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Macroeconomic challenges and the resilience of emerging market economies in the 21st century

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ADB Working Paper Series

**MACROECONOMIC CHALLENGES
AND THE RESILIENCE OF EMERGING
MARKET ECONOMIES IN THE 21ST
CENTURY**

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Abstract

A growing share of emerging markets (EMs) uses hybrid versions of inflation targeting that differ from the IT regimes of the OECD countries. Real exchange rate and international reserve changes affect the policy interest rates in commodity countries, aiming to stabilize their real exchange rate in the presence of volatile terms of trade and heightened exposure to capital inflow/outflow shocks. Inflation targeting works well with independent central banks, yet fiscal dominance concerns may hinder the efficacy and independency of central banks. This suggests experimenting with the integration of monetary rules and fiscal rules, possibly linking these rules with the operations of buffers like international reserves and sovereign wealth funds (SWFs). The global financial crisis validated the benefits of countercyclical management of international reserves and SWFs in reducing the volatility of real exchange rates. Macroprudential policies may complement or even substitute buffer policies by reducing a country's balance sheet exposure to foreign currency debt, mitigating the risk of costly sudden stops and capital flight. A growing share of EMs is experiencing exposure to new financial technologies (fintech), providing cheaper and faster financial services and extending financial coverage to previously under-served populations. Deeper fintech diffusion may redirect financial intermediation from regulated banks to emerging fintech shadow banks, some of which may have a global reach. These developments, and the diffusion of cryptocurrencies promising anonymized payment systems, may hinder the effectiveness of monetary policy and eventually induce greater financial instability. States may encourage the diffusion of efficient financial intermediation in ways that benefit users while restricting the use of anonymized exchange and global monies to reduce the threat of a shrinking tax base and to maintain financial stability.

Keywords: resilience, inflation targeting, fintech, financial stability and regulations

JEL Classification: F2, F3, F4, F6

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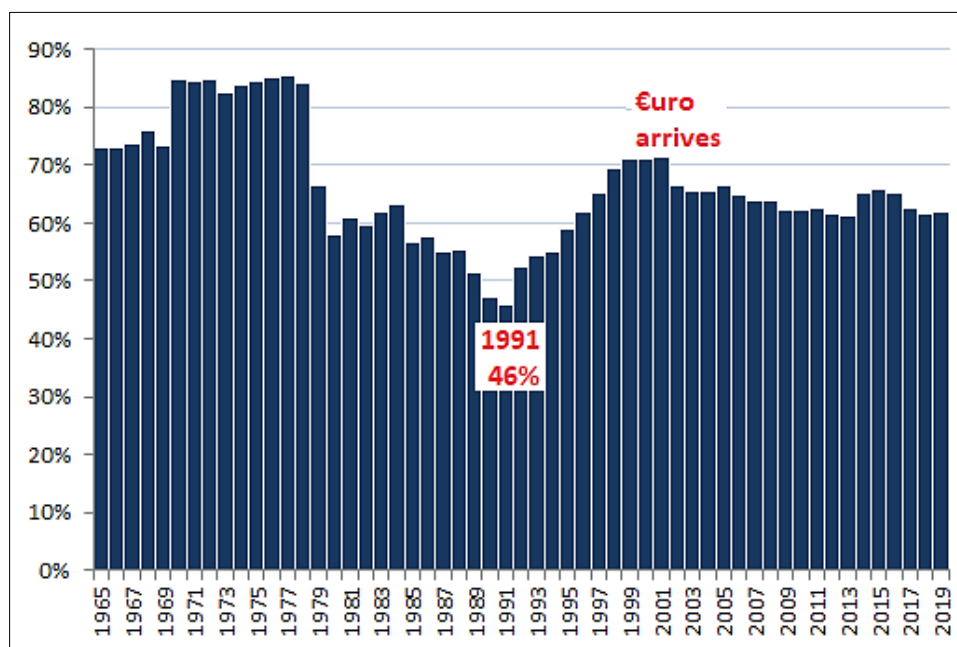
1. OVERVIEW AND SUMMARY

This paper takes stock of the recent challenges facing emerging market economies in the post-global financial crisis (GFC) environment. The confluence of four key developments shaped the pre-GFC environment.

First, financial globalization and deregulation, a process that started in the late 1970s in the OECD countries and continued in the emerging markets in the 1990s–2000s, transformed the global financial system into a complex cobweb of global networks, exposing countries to financial shocks that volatile bursts of capital inflows and outflows of “hot money” transmitted.

Second, despite the emergence of the eurozone and the People’s Republic of China (PRC) as large hubs of economic activity approaching the real size of the United States (US), the US dollar has retained and even increased its global financial dominance. Somehow paradoxically, a crisis that started in the US in 2007–2008 ended up solidifying and even deepening the global dominance of the US dollar. Remarkably, as the global real GDP share of emerging market economies approached half (adjusted for PPP issues) and the US global share declined to a fifth and below, the US dollar’s global financial importance approached two-thirds in 2019.¹ Figure 1 reports the US dollar share of official reserves, showing vividly the drop following the end of the Bretton Woods system from about 85% in the early 1970s to about 46% in 1991, then reversing, reaching about 70% at the creation of the eurozone, 1999, and then gently sliding to 62% by 2019.

Figure 1: US\$ Share of Global International Reserves

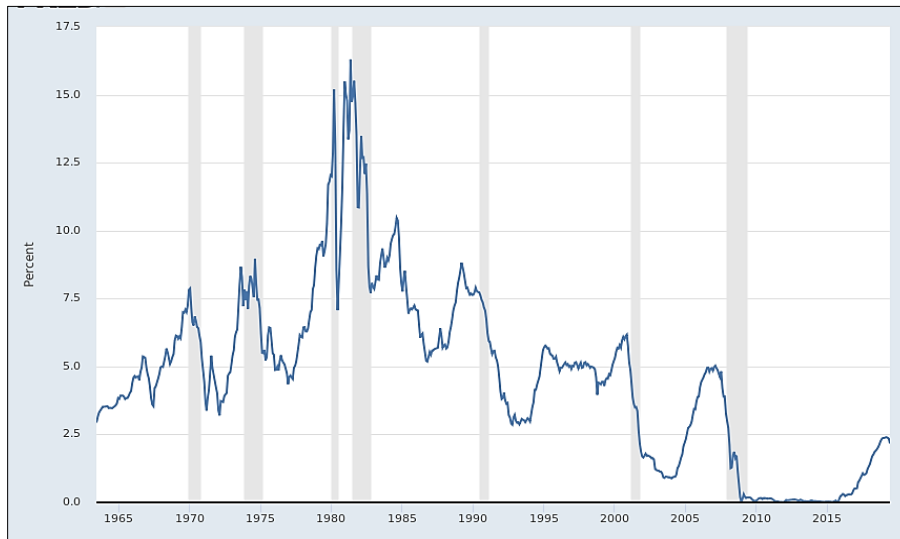


Source: IMF WOLFSTREET.com.

¹ Countries making up 70% of the global GDP use the US dollar as an anchor currency, and about half of global trade is invoiced in dollars. As of March 2018, 73.5% of the international credit to nonresidents was US dollar denominated, followed by 24% that was euro dominated (sources: *BIS Quarterly Review*, September 2018; Carney 2019).

Third, the quantitative easing (QE) policies that the global financial crisis (GFC) and the euro crisis pushed the nominal policy interest rate of most OECD countries toward the zero lower bound and some below zero. In tandem, the “risk-free” real interest rate maintained its secular trend toward zero and below. This trend started in the mid-1980s, and the 3-month interest rate in the US and Germany during the period 2009–2019 exemplifies it well (Figures 2a and 2b). In 2019, more than one-fourth of global bonds offered a negative yield (Figure 2c). These developments induced spells of “search for yield,” exposing the emerging market economies to large and volatile financial flows and later increasing the OECD demand for local currency debt in most emerging markets as well as emerging market economies’ (EMs’) application of macroprudential tools, aiming for greater financial stability.

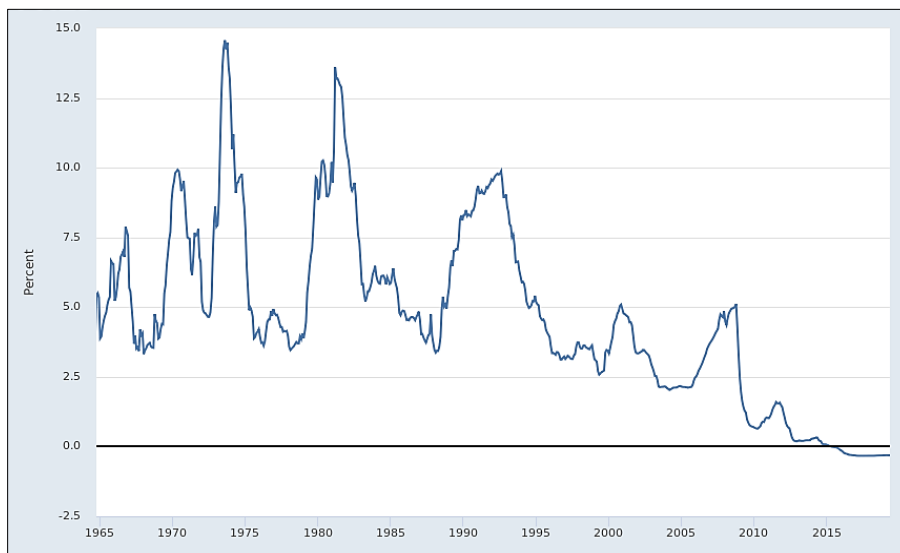
Figure 2a: 3-Month US T Bills



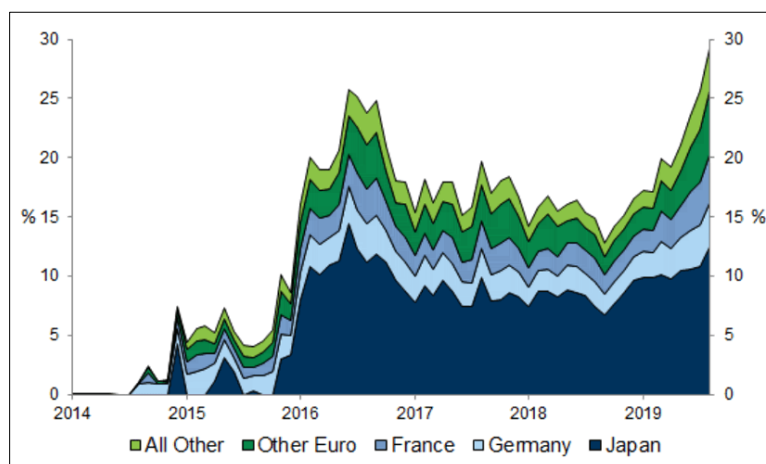
Note: Shaded areas indicate U.S. recessions.

