

# GREENING CHINA'S FINANCIAL SYSTEM

## CHAPTER 7:

# MONETARY POLICY AND GREEN FINANCE: EXPLORING THE LINKS

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## EXECUTIVE SUMMARY

**Monetary policy has been largely neglected in the worldwide discussions on green finance.** Similarly, most central banks have not even started thinking about their role in helping society reach its environmental objectives and about the potential implications of environmental degradation for their mandates.

**Bringing light to this blind spot is critical. The following report aims to make a contribution in this direction. Its starting point is the recognition that the conduct and effects of monetary policy are shaped by myriad factors.** Rules and structures of the international monetary system (IMS) (Section 2), mandates and objectives of central banks (Section 3), as well as the instruments they apply (Section 4), define their policy space and framework of reference. Understanding these building blocks and how they relate to each other is critical in exploring the links between monetary policy and green finance.

**The IMS stands at the core of the global financial architecture. Recommendations for its reform cover a large range of domains,** such as exchange rate regimes, capital flow management, reserve currencies, the structure of the banking sector and capital markets, financial regulation, money creation processes as well as alternative currencies. Calls for a greater use of the International Monetary Fund (IMF) Special Drawing Rights (SDRs) as a global reserve currency are a case in point. In that context, suggestions have also been made to use SDRs for the capitalization of green funds. Moreover, proposals to strip private banks of the ability to create money and to assign that responsibility exclusively to central banks have hit headlines across the world. At the same time, alternative currencies that are being used alongside official currencies are getting more attention. While these developments are at early stages, some economists believe they may be critical pillars for a green and inclusive economy.

**Within the current IMS, central bank mandates differ widely across countries. Several central banks in the G20 economies have a mandate covering two or more objectives, for example, price stability, financial stability, full employment and output growth. Others only focus on price stability.** A similarly diverse picture emerges from looking at central banks in developing countries. Potential changes to these mandates constitute an area for intense debates. The inclusion of financial stability in central bank mandates provides an example in this context. To what extent monetary policy can and should play a role in the prevention, management and resolution of financial crises remains a controversial topic. The impact that such crises can have on the housing market, for example, as well as the distortions that they create with regard to resource and land use, underlines the relevance of this debate for a green and inclusive economy.

**Whether one advocates for expanded or narrow mandates will depend significantly on whether one sees trade-offs between the different objectives.** To clarify objectives *ex ante*, and thus reduce the risk of *ex post* policy challenges, explicit goals may be warranted. Such clarification may also be key to dealing with potential trade-offs between explicit and implicit objectives—also with regard to green finance.

**Translating objectives into measurable targets is of critical importance. Central banks often have significant discretion in this regard. In setting their targets, they should account for possible interdependencies with the objectives of a green and inclusive economy.** Most central bank mandates, if not all of them, include price stability as an objective. Some leave the quantitative definition of this objective undetermined and within the exclusive responsibility of the central bank itself. Others stipulate that the central bank and the government must coordinate in setting a numerical inflation goal. Whether such targets should be raised, whether they should be defined in terms of headline or core inflation, whether central banks should target inflation rates or price levels, and across what time horizon inflation rates should be returned to the target if they deviate, are questions that call for a thorough evaluation of the implications for a broader sustainability agenda.

**The impact of resource scarcities on commodity prices, and thus inflation, is a case in point.** The appropriate reaction to changes in commodity markets is a key task for central banks and critical for a country's food and energy security. In that context, the economic models of many central banks assume that commodity prices are exogenous variables. Research, however, reveals that decisions by central banks have an impact on resource prices and thus on the inflation rates that they have targeted in the first place. A better understanding of these feedback loops and spillover effects is critical for policy formulation.

**Similarly, climate change, environmental degradation and related mitigation policies may have important consequences for financial stability.** Particularly, fossil fuel companies may face extensive write-downs of their assets when climate policy turns the reserves on their balance sheets into “stranded assets.” The fall in valuations may have significant repercussions for the stability of financial markets—a scenario that central banks should and are taking notice of.

**Setting policy rates is at the core of central bank toolkits to pursue their objectives.** By defining the rates at which they provide liquidity to the financial system, central banks influence an extensive range of market rates. The decision to increase or decrease interest rates and the magnitude of changes belongs to the key leverage points they have.

**The potential impact of interest rates on green investments is significant.** Net present value calculations that help to determine whether a government policy should be pursued, as well as discounted cash flow calculations based on which investment opportunities are assessed, depend greatly on the chosen discount factor and thus on interest rate levels. Against this background, low interest rates may provide a welcome opportunity to increase long-term investments for a green economy. The lower the interest rate, the more attractive are projects that require investments today to reduce costs and seize benefits in the future. Renewable energy projects are a case in point for this. They demand high capital spending as they are started, but have low running costs from thereon. Power generation based on fossil fuel also requires high investments upfront, but also high running costs over time. The higher the interest rate, the more these future costs are discounted and the better fossil fuel looks compared to renewable energy. By influencing interest rates, monetary policy affects a key factor in this calculation and thus investment decisions.

**A central bank's decision to buy and sell certain types of assets, accept them as collateral or use them to define borrowing limits and prices may have significant repercussions for green finance as well.** It may provide particular support, as in the case of the purchase of mortgage-backed securities in the United States, to the housing industry. It may offer targeted help, as intended by the European Central Bank's targeted longer-term refinancing operation to the non-financial sector. Or it can concentrate on particular sectors, such as solar energy, biogas and effluent treatment plants, which are the focus of a dedicated refinancing facility at a concessional rate by the central bank of Bangladesh. Further measures of “credit guidance,” such as differentiated reserve requirements, provide further illustration of sector support that some central banks already provide—and that could possibly be aligned further with the objectives for a green and inclusive economy.

**For a thorough exploration of the links between monetary policy and sustainability, let alone for making policy recommendations, additional research—in particular at a country level—is essential.** Nonetheless, this report suggests the following eight directions for further analysis that may provide initial guidance for future action:

1. Analyze historical and international experience with credit guidance in order to apply similar schemes for green finance.
2. Identify and mitigate biases in current monetary policy that are misaligned with the objectives for a green economy.
3. Expand central bank reporting to reflect environmental considerations in a key publication.
4. Assess the feasibility of steering asset purchases in the context of quantitative easing into green investments (e.g., through green bonds).
5. Develop a better understanding of the impact of interest rate levels on the long-term investments needed in the fields of energy, water and resource security.
6. Improve the knowledge base about the possible effects of environmental degradation and resource scarcities on price and financial stability.
7. Evaluate the possible use of SDRs to fund green investments.
8. Study international suggestions for the introduction of “sovereign money” and alternative currencies.

# INTRODUCTION

Monetary policy has been largely neglected in the discussions on green finance worldwide. Similarly, most central banks have not even started thinking about their role in helping society reach its environmental objectives and about the potential implications of environmental degradation for their mandates. Across the world, we are today scrutinizing every possible policy field—tax policy, energy policy, trade policy, education policy and others—to explore how these fields can be better aligned with the objectives of a green economy in general and green finance in particular. But we have not done the same with monetary policy.

This is particularly striking as the global financial crisis has significantly increased the influence of central banks and the policies they enact. It is also surprising in view of the risk that growing environmental degradation poses to the real economy and thus to price and financial stability. The potentially drastic reduction in the value of fossil fuel companies as a result of climate change policies and the shock to financial markets that this may bring about provides an illustration. Central banks that do not take these issues into account may be neglecting a key risk with regard to their mandate.

