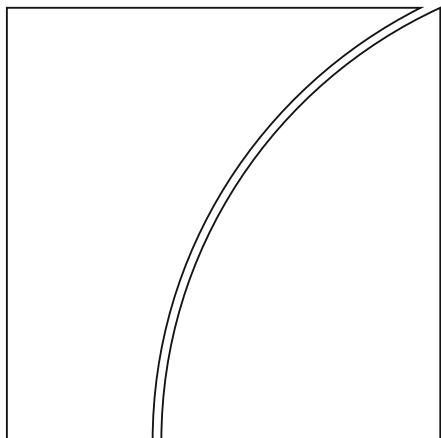




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## Foreword

Jaime Caruana

Central banks are not commercial banks. They do not seek profits. Nor do they face the same financial constraints as private institutions. In practical terms, this means that most central banks could lose enough money to drive their equity negative, and still continue to function completely successfully. For most central banks, one would have to go far to construct a scenario under which they might have to compromise their policy objectives in order to keep paying their bills.

The problem is that not everyone appreciates that a central bank's accounting equity can be negative without any reason for alarm bells to ring. Markets may instead react badly in the false belief that losses imply a loss of policy effectiveness. Politicians may also object, if they leap to the conclusion that bad decisions have been made at the taxpayer's expense, or that the central bank now depends on the government for a rescue. Such harmful self-fulfilling prophecies are in nobody's interest.

Even high-quality, lucidly presented financial statements will not always prevent such misperceptions from arising. Central banks should therefore ideally be equipped with the financial resources and financial mechanisms they need to keep performing their socially useful functions even during crisis periods. Avoiding these risks probably requires sufficient resources and mechanisms to keep equity positive in the face of losses caused by socially beneficial actions. In short, central bank financial independence is important.

The finances of central banks have not traditionally attracted much attention. But it makes sense to revisit this topic now that many central banks are operating far beyond traditional policy limits. The BIS has repeatedly raised concerns about the burdens associated with the unprecedented policy actions taken by some central banks. From the perspective of their own finances, central banks commonly have the strength they need to sustain such burdens, and we have no doubts about the central banks that are currently shouldering extraordinary financial risks. But our confidence is based on an understanding of the special character of central banks that may not be shared by markets and others.

This paper asks what level of financial resources is sufficient and what kind of financial mechanisms are suitable for this purpose. Inevitably, the answers are complex, depending greatly on the individual central bank's economic and political environment, as well as its functions. The paper provides a framework for thinking about these questions, and identifies some preferences.

One element we consider especially important is a properly designed surplus distribution arrangement. Such arrangements have two key characteristics. First, retentions and distributions should be strongly linked to a target for financial resources that is in turn scaled to the potential need for such resources in times of crisis. Second, payouts should be avoided from unrealised revaluation gains and income on particularly risky assets as if these represent final profits.

For the sake of trust-building, it is desirable that unrealised income and income on particularly risky assets are *transparently* ring-fenced from distributions, rather than hidden from the distribution scheme by accounting policies. This would mean fair value treatment for financial instruments whose changes in value are likely to be

of particular interest to taxpayers. Of course, central banks carry many assets and liabilities where changes in value are just not relevant, even under International Financial Reporting Standards (IFRS). But where distribution arrangements cannot be structured to match the key characteristics mentioned in the preceding paragraph, two accounting policies could make sense for central banks. The first is the use of revaluation reserves – and especially in an asymmetric manner, treating unrealised gains and losses differently – even for securities actively traded for policy reasons. The second is the use of general risk (“rainy day”) provisions. Revaluation reserves have the advantage of being transparently rule-driven. General provisions have the advantage of flexibility. These accounting policies may not be fully consistent with IFRS, but there are good reasons for their adoption.

For some central banks, arrangements that transfer risk to the fiscal authority may also be worth considering. Government indemnities for the financial consequences of unusual policy actions have been useful in certain cases. These are not, however, without problems. Public finances may be under stress at precisely the same time as those of the central bank. And given the implications of risk transfer for the public purse, such arrangements clearly work best in situations where society would prefer decision-making responsibility to be shared with, or even fully retained by, elected officials.

We also suggest that parts of the central bank’s balance sheet might on occasion usefully be ring-fenced and treated separately. This could make sense especially in the context of certain risk-transfer arrangements, but also for the purpose of communicating the non-standard and temporary nature of some financial exposures acquired in crisis circumstances. Two simple examples of such arrangements are subsidiaries and special purpose vehicles. When used to reduce transparency, subsidiaries and special purpose vehicles work against trust-building. But when they are used to clarify the evolution of a central bank’s finances and the nature of the links with policy actions, they can be helpful.

All these measures are best put in place in normal times, in anticipation of future stresses. This is because a central bank may need far greater financial resources in a crisis than in normal times, and these may not be available from strained public finances. The upshot is that the scale of the resources that a central bank might need to have on hand in case of a crisis could seem excessive to many people during tranquil times. Achieving the desired level of prepositioning of financial resources may therefore be politically difficult. The transfer of risk associated with properly designed surplus distribution arrangements, as well as special purpose risk-transfer arrangements, may also appear to conflict with political preferences. Yet, it is in the interests of society that central banks can continue performing their socially mandated functions, even during times of extreme stress.

Central banks therefore need to identify the minimum set of financial arrangements that will allow them to keep operating in such periods, in readiness for opportunities to establish fully robust financial foundations. These arrangements will naturally vary from country to country, so a common benchmark is not feasible. Instead, this paper is intended to help build an understanding of the thought process that might be used by a country seeking to identify minimum and desirable arrangements for its own circumstances.

## Overview and conclusions

1. Central banks exist for different purposes than commercial banks. They pursue national welfare, not profits. Their financial results are often a poor guide to their success.
2. Central bank gains and losses belong to society. Beyond this, financial results may be important for a central bank even though it can always create money to pay its bills, cannot be declared bankrupt by a court, and does not exist to make profits. Losses or negative capital may raise doubts – however erroneous – about the central bank's ability to deliver on policy targets, and expose it to political pressure.
3. Standalone financial strength can therefore buttress a central bank's credibility, especially where that has been weakened by its historical record, institutional arrangements or the political climate. Conversely, where credibility is otherwise unquestioned, financial strength may add little to a central bank's capacity to execute policy successfully. This alone makes it challenging to say what level of financial backing a given central bank needs.
4. In addition, financial strength should be scaled to the financial demands of the functions for which the central bank has independent responsibility. These financial demands may be much greater in a crisis than in normal times. Recent experience underscores this point. It is no easy task to assess the financial demands that might be encountered in times of stress for central bank operations, and to understand the specific crisis responsibilities of central banks.
5. If financial resources are scaled to match possible emergency demands, large buffers may build up in normal times, particularly for central banks with wide-ranging crisis management responsibilities. To ensure that central banks have independence in deploying them, such buffers need to be on the balance sheet, and available for use. Achieving this with capital invested in government securities need not be costly when viewed from the perspective of the whole public sector. But legal or practical (eg market pricing) limitations related to the size of the gross public debt, and to the central bank's ability to hold such debt, may exist. Moreover, political risks may arise, given what might (wrongly) appear to be an unneeded pot of public money available to fund desirable projects.
6. The size of financial buffers needed to assure a continuing independent operational and policy capability is affected by accounting policies, profit distribution and recapitalisation mechanisms, capital targets and risk-sharing arrangements. Decisions on these factors should be made in concert with decisions on a central bank's independent responsibilities and its consequent need for independent financial strength:
  - With respect to accounting policies, this may imply departing selectively but transparently from International Financial Reporting Standards.
  - With respect to distribution mechanisms for profits, this requires avoiding a bias towards decapitalisation or arrangements that impede a rapid rebuilding of equity.
  - With respect to risk-sharing arrangements, again the issue is to match financial independence with the demands of policy independence.

Exactly how these decisions are integrated is less important than they be considered as a package – a package designed to support operational and policy effectiveness even during crisis times, while maintaining throughout the trust of the community.

7. The need for financial resources is also a function of the risk that a central bank's finances may be mistakenly thought important for its capacity to function, as if it were a commercial bank. The scale of financial resources required can be reduced by improving the understanding of stakeholders and observers. High-quality financial disclosure, lucid explanations of links to policy and operations, and education of financial sector observers, the public and their political representatives are all important.

## Introduction<sup>1</sup>

The United States' recent financial crisis induced the Federal Reserve to make a number of unconventional policy interventions, many of which changed the Fed's financial risk profile. The Bank of England found itself in a similar situation. The ECB and the Eurosystem's national central banks were also faced with a string of financial crises, albeit of somewhat different origins. These central banks too have resorted to unconventional measures that are larger and financially riskier than any previously undertaken. And confronted by inflows of money seeking a safe haven, the Swiss National Bank has intervened heavily and repeatedly since 2009, with massive consequences for its balance sheet and the accompanying financial risks.

Even as these dramatic increases in the financial riskiness of leading central banks began, Willem Buiter was prompted to write a note asking: "Can central banks go broke?"<sup>2</sup> And after the Swiss central bank reported heavy losses in 2010 and the first half of 2011, Thomas Jordan was moved to give a speech enquiring rhetorically: "Does the Swiss National Bank need equity?"<sup>3</sup> While both provided relatively reassuring answers, they also suggested that challenges to the independent effectiveness of a central bank could result from financial weakness.

Such concerns are normally reserved for countries with underdeveloped financial systems and long histories of problems with economic governance. That they have now come up in connection with more advanced economies is part of the motivation for this paper. Changes in central banks' mandates, and the continuing use of non-standard policies during ongoing financial crises, are likely to affect central bank finances, especially if their financial buffers have not been reinforced for such a situation. How might that matter? Could policy objectives be threatened, and if so, how? What options might be available to limit unintended consequences for central banks' policy effectiveness, while preserving accountability? These are matters addressed in this paper.

The paper is structured as follows. Part A outlines the character and purpose of central banks and how they differ from commercial banks, and defines what is meant by finances and financial strength. Part B provides data on the financial strength of a representative sample of central banks. It illustrates the components of financial strength, and demonstrates large disparities across central banks. The reasons for these disparities are addressed in Part C, which allows us to explore the question of how much financial strength is required in specific circumstances. Part D presents a framework for assessing what degree of financial strength and capitalisation is appropriate.

Some data presented in Parts B and C are unavailable from public sources. In many cases, the institution has been anonymised; however, some non-public data are presented and attributed, with permission. Specific cases are discussed to illustrate points, but without intent to praise or criticise. As will become clear, there

<sup>1</sup> In grateful and fond memory of Andreas Keller (Swiss National Bank). A sincere thank you as well to numerous colleagues at central banks and at the BIS, for the wealth of ideas, information, patience and goodwill.

<sup>2</sup> Buiter (2008). Buiter was not first to address the issue of central bank finances (see Part A.2), but is mentioned here both because his note was prompted by the first round of extraordinary policy actions by central bank in the recent crises and because of the striking title.

<sup>3</sup> Jordan (2011).

are good reasons why there is no standard rulebook or practice for central bank financial management. The specific cases illustrate the reasons for this diversity.

## Part A Preliminaries: understanding central bank finances

### 1. Basics and concepts

#### a. Role and ownership

To understand central bank finances, it is first necessary to understand the role of central banks.

For over a century, central banks have been institutions of public policy, not commercial entities. Indeed, the vast majority of today's central banks were created from the outset as public policy institutions. For the small number that were set up originally as privately owned profit-seeking commercial companies, the growing conflicts of interest that accompanied their increasingly important role as the financial sector's informal police force and fire brigade led to their progressive withdrawal from commercial activities. Profit faded as an objective, to be replaced by financial system and currency stabilisation. Except for a few activities related to the provision of financial infrastructure, this withdrawal was largely complete by the beginning of the 20th century.<sup>4</sup>

Most central banks were publicly owned from the start. And many of the central banks that started out privately owned were nationalised during the 20th century.<sup>5</sup> For the handful of central banks which continue to have private shareholders, the rights of ordinary shareholders to select management and determine strategy are severely circumscribed, and allow no role in the formulation of public policy. Dividends to private shareholders are predetermined or limited in law, making these central banks wholly or mostly independent of the profit motive, and removing a potential conflict of interest between private financial advantage and public welfare.<sup>6</sup> Residual financial surpluses are transferred to the government in all such cases, creating instead a potential conflict between central bank policy and public finance objectives. If holes appear in the finances of the central bank, they are filled by transfers from the government – if at all. Accordingly, governments are the *beneficial owners* of all central banks (a term we will use throughout).<sup>7</sup>

A defining feature of central (as opposed to commercial) banks is that their customers are effectively captive. Most counterparties of the central bank do not

<sup>4</sup> At the beginning of the 20th century, there were only 18 central banks in existence. By the end of the 20th century, that number had grown to 173.

<sup>5</sup> Central banks established in the first third of the 20th century were, however, often constituted with private shareholdings, notwithstanding their public policy functions. From the 1930s on, many privately owned central banks were nationalised (the Reserve Bank of New Zealand in 1935, the National Bank of Denmark in 1936, the Bank of England in 1946, for example). The US Federal Reserve System is perhaps the best known example of a central bank established in the 20th century that continues to have private shareholders. The central banks of Belgium, Greece, Italy, Japan, South Africa, Switzerland and Turkey also have private shareholders.

<sup>6</sup> For example, annual dividends are limited to 5% of the face value of shares at the Bank of Japan, 10¢ per share at the South African Reserve Bank, 6% of face value at the Swiss National Bank, and 6% at the US Federal Reserve.

<sup>7</sup>  As shares in most central banks are not for sale, the central bank's current net asset position is not needed by capital markets as an input for valuing their equity shares. This removes one of the standard arguments for regular financial reporting on the basis of current market values of assets and liabilities. Protection from insolvency proceedings and the ability legally to operate with negative equity (discussed shortly) removes another. The implications for accounting and financial reporting policy choices are discussed in Part C.

voluntarily engage with it on negotiated terms, after comparing alternatives. This is because the central bank's "monetary" liabilities – banknotes and banks' call deposit accounts at the central bank (referred to collectively as base money below) – are *the* means of payment within the central bank's jurisdiction, legally and by social convention.<sup>8</sup> A central bank is the monopoly supplier of base money in its jurisdiction and can create such money at will, instantaneously, and at virtually no cost. And its customers are required to accept it. Accordingly, a central bank does not face the liquidity constraint faced by commercial banks and other entities, including the government.

### b. Form and structure

As it happens, most monetary authorities have been set up as banks: hence "central banks".<sup>9</sup> Accordingly, most monetary authorities have an explicit balance sheet and an associated profit and loss account. They have customers from whom they borrow and customers to whom they lend. They charge interest on loans, receive interest on other investments funded by their borrowings, and usually pay out less in interest on such liabilities than they generate from their assets. And much of commercial banking's clothing has been adopted by central banks, with increasingly similar titles for senior staff (eg chief financial officers are replacing chief accountants, chief risk officers are becoming more widespread), and there is a growing emulation of commercial banking's risk management and asset and liability management frameworks.

As a result, it is hardly surprising that casual observers find it difficult to understand where the parallels between central banking and commercial banking start and where they end. The relationship between the central bank's financial position and its ability to perform its tasks is one such source of potential confusion. Is a healthy balance sheet needed for policy success? Can policies run out of steam because they are not profitable?

The economics profession has struggled to understand how and why the financial position of the central bank might matter for its ability to conduct its policies successfully. For a commercial bank, it seems straightforward that an unprofitable bank will eventually be unable to pay its bills and thus be bankrupted – such a bank could hardly continue to function unchecked. However, the relevance of a central bank's finances for its ability to perform its policy tasks is less obvious.