Source: Board of Governors of the Federal Reserve System (US).

Figure 2b: 90-Day Rates for Germany



Source: Organization for Economic Co-operation and Development.

Figure 2c: Global Share of Negative Yielding Debt

Source: Bloomberg, Goldman Sachs Global Investment Research.

Finally, the acceleration of financial innovations' integration with the information technology revolution (fintech) and the growing globalization of finance imposed new and escalating challenges for regulators aiming to secure financial stability and fight the black and informal economy.

These developments validated the importance of the precautionary policies that emerging markets adopted after the wave of sudden stop crises in the 1990s but also brought new policies to the fore and increased emerging markets' will to experiment with new defensive measures. Below is a summary of the main points that the paper advances:

- I. Emerging markets increased the use of inflation targeting (IT), a regime that has shown its resilience over the past 20 years. By 2018, 23 countries used IT de jure, of which 18 had adopted it by 2002. About half of these countries are emerging markets. With the ECB, the number of countries living with currency following the IT regime is much larger. In addition, a growing number of countries are de facto following a hybrid version of inflation targeting. A significant share of emerging markets under IT, dominated by commodity countries, adjust the policy interest rate as part of a broader policy of IT and real exchange rate management. Under these circumstances, real exchange rate and international reserve (IR) changes also affect the policy interest rate.
- II. Inflation targeting works well with independent central banks, yet fiscal dominance concerns may hinder the efficacy of central banks. This suggests experimenting with the integration of monetary rules—like IT—with fiscal rules, possibly linking these rules with the operations of buffers like IRs and sovereign wealth funds (SWFs). The GFC validated the benefits of counter-cyclical management of IRs and SWFs in the context of stabilizing the real exchange rate. Buffer policies may also benefit from applying macroprudential regulations that aim to manage the balance sheet exposure of the financial system to foreign currency debt and the risk of sudden stops and capital flights.
- III. A growing share of EMs are experimenting with the application of financial technologies (fintech) as part of their adaptation to the information technology revolution. The growing fintech diffusion is profoundly changing the use of cash and transfer payments and the nature of financial intermediation. Fintech's major impact has been the massive scaling up and consolidation of financial

- services, approaching the “winner takes (almost) all” syndrome. In principle, national borders do not bound the scaling dynamics associated with fintech. Nevertheless, the nation states may, at a cost, limit this scaling.
- IV. The fintech revolution imposes growing pressure on traditional banks, providing consumers with the promise of cheaper and faster financial services. However, these developments may also hinder the effectiveness of monetary policy and reduce the tax base. Finding the proper regulatory response to fintech’s impact on monetary policy transmission and on the tax base is work in progress. While a nation state may focus on retaining control of its financial stability and tax base, the fintech sector is mostly aiming for rent maximization, overlooking possible adverse externalities associated with its activities. Thereby, we may witness an accelerated arms race between the state and the fintech sector.
 - V. An example of these forces is the advance of cryptocurrencies, promising anonymized financial intermediation. In contrast to the success of inflation-targeting regimes, there is no feasible path toward stability for a decentralized currency. This instability reflects *the tragedy of the commons* associated with cryptocurrencies—the public good aspect of stable valuation conflicts with the possible interests of “whales” (the large holders of the currency that may benefit from endogenous volatility). The chances are that most nation states will aim to contain these activities to a small-scale niche of finance. The nation state may ignore niche financial innovations but will regulate or even “nationalize” them once their size and instability become a systemic threat. Thereby, efficient scalability of a successful decentralized currency will survive as long as the private sector coordinates its policies with the nation state. States may opt to follow a dual goal of encouraging the diffusion of efficient financial intermediation in ways that benefit consumers and simultaneously augment the government’s control while restricting anonymized exchange and global monies in ways that minimize the threat of a shrinking tax base and the state’s ability to control financial intermediation.

2. EMERGING MARKETS IN THE PAST DECADES—A BRAVE NEW WORLD?

The short history of macroeconomics during the 21st century is a humbling experience to policy makers, scholars, and practitioners. Lucas summarized the buoyant assessment of the state of macroeconomics in his AEA address, *Macroeconomic Priorities*, in 2003: “Macroeconomics in this original sense has succeeded: Its central problem of depression prevention has been solved, for all practical purposes, and has in fact been solved for many decades. ... The potential gains from improved stabilization policies are on the order of hundredths of a percent of consumption.”

At the dawn of the 21st century, a growing share of economists credited the US Federal Reserve (the Fed) with contributing to the “Great Moderation” associated with the large decline in the volatility of key macroeconomic indicators and lower risk premia. The Great Moderation period mostly overlapped the tenure of Alan Greenspan, who headed the Fed from 1987 to 2006. His views gained prominence and captured well the zeitgeist of the late 1990s and early 2000s—growing optimism about the stabilizing effect of market forces and the ability of the US Federal Reserve to deal with adverse tail risk events, the importance of financial liberalization, and the view of regulations as cumbersome and ineffective: “As we move into a new century, the market-stabilizing private regulatory force should gradually displace many cumbersome,

increasingly ineffective government structures” (Alan Greenspan, Fed Chair, 12 April 1997). Governor Bernanke, the Fed Chair who replaced Chair Greenspan from 2006, attributed the Great Moderation to improved monetary policy in 2004, including the adaptation of the Taylor rule.²

Notable exceptions to these buoyant views included Shiller (2005), warning in the early 2000s that the bubbly dynamics had migrated from the “dot com” technology sector in the late 1990s to the housing market. Rajan (2005) asserted that growing endogenous exposure to under-valued tail risk developments in the financial sector led to an expansion of its ability to spread risks, thereby creating much greater access to finance for firms and households. He attributed this to the emergence of a whole range of intermediaries (“shadow banking”), the size and appetite for risk of which may expand over the business cycle. These intermediaries can also leave themselves exposed to certain small probability risks that their own collective behavior makes more likely. Applying principle–agent arguments and distance-from-default analysis, he attributed these trends to the financial liberalization and banking deregulation processes that took off from the 1980s, concluding that the US economy became more exposed to financial-sector-induced turmoil than in the past.

The GFC validated Rajan’s (2005) conjectures, challenging Greenspan’s assertion that bubbles are impossible to detect *ex ante*, easier to clean *ex-post*.³ Specifically, Jordà et al. (2015) concluded that history has shown that not all bubbles are alike. Some have enormous costs for the economy, while others blow over. They also demonstrated that what makes some bubbles more dangerous than others is credit. When credit booms fuel asset price bubbles, they increase financial crisis risks; upon collapse, deeper recessions and slower recoveries tend to follow them. Credit-financed housing price bubbles have emerged as a particularly dangerous phenomenon. They also showed that runaway credit growth increases the odds of reaching the zone of costly financial instability. The global financial crisis, 2007–2009, and the subsequent euro crisis, 2010–2013, were watershed events, shifting the policy and research focus in the search for strategies that fit better the era of heightened volatility and interest rates approaching the zero boundary and the growing threat of secular stagnation. The outcome has been a richer application of principal–agent, asymmetric information, behavioral, and other approaches.⁴ In this paper, we focus selectively on the current debates dealing with recent developments, occasionally in the context of these past macro contributions.

² “The finding that monetary policymakers violated the Taylor principle during the 1970s but satisfied the principle in the past two decades would be consistent with a reduced incidence of destabilizing expectational shocks.” ... “The Great Moderation, the substantial decline in macroeconomic volatility over the past twenty years, is a striking economic development. ... I have argued today that improved monetary policy has likely made an important contribution not only to the reduced volatility of inflation (which is not particularly controversial) but to the reduced volatility of output as well” (Governor Bernanke, the meetings of the Eastern Economic Association, Washington, DC, 20 February 2004).

³ “It was very difficult to definitively identify a bubble until after the fact—that is, when its bursting confirmed its existence. Moreover, it was far from obvious that bubbles, even if identified early, could be preempted short of the central bank inducing a substantial contraction in economic activity—the very outcome we would be seeking to avoid” Greenspan (2002).

