financial flows and ORT denotes net official reserve transactions. Thus, the right part of the equation indicates the financing of current account deficits (CAD). In line with Calvo (1998), if the country invests in a project at time t through external borrowing, it is subject to rollover risk at time $t+n$, thus a sudden stop could occur in any of the following periods.

A further specification in Gourinchas (2012) considers the difference between short-term and long-term debt. In this case, (4) becomes:

$$S - I = CA = PF_{st} + PPF' \tag{5}$$

where PF_{st} corresponds to net private short-term debt inflows and PPF' denotes other net private capital flows like long-term debt. CA now measures both an increase in short-term external borrowing—a vulnerability—and an increase in safer long-term flows. If the country invests in a foreign opportunity, this can be financed with external borrowing. If the borrowing is short-term, there is a maturity mismatch and risk of a sudden stop. And in the case of a sudden stop, the country liquidates the project and the crisis originates from the structure of external liabilities rather than CA balance.

The counterpart to sudden stops is capital flow *bonanzas* (surges) (Reinhart and Reinhart, 2009; Cardarelli et al., 2009; Caballero, 2010). Relevant observation is that, although bonanzas generate strong domestic credit growth and asset-price gains, they also heighten

[19]See IMF (2005), Obstfeld and Rogoff (2005), Blanchard and Milesi-Ferretti (2010).

systemic fragilities through increased reliance on foreign funding, setting the stage for potential sudden stops. The intuition is as follows: as the supply of foreign liquidity rises, the equilibrium rate—and thus the cost of domestic borrowing—falls, while interbank and sovereign risk spreads compress. In tandem, on the demand side, asset prices increase and collateral values appreciate. As loans require collateral, higher valuations allow borrowers to pledge more against the same asset without breaching their loan-to-value limits, and lenders perceive lower default risk because of higher recovery rates. The important risk channel now arises from the fact that global wholesale lenders will extend short-term foreign-currency funding[20], whereas the average domestic borrower seeks longer-term credit for investments or mortgages. Thus, local banks intermediate by borrowing short in foreign currency and lending long in local currency, creating both maturity and currency mismatches on their balance sheets.

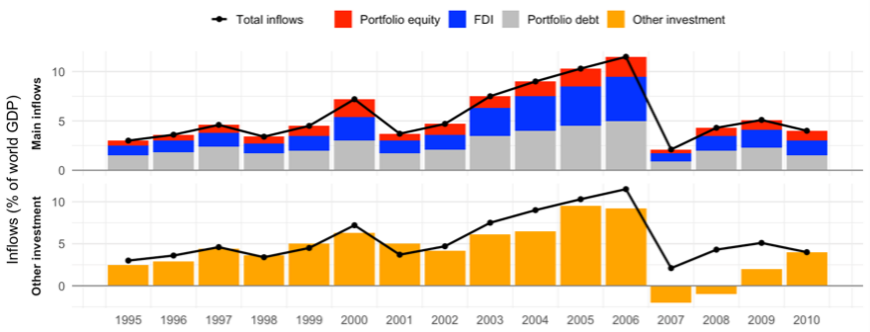
As the capital mobility experiments in the peak period involved both DE and EM, the same experiment was conducted in different labs. Latin American countries presented numerous structural rigidities whereas the EMs of East Asia, without such apparent macroeconomic rigidities, were *shining examples* (Obstfeld and Taylor, 2017) of mostly well-run economies with rapid economic growth. However, the Asian crisis shows that a further categorization of these labs depends not only on structural fundamentals but also on macroprudential and financial policy frameworks. The crises proved that the role of capital mobility is amplified when it interacts with other factors. In Asia, the key factor was financial regulation, in particular prudential oversight (IMF, 1999).

The historical analysis has confirmed the validity of the Mundell-Fleming framework until the 1990s. Ruggie (1982) already noted that the degree of economic insulation was less than the one advertised. Over time, the dynamics became increasingly complex. World financial inflows continued to accelerate from roughly 5 percent of world GDP (mid 1990s) to over 10 percent by 2007 (Figure 7), signaling a proper bonanza. The question was:

Is this time different from the preceding decade?

[20]International money markets a priori favor highly liquid instruments.

Figure 7: The Trajectory of World Capital Inflows (1995–2010)



Source: Author's elaboration based on Milesi–Ferretti (2025).

2.6 From Capital Flows to Global Liquidity: The Missing Link

Empirical evidence alone until 2009 proved insufficient to anticipate the scale and the nature of systemic risk that flows were propagating across economies. In 2009, gross capital inflows dropped dramatically, declining by approximately 60% from around $500 billion in 2008 to $200 billion in both AE and DE and for all types of flows (IIF, 2009). If we define global liquidity as in IMF (2012), namely as the volume of total liabilities of financial liabilities, it surged by 40%. 2009 thus marked an inflection point in the literature.

Two aspects of the 2009 Great Financial Crisis (GFC) are relevant to affirm a *Yes* to whether this time was different[21].

First, the concept of global liquidity became a dimension warranting scrutiny and responsibility. In 2011, the Committee of the Global Financial System (CGFS) formed a group to investigate global liquidity. The BoP account based on the Humean model of international adjustment —the early model of net external adjustment (NEA)— would soon be replaced by indicators of global liquidity[22]. Second, the international dimension of the crisis led scholars to focus on cross-border transmission effects and the role of international financial

[21] See Baker (2002) on the emerging housing bubble and reckless lending practices; Rajan (2005) on systemic risk exacerbated by financial innovations; Shiller (2005) on unsustainable housing valuations; Roubini (2006) on the risks of subprime lending and the impending housing collapse

[22] Also, in September 2013, the Saint-Petersburg G20 Summit called on the IMF to develop proposals on how to incorporate global liquidity indicators more broadly into the Fund's surveillance work (IMF, 2014).

intermediaries relative to financial deepening and reduction in home bias (Milesi-Ferretti and Tille, 2010; Cetorelli and Goldberg, 2011,2012; Bruno and Shin, 2015). How liquidity is distributed influences economic and financial conditions in ways that are not directly under the control of national policymakers (IMF, 2012). This was clearly the missing link in earlier macroeconomic models.

According to BIS (2011, p. 59),

Global liquidity should be understood as the overall ease of financing (or perceptions thereof) in the international financial system.

In other words, global liquidity is a vector of variables which shift the supply function of cross-border credit (Cerutti et al., 2014). It can be categorized into official and private components (BIS, 2011). Official liquidity is under the control of monetary authorities, such as those used for settling claims without restrictions, and is exclusively created by CB[23]. Private liquidity accounts for most of global liquidity and is more decentralized[24]. The common factor between the two is the ease of financing.

Global liquidity can be understood as cross-border credit. It operates through two fundamental channels for financial flows which are both found in BoP under *Other Investments* for cross-border bank loans and *Portfolio Investments* for bond issuance. From now on, we also refer to credit according to this definition. The two channels reflect the relevance of both banks and market-based funding, and evidence suggests that financing, including higher-risk projects and borrowers, has moved away from banks and toward market-based funding sources, mainly NBFIs[25] (Avdjiev et al., 2025; Buch and Goldberg, 2024; Goldberg, 2023; Cotelioglu et al., 2021; Eren et al., 2020). Also, as expected, the drivers of global liquidity are in line with push and pull factors (Table 3).

[23]Instruments like IMF-WB programs and special drawing rights (SDR) are not included as, although they support the mobilization of the same resources, they are not responsible for their creation.

[24]Private sector credit has relevant properties as an early warning indicator of financial vulnerabilities (Borio et al., 2011; Avdjiev et al., 2012; Aldasoro et al., 2018; Drehmann et al., 2024).

[25]Only in 2023, the size of the NBFI sector increased 8.5%, more than double the change of the banking sector (3.3%), making NBFI share of total global financial assets equal to 49.1% (Financial Stability Board, 2024).

BIS (2023) identifies three distinct phases in the evolution of global liquidity. We focus here on aggregate indicators, while Azis and Shin (2019) distinguish Asia-specific phases in global liquidity.

The first phase of global liquidity was bank-driven. Ahead of the GFC, global credit growth was primarily intermediated through banks, with bond market issuance playing a secondary role. This period was marked by light regulation of bank leverage and an MP stance that remained behind the curve. These conditions facilitated rapid credit expansion and rising systemic vulnerabilities (Borio and Disyatat, 2011).

The second phase began after the GFC and saw a structural shift from bank-based to bond-based credit, especially in U.S. dollar terms. This transition was underpinned by accommodative MP in AE, which encouraged investors to search for yield particularly in EM. Dollar credit to EM expanded rapidly, with year-on-year growth rates exceeding 10% and peaking at 24% in 2007. By Q1 2009, dollar-denominated credit accounted for 63% of total cross-border credit. This phase solidified the role of bond markets in international liquidity and reinforced the centrality of U.S. dollar credit in global intermediation.

A third phase has emerged with the inflationary shock started in 2021. CB tightenings, faster in the US than in the euro area or Japan, ended the low-for-long regime that had defined the patterns in Phase 2. As expected, global credit growth decelerated, with dollar-denominated credit contracting more sharply. Bank lending declined substantially, and this effect was amplified for EM banks. While bond market credit growth stalled, its share continued to rise relative to bank lending, highlighting the increasing role of the second channel of global liquidity. In addition, there has been a marginal increase in yen-denominated credit due to persistently accommodating policy in Japan, but until August 2024.

2.7 The Global Financial Cycle: Structure and Genetic Code

Financial integration has facilitated the geographic diffusion of financial shocks over time (Cetorelli and Goldberg, 2011, 2012; Bruno and Shin, 2015), suggesting that financial systems may follow a cyclical pattern. Rey introduced the term *global financial cycle*, which we denote as GFCy in line with Cerutti et al. (2017). Because the cycle arises from intercon-

nected and mutually dependent financial systems, the analogy of the three-body problem in physics shows how non-linear inter-connections among countries' financial systems defy precise measurement. The objective of this section is to show that these interconnections can be explained by two core factors driving the GFCy. This reveals why a modest shock to these increases the likelihood of systemic risk.

The two factors are risk appetite and U.S. MP.

The global risk factor is measured by U.S. implied equity volatility[26] (measured by the VIX index or the VXO) and the U.S. BBB-rated corporate bond spread over U.S. Treasury securities.

First, it has cyclical behavior, in the sense that the expansion of international banking correlates with changes in risk premia (Adrian and Shin, 2010). Second, it affects carry trades (Brunnermeier et al., 2009) as an international transmission channel and amplifier of liquidity and MP. Third, it can partially explain situations of drying-up (BIS, 2011), i.e., when risk appetite stimulates market leverage via short-term wholesale funding. When shocks occur, leverage propensity contracts, reducing market liquidity (transactions), while increasing market volatility.

Our second driver to highlight are U.S. monetary policy (MP) spillovers.

First, spillovers are distinguished into policy-induced spillovers and those arising from real shocks. But why are U.S. MP-induced spillovers a central focus of analysis? On the hegemonic role of the U.S. in international finance, the two main arguments are (1) the dollar supremacy in international financial markets; (2) the welfare effects of capital flows. Both arguments are related to the literature of the United States' *exorbitant privilege* (Gourinchas and Rey, 2007) in global finance and the corresponding *exorbitant duty* borne by its counterparties (Gourinchas et al. 2010). One key point is that, when compared to the U.S., economies are not only classified as developed or developing, but also as *insurers* or *liquidity*

[26]There has been higher focus also on exchange rate volatility (Sarno and Taylor, 2002). By postulating that the exchange rate is determined by the condition of a zero net balance of payments, macroeconomic models missed the exchange rate's role in reconciling stock demands and supplies that are normally orders of magnitude greater than BoP flows.

sinks based on their capacity to provide or absorb safe assets (Gourinchas et al., 2010, 2019). The channels of MP shocks are (1) the traditional expenditure switching effect (IMF, 2018); and (2) the world interest rate (Bruno and Shin, 2015). Suppose a contractionary shock which appreciates the dollar against non-U.S. currency and raises the price of U.S. exports. There are two channels. Foreign consumers substitute away from U.S. goods toward domestic products, boosting output in non-U.S. economies (first channel). Investors direct flows (portfolio rebalancing) to higher-yielding dollar assets (second channel).

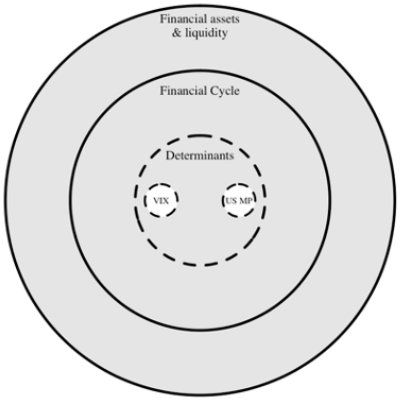
Empirically, the spillover effects of U.S. MP have been explored by studies such as Kim (2001), Canova (2005), Mackowiak (2007), and compared in size to domestic MP actions (Cecchetti et al., 2020). Chen et al. (2014), Bowman et al. (2015), Ahmed et al. (2017), and Hoek et al. (2021) all find that U.S. MP spillovers are smaller for countries with stronger fundamentals, in contrast to Eichengreen and Gupta (2015), Aizenman et al. (2016). Also, over time, the asymmetry in international financial spillovers of the Federal Reserve Bank (FED) has increased (Rey and Miranda-Agrippino, 2021). For EM, Avdjiev and Hale (2019) prove that U.S. MP drives cross-border bank lending through global banks.

On the relationship between risk and MP, the risk-taking channel of MP is well-documented. At the domestic level, monetary tightenings intensify informational frictions in credit markets, raising the external finance premium. This further amplifies the contractionary effect (Bernanke and Gertler, 1995). Instead, lower policy rates compress risk premia, incentivizing leverage and search-for-yield behavior (Borio and Zhu, 2008). At the international level, the same risk channel works through cross-border bank flows. Passari and Rey (2015) show that U.S. MP has larger effects in transmitting to financial conditions in economies outside the U.S., including those with inflation-targeting regimes[27] and flexible exchange rates. Bruno and Shin (2015) show that U.S. policy shocks transmit abroad mainly through cross-border bank credit flows—what is called the international risk-taking channel of MP.

[27]See Borio and Chavaz (2025) for a detailed evolution of inflation targeting across AE and DE.

The GFCy is different than the business cycle in its extension[28], determinants[29] and underlying structure. We adopt the framework of Figure 8.

Figure 8: Stylized Representation of the Global Financial Cycle



Source: Author's elaboration based on Table 24.

There are three caveats on Figure 8. First, the dashed outlines on the innermost circle are used to signal that both VIX and U.S. MP are correlated with the financial cycle, but also that VIX fluctuations may be themselves driven by U.S. MP. Miranda-Agrippino and Rey (2015) find that Fed Funds shocks explain 20% of VIX swings, 10% of capital flows to banks, and 5% of debt flows to non-banks in line with with Bruno and Shin (2015) over the period 1995-2007. Avdjiev et al. (2017) also find that the impact of global risk has increased post-GFC, particularly for international bond flows and declined for cross-border loan flows. Second, Jordà et al. (2018) propose the co-movement of risk premia instead of financial assets in the outmost layer similar to Blanchard and Summers (1984) on the synchronization in world real interest rates from 1970s. Third, the outline of the financial cycle might be finer for certain economies reflecting higher exposure to global factors (Goldberg and Krogstrup, 2018). Clearly, open economies experience greater effects (Bruno and Shin, 2015). Also, the type of recipient is relevant. For instance, Başkaya et al. (2017) show that local banks in Turkey are particularly sensitive to global financial conditions, while Cantú et al. (2019) report similar findings for Mexico.

[28]The length of a financial cycle is four times the length of a business cycle (Drehman and Tsataronis, 2014).

[29]Financial cycles directly reflect panics, contagion, and psychology (Kindleberger, 1978; Rodrik, 1998).

The GFCy can be analyzed from two perspectives. The first concerns economies that drive the cycle—primarily the U.S.—and is referred to here as the *active* perspective. The second focuses on economies that are affected by the cycle, and is referred to here as the *passive* perspective. The study adopts the passive perspective for Japan, motivated by the hypothesis of Miranda-Agrippino and Rey (2021, p.9):

> *The existence of a Global Financial Cycle does not imply that all countries and flows be exposed to it in the same way and to the same extent, which is confirmed by the heterogeneity and time-variation in the factor loadings that emerges from most of the studies.*

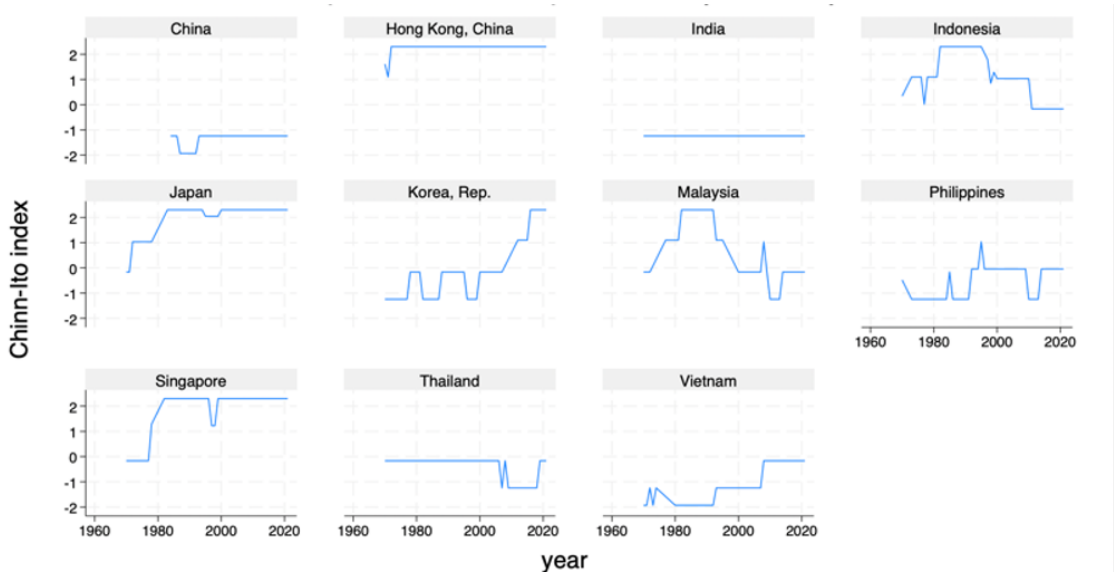
The previous chapters have introduced two main strands of the literature. First, the literature on capital flows as transmission channels of global financial conditions raises the question of which type of credit poses the greatest risks to Japanese financial stability. Second, the theoretical and empirical literature on the structure and drivers of the GFCy leads to two related questions: (1) whether the cycle is primarily driven by changes in U.S. monetary policy or in global risk sentiment, and (2) whether its effects are short-term and cyclical or persistent.

2.8 Localizing the Cycle in Japan

This section brings Japan into focus, and we advance four stylized facts on today's Japan.

Japan exhibits among the highest levels of capital account openness in Asia. (Figure 9).

Figure 9: Capital Account Openness Index for Selected Asian Countries (1960–2021)



Source: Author's calculations based on the Chinn–Ito index (Chinn and Ito, 2008; updated).

The yen is still among the reserve currencies (Figure 10). This is related to confidence to Japan, further determined by (1) prospects of Japanese economy from second part of 1900s and commitment of BOJ to maintain low inflation; (2) Japan built the world's largest government bond market and advanced banking sector; (3) Japan's MP[30].

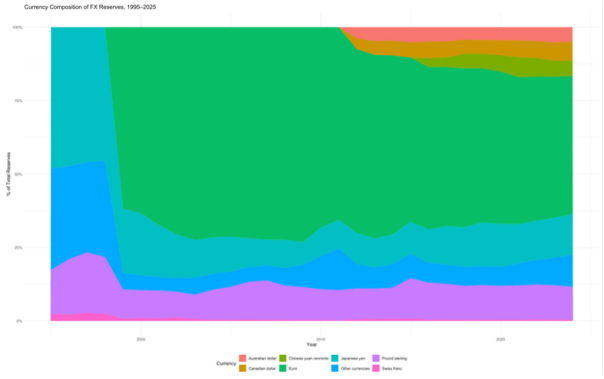
The confidence in the currency, coupled with BOJ's ultra low interest rate trajectory especially relative to the U.S. MP, has made the yen a preferred funding currency in the global carry trade. Yen-funded carry trades surged from under USD 50 billion in 2005 to around USD 300 billion by mid-2023, reaching approximately USD 325 billion by the end of 2024 (BIS, 2024). In other words, even modest shifts in domestic monetary policy can trigger sizeable unwinds. We call this the *mirroring effect*—changes in Japan's capital flows closely reflect (and therefore are a proxy for) global flow trends more effectively than other economies. For example, the BOJ's move toward tighter real policy rates in August 2024 coincided with a rapid 4 percent appreciation of the yen and a $20 billion reduction in outstanding yen funded carry positions within two weeks (BIS, 2024). The buildup of net short yen positions mirrors the surge in yen-funded carry (Figure 3.5). This raises the question of

[30]See Appendix (1).

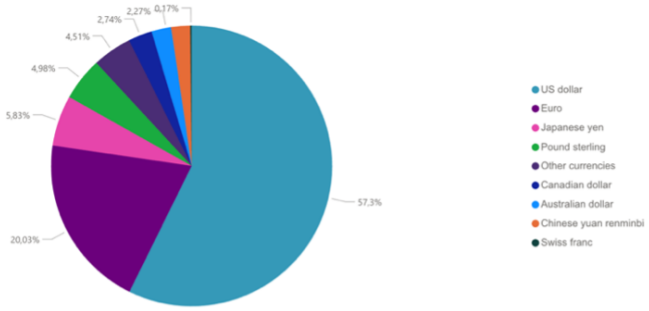
what a shift to higher interest rates[31] implies not only for Japan but also for global liquidity.

Figure 10: International Reserves (2024)

(a) International Reserves (ex. USD) (2000-2024)



(b) Allocated Reserves of Currency (2024)



Source: Author's elaboration based on IMF COFER (Q4 2024).

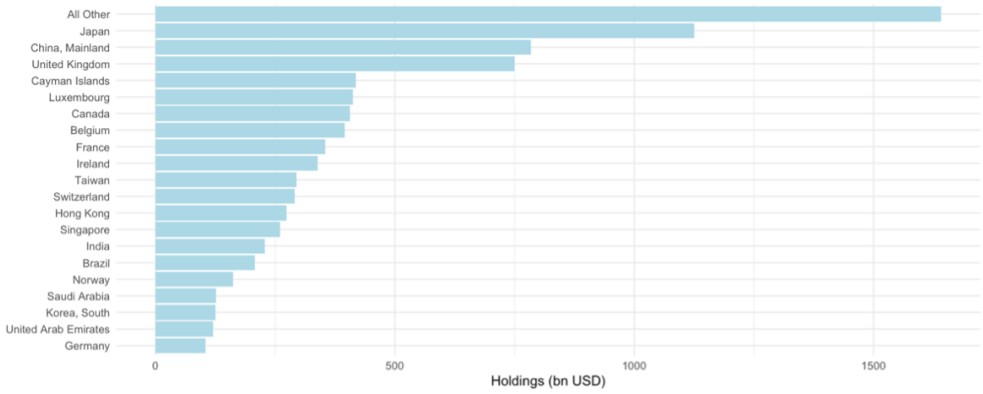
Note: Panel (a) shows shares of foreign-exchange reserves in all currencies except the U.S. dollar. Colors correspond to individual currencies as follows: Australian dollar (red), Canadian dollar (orange), yuan renminbi (light green), Euro (dark green), yen (light blue), Pound sterling (purple), Swiss franc (pink), Other currencies (blue). In panel (b), allocated JPY reserves correspond to 17% of Japan's GDP (Cabinet Office of Japan, 2025).

Japan is the largest foreign holder of U.S. Treasury securities (U.S. Department of the Treasury, 2025) (Figure 11). As a result, any shift in U.S. monetary policy has direct implications for portfolio returns via a steeper yield curve and funding liquidity via wider cross currency basis spreads. Historically, faced with twin deficits in the 1980s—simultaneous trade and fiscal deficits—the U.S. feared potential rate hikes. Koo

[31] See Ueda (2024).

(2003) states that Japan's demand for U.S. treasuries backed the dollar. In other words, the U.S. was saved by Japanese capital flows.

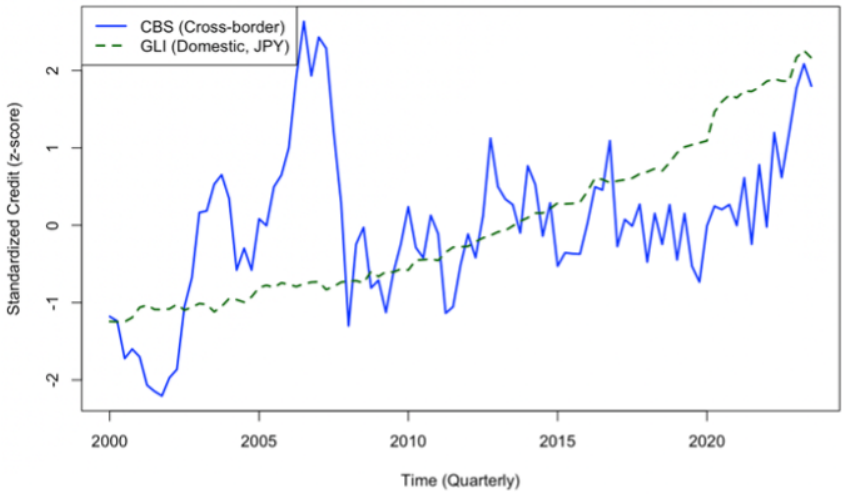
Figure 11: Holders of U.S. Treasury Securities (2025)



Source: Author's elaboration based on U.S. Department of the Treasury (2025).

Both domestic and cross-border bank credit have expanded in Japan, reflecting increased demand for yen funding and higher volatility in cross border and domestic credit flows (Figure 12). This expansion matters for Japan for two main aspects. First, it shapes the structure of financial markets through the role of Japanese banks, linking Japan into global liquidity cycles. Second, it amplifies the credit risk channel: high leverage via external claims certainly raises the economy's vulnerability. Although the credit boom was largely domestic, its link to risk was evident in the 1990s bubble. It was excessive corporate borrowing that precipitated what is properly termed a balance sheet crisis. Koo (2003) was among the first to emphasize that the collapse originated in banks' impaired balance sheets. Instead, Sheng (2009) argued that the troubled banking system was the essence of the problem, and it was not causal.

Figure 12: Domestic vs. Cross-Border Bank Credit in Japan (Standardized)



Source: Author's calculations based on BIS (2025).

Note: The two series are from the BIS Locational Banking Statistics (cross-border claims on Japan) and the BIS Global Liquidity Indicators (domestic JPY series). Both are plotted as standardized (z-score) deviations. The International Consolidated Banking Statistics (CBS) measure the consolidated foreign claims of banks headquartered in Japan on borrowers abroad (including debt securities and local affiliate claims). The Global Liquidity Indicators (GLI) track total credit to non-bank borrowers in foreign currency. The *Domestic, JPY* series isolates yen-denominated credit to non-residents and thus serves as a proxy for global yen liquidity.

The interest in applying the GFCy study to the economic case of Japan follows these four facts.

Each complex economic system has distinctive factors, but if we only consider as benchmarks of comparison GDP and financial integration, Japan is like other modern AE in the West. It is an advanced economy with its own and independent CB, currency and flexible exchange rate regime. Any economic scenario that applies to Japan may well apply elsewhere—a point also Paul Krugman (1998) made when he revived the liquidity trap argument. We do not suggest that Japan's role in international finance will necessarily expand. Rather, its international setting provides a compelling case to understand the evolution of global liquidity and the existence of the GFCy. Japan is indeed a funding center, and this is not new.

The four facts consistently affirm Japan's integration with international financial mar-

kets. Japan is included in all cross-country empirical studies of AE[32] (Table 24). Yet, to my knowledge a one-country study for Japan is new and the evidence remains limited: (1) with the exception of Fujiwara and Takahashi (2012), there is no study (Table 4.38) focusing exclusively on the link between the GFCy and Japan; (2) the literature focuses on U.S. (foreign) asset insurance, but Japan's role as the largest foreign holder of U.S. Treasuries has received little attention. Are the effects on asset recipients more pronounced than on issuers? And does being a major holder amplify these effects during certain periods?

In Section 4, we isolate the relationship between the GFCy and Japan using disaggregated domestic credit data to assess whether Japan's patterns reflect the cycle non-linearly through credit expansion or contraction.

3 The Institutional Architecture of Economic Insulation

The crises of the 1990s were an important inflection point in the history of capital flows. However, they resonate with earlier systemic breakdowns, namely the unraveling of the Bretton Woods system (1971) and the interwar gold standard (1931–1933). They suggest a pattern. Market participants underestimate or fail to recognize ex ante emerging risks, and policymakers may adjust tightening rules only after vulnerabilities become apparent. Indeed, there is a cycle of periods of complacency followed by abrupt (and systemic) corrections, contributing to the persistence of financial vulnerabilities.

The objective of this section is to understand the role of institutions in managing capital mobility. As for the Asian financial crisis, restrictions on capital mobility were strongly dependent also on the institutions in place. Here, we make no attempt to repeat the facts but to view them strictly from the institutional point of view.

[32] In the literature, Japan is analyzed together with Switzerland and, in some cases, Europe when defining global funding conditions. The literature on Japan is well established for its own economic and financial cycle, such as the effects of the QE and the domestic crisis. Early perspectives linking Japan and global financial variables, such as Koo (2003), are less common: he argues that Japan's demand for U.S. Treasuries supported the dollar from the 1980s, effectively sustained by Japanese capital flows.

