



Exchange Rate Regime Choices in Small Open Economies from Bretton Woods to Inflation Targeting

Nathan Sussman¹ · Charles Wyplosz¹ 

Accepted: 2 May 2024
© The Author(s) 2024

Abstract

After centuries of metallic monies, for a long time, our understanding of fiat money had remained rudimentary and often controversial. Successive regimes eventually failed. The end of the Bretton Woods system marked the moment when the link between fiat money and gold was severed and when the possibility of letting exchange rates float became possible. The small open economies adopted various arrangements. Informed by these experiments, the understanding of monetary policy substantially progressed, leading to the widespread adoption of the expected inflation-targeting strategy with similar inflation targets. As a result, exchange rate variability has declined. The US dollar dominance was maintained and even increased. Yet, new challenges have emerged. The long period of interest rates stuck at the effective bound effectively suspended the use of the strategy. Then, during the post-pandemic surge in inflation rates, inflation forecasts became highly imprecise.

Keywords Bretton Woods · Exchange rate regimes · Inflation targeting · Dollar dominance

JEL codes B27 · E02 · E58 · F33 · F55

Introduction

The invention of fiat currencies is often taken for granted, but it has deeply transformed the economic systems. Like with any major invention, it has taken time to understand what to do about it. Early years were marked by private issuance and crises, and central banks appeared very gradually. For over a century, as they officially backed paper with precious metal, they hardly saw themselves in charge of monetary policy. This changed after World War II when the link with gold started to fizzle out. Even so, the link was indirectly maintained via the US dollar in the Gold Exchange

✉ Charles Wyplosz
charles.wyplosz@graduateinstitute.ch

¹ The graduate institute, Geneva, Switzerland



System. The real emancipation came in 1973 when the Bretton Woods system collapsed, and, finally, the link with gold was formally eliminated after three centuries.

However, central banks were far from being able to develop reliable monetary policy strategies. Their objectives were not even clear, and few were independent. They were concerned with inflation, the exchange rate, and external price competitiveness, but also with helping out public borrowings, keeping interest rates low to support investment, and, in some cases, channeling funds to preferred industries and firms. The field of macroeconomics was gripped in the debate between monetarists and Keynesians. The first camp relied on a one-equation model—really a definition of money velocity—that focused on inflation and advocated monetary-base targeting. The second camp had worked out a two-equation model. International considerations were present in Friedman (1953) and in the Mundell-Fleming¹ extension of the Keynesian model, which ignored inflation. The monetarists favored free-floating exchange rates, while the Keynesians conditionally endorsed fixity.

Throughout this debate, the role of the former anchor, so far gold or the US dollar, the exchange rate, took a second seat. The Tinbergen rule implied that if central banks were to use the interest rate as their instrument to keep inflation low, the exchange rate was just one endogenous variable among many others. This was reasonable for the large and relatively closed countries, but it did not fit well the small economies. The Mundell-Fleming trilemma offered capital controls as the solution. However, for various other reasons, capital controls were gradually eliminated during the 1990s, which were also characterized by trade globalization. The small and now open economies had to be concerned with their exchange rates.

High oil prices during the oil shocks, tight labor markets, and strong labor unions sent inflation and nominal interest rates to double-digit levels in many advanced economies. Germany's success by focusing on monetary aggregates to see through the supply shocks and the Volcker deflation through the use of interest rates led to assigning a key role to the objective of containing inflation. The 1992 Taylor rule offered a synthesis of the emerging new view two decades after the end of the Bretton Woods system. At about the same time, Alesina and Summers (1993) showed that central bank independence provided better results, namely low inflation at no output cost. This eventually led to the widespread adoption of the inflation-targeting strategy. This paper's thesis is that once most developed countries' central banks pursued similar inflation-targeting strategies, exchange rates naturally became reasonably aligned.

The current situation resembles the Bretton Woods system in the sense that exchange rates vary little but with a key difference. Instead of monetary policy being constrained by exchange rate fixity, we now see stable exchange rates because monetary policies are broadly aligned. There are a few exceptions, like Switzerland's activity on the foreign exchange market and some puzzling developments in the euro area where post-pandemic inflation rates have widely diverged in the wake of the asymmetric shocks that occurred in the post-COVID-19 period.

The paper focuses on the advanced small open economies, for which the exchange rate plays a major role in trade and capital movements. They are defined as OECD

¹ Mundell (1963) and Fleming (1962).



members with free trade and capital movements and are price takers in trade and financial markets. As explained below, we end up with a list of six floaters and the small members of the European monetary union.

The paper aims to show the interplay between events and progress in our understanding of money and the role of monetary policy. The next section briefly revisits the history of fixed exchange rate regimes from the Gold Standard to the Bretton Woods system. It reminds us that, with the advent of fiat currencies, each regime needed to be protected by consistent policies at the national level. However, for decades, limited knowledge prevented the adoption of sturdy arrangements. After a regime collapsed, the next one sought to avoid previous inconsistencies but fell victim to new inconsistencies. Section "[After Bretton Woods: Confused Monetary Policies](#)" looks at the post-Bretton Woods period when central banks failed to establish new anchors and then had to fight high inflation amid high exchange rate volatility. As explained in Section "[The Unifying Impact of Inflation Targeting](#)," they gradually shifted to the inflation-targeting strategy. This common approach in terms of targets and instruments, which incorporated recent theoretical advances gained from previous failures, resulted in stable exchange rates and low inflation. Section "[Is the US Dollar Back After the Global Financial Crisis?](#)" focuses on the role of the dollar after it lost its central position guaranteed by the Bretton Woods system. Its dominance was somehow eroded during the ensuing years. Even though its role as a foreign exchange reserve currency and as a trade invoicing currency has been eroded, it has become again the dominant currency. Once inflation targeting was widely adopted, the long period of zero interest rates and the recent succession of historical events, from the COVID pandemic to recovery and the consequences of the Russian invasion of Ukraine, have exposed the limits of the inflation-targeting strategy presented in Section "[Inflation Targeting is Still Under Construction](#)." The last section concludes.

From the Gold Standard to Bretton Woods

So far, we have known four international monetary regimes: the Gold Standard, the Gold Exchange Standard, Bretton Woods, and the current evolving regime. The two first regimes ended after the world wars when governments prioritized financial needs over monetary commitments (Eichengreen and Sussman 2000). Wars often provided an opportunity for monetary regime innovations, such as creating central banks and fiat currencies (Quinn and Roberds 2014), but open economy understanding was lagging. The dominant principle behind the Gold Standard, the Gold Exchange Standard, and the Bretton Woods system was that national fiat monies were just claims on gold. Their gold values, i.e., exchange rates, might have to be adjusted—debased in the earlier metallic tradition—to cope with hardships, but this had to be avoided as much as possible. That this was the key decision to be made by central banks (where they existed) meant that monetary policy was essentially an exchange rate policy. A rare exception was the suspension of gold convertibility during the Napoleonic Wars when the Bank of England issued fiat currency, and



the exchange rates were flexible. The episode led to the emergence of monetary analysis with flexible exchange rates. The significant depreciation of the Pound in 1810 prompted Parliament to appoint the Bullion Committee that issued the Bullion Report (Sussman 1997). However, with the return to Gold in 1819, the developments achieved in monetary economics with flexible exchange rates were forgotten.