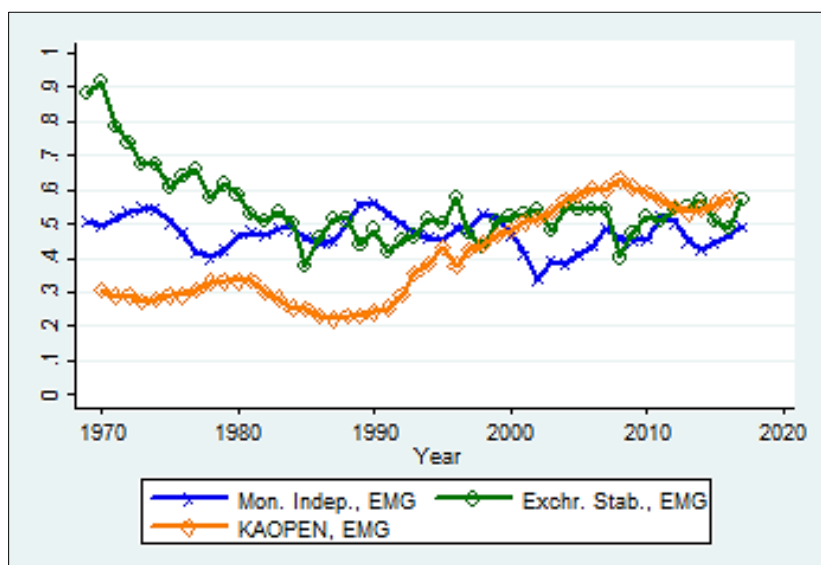
⁴ Stiglitz and Tirole were among the earlier contributors in this domain, although policy makers in the late 1990s and early 2000s mostly overlooked them. There has also been growing recognition of the need to refresh past macro paradigms, including Mundell–Fleming’s trilemma, Triffin’s paradox, the zero lower boundary challenges, the paradox of thrift, the redundancy problem (aka the $n - 1$ problem), the inequality of the number of policy instruments and the number of targets at the international level, which Mundell (1969) suggested, an example of Tinbergen’s (1952) analysis of targets and instruments, and other mostly overlooked concepts.

3. EMERGING MARKETS' TRILEMMA CHOICES: FROM FIXED EXCHANGE RATE AND FINANCIAL AUTARKY TO INFLATION TARGETING AND MANAGED FINANCIAL INTEGRATION, BUFFERED BY RESERVE AND MACROPRUDENTIAL REGULATIONS

The 1960s and 1970s induced profound changes: the collapse of the Bretton Woods (BW) regime reflected the recovery of Western Europe from World War II and the search for a global order that fit the aspirations of the core of Europe better. The greater exchange rate flexibility of key currencies and the acceleration of financial liberalization put new forces in motion. The remarkable recovery of Japan after World War II provided a vivid example of export-led economic takeoff, a process that, with a lag, inspired the takeoff of the Republic of Korea, the PRC, and more than a dozen other countries forming the block of emerging markets (EMs). Within 50 years, the EMs became the hub of global growth, increasing their global GDP share toward half and above (adjusted by purchasing power considerations). Remarkably, in the early 1990s, the EMs opted to embrace greater financial integration, a trend that Mexico, in the aftermath of the NAFTA agreement, as well as the Republic of Korea, Thailand, and others illustrate. This came at the end of the lost decade of the 1980s, a time when most EMs experienced exposure to the debt overhang crises that excessive borrowing in the 1970s generated, funded by recycling the petro-dollar that the quadrupling of the price of oil generated in the early 1970s. The renewed hard currency borrowing of EMs in the early 1990s, still mostly operating under a fixed exchange rate, promoted a brief “honeymoon” with upbeat assessments of Mexico, the Republic of Korea, and other EMs. These developments, however, set the stage for new types of banking and balance of payment crises.

Mexico's history illustrated the hazard of EMs' attempts to keep pegging their currency at times of greater financial integration while maintaining a proactive monetary policy. Simply put, this configuration contradicted the Mundell–Fleming trilemma, putting in motion forces that induced the fully blown Tequila Crisis of December 1994. Intriguingly, Mexico adopted a flexible exchange rate regime after the crisis while increasing its financial integration over time. The crisis also came at a time when people viewed the choice of deeper financial integration as a way to encourage the continuation of FDI inflows into Mexico that the NAFTA triggered, viewing this trend as the key to Mexico's future. The Mexican crisis of 1994 turned out to be the first in a wave of more than a dozen similar crises, the most notable being the East Asian, the Russian, and the Brazilian crises during the second half of the 1990s (see Eichengreen 2019b).

A common script of the dynamics leading to these crises was greater external borrowing in hard currencies that greater financial integration induced, an economic boom inducing real exchange rate appreciation, and current account deterioration pressures. Incipient capital flight that concerns about dwindling international reserves triggered frequently terminated the ensuing economic boom within several years. Calvo (1988) dubbed these crises “sudden stop crises,” in which the sudden stopping of external funding induces exchange rate, balance of payment, and banking crises. Most of the affected countries followed a similar adjustment, moving over time toward the middle ground of the Mundell–Fleming trilemma: controlled exchange rate flexibility, growing but controlled financial openness, and viable though limited monetary independence, which hoarding and managing growing buffers of international reserves supported (Figure 3).

Figure 3: EMs' Convergence to the Trilemma Middle Ground

Sources: http://web.pdx.edu/~ito/trilemma_indexes.htm; see the overview in Aizenman (2019b).

This trend also reflected the recognition that flexible exchange rates among key global currencies in the post-BW world (USD, DM, BP, YEN) expose EMs to greater implicit exchange rate flexibility, as pegging to one of these currencies implies floating against the others. The sudden stop crises also induced precautionary hoarding of international reserves, and EM economies tripled their international reserves/GDP in a decade, from about 8% in the early 1990s to about 30% in the early 2000s (Aizenman and Lee 2007). This trend was much more pronounced in countries in East Asia with a high saving rate, which “precautionary motives” aimed at reducing the probability and the damage of sudden stop crises induced. Arguably, some of this trend also reflected “mercantilism”—the proactive policy of delaying the real appreciation associated with a successful manufacturing export-led growth strategy, which the PRC exemplifies. Observers also noted the possibility of affected countries carrying out competitive hoarding, aiming to protect market shares, and “keeping up with the Joneses” dynamics (Cheung and Qian 2009). The empirical research that Aizenman (2019b) overviewed validated the emergence of a continuous version of the trilemma, in which most emerging markets converged to the middle ground of the trilemma. However, it modified the original trilemma in several other important ways.

First, financial stability was added as a key policy goal, morphing the trilemma into a possible quadrilemma. While financial stability was an implicit goal during the Bretton Woods system, the tight controls of capital flows (mostly prohibited, with few exceptions needing the state’s approval) implied limited exposure to financial fragility due to external factors. The overall tight regulation of banks, an outcome of the Great Depression era, limited domestic banks’ leverage and risk taking, taming exposure to domestic financial fragility. The sudden stop crises of the 1990s vividly illustrated the cost of greater financial integration and hard currency external borrowing in the form of growing susceptibility to capital flight crises associated with real depreciations, inducing sharp increases in the real cost of serving the external, hard-currency debt, destabilizing the domestic banking system, and inducing occasional costly sovereign defaults, banking crises, and restructuring.

Second, the increasing global share of the GDP coming from the eurozone and EMs, along with the global financial crisis of 2007–2009 and the subsequent eurozone

crisis, led to the paradoxical trend of increasing the global role of the US dollar as the dominant currency for invoicing international trade, supplying about two-thirds of international reserves and the deepest and most liquid market of “safe assets,” all at a time when the global GDP share of the US declined and reached parity with that of the eurozone and the PRC (adjustment by PPP). These developments and the GFC led Rey (2013) to conjecture that the trilemma had morphed into a dilemma over the past decades. Specifically, independently of exchange rate regime choices, countries adopting open capital markets experience exposure to the global financial cycle, a cycle that US monetary and financial policies dominate, substantially weakening their monetary independence. The only effective way to regain monetary independence in Rey’s dilemma world is to shut down financial integration, control private flows heavily, and prohibit flows that countries deem to be too destabilizing.

The ongoing debate propagated by the dilemma conjecture outlined several challenges to Rey’s view. While the financial importance of the US dollar and US monetary policies increased, exchange rate regimes still mattered in the presence of balance sheet exposure associated with external borrowing in hard currency. With proper management of financial policies, exchange rate flexibility provides greater monetary autonomy at the margin, though the GFC and the changing conduct of monetary policies amidst the challenges of QE and policy interest rates approaching the zero lower bound have affected the actual trilemma trade-offs, thereby increasing the global importance of the US financial and real cycles. Taking this perspective, Aizenman, Chinn, and Ito (2016) investigated how the movements in the central economies—the US, Japan, the eurozone, and the PRC—affect the trilemma choices and financial conditions of developing and EM countries (dubbed peripheral countries). In the 2000s–2010s, the strength of the links with the central economies were the dominant factor. The movements of the policy interest rate also appear to have been sensitive to global financial shocks around the EM crises of the late 1990s and since the 2008 GFC. Research has found that the exchange rate regime and financial openness have a direct influence on the sensitivity to the central economies. The weights of major currencies, external debt, and currency debt compositions are significant factors.⁵

Klein and Shambaugh’s (2015) insightful analysis concerned whether partial capital controls and limited exchange rate flexibility allow for full monetary policy autonomy. They found that partial capital controls do not generally allow for greater monetary control than open capital accounts unless the capital controls are quite extensive. However, a moderate amount of exchange rate flexibility does allow for some degree of monetary autonomy, especially in emerging and developing economies. Empirically, they observed that, while some countries have long-standing, pervasive capital controls, a substantial subset of countries uses limited controls on an episodic basis.⁶ In this context, Obstfeld, Ostry, and Qureshi (2019) found that countries with fixed exchange rate regimes are more likely to experience financial vulnerabilities—faster domestic credit and house price growth and increases in bank leverage—than those with relatively flexible regimes. The transmission of global financial shocks is likewise magnified under fixed exchange rate

⁵ More specifically, having a greater weight on the dollar (or the euro) makes the response of financial variables more sensitive to a change in key variables in the US (or the euro area, respectively), such as policy interest rates, exchange rate market pressure, and the real exchange rate. Thus, the degree of exchange rate flexibility continues to affect the sensitivity of developing countries to policy changes and shocks in the central economies.