For one thing, although set up as banks, central banks are not usually subject to standard bankruptcy proceedings, and do not normally face minimum capital requirements.<sup>10</sup> Even though they are structured as banks, central banks are not normally set up under company law, or subject to legislation on the licencing and

<sup>8</sup> There are exceptions, such as when residents use foreign currency in parallel to or instead of the domestic currency as a means of payment. In Latin America, for example, official or unofficial dollarisation was widespread in the 1990s and early 2000s.

<sup>9</sup> A monetary authority need not be a bank. Some are currency boards, which may or may not issue banknotes. Prior to the relatively recent (for most countries) innovation of central banking, national treasuries often conducted many of the functions of modern central banks. Even today, most national treasuries borrow and lend without themselves having the need for a formal balance sheet or banking structure. A banking structure may be convenient for a monetary authority, but as will become clear, it is also a source of confusion.

<sup>10</sup> There may be rare exceptions that we are not aware of. Until as recently as 2011, the National Bank of Belgium was indeed subject to company law provisions that require automatic dissolution once 50% of capital has been depleted.

prudential regulation of financial institutions. Company law typically allows creditors to petition courts to declare a debtor bankrupt and appoint a receiver or liquidator to take control of the assets. And in cases where company law is applicable, the central bank is almost always explicitly protected from bankruptcy or related proceedings through exemptions granting the highest body of the institution or the state the exclusive right to liquidate the institution.<sup>11</sup> Thus a central bank can have balance sheet liabilities that exceed balance sheet assets – that is, it can be “balance sheet insolvent”,<sup>12</sup> according to the accounting conventions used – and yet remain immune to creditor proceedings, or regulatory intervention based on breaching minimum capital ratios, which could otherwise stop it from continuing operations.

Terminology, as used in this discussion:

By *balance sheet solvency* we mean reported assets exceed reported liabilities, thus providing *positive net worth in accounting terms*. Positive net worth in accounting terms means that there is positive *shareholder equity*. (Because central banks rarely have traded shares, there is usually no market value analogue to balance sheet equity.)

*Comprehensive net worth* is the present value of probable future income, minus the present value of probable future expenditures. It is a forward-looking version of net worth, allowing for assets and liabilities that are not registered on the balance sheet. The *comprehensive balance sheet* is the balance sheet augmented to include such assets and liabilities. (Note: this bears a relationship to but is not the same as an accountant’s notion of comprehensive net income. The accounting concept is not forward-looking).

### c. Financial resources and financial strength

A further preliminary matter is to define more carefully what is meant by “financial resources” and “financial strength”. In our terminology *financial resources* are those financial elements that can absorb or buffer losses and/or provide a base for income generation. They may currently be present and available, or callable.

The right to call for fresh resources is to be distinguished from a generic reliance on the owner’s deep pockets. While in principle the beneficial owner of the central bank – the government – has both deep pockets (through the power to tax) and an unlimited liability for the good functioning of the institutions of society, in practice central bank and public finances may be under pressure at the same time. Politicians who are also under pressure may be driven by incentives that are at odds with the long-term public policy objectives given to the central bank. Moreover, reliance on a government backstop may imply forgoing functional independence. He who pays the piper can usually call the tune (whether openly or unobserved). It matters, therefore, whether viability is assessed in terms of *standalone* financial resources, or of the combined financial resources of the central bank and its sponsor/owner. This paper is concerned with the former.

*Financial strength* includes financial resources but goes further to consider risk transfer or insurance arrangements and, importantly, institutional design features

<sup>11</sup> For example, such exemption clauses can be found in central bank law in Austria, Greece, South Africa, Switzerland and Turkey.

<sup>12</sup> Some insolvency specialists draw a distinction between “balance sheet insolvency” and “equitable insolvency” (see Lastra (2009) for a discussion of the distinction in a commercial banking context, and Buiter (2008) for a discussion in the central banking context). Equitable insolvency bears some relationship to illiquidity, whereas balance sheet insolvency has the same meaning as used here (see the box above). At the same time, equitable solvency *throughout the future* bears a close relationship to comprehensive net worth.

that help maintain financial resources over time. For example, surplus distribution arrangements that give priority to achieving and maintaining a given level of financial resources provide financial strength, whereas distribution arrangements that give priority to continuing transfers to the government do not.

The most fundamental source of financial strength is assured profitability through time – ie *positive comprehensive net worth* – coupled with mechanisms that make temporary fluctuations in accounting net worth (including into negative territory) essentially irrelevant. Comprehensive net worth is not commonly measured and reported. We do not attempt to measure it, but we allude to the concept when discussing *structural net income* – the discounted present value of which constitutes comprehensive net worth.

Some brief elaboration on how these terms relate to *capital* may be helpful, since discussions of central bank finances often focus on capital and its adequacy. Starting at the narrowest end of the range of components of financial strength:

- *Capital* refers to the money committed unconditionally by the owners of the central bank, either at the central bank's foundation or subsequently by way of a new injection of funds (eg in a recapitalisation). For most central banks, "capital" is foundation capital, and is a historically determined number that is small relative to reserves built from retained earnings. Foundation capital rarely acts as a buffer – it is rarely written down. The Bank of Mexico, for example, continues to report MXP 8,284 million of capital even in years when total equity is negative.
- Capital is only one component of *equity*, which also includes more active buffers such as reserves (built through retained earnings that are not distributed to shareholders as dividends), retained earnings (ie profits pending distribution or transfer to reserve), revaluation accounts (a special buffer tied to changes in the value of assets and liabilities in the books of the central bank), and general provisions against risks that are yet to be realised.
- Our definition of *financial resources* goes beyond equity to include callable resources. In a few cases (eg the Bank of Korea), central banks have the right to call for fresh capital from their owners, and that call is enforceable.
- And our definition of *financial strength* goes further again, to allow for risk transfer mechanisms that work in favour of keeping the central bank's financial resources intact. These risk transfer mechanisms may include the structure of the rules governing the distributions of dividends.

Our definition of financial strength is therefore multifaceted. As will become clearer, long-run profitability while simultaneously fulfilling policy and operational objectives is the underlying core – although it is rarely visible in regular financial statements. Because visible financial buffers – ie those that appear in the published financial statements – matter both for market and political reactions (important for the ability to meet objectives) and for profitability, accounting equity is also relevant. As we are concerned about standalone financial strength, the ingredients of structural profitability and visible financial buffers must be under the independent control of the central bank in order to qualify for this definition.

Some private sector economists have recently made some calculations that illustrate the potential quantitative importance of these distinctions. The table below summarises their calculations for three central banks.<sup>13</sup>

Illustrations of the quantitative significance of different concepts

Table 1

	Eurosystem (€ billions)	Bank of England (£ billions)	Federal Reserve (\$ billions)
Comprehensive net worth at price stability	5,068	237	4,172
Shareholder equity (end-2010)	411	4.8	134
Total assets (end-2010)	2,002	247	2,428

Comprehensive net worth here consists of the sum of the present value of future seigniorage income, conventional shareholder equity, and the stock of banknotes outstanding.

Sources: Buiter and Rahbari (2012), and central bank financial statements.

## 2. The relevance of own finances, as viewed from the economics literature

The literature identifies three reasons to think that a central bank's financial state may be of little relevance to its ability to discharge its policy obligations: (1) base money can be created as needed; (2) base money monopoly seemingly assures long-run profitability, since these liabilities carry no servicing cost;<sup>14</sup> and (3) government ownership provides a backstop. All three have been subject to challenge.

### a. Theory

Bindseil et al (2004) argue that for as long as people are willing to hold central bank liabilities at no interest and base money grows at least as fast as operating expenses, adverse events will just be bumps along a road of assured long-term financial strength. From this perspective, the comprehensive net worth of the central bank is greater than the net assets registered on the published balance sheet. This is because published balance sheets do not include intangible assets such as the franchise value of the (monopoly) right to issue base money (Fry (1992), Stella (1997), Ize (2005), Buiter (2008)).<sup>15</sup> Fry (1992) shows that comprehensive net worth

<sup>13</sup> The numbers presented for comprehensive net worth in Table 1 are extracted from a matrix of values calculated by Buiter and Rahbari using different assumptions. For illustrative purposes and without implied judgment we have selected the values corresponding to country-specific estimates of the interest rate semi-elasticity, but identical estimates and assumptions for the output elasticity of currency demand (0.8), trend real growth rates (1.5% per annum), inflation (2% per annum), and discount rates (4%).

<sup>14</sup> We ignore printing and other currency management costs, as well as the costs of maintaining computer systems to support deposit accounts at the central bank, as they are typically trivial in the scheme of things.

<sup>15</sup> This assumes that the central bank does not have contingent or other off-balance sheet liabilities with a net present value larger than the unregistered franchise value of its monopoly over base money issuance.

could reach over one third of annual GNP even in (stylised but realistic) cases where prices are stable.<sup>16</sup>

However, the ability to create base money and exchange it for the resources needed to run the central bank, or for the assets used in the implementation of policy, may not be the financial cold fusion device that it first appears to be. There are limits. BIS (1996), Friedman (2000), Goodhart (2000) and Santomero and Seater (1996) amongst many others discuss the prospect of central banks' currency note issue eventually being crowded out by e-monies. Also, central banks may effectively lose their monopoly right to issue currency notes through dollarisation (Papi (2011)). More generally, the return (in terms of higher central bank revenues) coming from monetary expansions is thought to follow a seigniorage Laffer curve, declining after some peak as inflation continues to rise (Cagan (1956), Anand and van Wijnbergen (1989), Easterly, Mauro and Schmidt-Hebbel (1995) and Buiter (1986)).

The limits that result from changes in the behaviour of base money holders as the value of base money erodes are not, however, the ones most likely immediately to bind. The inflation rates required of policymakers by the macroeconomic objectives written in their governing laws are typically well below those at which central bank revenue would peak as inflation rises.<sup>17</sup> At first glance, this might be taken to imply: end of story – the revenue consequences of inflation higher than that consistent with policy objectives are irrelevant. But from another angle, this simply reveals that the issue is a potential conflict or trade-off between policy and financial objectives.

Stella and Lönnberg (2008) coin the term "policy insolvency" or "policy bankruptcy" for cases where the only way to assure long-run profitability – absent transfers from the government – is to increase base money at a rate inconsistent with the policy objective.<sup>18</sup> Buiter (2007) derives analytically the conditions under which such a Laffer curve would render an inflation target "not independently financeable" by the central bank – by which he means not consistent with the central bank's long-term profitability and hence positive comprehensive net worth.<sup>19</sup> Stella and Lönnberg's policy insolvency can be thought of as being a state in which the chosen inflation target is not independently financeable by the central bank.

Yet how often do central banks find themselves in a situation where long-run profitability is so tenuous that their comprehensive net worth could be negative, such that they may face policy bankruptcy because the inflation target is not independently financeable? This is an empirical question. The second line of argument – that monopoly over base money issuance assures long-run profitability – suggests that such circumstances would be rare indeed. If so, we need not concern ourselves with the financial state of the central bank getting in the way of

<sup>16</sup> The relevance of the qualifier is as follows: the higher inflation is, the higher nominal interest rates are and therefore the wider the central bank's net interest margin is (assuming a non-trivial proportion of base money liabilities bearing no interest, and earning market-related yields).

<sup>17</sup> Easterly, Mauro and Schmidt-Hebbel's (1995) work suggests inflation rates of around 250% for the sample of 11 high inflation (>100% per annum) developing country cases during the period 1960–1990.

<sup>18</sup> Fry (1992) had suggested that insolvency for a central bank is defined by a situation in which accelerating inflation is required in order for it to continue to service its liabilities.

<sup>19</sup> Buiter also derives the conditions under which an inflation target is not "jointly financeable" by the central bank and treasury working together. In such a case, the inflation target is infeasible, since the government cannot even bail out the central bank to make the target financeable.

its policy goals. Such is the view often taken by economists whose view of central banking was formed in the context of a large developed financial market such as the United States. (Being an empirical question, the available evidence will be discussed in the next section).

The third strand of argument for being unconcerned about a central bank's finances involves the owner's deep pockets. Negative comprehensive central bank net worth on a standalone basis might not matter if the government's power of taxation provides a backstop, and that backstop can be deployed without getting in the way of policy.<sup>20</sup> Most macroeconomists implicitly assume that this is the case, by considering monetary policy and public sector finances within a unified institutional structure that conflates the monetary and fiscal authorities (see, for example, standard macroeconomics textbooks such as Romer (2011) and Walsh (2010)). Even so, standard macro commonly treats inflation as a source of tax revenue, and a potentially efficient source at that.<sup>21</sup> The possibility of a conflict between policy objectives of price stability and efficient financing of government spending arises. In more extreme circumstances, a fiscal authority with a wilful disregard for monetary policy might force inflationary financing to play a larger role than is consistent with price stability (Sargent and Wallace, 1981). The possibility of such fiscal dominance in the future may also play a role in normal times. If inflation is used as a revenue-raising device in normal times, signals are provided about the government's policy preferences in the management of its inter-temporal budget constraint. The greater the perceived chance that the inflation tax will be used when public finances are constrained, the more likely it is that a shortfall in the central bank's contribution to government revenues will result in higher inflation rates rather than higher tax rates.<sup>22</sup>

Such public finance considerations provide reasons for doubting that central bankers could always rely on the availability of transfers from tax revenues to plug holes in the comprehensive balance sheet, at least without impeding their pursuit of price stability. Furthermore, because the bigger concern of policy designers has

<sup>20</sup> Buiter (2008) indeed argues that the taxpayer, through the treasury, is the *ultimate and only* guarantor of central bank solvency. National fiscal authorities must therefore let it be known that they are underwriting the central bank's net worth. He does not address (in this 2008 paper) the implication of this crucial role of the fiscal authorities for central bank policy effectiveness, in circumstances where central bank independence has been instituted to support achievement of public policy objectives (for example, by making credible a price stability objective, or a promise not to forbear on enforcing regulation).

<sup>21</sup> Phelps (1973), Poterba and Rotemberg (1990) and Chari and Kehoe (1999). If inflation were widely considered in practice to be one of many tax sources, certain cyclical properties would be observed. They generally are not, according to Roubini and Sachs (1989), and Edwards and Tabellini (1991), although Delhy Nolivos and Vuletin (2012) suggest that this may be a result of not controlling different degrees of central bank independence (independent central banks would not adjust the tax – ie inflation – rate countercyclically or fill gaps left by weakness in other tax revenues).

<sup>22</sup> Under the fiscal theory of the price level, prices are indeterminate until the fiscal authorities choose a policy path, making the price level a joint function of fiscal and monetary policy (see Leeper (1991), Sims (1994), Woodford (1995), and Kotcherlakota and Phelan (1999)). Sims (2003, 2008) suggests that the ability to ignore the central bank's separate identity depends on the understanding that the taxes ultimately backstop the central bank's net worth. Where that backstop is not available – Sims suggests that the ECB may be in such a position – the central bank may need to worry more about preserving its net worth. Zhu (2003), on the other hand, creates an independent role for the central bank's finances within the Benhabib et al (2002) fiscal theory model by assuming that the central bank cares about its own net worth. In a liquidity trap, that concern for its own finances stops the central bank undertaking sufficiently aggressive policy, resulting in macroeconomic instability (local indeterminacy and bifurcation).

been to prevent overuse of the inflation tax,<sup>23</sup> institutional separation of the central bank and the treasury has been favoured, with the central bank being endowed with a price stability objective that dominates any financial considerations relating to inflation tax revenue forgone.<sup>24</sup> In this context, the assumption of a unified public sector is no longer valid. Since institutional separation to limit the role of political preferences in policy could be undermined if politicians remain ultimate paymasters, reliance even on future transfers from tax revenues to support the central bank's comprehensive net worth would conflict with the institutional design objectives. For Ize (2005), to maintain inflation credibility, a central bank needs its comprehensive net worth (its future real profits) to be non-negative, even if *current* profits and/or *current* accounting equity are negative. Buiter (2008) arrives at the same conclusion.