Bringing light to this blind spot is critical. As central banks transfer billions of dollars into the global economy on a monthly basis, we urgently need a solid understanding of the effects that their actions have on the green economy, as well as a thorough analysis of policy alternatives and their environmental impacts.

The following report aims to make a contribution in this direction. Its starting point is the recognition that the conduct and effects of monetary policy are shaped by myriad factors. Rules and structures of the IMS, mandates and objectives of individual central banks, as well as the instruments they apply, define their policy space and framework of reference. Understanding these building blocks and how they relate to each other is critical. Against this background, Section 2 provides a short historical overview on the development of the IMS and reviews five areas that have received particular attention in current debates on IMS reform. Section 3 explores different mandates and objectives that central banks have across the world and identifies their potential relationship with the goals of a green and inclusive economy. Section 4 focuses on the instruments and transmission mechanisms used by central banks to pursue their monetary policy goals and identifies their potential impacts for a green economy. Section 5 concludes with eight suggestions that may provide initial guidance for future action.

# 2

## INTERNATIONAL MONETARY SYSTEM

The IMS—“the rules and institutions that shape how international payments are handled” (IMF, 2011a)—stands at the core of the global financial architecture and is a significant factor for the policy space of central banks. This section provides a short historical background of the IMS and reviews five areas that have received particular attention in current debates on IMS reform.

### 2.1 HISTORICAL BACKGROUND

The IMS has been subject to permanent change. Often crises were the triggers for reform. The First World War caused many countries to abandon the gold standard. Some reintroduced a link between their currencies and gold in the interwar period, only to abandon it again in the 1930s following the Great Depression, using devaluations to improve their competitive position in the years before World War II. In 1944, the Agreements of Bretton Woods established a monetary order among the world’s major industrial nations that pegged the U.S. dollar to gold, and all other key currencies to the U.S. dollar at fixed exchange rates. The U.S. dollar became the world’s reserve currency.

Since the end of the Bretton Woods system in 1971, the IMS has become increasingly decentralized. With the United States suspending the convertibility of the U.S. dollar into gold in 1971, the Bretton Woods system came to an end. The U.S. dollar became a pure fiat currency, and a new era started in which many economies initially experimented with free-floating currencies, but eventually introduced alternative regimes (The Economist, 2014). Since then, the IMS has been characterized by nations choosing their own monetary policies, exchange rate targets and actions to safeguard financial stability. The U.S. dollar continued to be the world’s reserve currency. Capital flows increased. Current account and capital stock imbalances between countries grew dramatically. Exchange rate volatility went up. So did the average number of banking and currency crises (Bush, Farrant & Wright, 2011, p. 5; IMF, 2011b).

TABLE 1: INCIDENCE OF CRISES

		Banking crises (Number per year)	Currency crises (Number per year)
Pre-Gold Standard (1820–1869)		0.6	-
Gold Standard (1870–1913)		1.3	0.6
Interwar Period (1925–1939)		2.1	1.7
Bretton Woods (1948–1972)		0.1	1.7
memo	1948–1958	0.0	1.4
	1959–1972	0.1	1.9
Current (1973–2009)		2.6	3.7
memo	1973–1989	2.2	5.4
	1990–2009	3.0	2.4

Source: Bush et al. (2011), p. 7.

The recent financial crisis highlighted the deficiencies of the post-Bretton Woods system—called a “non-system” (see, e.g., Lin, Fardoust, & Rosenblatt, 2012; Mateos y Lago, Duttagupta, & Goyal, 2009; Ocampo, 2013) by some—and moved the debate on its reform up policy agendas. The renewed interest in IMS reform also put a spotlight on the role of central banks and the question of to what extent they should move beyond their current mandates and take further responsibilities in safeguarding macroeconomic and

financial stability. In 2008, French President Nicolas Sarkozy and U.K. Prime Minister Gordon Brown called for a “New Bretton Woods” and a redesign of the global financial architecture (Hall & Eaglesham, 2008). In 2009, the Governor of the People’s Bank of China (PBC), Zhou Xiaochuan, called for “an international reserve currency that is disconnected from individual nations” and suggested to give particular consideration to the IMF Special Drawing Rights in this context (Zhou, 2009). Further recommendations for reform include proposals from the Commission of Experts of the President of the United Nations General Assembly on Reforms of the International Monetary and Financial System, and the Palais-Royal Initiative, as well as further suggestions such as those from the Committee on International Economic Policy and Reform, the Reinventing Bretton Woods Committee, and Farhi, Gourinchas and Rey (2011; United Nations, 2009; Palais-Royal Initiative, 2011; Committee on International Economic Policy and Reform, 2011; Reinventing Bretton Woods Committee, 2009).

The evaluation of such proposals for IMS reform from a sustainability perspective is critical. Understanding their effects on growth, inflation and financial stability is important, but not enough—that needs to be complemented by a thorough review of potential reform impacts on sustainability goals such as job creation, inequality moderation, resource security and climate change mitigation.

## 2.2 EXCHANGE RATE REGIMES AND CAPITAL FLOW MANAGEMENT

Exchange rate regimes are a key aspect of the reform debates (Mohan, Patra, & Kapur, 2013, p. 7). Today, 56 per cent of IMF members have a hard or soft peg of their currency to the U.S. dollar or another currency, 18 per cent follow a managed float regime, 16 per cent free-float their currency and 10 per cent have another managed arrangement (IMF, 2013, p. 7). More than 90 per cent of emerging markets have opted for fixed or managed exchange rates (IMF, 2014a, p. 44).

Since the financial crisis, fears of “currency wars” triggered by monetary easing have repeatedly been the subject of intense discussions (see, e.g., Ross, 2012). Concerns about instability and misalignments of exchange rates underline calls for greater international policy coordination and adjustments (see, e.g., Eichengreen, 2013; IMF, 2012a). Their potentially adverse impact on international trade has also led to proposals to evaluate a possible role for the World Trade Organization in the monitoring exchange rates, and in taking action when they deviate significantly from those perceived to be in line with fundamentals (see, e.g., Gagnon, 2013; Thorstensen, Ferraz, & Marçal, 2011).

In terms of capital flows, liberalization topped the agenda for many years. Starting in the 1970s, after the breakdown of Bretton Woods, and continuing in the 1980s and 1990s, many advanced as well as developing economies opened their capital accounts and allowed foreign investments to flow into and out of their countries without any or with significantly fewer restrictions (Kaminsky & Schmukler, 2003). Annual global inward foreign direct investments surged from USD 13 billion in 1970 to a peak of USD 2 trillion in 2007, and amounted to USD 1.5 trillion in 2013 (United Nations Conference on Trade and Development, 2014a, 2014b).

More recently, a greater recognition that capital flows bring both benefits and risks has reopened the debate on appropriate deviations from full liberalization of capital accounts. Now referred to as “capital flow management measures,” interventions to reduce the volatility of capital inflows—for example, taxes, restrictions or prohibitions—are becoming increasingly accepted. In particular, the IMF started reviewing its position on the management of global capital flows in 2010 and two years later published a new institutional view that seeks to balance the benefits and risks of capital flows. It now sees capital flow liberalization as “more beneficial and less risky if countries have reached certain levels or ‘thresholds’ of financial and institutional development. ... There is ... no presumption that full liberalization is an appropriate goal for all countries at all times” (IMF, 2012b).



Monetary policy, exchange rate regimes and capital flow management are interdependent. Being conscious of exchange rate regimes and capital flow management is essential in the analysis of monetary policy. According to the “impossible trinity,” also known as the “trilemma,” a country cannot have a pegged exchange rate, free capital movement and an independent monetary policy at the same time. When the exchange rate is fixed and the capital account is open, a country does not have any more discretion to run its own monetary policy. Understanding the impact of exchange rates and capital flows on investments on a country level is equally important—not the least with regard to financing climate adaptation and mitigation projects in developing economies.