⁶ Their results are in line with Klein (2012), who classified the capital control of these regimes into “walls” and “gates,” respectively, and showed that walls are more effective than gates in limiting asset price booms and swings in the value of the real exchange rate. In addition, in any given year, there is a wide scope for employing capital controls, generating an extensive middle ground between open and closed capital markets.

regimes relative to more flexible (though not necessarily fully flexible) regimes. The authors attributed this to both reduced monetary policy autonomy and greater sensitivity of capital flows to changes in global conditions under fixed rate regimes.

Among the important developments influencing the conducting of monetary policy has been the emergence of inflation targeting (IT) as the new paradigm of monetary policy. The curious history of IT dates back to New Zealand (NZ) in the early 1990s, which Archer (2000) reviewed. The emerging IT regime in NZ is based on four pillars: the inflation rate as the medium-term objective for monetary policy; the use of a tightly specified inflation target to implement the medium-term objective; a clear institutional structure and typically an independent CB; and heavy reliance on transparency to support the IT arrangement. By 2019, 23 countries have de jure adopted IT, of which 18 had adopted it by 2002. More than half of the IT countries are emerging (or ex-emerging) market economies. With the ECB following a rule akin to IT, the number of countries living under a de jure regime is approaching 40.⁷ The IT regime gained momentum in tandem with the growing popularity and adoption of the Taylor Rule.⁸

This remarkable yet short history of IT led Rose (2007) to publish “A Stable International Monetary System Emerges: Inflation Targeting is Bretton Woods, Reversed.” According to this, “A stable international monetary system has emerged since the early 1990s. A large number of industrial and a growing number of developing countries now have domestic inflation targets administered by independent and transparent central banks. These countries place few restrictions on capital mobility and allow their exchange rates to float. The domestic focus of monetary policy in these countries does not have any obvious international cost. Inflation targeters have lower exchange rate volatility and less frequent ‘sudden stops’ of capital flows than similar countries that do not target inflation. Inflation targeting countries also do not have current accounts or international reserves that look different from other countries. This system was not planned and does not rely on international coordination. There is no role for a center country, the IMF, or gold. It is durable; in contrast to other monetary regimes, no country has been forced to abandon an inflation-targeting regime. Succinctly, it is the diametric opposite of the post-war system; Bretton Woods, reversed.”

This characterization of the successful diffusion of inflation targeting was an insightful snapshot of the state of IT prior to the GFC. Nevertheless, IT is not a panacea, and the GFC triggered a debate about the effectiveness and desirability of IT of the Taylor Rule type. Critiques noted that a growing share of OECD countries, including the US, Japan, and the eurozone, are undershooting their targets. This observation, and the collapse of the US policy interest rate toward zero and into the negative domain across several European countries in the aftermath of the GFC, led to the concern that IT may be too conservative a rule, overlooking the challenges associated with debt deflation and zero boundary concerns. Specifically, Blanchard, Dell’Ariccia, and Mauro (2010) advocated that central banks should announce a higher inflation target, around 4% or 5%, raising the possibility of increasing the target in turbulent times and considering alternative rules

⁷ The euro “The primary objective of the ECB’s monetary policy is to maintain price stability. The ECB aims at inflation rates of below, but close to, 2% over the medium term.” <https://www.ecb.europa.eu/mopo/html/index.en.html>.

⁸ Taylor’s rule was estimated for the Paul Volcker disinflation, 1984–1992 [Taylor (1993)], as a linear policy rule adjusting the policy interest rate to the evolving inflation gap and the output gap. A key result of the calibration is that the semi elasticity of the policy interest rate with respect to inflation shock is about 1.5, significantly above 1 (i.e., the way to deal with an inflationary shock is to increase the real interest rate by about half of the inflationary shock).

like price-level targeting that will compensate periods of inflation below the target with periods of tolerating the overshooting of the target, as well as other ideas.⁹

Another concern has been that, in the aftermath of the GFC, a growing share of central banks are losing their independence. Furthermore, some of the de jure IT countries follow policies that differ sharply from the original “four pillars” NZ variety to a degree that the targeted inflation is losing its credibility and relevance, as the country approaches the “collapsing regime” syndrome. Examples of this trend include the recent history of Turkey and Argentina. The case of Turkey illustrates vividly the hazard of losing CB independence and the de-anchoring of inflation that may follow fiscal dominance.¹⁰ To recall, the distinction between fiscal and monetary dominance regimes is due to Sargent and Wallace (1981). If the government adjusts the primary deficit to limit debt accumulation, it does not force the central bank to inflate away the debt, allowing the central bank to focus on inflation targeting, in line with monetary dominance. Long periods of large fiscal deficits and high public debt-to-GDP ratios have raised concerns over growing fiscal dominance by heightening the links between fiscal policy, monetary policy, and government debt management. This may be the case when higher policy interest rates or depreciating currencies raise concerns about debt sustainability, limiting monetary independence. Possible manifestations of these concerns include the “fear of floating,” fiscal pressure to mitigate rises of policy interest rates, financial repression, and the like. The fiscal dominance argument may apply to both hard currency public and private debt (Ahmed, Aizenman, and Jinjark 2019).¹¹ In the case of large private debt exposure, stabilizing the real exchange rate through large sales of international reserves (IRs) that are necessary to fund the servicing of the private debt may prevent a banking and financial crisis, a crisis that may induce the socialization of private losses, as was the case in Ireland and Spain during the eurozone crisis.

Countries facing large net hard-currency external debt face an open economy version of fiscal dominance in the form “fear of floating” (Calvo and Reinhart 2002). Specifically, real exchange rate depreciation increases the costs of serving their external debt by the external debt/GDP times the depreciation rate (the cost measured as a fraction of the country’s GDP). Under these circumstances, the central bank may put greater weight on stabilizing the real exchange rate to reduce the cost of serving the external debt and may limit the increase in the policy interest rate, hoping to delay a recession and adjustment. While this “gambling for resurrection” policy may provide some policy space in the short run, it may backfire over time.

In principle, the successful management of IRs and the exchange rate in the context of large debt overhang is possible as long as the CB is committed to following the necessary counter-cyclical buffers and regulatory policy consistently over the business cycle. For example, consider the Central Bank of Russia’s (CBR) management of its commodity-intensive economy during the period 2000–2019. The CBR hoarded large portions of the hard-currency oil revenue when the Russian Federation’s terms of trade improved during

⁹ See Frankel (2012).

¹⁰ As of August 2019, the Turkish CB stated a target of 5% from 2012. It missed this target significantly, and inflation accelerated non-linearly from 10% in 2012 to 20% in 2018. See <http://www.tcmb.gov.tr/wps/wcm/connect/EN/TCMB+EN/Main+Menu/Core+Functions/Monetary+Policy/PRICE+STABILITY+AND+INFLATION/Inflation+Targets>.

¹¹ Ahmed, Aizenman, and Jinjark (2019) reported that in EMs under non-IT regimes, composed mostly of exchange rate targeters, the interest rate effect of higher public debt is non-linear and depends both on the ratio of foreign currency to total public debt and on the ratio of hard-currency debt to GDP. For these EMs under non-IT regimes, real exchange rate depreciation and international reserve accumulation are significantly associated with higher interest rates. EMs with high commodity exposure show the most persuasive evidence of debt levels influencing policy interest rates.

the oil price rise prior to the GFC from about \$40/barrel in 2000 to about \$140/barrel in 2008. It used about one-third of these reserves to stabilize the real exchange rate when the price of oil subsequently collapsed. This policy of hoarding reserves for stormy days and selling reserves at times of collapsing oil revenue mitigated the Russian real exchange rate's appreciation at times of rising oil prices and probably prevented a full-blown banking and financial crisis in the Russian Federation following the drop in oil prices (Aizenman, Jinjark, and Zheng 2019).

Arguably, the successful international reserve buffer management of the Russian Federation during the period 2000–2019 is a second-best policy. The first-best policy may include macroprudential regulations and possibly external borrowing taxes scaling down the balance sheet exposure of the Russian Federation by raising the costs of borrowing in good times. Proper application of these policies may reduce the need for large-scale hoarding to support the bailouts of systemic borrowers in bad times (Rodrik 2006). Political economy considerations suggest that the Russian central bank, probably operating with limited ability to impose macroprudential regulations on powerful insiders, saved the Russian Federation in the 2000s–2010s from a much costlier exposure to sudden stops of the 1998 Russian crisis variety. In contrast, Turkey in the 2010s did not adopt a systematic buffering policy, to its own peril. See Kalemli-Özcan (2019) for a critical assessment of EMs' capacity to deal with the international spillover effects of US policies and Alfaro, Kalemli-Özcan, and Volosovych (2008) for the key importance of the quality of institutions in stabilizing the patterns of capital flows and the credibility of implementing desirable macroprudential policies.

Asian countries have made significant use of macroprudential tools, especially housing-related measures. Zhang and Zoli (2016) found that housing-related macroprudential policies, particularly loan-to-value ratio caps and housing tax measures, have helped to curb housing price growth, credit growth, and bank leverage in Asia.¹² Aizenman, Jinjark, and Zheng (2019) found that, although house price appreciation is positively associated with output growth, house price depreciation may either undermine or stimulate growth, depending on the depth of correction and the market environment. Large house price depreciation is associated with strong recovery in growth in the absence of banking crises, and this association is stronger in countries with a relatively weak safety net.¹³ Thereby, regulations reducing the risk of banking crises during periodic corrections of the real estate market are associated, on average, with a higher and more stable growth rate. Macroprudential policies also mitigated the growing balance sheet exposures associated with more volatile flows of “hot money” in the aftermath of the GFC (Korinek 2011; Shin 2011; Ostry 2012; Cerutti, Claessens, and Laeven 2017).¹⁴

¹² Research has reported similar results in other regions (Vandenbussche, Vogel, and Detragiache 2015).