There are two assumptions we make. First, we assume that institutions possess power and authority in markets. Precisely, it is power that determines the relationship between authority and market (Strange, 1988), thus, the role of institutions is time-variant. Second, the international order also shapes the national setting. This helps us address questions such as: Why did nations impose capital controls if capital mobility was seen as beneficial for local industries? Why are there still capital controls in certain countries?

3.1 Responsibilities

Capital mobility is regulated through capital controls, and capital controls are part of macroprudential policies. The institutions are both national governments (NG) and central banks (CB), though we also recognize the role of the International Monetary Fund (IMF)[33].

Capital controls require NG-CB coordinated decisions. Here, coordinated decisions do not imply loss of CB independence[34]. Also, the CB is uniquely positioned at the nexus of monetary and financial stability so that sharing macroprudential tasks (including capital controls) with the NG does not erode its core independence (Masciandaro, 2006b). Before floating exchange rate regimes became prevalent, policy responses to external shocks were managed primarily by CB with gold sterilization policies as main tool[35]. Since Bretton Woods, NG-CB coordination has factored in considerations on the international economic and financial regimes, in response to (1) increasing integration of capital markets and (2) IMF stabilization programs[36] in EMDEs.

[33]For example, in the U.S., during periods of distress (1930s and 1950s) the actors were the Treasury Department (Office of International Finance), the Federal Reserve and the executive branch of the government. Also in 1990s Thailand, the crisis response was primarily led by the Bank of Thailand in conjunction with the Ministry of Finance. In tandem, the IMF oversaw reform programs designed to stabilize the economy.

[34]See Masciandaro and Romelli (2015) for an analysis of the evolution of CB independence from the Great Inflation (1970s) throughout the Great Moderation (1980s-2000s).

[35]Mundell (1962) states that in a world of fixed exchange rates and perfect capital mobility, gold sterilization is like trying to stop water from spilling over an already full sink by turning down the tap, given that capital outflows offset any change in money supply.

[36]The internationalization of the world economy introduced a third actor into the NG-CB framework: the IMF. There was a recognized need for a global monetary institution and the two proposals on the table were: White's (under the guidance of Morgenthau) Stabilization Fund (White, 1943) and Keynes's Clearing Union (Keynes, 1943), with fil rouge the purpose of facilitating BoP equilibria. Keynes envisioned countries settling international balances using accounts denominated in a new supranational unit of account (currency), the bancor. The responsibility for corrective action was placed equally on creditor and debtor countries. Instead,

Two points are relevant for this section. First, it is impossible to divorce politics from economics[37]. Second, policy decisions are often regionally biased: Europe, the U.S., Asia and Latin America each developed distinct supervisory and capital-control frameworks, given the different nature of policymakers. For example, European policymakers tend to be more backward-looking because of a relatively higher importance of history in Europe (Strange, 1988). In other words, the decision function of the policy maker presents backward-looking bias—or inertia. Another explanation is the *geography view* (Masciandaro, 2006a): a country's neighbours and regional institutional legacies shape its own financial-supervision design.

3.2 Instruments

The questions are: (1) how can and do institutions evaluate capital flows; (2) what policy tools they have for capital inflow and outflow management; (3) how many tools they can realistically use.

For (1), institutions conduct a proper screening of capital flows. The question is whether restrictions should be based on the volume of capital flows such as persistent KA deficits, or on the risk profile of the flows, regardless of their quantity. The most comprehensive answer is the *dual screening* approach which involves evaluating the flows both from an aggregate macroeconomic perspective and from a risk management perspective at the sectoral or micro level (IMF, 2012). We add a third lens: the structure of the domestic financial system, which also determines how capital flows turn into economic shocks[38].

For instance, Chile in the 1990s introduced reserve requirements that varied with the maturity and currency of inflows—screening flows both by volume (large portfolio inflows) and by risk profile (short-term vs. long-term) (Agosin and Huaita, 1997). Malaysia's 1998 capital controls went a step further, exempting only long-term FDI while restricting short-term

the White plan called for a $5 billion Fund, which was ultimately agreed upon as $8.8 billion. However, funds were to be paid through subscriptions, and access to the Fund was limited by quotas tied to paid-in contributions.

[37] See theories of development economists (Myrdal, Seers, Lewis, Singer, Prebisch), and economic historians (Weber, Schumpeter, Kuznets, Cipolla).

[38] See Borio (2012), Cetorelli and Goldberg (2012).

portfolio flows—a dual screen by type and term (Athukorala and Rajapatirana, 2000). For our third lens, consider Korea's experience after 2008: its largely bank-centred system amplified the pass-through of global liquidity into corporate lending, so authorities imposed sector-specific limits on banks' foreign-currency liabilities rather than restrictions on all inflows (Kim and Doo, 2008). In essence, the real—filtered for exogenous shocks—impact of such measures is contingent upon the judgment of policymakers in the screening mechanism.

For (2), policy tools depend on the stage of domestic financial development, which makes sequencing important: structural policies should precede capital-flow measures. A *sequencing first* (Einchengreen, 2001) approach is key—deepening and stabilizing structurally domestic both financial markets and institutions before undertaking significant capital-account opening. A stylized representation of the ideal liberalization plan is in Figure 25.
Structural policies include measures to deepen domestic bond and equity markets[39], develop financial products in a safe manner[40], and strengthen regulation and supervision while streamlining rigidities (IMF, 2011). For the last point, from a survey on the liberalization experience of 34 DE and AE between 1973 and 1996, Williamson and Mahar (1998, p.29) suggest that:

While most [countries] *liberalized the capital account, few countries seem to have heeded the advice to precede financial liberalization with the introduction of a system of prudential supervision, staffed by supervisors who have a high degree of independence of the political authorities.*

Supervision is crucial from two dimensions: (1) structure; (2) dynamism. For the first, the two sub-dimensions to analyse are fragmentation—the degree to which supervisory powers are dispersed across multiple agencies—and the financial-conglomerates effect—the blurring

[39]Examples include the following: India created the Securities and Exchange Board of India (SEBI) to regulate capital markets (1992). In bond markets, Malaysia developed the Malaysia Government Securities (MGS) yield curve by issuing regular, benchmark-sized bonds, and established the Bond Info Hub (early 2000s). In equity markets, South Korea improved disclosure requirements and corporate governance under the Financial Supervisory Commission (1998-1999).

[40]Examples include the following: Malaysia's issuance of sukuk (Islamic bonds) with strong regulatory oversight (2001), Chile's structured use of pension fund instruments within a well-defined risk framework (from 1990s).

of boundaries between banks, insurers and other intermediaries that calls for unified oversight (Masciandaro, 2006a). For the second dimension, supervision must be continuously active in the sense of being recalibrated to evolving risks. This requires on one hand the existence of ad-hoc actors which focus on the relevance of policy, for instance macroprudential committees (e.g., the Bank of England's Financial Policy Committee or Chile's Financial Market Commission[41]), and dynamic tools that can be implemented (Goodhart, 2008). The standard example of dynamic tools is the countercyclical capital buffer which rises when the credit-to-GDP gap widens and falls in downturns (BCBS, 2010).

Once the structural (pre)conditions are met, what can institutions do? Following IMF (2012), Ostry et al. (2010, 2011), and BIS (2008), policy instruments can be divided into macroprudential policy measures (MPMs) and capital flow management measures (CFMs). Full details are in the Appendix. CFMs limit the quantity or alter the composition of capital flows, while MPMs prevent the buildup of systemic risks. Some measures fall into both categories. Despite their effectiveness, CFMs should not substitute macroeconomic policies, but they can be complementary alongside financial sector regulations (IMF, 2011), especially when macroeconomic conditions are volatile, and policymakers need time to determine the response.

Equally important is the challenge in identifying when and how to exit from CFM and/or MPMs. IMF (2012) proposes a standard cost-benefit analysis, concluding that the optimal time to exit is when policies impose unnecessary costs on the economy or become ineffective. Yet, for capital controls, there are two additional factors to consider: (1) Metrics; (2) Politics. NG may argue that some metrics do not account for country-specific factors. For example, in 2020, Korean authorities argued that external balance assessments (EBA) frameworks did not fully capture demographic factors and high savings rates (IMF, 2020). In general, this holds true particularly in Asia where different structural characteristics define local economic growth (World Bank, 2009). For the second factor, after World War II, capital controls were envisioned as part of a coordinated international effort managed by supranational organiza-

[41]The *Comisión para el Mercado Financiero* was established in 2017.

tions reflecting a political willingness among states to cooperate. Instead, in the inter-war period, many economies implemented capital controls largely out of a protectionist impulse, driven by ideologies aimed at safeguarding domestic interests (Bordo and Eichengreen, 1993). Also, politicians are able to intervene on a shorter time span because capital-flow control measures are relatively flexible in their design and timing. Less flexible and more exogenous is the structure of local and international financial markets. This is why, economic theory aside, liberalizing the capital account before the home-country financial system has been strengthened can contribute to serious economic problems.

For the last question (3), the room of maneuver available to countries is partly defined by the IMF Articles for IMF 191 members (IMF, 2024). However, the IMF's mandate on international capital movements (Article VI, Section 3) is narrower than its mandate on current international transactions (Article VIII, Section 2), which restricts payment and transfer controls without Fund approval. by contrast, Article VI permits members to impose controls on capital movements when necessary. The remaining room for maneuver depends on the institution's objectives. The financial trilemma (Schoenmaker, 2011) captures the trade-off among full integration, regulatory autonomy over prudential tools, and systemic stability, explaining why layered macroprudential measures are more practical than one instrument.
To understand how many policies institutions can use, we consider two prevailing views. Tinbergen (1952) understood the economy as a linear control system, where policy targets can be achieved if the available instruments are complete, thus, there is one instrument for each target. Mundell (1963) stated that policies should be paired with the objectives on which they have the most influence to not create instability or cyclicality.
For policies on capital controls, Tinbergen's rule is not practical. History shows that, to be effective, countries used a blend of different measures for the only objective of limiting capital mobility. Also, the complex interactions among multiple financial systems further complicate the application of Tinbergen's rule to capital control policies. Similar to the three-body problem in physics where the interactions among three bodies produce forces that are too connected to measure precisely, the interdependence of countries' financial systems can make it difficult to isolate a single instrument for each policy objective.

Two key insights emerge from Section 3. First, tools for capital management are a wider set than standard MP tools[42], and fall under a joint CB-NG framework. Second, these tools possess *some* degree of discretion which can be a political lever justified by protectionist ideologies, but also safeguards for institutional risk-management.
This policy framework holds also for Japan. The next section introduces the quantitative analysis and examines how center-country variables transmit to Japan, a key concern for policies of insulation against external shocks.

4 Data

This section presents the variables used in the analysis. The reference period is 1997Q1-2023Q4 (108 observations), beginning in 1997 to account for the Asian Financial Crisis. The analysis employs two categories of variables: (1) Global Financial Cycle indicators—U.S. monetary policy shocks and global risk sentiment; and (2) Japanese domestic and cross-border credit measures. Table 4.6 lists the data sources.

4.1 U.S. Monetary Policy Shocks

We use shocks as measure of monetary policy (MP). Shocks differ from spillovers which capture the international MP transmission. Spillovers reflect the systematic and anticipated policy component, whereas shocks isolate its unanticipated policy component. As MP variables often respond endogenously to macroeconomic conditions (exogeneity problem in model specification[43]), only shocks that are exogenous to the information set of economic and financial agents can be treated as such in the models. And the consensus considers this approach *narrative* because it relies on information directly sourced from the CB[44].

[42]See Appendix.

[43]The classical regression assumption that the error term ε_t is orthogonal to the regressor Δx_t is violated in this context. Here, ε_t denotes the regression residual, and Δx_t represents changes in the MP variable of interest.

[44]There is extensive literature examining the informational content embedded in FOMC announcements. Particularly, these announcements are shown to be significantly correlated ex post with economic and financial information that was already publicly available beforehand. Miranda-Agrippino and Ricco (2021) show a correlation with broad macroeconomic conditions extracted via dynamic factor models; Bauer and

Romer and Romer (1989, 2004) construct exogenous policy shocks from FOMC (Greenbook) forecasts before each FOMC meeting. Methodologically, they first regress actual policy decisions (i.e., changes in the federal funds rate) on the forecasts, and the residuals from the regression are the exogenous MP component. Two caveats follow. First, they capture the central bank (CB) policy timeline but do not incorporate financial market movements. Second, the policy timeline is slower than that of financial markets[45]. For this reason, recent approaches focus on higher-frequency identification (HFI), exploiting narrower time windows around FOMC announcements. Kuttner (2001) uses the daily difference between the actual federal funds target rate and the rate implied by the current or next-month futures contract before the FOMC meeting. Gurkaynak et al. (2005) introduce asset-price-based (federal funds futures contracts[46]) surprises reflecting both policy rate and path factors used for example in Rey (2014), Passari and Rey (2015). They consider two intraday measures, fifteen minutes (tight window) and fourty-five (wide window) after the policy announcement (1990-2004). Gertler and Karadi (2015) focus on a single surprise measure: the 30-minute change in 3-month-ahead federal funds futures around FOMC announcements. Jorda et al. (2018) construct a HFI based on 30-minute changes in interest rate futures around FOMC announcements. Swanson (2021) constructs three separate MP surprise measures using changes in multiple asset prices (Treasury yields, Eurodollar futures, and stock prices) within a 30-minute window. He estimates a three-factor model via principal components: (1) a target rate surprise, (2) a forward guidance surprise, and (3) an asset purchase (QE) surprise, allowing identification also during zero lower bound (ZLB) periods.

We use Bauer and Swanson (2023) (Figure 13) as in Degasperi and Venditti (2024). Bauer and Swanson (2023) respond to Ramey's (2016) critique on the limited variation in high-frequency MP shocks by doubling the set of announcements used (post-meeting press conferences, minutes releases, speeches and testimonies by Fed Chair and Vice Chair) over 30-minute windows around FOMC announcements. Why do we have such short-term win-

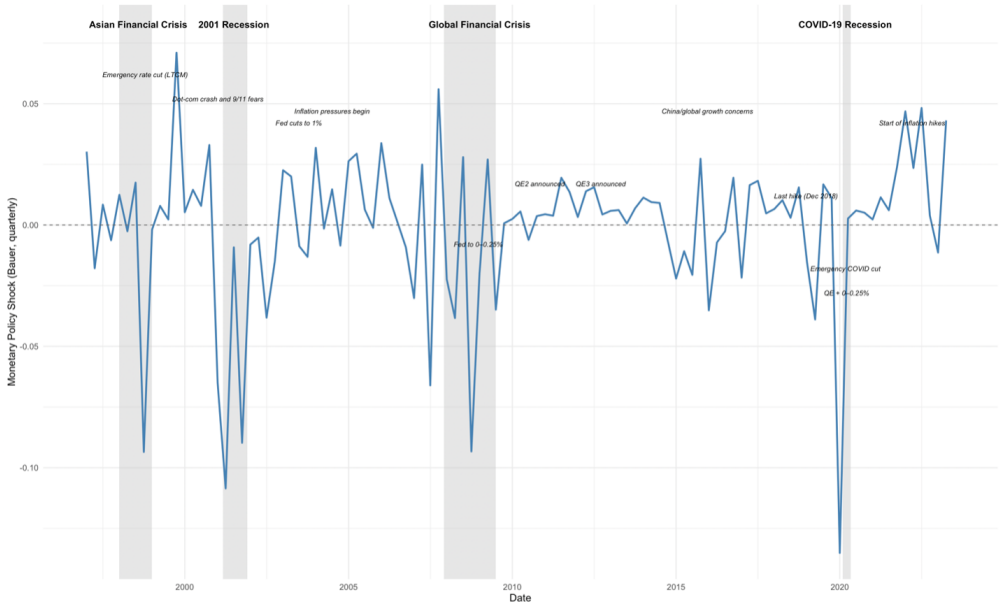
Swanson (2022) document alignment with surprises in major macroeconomic data releases—such as nonfarm payrolls, unemployment, GDP, and inflation—as well as with changes in financial market indicators like the SP 500, yield curve slope, and commodity prices.

[45]See also Bernanke and Kuttner (2004).

[46]Contracts include current-month Fed Funds futures, longer-maturity futures (e.g., 3- to 6-months) and Eurodollar futures.

dows of 30 minutes? The consensus is that the likelihood of other macroeconomic or financial news affecting asset prices within such a narrow window is low. Particularly, when identifying the credit channel of MP (Bernanke and Gertler, 1995), immediate movements in asset prices (as opposed to quantities, which may respond more slowly) and spreads are crucial, as they reflect agency problems, risk shifting, or the operation of value-at-risk constraints[47].

Figure 13: Monetary Policy Shocks (1997-2023)



Source: Author's elaboration based on Bauer and Swanson (2023) and NBER Recession Indicators (USREC) (FRED, 2025).

Note: The Asian Financial Crisis (1997–1998) is not an NBER-defined U.S. recession but is included for illustrative purposes due to its relevance for global financial conditions.

The surprises are measured using Eurodollar futures through 2022 and SOFR futures from January 2023 onward. To match the frequency of our macro-financial variables, we aggregate the monthly series to the quarterly level by averaging within each quarter. And, given our focus on tracing the transmission of MP to financial outcomes, we use the raw surprises to preserve the endogenous response of financial variables that would otherwise be excluded as a result of orthogonalization.

[47]See Gertler and Karadi (2015).

4.2 The Global Risk Factor

To identify an indicator for the global risk factor, we first gather multiple financial risk indicators[48] (Table 8) and conduct a Principal Component Analysis (PCA). Also, the variables are only prices (or market-based measures) and not quantities in line with BIS (2011) and Cerutti et al. (2019), who emphasize that the GFCy manifests more strongly through prices than through quantities.

The PCA provides a reduced-form statistical decomposition of a covariance matrix to identify orthogonal linear combinations that explain the maximum variance. The data matrix $X \in R^{T \times N}$ is decomposed as

$$X = F\Lambda^{\top} + E \tag{6}$$

where F is a $T \times k$ matrix of unobserved factors (principal components), $\Lambda \in R^{N \times k}$ contains the factor loadings, and E is the residual matrix.

We extract the dominant latent factor to be interpreted as the global risk factor (GRF). We then analyze the loadings of each variable on this factor and find that the VIX has the heaviest loading on the single latent factor. When we plot the global risk factor alongside the VIX (Figure 14), two stylized facts follow. First, the *moments* of change in the two measures are mostly synchronized. Second, the *direction* of change is not always synchronized and the VIX tends to react later than the GRF. In 2008, the GRF index rises sharply before the spike in the VIX, consistent with early signs of tightening credit and risk aversion ahead of the Lehman collapse, as broader financial stress was building before equity market volatility reacted. In 2020, credit and funding conditions responded also earlier.

The VIX thus is the most relevant indicator for risk and the best proxy for the GRF.

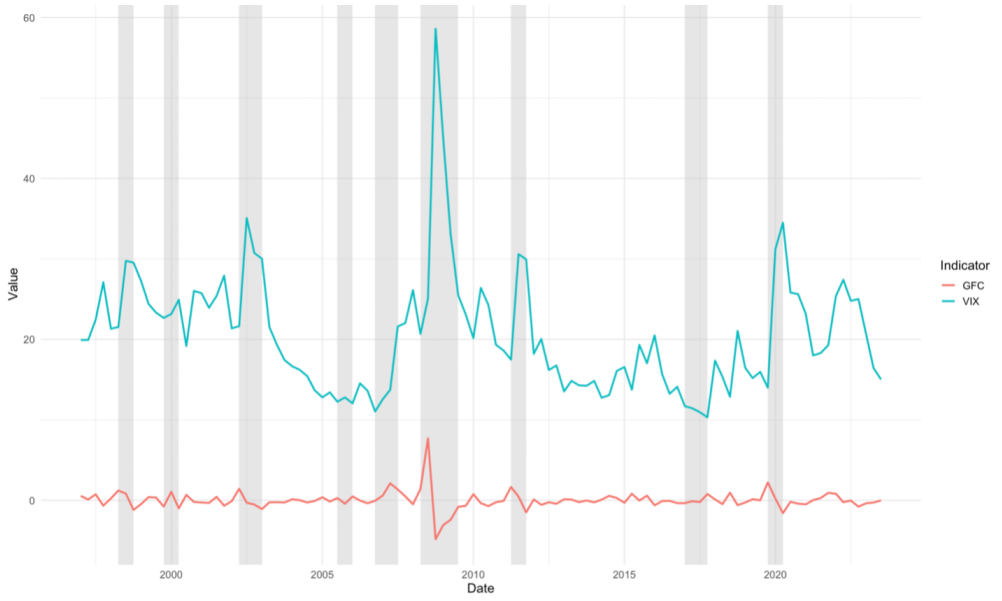
We find in the literature two approaches to estimate the GFCy: (1) the direct one; and (2) the indirect one. The direct one implies using directly proxies, that is, center-country variables, most commonly VIX and U.S. MP. The indirect one implies extracting a proxy of the cycle from PCA (Rey, 2013) or dynamic factor models (DFM)[49] (Scheubel and Stracca,

[48] See also Bauer et al. (2023, p.91) for a list of relevant financial risk indicators.

[49] There could be a third approach advanced by Jorda et al. (2018): 15-year rolling-window Spearman rank correlation coefficients between different types of capital flows.

2019; Cerutti et al., 2017; Cerutti and Claessens, 2024) from the common component of capital flows. We adopt the direct approach and choose two explanatory variables: VIX and U.S. MP shocks (Bauer and Swanson, 2023).

Figure 14: Global Financial Factor and VIX (1997-2023)



Source: Author's elaboration based on FRED data.

4.3 Credit in Japan

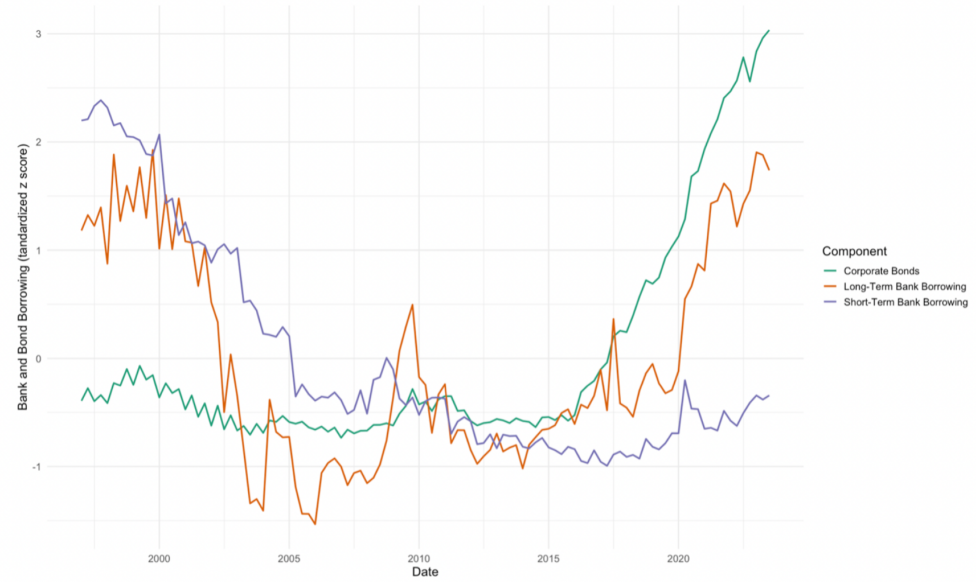
Credit indicators fall into two categories. The first consists of macro-aggregate measures that enable international comparability. The second category captures domestic (granular) credit lending.

Aggregate Credit. First, we draw on BIS International Banking Statistics. We rely on consolidated banking statistics (CBS) to measure claims by international banks on Japan (expressed as a ratio to GDP, in USD) and locational banking statistics (GLI) to capture the total gross liabilities of Japanese banks (expressed as a ratio to GDP, in USD). These are reported on a residency basis (GLI) and nationality basis (CBS). Figure 12 displays the standardized series, expressed as z-scores. BIS statistics are available only from 2000 (96 obvervations). GDP quarterly data is obtained from Japan's national accounts (in nominal

yen) and converted into USD using the bilateral exchange rate (DEXJPUS) from the Federal Reserve Economic Data (FRED), expressed as yen per US dollar.

Second, we use data from the Flow of Funds (FoF) Statistics compiled by the Bank of Japan (BoJ), focusing on liabilities of the non-financial corporate sector disaggregated by maturity (short-term vs. long-term) and counterparty type (bank vs. non-bank) (Figure 15). We focus on the non-financial corporate sector given the credit constraints faced by non-financial borrowers, which can amplify macroeconomic fluctuations through financial accelerator effects (Bernanke and Gertler, 1989; Kiyotaki and Moore, 1997). Instead, the classification by maturity and counterparty offers insights into corporate funding structures, particularly in relation to potential rollover risks.

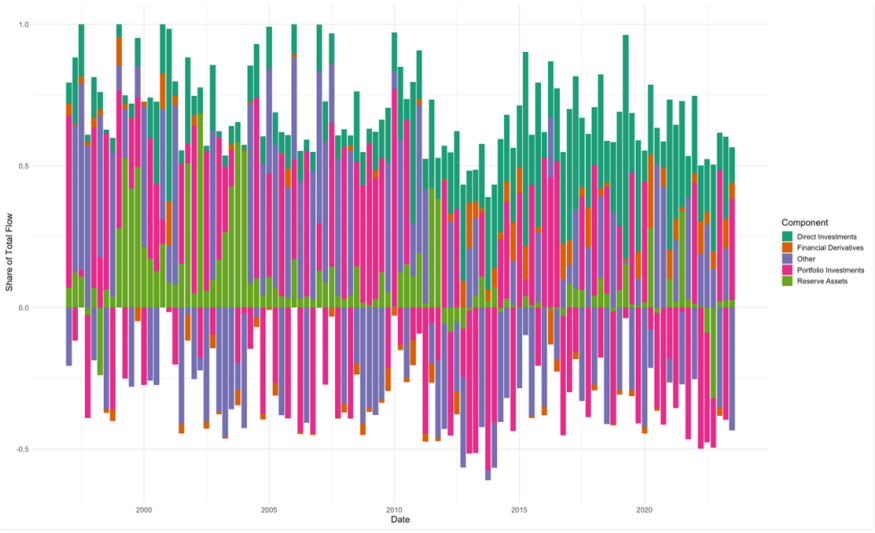
Figure 15: Corporate Credit in Japan (1997-2023)



Source: Author's elaboration based on Flow of Funds statistics (Bank of Japan).

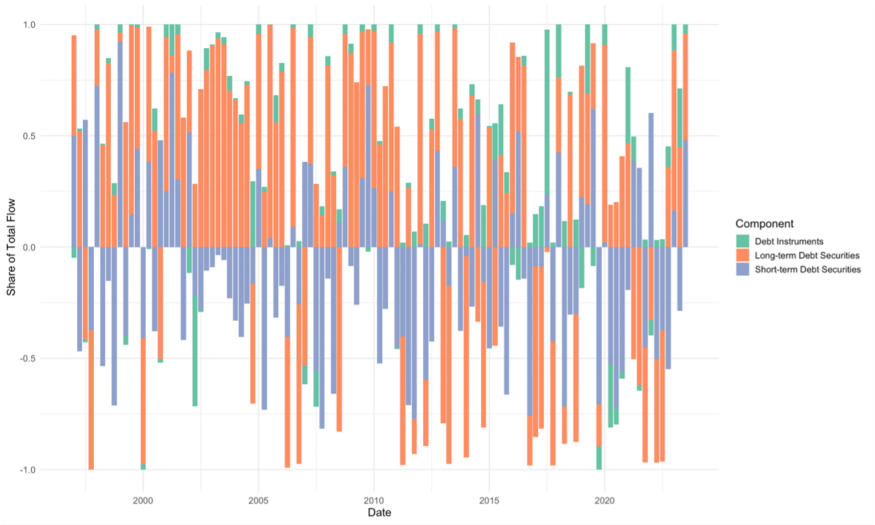
Third, and mainly for a robustness check, we use the BoP Financial Account (FA), as reported by the Ministry of Finance (MoF) and BoJ, in accordance with IMF standards. The dataset records cross-border capital flows (Figure 16), structured into: Direct investment (equity, reinvestment earnings, and debt instruments),

Figure 16: BoP Components (1997-2023)



Source: Author's elaboration based on Japan MoF data.

Figure 17: Credit in Japan (BoP Debt-Related Components) (1997-2023)



Source: Author's elaboration based on Japan MoF data.

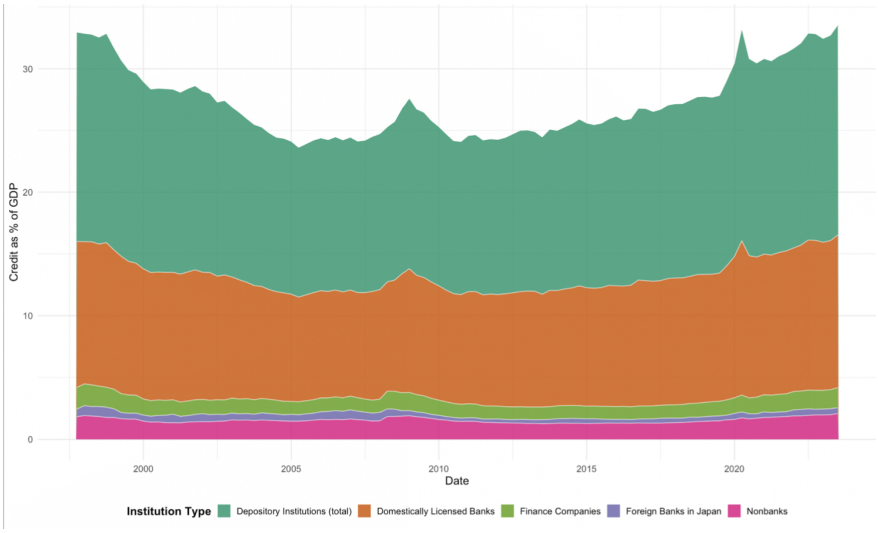
Portfolio investment (equity and debt securities, with further breakdowns by maturity), Other investment (such as loans, deposits, and trade credit), financial derivatives and reserve assets. Flow data are reported in yen billions. Figure 17 displays FA debt-related components. Each component's contribution is expressed as a share of the total gross flow

activity in a given quarter to reflect the intensity of use of each channel in line with standard capital flow literature in which gross flows and composition are more important than direction. Portfolio investments and Other flows dominate Japan's gross external transactions throughout the sample period. Notably, portfolio flows exhibit persistently large negative shares, indicating significant net outflows—consistent with Japan's status as a global capital exporter. The Other category, which includes loans, deposits, and trade credits, shows recurrent large contributions—both positive and negative—especially during periods of financial stress (e.g., post-2008 and around 2020). These reflect the cyclical behavior of cross-border bank lending and funding pressures. Reserve asset movements play a stabilizing role in earlier periods but fade in relative importance over time, possibly reflecting the BoJ's reduced need for exchange rate interventions in the face of structural current account surpluses.