The pre-World War I period of the Gold Standard has been associated with exchange rate stability and financial globalization on an unprecedented scale (Mauro et al. 2006). This stability could have led to large output variability. However, recent research shows that the classical gold standard did quite well in absorbing shocks because prices and wages were flexible (Chernyshoff, 2009). After the war, restoring the monetary system to its pre-war state seemed natural. However, the severe economic consequences of the war prevented a return to the classical Gold Standard (Accominotti 2020). The increases in wartime debts, coupled with declines in many central banks' gold reserves, made it impossible for all central banks to back their currencies with gold reserves.

The potential scarcity of gold was addressed by leading economists of the time, Cassel and Hawtrey, who suggested augmenting gold reserves with foreign exchange, which potentially raised the possibility of conducting monetary policy. This led to the creation of the Interwar Gold Exchange Standard (Hawtrey 1922). This monetary regime was short-lived for three main reasons. First, its implementation was not coordinated, and some countries took as long as eight years to join in. Second, just as the last countries joined in 1930, the world economy was hit by the Great Depression, which resulted in the regime's rapid demise when hard-hit countries ran out of reserves. Third, the misery of the Great Depression led many governments to accept responsibility for counter-cyclical policies.² Fiscal policies were part of the answer, with some initial successes but also sometimes a buildup of unsustainable public debts. Monetary policy, too, came into play when central banks clumsily sought to address the crisis because of a lack of understanding. Monetary policy autonomy resulted in counter-productive competitive devaluations (Eichengreen and Sachs, 1985; Wandschneider 2008).

When the Allies met at Bretton Woods in 1944 to discuss the postwar monetary arrangements, they were driven by the experience of the interwar years with currency speculation, sudden stops in 1929, and the dangers of inconsistent national monetary policies. It was becoming clear that central banks could conduct autonomous monetary policies but at the risk of changes in the exchange rates. The interwar experience and the precarious economic conditions after the war instilled a fear of floating (Calvo and Reinhart 2002). Since fiat currencies were still understood as claims to gold, the key Bretton Woods negotiators, Keynes and White, wanted to restore the fixed exchange rate system, if only to provide central banks with a clear mission. They were aware that monetary policy faces tradeoffs between pegging the exchange rate and external imbalances, including potentially disruptive capital flows. Therefore, the Bretton Woods system allowed for the restriction of capital

² Looking at this period, Eichengreen (1995) argues that democracies are less likely to trade exchange rate stability for monetary policy independence during crises.



flows on the capital account and limited exchange rate changes to cases of 'fundamental disequilibrium.'

Moreover, the IMF was created to coordinate the system and provide emergency liquidity to its members. Still, the link between fiat currencies and gold was seen as essential. The Bretton Wood system was anchored to gold by pegging the US dollar to gold and all other currencies to the dollar. Canada was the lone exception as it did not peg its dollar.

While the Bretton Woods system lasted longer than the gold exchange standard, it eventually failed owing to similar fundamental problems. First, the credibility of the regime was undermined by the incompatibility of monetary policy autonomy with fixed exchange rates, which had already destabilized the interwar standard. The Bretton Woods response was to allow for exchange rate adjustments, but in doing so, it created an inherent instability that was an invitation for speculation (Kugler and Straumann 2020). The second fundamental problem was the Triffin dilemma. Gold exchange systems are inherently unstable because in order to provide liquidity to the international payment system, the anchor country has to run current account deficits that eventually reduce its gold backing ratio, which invites speculative attacks against its currency. Both problems hinged on speculative attacks. It would take another decade before the theory of speculative attacks would be worked out and linked to the importance of credibility and time-inconsistency, as explained in Section "The Unifying Impact of Inflation Targeting." Yet, Keynes (1936) had already developed his 'beauty contest' analysis, which presumably led to the restrictions of capital movements. However, there were no such limits on the dollar and some other currencies like the Canadian dollar and the Deutschmark. There are still some lingering doubts about the effectiveness of capital controls. Eichengreen (1997) claims that they became less effective as time went by, while Ohanian et al. (2023) find that they were effective for most of the period—the political economy angle here is that the US received less flows than the counterfactual and more capital remained in other countries—and that this benefitted geopolitical stability.

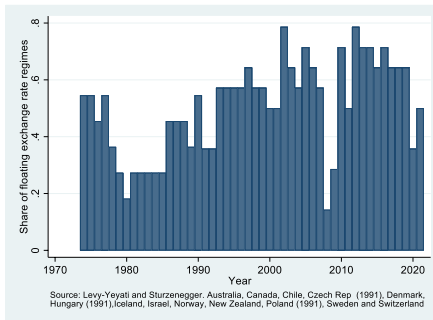
After Bretton Woods: Confused Monetary Policies

The Bretton Woods system had been convenient since it provided a ready-made anchor. When it ended, it took time to develop robust monetary strategies, which gradually converged to inflation targeting. Except for the special status of the US dollar, the Bretton Woods system had been highly equalitarian. Except for Canada, all countries were pegging their currencies to the US dollar and had access to IMF support. After 1973, the link with gold was cut, and no substitute anchor was available, so the US dollar was allowed to float freely. The other countries faced a varied menu of options, from free-floating to many different versions of pegging. Choosing an option, however, was complicated because of a lack of agreed-upon principles and the paucity of experiences with free-floating.

Following Friedman (1953), the monetarists argued in favor of free-floating, capital mobility, and a strict monetary rule. The rule was derived from an assumed direct link between money growth and inflation. But, they did not pay formal attention



Levy-Yeyati and Stutzenegger classification



Iltetzki et al. classification

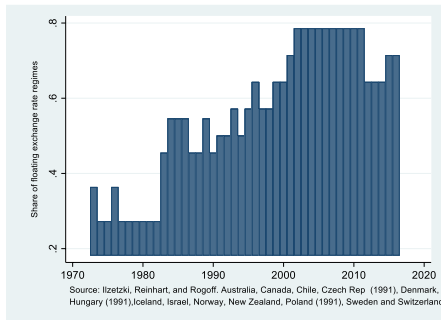


Fig. 1 Shares of small economies operating a fully flexible exchange regime. Sources: Levy-Yeyati and Stutzenegger (2005), Iltetzki et al. (2019)

to output variability and implicitly assumed that the exchange rate would move to compensate for inflation. The Keynesians were agnostic. A decade before the end of the Bretton Woods system, the Mundell-Fleming model had extended the standard Keynesian closed economy model to the case of small open economies. The Mundell-Fleming model, however, was very simple. In particular, it did not deal with inflation, and its treatment of the exchange rate was cursory. However, it established the trilemma principle, according to which fixed exchange rates, capital mobility, and monetary policy autonomy were incompatible. The trilemma was an important step in choosing an exchange rate regime while avoiding the inconsistencies that had undermined the previous systems. However, it did not specify which regime was most desirable. A country could let its exchange rate float, more or less freely, or it could peg its currency to that of a large country; it could even adopt a foreign currency, including by joining a monetary union.³