¹³ These results are consistent with the conjecture that delaying adjustment to large valuation losses induces deeper and more prolonged stagnation. Faster realization of losses combined with income support that deals with poverty mitigation may be superior to adjustment delays. The legal system and personal bankruptcy laws and the prevalence of mortgage insurance also affect the association between house price depreciation and economic growth.

¹⁴ Aizenman, Chinn, and Ito (2020) found that more extensive implementation of macroprudential policies would lead EMs to regain greater monetary independence from central economies (the US, the EZ, and Japan) when the central economies implement an expansionary monetary policy; when EMs run a current account deficit; when they hold lower levels of international reserves; when their financial markets are relatively closed; when they are experiencing an increase in net portfolio flows; and when they are experiencing credit expansion. Macroprudential policies negatively affect the interest rate connectivity between the central economies and the EMs especially in periods when the CEs implement an expansionary monetary policy. The results also suggest that macroprudential policies and IR holding are substitutes, in line with Rodrik (2006).

While the original inflation targeting and Taylor Rule ignored the real exchange rate as a policy goal in OECD countries, the research dealing with emerging market economies brought it to the fore (Aizenman, Hutchison, and Noy 2011; Berganza and Broto 2012; Ghosh, Ostry, and Chamon 2016; Ahmed, Aizenman, and Jinjark 2019). Indeed, it is possible to accomplish exchange rate targeting (aka exchange rate stabilization) by putting greater policy weight on stabilizing the real exchange rate, possibly through proactive management of sizable buffers of international reserves (IRs) and sovereign wealth funds (SWFs). Concerns about fiscal dominance led to the augmentation of IT rules with fiscal rules. Chile and Norway provide vivid examples of the possible benefits associated with such rules, helping to reduce the pro-cyclicality of the fiscal policy and providing greater fiscal and monetary spaces (Frankel, Vegh, and Vuletin 2014). Time will tell the degree to which other countries with more limited institutional capacities and policy stability will follow similar policies.

4. FINTECH DIFFUSION, FINANCIAL INTERMEDIATION, AND THE FUTURE ROLE OF CENTRAL BANKS AND REGULATORS—WORK IN PROGRESS OR REGRESS?

A growing share of emerging markets are experimenting with fintech innovations. The diffusion of fintech profoundly changes the use of cash and transfer payments and the nature of financial intermediation. Fintech may be especially attractive in emerging markets, as it allows countries with limited and inefficient banking services to leapfrog into the 21st century, utilizing the penetration of cell phone services in countries that limited phone line services historically constrained. The IMF WB report *Fintech: The Experience so Far*, in June 2019, described the benefits of financial inventions. The report's highlights included "Asia is ahead of other regions in many aspects of fintech. In China, the massive scale of its markets and a regulatory 'light touch' in the early years supported fintech development, with China emerging as a global leader. In India, large-scale adoption of mobile payments and an increase in money transfers have driven growth in mobile payments ... Sub-Saharan Africa is a global leader in mobile money innovation, adoption, and usage. The region leads the world in mobile money accounts per capita (both registered and active accounts), mobile money outlets, and volume of mobile money transactions. In Africa, close to 10 percent of GDP in transactions are occurring through mobile money, compared with just 7 percent of GDP in Asia and less than 2 percent of GDP in other regions. Across Africa, the adoption and use of technology in the provision of financial services is changing the way in which financial service providers operate and deliver products and services to their customers."

While some view the wave of fintech as the path to a brave new world, supplying cheaper and faster financial services, fintech also involves disruptive forces. Fintech's easier scalability has induced consolidation of financial services, approaching the "winner takes (almost) all" syndrome. In principle, national borders do not bound fintech scaling dynamics, yet nation states may, at a cost, limit this scaling. Deeper fintech diffusion may redirect financial intermediation from regulated banks to emerging fintech "shadow intermediaries," some of which may have a global reach. Fintech's disruptive power also leads to complex agency problems, whereby the growing market clout of fewer dominant suppliers aiming at profit maximization may increase social costs.

To put fintech's disruptive effects into the proper context, note that history is loaded with innovations with double-edged features. The diffusion of phone networks via costly

landlines during the 20th century induced powerful network externalities, leading to the emergence of “natural monopolies.”¹⁵ The benefits of fast and reliable communication that a few suppliers provided induced regulators to view phone companies as “utilities,” regulating their pricing and mergers and acquisitions. Oil and coal provide plentiful cheap energy but lead to environmental degradation, polluted air, and accelerated climate change. A common feature across these examples is that scalability frequently leads to externalities and requires proper policies to curb such forces that scalability unleashes.¹⁶ These concerns led Rajan and Zingales (2003) to warn about the gloomier side of under-regulated capitalism in *Saving Capitalism from the Capitalists*.¹⁷

Financial innovations provide growing benefits to underserved populations at low costs and with improving efficiency. However, the growing market clout of a few global giant suppliers of IT and fintech services may induce them to compromise privacy as part of their business model. The data that the suppliers of financial and commercial services relying on scalable IT services gather become a traded commodity.¹⁸ While the benefits of cheaper, faster financial services are frontloaded, the possible costs of diluting the existing regulatory capabilities of the nation state are lurking, increasing the exposure to more disruptive tail risks and financial instability (see Ragan 2005). The arrival of cryptocurrencies promising anonymized liquidity services further up the ante. Scalable cryptocurrencies may hinder the effectiveness of monetary policy, channeling financial intermediation into shadowy networks facilitating tax dodging. Finding the proper regulatory response to fintech’s impact on monetary policy transmission and on the tax base is work in progress.

While nation states have focused on financial stability and securing the tax base after the GFC, the fintech sector is mostly aiming for rent maximization, paying little regard to the possible adverse externalities associated with these activities. Thereby, we may witness an accelerated arms race between the state and the fintech sector. Putting this arms race into the public finance perspective, financial stability is a public good providing the infrastructure supporting faster growth. Financial innovators may overlook this public good aspect. Thus, an under-regulated fintech sector leads to moral hazard—financial instability increases the odds of costly financial crises. As the GFC illustrated, at a time

¹⁵ The percentage of housing units with telephones in the US in 1920 was 35%, reaching 78% in 1960 and 95% by 1990 (source: Federal Communications Commission).

¹⁶ With the bitcoin, the analogy of fintech’s social effects to energy’s pollution is by now a reality: in September 2019, the bitcoin’s capitalization was \$182 billion, about 0.2% of the global GDP, at times when managing bitcoin transactions consumed 0.3% of global electricity. This probably explained the Chinese authority declaration of April 2019, “Bitcoin is Wasteful Activity” (accessed September 2019. <https://www.wired.com/story/china-says-bitcoin-wasteful-wants-ban-mining/> and <https://thenextweb.com/hardfork/2019/09/07/satoshi-nakamoto-bitcoin-whale-moves-1b-worth-of-bitcoin-for-just-700-in-fees/>).

¹⁷ They noted that the capitalist economic order receives frequent praise for its efficiency, yet this efficiency holds as long as competitive forces dominate and powerful agents do not use their economic clout to bend the rules of the game in favor of their narrow benefits, inducing what some have dubbed “crony capitalism.” Under-regulated large corporations have no interest in the creation of a modern and flexible financial system with free entry of competitors, as that would provide opportunities for newcomers to challenge the incumbent dominance. Left to its own devices, a market that powerful corporations dominate is not self-regulated, and maintaining efficiency needs government regulation. This is not without risk either, as insider corporations have incentives to invest in capturing and keeping governments in their service, suppressing the market. Therefore, securing the full advantages of capitalism requires the right balance of regulations enacted by governments that are not following narrow corporate interests.

¹⁸ It may also open the door for predatory states to engage in “social engineering,” with big data providing real-time feedback, possibly in the form of a “social score” and the like.

of peril, even governments that championed “no bailouts” prior to the crisis socialize private-sector losses.¹⁹

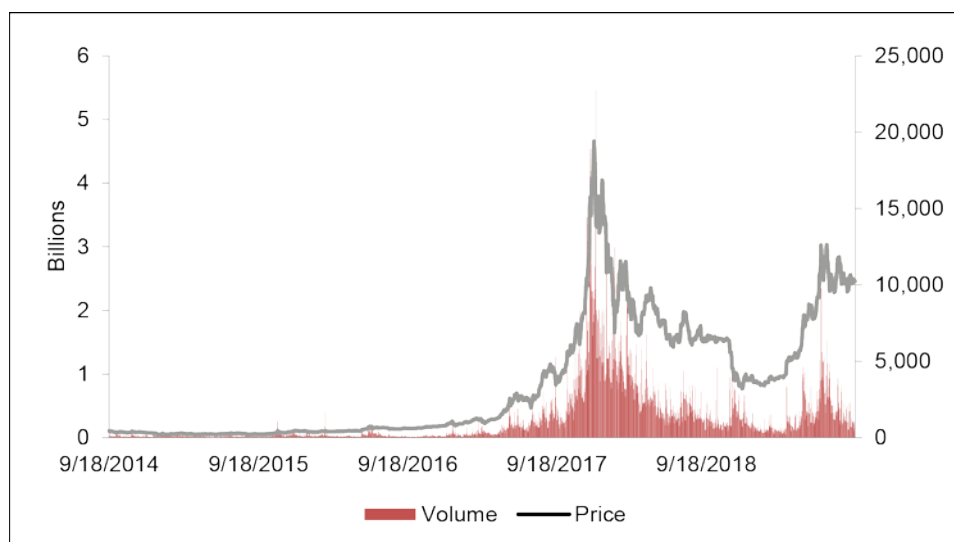
The growing number of cryptocurrencies illustrates the large private demand for anonymized, decentralized financial innovations. The history of cryptocurrencies dates back to the mission statement of the bitcoin, promising “Bitcoin: A Peer-to-Peer Electronic Cash System” (Nakamoto 2008).²⁰ With a short lag, this paper inspired growing trade in the “electronic cash” bitcoin. Figure 4 plots the volume and price history of the bitcoin. Notable are the high volatility and the positive co-movements of prices and volume. Other cryptocurrencies have similar features. This price volatility has intensified the debates about the stability problems of decentralized currencies.²¹ Believers have argued that smarter software managing future cryptocurrencies will solve these issues and that it is only a matter of time until a stable, decentralized currency emerges. Accordingly, inflation targeting has illustrated the viability of stable currency regimes.