## 2.3 RESERVE CURRENCIES

The use of reserve currencies is closely intertwined with exchange rate regimes and capital flow management for two reasons. First, central banks that want to intervene in currency markets need international reserves for doing so. Second, the scale and volatility of capital flows are key drivers of the demand for precautionary reserves (Mateos y Lago et al., 2009, p. 5).

The fact that demand for global reserves is met mainly by one country, the United States, and that being the key supplier of reserve assets provides the United States with a significant advantage, has been subject for intense debates for a long time. The “exorbitant privilege” that comes along with the U.S. dollar being the global reserve currency gives the United States more macroeconomic policy space, access to lower-cost financing and additional seigniorage (Mateos y Lago et al., 2009, p. 7). At the same time, it creates a conflict of interest—also referred to as the “Triffin Dilemma”—for the United States between pursuing its domestic monetary policy goals and providing global liquidity. The fact that the U.S. Congress has repeatedly come close to forcing the U.S. government to default on its debt, and thus on the world’s major reserve assets, adds further to international concerns (Ocampo, 2013).

Against this background, several proposals have been made for the introduction of a “super-sovereign” reserve currency that would be rules-based and not linked to the interests and economic conditions of any single nation. In fact, the introduction of an international currency unit was already suggested—unsuccessfully—by John Maynard Keynes in the negotiations of the Bretton Woods Agreements in 1944. Since then, both policy-makers and academics have repeatedly highlighted recommendations to replace the U.S. dollar with an alternative global reserve currency (see, e.g., Bergsten, 2009; Erten & Ocampo, 2012; Williamson, 2009; Zhou, 2009). Most of these proposals underline the fact that the IMF Special Drawing Rights (SDRs) already provide such an alternative and were launched in 1969 to fulfil this role: articles 8 and 22 commit IMF members to the objective of “making the special drawing right the principal reserve asset in the international monetary system” (IMF, 2008).

In that context, several suggestions have also been made to use SDRs to pursue specific sustainability objectives. Proposals by George Soros (2009) for developed countries to “lend \$100bn worth of [...] SDRs for 25 years to a special green fund serving the developing world,” by IMF staff to capitalize a green fund with reserve assets and to use SDRs for that (Bredenkamp & Patillo, 2010) and by the UN Department of Economic and Social Affairs (2012) to create “SDRs [...] to be allocated with a bias favoring developing countries or leveraged as development financing” are cases in point.

In addition to SDRs, the use of other currencies as reserve assets has repeatedly been and continues to be a topic on policy-makers’ agendas. According to the Currency Composition of the IMF’s Official Foreign Exchange Reserves (COFER) database, currency breakdowns are currently reported for just over a half of total foreign exchange reserves. Within that number, as per end-Q1 2014, the U.S. dollar accounted for 60.9 per cent of foreign reserves, followed by the euro (24.5 per cent), Japanese yen (4.0 per cent), pound sterling (3.9 per cent), Canadian dollar (1.9 per cent), Australian dollar (1.7 per cent), Swiss franc (0.3 per cent) and other currencies (2.8 per cent) (IMF, 2014b). World trade payments are also mainly done in U.S. dollar

(41.6 per cent), euro (32.4 per cent) and pound sterling (8.3 per cent). Use of the renminbi in international payments now stands at 1.5 per cent, up from 0.6 per cent in January 2013 (SWIFT, 2014). Concerns about this dependency on the U.S. dollar have led to repeated calls for a diversification of currencies used as reserves as well as in international trade. Suggestions for an increased use of regional currencies in Asia for bilateral trade settlements, as well as a bigger role of the euro for international trade, are cases in point for this (see, e.g., Rhee & Sumulong, 2013; Strauss & Hume, 2014). Measures to reduce the precautionary demand for national reserves, for example, by improving access to a global or regional reserves pool, have also been suggested (Mateos y Lago et al., 2009, p. 10).

## 2.4 BANKING SECTOR AND CAPITAL MARKETS

Banks play a central role in the transmission of monetary policy. The ability of central banks to influence market interest rates and lending depends significantly on the development and structure of the banking sector. This is particularly the case in economies with less developed capital markets, respectively for small companies who seek funding through bank loans rather than for larger corporations who can fund themselves through, if available, securities markets.

At the core of this stands the bank lending channel of monetary policy transmission. It is based on the view that banks are well positioned to overcome asymmetric information problems in credit markets and are thus important, in some cases essential, intermediaries that provide funding (Mishkin, 1996). It also assumes that expansionary monetary policy increases bank reserves and thus allows these institutions to expand their loan portfolios. To what extent they do that and whether they pass on reduced policy rates through the interest rates that they charge depends on the structure of the banking sector. The negative relationship between the degree of competition in the sector and borrowing costs is a case in point for that (see e.g., Bonfim et al., 2009; IMF, 2010, p. 5).

The relevance of the bank lending channel depends also on the availability of alternative funding sources through capital markets. Proposals for capital market development in emerging economies have been on policy-makers' agendas for a long time. They argue that "missing markets," that is to say, the lack of liquid local currency bond markets, lead these countries to push capital abroad and accumulate reserves as insurance. The result of capital flowing "uphill"—from emerging to advanced economies—results in investments not being made where they could be most productively used and thus to allocative inefficiencies. The development of local currency bond markets is suggested as a remedy (see e.g., Bush et al., 2011, p. 11; Committee on the Global Financial System, 2007; G20, 2013). It is also argued that deeper financial markets allow emerging markets to more readily absorb capital flows and would provide their central banks with a broader range of tools to conduct monetary policy (Singh, 2011; see also Huang, 2012; Mishkin, 1996; Zhang, 2012).

## 2.5 FINANCIAL REGULATION

Financial regulation is a further key factor that affects the transmission mechanism of monetary policy. Capital requirements for banks are a key aspect in this regard. As they attach lower risk weightings to collateralized rather than non-collateralized lending, they provide an incentive for financial institutions to focus their loan portfolio on asset-backed loans, for example mortgages, instead of project finance credit. The availability of long-term finance for sustainable infrastructure may suffer as a result (see e.g., Group of Thirty, 2013). An expansion of monetary policy may then lead to credit growth that funds price bubbles in existing assets rather than investments in the real economy. It may also result in sector biases and adverse sustainability effects. In Switzerland, as an example, more than CHF 900 billion, or 60 per cent of the CHF 1.5 trillion in total outstanding loans by the country's banks, are mortgages (Swiss National Bank, 2014) and thus used for real estate and construction—two sectors with a particularly high impact on the environment. A

thorough understanding of this connection—in particular in view of the country’s growing concerns about land use and urban sprawl—is essential (see e.g., White, 2012b, p. 19).

## 2.6 MONEY CREATION AND ALTERNATIVE CURRENCIES

In the current system, money is mainly created by commercial banks. Some contend that this should not be the case and that money creation should be the sole responsibility of central banks. Money today is predominantly credit-based money. Only a fraction of it comes from central banks themselves. The bulk of money in circulation is created by commercial banks making loans (see e.g., McLeay et al., 2014; New Economics Foundation, 2012). Critics argue that this role of commercial banks fuels boom/bust cycles and that only a small percentage of the loans they provide is invested into productive uses. In their view, money creation should be the exclusive responsibility of central banks, and commercial banks should be stripped of their current ability to increase money supply by granting loans (See e.g., Benes & Kumhof, 2012; Chamley, Kotlikoff, & Polemarchakis, 2012; Dyson, Greenham, Collins, & Werner, 2011; Jackson & Dyson, 2012; Wolf, 2014). In Switzerland, signatures are currently being collected to have the country vote on a proposal for a constitutional amendment that would implement this recommendation (Verein Monetäre Modernisierung, 2014).