There is thus a body of literature that rejects the idea that a central bank's financial state is *by nature* irrelevant to its ability to discharge its policy obligations, on all three grounds that might have led to that conclusion. In relation to all three grounds, this body of literature cites examples or empirical evidence to the contrary, suggesting that the policy irrelevance of a central bank's finances is not a given. (1) Base money can be created as needed, but potentially at the expense of price stability. (2) A monopoly over the issuance of base money does not guarantee long-run profitability, except again at the potential expense of policy objectives (and even then there are limits). And (3), government beneficial ownership provides a financial backstop that may contain a poison pill, by damaging policy performance through changing decision-maker incentives. To assess how common and therefore practically relevant are these counter-examples and limitations, we now consider the empirical evidence.

### b. Empirical evidence

The most significant empirical matter is whether central banks by nature always enjoy a stable and voluminous source of earnings. Martínez-Resano (2004, p8) describes this idea as "naïve". Schobert (2008) reports 43 cases of loss-making of at least one year, out of 108 central banks during 1984 to 2005. And Stella and Lönnberg (2008) present a table showing 15 Central and South American cases that between 1987 and 2005 had losses for five or more years running, with eight of those cases involving loss runs for a double-digit number of years.

Fry (1992) notes that published profits are typically much lower than calculated seigniorage revenues, with the difference usually being explained by holdings of substandard (non-market) assets and expensive liabilities. In a pared-down framework, Ize (2005) focused on the carrying cost of net foreign currency reserves and the relationship between the growth of central bank operating costs and currency issuance. With this stylised representation of the long-run profitability

<sup>23</sup> Overuse here implies misperceptions of the cost of inflation or misaligned decision-makers' incentives that allow higher than optimal inflation.

<sup>24</sup> There are two main strands of the literature arguing for institutional separation/independence. The first is rooted in models where an inflation bias is sourced in the interplay between inflation and short-term output trade-offs, and the resulting impact on *expectations* of policymaker behaviour (Barro and Gordon (1983); Persson and Tabellini (1993); Walsh (1995); and Albaresi et al (2003)). The second focuses on the influence of political competition on macroeconomic policy as a source of economic cycles or fluctuations (starting with Alesina (1987) and in subsequent work with various co-authors; and Drazen (2000)). Although these sources of inflation bias are conceptually independent of inflation tax considerations, by also motivating institutional separation, they likewise undermine the proposition that the central bank could rely on government bailouts to assure financial strength without potentially getting in the way of achieving policy objectives.

problem, he concluded that the average low-income country's – and several middle-income countries' – central bank is unlikely to have sufficient "structural" profits<sup>25</sup> to allow it to operate without either an equity base large enough to fill the income gap, or inflation above levels consistent with price stability. In other work, Ize (2006) found that in a sample of 87 central banks in 2003, about one third had negative structural profits, typically as a result of both negative net interest margins and relatively high operating costs. Net interest margins for the two thirds of the sample with positive structural profits were on average *positive* (to the tune of nearly 10% of currency on issue), whereas they were more than *negative* for the other third (to the tune of over 3%). The lack of structural profitability for the weak group was exacerbated by its comparatively high operating costs (40% higher than for the other group, on average, as a proportion of currency issuance).

Clearly, it cannot be the case that central banks are profitable *by nature*. There are too many counterexamples. Indeed, one of the points to be made in this paper is that central banking is highly diverse in its finances (as well as in other characteristics). Even in normal times, long-run profitability is tenuous for many central banks.

What accounts for these apparent violations of the proposition that monopoly control over base money issuance is a guarantor of profitability? Fry (1992) puts the blame squarely on quasi-fiscal activities taken on by central banks or forced on them.<sup>26</sup> Others point the finger more at exchange rate-related issues. Schobert (2008), for example, reports that of the 8% of annual financial statements surveyed (of 108 central banks, between 1984 and 2005) where losses were reported, the great majority had sterilisation costs or exchange rate losses as the biggest expenditure items.<sup>27</sup> Cukierman (2011) suggests that monetary regime changes and structural changes to the financial sector are both conducive to loss-making by the central bank, especially in countries with narrow financial markets. We will also suggest that part of the reason is grounded in the nature of financial systems in less advanced economies, and is thus structural (Section 1 in Part C).

Still, if not irrelevant by *nature*, and financial weakness is not in practice rare, it might be the case that a central bank's financial state is in practice *usually irrelevant*

<sup>25</sup> Roughly, profits generated from assets backing the currency issuance, net of interest expenses associated with interest-bearing liabilities and operating costs. See also Ize (2005).

<sup>26</sup> Quasi-fiscal actions may be thought of as redistributive policy actions that could have otherwise been undertaken by the fiscal authorities on budget, via some combination of taxes and subsidies.

<sup>27</sup> The Fry and Schobert views are not necessarily at odds. Mackenzie and Stella (1996), among others, argue that exchange rate related actions are often quasi-fiscal in character, in that they are redistributive (eg favouring exporters), and could in principle have been done instead on budget via explicit taxes, subsidies or expenditures. The dividing line between fiscal and monetary policy activities is not at all clear, given that many monetary actions have both distributional and fiscal consequences (in part, through the central banks' own finances). For Goodfriend (2011), credit policies – defined as actions that change the composition of the central bank's balance sheet but which, by not affecting bank reserves or the interest paid thereon, do not change the federal funds rate – fall clearly over the line. Monetary policy and interest-on-reserves policy (the other two categories that he discusses) have fiscal effects but are more obviously monetary in nature, he notes. Even so, at the zero lower bound, Goodfriend argues that risks to profits and hence fiscal income may become large and require the *ex ante* support of the fiscal authorities if the central bank's financial independence is to be preserved. Shirakawa (2010) is clearer still: "Unconventional policy measures taken by a central bank involve quasi-fiscal elements, such as potential taxpayers' burden incurred by a loss from such operations, and intervention in resource allocation at a micro level. ... Since [...] such measures need to be decided and implemented by government in democratic society, a central bank falls into a difficult position, when decisions by government are just postponed."

*to its purposes.* Ize (2006) provides *prima facie* evidence that it is not irrelevant in general to central banks' policy purposes. In the division of his sample of 87 central banks into those with positive and those with negative structural profits, he found average inflation in the former group to be about one third of the average rate in the latter in 2003 (3.5% versus 9.5%). Stella (2003) used the same approach (weak versus strong finances, although based on central bank losses, for a different sample, and for three years – 1992, 1996 and 2002) and produced similar results. Stella (2011) used a wider sample, a different set of years (1992, 1997 and 2004) and a different definition of financial strength ("capital" and "other net items" in the IMF's International Financial Statistics) to obtain much the same picture: central banks with weak finances tend to have higher inflation outcomes (twice as high<sup>28</sup>).

There are also several case studies to consider. According to Friedman and Schwartz (1963), the Fed's concern for its own net worth was a factor in preventing an aggressive expansionary response to the emerging Great Depression. Winding the clock forward, Ueda (2004) discusses the cases of Venezuela in the 1980s and 1990s, and Jamaica over a similar period, as examples where financial weakness had forced abandonment of inflation control.<sup>29</sup> Japan has itself been cited as an example of monetary policy being constrained by financial weakness – or rather, the threat thereof. Van Rixtel (2009) among others quotes several key Bank of Japan policymakers as expressing concern about aggressive quantitative easing potentially leading to a loss of independence through a weakening of the Bank's finances.<sup>30</sup>

In other references to specific cases, Dalton and Dziobek (2005) discuss several instances (Brazil, Chile, the Czech Republic, Hungary, Korea, Thailand) where losses were caused by prior policy mistakes, although in many of these cases central bank reforms subsequently prevented these losses compounding policy problems. Schobert (2005) highlights several cases in Eastern Europe and Turkey, where underperforming assets acquired for quasi-fiscal reasons were significant enough on the balance sheet to impair earnings and at times impede policy. Stella (2008) considers the examples of Costa Rica, Hungary, Nicaragua, Peru, Uruguay, and Venezuela. Prior to the introduction of a new central bank law, the Central Reserve Bank of Peru, for instance, experienced several years of mainly quasi-fiscal losses that exceeded 5% of GDP in 1987, with the losses being primarily financed by money creation. Inflation exploded, reaching 7,000% in 1990. Cases in Asia have also been cited at various times, including that of the Philippines where, to re-establish policy capacity, the old central bank was liquidated in 1993 and a new one instituted with a clean balance sheet and new governance arrangements. Stella (2011) also discusses the cases of Hungary in the mid-1990s, Peru and Uruguay in the late 1980s and early 1990s, Nicaragua in the early 1990s, identifying a

<sup>28</sup> Statistically different at the 99% confidence level, after excluding hyperinflation outliers.

<sup>29</sup> Vaez-Zadeh (1991) also discussed the experience of Jamaica, where in his reading of the history the central bank was forced to turn to financial repression (economically inefficient penalties on banks accessing central bank facilities) because the interest costs of raising its own liabilities rates were compounding existing losses.

<sup>30</sup> See Box 1 of van Rixtel (2008); see also Cargill (2005) and Benecká et al (2012). Sims (2003) had argued that a central bank concerned about its independence could refrain from stimulative monetary policy because of the implications for its own financial risks, but had associated that issue with the ECB rather than the Bank of Japan. He suggested instead that the fiscal authorities in Japan might have weakened their stimulus on account of worries about rising real liabilities at the central bank. It is important to note that today's Bank of Japan officials deny such an impact on policy. While recognising the existence of a conflict between the interests of policy and the Bank of Japan's own finances, Governor Shirakawa has made it clear that the policy interest dominates (Shirakawa (2010)).

correspondence between financial weakness at the central bank and poor macroeconomic policy outcomes.<sup>31</sup>

However, important recent case studies of the central banks of Chile (see especially Restrepo et al (2009)) and the Czech Republic (Cincibuch et al (2008) and Frait and Holub (2011)) provide evidence that financial weakness *per se* does not hamper policy performance in practice. A casual survey of central banks that have recently performed well in policy terms despite financial weakness would also include the central banks of Israel and Mexico. These four cases get more attention in Part C of this paper.

A simple association between periods of financial weakness or stress and policy outcomes is insufficient. At a minimum, it would be desirable to control for the presence of other factors that may contribute to determining policy outcomes. One obvious possibility is that bad national economic policy arrangements cause *both* poor macroeconomic outcomes and losses at the central bank. We are aware of only three studies that use econometric methods to attempt to control for such possibilities:

Klüh and Stella (2008) document a decline in the financial strength of the median central bank in the 10 years to 2005, with return on average assets falling from around 1.7% to around 0.75% (across a sample of 130 central banks). In panel regressions with 15 Latin American countries between 1987 and 2005, they find a statistically significant role for central bank financial strength in explaining the erosion of purchasing power, with some evidence of non-linearity, whereby only a substantial impairment of finances has a material effect on macroeconomic outcomes. Benecká et al (2012) subject these findings to several additional robustness checks, including extending the sample beyond Latin America and using different empirical techniques. They conclude that the Klüh and Stella results are sometimes confirmed, but are generally weak and not robust.

Adler et al (2012) take a different approach, asking not about the influence of central bank finances on macroeconomic policy outcomes, but instead on monetary policy settings, using optimised policy reaction functions as the baseline.<sup>32</sup> The idea is to side-step the question of additional determinants of macroeconomic policy outcomes beyond those under the control of the central bank. They find statistically significant effects of central bank financial weakness on deviations of interest rates from "optimal" settings, although most robustly and significantly when policy deviations are large. But these results hold only for less well developed economies. It is possible that the quality of policy institutions makes a difference.

### c. Summary

To summarise the messages from the literature: theory suggests that central banks can get into financial trouble despite the clear financial advantages that come with their monopoly right to create base money, protection from bankruptcy proceedings and the backing of an owner with exceedingly deep pockets. Such trouble is characterised by negative comprehensive net worth – that is, insufficient

<sup>31</sup> For clarity, here we are not using Stella's (2008) definition of financial weakness, which is a financial situation that prevents the achievement of policy goals. In this context, such a definition would be circular.

<sup>32</sup> The policy reaction functions are instrument rules in the spirit of Taylor rules, but allow for interest rate smoothing and a response to the exchange rate. The sample is limited to countries with a degree of exchange rate flexibility.

profitability over the entire (discounted) future to offset deficits. Only two escape routes appear available to a central bank that might be at risk of finding itself in such a situation, and neither is attractive. The first is to alter policy course: ease up on inflation control, or eschew desirable though financially risky policy actions. And even this escape route is not without limits, as the revenue gains from higher inflation ultimately fall, and a poorly-functioning financial market may eventually drive intermediation offshore. The second escape route – fresh real resources transferred from the taxpayer – may conflict with the policymaking incentive structures purposefully constructed by central bank independence, since taxpayer resources are intermediated through the political process. And public finances may not be in good enough shape for governments to forgo the chance to dip into inflation taxes.

The limited empirical evidence available is not conclusive as to the impact of weak finances on a central bank's prospects for policy success. While the theoretical financial barriers identified in the literature are not commonly felt, they do exist, especially in less developed economy contexts. What is less apparent from the literature is whether the (theoretical) possibility that a central bank might ultimately need fiscal backing could affect attitudes and expectations of economic agents now. In that context, we do not have formal evidence on the extent to which current conventional accounting indicators of financial strength or weakness are regarded by economic agents as noisy signals of approaching deep limits to policy (even if, in reality, they might often be downright misleading signals, as will be discussed later).<sup>33</sup> These unknowns may be becoming more important. The data tentatively suggested a trend weakening in the financial state of central banks even before the latest financial crisis struck in 2007. As we discuss in this paper, the crisis has substantially altered the financial exposures of several developed economy central banks, making their finances look more similar to those of their confrères in less developed economies.

<sup>33</sup> Vaez-Zadeh (1991) suggested that the mere emergence of losses at the central bank might have adverse macroeconomic consequences.

## Part B What financial resources do central banks have?

In this part, we document how the main elements of financial resources observed in a representative group of BIS shareholding central banks evolved between 2005 and 2010, and set that against how risks to central bank finances changed. We describe risk-sharing arrangements that are purpose-built, and those that are embedded in surplus (profit) distribution schemes for these central banks. We use a sample of BIS shareholding central banks because much of the data required for our analysis needs to be generated anew from central bank information systems, and the burden can be large. Because these data are rarely published, we identify only a few central banks by name, with their agreement.

The first section provides a schematic overview of the financial stocks and flows we are concerned with. In the second part, data on changes in the size, composition and risk exposures of balance sheets of 14 central banks from 2005 to 2010 are presented, to illustrate why questions concerning the financial strength of central banks have attracted increasing interest. The following four sections describe step by step how changes in financial exposures come to affect the financial resources of these central banks: First, Section 3 shows how accounting policies shape the translation of underlying (or "economic") exposures into accounting income. Section 4 presents the size and composition of financial buffers that are available for absorbing losses if risk exposures are realised, and Section 5 describes the impact of different valuation methods on some of these buffers. Section 6 discusses mechanisms available to some central banks to transfer specific risks to government before decisions on profit distributions are taken. Section 7 covers the last element of the chain – the rules governing how much of the distributable surplus will be transferred to government, and how much is retained by the central bank to rebuild or expand financial buffers for the future. In the last section, the step-by-step presentation is collapsed into brief case studies of the five central banks that have been identified by name in the preceding discussion.