However, an extrapolation from inflation targeting to the feasibility of a stable cryptocurrency suffers from the fallacy of composition. Due to a systemic coordination failure, akin to the tragedy of the commons, there is no feasible path toward a global central bank that would ensure the stability of a decentralized currency. The successful diffusion of inflation targeting has shown that a nation state has the ability to stabilize the purchasing power value of its currency in terms of the country’s price level. Competent and relatively independent central banks can achieve this. In 2019, IT countries produced most of the global GDP. In contrast, countries that have limited the independence of their central banks have found, with a lag, that their currencies have lost value. This increases the likelihood of capital flight, financial fragility, and banking crises. Under inflation targeting, the national central bank has clear ownership and the duty to stabilize the national currency, using the tools under its control. It can adjust the policy interest rate to keep inflation low, manage key monetary aggregates, and communicate the central bank’s policies.

¹⁹ The bailing out by ‘market-friendly governments’ is not an accident – the modern US more than quintupled the average Federal tax/GDP in comparison to the tax burden in the era of Free Banking (1837–1862) and National Banking (1938–1913). In exchange, the taxpayer expects the state to provide financial and economic stability, frequently punishing administrations that overlook the need to stabilize the economy at times of peril. This modern social contract is the outcome of evolutionary forces that induced the US to converge from the Free and National Banking eras and the absence of federal level regulations of the 19th^h century to the ‘New Deal’ era that emerged after the Great Depression. A key example of this evaluation is the formation of the FDIC 1933, Federal Deposit Insurance, “backed by the full faith and credit of the United States,” (i.e., backed by the tax payer), ultimately relegating to the Treasury and the Federal Reserve the task of securing financial stability.

²⁰ Specifically, “A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution. We propose a solution to the double-spending problem using a peer-to-peer network. The network timestamps transactions by hashing them into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work...”.

²¹ The analysis below expands and update the arguments outlined in Aizenman (2019a) VoxEu column. See also overview of these issues in Eichengreen (2019a), Roubini (2018), Cukierman (2019).

Figure 4: Bitcoin Daily Price (Right Axis, \$/BTC) and Volume (Left Axis, Billion \$)

Source: https://data.bitcoinity.org/markets/price_volume/5y/USD?r=day&t=.

In contrast, there is no clear central ownership and management of a decentralized cryptocurrency with the duty of keeping it stable and taking responsibility for it. Consequently, its valuation is unstable, as gaming among various stakeholders may lead to multiple equilibria, bubbles, and crashes. This instability reflects the tragedy of the commons associated with cryptocurrencies—the public good of stable valuation conflicts with the interests of anonymous large holders of the currency (“whales”) who can influence its value. Whales may benefit from the endogenous instability associated with exploiting their market influence (Gandal et al. 2018).²² Instability may also reflect the multiple equilibria associated with gaming decentralized cryptocurrencies (Biais et al. 2019). Their valuations experience exposure to the excessive optimism or pessimism of traders and possible market manipulation. Cryptocurrencies do not change the rules of finance and the agency problems that accompany financial intermediation. The anonymized nature of the exchange only magnifies these problems.

National currencies are, of course, exposed to similar speculative attacks, yet the clear allocation of duties to the central bank, and the Central Bank’s willingness to adopt policies for financial stability and stable currency valuation, provide the public good services associated with scalable safe currency. This is part of a complex system that may include deposit insurance schemes (akin to the FDIC), backstopped by the nation’s taxpayers. Again, there is no comparable allocation of duties and “property rights” in a decentralized currency. Therefore, one can expect relative instability to be the rule, not the exception. The combination of a decentralized currency and the anonymity associated with cryptocurrencies makes the use of stabilizing forces, as large players used during the era of “national banking” in the US, impossible. To recall, during the financial panic of 1907, J. P. Morgan pledged large sums of his own money and convinced other New York bankers to act accordingly to shore up the banking system. They operated as de facto lenders of last resort. The whales of that time clearly owned the rents associated with stable financial intermediation, so they chose to provide

²² On 6 September 2019, the top 10 bitcoin addresses accounted for 5.6% of the total supply, the top 100 14.7%, and the top 1000 34.6%. Accessed 8 September 2019. <https://thenextweb.com/hardfork/2019/09/07/satoshi-nakamoto-bitcoin-whale-moves-1b-worth-of-bitcoin-for-just-700-in-fees/>.

stabilization services as long as that would minimize their expected losses. The crisis of 1907 also illustrated the risks of private bailouts—the balance sheets of financial institutions constrained their credibility, and they required a leader who could convince other financial whales to join the bailout. Furthermore, private bailouts reflected the wish of whales to maximize their rents more than their concerns about households, small banks and firms, and national welfare. Indeed, the dynamics of the 1907 crisis led to the formation of the Federal Reserve System, which the Federal Reserve Act of 1913 created. In contrast to the bailout that J. P. Morgan coordinated, the anonymity of cryptocurrency holders means that there is a lack of agency and no stabilizing forces of the type that the 1907 private bailout exhibited.

It is no surprise that there is no clear path toward a global central bank with responsibility for the price stability of a decentralized currency. Among national central banks, there is reluctance to cooperate in normal times, as the mandate of each central bank prioritizes domestic goals that focus on domestic price stability and not on the global value of its currency. The observation that, in normal times, deeper macro cooperation among countries is associated with welfare gains akin to Harberger's second-order magnitude triangle, thus making the odds of cooperation low, compounds this coordination failure. When bad tail events induce imminent threats of financial collapse, the perceived losses have a first-order magnitude of terminating the total Marshallian surpluses. The apprehension of these losses in perilous times may elicit rare and beneficial macro cooperation (Aizenman 2016). In contrast, the anonymity of cryptocurrency owners may magnify the volatility, as there is no reason to expect the cryptocurrency's whales to provide stabilization in bad times.²³ Indeed, the market clout of the bitcoin whales provides ample opportunities to induce bubbly dynamics that insiders may exploit to their own benefits. These observations are consistent with the curious correlation patterns of bitcoin valuation that Baur, Hong, and Lee (2018) reported, noting that the bitcoin "is uncorrelated with traditional asset classes such as stocks, bonds and commodities both in normal times and in periods of financial turmoil. The analysis of transaction data of Bitcoin accounts shows that Bitcoins are mainly used as a speculative investment and not as an alternative currency and medium of exchange."²⁴

Taking the public finance perspective, one may conjecture that successful scalability of decentralized cryptocurrencies would breed private failure—the nation state may ignore niche financial innovations but would regulate or even "nationalize" them if their size and instability became a systemic threat. Efficient scalability of a successful decentralized currency is possible as long as the private sector coordinates its policies with the nation state. Scalable financial innovations that challenge the nation state's ability to enforce law and order would trigger an "arms race" between users and the nation state's law enforcement. A well-functioning nation state has access to deep, scalable resources. OECD countries, the PRC, and other efficient centralized regimes find ways to control scalable financial innovations. If the decentralized currency is scalable, nation states and central banks will face growing competition. They will react by either imposing regulations or reducing scalability and encryption. Either course of action crushes the emerging competition. Alternatively, they may compete directly with cryptocurrencies by offering their own e-money, as Lagarde (2018) articulated.²⁵

²³ An example is the recent "fork fights"; see "Bitcoin Cash Hard Fork Battle: Who Is Winning the Hash War?", *Cointelegraph Column*, 18 November 2018, accessed 20 September 2019.

²⁴ The close to zero correlation of the bitcoin with other assets induced some to conclude that the bitcoin may provide diversification opportunities. Without controlling for the cost of these "opportunities," this argument is akin to viewing casino gambling as investment in portfolio diversification.

²⁵ "What if, instead, central banks entered a partnership with the private sector—banks and other financial institutions—and said: you interface with the customer, you store their wealth, you offer interest, advice,

To put it in a historical perspective, the supplier of currencies benefits access to significant resources, aka seigniorage. History provides ample examples of regimes oversupplying the means of exchange, resulting in runaway inflation. Similar dynamics may occur in a weak federal system, in which the states compete for a greater share of seigniorage (Aizenman 1992; Cukierman, Edwards, and Tabellini 1992). By now, most nations have converged to a social contract in which the state has the monopoly on supplying currency and controlling the banking system and the seigniorage and in exchange is responsible for the provision of financial stability, deposit insurance services, and a battery of regulations aiming to reach these goals.²⁶ The wave of fintech of the 2010s imposed clear risks on the monopoly of the state, shifting the bulk of financial intermediation to “virtual shadow banks” associated with anonymized intermediation.