Alternative currencies are getting more attention too. Several economists point to the advantages of alternative currencies that may coexist with conventional money on the local or national level. Such alternative currencies may eventually replace current money as we know it (see e.g., Litaer, Arnsberger, Goerner, & Brunnhuber, 2012). Suggestions for energy-related monetary instruments provide examples in this context with a particular link to environmental sustainability (see e.g., Ryan-Collins, Schuster, & Greenham, 2013).

# 3

## MONETARY POLICY MANDATES AND OBJECTIVES

Central bank mandates, as defined in their respective establishment laws, differ widely. This section describes different mandates that central banks pursue across the world, explores potential trade-offs between their objectives, and provides examples of the links between central bank goals and sustainability.

Several central banks in the G20 economies have a mandate covering two or more objectives such as price stability, financial stability, full employment and economic development. Others have a single focus on price stability. A similar picture of diversity emerges when looking at central banks in developing countries. Recent analysis of the mandates and objectives of central banks in 51 low- and middle-income countries shows all 51 making reference to price stability, 40 mentioning economic growth and 38 adding exchange rate stability (International Labour Organization [ILO], 2014a).

TABLE 1: CENTRAL BANK MANDATES IN THE G20<sup>1</sup>

Argentina	To promote—within the framework of its powers and the policies set by the national government—monetary and financial stability, employment and economic development with social equality.
Australia	To ensure that the monetary and banking policy of the Bank is directed to the greatest advantage of the people of Australia and that the powers of the Bank [...] are exercised in such a manner as [...] will best contribute to: (a) the stability of the currency of Australia; (b) the maintenance of full employment in Australia; and (c) the economic prosperity and welfare of the people of Australia.
Brazil	To ensure the stability of the currency's purchasing power and a solid and efficient financial system.
Canada	To regulate credit and currency in the best interests of the economic life of the nation, to control and protect the external value of the national monetary unit and to mitigate by its influence fluctuations in the general level of production, trade, prices and employment, so far as may be possible within the scope of monetary action, and generally to promote the economic and financial welfare of Canada.
China	The PBC shall, under the leadership of the State Council, formulate and implement monetary policies, guard against and eliminate financial risks, and maintain financial stability. The aim of monetary policies shall be to maintain the stability of the value of the currency and thereby promote economic growth.
Eurozone	The primary objective of the European System of Central Banks [...] shall be to maintain price stability. Without prejudice to the objective of price stability, the [European System of Central Banks] shall support the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on European Union.
India	To regulate the issue of Bank Notes and keeping of reserves with a view to securing monetary stability in India and generally to operate the currency and credit system of the country to its advantage.
Indonesia	To achieve and maintain the stability of the rupiah value.
Japan	[To achieve] price stability, thereby contributing to the sound development of the national economy.
Korea	The purpose of this Act shall be to establish the Bank of Korea and to contribute to the sound development of the national economy by pursuing price stability through the formulation and implementation of efficient monetary and credit policies. The Bank of Korea shall pay attention to financial stability in carrying out its monetary and credit policies.
Mexico	To provide the country's economy with domestic currency. In pursuing this purpose, its primary objective shall be to seek the stability of the purchasing power of said currency. The Bank shall also have the purpose of promoting the sound development of the financial system and fostering the proper functioning of payment systems.
Russia	To protect the ruble and ensure its stability; to develop and strengthen the banking system of the Russian Federation; to ensure stability of and develop the national payment system; to develop the financial market of the Russian Federation; to ensure stability of the financial market of the Russian Federation.
Saudi Arabia	To deal with the banking affairs of the government; minting and printing the national currency (the Saudi Riyal), strengthening the Saudi currency and stabilizing its external and internal value, in addition to strengthening the currency's cover; managing the Kingdom's foreign exchange reserves; managing the monetary policy for maintaining the stability of prices and exchange rate; promoting the growth of the financial system and ensuring its soundness.

South Africa	To achieve and maintain price stability in the interest of balanced and sustainable economic growth in South Africa. The achievement of price stability is quantified by the setting of an inflation target by government that serves as a yardstick against which price stability is measured. The achievement of price stability is underpinned by the stability of the financial system and financial markets. For this reason, the bank is obliged to actively promote financial stability as one of the important determinants of financial system stability.
Turkey	The primary objective of the bank shall be to achieve and maintain price stability. The bank shall determine on its own discretion the monetary policy that it shall implement and the monetary policy instruments that it is going to use in order to achieve and maintain price stability. The bank shall, provided that it shall not be in conflict with the objective of achieving and maintaining price stability, support the growth and employment policies of the government.
United Kingdom	To promote the good of the people of the United Kingdom by maintaining monetary and financial stability.
United States	To promote effectively the goals of maximum employment, stable prices and moderate long-term interest rates.

*Note: Excluding the mandates of national central banks within the Eurosystem*

*Source: Central Bank websites and establishment laws*

The definition of a central bank's objectives and the question of whether central banks should pursue one or more objectives constitute areas for intense debates. Discussions about the mandate of the European Central Bank (ECB) are an example. Its primary objective is currently focused only on price stability. Many argue it should be expanded to include employment and thus to make ECB decision-makers as equally sensitive to unemployment as they are to inflation (see, e.g., Creel & Saraceno, 2011; Derviş, 2012; Epstein, 2007; Rosengren, 2013).

The addition of financial stability to the mandates of central banks that do not yet have this objective in their formal mission is another case in point. To what extent monetary policy can and should play a role in the prevention, management and resolution of financial crises has hit agendas across the world (Bank for International Settlements [BIS], 2011). Proponents of an explicit financial stability objective underline that price stability may be a necessity, but is not a sufficient condition for macroeconomic stability—and point to the recent financial crisis as a sobering illustration. They also argue that central banks should “lean against the wind” and curb credit or asset price growth in the interest of financial stability if needed (see e.g., BIS, 2011; Eichengreen, Rajan, & Prasad, 2011). Critics contend that a central bank “cannot reliably identify bubbles in asset prices, [and] even if it could identify bubbles, monetary policy is far too blunt a tool for effective use against them” (Bernanke, 2002). The impact such bubbles can have on, for example, the housing market and the distortions they create with regard to resource and land use underline the relevance of this debate for a broader agenda towards greening financial markets.

Whether one advocates for expanded or narrow mandates will depend significantly on whether one sees trade-offs between the different objectives. Potential conflicts between price stability and employment objectives are a case in point for this. In the United States, with inflation at 1.2 per cent and thus below the 2 per cent target, and employment lower than what is considered full employment, the objectives currently appear to be complementary (Lockhart, 2014). In Egypt, with inflation above 8 per cent while the country suffers from high unemployment, there appears to be at least a short-term trade-off (Central Bank of Egypt, 2014). In Europe, the ECB views its primary objective of price stability as fully aligned with its “secondary objectives” that are spelled out in the Treaty on European Union, namely: “a harmonious, balanced and sustainable development of economic activities, a high level of employment and of social protection, ... sustainable and non-inflationary growth, ... and economic and social cohesion”(European Community, 1957). Its view is based on an economic model in which central bank credibility is at the center of inflation expectations, and an increase in these expectations raises both inflation and output variability. According to this view, there is “no exploitable trade-off between these two objectives, at least not over the medium term” (Bini Smaghi, 2007; see also Cœuré (2014). Others might agree that this is an accurate reflection of what happens in the medium-to-long run, but point to the fact that the short-term trade-offs are relevant

and must not be neglected. Some also point to evidence for trade-offs in the medium and long terms, for example, to trade-offs between inflation and unemployment on a regional level (Fitzgerald, Holtemeyer, & Nicolini, 2013). In addition, while there may be a stable relationship between inflation and output, the links between price stability and other societal goals—for example, employment and social cohesion—may be less clear. The phenomenon of jobless growth and rising inequality, together with economic expansion, is a case in point for that.