### 1. Components of central bank finances: an overview

To show how actions by the central bank affect its own financial position, Figure 1 (see next page) provides an overview of the components discussed in this part of the paper.

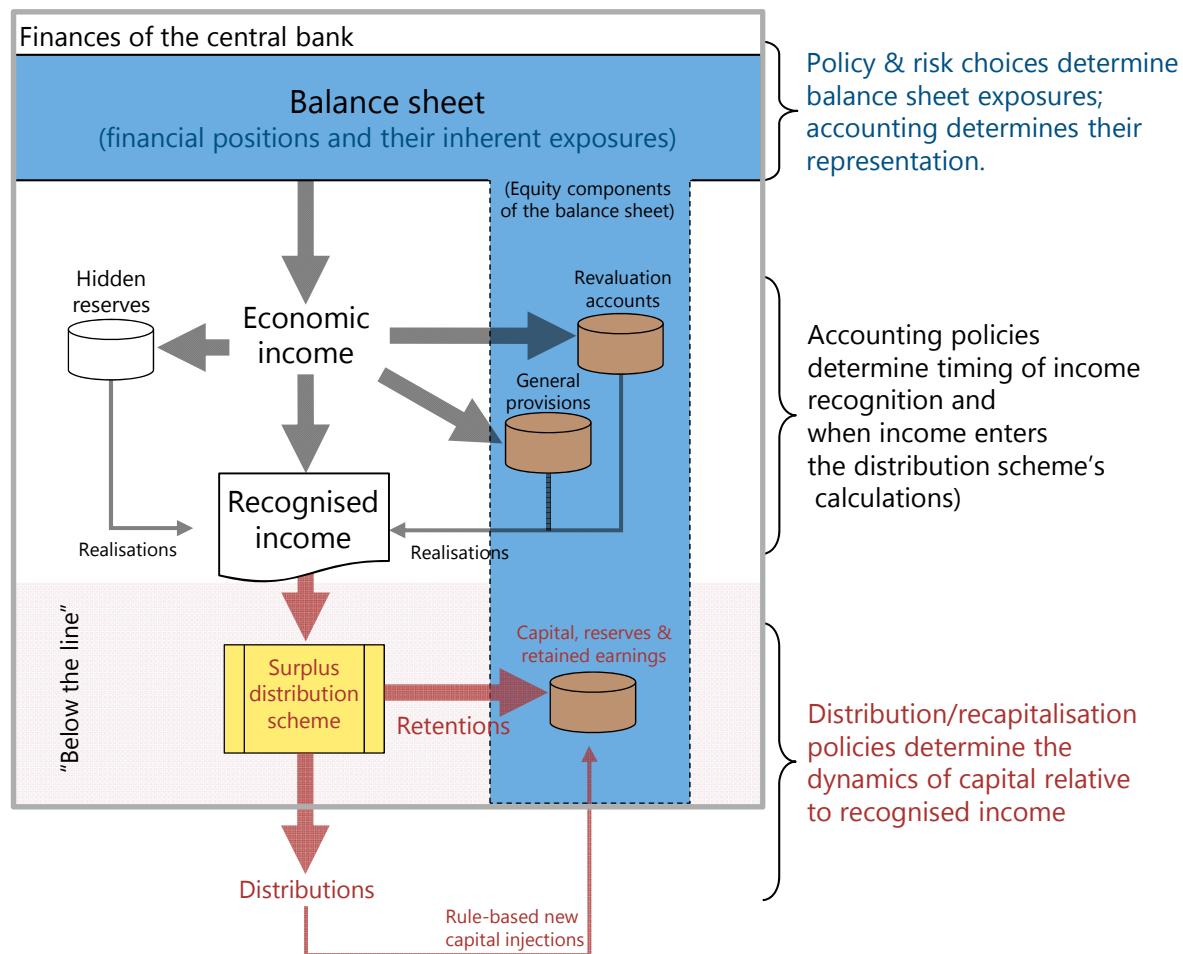
As set out in Figure 1, a central bank's policy and risk choices determine its financial positions and their inherent exposures, within a given economic environment. (In this paper we describe these inherent exposures as "economic exposures", distinguishing them from "accounting exposures".<sup>34</sup>) Understanding the feed-through to the financial position of the central bank requires an understanding of the flows (income) associated with the balance sheet positions adopted. This in turn requires an understanding of accounting policies, since they shape the representation in the financial statements of the underlying or "economic" balance sheet positions and their associated flows. Accounting policies are particularly

<sup>34</sup> The relevance of this distinction will become clearer in the context of a discussion of accounting for valuation changes, such as changes in the market value of bonds and other fixed interest investments (though it is also relevant to other sources of exposure). By "economic exposures" we are looking through the specific accounting treatment used and focusing on exposure to changes in market value, as if those changes were also changes in fair value.

important for how flows impact on visible buffers (ie those buffers or reserves presented in the financial statements). This is partly because income recognised by accounting policies typically drives the distribution scheme. Accordingly a distinction is drawn between flows leading up to the calculation of income (often described as flows "above the line", as the income number is often the bottom line of the profit and loss (P&L) statement), and flows that dispose of that income (often described as flows "below the line"). The distribution scheme contains a risk-sharing mechanism that affects the dynamics of visible buffers, closing the circle to the question of interest: how is the financial position of the central bank affected by its actions?

Components interacting to influence the evolution of financial buffers

Figure 1



## 2. The structure of balance sheets, and resulting financial exposures

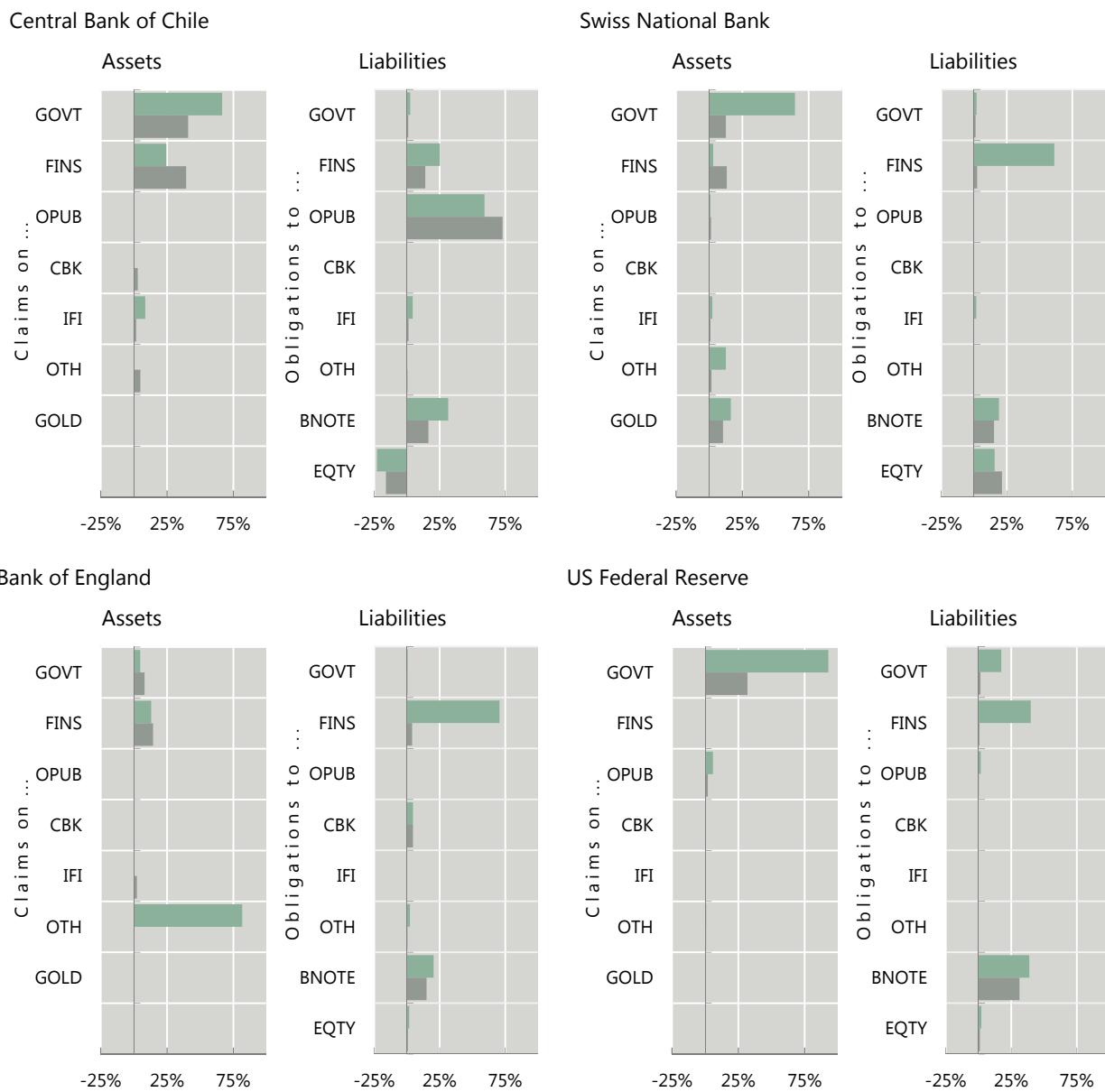
The first question is how the actions of central banks are reflected in their balance sheets. Data on the underlying economic positions, stripped where necessary of the impact of accounting policies, are not comprehensively available. Balance sheet data are often only available from accounting systems. However, with the assistance of several central banks, we have been able to reclassify balance sheet components so that assets and liabilities are presented by the economic sector of their

counterparts. More importantly, we have been able to break down assets and liabilities by their exposures to changes in the economic environment (and specifically to changes in interest rates, the exchange rate, and to the ability of debtors to pay).

### Balance sheet structure for four central banks in 2010

Assets and liabilities by economic sector of counterparty, in per cent of 2010 assets. Green bars show levels in 2010, grey bars levels in 2005.

Figure 2a



Notes: Horizontal bars are scaled to a percentage of 2010 assets (asset bars and liability bars each add to 100%). Green bars are for 2010; grey bars for 2005, also scaled to 2010 assets (thus where assets have doubled, the indicated 2005 levels would add to 50%). The keys for the economic sectors of asset and liability counterparties are: GOVT=governments; FINS=financial sector; OPUB=other public sector entities; CBK=other central banks; IFI=international financial institutions; OTH=other; GOLD=gold; BNONE=banknotes on issue; EQTY=equity.

Sources: published and unpublished data.

Figure 2a (previous page) shows the breakdown for four central banks (chosen to illustrate certain points) by economic sector of the counterparty, as at the end of 2010 (with corresponding 2005 positions indicated by vertical lines).

Three of the four central banks depicted in Figure 2a – the Bank of England, the US Federal Reserve, and the Swiss National Bank – all pursued strongly expansionary monetary policies over the latter part of the period 2005 to 2010, as indicated by the growth in total assets over the entire period. Yet the sectoral counterparts to that growth were rather different. For the Fed, asset growth mainly involved the purchase of government securities in exchange for domestic base money liabilities to financial institutions. For the Bank of England, asset growth occurred primarily through a subsidiary – the specially created Bank of England Asset Purchase Facility Fund Limited (BEAPFF) – which the Bank financed with loans. Hence the representation of the asset purchases associated with the asset exchange and quantitative easing programmes undertaken on each side of the Atlantic is very different, notwithstanding considerable similarities in their economic nature.

The Swiss National Bank's asset purchases, in the meantime, appear at first glance to be very similar to those of the Fed, being concentrated in additional claims on governments, producing – as for the Fed and the Bank of England – a corresponding increase in financial institutions' deposits at the central bank. Yet the SNB's newly acquired assets were almost entirely denominated in FX, consistent with the policy actions being dominated by exchange rate intervention. Accordingly, to make sense of the differences in the financial implications of the different policy actions of these three central banks, one needs to examine the nature of the economic exposures acquired in the course of such balance sheet changes. Such a breakdown is provided in Figure 2b (following page), as follows:

- The asset and liability positions from Figure 2a are repeated in outline, for ease of reference
- Within these positions, we show the exposure to each of four kinds of risk.

The four possible risk exposures are:

- Currency risk exposure, being the amount of that asset or liability class (measured as a proportion of total assets) that is denominated in foreign currency. This amount is indicated by the length of a **brown** bar.<sup>35</sup>
- Interest rate risk exposure, which is approximated by assets and liabilities with residual maturities beyond one year, where that asset or liability is subject to changes in market or fair value (whether or not those changes in value are accounted for in the financial statements). This amount is indicated by the length of a **yellow** bar.<sup>34</sup>
- Credit risk exposure, which is approximated by the amount of the asset class that is below triple A<sup>36</sup> (or its equivalent, if no rating is available), as indicated by the length of a **blue** bar.<sup>34</sup> Credit enhancements or layoffs are taken into account.

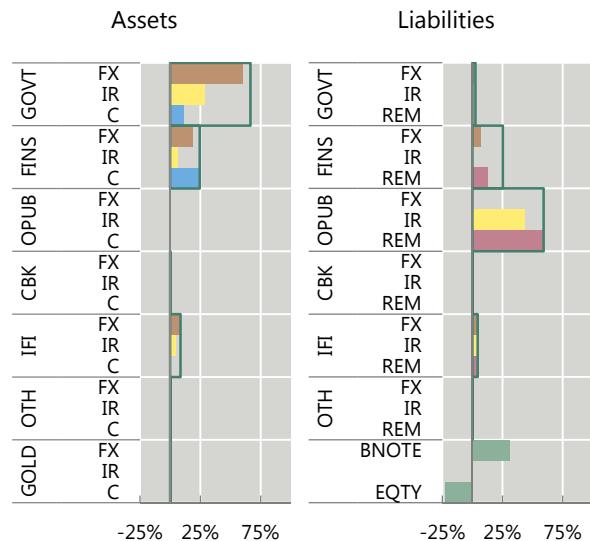
<sup>35</sup> If the coloured bar extends the entire length of the outline, the entirety of that asset or liability is exposed to that risk. If the relevant coloured bar is absent, the asset or liability is not exposed to that risk at all.

<sup>36</sup> By all major internationally active rating providers.