Granular credit. For the second category of granular credit, we use quarterly stock data on financial assets and liabilities by institutional sector (Figure 18). We assume financial intermediaries can screen and monitor borrowers, which makes it efficient for credit to flow from lenders to non-financial borrowers through the intermediaries. The analysis focuses on credit disaggregated by lender type, including: (1) domestically licensed banks, (2) foreign banks, (3) nonbank financial institutions (NBFIs), and (4) finance companies. *Domestic banks* are defined as banks and long-term credit banks engaging in financial intermediation through deposit-taking which have been established under Japanese legislation. Only banking accounts of domestically licensed banks are included and trust accounts are not included. *Foreign banks* refers to branches engaging in financial intermediation through deposit-taking that are established in Japan by foreign banks (BoJ, 2023). For each category, the data covers (1) total loans[50] as well as specific subcomponents—(2) consumer credit, and (3) loans to companies and governments. This structure helps identify whether changes in credit are driven by household demand, corporate financing needs or shifts in bank behavior.

[50]Empirical evidence on the risk-taking channel for loan books has been provided by Jimenez et al. (2012), and Dell'Ariccia et al. (2013).

Figure 18: Credit in Japan (Flow of Funds) (1997-2023)



Source: Author's elaboration based on GDP data (FRED) and Flow of Funds statistics (Bank of Japan).

We thus draw on two FoF complementary datasets from BoJ. The borrower-side perspective shows firm-level credit exposures and their vulnerability to shifts in funding conditions. In contrast, the second (more granular) dataset analyzes lending institutions.

5 Methodology

We adopt the local projections (LP) method of Jordà (2005) for two considerations of principle. First, it allows flexible estimation of impulse responses without requiring full specification (and identification) of the underlying data-generating process (DGP) as in VAR models[51], consistent with the uncertainty and non-linearity[52] of our processes at work. This is mainly motivated by the presence of episodes of elevated financial stress (Figures 14, 15). Second, LPs are robust to structural breaks and allow direct incorporation of non-linearities, such as state-dependent effects which we do not want to exclude ex ante from our specification, unlike the prevailing literature. Bai–Perron multiple structural break tests were

[51]Rey (2015) imposes contemporaneous restrictions (Cholesky) on the responses of the variables. The first variable cannot respond to contemporaneous shocks (within the quarter) of any other variables, the second one can respond to contemporaneous shocks affecting variable 1 but not any others and the effective Fed Funds rate (FFR) is the penultimate variable in order to respond to any variable except to the VIX. Financial variables such as credit, flows and leverage are in between.

[52]Cerutti et al. (2017) suggest incorporating non-linear GFCy effects into the analysis of capital flows.

conducted on the key variables (e.g., U.S. MP shocks, VIX), confirming the presence of discrete breakpoints (Section 6.3). Also, while the low bias of LPs comes at a variance cost, this cost must be paid to achieve robust uncertainty assessments (Montiel-Olea et al., 2025).

In a VAR (or SVAR), the reduced-form residuals u_t are linear combinations of unobserved structural shocks ε_t, but the exact identification of these shocks is unknown and must be determined through economic theory (Stock and Watson, 2001). Formally,

$$u_t = A\varepsilon_t, \tag{7}$$

where A is an unknown contemporaneous impact matrix. Resolving this identification problem is essential to recover impulse response functions (IRFs) that capture the economy's response to a one-unit innovation in the structural shock of interest (Stock, 2018). Two common econometric solutions are (1) restrictions (time or sign[53]); (2) valid external instruments like MP shocks.

The empirical methodology chosen thus justifies the introduction of U.S. MP shocks, which serve as valid instruments for identifying MP effects in both SVAR and LPs (Stock and Watson, 2018).

5.1 Baseline Equation

The impulse response of Japanese credit Credit_{t+s} to a structural shock vector d at horizon s is defined as the difference in conditional expectations, where d corresponds to (1) the VIX or (2) the U.S. MP shock. For the VIX, we use a one-year lag to mitigate endogeneity. For the U.S. MP shock, we employ the cumulative four-quarter (one year) measure, allowing us to better identify the persistence of external tightening episodes[54]. Thus,

$$IR(t,s,d) = E\big(\text{Credit}_{t+s} \mid v_t = d; X_t, Z_{t-1}, Z_{t-2}\big) - E\big(\text{Credit}_{t+s} \mid v_t = 0; X_t, Z_{t-1}, Z_{t-2}\big), \tag{8}$$

[53] See Sims (1980) and Uhlig (2005).

[54] The choice to cumulate is driven by the hypothesis that a sequence of unanticipated shifts over multiple quarters more realistically reflects persistent MP stances than isolated quarterly surprises.

where $X_t = (\text{Credit}_{t-1}, \ldots, \text{Credit}_{t-p})$ includes p lags of the endogenous variable in logs, and Z_{t-1}, Z_{t-2} denote the first and second lags of the control variables—Japan's real GDP (in logs), the nominal USD/JPY exchange rate change, and Japan's domestic interest rate (in levels)— and v_t denotes the vector of structural shocks, which corresponds either to the lagged VIX or to the U.S. MP shock. The controls account for (1) domestic macroeconomic conditions and (2) domestic monetary policy over a one-year horizon at quarterly frequency. The nominal USD/JPY exchange rate changes are included as a control variable only for credit indicators that have been converted from Japanese yen values to their U.S. dollar equivalents. All variables were differenced to ensure stationarity, as verified by Augmented Dickey-Fuller (ADF) tests before and after the transformation (Table 9). Logarithmic transformations were applied where appropriate, excluding series with zero or negative values.

For each horizon $s = 0, 1, \ldots, 24$, the impulse response function (IRF) is estimated by running the following regression:

$$\Delta^s \log(\text{Credit}_{t+s}) = \alpha^s + \sum_{k=1}^{p} B_k^s \Delta^k \log(\text{Credit}_{t-k}) + \sum_{j=1}^{4} C_j^s Z_{t-j} + D^s v_t + u_{t+s}^s, \qquad (9)$$

where α^s is a constant, B_k^s are lag-specific coefficients on the lagged differences of the endogenous variable, C_j^s are coefficients on the j-th lag of the control variables, and D^s is the coefficient on the structural shock v_t, either the VIX or U.S. MP shock. The error term u_{t+s}^s reflects a moving average (MA) of forecast errors and is characterized by an autocorrelation structure.

Finally, valid inference for impulse responses is based on separate OLS regressions estimated at each forecast horizon $h = 0, 1, \ldots, 24$. We employ heteroskedasticity and autocorrelation-consistent (HAC) standard errors to address serial correlation in the residuals u_{t+s}^s. Letting $\hat{\Sigma}_L^s$ denote the HAC covariance matrix of $\hat{B}_1^s$, the confidence intervals for the impulse response are constructed as

$$IR(t, s, d) \pm z_{\alpha/2} \cdot \sqrt{d' \hat{\Sigma}_L^s d} \qquad (10)$$

where $z_{\alpha/2}$ is the critical value from the standard normal distribution corresponding to the confidence level. We use $z_{0.16} \approx 1.00$ and $z_{0.05} \approx 1.645$ respectively for 68% and 90%

confidence intervals (CI) over a 24-quarter horizon in line with Miranda-Agrippino and Rey (2021). Responses are expressed in log-points.

5.2 Augmented Equation

Building upon the baseline specification (Equation 9), we extend the strategy by analyzing whether the transmission of U.S. MP shocks to Japanese credit markets depends on the prevailing global uncertainty regime, proxied by the VIX[55]. We define high-volatility episodes using the cyclical component of the VIX obtained via the Hodrick-Prescott (HP) filter (Figure 19) also used in Jorda and Taylor (2024). The HP filter decomposes a time series into a trend and a cyclical component by minimizing the sum of squared deviations from the trend and a penalty for variation in the trend's second difference[56]. For quarterly data, we adopt the conventional smoothing parameter $\lambda = 1600$ (Hodrick, 1997). The periods of heightened global volatility are those in which the VIX lies above its estimated trend component. This construction results in a time-varying regime indicator that captures temporary surges in uncertainty, allowing us to study whether the credit response to U.S. MP shocks differs across what we define *tranquil* and *turbulent* global financial conditions.

The corresponding local projection (LP) specification thus becomes:

$$\begin{aligned}\Delta^s \log(\text{Credit}_{t+s}) = \alpha^s + \sum_{k=1}^{p} B_k^s \Delta^k \log(\text{Credit}_{t-k}) + \sum_{j=1}^{2} C_j^s Z_{t-j} \\ + \gamma^s MP_t + D^s \cdot MP_t \cdot \mathbf{1}_{\{VIX_{t-1}^{\text{cycle}} > 0\}} + u_{t+s}^s,\end{aligned} \tag{11}$$

where MP_t is the U.S. MP shock, VIX_{t-1}^{cycle} is the lagged cyclical component of the VIX extracted from the HP filter, and $\mathbf{1}_{\{VIX_{t-1}^{\text{cycle}} > 0\}}$ is the indicator function equal to one in periods of above-trend volatility (turbolent global financial conditions). The indicator function acts

[55]The approach is motivated also by identification constraints. Because global risk measures correlate with U.S. MP (Miranda-Agrippino and Rey, 2020), one cannot include them as separate controls without violating the exogeneity condition needed for LP.

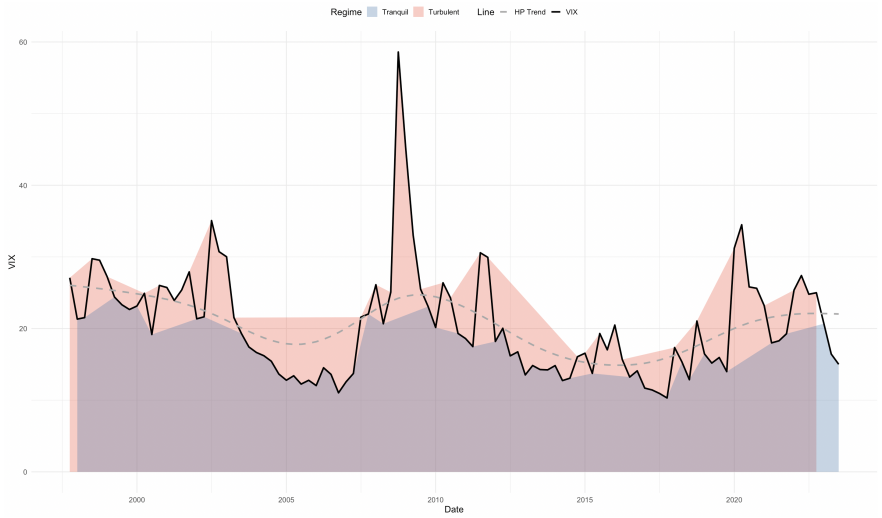
[56]See also Bekaert et al. (2013) for a decomposition of the VIX into components reflecting risk aversion and expected stock market volatility.

as a dummy variable, thus:

$$\mathbf{1}_{\{VIX_{t-1}^{\text{cycle}}>0\}} = \begin{cases} 1 & \text{if } VIX_{t-1}^{\text{cycle}} > 0 \\ 0 & \text{otherwise} \end{cases} \tag{12}$$

The coefficient γ^s captures the average unconditional effect of U.S. MP shocks, while D^s reflects the differential response in high-volatility regimes. By construction, this regime classification is endogenous to the statistical dynamics of volatility and provides a more statistically robust alternative to arbitrary thresholds (Section 6.3). The remaining identification assumptions from the baseline model are maintained.

Figure 19: HP-Filtered VIX and Regime Classification (1997-2023)



Source: Author's elaboration.

6 Results

6.1 Baseline Results

The initial adverse effect of a one-standard-deviation VIX shock on credit dissipates for all lenders except foreign banks (Table 4, Panel A). There are two phases as a response to VIX. In the short run—first 8 to 10 quarters (2 years)—credit growth declines or remains flat across lender types, indicating an initial tightening in credit supply. This

contractionary phase is consistent with the view that global risk shocks provoke precautionary retrenchment in lending activity due to risk aversion and external funding (deleveraging) pressures (Rey, 2015; Forbes and Warnock, 2012), and we find that this holds true also for Japan. However, from the medium-run onward, the responses become positive (and more significant) in line with Bruno and Shin (2013) and Baskaya et al. (2017). The positive sign of the medium-term responses suggests an expansion in credit provision particularly for total loans and loans to corporates and governments and for depository institutions, domestic banks, and finance firms. There is one notable exception in the case of foreign banks' consumer credit, where the response is negative and significant throughout most of the horizon. This exception—both in sign and shape— reflects foreign banks' greater exposure to global conditions, including (1) sensitivity to rollover risk; (2) balance-sheet-driven internal capital reallocation.

Two observations explain the mechanism at work. First, Japanese (domestic) banks have historically relied on stable retail funding and maintained conservative balance sheet practices (BoJ, 2023), which may help insulate them from prolonged stress episodes—hence the attenuated response observed at longer horizons. This structural conservatism, rooted in Japan's post-bubble financial reforms and reinforced by MoF stringent regulatory oversight, contributes to relatively stable intermediation capacity during external financial shocks. Second, the upward trajectory in the medium run can be a form of intertemporal smoothing, where institutions delay lending decisions in the face of uncertainty, but eventually resume activity once conditions normalize. These two observations could be formally explained with the model of Gertler and Kiyotaki (2010), which analyzes financial intermediaries with balance sheet constraints. Intermediary net worth (n_t) is defined as:

$$n_t = Z_t + (1-\delta)Q_t s_{t-1} - R_b b_{t-1} - R_d d_{t-1}, \tag{13}$$

where s_{t-1} are outstanding loans, b_{t-1} is interbank borrowing, and d_{t-1} denotes deposits. Institutional conservatism would correspond to higher initial intermediary net worth and greater reliance on stable funding such as deposits (d_t), both of which mitigate the tightening of credit constraints during global financial shocks. At the same time, uncertainty, proxied

by an increase in the VIX, would lower the market price of assets Q_t, compressing n_t and then the constraint on credit supply:

$$Q_t s_t = n_t + b_t + d_t. \tag{14}$$

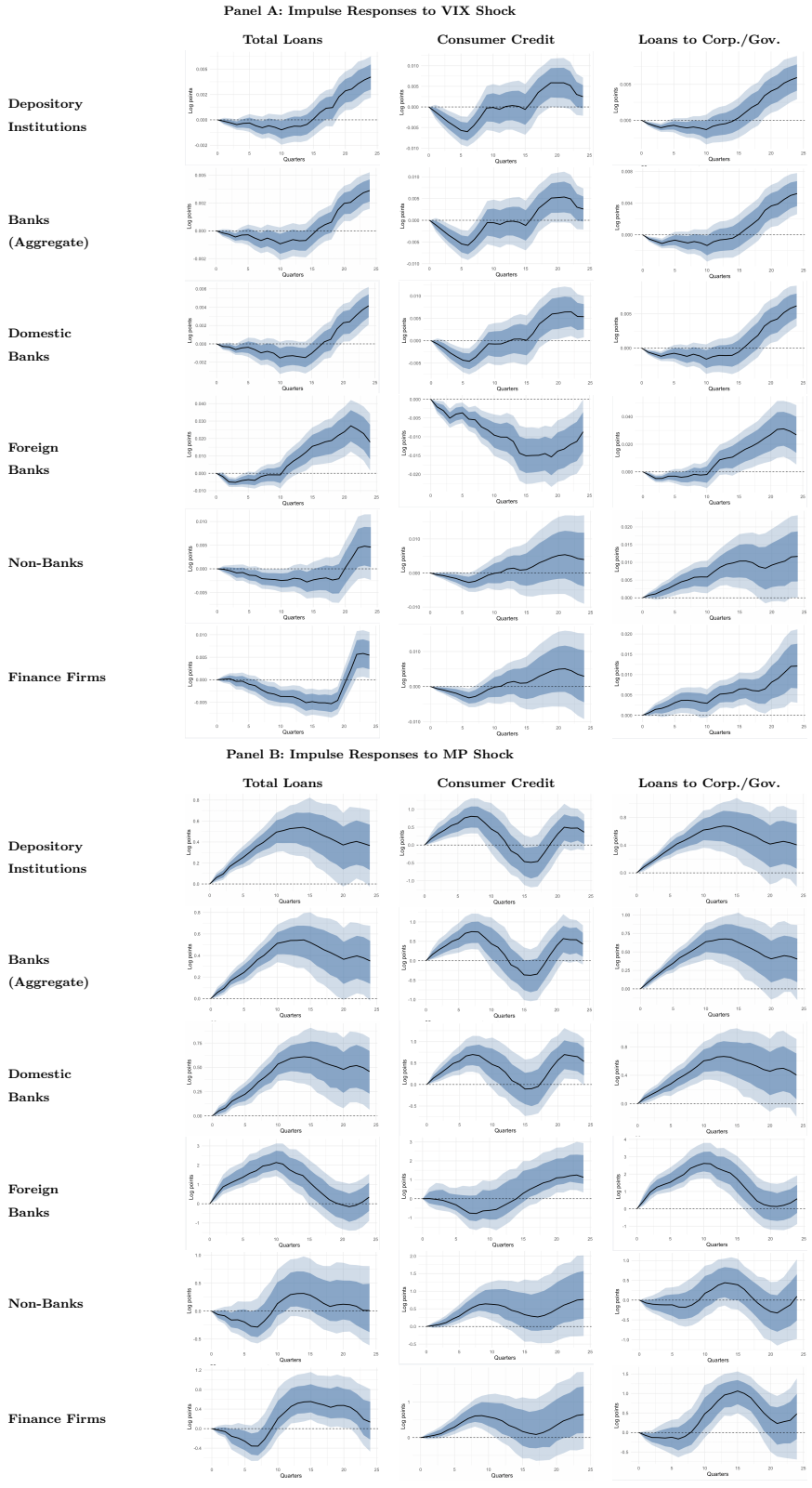
As asset prices and earnings gradually recover, net worth is rebuilt, relaxing funding constraints and enabling a resumption in lending activity—consistent with the delayed expansion observed in our impulse responses.

U.S. MP shocks and granular credit: cushioning for domestic banks, amplification for foreign banks. We find that an increase in the MP shock—i.e., a tightening—leads to an initially monotonic expansion in total loans and loans to corporations and governments of depository institutions, domestic banks, foreign banks, and aggregate banks[57] (Table 4, Panel B). Responses peak around quarter 12 before gradually decreasing, consistent with Bruno and Shin, (2015) and Degasperi et al. (2023). In the case of foreign banks, the expansion is stronger exceeding 2 log points at its peak, and the subsequent decline is sharper. We advance the hypothesis of a cushioning mechanism at play but only in the short term. The immediate positive response to a U.S. monetary tightening shock suggests that Japan's financial system may absorb rather than amplify rising global rates, triggering short-term reallocation effects in bank lending.

Japan may act as a relative safe haven—benefiting from (relatively) stable interest rate differentials, favorable currency expectations, credible and independent institutions, and resilient macro-financial fundamentals. These features can attract capital inflows or reduce the scale of capital outflows, thereby supporting domestic credit conditions as during the 2022 U.S. tightening cycle (BIS, 2023). Also, we read these IRFs as supporting the importance of the credit channel of MP (Bernanke and Gertler, 1995) internationally.

[57]For consumer credit, the estimated responses are not significant (limited to the first five and the final two quarters) and there is no evidence of significance for foreign banks.

Table 4: Impulse Responses of Granular Credit by Institution and Loan Type



The second plausible explanation is increased domestic liquidity through financial rebalancing. As U.S. assets become more attractive[58], investors offload non-U.S. holdings, including Japanese assets. This selling pressure may be absorbed by domestic financial intermediaries, temporarily increasing domestic liquidity (expanding balance sheet capacity). In the short term, this would support the observed expansion in credit provision.
As the shock propagates, the positive effect decreases. The full effects of an MP tightening unfold with lags, consistent with delayed transmission in financial markets[59].

Aggregate credit measures reveal more structural patterns of Japanese banking system. For the VIX shock, the most informative BIS measure is the consolidated banking statistics (CBS) (Table 6, Panel A). In periods of global uncertainty, international banks increase their exposures to Japan, supporting the interpretation of Japan as a safe-haven destination. The evidence of CBS shows that these dynamics are driven by foreign rather than domestic banks. Also, FoF components (Table 10, left column) show significant responses across most horizons, regardless of debt maturity. The strongest effects are observed for short-term bank borrowing, indicating that firms rely more heavily on liquid bank funding during periods of elevated uncertainty.
For a U.S. MP shock, the only statistically meaningful BIS response is the medium-term contraction in CBS (Table 6, Panel A). As expected, the direction is opposite to that observed under a VIX shock, reflecting a retrenchment in international lending driven by the tightening of U.S. MP (rising dollar funding costs). For FoF components, short-term bank borrowing is again the most significant and increases. Unlike in the case of the VIX shock, a tightening of U.S. monetary policy leads to an expansion in short-term borrowing. This may reflect banks' precautionary behavior in response to U.S. interest rate hikes, as they seek to reinforce liquidity buffers through short-term instruments.

There are two takeaways from the analysis of aggregate credit indicators. First, the results confirm that aggregate indicators reflect structural characteristics of Japanese banking

[58]Higher interest rates directly correspond to higher bond yields.
[59]On the delayed effects of monetary policy, see Christiano et al. (2005). For related dynamics such as the price puzzle and delayed overshooting, see Sims (1992) and Eichenbaum and Evans (1995).

system. BIS indicators provide the most interpretable signal and, although the sample is smaller (from 2000Q1), the width of the confidence intervals does not increase, suggesting robustness of the estimates. Second, as the sign of the responses of aggregate credit to the shocks is different than the one of granular data, the results may seem inconsistent. Yet, the indicators measure two different sides of credit. For example, the contraction in CBS as a response to U.S. tightening suggests that global banks retrench from foreign lending. Instead, the initial expansion in granular credit indicates the reallocation of credit domestically. This raises questions about foreign banks as they appear in both aggregate and granular credit. The key distinction is in the measurement. CBS report cross-border consolidated claims from the perspective of parent banks's headquarters. For example, if Bank A is headquartered in the U.S. and lends to Japanese borrowers from its overseas offices, these claims are captured in CBS data. By contrast, if Bank A has a local affiliate in Japan— sub-bank B—its lending activities to Japanese residents appear in the granular credit as foreign-bank credit. Thus, the expansion in the granular data may reflect increased domestic intermediation by foreign branches or subsidiaries operating within Japan, even as their parent simultaneously scale back their international exposures.

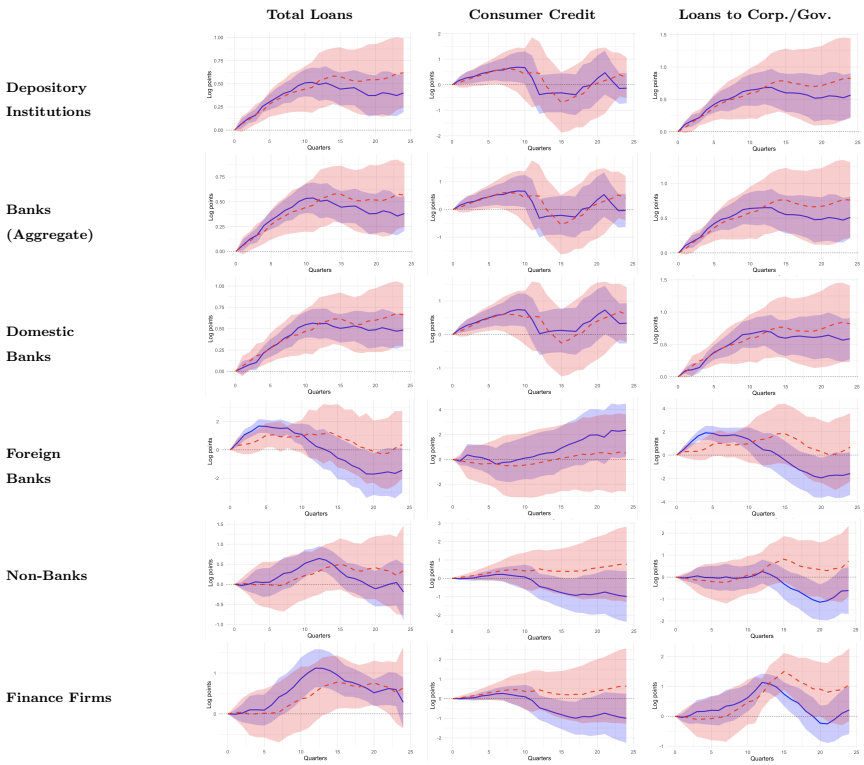
Japan's credit is not independent of global financial conditions. There is evidence of the global financial cycle (GFCy) and Japanese liquidity can mirror its dynamics, what we call the *mirroring effect*.

6.2 Regime-Dependent Results

We report the IRFs by lender types and loan categories in response to a U.S. MP shock, distinguishing tranquil (low VIX, blue line) from turmoil (high VIX, red line) periods. We focus on statistically significant results, and a significant coefficient in this specification does not imply that U.S. MP shocks have a significant effect on credit per se—that relationship is tested in the previous section. This specification tests whether the magnitude of the credit response to U.S. MP differs significantly across periods of high and low global financial volatility, as proxied by the VIX regime. Also, the shaded confidence bands in the IRFs represent uncertainty around regime-specific responses, not around the differential

effect captured by the interaction term[60].

Table 5: Impulse Responses of Granular Credit by Institution Type and Loan Category



Note: Median impulse responses obtained from local projections, with 90% confidence intervals (heteroskedasticity-robust standard errors). Regimes are based on the cyclical component of the VIX, extracted via a one-sided Hodrick–Prescott filter ($\lambda = 1600$). The red (dashed) line denotes the high-VIX (turmoil) regime; the blue (solid), the low-VIX (tranquil) regime. The cutoff is 2009Q4.

NBFIs consistently amplify global financial shocks as lenders (Table 5). First, domestic banks do not exhibit significant responses to U.S. MP shocks under either global risk regime, suggesting a more muted role in the credit transmission channel under high uncertainty. In contrast, foreign banks display statistically significant responses only in the medium run (from quarter 10) only for loans to governments and corporations and total loans. This limited responsiveness could reflect either a cautious recalibration of exposures

[60]Significance of the interaction can exist even when individual regime responses do not exceed zero within their confidence bands.

or tighter funding constraints affecting foreign institutions operating in Japan. Yet, the response retains the same sign as in the baseline specification, indicating an initial expansion followed by a leveling-off.

Second, we find that the only categories displaying consistently significant responses across all three credit types[61] are non-banks (including finance firms) with effects persisting up to 15 horizons for consumer credit. The response is initially expansionary followed by a gradual leveling-off by quarter 20. This pattern may reflect (1) greater flexibility in the lending behavior of non-bank actors or (2) their natural sensitivity to shifts in global funding costs and risk sentiment. The first argument is motivated by greater balance sheet and regulatory flexibility of non-bank lenders (Oishi et al., 2025; Goldberg, 2023). Particularly, business models based on tight inventory control tend to involve minimal risk warehousing (BIS, 2021). The second argument is supported by the typical investment profile of non-bank lenders, which includes exposure to retail and unsecured lending markets—particularly in the case of money market funds (MMFs) (BIS, 2021).

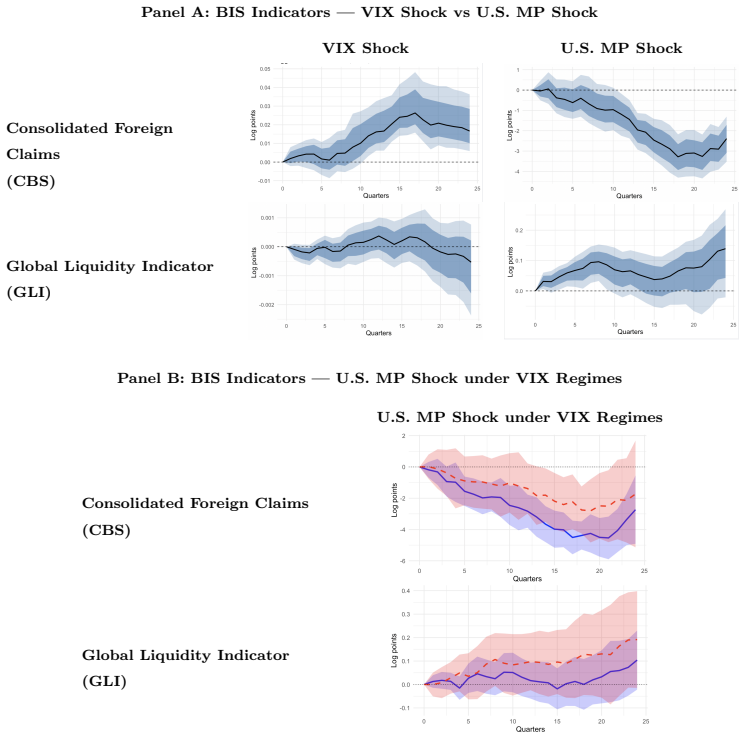
We advance the hypothesis that in Japan non-bank channels act as a transmission amplifier of global financial shocks. Evidence from FSB (2023) and BIS (2021) indicates that the NBFI sector is especially vulnerable to market volatility and interest rate shocks, respectively, VIX and U.S. MP shocks in our model. Recent evidence from BoJ (2025) shows how the shift in Japan's NBFI composition—particularly the rise of investment funds—has increased their responsiveness to market stress, amplifying volatility during turbulent periods. There is growing literature on the role of non-banks for both the structure of international banking (Buch and Goldberg, 2024) and their association with risk (Avdjiev et al., 2025). We support the literature by arguing here that (1) considering only risk is not enough. Also the funding channels must be considered, which implies reflecting U.S. MP; (2) periods of stress must be distinguished. For example, as emphasized in BIS (2021), while proprietary trading firms (PTFs) and hedge funds may contribute significantly to liquidity provision in

[61] In the baseline specification, the responses of non-banks and finance firms are significant only for consumer credit in the short run. This suggests that, when risk conditions in financial markets are not explicitly accounted for, the behavior of these institutions remains more difficult to detect. From both specifications, consumer credit appears to be more sensitive to VIX and U.S. MP shocks, and the interaction specification (Specification 2) confirms that this sensitivity becomes more pronounced when monetary tightening coincides with elevated global risk, likely due to higher perceived borrower risk or more binding lending constraints in retail credit markets.

normal conditions, their behavior is always opportunistic. As a consequence, the reliability of these liquidity sources decreases during episodes of market stress, further complicating their role in credit intermediation.