Possible trade-offs between price and financial stability provide further illustration. Some contend that a central bank that secures price stability will also protect the stability of the financial system: “incorporating financial stability considerations into monetary policy decisions need not imply the creation of an additional mandate for monetary policy. The potentially huge effect on price stability and employment associated with bouts of serious financial instability gives ample justification” (Tarullo, 2014). Similarly, some point to the risks that boom/bust cycles in asset prices pose for price stability and thus see a “tighter policy stance in the face of an inflating asset price bubble” as consistent with current price stability mandates (see e.g., Bordo & Wheelock, 1998; ECB, 2010; White, 2009). Others agree that price and financial stability are mutually supportive, but argue that the short-term interests of monetary policy and financial stability policy may occasionally diverge—an example being a leveraged asset bubble during a period of low inflation and a pace of expansion consistent with estimates of potential growth.

To clarify objectives *ex ante* and thus reduce the risk of *ex-post* policy challenges, explicit goals may be warranted. Such clarification may also be key to dealing with potential trade-offs between explicit and implicit objectives—also from a sustainability viewpoint (see, e.g., BIS, 2011). Moreover, translating objectives into measurable targets is, as we will see below, of critical importance, and often provides central banks with significant discretion. Such discretion would ideally be applied with a broad sustainability perspective as the starting point.

### 3.1 PRICE STABILITY

Most central bank mandates, if not all of them, include price stability as an objective. Some leave the quantitative definition of this objective undetermined and within the exclusive responsibility of the central bank itself. Others stipulate coordination between the central bank and the government in setting the numerical target (Dervis, 2012). For the ECB, the Governing Council has clarified that it “aims to maintain inflation rates [as measured by the Harmonised Index of Consumer Prices] below, but close to, 2% over the medium term” (ECB, 2014c). Similarly, in January 2012, the Federal Reserve (Fed) introduced a formal inflation target of 2 per cent as measured by the annual change in the price index for personal consumption expenditures as “most consistent over the longer run with the Federal Reserve’s statutory mandate” (Fed, 2014e). The Bank of Japan set an inflation target of 1 per cent in 2012 and doubled this number to 2 per cent in 2013 (BBC, 2013).

In setting inflation targets, possible interdependencies with the objectives of a green and inclusive economy should be taken into account. Whether such targets should be raised (see, e.g., Ball, 2013; Blanchard, Dell Ariccia, & Mauro, 2010), whether they should be defined in terms of headline or core inflation (see, e.g., Catão & Chang, 2010), whether central banks should target inflation rates or price levels (see, e.g., Altig & Bryan, 2013), and across what time horizon inflation rates should be returned to the target, if they deviate (see, e.g., Bank of England, 2013; Lockhart, 2014) are questions that call for a thorough evaluation of the implications for a broader sustainability agenda. Understanding the sustainability impact of deviations from the target—for example, inflation in the Eurozone that started falling well below the 2 per cent goal in 2013—as well as of the diversity in inflation rates faced by different sectors and regions (e.g., countries across the Eurozone or states across the United States), and different income groups, is equally important.

The links between inflation and inequality are a case in point. Studies on the correlation between the two point in different directions. Some researchers find inflation and inequality to be positively related (see, e.g., Albanesi, 2007) and thus support the standard case made by central banks that low and stable inflation is the best possible strategy to reduce inequality. Others find expansionary monetary policy to decrease inequality (see, e.g., Coibion, Gorodnichenko, Kueng, & Silvia, 2012). Further research indicates a U-shaped relationship, where rising inflation coincides with a reduction in income inequality until a certain inflation threshold and with an increase in inequality thereafter (see, e.g., Galli & van der Hoeven, 2001; Monnin, 2014). Putting the focus on wealth instead of income inequality, research focused on the United States indicates that the main losers from inflation are rich, old households (Doepke & Schneider, 2006). There may also be effects in the opposite direction, for example with inequality being a determining factor for inflation. Empirical studies that attribute a part of inflation to high inequality provide a case in point (see, e.g., Maurer & Yeşin, 2005). Robust correlations between high inequality and slower, less durable growth may also have potentially significant impacts on transmission mechanisms, as well as price and financial stability (see Ostry, Berg, & Tsangarides, 2014). Moreover, some research identifies “elite bias” in the political system resulting from inequality as an incentive for inflation (Crowe, 2006).

Similarly, the impact of resource scarcities on commodity prices and thus inflation is also relevant. The appropriate reaction to changes in commodity markets is a key task for central banks and critical for a country’s food and energy security. In that context, the question of whether to target headline or core inflation (i.e., the price of a basket that does or does not include food and energy) is of great importance (see, e.g., Catão & Chang, 2010). Moreover, the economic models of many central banks assume that commodity prices are exogenous variables. Research, however, reveals that the decisions by central banks have an impact on resource prices and thus on the inflation rates that they have targeted in the first place (see, e.g., Anzuini, Lombardi, & Pagano, 2010; Fratzscher, Schneider, & Van Robays, 2010). A better understanding of these feedback loops and spillover effects is critical for policy formulation.

### 3.2 EXCHANGE RATE STABILITY

The exchange rate regime followed by a country is another key parameter for the link between monetary policy and sustainability. Among the IMF members, 92 countries have an exchange rate anchor (IMF, 2013, p. 5). The establishment and pursuit of such a target has different effects on different sectors—with the general fault line running between exporting and non-exporting industries. The Swiss National Bank’s floor for the Swiss franc/euro exchange rate at 1.20 provides an illustration. It is particularly important for the country’s key exporting sectors such as pharmaceuticals, machinery and watches. Understanding the role these industries play with regard to sustainability and how the exchange rate target may shift the balance between them and other sectors in comparison to a non-intervention scenario is critical.

Exchange rates may also have significant impacts on the price of commodities. Fratzscher et al. (2013) find a causal link between exchange rates and oil prices and point to the fact that “a US dollar depreciation makes oil cheaper in domestic currency terms for those countries not pegged to the US dollar, thus raising global oil demand and the price of oil” (p. 5). Concretely, they estimate a weakening of the U.S. dollar by 1 per cent would cause oil prices to rise by 0.73 percent.

### 3.3 EMPLOYMENT

With unemployment figures at record highs, job creation ranks on top of policy agendas across the globe. Worldwide, the number of unemployed people stands at 200 million, and the unemployment rate amounts to 6 per cent. Advanced countries have seen this figure increase from 5.8 per cent pre-crisis to 8.5 per cent today. The figure across developing economies is roughly back to pre-crisis levels below 6 per cent (ILO, 2014b).

Against this background, it comes as no surprise that the role of central banks with regard to employment has been subject to intense debates. Similar to price stability, employment goals in central bank mandates are open to interpretation. Estimating full employment and selecting appropriate indicators is a challenging task. Unemployment rates may not provide an accurate picture of overall employment conditions as they depend on workforce participation rates. Those that can work, but have no job and are currently not looking for one, usually do not show up in official unemployment statistics. Yet this “shadow labor force” might be seeking employment, if economic conditions were different (Lockhart, 2014).