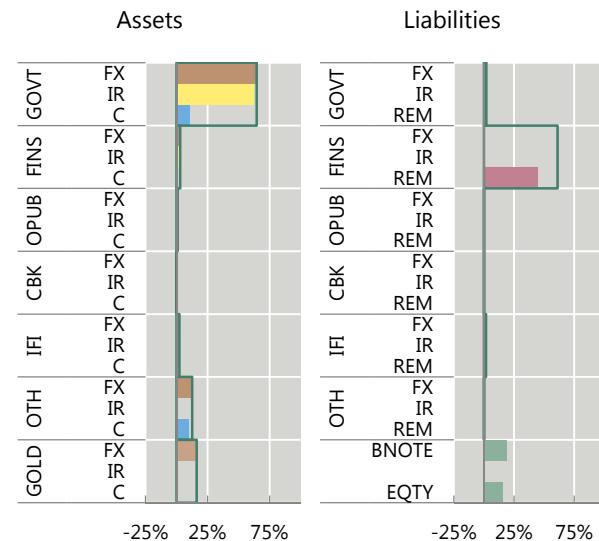
## Balance sheet exposures for four central banks in 2010

Assets and liabilities by economic sector of counterparty, and by exposure to risk, in % of 2010 assets      Figure 2b

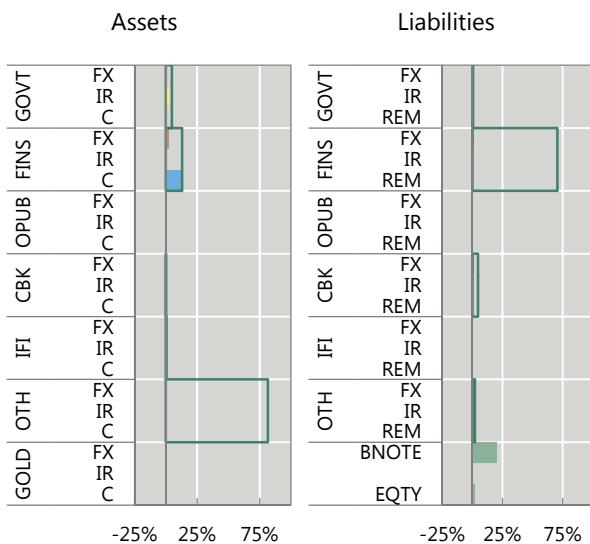
Central Bank of Chile



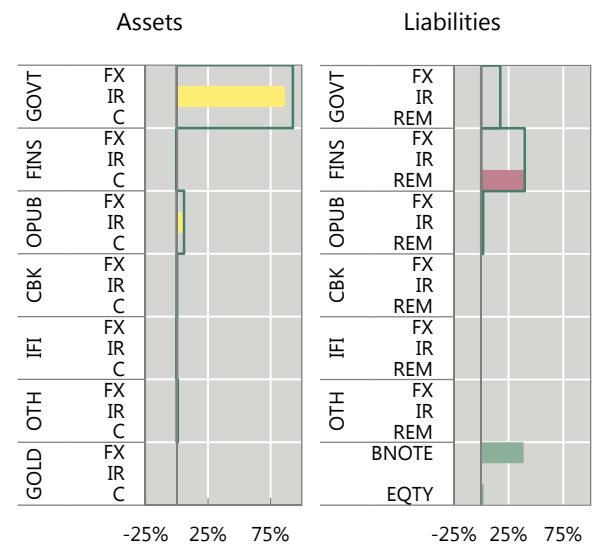
Swiss National Bank



Bank of England



US Federal Reserve



Refer to Figure 2a for keys for economic sectors. Coloured bars refer to a type of financial exposure indicated by the horizontally written key to their left. Keys are: FX=denominated in foreign currency; IR=greater than one year remaining to maturity; C=less than triple-A credit quality; REM=bears interest at or near market rates. Items shown as outlines correspond to the green bars in Figure 2a.

- A remuneration or earnings exposure, reflecting the sensitivity of the net interest margin to changes in the level of interest rates. This is approximated by the share of liabilities that bear interest at market or near market rates, and indicated by the length of a red bar.

For each of these risk exposures, it must be emphasised that it is the *exposure* being measured, *not the financial risk* resulting from that exposure. Information is not available on the value at risk (or similar metric) of each balance sheet position, on the same basis across central banks in the sample. Accordingly, the financial risks that attach to each exposure class cannot be compared directly either within, or

across, central bank balance sheets. However, for each central bank it is legitimate to observe *changes* in exposures through time, and significant differences in the structure of exposures between different central banks can also be observed validly.

Return to the comparison between the balance sheets of the SNB and the Fed. As mentioned, both saw large increases in claims on governments. Figure 2b (previous page) implies that both experienced substantial increases in interest rate risk exposures, in keeping with the long maturities of those increased claims. However, unlike the Fed, the SNB also apparently experienced a large increase in FX exposures, since essentially all of its elevated claims on governments are outside Switzerland. Further, as some of those governments were rated below triple A, there also appears to have been a corresponding increase in the SNB's credit exposure. Meantime, the increases in SNB liabilities were concentrated in deposits of financial institutions, and in money market bills issued by the SNB. The latter are remunerated and thus bear remuneration risk. These differences are potentially very important for the dynamics of the finances of each central bank.<sup>37</sup>

As a further illustration, compare the structure and evolution of the combined balance sheet of the Bank of England with the others just discussed.<sup>38</sup> The balance sheet expansion between 2005 and 2010 in the United Kingdom was even larger than in the other two cases, yet the asset and exposure composition of the expansion was dramatically different. The BoE's subsidiary, the BEAPFF, is not consolidated with the main balance sheet(s) because the financial risks and rewards arising from BEAPFF's activities belong entirely to the government, under an indemnity arrangement. The Bank's balance sheet registers loans to the BEAPFF, but because the loans and the counterparty are fully indemnified, no economic exposure results. Notwithstanding a structure of asset purchases arising from monetary policy actions in the UK that is similar in many respects to that in the United States, in Figure 2b the BoE shows no change in credit and interest rate exposures.<sup>39</sup>

In these three cases, we thus have three very different examples of the financial exposures arising from what at heart could be considered to be similar monetary policy innovations: easing financial conditions by asset purchases that result in a boost to the monetary base of the financial system. The Central Bank of Chile, in contrast, showed little change in the size and structure of its balance sheet (Figure 2a), or of its exposures (Figure 2b), over the same period, again indicating the diversity of experiences among central banks.

Diversity is further illustrated in Figure 3. Here we use the same method for calculating economic exposures and apply it across the wider sample. We sum

<sup>37</sup> This paragraph refers to changes in exposures that are implied by the combination of the changes in balance sheet components shown in Figure 2a and the resulting exposures shown in Figure 2b. Figure 3 on the following page presents changes in exposures between 2005 and 2010 across all balance sheet categories.

<sup>38</sup> The Bank of England has two balance sheets, one representing the note-issuing function and the other representing all other functions, including the monetary policy function. Our representation combines the two (and excludes the BEAPFF).

<sup>39</sup> The focus of this discussion is on the change in the balance sheet between the end of 2005 and the end of 2010. For around three months in 2008 and 2009 the Bank was exposed on emergency lending assistance to two large banks, only a small part of which was explicitly indemnified by the government. At peak, the Bank's unindemnified exposure through ELA was in the order of £50 billion. By way of comparison, indemnified exposures via BEAPFF amounted to around £200 billion at the end of 2010 (and almost double that by the end of 2012).

exposures using the common metric of a percentage of the balance sheet – even though 50% of the balance sheet exposed to FX may imply a different financial risk than 50% of the balance sheet exposed to interest rate risk (for example) – and show the changes between 2005 and 2010 (in coloured columns in the top panel), and compare these changes with the total change in assets over the period (in the open rectangles in the top panel).<sup>40</sup> Again we note that we are using rough proxies for existence of economic exposures, not consistent measures of financial risk, and we caution against using our exposure measures to compare the financial riskiness of different central banks.

Three points about Figure 3 are especially notable:

- The growth of economic exposures from 2005 to 2010 bears only a weak relationship to the growth of the balance sheet over the same period. The stacked coloured bars in the top panel representing summed changes in economic exposure visually show little correspondence with the outline bars representing the total change in assets. (The correlation between rank orders is 0.6.) Not only the Bank of England, but several other central banks registered large balance sheet growth without a similar-sized increase in their own economic exposures. Some of these cases are illustrations of financial risk-sharing devices, as for the Bank of England. The availability of such devices will be discussed further (though not necessarily with respect to the cases presented here).
- Among the central banks that saw the biggest accumulation of exposures between 2005 and 2010, there is little similarity with respect to the types of exposure accumulated. But they share the feature that new exposures were accumulated over this period on more than one risk dimension (four, in the case of the Swiss National Bank).
- The three central banks with the largest sum of exposures in 2005 saw the smallest growth of exposures from 2005 to 2010 (and, as it happens, the smallest balance sheet growth).

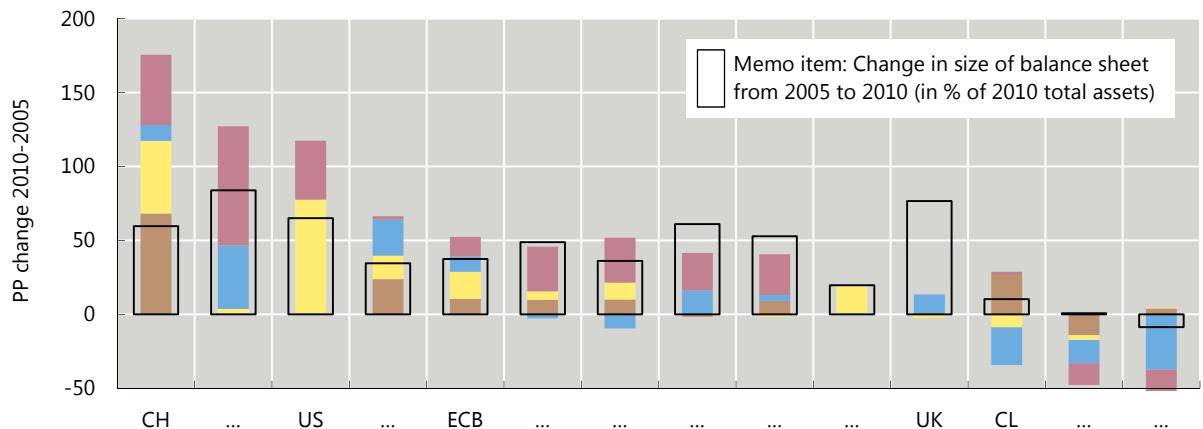
<sup>40</sup> To make the elements in the top panel comparable, the change in balance sheet size from 2005 to 2010 (bar in outline format) is shown as a percentage of 2010 assets, in the same way as the change in exposures shown by the coloured bars.

## Balance sheet exposures in 2005 and 2010

Figure 3

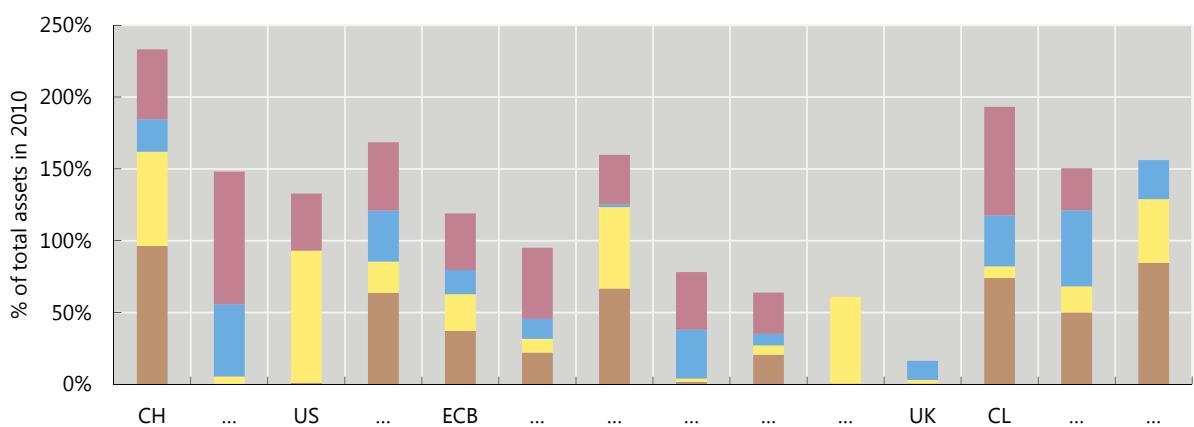
Change from 2005 to 2010

Measured in terms of 2010 assets



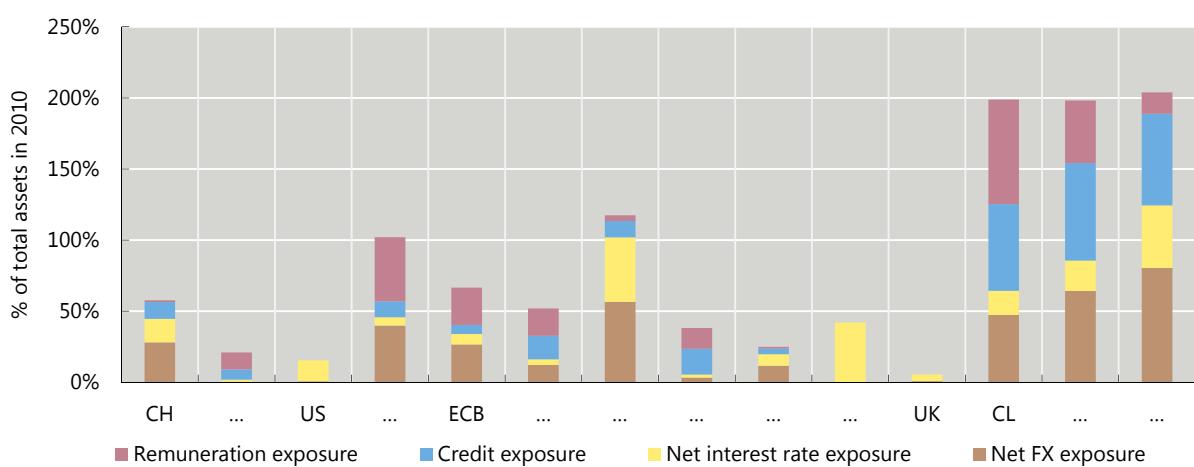
2010

Measured in terms of 2010 assets



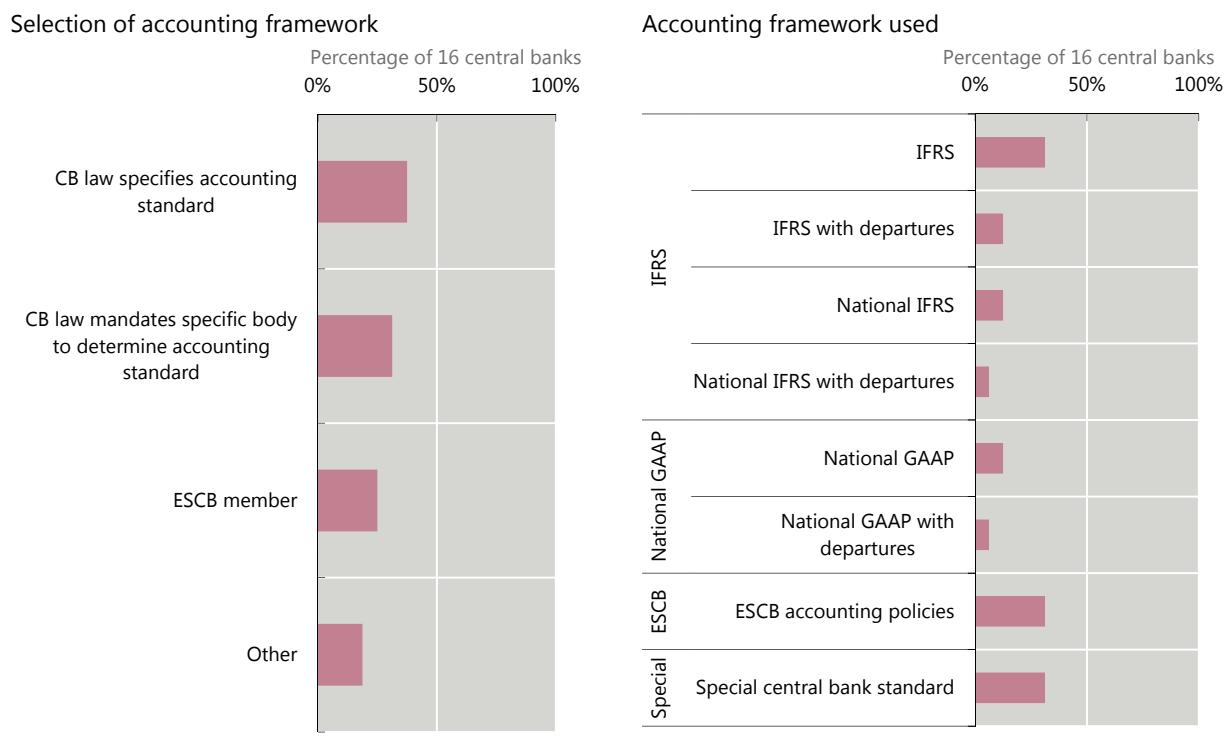
2005

Measured in terms of 2010 assets



Accounting framework

Figure 4



Source: BIS survey.