By then, most central banks were eager to carry out autonomous monetary policies. Few of them were independent, and they—or their governments—were actively managing the interest rates, usually less to control inflation than to support investments by lending to favored industries and national champions and to ease public borrowing costs. By 1973, the existing monetary theory provided no clear recommendation for choosing an exchange rate regime. The theory was underdeveloped and there was no or little empirical evidence available to judge which results were robust, if any. In addition, the Mundell-Fleming model did not provide any reliable guidance for the conduct of monetary policy since it did not include inflation. It only described monetary and fiscal policies as quasi-equivalent tools to stabilize output. It would take a couple more years to augment the Mundell-Fleming model with a Phillips curve to offer a complete model. Monetary policies could only be confused.

A first sign of confusion was the diversity of exchange rate regime choices. Figure 1 shows the exchange regimes chosen after 1973. The two charts differ because they use different exchange rate regime classifications for the same list of small open

³ Mundell (1961) had also created the optimal currency area theory to evaluate the merits of adopting a common currency.



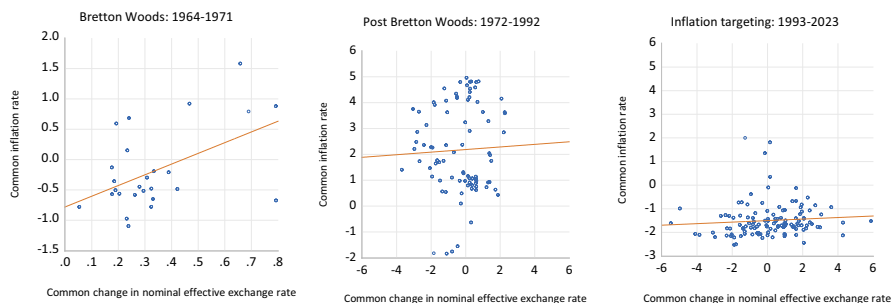


Fig. 2 Inflation and the exchange rate. Sample: Australia, Canada, New Zealand, Norway, Sweden, and Switzerland. The first principal component of inflation is standardized with a mean zero and a standard deviation of 2.05. The first principal component of changes in the effective exchange rate is standardized with a mean zero and standard deviation of 1.63. Each axis displays the corresponding mean (indicated as zero) and is measured in standard deviations from the mean. Source: OECD

economies. For the time being, we focus on the period until the early 1990s when the inflation-targeting strategy started to be widely adopted in developed countries. The Ilitzki et al. (2019) classification indicates a limited adoption of flexibility early on, which jumped in the mid-1980s. The Levy-Yeyati and Stuzenegger (2005) classification detects a sizeable initial uptake, but it did not last long until it grew back in the mid-1980s. Beyond acting as a warning about the sensitivity of the classification of exchange rate regimes, these results are a testimony to the fear of floating syndrome. With unconvincing arguments about regime choice and lacking previous experience, many countries adopted the seemingly prudent approach of sticking with fixed exchange rates.

A second sign of confusion was the rise in inflation. Having jettisoned the exchange rate as the anchor of monetary policy, central banks had to design an alternative strategy, but they largely failed. As a result, inflation generally rose. This is illustrated in Fig. 2, which plots the first component of inflation against the first component of annual change in the effective exchange rates. Relative to the sample in Fig. 1, our sample here and in the remainder of the paper includes the six most advanced small open economies (Australia, Canada, Norway, New Zealand, Sweden, and Switzerland) for which we can extend the analysis back to the 1960s to capture the Bretton Woods era.⁴ The figure shows that the move from Bretton Woods decoupled inflation from changes in (effective) nominal exchange rates, and inflation rose.⁵ The decoupling has persisted after the adoption of inflation targeting, but inflation declined (until recently).

⁴ We eliminate the former communist countries as well as Chile, Israel and Korea that were not advanced during a significant part of the period.

⁵ The first principal component of inflation rates for the 6 countries accounts for 85% of the variation in their inflation rates. The first principal component of the annual change in the effective exchange rate accounts for 52% of the variation. However, the loading for the first principal component for Switzerland is negative – which suggests that it was a hedge (safe haven) against the other currencies. Therefore, we dropped Switzerland from the sample in this exercise.

After the Global Financial Crisis in 2008, some central banks augmented their inflation-targeting policy strategies to include foreign exchange market interventions: over time, the IMF's view on interventions changed from a critical stance to endorsement under certain circumstances. IMF (2003) can be viewed as enshrining foreign exchange market interventions in the monetary toolbox.

Within the European Union, where most of the advanced small open economies are located, fear of floating dominated. The first reaction was to preserve the single market by limiting exchange rate fluctuations as much as possible. This first led to a regional Bretton Woods system arrangement, the European Monetary System (EMS), characterized by a severed link from the dollar and bilateral exchange pegs among the member countries. Fairly soon, the single market was extended to adopt full capital mobility. The Mundell-Fleming trilemma implied that national monetary policy autonomy had to be abandoned, but the European central banks ignored this implication. Few of them were independent, and most governments were loath to follow the lead of the Bundesbank, which was independent and intended to emerge as Europe's leading inflation-fighting central bank. When, predictably, the EMS became unstable, and some countries had to abandon it, policymakers realized the importance of the trilemma. They adopted hard pegs through the creation of the Euro, in effect abandoning their monetary policy instruments. The European Central Bank was inspired by the Bundesbank and its monetarist bend, as it combined a floating exchange rate for the Euro with a prominent role in controlling the money supply. Over time, it went along with the tide and switched to inflation targeting.

The Unifying Impact of Inflation Targeting

In retrospect, it may seem surprising that the role of expectations played a small role in the early post-Bretton Woods debates. Even though many earlier contributions had identified the importance of expectations and their impact on the exchange rate, the theory had not been worked out satisfactorily until Dornbusch (1976) built upon the nascent theory of rational expectations (Sargent and Wallace 1975; Lucas 1976). The improved understanding of the role of expectations led to several further innovations.

First, for the open economy, Obstfeld (1986) showed the possible existence of multiple equilibria, which explains the fundamental instability of foreign exchange—and, more generally, financial—markets. From there, Krugman (1991) clarified the role of monetary anchors, which led to a renewed defense of exchange pegs of various sorts (Krugman 1989).