Finally, all of the above considerations hold true at least for our definition of institutions from BoJ (2023)[62]. Non-banks—or shadow banking—are defined as institutions that procure funds through non-deposit methods and engage in lending. Finance firms also engage in lending[63] but the exclusion of real estate-focused lenders and different funding structures justify their treatment as a separate class of non-banks (BoJ, 2024; BIS, Glossary).

Table 6: Impulse Responses of BIS Indicators



Note: Median impulse response functions obtained from local projections, with 68% (darker shading) and 90% (lighter shading) confidence intervals.

[62] See BIS (2021, p.2) for a more detailed classification of NBFIs.

[63] Finance firms include money lenders (including leasing and credit companies), securities finance firms, and venture capital providers (BoJ, 2024).

Aggregate credit patterns suggest that short-term channels are key in transmitting U.S. MP shocks across risk regimes. Focusing on the second group of aggregate credit indicators (Tables 6, 11), only CBS register significant responses. This mirrors the baseline finding—both in magnitude and timing—reinforcing the notion that CBS, by capturing cross-border claims of internationally active banks, remains the most sensitive measure to external MP shocks and global risk. U.S. MP shocks contract credit during tranquil times and the decline appears more muted under turmoil, likely due to already-constrained global lending conditions during such episodes. For FoF measures, the updated specification confirms the baseline results. Short-term borrowing and short-term bank borrowing continue to show (for all the first 10 quarters) significant expansions in response to a U.S. monetary tightening under tranquil VIX regimes. This supports the interpretation that Japanese financial institutions proactively build liquidity buffers through short-term instruments when facing rising global rates (precautionary behavior). Short-term channels are therefore key in the transmission of global shocks.

There are three final takeaways. First and overall, NBFIs emerge as the most responsive lenders and consistently amplify global financial shocks. Second, aggregate credit patterns indicate that short-term funding channels are central to the transmission of U.S. MP shocks, particularly under tranquil risk regimes, consistent with precautionary liquidity behavior. Third, our model is more suited to capture effects up to the medium-term (15 quarters). This is consistent with the nature of financial cycles, which evolve at low frequencies. Drehmann et al. (2012) estimate typical cycle lengths of 8–16 years, while Schuler et al. (2015) report variations exceeding 20 years, Jorda et al. (2018) up until 32 years.

6.3 Robustness

As a robustness check, we subject our baseline specification to a series of tests. First, we replace our baseline credit indicators with alternative measures. The literature on the GFCy identifies capital flows as the first observable dimension of the cycle (Figure 8), precisely risky asset prices and credit as main empirical manifestations[64]. Variable selection for the

[64]Claessens et al. (2011, 2012) rely primarily on house prices. Rey (2013) emphasizes gross capital flows and global credit growth. Cerutti et al. (2017) focus on general capital flows and remain skeptical of the

literature is therefore critical. Second, we assess the impact of removing domestic control variables to evaluate their role in impacting credit. Third, we test alternative classifications of financial regimes with threshold-based approaches. Further checks address shock specification and lag structure.

The thesis focuses on credit as a proxy for the GFCy, along two dimensions: (1) aggregate vs. granular, and (2) domestic vs. foreign. Our specification includes seven different categories of aggregate credit and four different categories of lender types. All results are reported for the full set of credit indicators in the Appendix.

The main analysis on granular credit focuses on both depository institutions, including banks, and non-banks, including finance firms, as credit lender types. The coverage of both segments—regulated versus market-driven credit channels—ensures robustness. More precisely, non-banks and finance firms are alternative lender categories which are part of the broader category of Other Financial Intermediaries (BoJ, 2023). Also, for the lender-disaggregated credit data, using different credit measures for the same lender type does not alter the sign of the estimated coefficients, though it affects their statistical significance. The only exception is consumer credit for foreign banks. Overall, the findings support the robustness of our results.

For aggregate credit indicators, we focused on stock measures (BIS, FoF) because by structure they are more suited for our analysis. Stocks reflect a unit's holdings of assets and liabilities at a specific point in time, including the resulting net worth (IMF, 2001). For completeness and in line with the traditional literature on BoP movements as drivers of financial imbalances (Caballero et al., 2008; Gourinchas et al., 2010; Gourinchas, 2012) and systemic risk (Calvo, 1998; Forbes and Warnock, 2012), results are also presented for Japan's BoP debt-related components[65]. The effects are mostly insignificant across both the specifications with larger CI bands. Thus, they do not adequately capture the domestic sensitivity to GFCy dynamics.

GFCy's general relevance, but acknowledge that omitting credit may weaken the analysis. Scheubel et al. (2019) construct a GFC index based exclusively on capital flows to EM.

[65]The evolving structure of Japan's BoP from 1997 to 2023 is reported in Figures 4.5 and 4.6.

The classification of financial regimes in the empirical specification uses the HP-filtered VIX based on trend analysis (Figure 19). To test for robustness of the results and whether the trend-approach yields more robust results, the HP-filtered was replaced with a threshold-based approach, employing both (1) the 75th percentile criterion and (2) a fixed threshold (VIX $\geq$ 30 for two consecutive quarters). Results corresponding to the percentile-based method are reported in Tables 15-16, and those for the fixed-threshold approach in Tables 17–18. Two considerations follow. First, since the VIX is a behavioral measure, classifications based on arbitrary fixed thresholds such as 30 lack an endogenous rationale. A similar approach is to define a fixed number of VIX regimes based on visual inspection of its distributional patterns (Figure 23). Yet, both the HP trend-based approach and the percentile-based threshold (75th percentile) rely on the internal distribution of the VIX and are thus more consistent. Second, our trend-based specification (Equation 11) yields more stable and robust results as reflected from the narrower confidence intervals.

As additional robustness check, we performed checks on the controls. First, we assessed (1) their relevance and (2) correct specification within the model.

First, we removed controls from the specification. We dropped the domestic interest rate (uncollateralized overnight call rate), which we did not expect to substantially affect the results, given that it has remained low and stable in Japan for most of the sample. In fact, results (Tables 21-22) show that the overall shape, sign and direction of the responses remain consistent across institution types and loan categories. However, for depository institutions and domestic banks, the responses under the tranquil regime (blue solid line) narrow slightly and stay above zero more consistently. The opposite is true for foreign banks, reinforcing their sensitivity to global conditions when domestic monetary policy is not considered. For aggregate credit indicators, responses remain unchanged.

Instead, when removing domestic GDP (Tables 19-20), the responses of granular credit present the same shape, sign and direction, but the statistical significance weakens, as the confidence intervals shift downward and begin to overlap with the zero line. For aggregate credit indicators, the responses of BIS indicators are not affected. Instead, the FoF responses become more significant once GDP is excluded, indicating that their dynamics are more sen-

sitive to domestic cyclical conditions.

To test correct specification, we initially estimated the model under alternative lag structures—specifically, two and four lags of the controls—to assess robustness to dynamic specifications. Lag length was selected based on three criteria: (1) model parsimony; (2) autocorrelation function (ACF) decay; and (3) stability of variance inflation factors (VIF). Although VIF-based diagnostics suggest that one lag is optimal, we opted for two lags due to the high persistence in the variables, consistent with the Box-Jenkins-type reasoning in VAR models. The inclusion of lagged terms naturally increases the risk of multicollinearity.

Finally, we tested the model with residualized (orthogonalized) control variables to verify that the controls do not absorb variation attributable to the shocks of interest[66]. The results are unchanged for CI across specifications with and without residualized controls, suggesting that collinearity between Japanese domestic controls with U.S. MP shocks is limited. Orthogonalizing control variables therefore does not materially affect inference.

6.4 Limitations

Based on our analysis, we draw three potential threats to our study and points of future research.

First, we do not fully account for heterogeneity across Japanese banks. The choice of variables in the analysis reflects a combination of prior empirical literature and theoretical justifications, but event-based or panel approaches focusing on bank-level balance sheet features such as the diversification ratio (non-interest income share), foreign exposure, or reliance on wholesale funding would provide greater clarity on cross-bank differences in shock transmission. For example, Japanese banks with higher exposure to EM Asia may absorb or propagate global liquidity shocks differently. Identifying who absorbs and who transmits liquidity under stress would strengthen the understanding of systemic risk and resilience in Japan's financial sector.

Second, the analysis centers on medium-term credit responses. However, short-term market reactions, particularly in equity markets, remain underexplored. Future work could exam-

[66]See Wurm and Fisicaro (2014) and York (2012).

ine high-frequency asset price responses to global financial shocks to assess whether equity channels mirror or diverge from the credit-based mechanisms identified here.
Third, this study is the starting point for event studies of individual countries. Existing work such as Morais et al. (2015) for Mexico and Baskaya et al. (2017) for Turkey highlights the value of country-specific identification. Extending a similar approach to Japan was only a necessary first step. Japanese liquidity is not global liquidity, but it is a useful guide to its direction.

6.5 Changing Sensitivities

Credit flows in Japan respond to global financial variables, and the degree of this sensitivity has changed over time.
Fratzscher (2012) shows that the VIX dominated the dynamics of net capital flows up to the 2008 GFC, with heterogenous effects across countries arising from differences in quality of domestic institutions, country risk and the strength of domestic macroeconomic fundamentals. Since the crisis, the frequency of extreme capital flow episodes has not changed since the GFC but less correlated with changes in the VIX (Forbes and Warnock, 2020). Focusing on global liquidity (credit) within capital flows, Avdjiev et al. (2017) find that the sensitivity to U.S. MP rose substantially in the immediate aftermath of the GFC, peaked around the 2013 Fed taper tantrum and then reverted to pre-crisis levels as MP converged among AE. This evolution is linked to borrower migration across global funding sources, particularly NBFIs (Adjiev et al., 2025). Instead, Goldberg et al. (2023) show that the sensitivity of global liquidity to U.S. MP has increased post-GFC.

Sensitivity is country-specific. In Japan, the GFC might have altered the sensitivity of credit flows to center-country (U.S.) variables. We augment Equation (9) with a dummy variable, *post2009*, which takes the value 1 from 2009 onward and 0 otherwise. Including in Equation (11) both interaction terms—U.S. MP shocks interacted with the VIX regime and with the post-2009 dummy— would induce multicollinearity, compromising causal identification. We therefore estimate each interaction separately. Note that the dummy variable

post2009 is equivalent to the indicator function:

$$post2009_t = \mathbf{1}_{\{t \geq 2009Q4\}}, \tag{15}$$

where the indicator takes the value 1 from 2009Q4 onward and 0 otherwise. Precisely, we consider 2009Q4 as the breakpoint, as it marks the conclusion of the acute phase of the global financial crisis. By 2009Q4, systemic conditions had begun to stabilize and major CBs had shifted from emergency interventions to medium-term unconventional MP programs. This timing is also supported empirically. The cyclical component of the VIX peaks in early 2009 and begins a sustained decline thereafter (Figure 19). Similarly, the largest U.S. MP shocks begin to subside right after the end of 2009, signaling a transition to a new regime of sustained monetary accommodation (Figure 13). We also compute Bai-Perron structural breaks for the MP shocks and identify six breaks, occurring in 2003 Q4, 2007 Q4, 2011 Q3, 2015 Q3, 2019 Q2, and 2023 Q2. They correspond to key inflection points of U.S. MP: respectively, end of the early-2000s easing cycle, first signs of the GFC, peak of post-GFC QE and Operation Twist, lead-up to the first-rate hike post-zero-lower-bound era (December 2015), Fed easing among trade tensions, post-COVID tightening cycle culmination.
The specification[67] to assess whether the sensitivity of credit in Japan to U.S. MP shocks changed after 2009 thus is:

$$\begin{aligned} \Delta^s \log(\text{Credit}_{t+s}) = \alpha^s + \sum_{k=1}^{p} B_k^s \Delta^k \log(\text{Credit}_{t-k}) + \sum_{j=1}^{4} C_j^s Z_{t-j} \\ + \gamma^s MP_t + \delta^s MP_t \cdot \mathbf{1}_{\{t \geq 2009Q4\}} + u_{t+s}^s, \end{aligned} \tag{16}$$

The corresponding specification for global risk conditions, proxied by the VIX, is:

$$\begin{aligned} \Delta^s \log(\text{Credit}_{t+s}) = \alpha^s + \sum_{k=1}^{p} B_k^s \Delta^k \log(\text{Credit}_{t-k}) + \sum_{j=1}^{4} C_j^s Z_{t-j} \\ + \gamma^s \text{VIX}_t + \delta^s \text{VIX}_t \cdot \mathbf{1}_{\{t \geq 2009Q4\}} + u_{t+s}^s, \end{aligned} \tag{17}$$

Considerations for the other variables hold the same. Table 23 reports the IRFs.

[67] We refer to this specification in the Appendix as Specification 3.

Since 2009, domestic banks have quieted their sensititivity to global risk, while credit from foreign banks has become more procyclical to it. We find that the sensitivity of total loans and loans to corporations and governments to VIX has decreased with responses attenuating—from the initial contraction, they now reach –0.05 log points at peak, compared to –0.15 in the pre-2009 period. The results are significant through the medium term (quarters 15–18) in line with Forbes and Warnock (2020). By contrast, credit from foreign banks became more procyclical to global risk after 2009, confirmed by the relatively more upward responses of total loans and loans to corporations and governments (green line). Here, the results are significant from the medium term onward (from quarter 10).

For aggregate credit indicators in the new specification, BIS Global Liquidity Indicator (GLI) is the only aggregate credit measure for which the interaction term remains statistically significant across the-medium term horizons (Quarters 7-17). However, the response lacks a clear pattern, further confirming that GLI is not well suited for the purposes of our analysis. Before 2009, increases in global risk aversion led to stronger contractions in global liquidity, likely reflecting the role of macroprudential tools and precautionary policy buffers that helped make countries less sensitive after 2009. This is further assessed through correlation patterns (Figures 21-22), indicating that the correlation between a proxy of capital flows, derived from a PCA of our comprehensive dataset of capital flow variables, and the VIX is not significant over the full sample period (2000–2023). However, if we disaggregate the sample to exclude the full manifestation of the GFC in Japan, we find that the significance is driven mainly by the first part of the sample (Figure 22), confirming that the sensitivity of credit to the VIX has decreased after 2009[68].

U.S. monetary policy transmits to Japan mainly through foreign-bank channels. For U.S. MP and in line with Avdjiev et al. (2017), consumer-credit responses are

[68]We also find that Covid-19 effects can be detected from this correlation analysis. If we exclude the final part of the sample, which corresponds to the full manifestation of the Covid-19 shock's effects (2020-2023), the correlation also becomes significant, with a dramatic drop in the p-value (Figure 21). With Covid-19, the channels that once transmitted external impulses into credit dynamics may have become increasingly inward-looking.

positive over the full 25-quarter horizon only for domestic and foreign banks. The difference lies in the timing: the responses of domestic banks flatten earlier earlier (quarter 20), whereas the responses of foreign bank remain elevated for longer, indicating greater sensitivity among foreign banks in Japan. Relative to the pre-2009 baseline, differences emerge from quarter 7 onward, with post-2009 responses showing a more sustained expansion in credit for both domestic and foreign banks. Statistical significance is concentrated in the medium term (from quarter 10), with responses of foreign banks significant both before and after 2009, and responses of domestic banks significant only in the post-2009 period.
For aggregate credit indicators, unlike the previous case with GLI, only CBS exhibits a significant interaction coefficient, suggesting that the post-2009 transmission of U.S. MP shocks to credit in Japan was primarily driven by foreign banks' claims (nationality basis) rather than local funding conditions (residency basis). This aligns with Avdjiev et al. (2017), who show that consolidated exposures better capture global bank lending channels, particularly in an environment of abundant dollar liquidity. The results also support the risk-taking channel of U.S. MP, as the observed increase in cross-border credit following U.S. easing is consistent with a greater willingness of banks to lend.

Why specification design matter: Global risk dampens the transmission of U.S. monetary policy to foreign-bank consumer credit. For domestic banks, the results are consistent with those from Specifications 1 and 3. For foreign banks, the baseline specification shows no significant response of consumer credit unlike loans. Introducing the post-2009 interaction captures the dynamics of consumer credit more effectively, with the expansion primarily attributable to the post-crisis period. However, when conditioning on episodes of elevated global risk (Specification 2), the magnitude of the credit response attenuates, indicating that high market uncertainty weakens the transmission of U.S. monetary policy to foreign-bank lending.

Global volatility dominates domestic volatility in Japan's credit and real-sector responses. The sensitivity of credit in Japan to global variables has changed over time, raising the question of whether domestic financial conditions have then taken on a

larger role. Domestic financial conditions are proxied by the Nikkei Stock Average Volatility Index (VXJ), provided by the Center for Mathematical Modeling and Data Science of the University of Osaka. The VXJ measures the expected 30-day volatility of the Nikkei 225 index, derived from prices of Nikkei 225 options traded on the Osaka Exchange.

First, we compute the Bai-perron structural breaks for the VXJ. These are 2004 Q2, 2007 Q2, 2009 Q4; for VIX 2003 Q2, 2007 Q2, 2011 Q4, 2019 Q4. The breaks in VXJ thus reflect episodes of global financial stress rather than domestic Japanese-specific events, supporting the strong interconnection between Japanese and U.S. financial markets[69]. Respectively, the 2004Q2 coincides with the normalization of global MP following early-2000s easing; 2007Q2 marks the onset of the subprime mortgage crisis; 2009Q4 corresponds to the post-GFC transition into unconventional MP regimes.

Second, we test whether the VIX remains a stronger driver of credit co-movement and cyclicality in Japan than domestic financial volatility. We re-estimate Equation (9) replacing the VIX with the VXJ. Results are reported in Tables 13-14. We find that credit provided by foreign banks is never significant, whereas credit provided by domestic banks, including consumer credit, total loans and loans to governments and corporations, exhibits significant coefficients (in the first 15 horizons). The coefficients are consistently negative, indicating that increases in domestic financial volatility are associated with a short-run contraction in credit supply by domestic institutions. This pattern supports the view that domestic financial stress disproportionately constrains local credit channels, particularly in the short term, confirmed by the significance of FoF short-term borrowing.

For aggregate credit, CBS remain the most responsive measure to domestic volatility. This reflects the structure of CBS: as a measure of cross-border claims by internationally active banks, it is inherently more sensitive to changes in perceived credit risk. Foreign lenders may adjust exposures more flexibly in response to domestic financial conditions because of information frictions (asymmetries), while domestically booked liabilities captured by GLI may be comparatively stickier and less reactive to short-term volatility.

We further assess the role of the VXJ in the real economy (Table 12) and consider whether its effects are comparable to those of the VIX in the U.S. economy. CPI and unemployment

[69] See Section 2.8.

(both from FRED) are available at monthly frequency, while VXJ is aggregated monthly using end-of-period values. Variables are log-transformed and differenced where necessary to ensure stationarity. The monthly Index of Industrial Production (base year = 2020) is obtained from Japan's Ministry of Economy, Trade and Industry.

Responses are not significant for GDP and Production. For unemployment, the rise in unemployment reflects firms' adjustments to heightened uncertainty—via reduced hiring or investment delays. Instead, the decrease in CPI hihglights that spikes in financial volatility may tighten financial conditions and raise precautionary pricing behavior or cost of credit, leading to pass-through effects on prices. Overall, VXJ shocks appear to have only modest effects on the real economy.

7 Policy Implications of the Mirroring Effect

The *toolkit* (Goldberg, 2023) of institutions is not new[70]. Policy must be *modern* and *relevant*. Its effectiveness depends on the sensitivity of capital flows to (1) the specific phenomena the institutions aim to get a grip on; and (2) policy instruments.

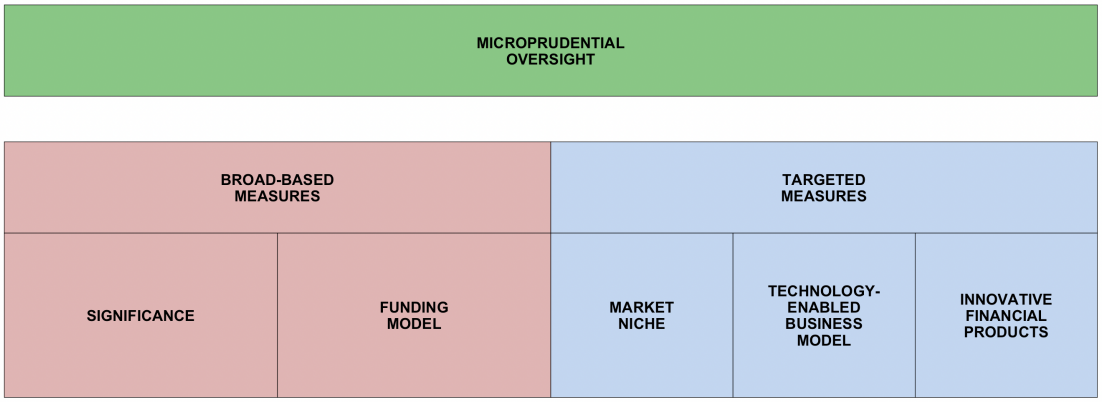
A monitoring framework anchored in institutional categories is more effective than one based on capital-flow types. To be relevant, domestic policies must factor in the heterogenous effects of capital flows. Liquidity screening policies should be studied more carefully, both for quantities and prices. The literature is vast for EM. Cerutti and Claessens (2024) report the main examples: CB FXI, asset purchases programs (APPs), macroprudential (MaPP) and capital flow management (CFM) policies[71]. However, given Japan's sustained openness to capital mobility, managing inflows and outflows by type of capital flow appears unrealistic due to the current level of financial integration, which also includes digital channels (Gou et al., 2024). Monitoring by institutional category rather than by category of capital flows is key.

[70] See Section 2(2).

[71] See also IMF's Integrated Policy Framework (IPF) (Basu and Suman, 2024, p.70).

A classification of institutions based on global sensitivity is needed. We find that, when distinguishing between volatility regimes, nonbank institutions are the most relevant. This suggests a policy approach that complements the Global Monitoring Report on Non-Bank Financial Intermediation (published annually since 2012) by developing country-specific monitoring frameworks for nonbank intermediation. A more granular classification of institutional sub-categories according to their sensitivity to *global* market conditions would be required, potentially using indicators of market pressure such as those proposed by Goldberg (2023).

Figure 20: Microprudential Oversight Framework over NBFIs



Source: Author's elaboration based on BIS (2024).

The two elements—monitoring by institutional category and classification by global sensitivity—can be combined within the BIS's holistic framework (BIS, 2024), which includes microprudential oversight (Figure 20), institutional oversight, and group-wide supervision. In this structure, global sensitivity would fall under the broad-based component of microprudential policy.

The approach is also relevant as it targets medium-term dynamics in line with our findings. In Japan, the most significant effects emerge over the medium term, supporting the view that financial cycles operate at lower frequencies rather than at high-frequency intervals.

For ASEAN, regional coordination is not optional. We highlight one overlooked aspect of prudential regulation in Japan: regional coordination mechanisms—such as infor-

mation sharing and early warning systems—that can manage systemic risks at the regional level. Japan is at the core of regional financial stability in Asia, where governance mechanisms remain critically discussed—the Asian Financial Crisis occurred less than 25 years ago. ADBI (2025, p.16) discusses the multilateral development of financial governance mechanisms from the Asian perspective, suggesting that, due to the Global North's leadership, the reaction function of Asian supervisory bodies does not adequately reflect the regional priorities of ASEAN. In other words, the issue of financial stability is amplified in the region[72].

The mirroring effect of Japanese liquidity is a possibility, not a necessity for Japan. The mirroring effect can be decomposed into: (1) *mirroring possibility*; and (2) *mirroring necessity*. We use the term mirroring possibility to describe cases like Japan, where domestic financial conditions may reflect the GFCy, but this is not structurally imposed. Instead, mirroring necessity refers to economies, particularly EM, that are dependent on international liquidity provision and thus must align with global cycles.
For our case of mirroring possibility, the Tinbergen rule of using two different tools for two different objectives (policies) appears less applicable today due to the interdependence of microprudential and macroprudential policies in Japan. This is driven by (1) the increasing size of domestic financial conglomerates; (2) the blurred boundaries between risk at the institutional level and systemic vulnerabilities. For example, monitoring cross-border financial linkages implies monitoring risk exposure metrics such as the ratio of EM assets to total foreign claims—particularly for Japanese banks with substantial portfolios concentrated in the ASEAN region.

Probabilistic modeling for microprudential oversight is key. We find that the overall sensitivity to U.S. monetary tightenings has increased, suggesting as ideal policy approach: (1) isolating the effects of domestic policy actions, particularly in relationship to financial stability; (2) identifying those stemming from external shocks. In practice, this calls for the explicit incorporation of external shocks into institutional analytical frame-

[72]Note that Japan is not an ASEAN country but it is the key dialogue partner within ASEAN+3 (with China and South Korea).

works through probabilistic modeling, non-linear and state-contingent specifications, and more Bayesian forms of stress testing as explored by the European Central Bank (Sahuc et al., 2022).

Finally, the sensitivity to uncertainty (proxied by the VIX) might have decreased for the measures of credit, but on absolute levels all indexes of uncertainty have been increasing. The question for policymakers is:

How can the Japanese financial system withstand the sustained increase in uncertainty while promoting local financial developments?

8 Conclusion

The Global Financial Cycle (GFCy) makes economies *mirror* the fluctuations in the center-country's financial conditions (the U.S.). The primary objective of this study has been to contribute to the academic discourse on the transmission of the cycle through credit lending in one country: Japan. Global liquidity and global financial cycles are closely interlinked, and this study brings them together by (1) using credit (as subset of capital flows) dynamics to trace the cycle; and (2) analyzing a country that remains central to global liquidity.

The empirical analysis (Section 4) aims at studying the non-linearity of transmission effects of VIX and U.S. monetary policy-our proxies of the GFCy- on a set of credit data for Japan. First, we demonstrate that a single global factor summarizing global financial conditions is statistically less informative for Japan compared to the VIX. Second, our findings from LPs highlight that in response to an increase in global volatility, Japan domestic lending benefits from flight-to-safety dynamics supporting domestic credit provision. Third, we find that the impact of a U.S. tightening is conditional on the stance of global uncertainty, which to my knowledge is new in the literature. Finally, we find that in Japan non-bank channels act as a transmission amplifier of global financial shocks.
We also examine whether these effects changed after 2009 and find a sharper response among foreign banks. Since 2009, domestic banks have quieted their sensititivity to global risk, while

credit from foreign banks has become more procyclical to it.

The GFCy is a phenomenon that can be quantified. This result challenges the degree of monetary policy sovereignty of open economies, and echoes the claim of Rey (2013) that the Mundellian trilemma is a dilemma. The question raised at the beginning—whether a single drop of rain in one country can soak every economy—finds support in our findings. If all countries operate within the same financial climate, then domestic seasonal factors matter less than assumed: global shocks, in our case global uncertainty and tightenings, transmit widely, and the scope for insulation is limited even for countries like Japan. Insulation à la Mundell- Fleming is not possible.

As noted by Cerutti et al. (2017, p. 3),

A country is more likely to give up the gains of international financial integration as it tries to insulate itself.

This paradox captures the core dilemma faced by policymakers today: how to preserve financial and macroeconomic stability while benefitting from capital flow openness. This calls for the adoption of policymaking frameworks that are non-linear, probabilistic, and contingent on global financial conditions.

Particularly in the ASEAN region, the trade-off between financial openness and insulation is not binary, but contingent. Future policy success will depend not only on the calibration of tools, but also on institutional independence, and regional cooperation based on an understanding of global (common) financial asymmetries[73]. A rich policy agenda remains ahead.

[73]The common factors in current discussions are the risks to U.S. bond market stability arising from concerns about the sustainability of the U.S. fiscal deficit. This has important implications for Japan. For Japanese financial markets, and in line with global trends, the role of NBFIs may reintroduce risks that are not new but have not been observed for some time (Lagarde, 2025).

9 Bibliography

Acemoglu, Daron and Robinson, James A. (2012). Why Nations Fail: The Origins of Power, Prosperity, and Poverty. Crown Business.

Adrian, Tobias, and Hyun Song Shin (2010). "Liquidity and leverage." In: Journal of Financial Intermediation 19.3, pp. 418–437.