### 3. Accounting policies: translating economic exposures into accounting income

Accounting policies do not change the economic reality of the financial risks acquired in the course of pursuing policy and operational objectives. Yet we will explain in section 3 of Part C that accounting policies matter in at least two ways: they change behaviour, and they affect financial strength through the operation of the surplus distribution schemes or other rules that depend on accounting measures.

There is no dominant generally accepted accounting framework for central banks (Figure 4, right-hand panel). Three types of framework are commonly used, namely IFRS (to a greater or lesser extent), the ESCB framework (used mainly by the central banks of the euro area), and home-grown frameworks embedded in central bank or other laws.

The points of differentiation between these accounting policies/frameworks in principle concern the measurement of changes in the value of financial instruments; when such changes are recognised as income; and whether general provisions can be made for potential losses. Unfortunately, statements of accounting policies do not always provide clarity on the quantitative significance of these points of differentiation, since a mapping of accounting policies to each balance sheet category is required, and such a mapping is not always available.

To obtain a better understanding of how accounting policies combine with central banks' financial positions to affect their finances, we organised the balance

sheets of 16 central banks by the three standard methods used to value instruments and recognise income (see box below). The results are shown in Figure 5, on the basis of five-year averages (2006 to 2010).

The three combinations of valuation and income recognition shown in Figure 5 are (consistent with the terminology presented in the box):

- The proportion of the total balance sheet that is treated according to fair value through P&L is shown by the proportion of blue (labelled "Revaluations go to P&L" in the key to the figure) in each central bank's rectangle.<sup>41, 42</sup>
- The proportion treated according to fair value through equity is shown in green (labelled "Revaluations go to equity" in the key).<sup>41, 42</sup>
- The proportion treated according to amortised cost (sometimes called "historic cost") is shown in red (labelled "Not revaluing" in the key).<sup>41</sup>
- Where one of the three accounting methods is not used at all, we insert a hairline-width placeholder.

### Three common accounting treatments for income:

Accounting for income arising from financial positions involves choices on both the *valuation* of assets and liabilities, and the *recognition of income* arising from changes in value. There are three common combinations of valuation and income recognition. They are:

**Fair value through Profit and Loss (P&L).** Assets and liabilities are measured at "fair values" (often indicated by market values), and all changes in value as well as accruals are recognised as income (hence being reflected in the P&L statement).

**Fair value through equity.** Assets and liabilities are measured at fair value, but only accruals and realised gains and losses (from sales) are included in the P&L account. Unrealised changes in value are not recorded as profit/loss but are instead recorded either (i) directly in revaluation accounts (balance sheet items that effectively constitute part of equity) or (ii) in the statement of Other Comprehensive Income, which flows into the reporting entity's equity. That these unrealised changes in value are considered equity items is consistent with the idea that such changes in value belong to the owners.

**Amortised cost/face value.** Assets and liabilities are not revalued but are instead recorded at their acquisition (or some other historic cost) or face value if appropriate, amortised for premiums paid or discounts received. There is thus no recognition of income from changes in market values (or other indicators of current value) – if such changes occur for the instrument being accounted.

In all three cases, regular contractual flows of interest payments and receipts (if applicable) are recorded as income.

<sup>41</sup> The overall width of the rectangle depicted for each central bank is scaled to the sum of assets and liabilities, except equity, of that central bank, averaged over the five years to 2010. The relative width of each coloured block within the rectangle is calculated from the average shares over the five years of the assets and liabilities that were subject to the corresponding accounting treatment.

<sup>42</sup> For central banks using the ESCB accounting methodology, or similar asymmetric treatments of revaluation income, the proportions of the balance sheet shown as being treated as fair value through equity are overstated, and the proportions shown as fair value through P&L are correspondingly understated. This is because the asymmetric treatment routes part of the income (all gains) to revaluation accounts, and part (losses greater than the corresponding revaluation account buffer) to P&L. The proportions treated each way thus vary with circumstances. For simplicity, all assets and liabilities subject to asymmetric treatment are shown as being revaluing to revaluation accounts in equity.

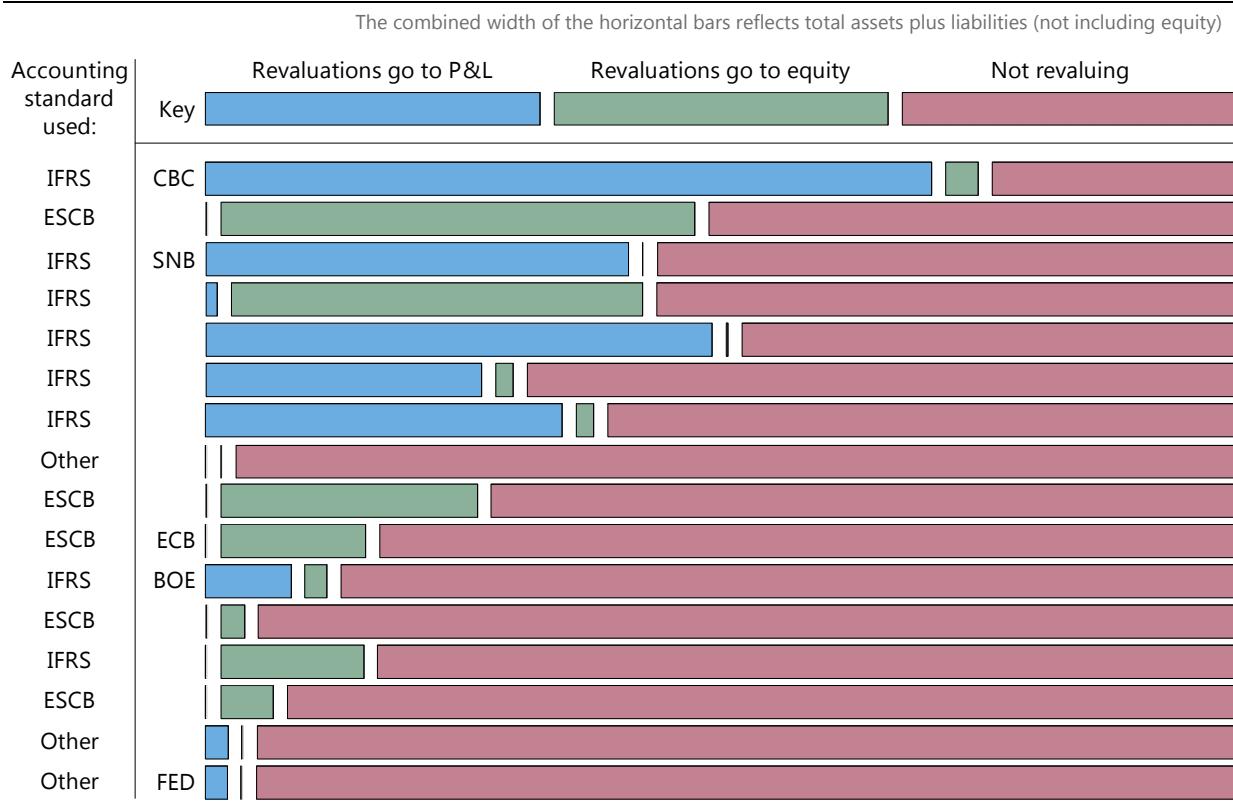
The predominant character of the accounting standard or framework used – consistent with the right panel of Figure 4 – is indicated to the left of Figure 5 (IFRS or IFRS-like, with fair value treatment of qualifying financial instruments; ESCB, for those using the eurosystem accounting approach; or Other).

In a nutshell, the more blue in Figure 5, the more that assets or liabilities are revalued with valuation changes going through P&L; the more green, the more that revaluation accounts are used; and the more red, the more assets and liabilities are held at an unchanging book value (eg at acquisition cost).

### Balance sheet composition by accounting treatment for price changes

(averages of financial years 2006-10)

Figure 5



It is important to caution that the different accounting treatments for income under discussion here – in the box on the previous page, and shown in Figure 5 – relate to the treatment of price (or value) changes *in the currency of denomination*. The accounting treatment of changes in the local currency values of assets and liabilities denominated in foreign currencies, due to changes in exchange rates, is also highly relevant for central banks. The treatment of income arising from these exchange rate “(re)translation” effects is not always matched with the treatment of income arising from changes in the price (or value) of held assets and liabilities. This is shown in Annex 1, which goes into this territory in more detail.

Having made that caveat, the main takeaways are: first, the major part of the balance sheet, for the majority of central banks, is not subject to revaluation (red dominates.) Second, for items revalued as market prices change, revaluation gains and losses go to P&L and to revaluation accounts in about the same number of cases (blue and green are similarly represented). Third, the dominant accounting

framework used provides relatively little insight (by itself) into the valuation dynamics of the balance sheet.

On the third point, the accounting treatment of financial positions depends both on the accounting standard/framework being followed *and* the inherent nature of the position. A central bank's liabilities may be dominated by banknotes on issue and the call deposits of financial institutions. Neither is subject to change in nominal value, being legally and practically fixed. Regardless of the chosen accounting treatment, there are no revaluations. A central bank's assets may also be dominated by positions that are treated as fixed in nominal value under each of the standard accounting treatments, such as deposits and loans. Central banks such as the Bank of England (sixth from the bottom) comply fully with IFRS, but the great majority of assets and liabilities are in forms that are not revalued under IFRS (currency notes and deposits on the liabilities side; loans on the assets side).<sup>43</sup> Another example of the interplay between accounting policies and the inherent nature of the positions is the Swiss National Bank (third from the top). Normally, all of the SNB's assets are subject to revaluation, with gains and losses going to P&L. However, exceptionally, during the period covered by Figure 5, the SNB had claims on the UBS stabilisation fund which, due to their form, are not revalued under IFRS. (Annex 1 shows the asset and liability breakdown in more detail.)

The point that the essential business structure of a central bank may lead to inherent mismatches in the economic character of liabilities and corresponding assets, and hence to inherent mismatches in their accounting treatment, is crucial to a full understanding of its financial dynamics. Interest rate and exchange rate exposures are often much larger than would be contemplated by most types of commercial financial institution. If the accounting treatment registers those changes in value, the financial statements will reflect the inherent dynamics of the institution's economic exposures. Annex 1 decomposes Figure 5 into assets and liabilities, and by currency of denomination. Substantial mismatches between the valuation treatments of assets and liabilities are revealed. In some cases, almost all assets are revalued, but liabilities are not. Likewise for the treatment of changes in value due to foreign exchange translation. Many central banks have substantial assets in foreign currency;<sup>44</sup> only a few also have liabilities in foreign currency. Again, both underlying and accounting mismatches arise (the latter mostly between assets of a similar type, where those denominated in domestic currency are treated according to one accounting method, and those denominated in foreign currency to another).

#### 4. Exposures and accounting treatment combined: impact on P&L

To make the interaction between economic exposures and accounting treatment more concrete, as a prelude to considering the consequent impact on financial buffers, in Table 2 (page 32) we present three contrasting cases: the Central Bank of Chile, the European Central Bank and the US Federal Reserve. For the sake of comparability the data are divided by the assets of each central bank; and for the sake of avoiding idiosyncratic outcomes, they are then averaged over the five years 2006 to 2010.

<sup>43</sup> Likewise, intra-Eurosystem claims arising out of (for example) the allocation of euro banknotes are not subject to market value changes.

<sup>44</sup> Gold is treated as being denominated in foreign currency.

The shaded areas of the table contain information on changes in the values of assets and liabilities that these central banks register by adjusting their book values. The shares of assets and liabilities that are revalued are shown in the third column (to avoid the need for the reader to refer back to Figure 5 and Figures A2 to A4 in Annex 1). For those revaluations and FX retranslations that are immediately recognised as income, the far right column captures the direct P&L impact. For those revaluations and FX retranslations that are taken instead to equity, the far right column captures mostly the P&L resulting from transactions that crystallise past valuation changes, transforming those valuation changes into “realised” or cash income.<sup>45</sup> The main exception is for the ECB, where the revaluation accounts operate asymmetrically; for the ECB, the P&L effect is a mix of unbuffered revaluation losses and realisations of past valuation changes.

The unshaded areas of the table show P&L arising from sources other than revaluations and FX retranslations. Net operating income – primarily arising from net interest income and from the accrual of premiums and discounts on fixed interest assets and liabilities – is the main such source of P&L.

The three cases differ substantially. The CBC, with the largest FX exposure of the three (on average over this period 80% of assets and 12% of liabilities were denominated in foreign currencies), experienced by far the largest FX retranslation flows of the three cases. To some extent, larger exchange rate variance was also relevant. Despite being subject to such variance, the CBC takes FX retranslations straight to P&L. Accordingly, recognised income was swelled by more than 9% of assets on average over the years in which FX retranslations were positive, and reduced by 8.5% of assets on average in years when it was negative. As positive and negative years nearly balanced, the average effect on P&L over the five years was to reduce P&L by 1.3% of assets.

Contrast this for a moment with the ECB, where both FX exposures (34% of assets and 1% of liabilities) and exchange rate variance were much smaller, and such FX retranslation changes as occurred were largely absorbed by revaluation accounts, hence the somewhat lower net impact of valuation changes on P&L. Recall that in the ECB case, revaluations and FX retranslations are taken to the revaluation accounts if they are positive, and to P&L if they are more negative than the outstanding balance in the revaluation account for each currency and security.<sup>46</sup> Accordingly, in addition to having smaller FX exposures than the CBC, by choosing to use revaluation accounts (asymmetrically) the ECB protects P&L from the sort of income variations that is a feature of the CBC’s finances.

And to drive home the point that both underlying exposures and accounting policies are relevant to the resulting variance in income, compare the situation of the CBC and the Federal Reserve. Both use the same accounting policy for FX retranslations, taking gains and losses directly to P&L. Yet the Fed experiences very small P&L variation as a result, since its FX exposures are themselves very small (2% of assets, and essentially 0% of liabilities).

<sup>45</sup> Realisations resulting from transaction are not the only reason for transfers between revaluation accounts and P&L, but are normally the main reason.

<sup>46</sup> So some negative FX retranslations will have been taken to P&L. These are included in Net Operating Profits.