Second, in the closed economy setting, the importance of expectations in shaping inflation rates via the Phillips curve had been recognized since Phelps (1967), but for long it played a surprisingly limited role in the design of monetary policies. Expectations became central in two related steps. First, Kydland and Prescott (1977) showed that policy may be time inconsistent when central banks make commitments, in part to shape market expectations, that eventually prove to be ill suited. This was spectacularly illustrated during the 1980s when Volcker's Fed prematurely cut its interest rates while it was battling inflation. The time inconsistency phenomenon was widely



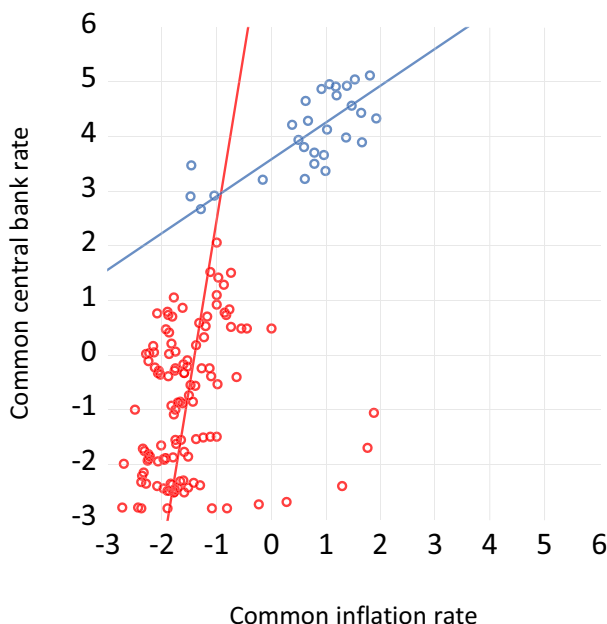


Fig. 3 Taylor rules in advanced small open economies - Quarterly data, 1985–2023. The labels of the axes represent normalized values with a mean of 0 and a standard deviation of 2.18 for inflation and 2.27 for interest rates. Sample: Australia, Canada, New Zealand, Norway, Sweden, Switzerland. Sources: Central bank rates: BIS, Inflation: OECD

seen as advocating strict monetary policy rules, as supported by the monetarists. But, instead of a money-growth rule, Taylor (1993) proposed an interest rule in the Keynesian tradition.

The expected inflation-targeting strategy embodied the much-improved state of knowledge at the time. Following New Zealand in 1990 and Canada in 1991, all central banks in the advanced countries and beyond have gradually adopted the inflation-targeting strategy. The adoption is not always explicit, and the inflation target varies from country to country, although 2% is a fairly generalized norm. Mostly implicitly, central banks follow a Taylor rule, even if the weights on inflation and activity may vary over time. The strategy generally ignores the exchange rate and, therefore, the needs of the advanced small open economies. The Mundell-Fleming trilemma requires the exchange rate to be floating, and, as can be seen in Fig. 1, most non-European small economies have adopted this regime. Since all inflation-targeting central banks carry out similar monetary policies, absent asymmetric shocks, the similarity of decisions and outcomes tends to limit exchange rate fluctuations. Fear of floating has dissipated with that experience. The unifying anchoring role of the exchange rate under the Bretton Woods system is now fulfilled by the Taylor rule embodied in the expectation inflation-targeting strategy. This outcome is illustrated in the following two figures.

Figure 3 plots the first principal component of inflation rates in the same six small countries against the first principal component of their central bank policy rates.



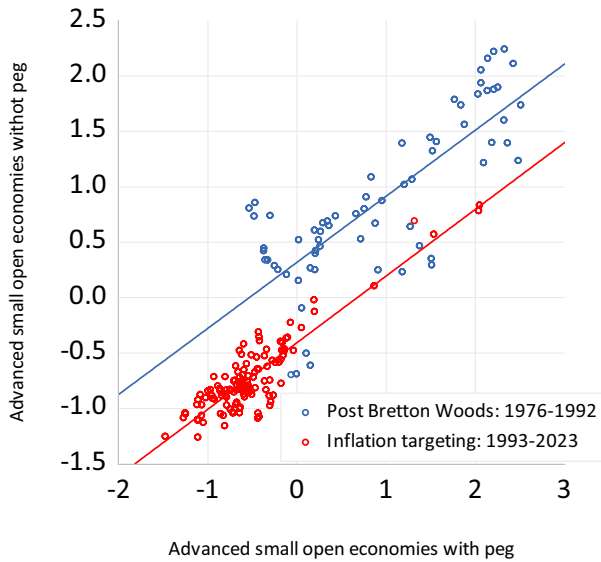


Fig. 4 The role of exchange rate regimes –Common Inflation Rate: 1976–2023, Quarterly data. Countries without pegs: Australia, Canada, Norway, New Zealand, Sweden, Switzerland; Countries with pegs: Austria, Belgium, Denmark, Estonia, Finland, Greece, Ireland, Lithuania, Latvia, Luxembourg, Netherlands, Portugal, Slovakia, Slovenia. Unbalanced sample adjusted according to Euro adoption dates. The first principal component of inflation is standardized with a mean zero and a standard deviation of 1. Source: OECD

This does not really represent Taylor rules since it ignores the economic activity variable, but the message is clear. After 1992, the slope is greater than unity, which means that central banks react aggressively to changes in inflation. Consequently, at least until the post-COVID period, the variability of inflation rates is much smaller than in the previous post-Bretton Woods period. This is confirmed by the fact that the first component of inflation rates accounts for 68% of the individual countries' rates during the inflation-targeting period as opposed to 58% during the post-Bretton Woods period.⁶ The outliers correspond to the inflation surge observed during the recent post-COVID period, which we discuss in Section "[Inflation Targeting is Still Under Construction](#)."

The Euro area member countries, however, operate under a different regime. They share a common inflation-targeting central bank, but each one operates with a hard peg. Denmark is a de facto member of the Euro area. Thus, all advanced small open economies are inflation targeters directly or indirectly via euro area membership. Figure 4 shows that this difference does not make much of a difference for inflation. It plots the first component of inflation in small countries with a flexible

⁶ The periods tested are 1972–1992 and 1993–2023. Some may criticize the use of principal components when the data exhibits unit roots. Bai and Ng (2004) and the empirical literature that examines principal components of global inflation (Ha et al 2023) suggest that this is not a major source of concern.