Adrian, Tobias, and Adam B. Ashcraft (2012). "Shadow Banking Regulation." Annual Review of Financial Economics, 4(1), pp. 99–140.

Avdjiev, Stefan, Leonardo Gambacorta, Linda S. Goldberg and Stefano Schiaffi (2025). "The Risk Sensitivity of Global Liquidity Flows: Heterogeneity, Evolution and Drivers." NBER Working Paper No. 33674.

Agosin, Manuel R., and Ricardo Ffrench-Davis (1997). "Managing capital inflows in Chile." Estudios de Economía 24(2), pp. 297–326. Santiago: Department of Economics, University of Chile.

Aguiar, Mark and Gita Gopinath (2007). "Emerging Market Business Cycles: The Cycle Is the Trend." In: Journal of Political Economy 115.1, pp. 69–102.

Ahmed, Masood; Gooptu, Sudarshan (1993). "Portfolio Investment Flows to Developing Countries." Finance and Development, March 1993, pp. 9–11.

Ahmed, Shaghil, and Andrei Zlate (2014). "Capital Flows to Emerging Market Economies: A Brave New World?" In: Journal of International Money and Finance 48 (PB), pp. 221–248.

Aizenman, Joshua; Brian Pinto; and Artur Radziwill (2004). "Sources for Financing Domestic Capital – Is Foreign Saving a Viable Option for Developing Countries?" In: NBER Working Paper Series No. 10624.

Aizenman, Joshua, Mustafa Binici, and Michael M. Hutchison (2016). "The Transmission of Federal Reserve Tapering News to Emerging Financial Markets." *International Journal of Central Banking*, 12(2): 317–356.

Aldasoro, I., Borio, C., and Drehmann, M. (2018). "Early warning indicators of banking crises: Expanding the family." BIS Quarterly Review, March 11 2018, 29–45.

Alesina, Alberto, and Guido Tabellini (2007). "Bureaucrats or Politicians? Part I: A Single

Policy Task." In: American Economic Review 97(1), pp. 169–179.

Alexander, Sidney S. (1952). "Effects of a Devaluation on a Trade Balance." In: IMF Staff Papers 2 (2), pp. 263–278.

Alfaro, Laura, Chanda, Areendam, Kalemli-Özcan, Sebnem, Sayek, Selin (2004). "FDI and economic growth: the role of local financial markets." Journal of International Economics 64(1): 89–112.

Altavilla, Carlo, Luca Brugnolini, Refet S. Gürkaynak, Roberto Motto, and Giuseppe Ragusa (2019). "Measuring euro area monetary policy." Journal of Monetary Economics 108(C), pp. 162–179.

Altunbas, Yener, Leonardo Gambacorta, and David Marqués-Ibáñez (2010). "Does Monetary Policy Affect Bank Risk-Taking?" ECB Working Paper Series, No. 1166, March.

Altunbas, Yener, Leonardo Gambacorta, and David Marqués-Ibáñez (2012). "Do Bank Characteristics Influence the Effect of Monetary Policy on Bank Risk?" ECB Working Paper Series, No. 1427, March.

Ando, Albert, and Franco Modigliani (1963). "The 'Life-Cycle' Hypothesis of Saving: Aggregate Implications and Tests." American Economic Review 53(1), pp. 55–84.

Angeloni, Ignazio, and Ester Faia (2009). "A Tale of Two Policies: Prudential Regulation and Monetary Policy with Fragile Banks." Kiel Working Paper No. 1569, Kiel Institute for the World Economy (IfW), October 2009.

Angrist, Joshua D., Òscar Jordà, and Guido M. Kuersteiner (2018). "Semiparametric Estimates of Monetary Policy Effects: String Theory Revisited." Journal of Business and Economic Statistics, 36(3), 371–387.

Arrow, Kenneth J., and Gérard Debreu (1954). "Existence of an Equilibrium for a Competitive Economy." In: Econometrica 22 (3), 265–290.

Arteta, Carlos; Kamin, Steven Brian and Ruch, Franz Ulrich (2023). "How Do Rising U.S. Interest Rates Affect Emerging and Developing Economies? It Depends." Policy Research Working Paper 10258, World Bank Group.

Kim, Soyoung, and Doo Yong Yang (2008). "Managing capital flows: The case of the Republic of Korea." ADBI Discussion Paper 88. Tokyo: Asian Development Bank Institute.

Asian Development Bank Institute (2025). "Ready for the Next Financial Crisis? Strengthening Financial Governance Mechanisms." ADBI Working Paper Series No. 1515, July 2025. Tokyo: Asian Development Bank Institute.

Athukorala, Prema-Chandra (2008). "The Malaysian Capital Controls: A Success Story?" Asian Economic Papers 7(1), pp. 31–74. Cambridge, MA: MIT Press.

Avdjiev, Stefan; Kuti, Zsolt; and Takáts, Előd. (2012). "The euro area crisis and cross-border bank lending to emerging markets." BIS Quarterly Review, December 2012, pp. 37 – 47.

Avdjiev, Stefan; Gambacorta, Leonardo; Goldberg, Linda S.; and Schiaffi, Simone (2017). "How Important Is the Global Financial Cycle? Evidence from Capital Flows." IMF Working Paper WP/17/193, International Monetary Fund, September 2017.

Avdjiev, Stefan, and Galina Hale (2019). "U.S. Monetary Policy and Fluctuations of International Bank Lending." Journal of International Money and Finance, 95(C): 251–268.

Azis, Iwan J. and Hyun Song Shin (2019). How Do Global Liquidity Phases Manifest Themselves in Asia? Manila: Asian Development Bank.

Bacchetta, Philippe, and Kenza Benhima (2010). "The Demand for Liquid Assets, Corporate Saving, and Global Imbalances." In: Cahiers de Recherches Économiques du Département d'économie 10.12, Université de Lausanne, Faculté des HEC.

Bagehot, Walter (1873). Lombard Street: A Description of the Money Market. London: Henry S. King & Co.

Bai, Yan, & Zhang, Jing (2012). "Financial Integration and International Risk Sharing." Journal of International Economics, 86(1): 17–32.

Baker, Dean (2002). "The Run-Up in Home Prices: Is It Real or Is It Another Bubble?" Briefing Paper, January. Washington, DC: Center for Economic and Policy Research.

Bank for International Settlements (2011). "Global liquidity – concept, measurement and policy implications." CGFS Paper No. 45, December 2011. Basel: BIS.

Bank for International Settlements (2021). Non-bank financial intermediaries and financial stability. BIS Working Papers No. 972, Monetary and Economic Department. Basel: Bank for International Settlements.

Bank for International Settlements (2022). "Macro-Financial Stability Frameworks and Ex-

ternal Financial Conditions." Report submitted to the G20 Finance Ministers and Central Bank Governors, July 2022. Bank for International Settlements, Basel.

Bank for International Settlements. (2023). Global liquidity: a new phase? BIS Quarterly Review, 04 December 2023, pp. 1–11.

Bank for International Settlements (2024). Safeguarding the financial system's spare tyre: regulating non-bank retail lenders in the digital era. FSI Insights on Policy Implementation No. 56, March 2024. Basel: Bank for International Settlements.

Bank of England (2021). "Stress testing the UK banking system: 2021 Solvency Stress Test results." London: Bank of England.

Barbuscia, Davide and Pushkala Aripaka (2025). Moody's cuts America's pristine credit rating, citing rising debt. Reuters, May 17, 2025.

Barro, Robert J. (1991). "Economic Growth in a Cross Section of Countries." In: Quarterly Journal of Economics 106.2, pp. 407–443.

Barro, Robert J. and Xavier Sala-i-Martin (1991). "Convergence Across States and Regions." Brookings Papers on Economic Activity 1991(1): 107–182.

Barro, Robert J., and Xavier Sala-i-Martin (1992). "Convergence." Journal of Political Economy 100(2), pp. 223–251, April 1992.

Basel Committee on Banking Supervision (2010). "Guidance for National Authorities Operating the Countercyclical Capital Buffer." Bank for International Settlements, Basel, December 1, 2010.

Başkaya, Yusuf Soner; Binici, Mahir; and Kenç, Turalay (2017). "International Banking and Cross-Border Effects of Regulation: Lessons from Turkey." International Journal of Central Banking 13(S1): 379–423.

Basu, Suman S., and Gita Gopinath (2024). "An Integrated Policy Framework (IPF) Diagram for International Economics." IMF Working Paper No. 24/41, International Monetary Fund.

Baxter, Marianne, and Mario J. Crucini (1995). "Business Cycles and the Asset Structure of Foreign Trade." In: International Economic Review 36.4, pp. 821–854.

Bauer, Michael D., and Eric T. Swanson (2022). "A Reassessment of Monetary Policy Surprises and High-Frequency Identification." NBER Working Paper No. 29939. Cam-

bridge, MA: National Bureau of Economic Research.

Bauer, Michael D., and Eric T. Swanson (2023). "An Alternative Explanation for the 'Fed Information Effect.'" American Economic Review, 113(3), 664–700.

Bekaert, Geert, Campbell R. Harvey, and Christian T. Lundblad (2005). "Liquidity and Expected Returns: Lessons from Emerging Markets." NBER Working Paper No. 11413, June.

Bekaert, Geert, Marie Hoerova, and Marco Lo Duca (2013). "Risk, uncertainty and monetary policy." Journal of Monetary Economics, 60(7), pp. 771–788. Amsterdam: Elsevier.

Bernanke, Ben S. and Mark Gertler (1995). "Inside the Black Box: The Credit Channel of Monetary Policy Transmission." In: Journal of Economic Perspectives 9.4, pp. 27–48.

Bernanke, Ben S., Mark Gertler, and Simon Gilchrist (1999). "The Financial Accelerator in a Quantitative Business Cycle Framework." In: Handbook of Macroeconomics, Vol. 1C, edited by John B. Taylor and Michael Woodford, pp. 1341–1393. Amsterdam: North-Holland.

Bernanke, Ben S. (2013). "A Century of U.S. Central Banking: Goals, Frameworks, Accountability." Speech delivered at the conference "The First 100 Years of the Federal Reserve: The Policy Record, Lessons Learned, and Prospects for the Future," Federal Reserve Board, Cambridge, MA, July 10.

Blanchard, Olivier J., and Lawrence H. Summers (1984). "Perspectives on High World Real Interest Rates." In: Brookings Papers on Economic Activity 1984 (1), pp. 273–324.

Bluedorn, John C., and Christopher Bowdler (2010). "The Empirics of International Monetary Transmission: Identification and the Impossible Trinity." Journal of Money, Credit and Banking, 42 (4): 679–713.

Blanchard, Olivier, and Gian Maria Milesi-Ferretti (2009). "Global Imbalances: In Midstream?" IMF Staff Position Note SPN/09/29 (November 10, 2009), International Monetary Fund, Washington, D.C.

Bordo, Michael D., and Barry Eichengreen, editors (1993). A Retrospective on the Bretton Woods System: Lessons for International Monetary Reform. Chicago: University of Chicago Press.

Bordo, Michael D., and Ronald MacDonald (2005). "Interest Rate Interactions in the Clas-

sical Gold Standard, 1880–1914: Was There Any Monetary Independence?" In: Journal of Monetary Economics 52.2, pp. 307–327.

Borensztein, E.; De Gregorio, J.; and Lee, J.-W. (1998). "How Does Foreign Direct Investment Affect Economic Growth?" Journal of International Economics, 45(1): 115–135.

Borio, Claudio; and Lowe, Philip (2002). "Asset prices, financial and monetary stability: exploring the nexus." BIS Working Paper No. 114, 2 July 2002.

Borio, Claudio, and Haibin Zhu (2008). "Capital Regulation, Risk-Taking and Monetary Policy: A Missing Link in the Transmission Mechanism?" BIS Working Paper No. 268, Bank for International Settlements, 17 December 2008.

Borio, C., and Disyatat, P. (2011). "Global imbalances and the financial crisis: Link or no link?" BIS Working Papers No. 346, Bank for International Settlements, May 2011.

Borio, Claudio; McCauley, Robert N.; and McGuire, Patrick. (2011). "Global credit and domestic credit booms." BIS Quarterly Review, September 2011, pp. 43 – 57.

Borio, Claudio (2013). "The Financial Cycle and Macroeconomics: What Have We Learnt?" Journal of Banking & Finance 45, pp. 182–198.

Borio, Claudio; and Chavaz, Matthieu (2025). "Moving targets? Inflation targeting frameworks, 1990–2025." BIS Quarterly Review, 11 March 2025, pp. 1–22.

Bowman, D., J. M. Londono, and H. Sapriza (2015). "U.S. Unconventional Monetary Policy and Transmission to Emerging Market Economies." Journal of International Money and Finance 55 (July): 27–59.

Brainard, William C. (1967). "Uncertainty and the Effectiveness of Policy." American Economic Review 57 (2): 411–425.

Brecher, Richard A. and Díaz-Alejandro, Carlos F. (1977). "Tariffs, foreign capital and immiserizing growth." Journal of International Economics 7(4): 317–322.

Broner, Fernando; Didier, Tatiana; Erce, Aitor; and Schmukler, Sergio L. (2013). "Gross Capital Flows: Dynamics and Crises." In: Journal of Monetary Economics 60(1), pp. 113–133.

Brooks, Robin (2000). "What will happen to financial markets when the baby boomers retire?" IMF Working Paper 00/18, International Monetary Fund.

Brooks, Robin (2003). "Population aging and global capital flows in a parallel universe."

IMF Staff Papers 50(2): 200–221.

Brunnermeier, Markus K., Stefan Nagel, and Lasse H. Pedersen (2009). "Carry Trades and Currency Crashes." In: NBER Macroeconomics Annual 2008, Vol. 23, pp. 313–347. Cambridge, MA: National Bureau of Economic Research.

Bruno, Valentina, and Hyun Song Shin (2013). "Capital Flows, Cross-Border Banking and Global Liquidity." NBER Working Paper No. 19038, May 2013.

Bruno, Valentina, and Hyun Song Shin (2015). "Capital Flows and the Risk-Taking Channel of Monetary Policy." Journal of Monetary Economics 71(C): 119–132.

Buch, Claudia M., Matthieu Bussière, Linda Goldberg, and Robert Hills (2019). "The International Transmission of Monetary Policy." Journal of International Money and Finance 91: 29–48.

Buch, Claudia M., and Linda S. Goldberg (2024). "International Banking and Nonbank Financial Intermediation: Global Liquidity, Regulation, and Implications." Staff Reports 1091, Federal Reserve Bank of New York.

Caballero, Ricardo J.; Farhi, Emmanuel; and Gourinchas, Pierre-Olivier (2008). "An Equilibrium Model of 'Global Imbalances' and Low Interest Rates." American Economic Review 98(1): 358–393.

Caballero, Julián (2010). "Do Surges in International Capital Inflows Influence the Likelihood of Banking Crises? Cross-Country Evidence on Bonanzas in Capital Inflows and Bonanza-Boom-Bust Cycles." Working Paper No. 10-23. Santa Cruz, CA: Institute for International Economics, University of California Santa Cruz.

Caballero, Julián and Upper, Christian (2023). "What happens to EMEs when US yields go up?" BIS Working Papers 1081, Bank for International Settlements.

Calvo, Guillermo A. (1998). "Capital Flows and Capital-Market Crises: The Simple Economics of Sudden Stops." In: Journal of Applied Economics 1(1), pp. 35–54.

Calvo, Guillermo A., Alejandro Izquierdo, and Luis-Fernando Mejía (2008). "Systemic Sudden Stops: The Relevance of Balance-Sheet Effects and Financial Integration." IDB Working Paper 1628, Inter-American Development Bank.

Calvo, Guillermo A., Leonardo Leiderman, and Carmen M. Reinhart (1993). "Capital Inflows and Real Exchange-Rate Appreciation in Latin America: The Role of External

Factors." In: IMF Staff Papers 40(1), pp. 108–151.

Calvo, Guillermo A., Leonardo Leiderman, and Carmen M. Reinhart (1996). "Inflows of Capital to Developing Countries in the 1990s." In: Journal of Economic Perspectives 10(2), pp. 123–139.

Canova, Fabio (2005). "The Transmission of U.S. Shocks to Latin America." In: Journal of Applied Econometrics 20(2), pp. 229–251.

Cantú, Carlos Armando de Jesús; Roberto Lobato; Calixto López; and Fabrizio López-Gallo (2019). "A Loan-Level Analysis of Bank Lending in Mexico." BIS Working Papers No. 802, Bank for International Settlements.

Caramazza, Francesco, and Junaid Aziz (1998). "Fixed or Flexible? Getting the Exchange Rate Right in the 1990s". International Monetary Fund Economic Issues No. 13 (April 1998).

Cardarelli, Roberto; Elekdag, Selim; and Kose, M. Ayhan (2010). "Capital Inflows: Macroeconomic Implications and Policy Responses." In: Economic Systems 34.4, pp. 333–356.

Cassel, Gustav (1918). "Abnormal Deviations in International Exchanges." In: Economic Journal 28(112), pp. 413–415.

Cassis, Youssef (2006). Capitals of Capital: A History of International Financial Centres, 1780–2005. Cambridge: Cambridge University Press.

Cecchetti, Stephen G.; Mancini-Griffoli, Tommaso; Narita, Machiko; and Sahay, Ratna (2020). "U.S. or Domestic Monetary Policy: Which Matters More for Financial Stability?" IMF Economic Review 68(1): 1–29.

Cerutti, Eugenio; Claessens, Stijn; and Ratnovski, Lev (2014). "Global Liquidity and Drivers of Cross-Border Bank Flows." IMF Working Paper 14/69, International Monetary Fund.

Cerutti, Eugenio; Claessens, Stijn; and Ratnovski, Lev. (2017). "Global Liquidity and Cross-Border Bank Flows." Economic Policy, 32(89), 81–125.

Cerutti, Eugenio, Stijn Claessens, and Andrew K. Rose (2019). How Important is the Global Financial Cycle? Evidence from Capital Flows. IMF Economic Review 67(1): 24–60. Washington, DC: International Monetary Fund.

Cerutti, Eugenio and Stijn Claessens (2024). The Global Financial Cycle: Quantities versus Prices. IMF Working Paper WP/24/158. Washington, D.C.: International Monetary

Fund.

Cetorelli, Nicola and Goldberg, Linda S. (2011). "Global banks and international shock transmission: Evidence from the crisis." IMF Economic Review 59(1): 41–76.

Cetorelli, Nicola and Goldberg, Linda S. (2012). "Banking globalization and monetary transmission." Journal of Finance 67(5): 1811–1843.

Chen, J., T. Mancini-Griffoli, and R. Sahay (2014). "Spillovers from United States Monetary Policy on Emerging Markets: Different This Time?" IMF Working Paper 14/240, International Monetary Fund, Washington, DC.

Chen, Qianying, Andrew Filardo, Dong He, and Feng Zhu (2016). "Financial Crisis, US Unconventional Monetary Policy and International Spillovers." Journal of International Money and Finance 67: 62–81.

Chinn, Menzie D. and Hiro Ito (2008). "A New Measure of Financial Openness." Journal of Comparative Policy Analysis 10(3), pp. 309–322.

Christiano, Lawrence J., Martin Eichenbaum, and Charles L. Evans (2005). "Nominal rigidities and the dynamic effects of a shock to monetary policy." Journal of Political Economy 113(1), pp. 1–45. Chicago: University of Chicago Press.

Chuhan, Punam; Claessens, Stijn; and Mamingi, Nlandu (1993). "Equity and Bond Flows to Latin America and Asia: The Role of Global and Country Factors." World Bank Policy Research Working Paper No. 1160. Washington, DC: World Bank.

Claessens, Stijn; M. Ayhan Kose; and Marco E. Terrones (2011). "Financial Cycles: What? How? When?" BIS Working Paper No. 355. Basel: BIS.

Claessens, Stijn; M. Ayhan Kose; and Marco E. Terrones (2012). "How Do Business and Financial Cycles Interact?" Journal of International Economics 87 (1), 178–190.

Claessens, Stijn; Glaessner, Thomas; and Klingebiel, Daniela (2025). "Strengthening central bank financial resilience in a changing world." VoxEU Column: Central Banking, Centre for Economic Policy Research, 7 April.

Clarida, Richard; Galí, Jordi; and Gertler, Mark. (1999). "The Science of Monetary Policy: A New Keynesian Perspective." Journal of Economic Literature 37(4): 1661–1707.

Cochrane, John H., and Monika Piazzesi (2002). "The Fed and interest rates – A high-frequency identification." American Economic Review 92(2), pp.90–95.

Cooper, Richard N. (1984). "A Monetary System for the Future." In: Foreign Affairs 63(1), pp. 166–184.

Corsetti, Giancarlo and Pesenti, Paolo (2005). "International dimensions of optimal monetary policy." Journal of Monetary Economics 52(2): 281–305.

Cúrdia, Vasco, and Woodford, Michael. (2010). "Credit Spreads and Monetary Policy." Journal of Money, Credit and Banking, 42(s1), 3–35.

Debortoli, Davide, Luca Gambetti, Mario Forni, and Luca Sala (2020). "Asymmetric Effects of Monetary Policy Easing and Tightening." Barcelona School of Economics Working Paper No. 1205.

Dedola, Luca, and Giovanni Lombardo (2012). "Financial Frictions, Financial Integration and the International Propagation of Shocks." Economic Policy 27(70), pp. 319–359.

Degasperi, Riccardo, Seokki Simon Hong, and Giovanni Ricco (2023). "The Global Transmission of U.S. Monetary Policy." Working Paper 2023-02, Center for Research in Economics and Statistics (CREST).

Degasperi, Riccardo and Venditti, Fabrizio (2024). "US Monetary Policy Spillovers to the Euro Area." Bank of Italy Occasional Paper 891.

Dekle, Robert, and Kenneth M. Kletzer (2002). "Domestic Bank Regulation and Financial Crises: Theory and Empirical Evidence from East Asia." In Preventing Currency Crises in Emerging Markets, edited by Sebastian Edwards and Jeffrey A. Frankel, 196 – 237. Chicago: University of Chicago Press.

Demirgüç-Kunt, Asli; Detragiache, Enrica (1998). "The Determinants of Banking Crises in Developing and Developed Countries." IMF Staff Papers 45 (1): 81–109.

Detken, Carsten; Weeken, Olaf; Alessi, Lucia; Bonfim, Diana; Boucinha, Miguel; Castro, Christian; Frontczak, Sebastian; Giordana, Gaston; Giese, Julia; Wildmann, Nadya; Kakes, Jan; Klaus, B. (2014). "Operationalising the Countercyclical Capital Buffer: Indicator Selection, Threshold Identification and Calibration Options." ESRB Occasional Paper Series No. 5, European Systemic Risk Board.

Domar, Evsey D. (1946). "Capital Expansion, Rate of Growth and Employment." Econometrica 14 (2): 137–147.

Dooley, Michael P. (1988). "Capital Flight: A Response to Differences in Financial Risks."

IMF Staff Papers 35 (3): 422–436.

Dornbusch, Rudiger (1976). "Expectations and Exchange Rate Dynamics." Journal of Political Economy 84 (6): 1161–1176.

Dornbusch, Rudiger, and Paul R. Krugman (1976). "Flexible Exchange Rates in the Short Run." Brookings Papers on Economic Activity, vol. 7, no. 3, pp. 537–584.

Dornbusch, Rudiger; Fischer, Stanley (1980). Macroeconomics. New York: McGraw-Hill.

Drehmann, Mathias; Tsatsaronis, Kostas (2014). "The Credit-to-GDP Gap and Countercyclical Capital Buffers: Questions and Answers." BIS Quarterly Review, March 2014.

Drehmann, Mathias, Claudio Borio, and Kostas Tsatsaronis (2012). "Characterising the Financial Cycle: Don't Lose Sight of the Medium Term." BIS Working Paper No. 380, Bank for International Settlements.

Drehmann, Mathias; Juselius, Mikael; and Quincy, Sarah. (2024). "Aggregate debt servicing and the limit on private credit." BIS Working Papers No. 1235, Bank for International Settlements, 11 December 2024.

Edwards, Sebastian (2001). "Capital Mobility and Economic Performance: Are Emerging Economies Different?" NBER Working Paper No. 8076. Cambridge, MA: NBER.

Eichenbaum, Martin, and Charles L. Evans (1995). "Some Empirical Evidence on the Effects of Shocks to Monetary Policy on Exchange Rates." The Quarterly Journal of Economics, 110(4), 975–1009.

Eichengreen, Barry, and Poonam Gupta (2015). "Tapering Talk: The Impact of Expectations of Reduced Federal Reserve Security Purchases on Emerging Markets." Emerging Market Review, 25: 1–15.

Eichengreen, Barry (2008). Globalizing Capital: A History of the International Monetary System, 2nd ed. Princeton, NJ: Princeton University Press.

Eren, Egemen, Andreas Schrimpf, and Vladyslav Sushko (2020). US dollar funding markets during the COVID-19 crisis: The international dimension. BIS Bulletin No.15, Monetary and Economic Department. Basel: Bank for International Settlements.

Faust, Jon, Eric T. Swanson, and Jonathan H. Wright (2004). "Do Federal Reserve policy surprises reveal superior information about the economy?" The B.E. Journal of Macroeconomics 4(1), pp.1–31.

Financial Stability Board (FSB) (2023). The Financial Stability Implications of Leverage in Non-Bank Financial Intermediation. Basel: Financial Stability Board.

Financial Stability Board. (2024). Global Monitoring Report on Non-Bank Financial Intermediation 2024. 16 December 2024.

Fleming, J. Marcus (1962). "Domestic Financial Policies Under Fixed and Under Floating Exchange Rates." IMF Staff Papers 9 (3): 369–380.

Forbes, Kristin J.; Warnock, Francis E. (2012). "Capital Flow Waves: Surges, Stops, Flight, and Retrenchment." Journal of International Economics 88 (2): 235–251.

Forbes, Kristin J. and Warnock, Francis E. (2021). "Capital flow waves—or ripples? Extreme capital flow movements since the crisis." Journal of International Money and Finance 116: 102394.

Frankel, Jeffrey A.; Schmukler, Sergio L.; Servén, Luis (2004). "Global Transmission of Interest Rates: Monetary Independence and the Currency Regime." Journal of International Money and Finance 23 (5): 701–733.

Frenkel, Jacob A. (1977). "A Monetary Approach to the Exchange Rate: Doctrinal Aspects and Empirical Evidence." In: Flexible Exchange Rates and Stabilization Policy, edited by Jan Herin, Assar Lindbeck, and Johan Myhrman, pp. 68–92. London: Palgrave Macmillan.

Friedman, Milton (1953). "The Case for Flexible Exchange Rates." In: Essays in Positive Economics. Chicago: University of Chicago Press, pp. 157–203.

Friedman, Milton; and Schwartz, Anna J. (1963). A Monetary History of the United States, 1867–1960. Princeton: Princeton University Press.

Friedman, Thomas L. (1999). The Lexus and the Olive Tree: Understanding Globalization. New York: Farrar, Straus and Giroux, p. 223.

Fukuda, Yoshiyuki, Yuki Kimura, Nao Sudo, and Hiroshi Ugai (2013). "Cross-country Transmission Effect of the U.S. Monetary Shock under Global Integration." Bank of Japan Working Paper Series No. 13-E-16

Galí, Jordi; Monacelli, Tommaso (2005). "Monetary Policy and Exchange Rate Volatility in a Small Open Economy." Review of Economic Studies 72 (3): 707–734.

Gali, Jordi (2008). Monetary Policy, Inflation, and the Business Cycle: An Introduction to

the New Keynesian Framework. Princeton, NJ: Princeton University Press.

Georgiadis, Georgios (2015). "Examining Asymmetries in the Transmission of Monetary Policy in the Euro Area: Evidence from a Mixed Cross-Section Global VAR Model." European Economic Review 75(C): 195–215.

Gerali, Andrea; Neri, Stefano; Sessa, Luca; and Signoretti, Federico M. (2010). "Credit and Banking in a DSGE Model of the Euro Area." Journal of Money, Credit and Banking, 42(s1), 107–141.

Gertler, Mark, and Peter Karadi (2015). "Monetary Policy Surprises, Credit Costs, and Economic Activity." American Economic Journal: Macroeconomics, 7(1), 44–76.

Gertler, Mark, and Kiyotaki, Nobuhiro. (2010). "Financial Intermediation and Credit Policy in Business Cycle Analysis." In B. M. Friedman and M. Woodford (Eds.), Handbook of Monetary Economics, Vol. 3, pp. 547–599. Elsevier.

Goldberg, Linda S. (2023). "Global Liquidity: Drivers, Volatility and Toolkits." NBER Working Paper No. w31355. Cambridge, MA: National Bureau of Economic Research.

Goldberg, Linda S.; Krogstrup, Signe (2018). "International Capital Flow Pressures." IMF Working Paper No. 18/030. Washington, DC: International Monetary Fund.

Goodhart, C. A. E. (2008). "The Regulatory Response to the Financial Crisis." Journal of Financial Stability 4 (4): 351–358.

Gourinchas, Pierre-Olivier; Jeanne, Olivier (2007). "Capital Flows to Developing Countries: The Allocation Puzzle." NBER Working Paper No. 13602.

Gourinchas, Pierre-Olivier; Rey, Hélène; Govillot, Nicolas (2010). "Exorbitant Privilege and Exorbitant Duty." IMES Discussion Paper No. 2010-E-20. Institute for Monetary and Economic Studies, Bank of Japan.

Gourinchas, Pierre-Olivier (2012). "Global Imbalances and Global Liquidity." In: Asia's Role in the Post-Crisis Global Economy, edited by Reuven Glick and Mark M. Spiegel, pp. 305–340. San Francisco, CA: Federal Reserve Bank of San Francisco.

Grossman, Gene M. and Elhanan Helpman (1991). Innovation and Growth in the Global Economy. Cambridge, MA: MIT Press.