In 2012, the Fed, for the first time, tied its policy rate to a numerical employment target and announced that it would keep the target range for the Federal Funds Rate close to zero as long as the unemployment rate remained above 6.5 per cent (Fed, 2012). In 2013, it amended its position and clarified that the target range is likely to remain at current levels “well past the time that the unemployment rate declines below 6½ percent” (Fed, 2013)—a clarification that may also have been triggered by its consideration of the “shadow labour force” as referred to above.

Similarly, the Bank of England decided in August 2013 that it would not raise interest rates and stands ready to make further asset purchases, while the unemployment rate remained above 7 per cent. It subjected this forward guidance to the condition that (1) its 18-to-24-month inflation forecast remained below 2.5 per cent, (2) medium-term inflation expectations remained sufficiently anchored and (3) its monetary policy would not be considered a threat to financial stability that cannot be contained by mitigating policy actions. It also clarified that the 7 per cent threshold did not reflect its view on the lowest sustainable unemployment rate, but was rather considered an appropriate point to reassess its monetary policy position (Bank of England, 2013).

### 3.4 FINANCIAL STABILITY

As other objectives in central bank mandate, the translation of the goal of maintaining financial stability into concrete targets is not straightforward—probably even less so than the objective of price stability (BIS, 2011).

Similar to the links between price stability on the one hand and inequality and resource scarcities on the other, there may be important impacts between financial stability and green inclusive growth in both directions. Kumhof, Rancière and Winant (2013) point out that rising income inequality, combined with high household debt, can trigger financial and real crises. In June 2014, ECB Governing Council member Ewald Nowotny said that “monetary policy makers, including also the IMF, are paying more attention to questions of inequality, because we’ve seen that distribution can have effects that are relevant for monetary policy. ... For instance, it was a key reason for the U.S. financial crisis that policy makers tried to solve the housing problem for lower income brackets not by social housing but by very cheap credit” (Groehndahl, 2014).

Climate change, environmental degradation and related mitigation policies may have important consequences for financial stability as well. Particularly fossil fuel companies may face extensive write-downs of their assets when climate policy turns the reserves on their balance sheet into “unburnable reserves” and thus “stranded assets.” The fall in valuations may have significant repercussions for the stability of financial markets—a scenario that central banks should and are taking notice of (Morales, 2012).



# 4

## MONETARY POLICY INSTRUMENTS AND TRANSMISSION

In addition to the IMS and the mandates and objectives of central banks, the questions of which tools are available to them, what they are allowed to do to pursue their mandates and what they decide to do are critical—not just in economic terms but also from an environmental perspective. Against this background, this section describes the instruments that central banks use, their impact on the real economy and thus their possible relevance for green financial markets.

### 4.1 INTEREST RATES

Setting policy rates is at the core of central bank toolkits to pursue their objectives. By defining the rates at which they provide liquidity to the financial system, central banks influence market rates. The decision when to increase or decrease interest rates and the magnitude of changes belongs to the key leverage points they have.

In the United States, the Fed defines a target for the Federal Funds Rate—the rate at which banks and other depository institutions lend and borrow reserves from each other that they hold at the Fed—and intervenes to align the effective rate with its goal. It also sets a discount rate at which depository institutions can borrow money directly from the regional Federal Reserve Banks, as well as—since 2008—a rate for interest that the Fed pays on required and excess reserves. Since 2008, the Federal Funds Target Rate stands at a historic low of 0-0.25 per cent (Fed, 2008) and has thus hit “zero lower bound,” the Discount Rate for primary credit is 0.75 per cent (Fed, 2014e), and the interest rate that depository institutions receive on their reserves amounts to 0.25 per cent (Fed, 2014a).

Similarly, the ECB sets an interest rate for its main refinancing operations (MROs), currently at 0.15 per cent, as well as a rate on its marginal lending facility, currently at 0.40 per cent, which offers overnight credit to banks from the Eurosystem. It also sets a rate for overnight deposits that banks make at the ECB, which entered negative territory in June 2014: since then the deposit facility interest rate stands at -0.10 per cent (ECB, 2014b).

The transmission from policy rates to market interest rates differs from country to country and from time to time, and depends significantly on the respective economic and financial conditions. Traditionally, the rates set by central banks influence both short- and long-term market interest rates. More recently, the transmission from policy rates to market rates became less stable. The alleged loss of control of the ECB over interest rates in Spain and Italy was an illustration of this (The Economist, 2013). Against this background, several central banks have started to intervene to directly influence longer-term interest rates and other asset prices.

With interest rates playing a central role in models that discount future benefits and costs, their potential impact on sustainability is significant. Net present value calculations that help to determine whether a government policy should be pursued, as well as discounted cash flow calculations based on which investment opportunities are assessed, depend greatly on the chosen discount factor and thus on interest rate levels. The fact that the U.S. government uses the interest rates on U.S. Treasuries and Notes as its official discount factors (Office of Management and Budget, 2013), and that the Fed has directly intervened to influence the prices of these securities, provides an illustration of the important sustainability effects that central banks can have.

In this context, low interest rates may provide a welcome opportunity to increase long-term investments for a green economy (see, e.g., *The Economist*, 2012a). The lower the interest rate, the more attractive are projects that require investments today to reduce costs and seize benefits in the future. Renewable energy projects are a case in point. They demand high capital spending when they are started, but have low running costs from thereon. Power generation based on fossil fuel also requires high investments upfront, but also has high running costs over time. The higher the interest rate, the more these future costs are discounted and the better fossil fuels look compared to renewable energy. By influencing interest rates, monetary policy affects a key factor in this calculation and, thus, investment decisions.

Interest rates may also have potentially significant effects on commodity markets and, thus, resource security. Harold Hotelling argued as early as 1931 that the price of a non-renewable resource should increase at the rate of interest. Similarly, and more recently, research has pointed to the impact of low interest rates on increasing the demand for storable commodities and reducing their supply by lowering the incentive for extraction today rather than tomorrow (Frankel, 2008, 2014). Other researchers echo this view and show global monetary liquidity and low interest rates to be a driver for increases in both spot as well as futures prices of commodities. Lower returns on bonds and the incentive they bring to shift investments into higher-yielding asset classes—including commodities—are one of the channels at work in this context (see, e.g., Chakraborty & Bordoloi, 2013; Eickmeier & Lombardi, 2012). Lower interest rates also decrease inventory carrying costs for commodities and may thus increase incentives to smooth prices and lower volatility (Gruber & Vigfusson, 2012). Such links between monetary policy and commodity prices may have direct and critical consequences for resource security and livelihoods. The plea by Jeffrey Sachs in 2011 for the Fed to end its quantitative easing as “the first and easiest step to counter [the food crisis]” is an example for the calls that are made and the questions they raise (Sachs, 2011). The impact of prices, volatility and correlation on long-term supply and demand in commodity markets and the role of central banks in influencing these variables are cases in point.

At the same time, low interest rates pose significant challenges to savers and institutional investors to meet their return objectives. In January 2012, a working paper from the Bank for International Settlements, the “central banks’ central bank,” pointed to low coverage ratios of pension funds “resulting from an extended period of poor financial market returns followed by very low long-term interest rates” (Ramaswamy, 2012). A few months later, the U.K. pensions minister called the current low interest rate environment a “complete nightmare” for pension funds (Investment & Pensions Europe, 2012). His views were echoed by the Adam Smith Institute, Save Our Savers and the Cobden Centre in an October 2012 report arguing that “low interest rates and QE have poleaxed pension funds” and that “shortfalls in funds must be met by the companies concerned, reducing their investment resources and pushing fragile enterprises towards insolvency” (Adam Smith Institute et al., 2012; see also Ramaswamy, 2012). As a result, low interest rates may be pushing investors into more risky projects to increase returns. In that context, some researchers point to the dangers of “malinvestments” and misallocation of credit that come along with interest rates at current low levels (see, e.g., Garrison, 2012; Polleit, 2011).