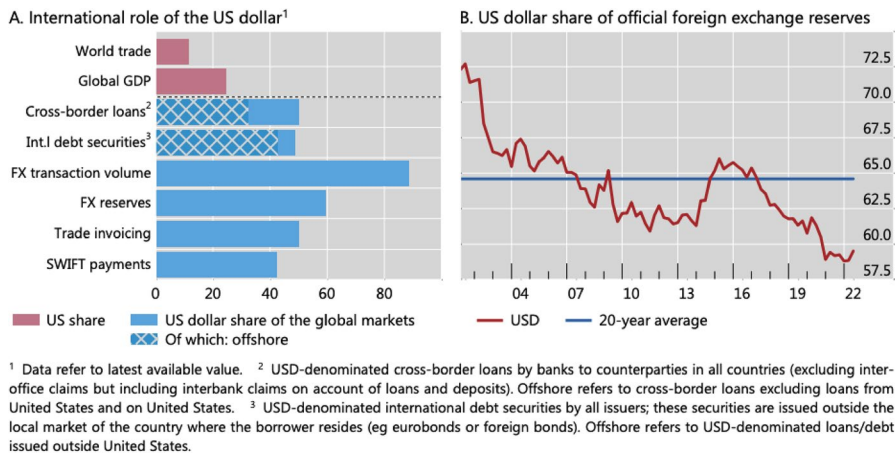


Fig. 5 International role of the dollar (%). Source: BIS (Maronoti, 2022)

exchange rate against the first component of inflation in small countries with a hard peg. The relationship is examined over two periods: the post-Bretton Woods period (during which most future euro area members were part of the European Monetary System (excluding the Central and East European countries) and the inflation-targeting period. Strikingly, the exchange rate regime plays a very limited role within each period since the common component of the inflation rate is correlated between the two exchange rate regimes. The figure also shows that inflation targeting has reduced the level of inflation.

Is the US Dollar Back After the Global Financial Crisis?

When the Bretton Woods system ended, it was sometimes expected that the US dollar would no longer be the world's dominant currency and anchor for other central banks. The right-hand chart in Fig. 5 shows that the US dollar plays a lower role in central bank exchange reserves, which is also true for international trade payments. The left-hand chart indicates that the dollar retains an outsize role in most other international uses of currencies, and often remains dominant by far.⁷ In this section, we focus on another key global function of the Federal Reserve: setting worldwide monetary conditions, especially for small open economies. This was, arguably, the main intention when the Bretton Wood system was set up.

In theory, the advanced countries are free to conduct their monetary policies independently from the Fed ever since they severed the link between their currencies and the US dollar by adopting a floating regime, individually or collectively. Why would they still follow the Fed? One reason could be a lingering fear of floating. If their monetary policies were to disassemble the Fed's, their exchange rates vis

⁷ For a more detailed analysis, see Arslanalp (2022).



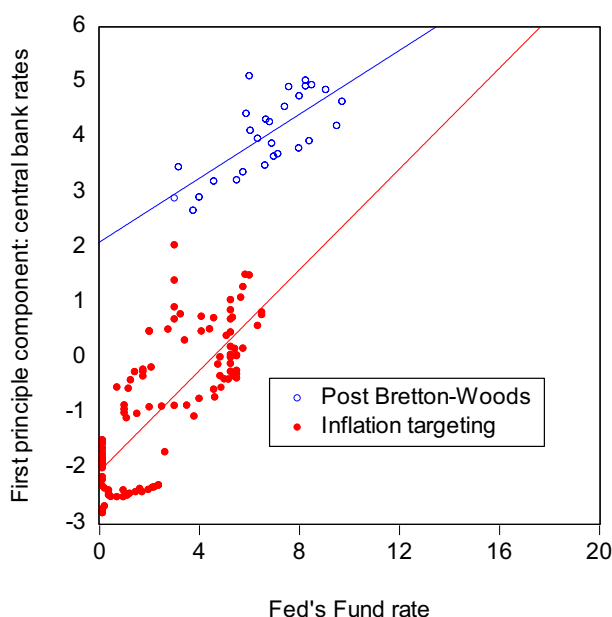


Fig. 6 Policy interest rates in small economies and the Fed funds rate. Quarterly data 1986–2023; Post-Bretton Woods: 1983–1992; Inflation targeting: 1993–2023. Sample: Australia, Canada, New Zealand, Norway, Sweden, Switzerland; Vertical axis normalized first principal component of central bank policy rates standardized with a mean zero and a S.D of 2.28. Source: BIS

a vis the dominant currency could vary widely. Initially, fear of floating was perhaps reinforced by the lack of an anchor that would guide monetary policy. But now that the Fed is also following the inflation-targeting strategy, its policies are usually well aligned with the monetary policies pursued by other central banks.

Another explanation is globalization. Many developing countries have grown rapidly over the last decades as they integrated the world markets. Now that they have become richer and more financially sophisticated, they need more financial services. However, very few of them have established local financial markets that can rival US markets, whether in size, sophistication, or range of services. As the euro area is not offering strong competition, these countries really have no alternative to the US markets and the dollar. The dollar dominance on foreign exchange transactions (Fig. 5) clearly indicates this effect.

Rey (2013) suggests yet another explanation. As capital movements transmit monetary conditions, the interest rates on global financial markets tend to move together with those in the US, which is home to the largest financial markets. This leaves little room to set policy interest rates that significantly diverge from those in the US. Rey (2013) argues that free capital movements have transformed the trilemma into a dilemma: independent monetary policies are possible if and only if the capital account is managed. Even in large countries, central banks need to adopt similar policies to those of the Fed. This possibility applies *a fortiori* to small open economies.



Figure 6 provides supporting evidence. It plots the relationship between the Fed's funds rate and the first principal component of the policy rates of our sample of six small open economies. It shows that the link has remained after the Bretton Woods system ended. The link strengthened after the adoption of the inflation-targeting strategy.⁸ The convergence of monetary policies among inflation-targeting central banks has taken a form of convergence toward the Fed's policies.

Obviously, the correlation does not imply that the Fed policy rate guides policy rates in the small economies. It may have been that, with a similar target, most central banks followed similar policies in the face of similar conditions. Table 1 in the Appendix presents some evidence of a causality link from the US to other countries' policy interest rates. Table 2 indicates that QE did not affect the results.

The table also suggests that the dollar's influence has strengthened after the global financial crisis, even though it started in the US and was triggered by ineffective financial regulation and supervision. But, the US authorities reacted forcefully to calm the domestic financial markets down and then led global financial regulation and supervision reforms. In addition, during the crisis, the Fed provided liquidity swap arrangements to several central banks (Australia, Brazil, Canada, Denmark, the ECB, England, Japan, Korea, Mexico, New Zealand, Norway, Singapore, Sweden, and Switzerland). Most of these swap agreements were renewed in 2020, but at that time, there was no shortage of liquidity following a decade of quantitative easing. Thus, after 2008, the Fed emerged again as the main source of global liquidity, a stark similarity with the Bretton Woods system. The key difference is that exchange rates are no longer pegged to the dollar, but they have moved very little, at least up until 2020.

Inflation Targeting is Still Under Construction.