Gürkaynak, Refet S., Brian Sack, and Eric Swanson (2005). "Do Actions Speak Louder Than Words? The Response of Asset Prices to Monetary Policy Actions and Statements."

International Journal of Central Banking, 1(1), May.

Hansen, Alvin H. (1953). A Guide to Keynes. New York: McGraw-Hill.

Harrod, Roy F. (1939). "An Essay in Dynamic Theory." In: Economic Journal 49.193, pp. 14–33.

Hayashi, Fumio and Edward C. Prescott (2002). "The 1990s in Japan: A Lost Decade." Review of Economic Dynamics 5.1, pp. 206–235.

Hicks, John R. (1937). "Mr. Keynes and the 'Classics'; A Suggested Interpretation." Econometrica 5 (2): 147–159.

Hodrick, Robert J., and Edward C. Prescott (1997). "Postwar U.S. Business Cycles: An Empirical Investigation." Journal of Money, Credit and Banking 29(1), pp. 1–16.

Horioka, Charles Yuji (1990). "Why Is Japan's Household Saving Rate So High? A Literature Survey." Journal of the Japanese and International Economies 4 (1): 49–92.

Hume, David (1752). "Of the Balance of Trade." Discourse V in Political Discourses. London: A. Millar.

Ilzetzki, Ethan, and Keyu Jin (2021). "The Puzzling Change in the International Transmission of U.S. Macroeconomic Policy Shocks." Journal of International Economics 130 (May): 103444.

Institute of International Finance (2009). "Capital Flows Tracker Database." Institute of International Finance, Washington, DC.

International Monetary Fund (1994a). "The IMF and the Latin American Debt Crisis." IMF Working Paper No. 94/23. Washington, DC: International Monetary Fund.

International Monetary Fund (1994b). "The IMF and the Latin American Debt Crisis: Seven Common Criticisms." IMF Policy Discussion Paper No. 94/023. Washington, DC: International Monetary Fund.

International Monetary Fund, Asia and Pacific Department (1999). The Asia Crisis: Causes, Policy Responses, and Outcomes. IMF Working Paper WP/99/138. Washington, DC: International Monetary Fund.

International Monetary Fund (2001). Government Finance Statistics Manual 2001. Washington, D.C.: International Monetary Fund.

International Monetary Fund (2003). Japan's Lost Decade: Policies for Economic Revival.

Edited by Tim Callen and Jonathan D. Ostry. Washington, DC: International Monetary Fund.

International Monetary Fund (2003). Japan's Lost Decade: Policies for Economic Revival. Edited by Tim Callen and Jonathan D. Ostry. Washington, DC: International Monetary Fund.

International Monetary Fund (2005). "Chapter II. Global Imbalances: A Saving and Investment Perspective." In: World Economic Outlook, September 2005, pp. 91–120. Washington, DC: International Monetary Fund.

International Monetary Fund (2009). Balance of Payments and International Investment Position Manual, 6th ed. Washington, DC: International Monetary Fund.

International Monetary Fund (2012). "The Liberalization and Management of Capital Flows: An Institutional View." Policy Paper, November 14, 2012. Washington, DC: International Monetary Fund.

International Monetary Fund (2014). "Global Liquidity—Issues for Surveillance." IMF Policy Paper, March 11, 2014. Washington, DC: International Monetary Fund

International Monetary Fund (2018). "No Pain, All Gain? Exchange Rate Flexibility and the Expenditure-Switching Effect." IMF Working Paper WP/18/213

International Monetary Fund (2023). Taxonomy of Capital Flow Management Measures (CFMs). Washington, DC: International Monetary Fund.

International Monetary Fund (2024). "List of Member Countries." IMF Website. Available at: https://www.imf.org/external/np/sec/memdir/memdate.htm (accessed January 11, 2024).

International Monetary Fund (2025). "Chapter 2. The Rise of the Silver Economy: Global Implications of Population Aging." In: World Economic Outlook, April 2025, pp. 1–36. Washington, DC: International Monetary Fund.

International Monetary Fund (2025). "Currency Composition of Official Foreign Exchange Reserves (COFER): Q4 2024." IMF Data.

Available at: https://www.imf.org/en/Data (accessed May 16, 2025).

Jiménez, Gabriel, Steven Ongena, José-Luis Peydró, and Jesús Saurina (2010). "Credit Supply and Monetary Policy: Identifying the Bank Balance-Sheet Channel with Loan

Applications." Economics Working Paper 1706, Department of Economics and Business, Universitat Pompeu Fabra, revised September 2011.

Johnson, Chalmers (1982). MITI and the Japanese Miracle: The Growth of Industrial Policy, 1925–1975. Stanford, CA: Stanford University Press.

Jordà, Òscar (2005). "Estimation and Inference of Impulse Responses by Local Projections." American Economic Review 95(1), pp. 161–182. American Economic Association.

Jordà, Òscar; Schularick, Moritz; and Taylor, Alan M. (2012). "When Credit Bites Back: Leverage, Business Cycles, and Crises." Federal Reserve Bank of San Francisco Working Paper 2011-27, October.

Jordà, Òscar; Moritz Schularick; Alan M. Taylor; and Felix Ward (2018). "Global Financial Cycles and Risk Premiums." NBER Working Paper No. 24677, National Bureau of Economic Research.

Jordà, Òscar, and Alan M. Taylor (2024). "Local Projections." NBER Working Paper No. 32822, National Bureau of Economic Research.

Ju, Jiandong, and Shang-Jin Wei. 2010. "Domestic Institutions and the Bypass Effect of Financial Globalization." American Economic Journal: Economic Policy 2 (4): 173–204.

Keynes, John M. (1919). The Economic Consequences of the Peace. London: Macmillan.

Keynes, John M. (1936). The General Theory of Employment, Interest and Money. London: Macmillan.

Keynes, John Maynard (1980). "A Plan for an International Clearing Union." In Donald Moggridge (ed.), The Collected Writings of John Maynard Keynes, Vol. XXV: Activities 1940–1944: Shaping the Post-War World, pp. 188–204. London: Macmillan Press; New York: Cambridge University Press. (Reprinted from the 1944 Bretton Woods proceedings.)

Khan, Mohsin S., and Nadeem Ul Haque (1985). "Foreign Borrowing and Capital Flight: A Formal Analysis." IMF Staff Papers 32, no. 4 (December 1985): 606–628.

Kindleberger, Charles P. (1978). Manias, Panics, and Crashes: A History of Financial Crises. New York: Basic Books.

Kim, Soyoung (2001). "International Transmission of U.S. Monetary Policy Shocks: Evidence from VARs." Journal of Monetary Economics, 48(2) (October), pp. 339–372.

Kirkegaard, Jacob Funk (2025). "Managing an Aging Society: Learning the Right Lessons from Japan." PIIE Working Paper 25-4. Washington, DC: Peterson Institute for International Economics, April.

Kishan, Ruby P., and Timothy P. Opiela (2000). "Bank Size, Bank Capital, and the Bank Lending Channel." Journal of Money, Credit and Banking, 32(1), 121–141.

Klein, Michael W. and Giovanni Olivei (2008). "Capital Account Liberalization, Financial Depth, and Economic Growth." In: Journal of International Money and Finance 27.6, pp. 861–875.

Kydland, Finn E. and Prescott, Edward C. (1982). "Time to Build and Aggregate Fluctuations." Econometrica 50(6): 1345–1370.

Koepke, Robin (2015). "What Drives Capital Flows to Emerging Markets: A Survey of the Empirical Literature." Institute of International Finance Working Paper, April 2015.

Koo, Richard C. (2003). Balance Sheet Recession: Japan's Struggle with Unemployment and Deflation. Hoboken, NJ: John Wiley & Sons.

Korinek, Anton (2018). "Regulating Capital Flows to Emerging Markets: An Externality View." Journal of International Economics 111(C): 61–80.

Kose, M. Ayhan; Eswar S. Prasad; and Marco E. Terrones (2009). "Does Financial Globalization Promote Risk Sharing?" Journal of Development Economics 89(2), pp. 258–270.

Krugman, Paul R., and Maurice Obstfeld (1991). International Economics: Theory and Policy. Addison-Wesley Educational Publishers.

Krugman, Paul R. (1998). "It's Baaack: Japan's Slump and the Return of the Liquidity Trap." Brookings Papers on Economic Activity 29.2, pp. 137–205.

Krugman, Paul R. (1999). "Balance Sheets, the Transfer Problem, and Financial Crises." International Tax and Public Finance, 6(4): 459–472.

Kuttner, Kenneth N. (2001). "Monetary Policy Surprises and Interest Rates: Evidence from the Fed Funds Futures Market." Journal of Monetary Economics, 47(3), 523–544.

Kuznets, Simon (1966). Modern Economic Growth: Rate, Structure and Spread. New Haven: Yale University Press.

Laeven, Luc, Giovanni Dell'Ariccia, and Gustavo A. Suarez (2016). "Bank Leverage and Monetary Policy's Risk-Taking Channel: Evidence from the United States." Working

Paper Series 1903, European Central Bank.

Lagarde, Christine (2025). Cutting through the noise: exercising good judgment in a world of change. Speech at the Ninth Annual Conference of the European Systemic Risk Board, Frankfurt am Main, 3 September 2025. European Central Bank.

Lane, Philip R.; and Milesi-Ferretti, Gian Maria (2007). "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities, 1970–2004." Journal of International Economics, 73(2): 223–250, November.

Lane, Philip R. (2024). "Monetary Policy under Uncertainty." Keynote speech at the Bank of England Watchers' Conference 2024, King's College London, London, 25 November.

Lessard, Donald R., and John Williamson (eds.) (1987). Capital Flight and Third World Debt. Washington, DC: Institute for International Economics. ISBN 0-88132-059-5.

Lewis, Karen K. (1996). "What Can Explain the Apparent Lack of International Consumption Risk Sharing?" In: Journal of Political Economy 104.2, pp. 267–297.

Lim, Kyung-Mook and Weil, David N. (2003). "The Baby Boom and the Stock Market Boom." Scandinavian Journal of Economics 105(3): 359–378.

Long, John B. and Plosser, Charles I. (1983). "Real Business Cycles." Journal of Political Economy 91(1): 39–69.

Lucas, Robert E., Jr. (1976). "Econometric Policy Evaluation: A Critique." Carnegie–Rochester Conference Series on Public Policy, 1(1): 19–46, January.

Lucas, Robert E., Jr. (1988). "On the Mechanics of Economic Development." In: Journal of Monetary Economics 22.1, pp. 3–42.

Lucas, Robert E., Jr. (1990). "Why Doesn't Capital Flow from Rich to Poor Countries?" In: American Economic Review 80.2, pp. 92–96.

Mackowiak, Bartosz (2007). "External Shocks, U.S. Monetary Policy and Macroeconomic Fluctuations in Emerging Markets." Journal of Monetary Economics, 54(8): 2512–2520, November.

Mankiw, N. Gregory, David Romer and David N. Weil (1992). "A Contribution to the Empirics of Economic Growth." In: Quarterly Journal of Economics 107.2, pp. 407–437.

Masciandaro, Donato (2005). "Financial Supervision Unification and Central Bank Fragmentation Effect." University of Lecce Economics Working Paper No. 74/35.

Masciandaro, Donato (2006a). "Determinants of Financial Supervision Regimes: An Empirical Analysis." SSRN Working Paper, posted June 9, 2006.

Masciandaro, Donato (2006b). "Reforms of Financial Supervision Regimes and Central Banks: Exploring the Nexus." Preliminary draft; paper presented at the "Macro Prudential Supervision: Challenges for Financial Supervisors" conference, organized by the International Monetary Fund and the Korean Financial Supervisory Service/Financial Supervisory Commission, Seoul, November 7–8, 2006.

Masciandaro, Donato, and Marc Quintyn (2008). "Helping Hand or Grabbing Hand? Politicians, Supervision Regime, Financial Structure and Market View." Paolo Baffi Centre Research Paper No. 2008-14, Università Bocconi, May 2008. Posted May 27, 2008; revised July 24, 2008.

Masciandaro, Donato, and Davide Romelli (2015). "Ups and Downs of Central Bank Independence from the Great Inflation to the Great Recession: Theory, Institutions and Empirics." Financial History Review 22(3), pp. 259–289.

McGuire, Patrick, and Nikola Tarashev (2008). "Bank Health and Lending to Emerging Markets." BIS Quarterly Review, December 2008, pp. 67–80. Bank for International Settlements.

Meade, James E. (1951). The Balance of Payments. The Theory of International Economic Policy, Vol. 1. Oxford University Press.

Meade, James E. (1955). Trade and Welfare. Oxford: Clarendon Press.

Meade, James E. (1957). "The Balance-of-Payments Problems of a European Free-Trade Area," Economic Journal 67(267), pp. 379–396.

Meh, Césaire A., and Moran, Kevin. (2010). "The Role of Bank Capital in the Propagation of Shocks." Journal of Economic Dynamics and Control, 34(3), 555–576.

Mendoza, Enrique G., Vincenzo Quadrini, and José-Víctor Ríos-Rull (2009). "Financial Integration, Financial Development, and Global Imbalances." Journal of Political Economy 117 (3): 371–416.

Mendoza, Enrique G. (2010). "Sudden Stops, Financial Crises, and Leverage." In: American Economic Review 100.5, pp. 1941–1966.

Metzler, Lloyd A. (1951). "Wealth, Saving, and the Rate of Interest," Journal of Political

Economy, Vol. 59, pp. 93–116.

Metzler, Lloyd A. (1960). "The Monetary Dynamics of International Adjustment under Fixed and Flexible Exchange Rates," Quarterly Journal of Economics, Vol. 84 (May), pp. 227-57.

Milesi-Ferretti, Gian-Maria, and Cédric Tille (2010). "The Great Retrenchment: International Capital Flows During the Global Financial Crisis." IHEID Working Paper No. 18-2010, Economics Section, The Graduate Institute of International Studies, revised September 15, 2010.

Milesi-Ferretti, Gian Maria (2025). "External Wealth of Nations complete update, 2023." Brookings Institution – The Hutchins Center on Fiscal and Monetary Policy Blog, January 13, 2025.

Miranda-Agrippino, Silvia; and Rey, Hélène (2015). "U.S. Monetary Policy and the Global Financial Cycle." NBER Working Paper No. 21722, National Bureau of Economic Research, November 2015; revised March 2019.

Miranda-Agrippino, Silvia, and Giovanni Ricco (2021). "The Transmission of Monetary Policy Shocks." American Economic Journal: Macroeconomics, 13(3), pp.74–107. Nashville, TN: American Economic Association.

Miranda-Agrippino, Silvia, and Hélène Rey (2021). "The Global Financial Cycle." NBER Working Paper No. 29327, National Bureau of Economic Research, October 2021.

Mitchell, Wesley C. and Arthur F. Burns (1946). Measuring Business Cycles. New York: National Bureau of Economic Research.

McKinnon, Ronald I. (1973). Money and Capital in Economic Development. Washington, DC: Brookings Institution.

Montiel, Peter J.; Fernández-Arias, Eduardo (1996). "The Surge in Capital Inflows to Developing Countries: An Analytical Overview." World Bank Economic Review 10 (1): 51–77.

Montiel Olea, José L., James H. Stock, and Mark W. Watson (2021). "Inference in Structural Vector Autoregressions Identified with an External Instrument." Journal of Econometrics, 225(1), 74–87.

Montiel-Olea, José Luis, Mikkel Plagborg-Møller, Eric Qian, and Christian K. Wolf (2025).

"Local Projections or VARs? A Primer for Macroeconomists." NBER Macroeconomics Annual, vol. 40. Cambridge, MA: National Bureau of Economic Research.

Morris, Stephen and Shin, Hyun Song (1998). "Unique Equilibrium in a Model of Self-Fulfilling Currency Attacks." American Economic Review 88(3): 587–597.

Mundell, Robert A. (1961a). "The International Disequilibrium System." Kyklos 14(2), pp. 154–172.

Mundell, Robert A. (1961b). "Flexible Exchange Rates and Employment Policy." Canadian Journal of Economics and Political Science 27(4), pp. 509–517.

Mundell, Robert A. (1961c). "International Trade and Factor Mobility." American Economic Review 51(2), pp. 177–189.

Mundell, Robert A. (1962). "The Appropriate Use of Monetary and Fiscal Policy for Internal and External Stability," IMF Staff Papers 9(1), pp. 70–79.

Mundell, Robert A. (1963). "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates," Canadian Journal of Economics and Political Science 29(4), pp. 475–485.

Mundell, Robert A. (2001). "Notes on the History of the Mundell–Fleming Model: Keynote Speech," IMF Staff Papers 47 (Special Issue), pp. 215–227.

Nakaso, Hiroshi (2001). "The financial crisis in Japan during the 1990s: how the Bank of Japan responded and the lessons learnt." BIS Papers No. 6, Bank for International Settlements, October 2.

Nurkse, Ragnar (1944). International Currency Experience: Lessons of the Interwar Period. Geneva: League of Nations, Economic, Financial and Transit Department.

Obstfeld, Maurice (1986). "Capital Flows, the Current Account, and the Real Exchange Rate: Some Consequences of Stabilization and Liberalization." In Sebastian Edwards and Liaquat Ahamed (eds.), Economic Adjustment and Exchange Rates in Developing Countries, pp. 201–232. Chicago: University of Chicago Press.

Obstfeld, Maurice (1994). "The Logic of Currency Crises." NBER Working Paper No. 4640, National Bureau of Economic Research (February).

Obstfeld, Maurice (1998). "The Global Capital Market: Benefactor or Menace?" Journal of Economic Perspectives 12(4), pp. 9–30.

Obstfeld, Maurice. (2001). "International Macroeconomics: Beyond the Mundell–Fleming Model." IMF Staff Papers, Vol. 47, Special Issue (Mundell-Fleming Lecture), pp. 1–39.

Obstfeld, Maurice; Jay C. Shambaugh; and Alan M. Taylor (2005). "The Trilemma in History: Trade-offs among Exchange Rates, Monetary Policies, and Capital Mobility." Review of Economics and Statistics 87(3), pp. 423–438, August 2005.

Obstfeld, Maurice, and Kenneth Rogoff (2005). "Global Current Account Imbalances and Exchange Rate Adjustments." Brookings Papers on Economic Activity 2005(1), pp. 67–146.

Obstfeld, Maurice, and Alan M. Taylor (2017). "International Monetary Relations: Taking Finance Seriously." Journal of Economic Perspectives, 31(3): 3–28.

OECD (1976). Code of Liberalisation of Capital Movements. Paris: Organisation for Economic Co-operation and Development.

Oishi, Hiroshi, Etsuike Kobayashi, and Yoshihiko Sugihara (2025). "Recent Developments in Non-Bank Financial Intermediation and Initiatives to Enhance Its Resilience." Bank of Japan Review, 2025-E-6, May. Tokyo: Financial System and Bank Examination Department, Bank of Japan.

Ostry, Jonathan D., Atish R. Ghosh, Karl Habermeier, Marcos Chamon, Mahvash S.Qureshi, and Dennis B. S. Reinhardt (2010). "Capital Inflows: The Role of Controls." IMF Staff Position Note No. 4. Washington, DC: International Monetary Fund, February 19

Ostry, Jonathan D., Atish R. Ghosh, Karl F. Habermeier, Luc Laeven, Marcos d. Chamon, Mahvash S. Qureshi, and Annamaria Kokenyne (2011). "Managing Capital Inflows: What Tools to Use?" IMF Staff Discussion Note SDN/11/06, April 5. Washington, DC: International Monetary Fund.

Pagliari, Maria Sole; and Hannan, Swarnali Ahmed (2024). "The volatility of capital flows in emerging markets: Measures and determinants." Journal of International Money and Finance 145(C).

Passari, Evgenia; and Rey, Hélène (2015). "Financial Flows and the International Monetary System." Economic Journal 125(584): 675–698.

Persson, Torsten; and Guido Tabellini (2000). Political Economics: Explaining Economic Policy. Cambridge, MA: MIT Press.

Polak, Jacques J. (1957). "Monetary Analysis of Income Formation and Payments Surpluses." IMF Staff Papers 6(1), pp. 1–50, November 1957.

Polanyi, Karl (1944). The Great Transformation: The Political and Economic Origins of Our Time. New York: Farrar & Rinehart.

Prasad, Eswar S.; Rogoff, Kenneth S.; Wei, Shang-Jin; and Kose, M. Ayhan (2003). "Effects of Financial Globalization on Developing Countries: Some Empirical Evidence." IMF Occasional Paper No. 220. Washington, DC: International Monetary Fund.

Quinn, Dennis M. (1997). "The Correlates of Change in International Financial Regulation." American Political Science Review 91(3), pp. 531–551.

Radelet, Steven and Jeffrey D. Sachs (1998). "The Onset of the East Asian Financial Crisis." In: NBER Macroeconomics Annual 1998, pp. 1–46.

Rajan, Raghuram G. and Luigi Zingales (2003). "The Great Reversals: The Politics of Financial Development in the Twentieth Century." In: Journal of Financial Economics 69.1, pp. 5–50.

Rajan, Raghuram G. (2005). "Has Financial Development Made the World Riskier?" NBER Working Paper No. 11728, National Bureau of Economic Research, November 2005.

Ramey, Valerie A. (2016). "Macroeconomic Shocks and Their Propagation." In J. B. Taylor and Harald Uhlig (Eds.), Handbook of Macroeconomics, vol. 2, pp. 71–162. Elsevier.

Reinhart, Carmen M., and Kenneth S. Rogoff (2004). "The Modern History of Exchange-Rate Arrangements: A Reinterpretation." Quarterly Journal of Economics, 119(1): 1–48.

Reinhart, Carmen M. and Vincent R. Reinhart (2009). "Capital Flow Bonanzas: An Encompassing View of the Past and Present." In: NBER Working Paper Series No. 14321. Cambridge, MA: National Bureau of Economic Research.

Reinhart, Carmen M. and Kenneth S. Rogoff (2009). This Time Is Different: Eight Centuries of Financial Folly. Princeton, NJ: Princeton University Press.

Rey, Hélène (2013). "Dilemma Not Trilemma: The Global Financial Cycle and Monetary Policy Independence." In Economic Policy Symposium Proceedings, Jackson Hole, Wyoming, Federal Reserve Bank of Kansas City, August 22–24, 2013, pp. 285–333.

Rey, Hélène (2014). "International Channels of Transmission of Monetary Policy and the

Mundellian Trilemma." Paper presented at the 15th Jacques Polak Annual Research Conference, International Monetary Fund, Washington, DC, November 13–14, 2014.

Miranda-Agrippino, Silvia, and Hélène Rey (2021). "The Global Financial Cycle." NBER Working Paper No. 29327, National Bureau of Economic Research, October 2021.

Ricardo, David (1817). On the Principles of Political Economy and Taxation. London: John Murray.

Robinson, Joan (1956). The Accumulation of Capital: A Study of the Theory and Policy of Capital. Macmillan.

Rodrik, Dani (1998), "Who Needs Capital-Account Convertibility?" in Peter Kenen (ed), Should the IMF Pursue Capital Account Convertibility? Essays in International Finance no. 207, Princeton: Princeton University Press (May).

Romer, Christina D., and David H. Romer (2004). "A New Measure of Monetary Shocks: Derivation and Implications." American Economic Review, 94(4), pp. 1055–1084.

Romer, Paul M. (1986). "Increasing Returns and Long-Run Growth." In: Journal of Political Economy 94.5, pp. 1002–1037.

Romer, Paul M. (1987). "Growth Based on Increasing Returns Due to Specialization." In: American Economic Review 77.2, pp. 56–62.

Rotemberg, Julio J. and Woodford, Michael (1997). "An optimization-based econometric framework for the evaluation of monetary policy." In NBER Macroeconomics Annual 1997, vol. 12, edited by Ben Bernanke and Julio J. Rotemberg, pp. 297–361. Cambridge, MA: MIT Press.

Roubini, Nouriel (2006). "Why Central Banks Should Burst Bubbles." International Finance 9 (1): 87–107.

Ruggie, John Gerard (1982). "International Regimes, Transactions, and Change: Embedded Liberalism in the Postwar Economic Order." In: International Organization 36.2, pp. 379–415.

Sahuc, Jean-Guillaume, Olivier de Bandt, Hibiki Ichiue, Bora Durdu, Yasin Mimir, Jolan Mohimont, Kalin Nikolov, Sigrid Roehrs, Valério Scalone, and Michael Straughan (2022). "Assessing the Impact of Basel III: Evidence from Structural Macroeconomic Models." EconomiX Working Papers 2022-3, University of Paris Nanterre.

Sarno, Lucio, and Mark P. Taylor. (2002). The Economics of Exchange Rates. Cambridge: Cambridge University Press.

Scheubel, Beatrice; Stracca, Livio; and Tille, Cédric (2019). "The global financial cycle and capital flow episodes: a wobbly link?" ECB Working Paper Series No. 2337, April 2019.

Schiaffi, Stefano, Leonardo Gambacorta, Linda S. Goldberg and Stefan Avdjiev (2018). "Global risk conditions now a weaker driver of global liquidity." VOX CEPR Policy Portal, March 20, 2018.

Schoenmaker, Dirk (2011). "The Financial Trilemma." Economics Letters 111(3), pp. 57–59.

Schuler, Kurt, and Andrew Rosenberg, eds. (2013). The Bretton Woods Transcripts. New York: Center for Financial Stability.

Schüler, Yves S., Paul Hiebert, and Tuomas A. Peltonen (2015). "Characterising the Financial Cycle: A Multivariate and Time-Varying Approach." ECB Working Paper No. 1846, European Central Bank.

Shaw, Edward S. (1973). Financial Deepening in Economic Development. New York: Oxford University Press.

Sheng, Andrew L. T. (2009). "Lessons from Asian Financial Experience – Commentary." Proceedings of the Federal Reserve Bank of San Francisco, October 2009, pp. 115–122.

Shiller, Robert J. (2005). Irrational Exuberance, 2nd ed. Princeton, NJ: Princeton University Press.

Sims, Christopher A. (1980). "Macroeconomics and Reality." Econometrica 48(1), pp.1–48. Econometric Society.

Sims, Christopher A. (1992). "Interpreting the Macroeconomic Time Series Facts: The Effects of Monetary Policy." European Economic Review, 36(5), 975–1000.

Sims, Jocelyn; Romero, Jessie (2013). "Latin American Debt Crisis of the 1980s." Federal Reserve History. Available at: https://www.federalreservehistory.org/essays/latin-american-debt-crisis (accessed March 13, 2025).

Solow, Robert M. (1956). "A Contribution to the Theory of Economic Growth." In: Quarterly Journal of Economics 70.1, pp. 65–94.

Stock, James H., and Mark W. Watson (2001). "Vector autoregressions." Journal of Economic Perspectives 15(4), pp. 101–115.

Stock, James H. (2018). "Identification and Estimation of Dynamic Causal Effects in Macroeconomics Using External Instruments." NBER Working Paper No. 24216, National Bureau of Economic Research

Strange, Susan (1988). States and Markets: An Introduction to International Political Economy. London: Pinter.

Stremmel, Hanno (2015). "Capturing the Financial Cycle in Europe." ECB Working Paper Series No. 1811, European Central Bank, June 2015.

Swan, Trevor W. (1956). "Economic Growth and Capital Accumulation." In: Economic Record 32.2, pp. 334–361.

Swanson, Eric T. (2021). "Measuring the effects of Federal Reserve forward guidance and asset purchases on financial markets." Journal of Monetary Economics, 118(C), pp. 32–53. Elsevier.

Tinbergen, Jan (1952). On the Theory of Economic Policy. Amsterdam: North-Holland. Chapter II (p. 22).

Triffin, Robert (1960). Gold and the Dollar Crisis: The Future of Convertibility. New Haven, CT: Yale University Press.

Ueda, Kazuo (2024). "Progress and Challenges in the Asia-Pacific Financial System." Keynote address at the 18th Asia-Pacific High-Level Meeting on Banking Supervision, Bank for International Settlements, Tokyo, March 6, 2024.

Uhlig, Harald (2005). "What are the effects of monetary policy on output? Results from an agnostic identification procedure." Journal of Monetary Economics 52(2), pp.381–419. Elsevier.

van Wincoop, Eric (1994). "Welfare Gains from International Risk Sharing." Journal of Monetary Economics 34(2), pp. 175–200, October 1994.

van Wincoop, Eric (1999). "How Big Are Potential Welfare Gains from International Risk Sharing?" Journal of International Economics 47(1), pp. 109–135, February 1999.

White, Harry Dexter (1943). "A Proposal to Establish a Stabilization Fund." Memorandum from the Treasury Department, November 12, 1943. Thompson, Morgenthau, and White Collection, U.S. National Archives.

Williamson, John, and Molly Mahar (1998). "A Survey of Financial Liberalization." Es-

says in International Finance No. 211, International Finance Section, Department of Economics, Princeton University, November 1998.

Woodford, Michael (2003). Interest and Prices: Foundations of a Theory of Monetary Policy. Princeton, NJ: Princeton University Press.

World Bank (1993). The East Asian Miracle: Economic Growth and Public Policy. Washington, DC: World Bank.

World Bank (1997). World Development Report 1997: The State in a Changing World. Washington, DC: World Bank.

World Bank (2009). Reshaping Economic Geography. World Development Report 2009.

World Bank (2024). World Development Indicators 2024. Washington, DC: World Bank.

Wurm, Lee H., and Sebastiano A. Fisicaro (2014). "What residualizing predictors in regression analyses does (and what it does not do)." Journal of Memory and Language, 72(April), pp. 37–48.

York, Richard (2012). "Residualization is not the answer: Rethinking how to handle multicollinearity." Social Science Research, 41(6), pp. 1379–1386.