Low interest may also be a key driver behind rising asset prices and thus an important factor behind growing wealth inequality. In 2012 the Bank of England published a paper estimating that 40 per cent of the gains resulting from the asset purchases it used to pursue its low interest rate target went to the richest five per cent of households (Bank of England, 2012; see also Elliot, 2012). Shortly thereafter, the *Financial Times* reported that “hedge funds are reaping some of their biggest profits from the securitized mortgage market since 2007” and pointed to the “large liquidity support from the US Federal Reserve” as one of the triggers of “a major rally in mortgage securities that hedge funds have been quick to take advantage of” (Jones, 2012). *The Economist* called the approach to boost asset prices, “make the rich wealthier and then pray that they will spend some of their newfound gains in ways that create jobs: trickle-down monetary policy,” and argued that, “if that is the plan,” we should “have an honest democratic debate about it and pass tax cuts”

(The Economist, 2012b). Other authors take the opposite view and argue that it is actually tight monetary policy that increases inequality (see, e.g., Coibion et al., 2012).

Possible industry and regional biases of interest rate effects are further points to note. While research on the impact of central bank decisions mostly focuses on aggregate economic indicators such as GDP, inflation and employment, a strand of the literature identifies asymmetric impacts of monetary policy on a disaggregate level—both with regard to sectors (see, e.g., Dhal, 2011; Hayo & Uhlenbrock, 1999; Peersman & Smets, 2002; Pellényi, 2012; Rodriguez-Fuentes & Padron-Marrero, 2008) as well as regions (see, e.g., Barigozzi, Conti, & Luciani, 2011). As mentioned above, the level of interest rates, for example, has different implications for renewable energy with relatively higher upfront costs and lower running costs, than on gas-fired power plants with a higher proportion of expenses resulting from operations. Interest rate changes by the ECB have different effects on a country like Greece with government debt at over 170 per cent of GDP compared to Estonia with a debt-to-GDP ratio of 10 per cent (Eurostat, 2014). Measures taken by the Fed to support housing markets have different social implications in Florida with a foreclosure rate of 1:409 than in Vermont with a rate of 1:11, 509 (RealtyTrac, 2014). They also have different impacts in the United States compared to other countries. The potentially destabilizing effects of financial flows into emerging markets as a result of quantitative easing by the Fed and their outflow as a consequence of the Fed's tapering are a case in point—and a development that the Reserve Bank of India Governor Raghuram Rajan pointed to in an interview earlier this year in which he warned that “international monetary cooperation has broken down” (Goyal 2014; see also Rojas-Suarez, 2010). Identifying the connections between such asymmetries and sustainability is critical to assessing and defining future policy.

## 4.2 STANDING FACILITIES AND OPEN MARKET OPERATIONS

Key instruments through which central banks implement their policy rates and other targets include standing facilities and open market operations (OMOs). Standing facilities provide liquidity to banks and other depositary institutions, respectively offering them the possibility of depositing money at their request. The Discount Window of the Fed, the Marginal Lending Facility and the Deposit Facility of the ECB, as well as the Operational Standing Facilities of the Bank of England are examples of that. In contrast, OMOs are market transactions that are initiated by central banks to buy or sell certain assets.

The Fed has historically used OMOs to move the interest rate that depositary institutions charge each other for trading their reserve balances, the Federal Funds Rate, to the target rate as defined by the Federal Open Market Committee. In that context, it conducts permanent OMOs through outright purchases or sales of securities, as well as temporary OMOs for short-term reserve adjustments through repurchase agreements and reverse repurchase agreements. Since the financial crisis, and in particular since 2008, the Fed has also used OMOs to influence longer-term interest rates through several large-scale asset purchase programs, which has significantly increased its holdings of longer-term securities. It has also extended the average maturity of its portfolio through a maturity extension program (also referred to as “Operation Twist”) (Fed, 2014d).

The ECB runs two types of regular OMOs—main refinancing operations providing one-week liquidity in euros, and longer-term refinancing operations providing three-month liquidity in euros. In recent years, the ECB complemented these measures with two operations providing three-year liquidity in euros (maturing in January and February 2015), as well as operations providing liquidity in U.S. dollars. In addition, in June 2014, it announced a series of targeted longer-term refinancing operations (TLTROs) that provide refinancing for loans to the euro area non-financial private sector, excluding loans to households for house purchases, over a window of two years (ECB, 2014c). Main refinancing operations, longer-term refinancing operations and TLTROs offer liquidity through repurchase agreements whereby a bank sells an asset to the ECB and commits to buy it back in the future at a slightly higher price that reflects the borrowing rate.

Next to the critical role played by the policy rates, the use and impact of these instruments are influenced by what assets are bought and sold respectively, and accepted as collateral in these transactions. The Fed currently holds more than 90 per cent of its balance sheet in USD 2.4 trillion in U.S. Treasuries and USD 1.7 trillion in mortgage backed securities (Fed, 2014c). The background memorandum for a recent U.S. Congress hearing argued that the latter “arguably puts the central bank in the position of favoring certain sectors of the economy over the others” (U.S. House of Representatives, 2014). One of the experts at the hearing conceded that this is true, but was appropriate because the sector had suffered disproportionately from the crisis, and quantitative easing is “more effective when undertaken in markets that are impaired” (Bivens, 2014). Chairman Bernanke referred to these purchases as being focused on “the principal types of securities that the Federal Reserve is permitted to buy under the Federal Reserve Act” (Bernanke, 2012). Others point out that, indeed, these are the principal securities, but not the only types that the Fed may take on its balance sheet, and suggest considering adding other assets to the portfolio, for example, securities to “fund public-private partnerships for investment in infrastructure instead of [...] state and local debt” (Diaz-Bonilla, 2012).

The Bank of England currently holds all the GBP 375 billion that it injected under its quantitative easing program in U.K. government securities (“gilts”). It has been urged to review the composition of this portfolio and to consider investing a part of this portfolio into “bonds issued by agencies with a specific remit for productive investment within the UK, such as in housing-building and retrofit, infrastructure and small and medium enterprises (SMEs).” (Ryan-Collins, Werner, Greenham, & Bernardo, 2013). As cash from maturing gilts continues to be reinvested to keep the stock at its current level, a decision on this issue remains a critical one.

The ECB, in 2013, adapted its requirements for collateral to accept asset-backed securities, arguing that this should support lending to small and medium businesses (Steen, 2013). At the same time, its legal framework prohibits “monetary financing,” and thus the purchase of government bonds in primary markets. Moreover, the ECB “may not differentiate between public and private institutions and, in particular, must not give public institutions (such as development banks) better conditions in its refinancing operations than private sector banks” (Cour-Thimann & Winkler, 2013, p. 5).

A central bank’s decision to buy and sell certain types of assets and not others may have significant repercussions for green finance. It may have an impact, as in the case of the purchase of mortgage-backed securities in the United States, on particular sectors. It may be seen, as suggested above for the Bank of England, as an opportunity to fund specific economic priorities, such as house retrofits for climate adaptation. And it may affect, as alluded to by the ECB, the access of finance for small and medium-sized firms. The fact that the massive central bank interventions in recent years were made without exploring the possibility of aligning them with green objectives constitutes a huge missed opportunity. At least part of the newly injected money could have been steered into environmental programs. At least part of it could have been used for what some refer to as “green quantitative easing” or “strategic quantitative easing” (Ryan-Collins, Werner et al., 2013b; Werner, 2012). In that context, it is important to note that central banks worldwide are expected to keep their balance sheets at current high levels for some time to come. To do that, they will need to reinvest their assets as the securities that they hold at the moment mature. As a result, opportunities for green quantitative easing will be presenting themselves again.