Inflation targeting has become the 'gold standard' for monetary policy. It is coherent with current knowledge and has allowed central banks to achieve price stability for several decades. Yet, like the Gold Standard, experience shows that it is not as sturdy as it was once believed.

The Lower Effective Bound and QE

For reasons that remain to be clarified, many policy interest rates have been stuck from 2009 to 2020 at the lower effective bound, either zero or even negative. During this period they have been unable to follow the Taylor rule at a time when inflation rates remained below targets. They resorted to non-standard instruments, chiefly by expanding massively the money supply, possibly to no avail.⁹ Re-absorbing excess liquidities is the next challenge.

⁸ While during most of that period and until 2012, the Fed did not formally adopt inflation targeting, it was aiming de facto at a 2% inflation rate, similar to the targets adopted in our sample countries.

⁹ There is no agreement whether QE has had a macroeconomic effect, see the collection of essays in Den Haan (2016)



Erroneous Forecasts

After the pandemic, inflation quickly surged. The large central banks initially insisted that the surge would be temporary because it was fueled by external supply shocks before and after the invasion of Ukraine. Accordingly, they decided to 'see through' these supply-side shocks and kept the interest rates where they were. They failed to recognize the demand boost resulting from household dissaving as well as the expansionary stances of monetary and fiscal policies. The leftmost chart in Fig. 7 shows that the Bank of England was the first large central bank to recognize its error and started to raise its policy rate at end-2020. The Fed followed suit a few months later, as did the ECB even later. Among the small economies, the central banks of New Zealand, Norway, and Canada moved earlier. At the same time, Australia and Sweden followed the Fed, and Switzerland followed the ECB. After that, all central banks hiked their policy rates at broadly similar speeds as they restated their commitments to inflation targeting.

These similar actions are not the result of any explicit coordination. As in previous years, inflation-targeting central banks reacted broadly in the same way as they faced similar inflation surges. All central banks became hostage to the uncertainties generated by a series of historically exceptional shocks. It is not surprising that central bank forecasts were unable to pick up these events and their aftermath. Because inflation targeting is meant to be driven by expectations of future inflation, the inflation-targeting strategy was partly disabled. It had to be adjusted in an ad hoc fashion, with the emphasis shifting from inflation forecasts to observed inflation, which may portend a delayed phase of interest rate cuts. Apparently, long-run inflation expectations remained reasonably stable despite clearly unsatisfactory results. It seems that the central banks' commitments to uphold the target have remained credible, both during the zero or negative inflation period and during the recent rise in inflation above targets. The resolve to bring inflation to target through a rapid succession of interest rate hikes must have been convincing. These events have exposed another challenge to inflation targeting.

Exchange Rates

Figure 8 looks at the small economies' nominal and real effective exchange rates. Switzerland appears as an outlier, to be discussed further below. All other nominal effective exchange rates (leftmost chart) depreciated at the onset of the pandemic but quickly recovered.¹⁰ The ensuing appreciation reflects their move to hike the policy rates ahead of the larger central banks, which was undone when the latter caught up. With limited inflation differentials, the real exchange rates followed a similar pattern.

¹⁰ Sweden, and more recently Norway, are outliers that experienced a recent sharp depreciation. In Sweden, beginning in 2022 the central bank sold some of the foreign exchange reserves accumulated after the global financial crisis.



All in all, these fluctuations have been limited ($\pm 5\%$). This is puzzling given the size of the external shocks, which have been asymmetric, affecting different countries in different ways. It could confirm the view that inflation-targeting provides an effective anchor that stabilizes the exchange rate. If that is the case, the exchange rate may be losing its shock-absorbing role.

The case of Switzerland is different. Since its central bank targets a lower inflation rate than the others—between 0 and 2%, presumably 1% on average—its exchange rate follows a long-term appreciation trend, hence the need for routine foreign exchange market interventions to smooth appreciation around the trend.¹¹ After the pandemic, the global inflation surge was muted in Switzerland. Its limited dependence on oil and gas suggested that the Swiss National Bank would not need to raise its policy interest rate much. However, unconvinced by the ‘temporary hypothesis,’ the Swiss National Bank started in mid-2021 to encourage a nominal appreciation to contain inflation further, and it worked. Switzerland thus combines an (implicit) inflation-targeting strategy and an active exchange policy. Are hybrid strategies of this sort a useful model for other countries?

A Challenge to the Euro Area

The hard pegs of euro area member countries usually imply a high degree of real effective exchange stability, which matters for intra-European trade. However, it has long been recognized that asymmetric shocks that result in large inflation differentials represent the main drawback of monetary unions. The shocks that have occurred since 2020 have been asymmetric or have had asymmetric impacts on member countries, as shown in Fig. 9. At the top of the list, we find the Baltic countries and other countries that had large trade ties with Russia. At the bottom of the list, we observe countries that used subsidies to contain price increases of sensitive products like energy and food. The differences are considerable. For instance, prices have increased by 25 percentage points more in Estonia than in Cyprus.

The absence of exchange rates evoked similar inflation divergences during the return to the Gold Standard in the 1920s, which durably hurt countries like Great Britain or were met with significant depreciations, which is not an option in the present case. This is a serious challenge.

The first possibility is the Balassa-Samuelson effect. The countries with the highest inflation in Central and Eastern Europe are catching up with the older monetary union members. The effect, however, would take years to erase the accumulated price differences. A second possibility is that several of these countries have displayed a significant degree of downward wage and price flexibility in the past. Recent readings of inflation (January 2024), also displayed in Fig. 9, show that inflation differentials in the Eurozone have declined, but the accumulated differentials remain substantial.

¹¹ See Gerlach-Kristen et al, (2018).



Table 1 The link between policy interest rates in small economies and the Fed funds rate

Dependent variable: common central bank rate				
Variable	Coefficient	Std. error	t-Statistic	Prob.
1986Q1–1993Q1–29 obs				
C	2.21	0.44	4.96	0.0000
Inflation _{t-1}	0.23	0.13	1.75	0.0820
Fed funds rate _t	0.25	0.08	3.25	0.0014
1993Q2–1999Q1–24 obs				
C	1.87	0.43	4.33	0.0000
Inflation _{t-1}	0.81	0.14	5.78	0.0000
Fed funds rate _t	0.02	0.10	0.20	0.8380
1999Q2–2007Q4–35 obs				
C	−0.22	0.27	−0.80	0.4222
Inflation _{t-1}	0.45	0.14	3.30	0.0012
Fed funds rate _t	0.20	0.05	4.75	0.0000
2008Q1–2015Q4–32 obs				
C	−1.12	0.12	−9.37	0.0000
Inflation _{t-1}	0.41	0.07	5.49	0.0000
Fed funds rate _t	0.87	0.05	18.03	0.0000
2016Q1–2023Q4–32 obs				
C	−2.71	0.14	−19.34	0.0000
Inflation _{t-1}	0.10	0.06	1.67	0.0968
Fed funds rate _t	0.39	0.07	5.53	0.0000
R-squared	0.98	Mean dependent var		0.00
Adjusted R-squared	0.98	SD dependent var		2.28

The dependent variable is the first principal component of central bank rates. Inflation is the first principal component of inflation; Sample 1986Q1–2023Q4 (due to data availability); Countries: Australia, Canada, New Zealand, Norway, Sweden, and Switzerland; Estimation method Least Squares with Breaks, Bai-Perron Trimming 0.15; Max. breaks 5, Sig. level 0.05; Allows heterogeneous error distributions across breaks.