Appendix

The Evolution of the Room for National Monetary Policy

Table 7: Rolling Correlations (1975–2023)

Country	Period	Mean Corr	SD Corr
Australia	1975–1990	0.319	0.481
	1991–2008	0.615	0.439
	2009–2023	0.288	0.636
Canada	1975–1990	0.258	0.113
	1991–2008	0.595	0.415
	2009–2023	0.487	0.612
England	1975–1990	0.329	0.460
	1991–2008	0.609	0.292
	2009–2023	0.468	0.589
France	1975–1990	0.438	0.390
	1991–2008	0.338	0.512
	2009–2023	0.197	0.587
Germany	1975–1990	0.393	0.391
	1991–2008	0.215	0.655
	2009–2023	0.187	0.591
Italy	1975–1990	0.452	0.420
	1991–2008	0.400	0.432
	2009–2023	0.186	0.623
Japan	1975–1990	0.264	0.433
	1991–2008	0.236	0.583
	2009–2023	0.216	0.332
Sweden	1975–1990	0.452	0.449
	1991–2008	0.155	0.456
	2009–2023	-0.170	0.539
Switzerland	1975–1990	0.149	0.348
	1991–2008	0.331	0.514

Note: Corr = correlation; SD = standard deviation.

Source: Author's elaboration based on Bordo and MacDonald (2005). Data from: Federal Reserve (FRED St. Louis), BoE, ECB, BoJ, RBA, Bank of Canada.

Global Risk Variables

Table 8: Global Risk Variables

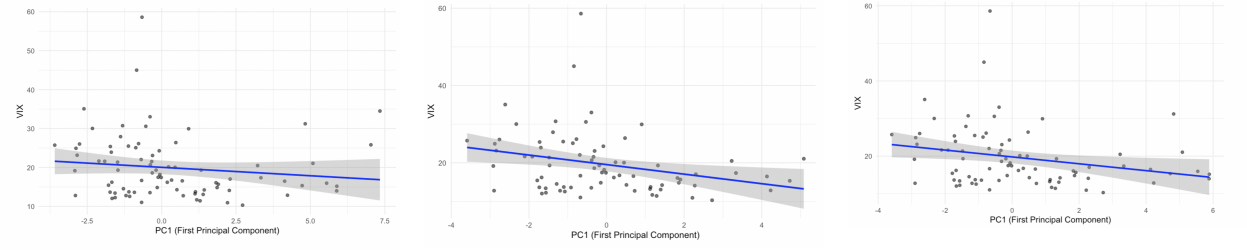
Variables
Nominal Broad U.S. Dollar Index
ICE BofA U.S. Corporate Index Option-Adjusted Spread
CBOE Volatility Index
NASDAQ Composite Index
3M LIBOR minus 3M Treasury Bill Rate
90D AA Financial Commercial Paper Interest Rate
3M Treasury Constant Maturity Yield
ICE BofA High Yield OAS
University of Michigan Consumer Sentiment Index
Chicago Fed National Financial Conditions Index
Securities Brokers and Dealers Liabilities
Senior Loan Officer Survey
ICE BofA EM Corporate Plus Index OAS

Source: Author's elaboration based on FRED and Fed Board data.

Correlation between Credit in Japan and VIX

Figure 21: Correlation of Credit in Japan and VIX

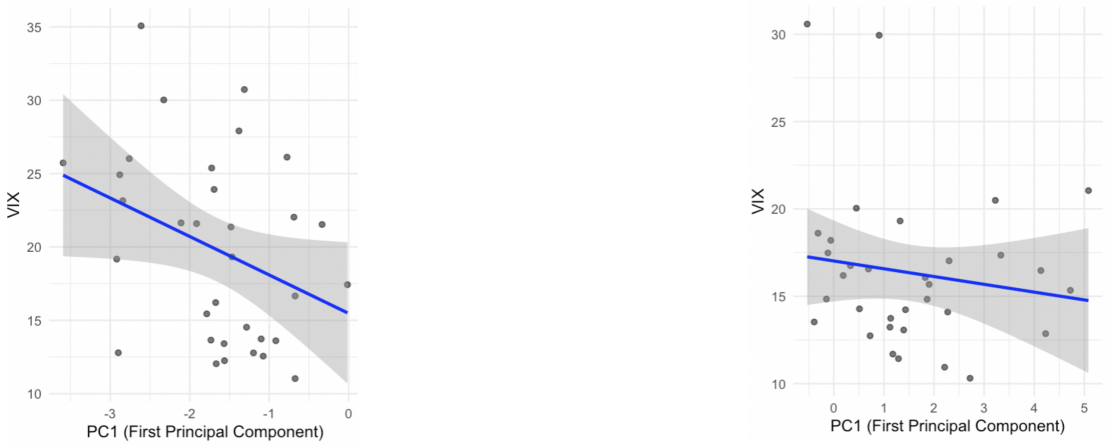
(a) 2000–2023 (p-value: 0.236) (b) 2000–2019 (p-value: 0.01) (c) 2000–2020 (p-value: 0.02)



Source: Author's elaboration based on credit and VIX data (FRED, 2025).

Figure 22: Correlation of Credit in Japan and VIX, No GFC

(a) Subsample 1 (pre-GFC) (b) Subsample 2 (post-GFC)



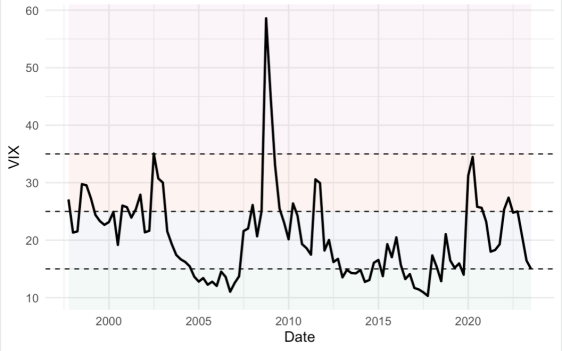
Source: Author's elaboration based on credit and VIX data (FRED, 2025).

Note: We capture the underlying co-movement of Japanese capital flows with a principal component analysis including our wide set of Japanese capital flow categories with the objective of synthesizing systemic—hence shared—fluctuations. We extract the first principal component (PC1), which accounts for approximately 32% of the total variance. The PC1 loadings highlight that the component is positively associated with variables such as GLI, direct investment, long-term borrowing, and corporate bonds.

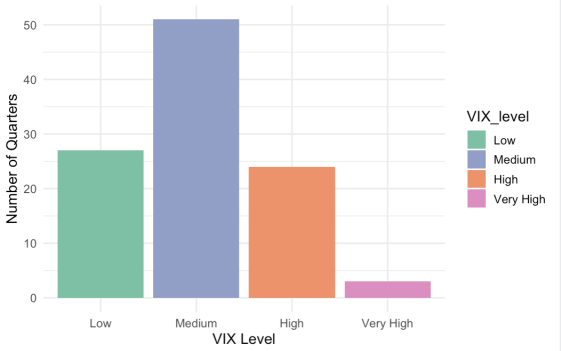
Alternative Identification of VIX Regimes

Figure 23: Identification of Four Regimes in VIX

(a) VIX Time Series with Regime Shading



(b) Frequency of VIX Regimes

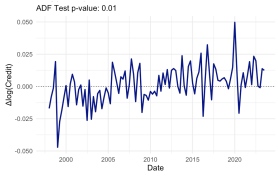


Source: Author's elaboration based on VIX data (FRED, 2025).

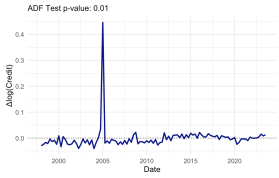
Stationarity

Table 9: Differenced Series and ADF Test Statistics for Credit Variables

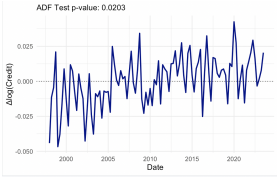
Depository(1)



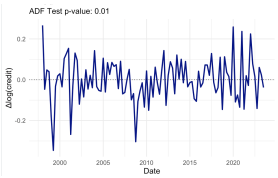
Depository (2)



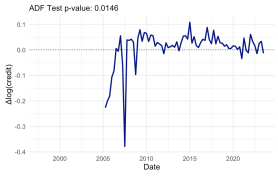
Depository (3)



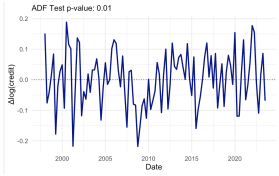
Foreign (1)



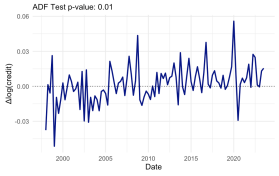
Foreign (3)



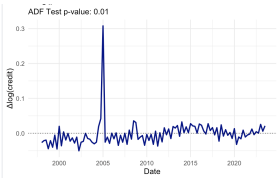
Foreign (4)



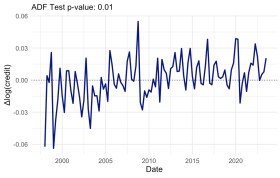
Domestic (1)



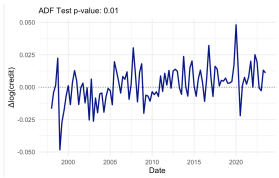
Domestic (3)



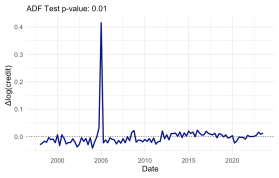
Domestic (4)



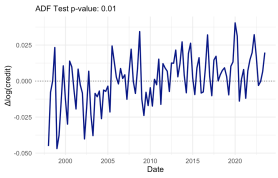
Banks, aggregate (1)



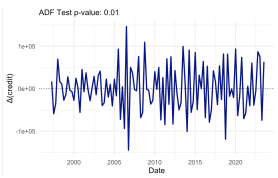
Banks, aggregate (3)



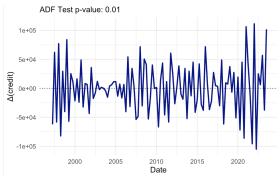
Banks, aggregate (4)



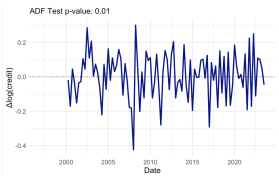
LT Debt Securities



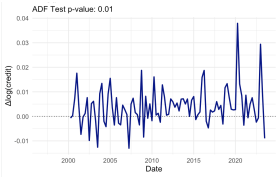
ST Debt Securities



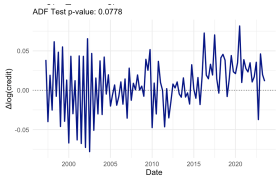
Consolidated Banking Statistic



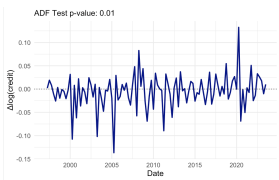
Global Liquidity Indicator



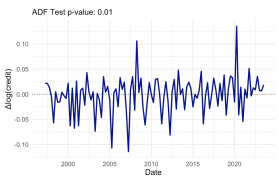
Bonds



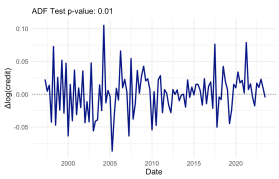
ST Bank Borrowings

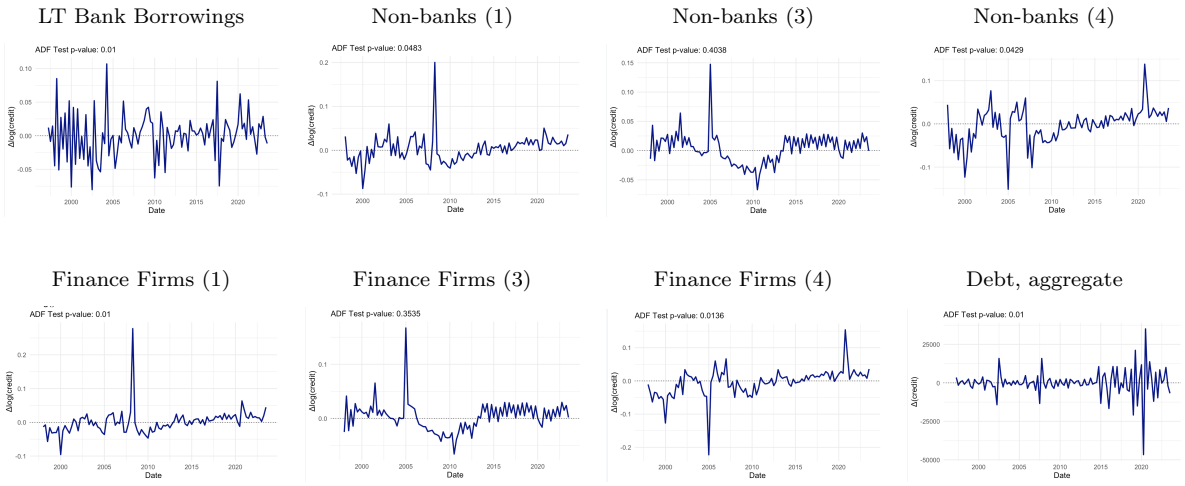


ST Borrowings



LT Borrowings





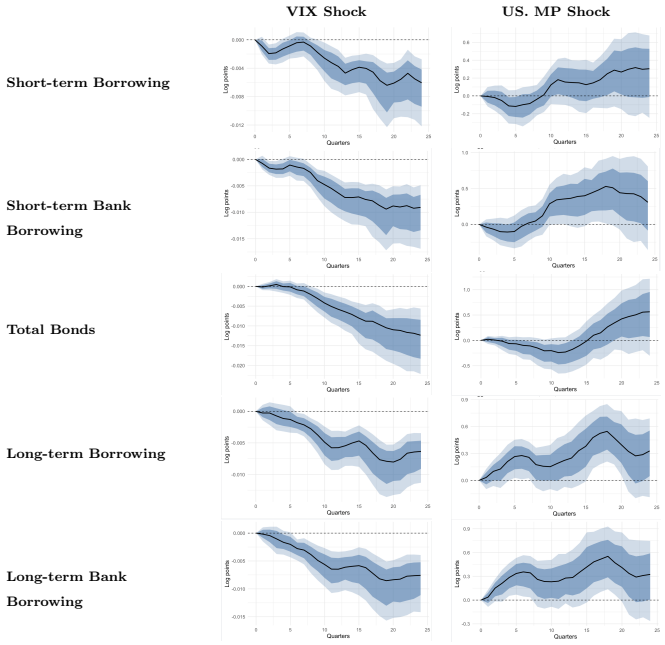
Note: Each graph displays the first-differenced series of a credit variable. ADF test statistics refer to the Augmented Dickey–Fuller test applied to the differenced series to check for stationarity. (1) indicates total loans; (3) consumer credit; and (4) loans extended to corporations or governments.

Impulse Response Functions

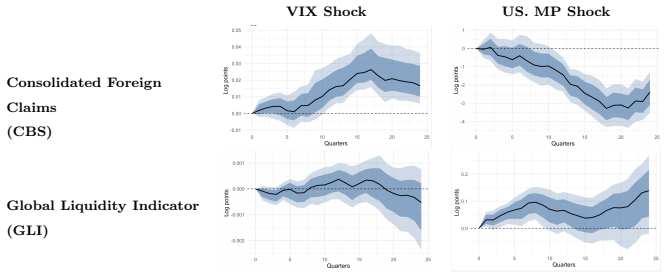
Baseline Specification

Table 10: Impulse Responses of FoF, BIS, and BoP-related Credit Indicators

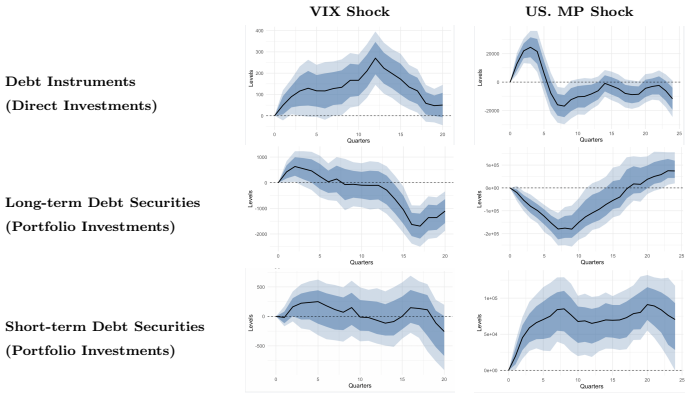
Panel A: Impulse Responses of Flow of Funds (FoF) Components



Panel B: Impulse Responses of BIS Indicators



Panel C: Impulse Responses of BoP-related (FA) Credit



Note: Median impulse response functions obtained from local projections, with 68% (darker shading) and 90% (lighter shading) confidence intervals.

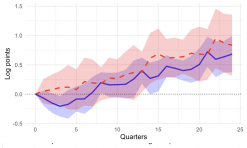
Specification 2

Table 11: Impulse Responses of FoF, BIS, and BoP-related Credit Indicators

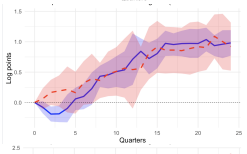
Panel A: Impulse Responses of Flow of Funds (FoF) Components

U.S. MP Shock under VIX Regimes

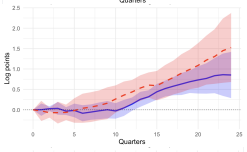
Short-term Borrowing



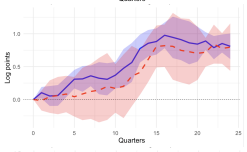
Short-term Bank Borrowing



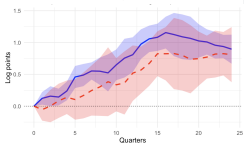
Total Bonds



Long-term Borrowing



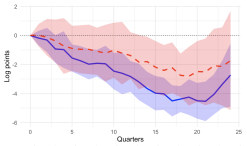
Long-term Bank Borrowing



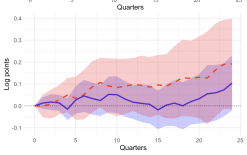
Panel B: Impulse Responses of BIS Indicators

U.S. MP Shock under VIX Regimes

Consolidated Foreign Claims (CBS)



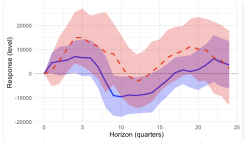
Global Liquidity Indicator (GLI)



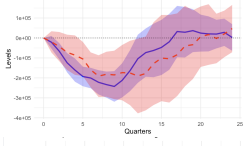
Panel C: Impulse Responses of BoP-related (FA) Credit

U.S. MP Shock under VIX Regimes

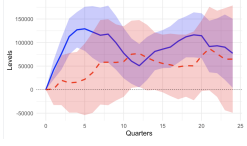
Debt Instruments (Direct Investments)



Long-term Debt Securities (Portfolio Investments)



Short-term Debt Securities (Portfolio Investments)



Note: Median impulse response functions obtained from local projections, with 68% (darker shading) and 90% (lighter shading) confidence intervals.

Impulse Responses to VXJ Shock

Table 12: Impulse Responses of Macroeconomic Variables

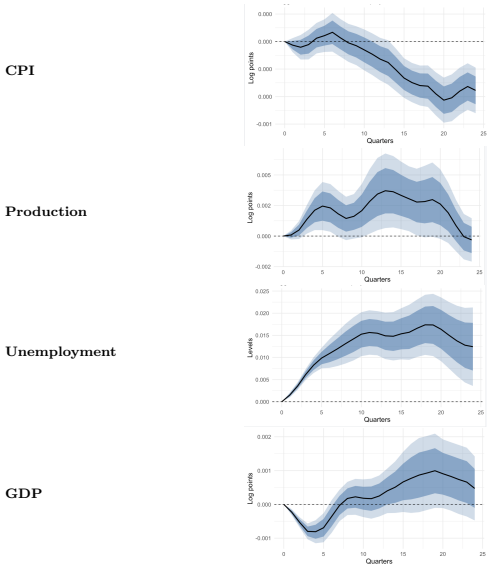
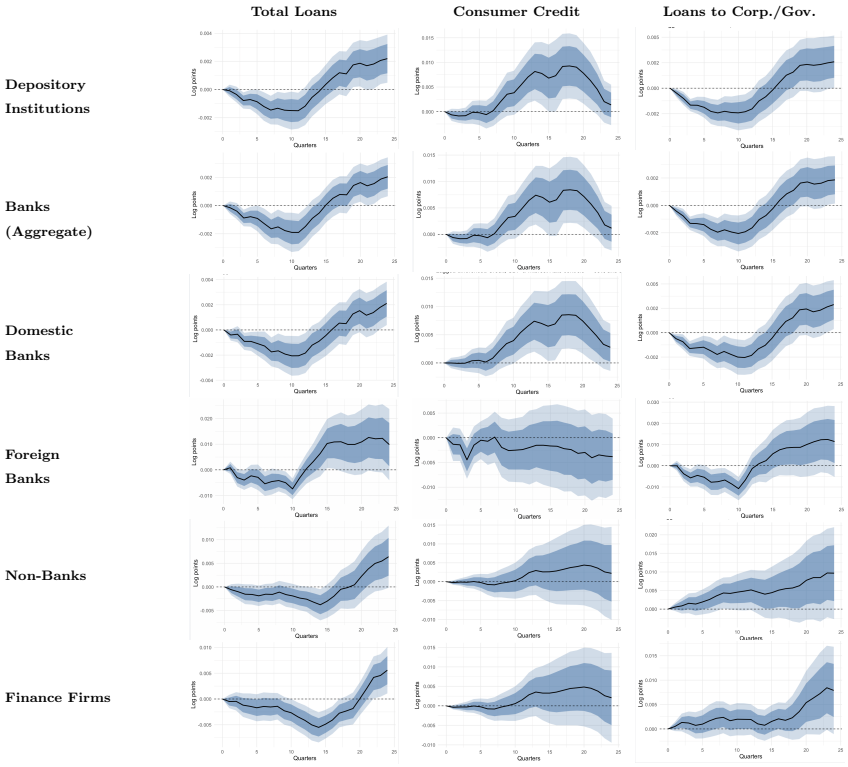


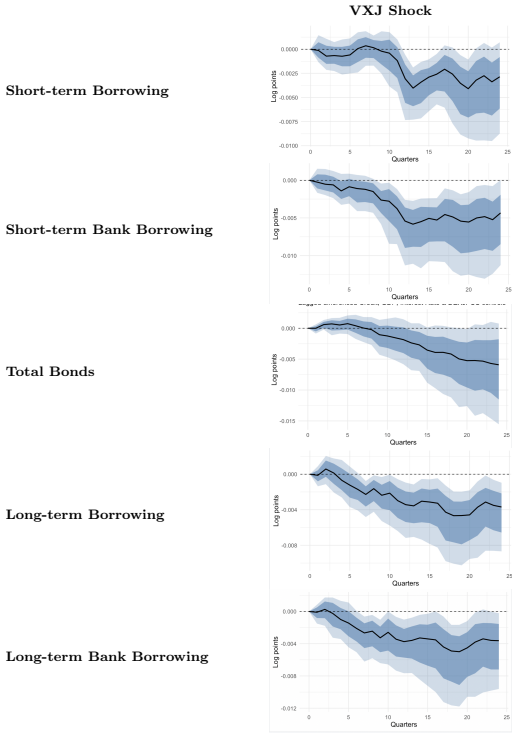
Table 13: Impulse Responses of Granular Credit by Institution and Loan Category



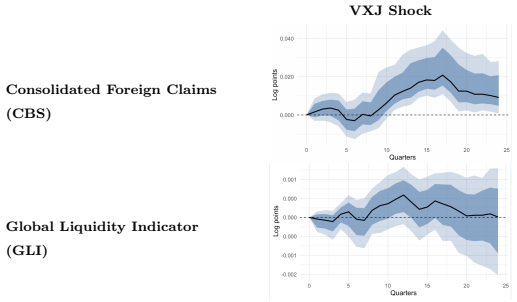
Note: Median impulse response functions obtained from local projections, with 68% (darker shading) and 90% (lighter shading) confidence intervals.

Table 14: Impulse Responses of FoF, BIS, and BoP-related Credit Indicators

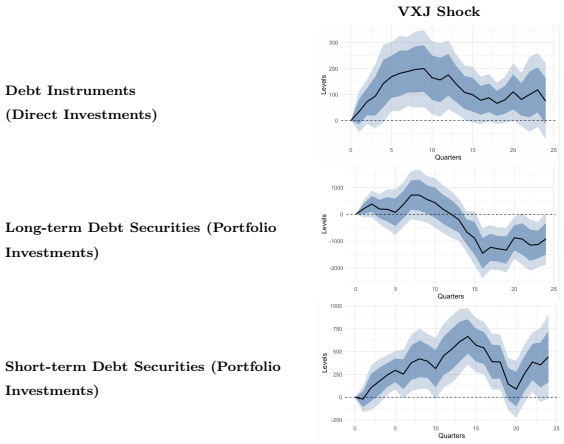
Panel A: Flow of Funds (FoF) Components



Panel B: BIS Indicators



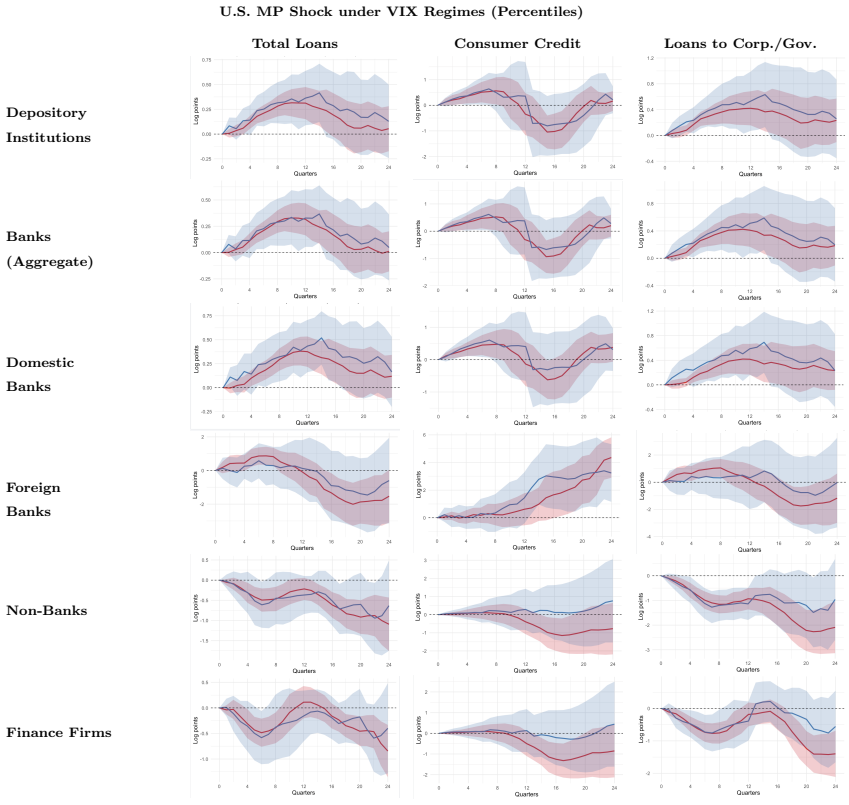
Panel C: BoP-related (FA) Credit



Note: Median impulse response functions obtained from local projections, with 68% (darker shading) and 90% (lighter shading) confidence intervals.

Robustness: VIX Regimes (Percentiles)

Table 15: Impulse Responses of Granular Credit by Institution and Loan Category



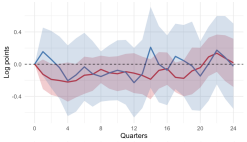
Note: Median impulse responses obtained from local projections, with 90% confidence intervals (heteroskedasticity-robust standard errors). Regimes are classified based on whether the VIX exceeds its sample 75th percentile threshold for at least two consecutive quarters. The red (dashed) line denotes the high-VIX (turmoil) regime; the blue (solid), the low-VIX (tranquil) regime.