A further point to consider is the definition of potential borrowing limits. The ECB TLTROs provide refinancing to banks up to a percentage of loans to the non-financial private sector, excluding loans to households for house purchase. The exclusion of loans to the financial sector is aligned with its objective to ensure growth in credit to the real economy. With the exclusion of mortgages, the ECB reflects its concern about housing bubbles. Both exclusions influence credit allocation and echo the view that there may be a role for central banks to direct private credit creation away from certain sectors—guidance that can be further aligned with the objectives of a green and inclusive economy.

Some central banks—for example, the Bank of England with its Funding for Lending Scheme—have taken this approach a step further and made both the quantity and the price, of refinancing dependent on the amount of loans banks are providing to the real economy (Churm et al., 2012). Others have targeted refinancing schemes at an even narrower sector focus. An illustration is provided by the central bank of Bangladesh that has set up a dedicated BDT 2 billion (USD 26 million) refinancing facility at a concessional rate for projects focused on solar energy, biogas and effluent treatment plants (Bangladesh Bank, 2013). Bank loans for projects in these fields can be refinanced through Bangladesh Bank at a discounted rate of 5 per cent, provided that the interest charged to bank customers does not exceed 12 per cent.

Opinions about such targeted refinancing lines are mixed. Some see them as tools to overcome market failures and as important drivers to pursue key objectives such as poverty alleviation, job creation, food security and green investments. Others fear that they open doors for rent-seeking. They also point to the risk that funds from these refinancing lines are not used for their intended purpose. Moreover, in this context, some warn that the management of these lines takes up management capacity from the central bank and thus reduces its ability to pursue its other tasks, including banking regulation. Understanding these factors is critical for the design of an effective targeted refinancing line. Ensuring adequate monitoring and evaluation capacity in the central bank is essential for its successful implementation. Focusing this instrument on specialized banks—for example, a green bank for a refinancing line for green investments—could be a further success factor.

### 4.3 RESERVE REQUIREMENTS

Reserve Requirements are reserves that depository institutions need to hold as a percentage of customer deposits. Reserves that banks hold above the required levels are called excess reserves. Central banks—in the conventional view—use reserve requirements to influence the amount of money that banks can make loans with. The higher the requirement, the less funds for borrowing are available and the smaller the “money multiplier.” In contrast, proponents of theories of “endogenous money” contend that reserve requirements do not impose a constraint on banks to lend money, as the central banks will always supply them with the reserves they need. In their view, the money multiplier is a “myth” (Kydlund & Prescott, 1990; also see Benes & Kumhof, 2012; Carpenter & Demiralp, 2010).

This fundamental dispute notwithstanding, central banks across the world, including the Fed, the ECB and the PBC, are listing reserve requirements within their monetary policy toolbox. Others, such as the Bank of England and the Bank of Canada, do not set minimum requirements.

Some do not only use minimum reserves to influence the overall availability of credit, but set differentiated reserve requirements to steer credit towards certain parts of the economy. Targeted reductions in minimum reserves in China are a case in point for this. The country introduced a formal two-tier system with different Reserve Requirement Ratios (RRRs) for large and small banks in 2008. Since then, it has made further differentiations in the RRR (Ma, Xiangdong, & Xi, 2011). Most recently, in April 2014, the country’s central bank lowered the RRR by 50–200 basis points for county-level rural commercial banks and rural cooperatives. Two months later, it reduced the requirements for banks that had not yet profited from the April measures and that were holding sizable loans to the farming sector and SMEs. The measure also covered financial institutions that were providing auto and consumer loans (Qing & Shao, 2014; Wall Street Journal, 2014). Along similar lines, but with a different sector focus, Lebanon’s central bank engaged in an initiative to fund renewable energy projects in the country whereby it reduces reserve requirements for banks that are providing loans under the scheme (Campiglio, 2014).

For a thorough exploration of the links between monetary policy and green finance in China, let alone for making policy recommendations, additional research—in particular on a country level—is essential. Nonetheless, the following eight suggestions may provide initial guidance for future action:

- 1. Analyze historical and international experience with credit guidance in order to apply similar schemes for green finance.** As described in Sections 4.2 and 4.3, central banks around the world have used various instruments to steer credit into certain parts of the economy. The Bank of England’s Funding for Lending Scheme, targeted refinancing lines of Bangladesh Bank and differentiated reserve requirements set by the PBC are examples. Further analysis of the successes and pitfalls of such credit guidance would provide a solid foundation to determine if and how similar schemes could be designed to support green investments in China moving forward.
- 2. Identify and mitigate biases in current monetary policy that are misaligned with the objectives for a green economy.** As described in Sections 4.2 and 4.3, monetary policy often comes with biases. The choice of assets that central banks buy and accept as collateral, differentiated reserve requirements, as well as other criteria they set within the instruments they use, may not be neutral for the environment. Identifying such biases and, where possible, mitigating them may be one of the most concrete short-term measures to take.
- 3. Expand central bank reporting to reflect environmental considerations in a key publication.** Reporting by the PBC on the possible relationship between its policies and environmental objectives would be a key contribution towards raising awareness about important interdependencies in its work. It would also provide an impulse, both within and outside of the PBC, to further assess the impact that their policies have on the environment, and vice versa, to expand the knowledge base on the effects of environmental developments on their core mandate.
- 4. Assess the feasibility of steering asset purchases in the context of quantitative easing into green investments (e.g., through green bonds).** As described in Section 4.2, various central banks have significantly expanded their balance sheet in recent years. Many are expected to maintain their balance sheets at current high levels for the foreseeable future and thus continue reinvesting assets as the securities that they hold at the moment mature. An assessment to what extent this also applies to the PBC and, if so, whether their future investments could be steered towards “green quantitative easing” could make an important contribution to policy debates.
- 5. Develop a better understanding of the impact of interest rate levels on the long-term investments needed, for example, in the fields of energy, water and resource security.** As described in Section 4.1, interest rates are a central variable in investment decisions, and green investments may be more sensitive to interest rate changes than other investments. A close examination of this relationship in China would likely provide critical insights into a key factor for green investments.
- 6. Improve the knowledge base about the possible effects of environmental degradation and resource scarcities on price and financial stability.** As described in Sections 3.1 and 3.4, environmental degradation and resource scarcities may have significant effects on core monetary policy objectives—in particular, price and financial stability. Improving the knowledge base about these linkages, what risks they potentially pose to the core mandate of the PBC, and how the PBC could contribute to mitigating these risks would be a key step towards building up resilience.
- 7. Evaluate the possible use of SDRs to fund green investments.** As described in Section 2.3, several suggestions have been made to use SDRs to fund green investments. The governor of the PBC has been one of the proponents of an increased role of SDRs as a reserve currency. China could leverage this leadership role to promote an evaluation of the costs and benefits of a green fund that would be capitalized with SDRs.

8. **Study international suggestions for the introduction of “sovereign money” and alternative currencies.** As described in Section 2.6, suggestions to strip private banks of their ability to create money and to assign that responsibility exclusively to central banks have hit headlines across the world. At the same time, alternative currencies that are being used alongside official currencies are getting more attention. While these developments are at early stages, some economists believe they may be critical pillars for a green and inclusive economy. Further studies of these suggestions and their possible implications for China would be important to determine to what extent such system changes could be a path for greening China’s financial markets.

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