Table 2. Estimation for the COVID-19 QE period

Dependent variable: common central bank rate				
Variable	Coefficient	Std. error	t-Statistic	Prob.
2016Q1–2023Q4–32 obs				
C	−2.73	0.19	−13.89	0.0000
Inflation _{t-1}	0.11	0.07	1.57	0.1282
Fed funds rate _t	0.40	0.08	4.81	0.0001
Inflation _{t-1} *COVID	−0.09	0.07	−1.26	0.2185
Fed funds Rate _t *COVID	−0.09	0.08	−1.14	0.2648
R-squared	0.93	Mean dependent var		−2.19
Adjusted R-squared	0.91	SD dependent var		0.79

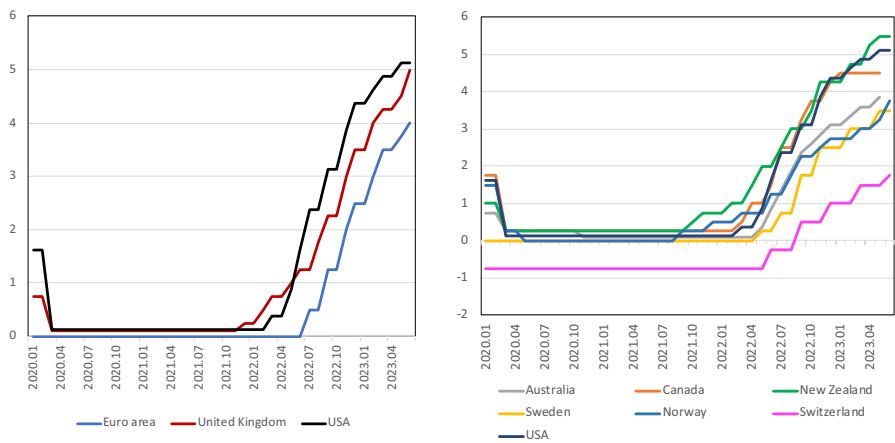


Fig. 7 Policy rates in large and small countries. Source: BIS

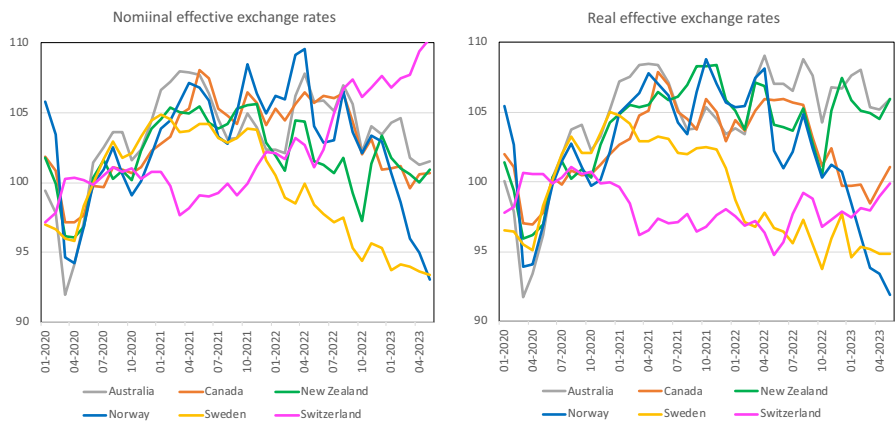


Fig. 8 Nominal and real effective exchange rates. Source: BIS



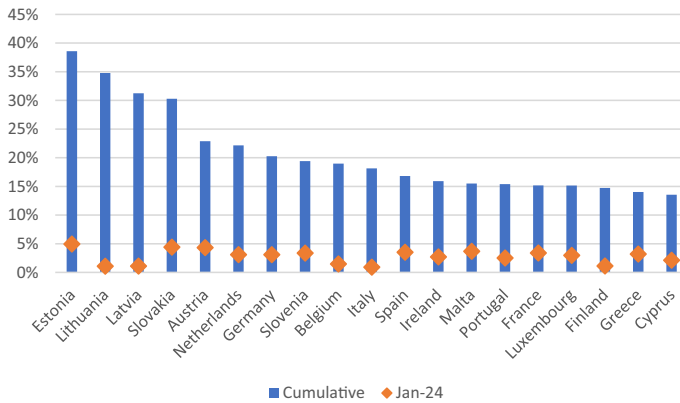


Fig. 9 Cumulated increase in HCPI from Jan. 2020 to June 2023 (%). Source: Eurostat

Conclusions

After centuries of metallic monies, for a long time, our understanding of fiat money has remained rudimentary and often controversial. The end of the Bretton Woods system marked the moment when the link between fiat money and gold was severed and when the possibility of letting exchange rates float became possible. Facing a range of totally new issues, central banks experimented and learned by doing, often well ahead of existing knowledge. The developed small economies were particularly exposed to this new state of affairs, because exchange rates considerably matter for them. Choosing an exchange rate regime and drawing its implication for the conduct of monetary policy, presented central banks with a daunting challenge.

Knowledge quickly expanded during the early post-Bretton Woods period. Ad hoc monetary policy practice has given way to a set of principles that recognize the ubiquitous role of expectations, the instability of financial markets, and the formation of prices. The result has been the expected inflation strategy. While this is a closed economy concept, its widespread adoption has turned out to be a crucial contribution to stabilizing exchange rates. Nowadays, nearly all developed small open economies either let their exchange rates float or belong to the European monetary union.

However, the last decade has exposed the limits of the expected inflation-targeting strategy. During the 2010s, central banks have lost much of their firepower when they brought their interest rates down to their effective lower bounds. The post-Covid inflation surge showed that inflation forecasts may be too uncertain to guide policy decisions. It has also confirmed that massive asymmetric shocks endanger monetary unions in ways that remain to be fully grasped. The main good news is that the inflation-targeting strategy has kept long-term inflation expectations reasonably anchored, which may explain the relative stability of nominal exchange rates and possibly contributed, unlike in the interwar period, to financial stability in the face of large economic shocks.



Appendix

Table 1 shows the relationship between the common factor of central banks' policy rates (dependent variable), the lagged common annual inflation rate, and the Fed funds rate. Since there is good reason to believe that there could be structural breaks in the relationship, we estimate an OLS model with structural breaks.