Table 16: Impulse Responses of FoF, BIS, and BoP-related Credit Indicators

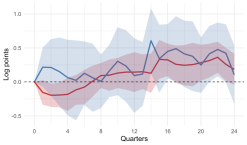
Panel A: Flow of Funds (FoF) Components

U.S. MP Shock under VIX Regimes (Percentiles)

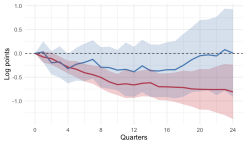
Short-term Borrowing



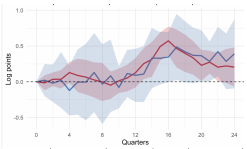
Short-term Bank Borrowing



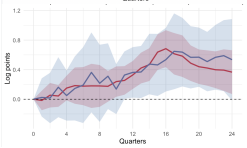
Total Bonds



Long-term Borrowing



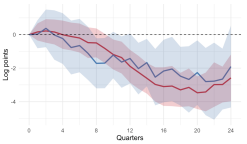
Long-term Bank Borrowing



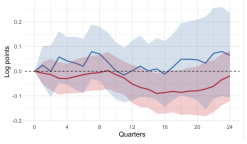
Panel B: BIS Indicators

U.S. MP Shock under VIX Regimes (Percentiles)

Consolidated Foreign Claims (CBS)



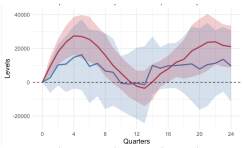
Global Liquidity Indicator (GLI)



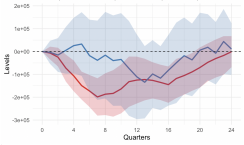
Panel C: BoP-related (FA) Credit

U.S. MP Shock under VIX Regimes (Percentiles)

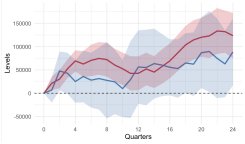
Debt Instruments (Direct Investments)



Long-term Debt Securities (Portfolio Investments)



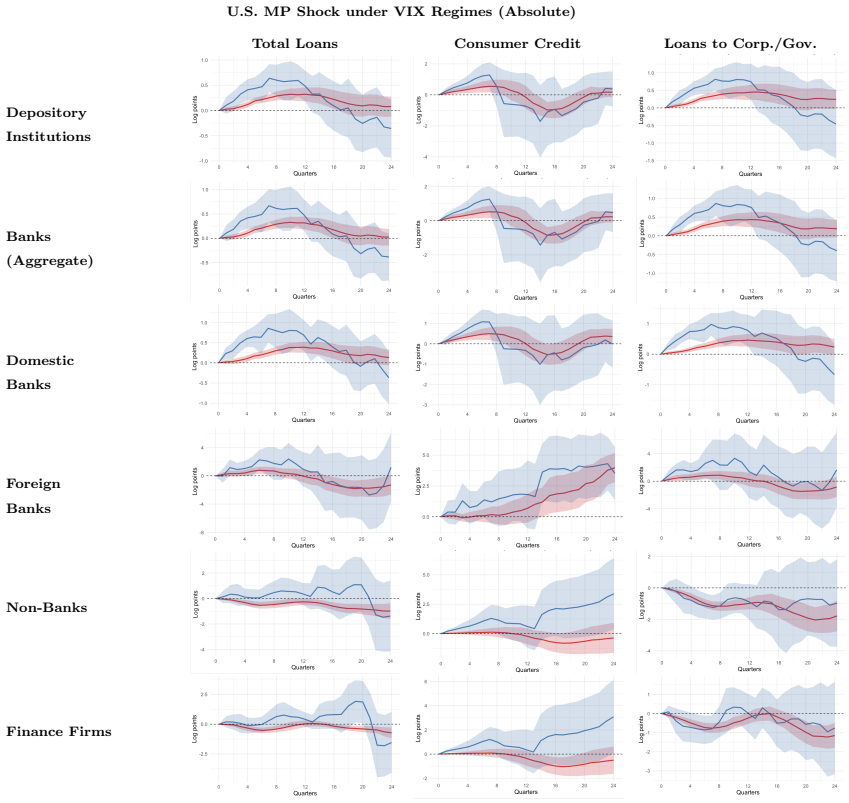
Short-term Debt Securities (Portfolio Investments)



Note: Median impulse responses obtained from local projections, with 90% confidence intervals. See note to Table 15 for methodological details.

Robustness: VIX Regimes (Fixed Threshold)

Table 17: Impulse Responses of Granular Credit by Institution and Loan category



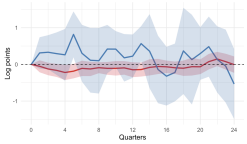
Note: Median impulse responses obtained from local projections, with 90% confidence intervals (heteroskedasticity-robust standard errors). Regimes are defined by VIX ≥ 30 for at least two consecutive quarters. The red (dashed) line denotes the high-VIX (turmoil) regime; the blue (solid), the low-VIX (tranquil) regime.

Table 18: Impulse Responses of FoF, BIS, and BoP-related Credit Indicators

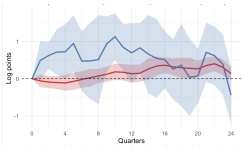
Panel A: Flow of Funds (FoF) Components

U.S. MP Shock under VIX Regimes (Absolute)

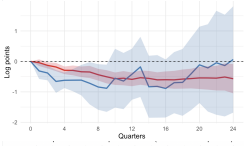
Short-term Borrowing



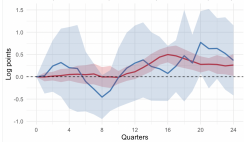
Short-term Bank Borrowing



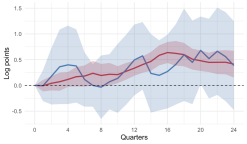
Total Bonds



Long-term Borrowing



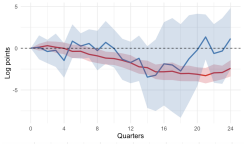
Long-term Bank Borrowing



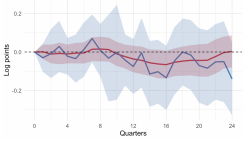
Panel B: BIS Indicators

U.S. MP Shock under VIX Regimes (Absolute)

Consolidated Foreign Claims (CBS)



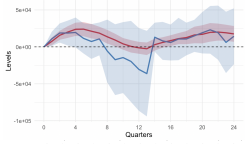
Global Liquidity Indicator (GLI)



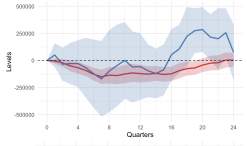
Panel C: BoP-related (FA) Credit

U.S. MP Shock under VIX Regimes (Absolute)

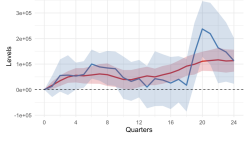
Debt Instruments (Direct Investments)



Long-term Debt Securities (Portfolio Investments)



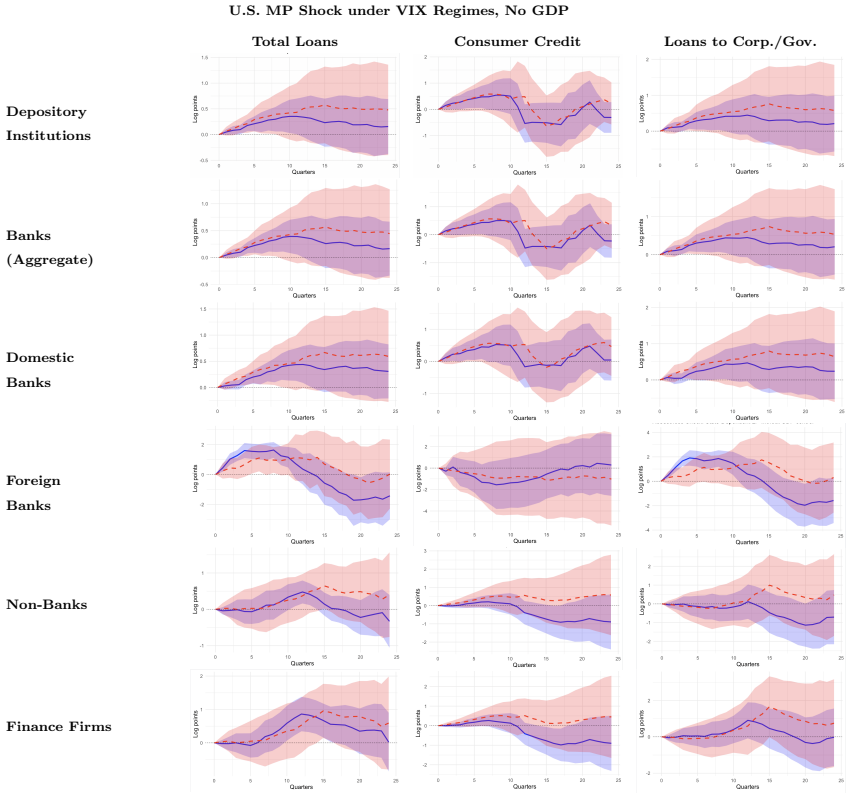
Short-term Debt Securities (Portfolio Investments)



Note: Median impulse responses obtained from local projections, with 90% confidence intervals. See note to Table 5.20 for methodological details.

Robustness: No GDP

Table 19: Impulse Responses: Granular Credit by Institution Type and Loan Category



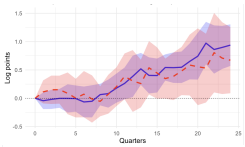
Note: Median impulse responses obtained from local projections, with 90% confidence intervals (heteroskedasticity-robust standard errors). Specification excludes GDP as a control. Regimes follow the cyclical component of the VIX (one-sided HP filter, $\lambda = 1600$). Red (dashed): high-VIX regime; blue (solid): low-VIX regime. Cutoff: 2009Q4.

Table 20: Impulse Responses of FoF, BIS, and BoP-related Credit Indicators

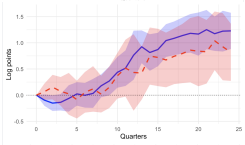
Panel A: Flow of Funds (FoF) Components

U.S. MP Shock under VIX Regimes, No GDP

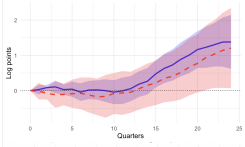
Short-term Borrowing



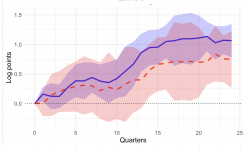
Short-term Bank Borrowing



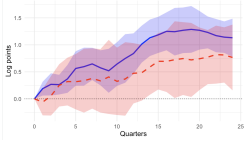
Total Bonds



Long-term Borrowing



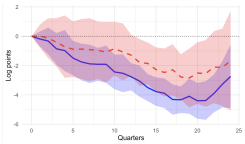
Long-term Bank Borrowing



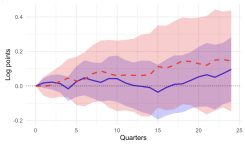
Panel B: BIS Indicators

U.S. MP Shock under VIX Regimes, No GDP

Consolidated Foreign Claims (CBS)



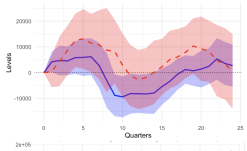
Global Liquidity Indicator (GLI)



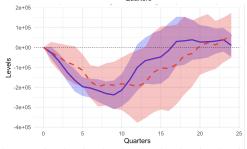
Panel C: BoP-related (FA) Credit

U.S. MP Shock under VIX Regimes, No GDP

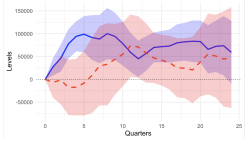
Debt Instruments (Direct Investments)



Long-term Debt Securities (Portfolio Investments)



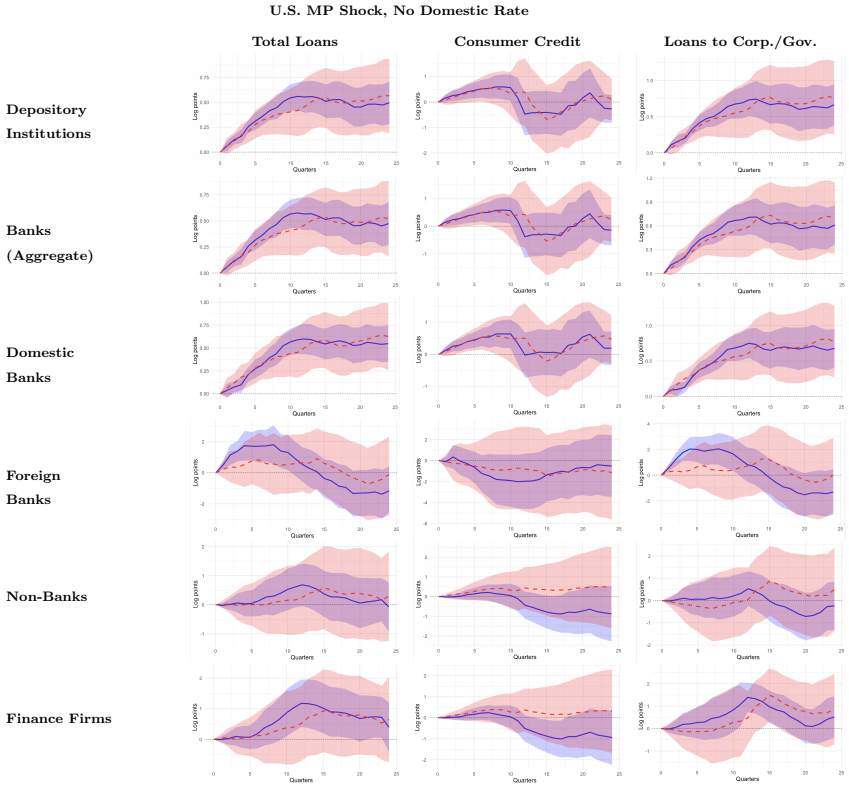
Short-term Debt Securities (Portfolio Investments)



Note: Median impulse responses obtained from local projections, with 90% confidence intervals. See note to Table 5.24 for methodological details.

Robustness: No Domestic Rate

Table 21: Impulse Responses: Granular Credit by Institution Type and Loan Category



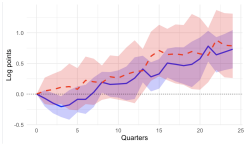
Note: Median impulse responses obtained from local projections, with 90% confidence intervals (heteroskedasticity-robust standard errors). Specification 2 excludes the domestic interest rate as a control. Regimes follow the cyclical VIX (one-sided HP filter, $\lambda = 1600$). Red (dashed): high-VIX regime; blue (solid): low-VIX regime. Cutoff: 2009Q4.

Table 22: Impulse Responses of FoF, BIS, and BoP-related Credit Indicators

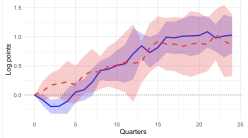
Panel A: Flow of Funds (FoF) Components

U.S. MP Shock under VIX Regimes, No Domestic Rate

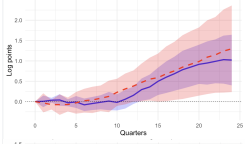
Short-term Borrowing



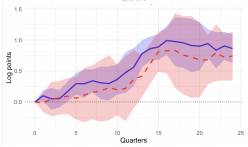
Short-term Bank Borrowing



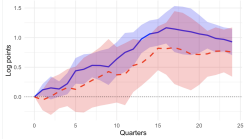
Total Bonds



Long-term Borrowing



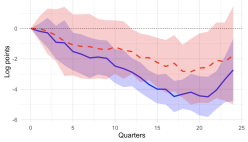
Long-term Bank Borrowing



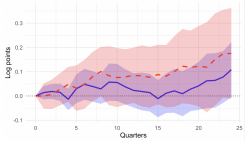
Panel B: BIS Indicators

U.S. MP Shock under VIX Regimes, No Domestic Rate

Consolidated Foreign Claims (CBS)



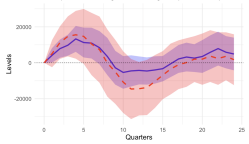
Global Liquidity Indicator (GLI)



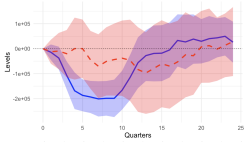
Panel C: BoP-related (FA) Credit

U.S. MP Shock under VIX Regimes, No Domestic Rate

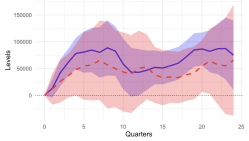
Debt Instruments (Direct Investments)



Long-term Debt Securities (Portfolio Investments)



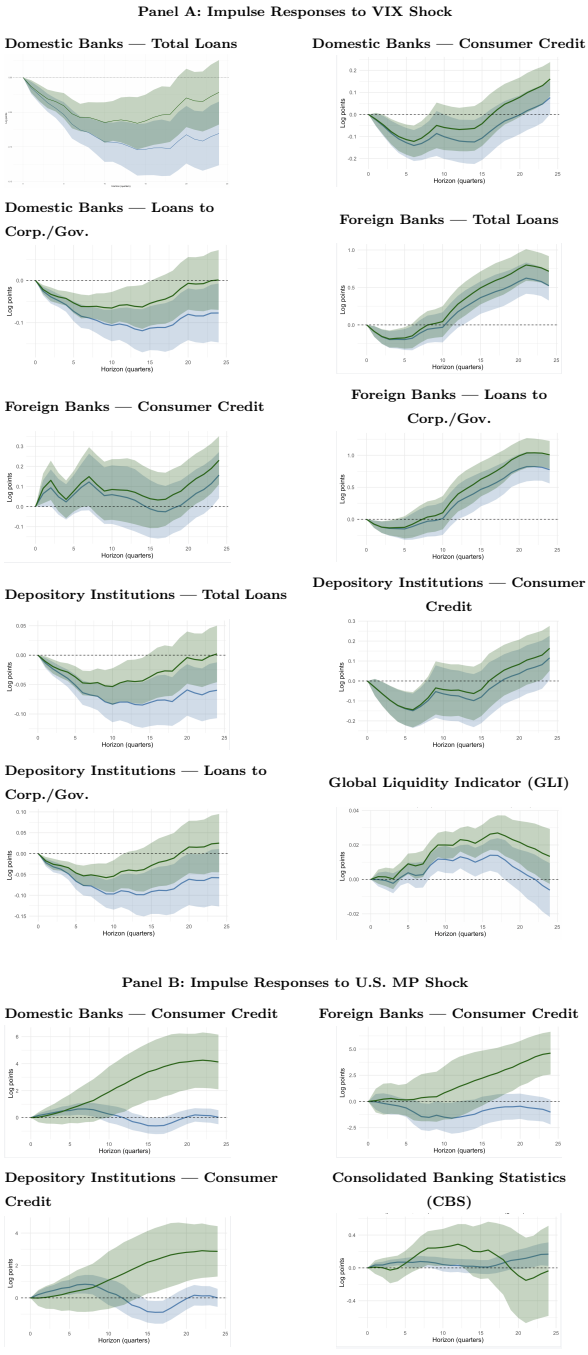
Short-term Debt Securities (Portfolio Investments)



Note: Median impulse responses obtained from local projections, with 90% confidence intervals. See note to Table 21 for methodological details.

Specification 3: Before and After 2009

Table 23: Impulse Responses to VIX and U.S. MP Shocks



Note: Median impulse responses obtained from local projections, with 90% confidence intervals (heteroskedasticity-robust standard errors). Specification 4 (interaction between the VIX and post-2009Q4 dummy). Only impulse responses with statistically significant interaction coefficients are displayed. The green line represents responses for the post-2009 period, while the blue line corresponds to the pre-2009 period.

Literature on the Global Financial Cycle (1984-2025)

Table 24: Systematic Review of the Global Financial Cycle Literature

Author (Year)	Methodology	Sample	Year	Key Finding
Blanchard and Summers (1984)	Panel style correlation analysis (5-year rolling)	6 Countries	1965–1984	Documents synchronized movements in world real interest rates.
Borio and Lowe (2002)	Non-parametric dating of booms and busts; computation of indexes of financial sector vulnerability	6 Countries	1998	Large asset-price swings create tougher trade-offs for domestic monetary policy.
Fujiwara and Takahashi (2012)	VAR (in a rolling window); creation of total spillover index (forecast-error variance)	7 Countries	1988–2009	In Asian stock and bond markets, U.S. has been the main driver of fluctuations.
*Borio (2013)	Survey essay	—	—	The financial cycle is presented as long swings in credit, asset prices, and leverage.
Bruno and Shin (2013)	Double-decker Vasicek-style banking model; "global bank" factor from changes in broker-dealer leverage and equity; GMM estimation	46 Countries	1995–2007	Global liquidity exhibits the same long, synchronized ups and downs; global factors dominate local factors as determinants of banking sector capital flows.
*Rey (2013)	PCA for GFCy; recursive VAR (with Cholesky restriction)	80+ Countries	1990–2013	A single global factor—the first principal component of risky-asset returns across markets—explains 20% of common variation; credit and portfolio-debt inflows highly synchronized (correlation = 0.52).
Cerutti et al. (2014)	Panel regression (with country fixed effects, standard errors clustered by country)	77 Countries	1990–2012	Non-price determinants of cross-border credit supply driven primarily by uncertainty (VIX), US monetary policy (term premia), and UK and Euro Area bank conditions.
*Rey (2014)	PCA for GFCy; SVAR for US MP (with U.S. MP shocks)	80+ Countries	1990–2013	US monetary policy shocks are transmitted internationally even in inflation-targeting economies with large financial markets (Sweden, Canada, New Zealand, UK).
Bruno and Shin (2015)	Recursive VAR	46 Countries	1995–2007	Global liquidity conditions transmit across borders.
*Miranda-Agrippino and Rey (2015)	DFM for GFCy; VAR (with U.S. MP shocks)	80+ Countries	1990–2012	Unique global factor in international risky asset prices explains 20% of variance; US policy shocks explain 20% of VIX, 10% of bank-flow shocks, 5% of non-bank-flow shocks.
*Passari and Rey (2015)	Panel regression for stock market returns; SVAR for U.S. MP	53 Countries	1990–2013	US monetary policy tightening affects the VIX; especially strong effects on UK financial conditions.

Continued on next page

Continued from previous page

Author (Year)	Methodology	Sample	Year	Key Finding
*Stremmel (2015)	Non-parametric computation of different indexes (frequency-based band-pass filter; combination of indicators)	11 Countries	–	Constructs seven GFCy measures and finds the most important are credit-to-GDP ratio and credit growth.
Baskaya et al. (2017)	WLS Regression (with firm × bank fixed-effects)	1 Country	2006–2013	Macroprudential tightening abroad leads to lending growth by banks in Turkey.
Cerutti et al. (2017)	Panel regression (with country fixed effects and standard errors clustered)	46 Countries	1995–2013	Global financial conditions best captured by US monetary conditions, exchange-rate dynamics, and European bank conditions.
*Jordà et al. (2018)	15-year rolling-window Spearman rank correlation coefficients for GFCy; Baxter-King band-pass filter; cumulative impulse response functions with local projections	17 Countries	1870–2013	Co-movement of international risk premia is the core of the global cycle after 1990; US monetary policy is a key source of fluctuations in risk appetite.
*Cantu et al. (2019)	Firm–bank panel regression (with time-invariant bank fixed effects)	1 Country	2009–2017	Mexican bank flows co-move with global financial cycle indicators.
*Cerutti et al. (2019)	DFM for GFCy (largest eigenvalue); panel regressions	85 Countries	1990–2015	The GFCy explains at most a quarter of cross-country capital-flow variations.
*Scheubel and Stracca (2019)	PCA for GFCy (with theoretical restrictions); logit regression for currency crises episodes	189 Countries	1990–2017	New structural-factor GFCy measure shows effects on the frequency of capital-flow episodes and currency crises.
*Miranda-Agrippino and Rey (2021)	DFM (with estimation using Maximum Likelihood); VAR	81 Countries	1990–2018	Causal effects of US Fed, ECB, PBoC policies on the GFCy; GFCy amplifies transmission of US monetary-policy shocks across major financial-cycle channels.
*Degasperi et al. (2023)	SVAR-IV for U.S. MP; 2 VARs (US-global, US-foreign country bilateral)	30 Countries	1990–2018	Tightening of U.S. MP triggers a global contraction in real activity through financial variables.
Avdjiev et al. (2025)	Panel regression (with fixed-effects)	46 Countries	1995–2024	Risk sensitivity of global liquidity flows is higher when funded by constrained intermediaries; post-GFC shift from cross-border loans to debt securities lowers EME risk sensitivity.
*Cerutti and Claessens (2024)	Factor analysis for GFC; Panel VAR (with fixed effects)	76 Countries	2000–2021	Common factor + US GFCy drivers explain 30% of domestic credit, 40% of stock returns, 60% of house-price variation, and 75% of rates and bond-spread variation.

Note: An asterisk* next to a study indicates that it explicitly uses the term *Global Financial Cycle*; studies without the asterisk analyze its dynamics without naming it directly.

Capital Flow Measures

The main MPMs available are outlined below. Also, some of the measures are de facto conventional MP policy, but here they are classified as policy responses to capital inflow surges as the context is different from that of conventional MP under CB mandates.

Interest rate reduction via MP expansion. The objective is the reduction of the delta between domestic and foreign assets[74]. This is preferable when inflation is low. Otherwise, fiscal tightening is relatively more appropriate. The mechanism is as follows: fiscal tightening lowers aggregate demand and inflationary pressures, reducing the need for CB to raise interest rates.

Currency appreciation via MP tightening. This is preferable when the currency is not overvalued relative to macroeconomic fundamentals (e.g., the USD in 1960s). However, some temporary overshooting relative to fundamentals can be unavoidable as the reaction of the foreign currency (FX) market is more immediate than the goods market[75]. Instead, the overshooting scenario becomes the new-normal scenario if capital inflows are sustained (or expected to) in the medium term.

Accumulation of international reserves via FX market interventions[76]. Inflows increase the supply of foreign currency in the domestic market and the CB can buy these inflows and accumulate them as FX reserves. FX reserves are used to address exchange rate volatility and support balance sheet adjustments. This is preferable when international reserves are not sufficiently high, as accumulation of FX reserves can be inflationary due to the expansion of domestic money supply, requiring sterilization through interest-bearing bonds[77] to absorb the excess liquidity. Additional concerns arise when the currency in which FX reserves are held depreciates, leading to a decline in the value of reserves —valuation losses (IMF, 2012). Also, heavy intervention can unintentionally incentivize more inflows by supporting expectations of further appreciation[78]—self-fulfilling expectations in finance (Morris and Song, 1998)—.

CFMs are generally divided into residency-based and nationality-based measures[79]. The main ones are outlined below:

Price-based measures. These measures work by altering the return on capital flows through taxes or reserve requirements (e.g., Chile's unremunerated reserve requirements on short-term foreign borrowing in 1990s). For example, taxing short-term portfolio inflows or requiring unremunerated reserve deposits dis-

[74]Implicit assumption is that flows respond to the delta, in line with the Mundell-Fleming framework.

[75]See Dornbuch (1976)

[76]FX market interventions were widely recognized as am alternative form of monetary policy (Mundell, 1963).

[77]These are properly fiscal costs, recalling that the balance sheet of CB pertains to the public sector, despite CB institutional independence from NG.

[78]See Sarno et al. (2001) on how exchange rate interventions work.

[79]Implicit assumption is that clear discrimination between the two is possible. Obviously, if discrimination is not possible, nationality-based CFMs default to residency-based ones.

courages speculative or volatile investments by reducing their net yield. At the same time, incentives for domestic agents to invest abroad—such as tax deductions or regulatory advantages—can help balance excessive inflow pressures by encouraging outflows, alleviating appreciation pressures.

Quantity-Based Measures. Intuitively, these are similar in nature to import quotas in international trade, limiting the inflows. They are preferrable when price-based measures are insufficient to prevent speculative investments.

The main measures of this type include caps or limits on foreign borrowing by domestic institutions, reducing both overall domestic indebtedness and external indebtedness, particularly when there is risk of currency mismatches or swings in foreign MP. They are supported by legal approval requirements (e.g., in South Korea government authorizations for foreign loans in the 1990s) and outright prohibitions on specific capital transactions.

Prudential Measures with CFM Intent. Limits on FX exposure or liquidity requirements on FX liabilities. These prevent especially the excessive build-up of carry-trade positions—when market agents borrow in a low-yield currency to chase higher returns abroad— and the effects on the banking sector when the positions change.

FX Market Measures. These include the establishment of multiple exchange rate systems and FX intervention. For example, different transactions are subject to different exchange rates (e.g., from early 2000s Venezuela applied less favorable rates to portfolio outflows).

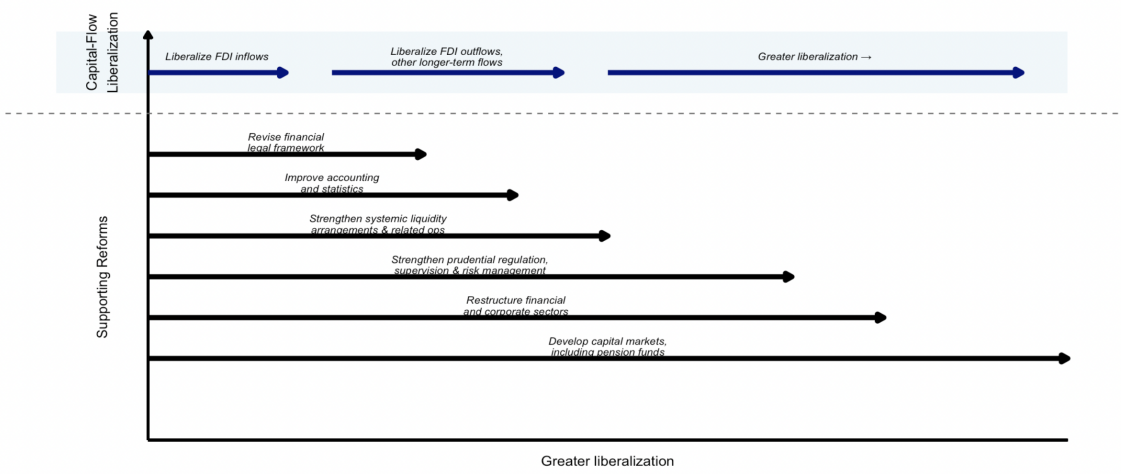
On the other hand, there are measures to control capital outflows. These are designed primarily to prevent the depletion of international reserves, which are on the asset side of a CB balance sheet. Residency-based CFM measures include, for instance, limits on residents' investments and transfers abroad and restrictions on the sale and repatriation of nonresidents' investments in domestic FX markets. Examples include waiting periods for nonresidents to transfer proceeds from domestic securities (e.g., Chile during the 1990s), taxes on the transfer of proceeds (e.g., Malaysia from 1998), mandatory holding periods before currency conversion (e.g., Ukraine in 2008).

But are these measures to control outflows equally important? To answer this question, IMF (2023) provides a comprehensive inventory of CFM measures across all member countries. A simple algorithm filtering for *hybrid* policies—those that can be classified as both inflow and outflow controls—counts roughly 60 measures to control capital outflows and 40 measures to control capital inflows. If we remove the outlier (Ukraine) for outflow measures, Argentina ranks first in the number of outflow restrictions. On the inflow side, Australia ranks first, followed by India. The distribution of measures for all IMF countries underscores the tight relationship among trade flows, current account balances, and capital account regulations.

In terms of policies for financial markets structure, prime examples include reinforcing the infrastructure of over-the-counter (OTC) derivatives markets, expanding the regulatory room to include shadow banks as

a set of NBFIs, enhancing the regularity and quality of supervisory bodies. Here, the structure of local financial markets shapes especially the prevailing supervisory framework (Masciandaro and Quintyn, 2008).

Figure 24: Stylized Representation of a Broad Liberalization Plan



Source: Author's elaboration based on IMF (2012).