## Impact of valuation methods on financial buffers (above the line)

Averages of the years 2006–2010; stocks and flows both expressed as a % of total assets

Table 2

Central Bank of Chile		Accounting treatment (stock to which applied; assets/non-equity liabilities) ①	Associated revaluation and FX translation flows		
Revaluations and FX retranslations that are ...			Average of +ve years	Average of -ve years	Net impact on P&L
...taken to P&L	For price changes	93/61	+0.9	0.0	+0.6
	For FX retranslations	80/12	+9.4	-8.5	-1.3
...taken to revaluation accounts in equity	For price changes	7/0	0.0	0.0	② 0.0
	For FX retranslations	0/0	-	-	
Net operating income (profit/loss from interest, accruals, fees etc, net of operating costs)					-1.9
Transfers between general risk buffers and P&L					-
Total declared profit/loss					-2.7
European Central Bank		Accounting treatment (stock to which applied; assets/ non-equity liabilities) ①	Associated revaluation and FX translation flows		
Revaluations and FX retranslations that are ...			Average of +ve years	Average of -ve years	Net impact on P&L
...taken to P&L	For price changes	0/0	-	-	-
	For FX retranslations	0/0	-	-	-
...taken to revaluation accounts in equity	For price changes	27/0	+0.2	-0.2	②③ -0.1
	For FX retranslations	34/1	+2.4	-1.8	
Net operating income (profit/loss from interest, accruals, fees etc, net of operating costs)					+1.0
Transfers between general risk buffers and P&L					-0.5 ④
Total declared profit/loss					+0.4
US Federal Reserve		Accounting treatment (stock to which applied; assets/ non-equity liabilities) ①	Associated revaluation and FX translation flows		
Revaluations and FX retranslations that are ...			Average of +ve years	Average of -ve years	Net impact on P&L
...taken to P&L	For price changes	4/0	+0.2	-0.1	0.0
	For FX retranslations	2/0	+0.1	0.0	+0.1
...taken to revaluation accounts in equity	For price changes	0/0	-	-	-
	For FX retranslations	0/0	-	-	-
Net operating income (profit/loss from interest, accruals, fees etc, net of operating costs)					+3.1
Transfers between general risk buffers and P&L					-
Total declared profit/loss					+3.1

Note: A dash (-) rather than 0.0 means not applicable. ① The share of assets that are not revalued is not shown, but is approximately 100–(the shares of assets shown as revaluing). The share of liabilities that are not revalued is also not shown, but it can be deduced in the same way except for the case of the Central Bank of Chile, which had negative equity over the period). ② Transfers between revaluation accounts in equity and P&L, typically to account for the realisation of value gains and losses previously taken to equity. ③ Includes revaluation losses that are unable to be charged to a revaluation account because of an insufficient balance – see text. ④ A negative sign indicates that income was used to build general risk buffers prior to P&L being declared.

The CBC also stands out against the other two in relation to interest rate exposures and their accounting treatment. Over 90% of assets are in principle subject to price revaluation, as are just over 60% of liabilities. And resulting revaluations are taken directly to P&L. This is in contrast with the ECB case, where much less of the balance sheet is subject to price revaluation, P&L is (asymmetrically) protected by the use of revaluation buffers; and especially the Fed case, where next to no assets, and no liabilities, are revalued. As noted previously, the question of exposure to interest rate risk is partly the result of the underlying positions on the balance sheet, and partly the result of accounting policy. By referring back to Figure 3, which shows underlying exposures, one can observe that in both cases, and the more so in the Fed case, underlying interest rate exposures were non-trivial, especially in 2010.

A final feature worth drawing attention to is the relative sizes of net operating income and accruals. Net operating income and accruals include seigniorage, and can be thought of as the regular or normal income flow. The Fed had by far the largest regular net income flow, with positive net operating income in each year, and by design, very little variation in income arising from revaluations and FX translations. The CBC in contrast recorded an operating loss in four of the five years covered by the table, and is subject to substantial variability in P&L from FX translations in particular. The ECB had smaller non-revaluation net income, but – again by design – very little variation arising from revaluations.

The relationship between the size of normal income flows and the variance of income turns out to be important to the potential for financial strength to be eroded by the operation of the distribution mechanism. The issue here is the potential for the distribution system asymmetrically to drain resources from the entity, by allowing the distribution of temporary income (from transitory, unrealised revaluation gains, for example) but not providing for compensating injections in the face of temporary losses (from transitory, unrealised revaluation losses, for example). Central banks that have distributable income that fluctuates between surplus and loss may be exposed to such a distribution asymmetry.

## 5. Financial buffers on the balance sheet

With the diversity among actual central bank balance sheets and the economic and accounting exposures they contain as a backdrop, we turn to the next component of the financial framework that plays a role in shaping the evolution of financial strength: the financial buffers in the balance sheet, and the rules governing them. The top panel of Figure 6 (next page) shows the size and composition of visible financial buffers (relative to total assets) in 2010. Since visible buffers are all components of equity, the top panel of the figure shows accounting equity, which is negative for the Central Bank of Chile and two other cases.

For several central banks, revaluation accounts constitute a large portion of accounting equity. The other equity component that operates above the line is general risk (“rainy day”) provisions. Only one among this group shows a notable amount of such provisions. These features are relevant to the later discussion of how far accounting policies can protect against capital erosion through the distribution system.

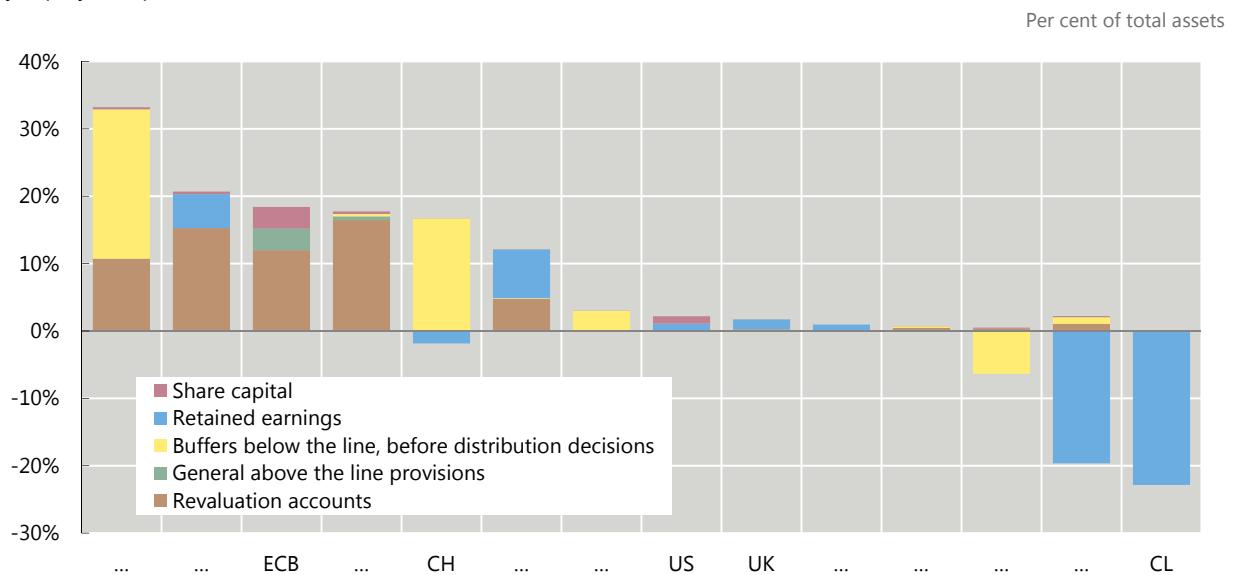
The bottom panel of Figure 6 adds banknotes in circulation to visible buffers in order to obtain a wider measure of financial strength. The case for considering banknotes on issue as a source of financial strength is that they act more like equity

capital than debt obligations. As they bear no interest, and are perpetual in character, they provide a stable funding base for income generation. To the extent that net income can be retained when needed, a large share of banknote liabilities provides a base for rebuilding equity if it has been depleted by a negative shock. Clearly, the inclusion of banknotes makes a large difference to the sense of the scale of financial buffers available to central banks.

### Financial buffers in the balance sheet in 2010

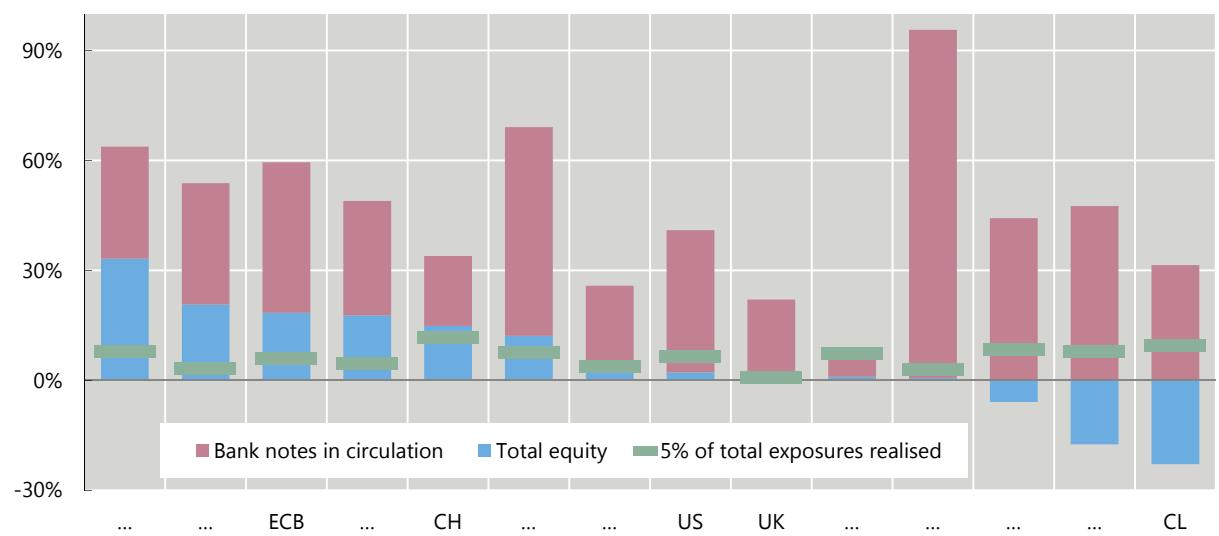
Figure 6

By equity component



Including banknotes in circulation

Per cent of total assets



Note: Total exposures refer to the exposures depicted in Figure 3, middle panel (noting that the ordering of the central banks in the two figures differs).

In order to obtain some sense of the relationship between the size of financial buffers available to central banks and their need for such buffers, the lower panel of

Figure 6 overlays an indicator derived from the earlier discussion of balance sheet exposures. The indicator is simply 5% of the aggregate amount of such exposures. This is tantamount to performing a thought experiment in which some of these exposures are realised (in whatever form that realisation takes place, whether by FX, interest rate, and/or credit losses, and/or an increase in the interest rate paid on liabilities relative to interest earned on assets) to the aggregate tune of 5% of the balance sheet.

The pattern is interesting mostly for the apparent lack of association between the scale of exposures – on this crude measure – and the size of buffers. This can be put another way. *Prima facie*, on this crude basis, some central banks are much better covered by financial buffers, relative to their exposures, than others. These differences may reflect the presence of other factors that provide protection. We will discuss such factors shortly. They may also reflect the fact that realisations of these economic exposures are not necessarily translated into accounting income. It depends on accounting policies. We illustrate the importance of this latter point in the following section, by examining more closely the situation for three central banks.

## 6. Risk transfer arrangements

In this section, we address special risk transfer arrangements that operate upstream of the risk-sharing structure embedded within surplus distribution schemes.

Of the 16 central banks covered in our research, roughly a third saw special arrangements being put in place in the past few years (in some cases several of them), to lay off heightened risks inherent in policy actions that were deemed necessary to manage the financial crisis. By contrast, more permanent risk transfer arrangements are relatively rare – something that we return to.

Among newly established risk transfer mechanisms, the Bank of England's BEAPFF facility is a striking example. As mentioned before, the BoE was authorised by the UK Treasury to set up the BEAPFF as a special subsidiary to implement the Asset Purchase Facility (APF). The APF is a vehicle by which the Monetary Policy Committee can buy assets with newly created bank reserves – the United Kingdom's QE programme – and backstop the liquidity of certain important secondary markets in private paper. The BEAPFF accounted for the majority of the large balance sheet expansion seen between 2009 and 2010 at the BoE. Importantly, it was established to carry out a core policy function of the central bank, whose heightened risk characteristics are fully borne by the Treasury through government indemnities, but with the core central bank balance sheet largely insulated from closer Treasury financial interest.

Reflection on the need to create the BEAPFF at short notice has led the authorities in the United Kingdom to capture the principles of such arrangements in a new memorandum of understanding between the Bank and the Treasury covering crisis management arrangements. The MOU came into effect alongside new financial stability arrangements introduced in 2013.

Other examples of risk layoff arrangements instituted during crisis episodes are the Maiden Lane I special purpose vehicle (SPV) and the Fed's role in the TALF in the United States, as well as the UBS Stabilisation Fund in Switzerland.

In addition to providing a mechanism for separately identifying financial risks for transfer, there may be presentational advantages to be obtained from the use of

an SPV. An SPV can be used to differentiate an unusual operation by the central bank from its normal business. Relatedly, transparency can actually be enhanced if separate reporting on the SPV is more extensive than the usual central bank standard with respect to normal operations. This was the case, for example, for the Maiden Lane I SPV. It is perhaps ironic that a vehicle that was widely abused by the private sector to hide information can in fact be the platform for better information for a central bank's many stakeholders.

South Africa is one example where a risk transfer arrangement has been a longer-term feature of the central bank's institutional design. While the SARB owns the bulk of South Africa's foreign exchange reserves (currently about 88%), according to Section 28 of the central bank law (with details set out in an agreement with the government) the SARB records FX retranslations on a special revaluation account that is owned by the government: the Gold and Foreign Exchange Contingency Reserve Account (GFECRA). (By contrast, price changes on foreign currency denominated securities are recorded in P&L.) The role played by the GFECRA is striking – the declared P&L of the SARB varies little from year to year despite the SARB balance sheet containing a significant exchange rate exposure and the bank accounting for foreign currency assets and liabilities at closing exchange rates.

A second example of a long-standing risk transfer arrangement is to be found at the Reserve Bank of New Zealand (RBNZ), also relating to FX risk. Under the RBNZ's law, the Minister of Finance may direct exchange rate policy and actions. Should the Minister do so, the law provides (Section 21) that ensuing exchange rate gains are paid to the government's account at the RBNZ, and the Bank is compensated for ensuing losses out of that account without the need for Parliamentary appropriation. Gains and losses include both realised and unrealised components.

## 7. Distribution schemes and recapitalisation arrangements

The final factor shaping the dynamics of a central bank's financial strength is the mechanism used to determine how much of the distributable (accounting) income is passed over to shareholders and/or to the beneficial owner, and how much of it is added to financial buffers of the central bank (see Figure 1 on page 20). In principle, such distribution mechanisms can allow for negative dividends whereby fresh capital is injected by the beneficial owner. Therefore, this section covers both distribution and recapitalisation arrangements.

Distribution schemes may be based on established rules, and/or feature discretionary decisions by the central bank, by shareholders, or jointly by the central bank and shareholders. These rule-based arrangements can be decomposed into four categories, not all of which need to be present at once: an ability to draw on external resources if negative dividends are required; targets for buffers (sometimes called capital targets); retention schemes; and dividend smoothing arrangements.

The key issue for the dynamics of the distribution scheme is how far the scale of retentions is conditional on the central bank's financial state. Distribution schemes which require distributions even when equity is weak or negative may be exposed to a distribution asymmetry; those schemes in which distributions are strongly conditioned on the state of finances have an inbuilt mechanism that works to offset such an asymmetry.