The PRC provides an example of the feasibility and ability of the state to follow a dual goal of encouraging the diffusion of efficient fintech exchange in ways that benefit private uses and augment the government’s controls²⁷ while restricting anonymized exchange in ways that minimize its threats to shrink the tax base and to the state’s ability to control financial intermediation.²⁸ The chances are that other states will choose their own menu of policies aiming at achieving these dual goals.

loans. But when it comes time to transact, we take over. This partnership could take various forms. Banks and other financial firms, including startups, could manage the digital currency. Much like banks which currently distribute cash. Or, individuals could hold regular deposits with financial firms, but transactions would ultimately get settled in digital currency between firms. Similar to what happens today, but in a split second. All nearly for free. And anytime. The advantage is clear. Your payment would be immediate, safe, cheap, and potentially semi-anonymous. As you wanted. And central banks would retain a sure footing in payments ... Putting it another way: the central bank focuses on its comparative advantage—back-end settlement—and financial institutions and start-ups are free to focus on what they do best—client interface and innovation. This is public-private partnership at its best.” <https://www.imf.org/en/News/Articles/2018/11/13/sp111418-winds-of-change-the-case-for-new-digital-currency>.

²⁶ An exception to these are states that chose to adopt a foreign currency as their legal tender, frequently as a mechanism to reduce the past instability associated with their currency, or joined a monetary union like the eurozone, delegating the supplying of local currency to the central bank of the currency area.

²⁷ “The landscape of Chinese fintech is dominated by two players: Ant Financial, an affiliate of Alibaba, and Tencent ... Mobile transactions in China reached nearly \$18.7trn last year, 100 times more than in 2013—and more than all transactions handled worldwide by Visa and MasterCard combined. Regulators are more conflicted. By making spending easier, the fintech duo boost consumption, which has long been too low as a share of China’s GDP. They bring financial services to poorer people and force state-owned behemoths to up their game. But their popularity is also an economic risk ... ‘Customers are leaving banks’ ... A bigger exodus might destabilise the financial system. So over the past year, regulators have put speed bumps in their way ... Ant has capped the amount of cash users can invest or withdraw in a day. The online banks launched by Tencent and Ant—respectively, WeBank and MYBank—have also been hindered by deposit caps. And the central bank called off a trial in which Ant and Tencent were developing credit scores on individuals. Instead, they were given stakes in Baihang, a state-owned credit-rating system. Potentially most significant is the launch in July of NetsUnion, a clearing house for online payments. Although it should make mobile payments safer, it will also stand between fintech firms and banks, making it more difficult for Ant and Tencent to drive a hard bargain over fees ... it is only a matter of time before it is used to limit mobile transactions, ostensibly to address concerns such as money-laundering but also protecting banks from competition. All this is the backdrop for the decision by Ant and Tencent to play up technology offerings instead of financial services ... The idea for both is that, with their vast user bases and data troves, they can help banks identify smaller borrowers and manage lending risks. Banks put up the capital; Ant and Tencent get ‘technology fees.’” “Ant and Tencent As Regulators Circle, China’s Fintech Giants Put the Emphasis on Tech.” *The Economist*, 13 September 2018.

²⁸ On 4 September 2017, a Chinese government announcement stated: “initial coin offerings (ICOs) financing that raises so-called ‘virtual currencies’ such as Bitcoin and Ethereum through the irregular sale and circulation of tokens is essentially public financing without approval, which is illegal. The Announcement warned that tokens or virtual currencies involved in ICO financing are not issued by monetary authorities and therefore not mandatorily-accepted legal tender, and thus do not have equal

We close the section with a short overview of the Libra, which Facebook introduced in 2019. Libra's white paper provided preliminary details of the mission and its design:

Libra is a simple global currency and financial infrastructure that empowers billions of people. Libra is made up of three parts that will work together to create a more inclusive financial system:

1. It is built on a secure, scalable, and reliable blockchain;
2. It is backed by a reserve of assets designed to give it intrinsic value;
3. It is governed by the independent Libra Association tasked with evolving the ecosystem ...²⁹

While Libra's promised design differs from that of the bitcoin, the two share similar agency problems, and there are concerns about their impacts on the potency of the state's monetary and financial stability. First, Libra is accountable to its shareholders, with limited accountability to the actual users and the citizens of the countries experiencing its ultimate effects. A successful Libra will weaken the potency of monetary policy and dilute the state's seigniorage, and it may increase countries' exposure to financial instability resulting from foreign shocks, like capital controls, global web disruptions, and so on. Depending on the design of the future Libra, it may also shrink the state's tax base. Thereby, there is no clear reason why central banks and treasuries will support the outsourcing of financial intermediation and the payment system to a globalized private platform. The public finance logic is clear: privatize scalable and globally successful Libra profits Facebook, but socialize any future losses associated with financial instability and crisis. Consequently, states may impose clear regulations akin to or more stringent than the one that they have presently invoked on globalized financial institutions.

legal status with fiat currencies and cannot and should not be circulated and used in the market as currencies."

"As early as December 3, 2013, a notice declared banks and payment institutions in China are prohibited from dealing in bitcoins. Financial and payment institutions are prohibited from using bitcoin pricing for products or services or buying or selling bitcoins, nor can they provide direct or indirect bitcoin-related services, including registering, trading, settling, clearing, or other services." *Library of Congress. 2008. Regulation of Cryptocurrency Around the World (PDF)*, pp. 106–7. *The Law Library of Congress, Global Legal Research Center. June 2018.*

See also "Starting January 2019, non-bank payments companies must place 100 percent of their customer deposit funds under centralized, interest-free accounts as Beijing moves to rein in financial risks. In the past, third-party payments firms were allowed to hold pre-paid sums from buyers for a short period of time before transferring the money to merchants. This layout allowed companies like Alibaba's payments affiliate Ant Financial and Tencent to earn interest by depositing customer money into bank accounts." <https://techcrunch.com/2019/01/17/policy-squeezes-at-china-payments-firms/>.

²⁹ International reserves buffer the promised stability of the future Libra:

"What are the actual assets that will be backing each Libra coin? The actual assets will be a collection of low-volatility assets, including bank deposits and government securities in currencies from stable and reputable central banks. As the value of Libra will be effectively linked to a basket of fiat currencies, from the point of view of any specific currency, there will be fluctuations in the value of Libra. The makeup of the reserve is designed to mitigate the likelihood and severity of these fluctuations, particularly in the negative direction (i.e., even in economic crises). To that end, the above basket has been structured with capital preservation and liquidity in mind. On the capital preservation point, the association will only invest in debt from stable governments with low default probability that are unlikely to experience high inflation. In addition, the reserve has been diversified by selecting multiple governments, rather than just one, to further reduce the potential impact of such events. In terms of liquidity, the association plans to rely on short-dated securities issued by these governments, that are all traded in liquid markets that regularly accommodate daily trading volume in the tens or even hundreds of billions." Accessed 3 September 2019. <https://libra.org/en-US/white-paper/>.

The list of other concerns is long—stating that reliance on the “scalable, and reliable blockchain” is speculative, as only time will tell us the convergence of blockchain into this Promised Land. Backing up the Libra with reserve accounts composed of a basket invested “in debt from stable governments with low default probability that are unlikely to experience high inflation” raises serious currency valuation risks, inflationary risks, and agency issues related to real-time monitoring of the adequacy of this coverage. To illustrate, the dollar/euro exchange rate swings in the past 20 years included several spells of 25% changes in 2 years. Similarly, the SF/dollar experienced even larger fluctuations after the GFC. This suggests that the basket valuation will be far from stable. History has shown that even “stable governments” occasionally impose capital controls at times of peril and crisis and renege on past promises (see Edwards 2018). Furthermore, the balance sheet of a private supplier of money constrains its ability to back its commitment, as well as the will of its shareholders to undertake what is necessary to provide the promised services. In contrast, the state’s ability to monetize liabilities (i.e., to print money) and to tax its citizens backs a sovereign state’s ability to support financial stability. In the US, the FDIC insurance covers the US banking system, but one doubts the willingness of the US and its taxpayers to support Libra’s type of global arrangements.³⁰

5. CONCLUDING REMARKS

The winds of trade and currency wars of recent years are vivid illustrations of the growing scarcity of global cooperation in the late 2010s, validating the need for emerging markets to put their house in order. The sudden stops of the 1990s, the GFC, and the EZ crisis induced emerging markets to adopt defensive strategies, experimenting with new policy tools. The convergence to the middle ground of the trilemma helped. Greater monetary space has emerged through the proper precautionary management of international reserves, with the supplement of prudential regulations aimed at reducing the exposure to hot money inflows at times of “risk on,” thereby mitigating the cost of hot money outflows at times of “risk off.” Nevertheless, these steps are not sufficient to deal with the looming challenges, including the growing exposure of emerging markets to fiscal dominance; the need to adjust policy to fast-moving endogenous fintech innovations; and deglobalization trends. Greater application of SWFs as buffers integrated with fiscal rules may help. Experimentation with modified IT schemes and dynamic macroprudential regulations aiming to mitigate pro-cyclical leverage cycles and fintech shadow banking may be essential to reduce emerging markets’ exposure to costly future volatility. These defensive postures may be emerging market economies’ second-best response to the limited global international coordination.

³⁰ See Eichengreen (2018) and Niepelt (2019) Voxeu Columns for further discussion of the Libra.