The results confirm our interpretation of Fig. 6. It also suggests that the relationship has changed over time. The Fed funds rate was dominant from 1986 to 1992. Then, during the first phase of inflation targeting—from 1993 to 1999—policy rates were affected by lagged inflation, and the effect of the Fed's fund rate was not statistically significant. From 1999 until the global financial crisis in 2008, the contribution of lagged inflation declined, and that of the Fed's fund rate increased and became significant. From 2008 until the beginning of 2015, the impact of the Fed's fund rate increased. From 2015 to the first quarter of 2023, the impact of the Fed's policy rate continued to dominate the impact of lagged inflation both in the magnitude of the coefficient and its significance.

During the period following the global financial crisis, many central bank rates were at the effective lower bound, and the major central banks resorted to quantitative easing (QE), either through domestic bond purchases or unsterilized foreign exchange market interventions. In our sample of the very advanced small open economies, Sweden started using QE in 2010 and again in 2015, and Switzerland engaged in large-scale foreign exchange market interventions since 2010. During the Covid pandemic, Australia, Canada, New Zealand, and Sweden started QE programs in March 2020—the policies ended by December 2021. Therefore, in terms of our regression analysis, which focuses on policy rates, the omission of QE from the estimation could be of concern only during COVID-19, when it could affect the first principal component of central banks' policy rates. However, since this period includes only seven observations, we cannot estimate a separate regression for that period. Nevertheless, the last period in our break tests has 32 observations—of which QE accounts for less than 25%. Estimating the period from 2016Q1 to 2023Q and including a dummy interaction for the COVID period shows that its impact is quantitatively and statistically insignificant (Table 2).

Funding Open access funding provided by Geneva Graduate Institute.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

Accominotti, Olivier. 2020. International monetary regimes: the interwar gold exchange standard. *Handbook of the History of Money and Currency*. https://doi.org/10.1007/978-981-13-0596-2_24.



- Alesina, Alberto, and Lawrence Summers. 1993. Central bank independence and macroeconomic performance: some comparative evidence. *Journal of Money, Credit and Banking* 25(2): 151–162.
- Arslanalp, Serkan, Barry Eichengreen, and Chima Simpson-Bell. 2022. "The stealth erosion of dollar dominance: active diversifiers and the rise of nontraditional reserve currencies", Working Paper 22/58, IMF.
- Bai, Jushan, and Serena Ng. 2004. A PANIC attack on unit roots and cointegration. *Econometrica* 72(4): 1127–1177.
- Calvo, Guillermo A., and Carmen M. Reinhart. 2002. Fear of floating. *The Quarterly Journal of Economics* 117(2): 379–408.
- Chernyshoff, Natalia, David S. Jacks, and Alan M. Taylor. 2009. Stuck on gold: Real exchange rate volatility and the rise and fall of the gold standard, 1875–1939. *Journal of International Economics* 77(2): 195–205.
- Dornbusch, Rudiger. 1976. Expectations and exchange rate dynamics. *Journal of Political Economy* 84(6): 1161–1176.
- Eichengreen, Barry. 1995. *Golden Fetters: The Gold Standard and the Great Depression, 1919–1939*. New York: Oxford University Press.
- Eichengreen, Barry. 1997. The Bretton Woods system: paradise lost? In *Gold Standard Theory & History*, ed. B. Eichengreen and M. Flandreau, 231–241. Routledge.
- Eichengreen Barry and Jeffrey Sachs. 1985. "Exchange Rates and Economic Recovery in the 1930s." *The Journal of Economic History* 45(4): 925–946.
- Eichengreen, Barry and Nathan Sussman. 2000. The International Monetary System in the (Very) Long Run, *I.M.F. Working Paper WP/00/43*.
- Fleming, J. Marcus. 1962. Domestic financial policies under fixed and floating exchange rates. *IMF Staff Papers* 9: 369–379.
- Friedman, Milton. 1953. "The Case for Flexible Exchange Rates", in *Essays in Positive Economics*: 157–203. Chicago: University of Chicago Press.
- Gerlach-Kristen, Petra, Richhild Moessner, and Rina Rosenblatt-Wisch. 2018. Computing long-term market inflation expectations for countries without inflation expectation markets. *Russian Journal of Money and Finance* 77(3): 23–48.
- Ha, Jongrim, M. Ayhan Kose, and Franziska Ohnsorge. 2023. One-stop source: A global database of inflation. *Journal of International Money and Finance* 137(3): 102896.
- Hawtrey, Ralph George. 1922. The Genoa Resolutions on Currency. *The Economic Journal* 32(127): 290–304.
- Ilzetzki, Ethan, Carmen M. Reinhart, and Kenneth S. Rogoff. 2019. Exchange arrangements entering the twenty-first century: which anchor will hold? *The Quarterly Journal of Economics* 134(2): 599–646.
- Ilzetzki, Ethan, Carmen M. Reinhart and Kenneth S. Rogoff. 2020. Will the secular decline in exchange rate and inflation volatility survive covid-19?, Working Paper 28108, NBER.
- Ilzetzki, Ethan, Carmen M. Reinhart and Kenneth S. Rogoff. 2023. Exchange rate volatility and monetary policy, VoxEU.
- IMF. 2003. Integrated policy framework—principles for the use of foreign exchange intervention, strategy, policy and review department.
- Keynes, J. Maynard. 1936. *The general theory of employment interest and money*. London: Palgrave Macmillan.
- Kydland, Finn E., and Edward C. Prescott. 1977. Rules rather than discretion: The inconsistency of optimal plans. *Journal of Political Economy* 85(3): 473–492.
- Krugman, Paul. 1989. The case for stabilizing exchange rates. *Oxford Review of Economic Policy* 5(3): 61–72.
- Krugman, Paul. 1991. Target zones and exchange rate dynamics. *The Quarterly Journal of Economics* 106(3): 669–682.
- Kugler, Peter, and Tobias Straumann. 2020. International monetary regimes: The bretton woods system. *Handbook of the History of Money and Currency*. https://doi.org/10.1007/978-981-13-0596-2_25.
- Levy-Yeyati, Eduardo, and Federico Sturzenegger. 2005. Classifying exchange rate regimes: Deeds versus words. *European Economic Review* 49(6): 1603–1635.
- Lucas, Robert. 1976. Econometric policy evaluation: A critique. *Carnegie-Rochester Conference Series on Public Policy* 1: 19–46.
- Maronoti, Bafundi. 2002. Revisiting the international role of the dollar, *Quarterly Review*, BIS.
- Mauro, Paolo, Nathan Sussman, and Yishay Yafeh. 2006. *Emerging Markets and Financial Globalization: Sovereign Bond Spreads in 1870–1913 and Today*. Oxford University Press.



Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.