REFERENCES

- Ahmed, Rashad, Joshua Aizenman, and Yothin Jinjarak. 2019. *Inflation and Exchange Rate Targeting Challenges Under Fiscal Dominance* (No. w25996). National Bureau of Economic Research. Cambridge, MA, US.
- Aizenman, Joshua. 1992. "Competitive Externalities and the Optimal Seigniorage." *Journal of Money, Credit & Banking* 24 (1): 61.
- . 2016. "International Coordination and Precautionary Policies." *International Economic Journal* 30 (3): 379–91.
- . 2019a. "On the Built-In Instability of Cryptocurrencies." *VoxEu Column*, 12 February. London, UK.
- . 2019b. "A Modern Reincarnation of Mundell–Fleming’s Trilemma." *Economic Modelling* 81: 444–54.
- Aizenman, Joshua, Menzie Chinn, and Hiro Ito. 2020. "Financial Spillovers and Macroprudential Policies." *Open Economies Review*: 1–35.
- . 2016. "Monetary Policy Spillovers and the Trilemma in the New Normal: Periphery Country Sensitivity to Core Country Conditions." *Journal of International Money and Finance* 68: 298–330.
- Aizenman, Joshua, Michael Hutchison, and Ilan Noy. 2011. "Inflation Targeting and Real Exchange Rates in Emerging Markets." *World Development* 39 (5): 712–24.
- Aizenman, Joshua, Yothin Jinjarak, and Huanhuan Zheng. 2019. "Housing Bubbles, Economic Growth, and Institutions." *Open Economies Review* 1–20.
- Aizenman, Joshua, and Jaewoo Lee. 2007. "International Reserves: Precautionary versus Mercantilist Views, Theory and Evidence." *Open Economies Review* 18 (2): 191–214.
- Alfaro, Laura, Sebnem Kalemli-Özcan, and Vadym Volosovych. 2008. "Why Doesn't Capital Flow from Rich to Poor Countries? An Empirical Investigation." *Review of Economics and Statistics* 90 (2): 347–68.
- Archer, David J. 2000. "Inflation Targeting in New Zealand." In: *IMF Institute Seminar on Inflation Targeting*, March.
- Baur, Dirk G., Kihoon Hong, and Adrian D. Lee. 2018. "Bitcoin: Medium of Exchange or Speculative Assets?" *Journal of International Financial Markets, Institutions and Money* 54: 177–89.
- Berganza, Juan Carlos, and Carmen Broto. 2012. "Flexible Inflation Targets, Forex Interventions and Exchange Rate Volatility in Emerging Countries." *Journal of International Money and Finance* 31 (2): 428–44.
- Biais, Bruno, Christophe Bisiere, Matthieu Bouvard, and Catherine Casamatta. 2019. "The Blockchain Folk Theorem." *Review of Financial Studies* 32 (5): 1662–715.
- BIS Quarterly Review, September. 2018. Bank for International Settlements, Basel, Switzerland.
- Blanchard, Olivier, Giovanni Dell’Ariccia, and Paolo Mauro. 2010. "Rethinking Macroeconomic Policy." *Journal of Money, Credit and Banking* 42: 199–215.

- Calvo, Guillermo A., and Carmen M. Reinhart. 2002. "Fear of Floating." *Quarterly Journal of Economics* 117 (2): 379–408.
- Carney, Mark. 2019. "The Growing Challenges for Monetary Policy in the Current International Monetary and Financial System." In *Remarks at the Jackson Hole Symposium*, 23 August.
- Cerutti, Eugenio, Stijn Claessens, and Luc Laeven. 2017. "The Use and Effectiveness of Macroprudential Policies: New Evidence." *Journal of Financial Stability* 28: 203–24.
- Cheung, Yin-Wong, and Xingwang Qian. 2009. "Hoarding of international reserves: Mrs Machlup's wardrobe and the Joneses." *Review of International Economics*, 17(4), 824-843.
- Cukierman, Alex. 2019. *Welfare and Political Economy Aspects of a Central Bank Digital Currency*. Comments at Davos BEF 2019, Monetary Policy for Decentralized Currency, Jan 25th.
- Cukierman, Alex, Sebastian Edwards, and Guido Tabellini. 1992. "Seigniorage and Political Instability." *American Economic Review* 82 (3): 537–55.
- Edwards, Sebastian. 2018. *American Default: The Untold Story of FDR, the Supreme Court, and the Battle over Gold*. Princeton University Press, Princeton, NJ, US.
- Eichengreen, Barry. 2018. *From Commodity to Fiat and Now to Crypto: What Does History Tell Us?* Working Paper 25426. NBER, Cambridge, MA, US.
- . 2019a. "Libra: The Known Unknowns and Unknown Unknowns." *VoxEU Column*, 4 September, London, UK.
- . 2019b. *Globalizing Capital: A History of the International Monetary System*. Princeton University Press, Princeton, NJ, US.
- Frankel, Jeffrey, 2012. "Inflation targeting is dead: Long live nominal GDP targeting." *VoxEU Column*, August 19, London, UK.
- Frankel, Jeffrey A., Carlos A. Vegh, and Guillermo Vuletin. 2013. "On Graduation from Fiscal Procyclicality." *Journal of Development Economics* 100 (1): 32–47.
- Gandal, Neil, J. T. Hamrick, Tyler Moore, and Tali Oberman. 2018. "Price Manipulation in the Bitcoin Ecosystem." *Journal of Monetary Economics* 95: 86–96.
- Ghosh, Atish R., Jonathan D. Ostry, and Marcos Chamon. 2016. "Two Targets, Two Instruments: Monetary and Exchange Rate Policies in Emerging Market Economies." *Journal of International Money and Finance* 60: 172–96.
- Greenspan, Alan. 2002. *Remarks on Economic Volatility*, at the Federal Reserve Bank of Kansas City Annual Symposium, Jackson Hole, Wyoming, August 30.
- Jordà, Òscar, Moritz Schularick, and Alan M. Taylor. 2015. "Leveraged Bubbles." *Journal of Monetary Economics* 76: S1–20.
- Kalemli-Özcan, Şebnem. 2019. *U.S. Monetary Policy and International Risk Spillovers*. Working Paper No. 26297. September 2019. NBER, Cambridge, MA, US.
- Klein, Michael. W. 2012. "Capital Controls: Gates versus Walls." *Brookings Papers on Economic Activity* 1: 317–67, Washington, DC.
- Klein, Michael, and Jay Shambaugh. 2015. "Rounding the Corners of the Policy Trilemma: Sources of Monetary Policy Autonomy." *American Economic Journal: Macroeconomics* 7 (4): 33–66.

- Korinek, Anton. 2011. "The New Economics of Prudential Capital Controls: A Research Agenda." *IMF Economic Review* 59 (3): 523–61.
- Lagarde, Christine. 2018. "Winds of Change: The Case for New Digital Currency." Speech at the *Singapore Fintech Festival*, 14 November.
- Mundell, Robert. 1969. "Toward a Better International Monetary System." *Journal of Money, Credit and Banking*, 1 (3): 625–48.
- Nakamoto, Satoshi. 2008. *Bitcoin: A Peer-to-Peer Electronic Cash System*.
- Niepelt, Dirk. 2019. "Libra Paves the Way for Central Bank Digital Currency." *VoxEu column*, 12 September, London, UK.
- Obstfeld, Maurice, Jonathan D. Ostry, and Mahvash S. Qureshi. 2019. "A Tie that Binds: Revisiting the Trilemma in Emerging Market Economies." *Review of Economics and Statistics* 101 (2): 279–93.
- Ostry, Jonathan D. 2012. "Managing Capital Flows: What Tools to Use?" *Asian Development Review* 29 (1): 82.
- Rajan Raghuram G. 2005. *Has Financial Development Made the World Riskier?* (No. w11728). NBER, Cambridge, MA, US.
- Rajan, Raghuram G., and Luigi Zingales. 2004. *Saving Capitalism from the Capitalists: Unleashing the Power of Financial Markets To Create Wealth and Spread Opportunity*. Princeton University Press, Princeton, NJ, US.
- Rey, H el ene. 2013. *Dilemma not Trilemma: The global financial cycle and monetary policy independence*. In *Jackson Hole Symposium* (Vol. 24).
- Rodrik, Dani. 2006. "The Social Cost of Foreign Exchange Reserves." *International Economic Journal* 20 (3): 253–66.
- . 2019. *Putting Global Governance in its Place*. WP 26213. NBER, Cambridge, MA, US.
- Rose, Andrew. 2007. "A Stable International Monetary System Emerges: Inflation Targeting is Bretton Woods, Reversed." *Journal of International Money and Finance* 26 (5): 663–81.
- Roubini, Nouriel. 2018. "Crypto is the Mother of All Scams and (Now Busted) Bubbles While Blockchain is the Most Over-Hyped Technology Ever, No Better than a Spreadsheet/Database." Testimony for the *Hearing of the US Senate Committee on Banking, Housing and Community Affairs*, October.
- Sanches, D. 2016. "On the Inherent Instability of Private Money." *Review of Economic Dynamics* 20: 198–214.
- Sargent, Thomas J., and Neil Wallace. 1981. "Some Unpleasant Monetarist Arithmetic." *Federal Reserve Bank of Minneapolis Quarterly Review* 5 (3): 1–17.
- Shiller, Robert. 2005. *Irrational exuberance, 2nd edition*. Princeton University Press.
- Shin Hyun Song. 2011. "Macroprudential Policies beyond Basel III." *BIS Papers* 1 (5).
- Taylor, J. B. (1993, December). "Discretion versus Policy Rules in Practice." *Carnegie-Rochester Conference Series on Public Policy* 39: 195–214. North-Holland.
- Tinbergen, Jan. 1952. *On the Theory of Economic Policy*. North-Holland Publishing Company, Amsterdam.

The Economist. 2018. "Ant and Tencent As Regulators Circle, China's Fintech Giants Put the Emphasis on Tech." 13 September. London, UK.

Vandenbussche, Jérôme, Ursula Vogel, and Enrica Detragiache. 2015. "Macroprudential Policies and Housing Prices: A New Database and Empirical Evidence for Central, Eastern, and Southeastern Europe." *Journal of Money, Credit and Banking* 47 (S1): 343–77.

Zhang, Longmei, and Edda Zoli. "Leaning against the Wind: Macroprudential Policy in Asia." *Journal of Asian Economics* 42: 33–52.