The first two categories of rule-based arrangements (the ability to call for fresh resources and the use of targets) are inherently conditional in character, but they can be slow or fast-acting, depending on the details. It may seem odd to discuss dividend payments as if they were not contingent in the first place. After all, for commercial entities the essential feature distinguishing dividends from debt service obligations is the former's contingency on the financial health of the company. Yet in many central bank cases, laws and practice provide only limited or no scope for the central bank to withhold surpluses even where equity is already negative. For example:

- The Bank of England is required to distribute to the Exchequer 100% of any Issue Department surplus and 50% of any Banking Department surplus, irrespective of the state of equity reserves.
- The Central Bank of Ireland can only retain a maximum of 20% of any surplus, independent of the state of equity.<sup>47</sup>
- Having calculated distributable income as a five-year smoothing of accounting income (adjusted for certain revaluation income), the Sveriges Riksbank must distribute 80%, irrespective of the equity situation.
- The Bank of Japan may only retain 5% of surpluses by right. However, further retentions are possible with the authorisation of the Minister of Finance.

To obtain a sense of the range of distribution arrangements in use, we analysed those codified in laws and secondary legislation, for 16 central banks. Our interest was in the presence of features that buttress each central bank's financial strength. We also evaluated judgmentally the power of these features. Distribution schemes that involve non-trivial targets for equity were ranked ahead of those that involve small targets (or simple non-negative targets), which were in turn ranked ahead of those with no targets (especially where some distribution is mandatory). Schemes where the central bank has discretion over the distribution were ranked ahead of those where there are joint negotiations, which were in turn ranked ahead of those where some distribution is mandatory or at the decision of shareholders. The ability to retain a large part, or all, of any surplus was ranked ahead of a capped retention. And the ability to call for fresh resources from shareholders to cover a year's loss was scored highly. No cases of automatic and full recapitalisation were found; had they been, they would have ranked even higher as a mechanism for protecting financial strength through fresh capital.<sup>48</sup>

Annex Table A5 presents the raw material for this assessment. Figure 7, which stacks these features, shows the outcome, in a deliberately fuzzy manner. The greater the number of features that aid the retention of financial resources, and the greater their power, the longer the bar. Such an evaluation is necessarily subjective. Accordingly we use shades and diffuse boundaries to underscore that these

<sup>47</sup> Such a situation potentially leaves the formal arrangements at odds with the 2012 Convergence Report which states that "... financial independence also implies that an NCB should always be sufficiently capitalised. In particular, any situation should be avoided whereby for a prolonged period of time an NCB's net equity is below the level of its statutory capital or is even negative, including where losses beyond the level of capital and the reserves are carried over" and "Profits may be distributed to the State budget only after any accumulated losses from previous years have been covered and financial provisions deemed necessary to safeguard the real value of the NCB's capital and assets have been created."

<sup>48</sup> Although the Bank of Korea's ability to have the government budget cover a year's losses that exceed reserves comes very close, and is accordingly ranked highly.

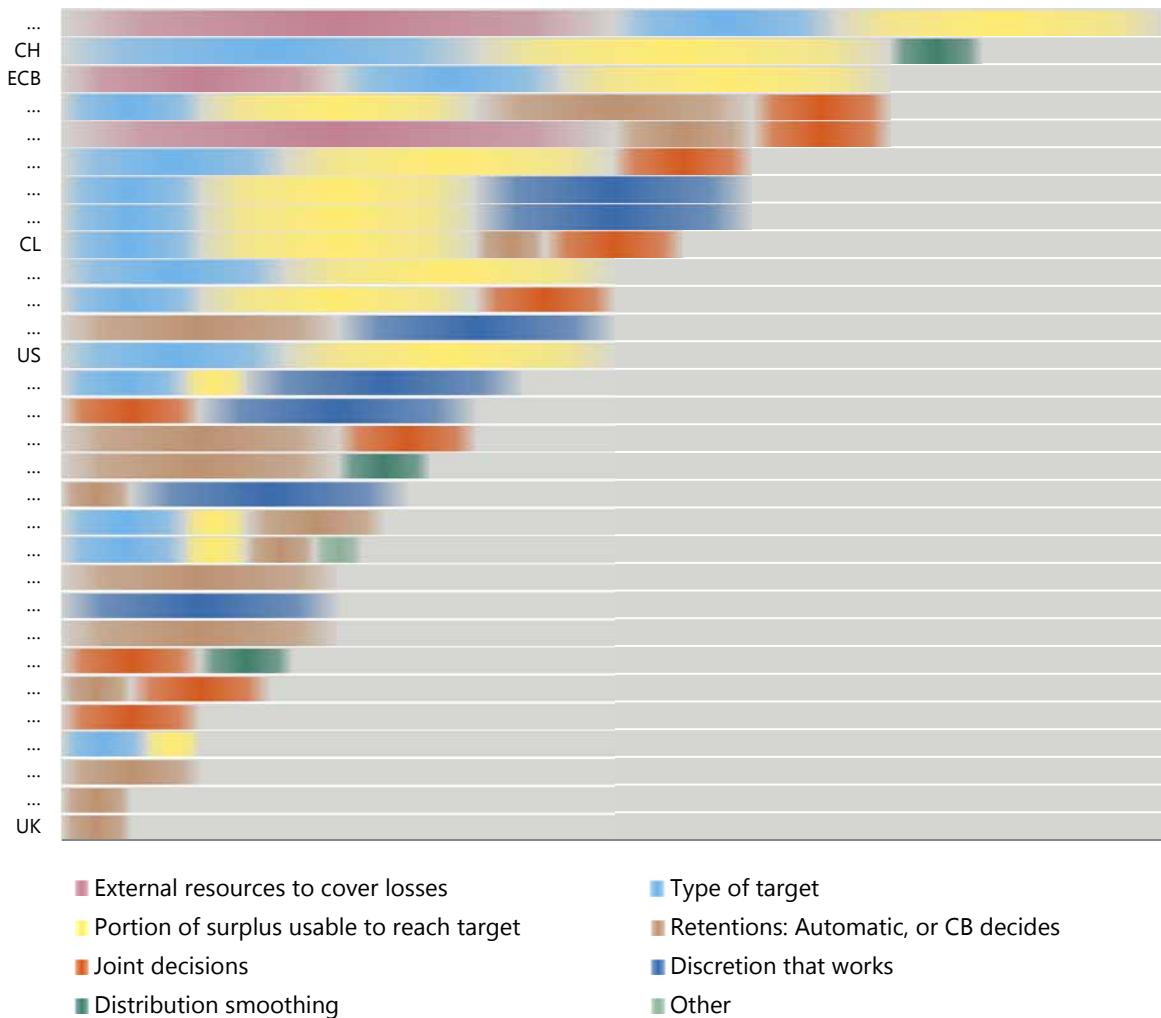
properties do not lend themselves to precise measurements. Some features of the assessment are:

- Distribution schemes vary widely in the range and power of features that provide financial strength – or work against its erosion in the presence of income volatility (see the discussion on distribution asymmetries in Part C.3).

### Components of distribution rules

Evaluated on a notional index of supportiveness of financial strength

Figure 7



Source: BIS staff assessments.

- Targets are present in about half of the sample, but they are often implicit. Some targets are simply for non-negative general reserves: when general reserves become negative, more of the surplus can be retained than normal (the Bank of Mexico being one of several such examples). Some targets are for foundation capital. An example is a transitional measure that allows the Central Bank of Chile to retain all surpluses until equity recovers to the initial mandated level of capital (indexed to offset the effects of inflation). The Fed also has a small equity target that is indexed to assets of shareholders (member banks).

- Few have substantial targets for total equity or main components thereof. One that does is the Swiss National Bank. The first call on any surplus is to fund a reserve (the “currency reserves provision”) that follows a formula set by the SNB’s Council. The calculation of the yearly allocation to provisions is based on the average growth rate of nominal GDP. The resulting level of the target has been in the range of 15–30% of assets (prior to the most recent jumps in the size of assets).<sup>49</sup>
- When the target condition is triggered, the amount of the surplus that is available to meet the target is usually very high – often all of the surplus being available for the purpose. But not always. In several cases, the funds available to achieving the target are limited to a certain proportion (eg 20%) of the available surplus.
- An ability to draw on external resources is rare – only two central banks can do so in case of losses (one of them is the ECB).
- Standard retention proportions are typically small (eg less than 10% of distributable surplus). Joint decisions by the central bank and the shareholder are just as common.

## 8. Adding up the parts

As indicated at the outset, assessing the financial position of a central bank and the implications for its financial strength requires several interacting components to be considered. We have discussed the relevance of the structure of central bank balance sheets and their attendant financial exposures; the role of accounting policies; the availability of formal financial buffers; the contribution of special-purpose risk transfer mechanisms; and finally, residual risk sharing through distribution schemes and recapitalisation arrangements. Notwithstanding that some further parts of the puzzle are still to be covered, we think it would be valuable to illustrate the nature of the interactions between the parts already discussed, by describing how those interactions work for five central banks that cover a wide range of possible arrangements:

First, the **Swiss National Bank** saw a very large increase in financial exposures in the period studied, taking exposures to a high level relative to existing buffers – which have themselves been falling from a high level. Combined with the use of fair value to P&L accounting, the scale of such exposures could in principle expose SNB to a distribution asymmetry problem. However the SNB’s distribution scheme provides considerable protection against a distribution asymmetry. The distribution scheme uses an equity target that is notably positive and growing, allows full retention of any surpluses when equity dips below target, and caps annual distributions thereafter. That equity was significantly positive – at more than 50% of assets (around 90% if banknotes on issue are counted as quasi-equity) – going into this turbulent period is testament to the effectiveness of this scheme. Baseline income is strong judging by the 2005–10 period, although assets have grown disproportionately in low-return areas, and there are now larger risks, most

<sup>49</sup> With the dramatic recent increase in the size of the SNB’s balance sheet resulting from its FX interventions to support the 1.20 euro floor, the target reserve has fallen sharply relative to assets, notwithstanding the indexation of the target (nominal GDP grew by about 7% between 2009 and 2012 while SNB assets more than doubled). Given this huge increase in assets, the SNB decided to increase the yearly allocation to provisions by doubling the amount calculated by the formula.

predominantly FX risk but also credit risk. There is now also an exposure to the interest cost of liabilities rising relative to the income generated on corresponding assets should Switzerland's inflation rate run higher than that of the countries in which assets are invested. But in structural terms, the distribution scheme would allow reasonably quick rebuilding of equity to again become an effective buffer; the variance in P&L allowed through by the accounting system has limited chance to undermine that process; and comprehensive net worth would likely remain a large positive number even if equity were to dip further or go negative.

The **Fed** has also seen a large increase in exposures, especially those relating to interest rate risk (FX risk continues to be almost absent). The Fed does not recognise changes in fair value of the main source of the exposure – holdings of Treasuries – themselves as income, but the risk to earnings remains since early and rapid normalisation of interest rates would mean either realisations, with attendant value losses, or (in effect) costlier servicing of the liabilities held against those assets. And by also not taking changes in fair value to equity, the opportunity to build revaluation buffers is not available. The Fed's formal, visible buffers are relatively slim. By the end of 2010, the Fed's holdings of assets subject to interest rate risk was about 40 times its conventional equity, implying that a change in asset values (or servicing costs thereon) of about 2.5% would be sufficient to deplete equity (assuming nothing else changed). The distribution mechanism provides some protection, in the sense that future surpluses can be fully captured until the (quite low) equity target is restored, and the Fed's baseline (or normal-times) earnings are ample, implying that future surpluses should also be ample. The paucity of visible buffers compared with the scale of the increase in exposures seems to add up to a risk of negative equity over a short-run period, notwithstanding strong comprehensive net worth throughout (Table 1 on page 11 provides orders of magnitude). However, the Fed's accounting policies allow for the capitalisation of future retentions of surpluses that are needed to rebuild equity. This accounting approach means that reported accounting equity would in fact remain positive even were income losses to exceed existing buffers. (We describe this approach in Part C.)

The **ECB**'s increase in exposures during 2005–10 was mostly in the form of FX and credit risk. The conventional equity position significantly covers the exposures, even though only a small portion of the capital increase decided at the end of 2010 was paid in by the end of that year. At the end of 2010, ECB holdings of claims on governments and private sector financial institutions amounted to 2.1 times its conventional equity.<sup>50</sup> The major part of equity is revaluation account balances, which are available to absorb reductions in the values of specific assets for which a revaluation buffer has been accumulated on account of past revaluation gains – that is, they are not generic buffers. The capital increase decided in 2010 also permits an increase in the general reserve fund or the general risk provision, to the extent to which the capital increase is paid in. Compared with revaluation reserves, these equity components provide additional flexibility. However, capital (and by implication the sum of general reserves and non-specific provisions) has reached previously agreed limits.

Most of the ECB's marketable assets are marked to market, whereas some – those relating to monetary policy operations, and including securities acquired

<sup>50</sup> An important qualifier needs to be recorded. The ECB's net claims on other central banks within the Eurosystem – including those acquired as a result of the role that the ECB's balance sheet plays in the TARGET2 settlement system – are left aside on the grounds that their risk profiles are highly situation-dependent.

under the Securities Market Programme (SMP) and Covered Bonds Purchase Programme (CBPP) – were allocated to a Hold-To-Maturity (HTM) portfolio and are not revalued. For those revalued, the ECB's asymmetric approach to revaluation buffers means that valuation losses can often be passed through the P&L, offsetting increases in dividends that may be associated with earnings on higher risk spreads (recognising that disproportionately risky securities typically provide higher risk income through expanded spreads, in compensation for possible valuation losses). But, as with the Fed, in the case of those securities that are not revalued there is the potential to continue to pay away risk income to shareholders without any offset even as their market values fall. In other words, the dividend can be boosted at the same time as the underlying value of assets is eroded. Whether this creates a vulnerability for the ECB depends in part on whether it continues to use to the full its ability to build general risk provisions to capture rather than pay away risk income. And it depends in part on its ability to continue to be paid in full on its holdings, notwithstanding restructurings or defaults of such instruments – the ECB was not impacted by the Greek government debt restructuring, and could thereby maintain expected cash flows through to maturity. As for the Fed, however, holding securities at unchanging values through to maturity does not eliminate their interest rate risk. Should the Fed need to withdraw liquidity at notably higher interest rates, an elevated financing cost will be incurred even as assets are held to maturity.

The ECB has a robust distribution scheme involving a substantial amount of authorised capital and reserves, and the ability to access fresh resources. Distributions are contingent on shortfalls of reserves relative to their authorised amount, with a slow-acting component in the sense that only 20% of surpluses can be appropriated to rebuild reserves at the ECB's discretion. But there is also a fast-acting component, in that there is no restriction on the rate at which general risk provisions can be built, and such provisions are substitutable for general reserves in terms of counting towards the authorised amount of reserves. The ability to access fresh resources to cover a loss, by appropriating the NCBs' share of monetary income (with the agreement of the General Council), provides substantial financial strength. NCB monetary income averaged about €16 billion per year over the period under study, equal to about 90% of the ECB's average net equity – a considerable backstop, although one that might be smaller when needed if hits to monetary income are the source of a loss. Moreover, comprehensive net worth is likely to be secure in most imaginable scenarios.<sup>51</sup>

The **Bank of England** is a special case of some interest. Its balance sheet growth was particularly large over this period – the largest of these five cases – but there was hardly any increase in exposures, and that increase was from a low starting point. The Bank has correspondingly small equity buffers – at the end of 2010, equity amounted to 1.7% of assets. The distribution system would be no help at all if equity were exposed (the whole of any surplus resulting from currency issuance activities – essentially, seigniorage – is automatically passed to the government, as is 50% of any surplus resulting from other central banking activities).<sup>52</sup> The key to understanding the scale of balance sheet growth,

<sup>51</sup> Table 1 on page 11 provides estimates of the comprehensive net worth of the Eurosystem, rather than the ECB specifically.

<sup>52</sup> As all seigniorage income is automatically passed to the government, the comprehensive net worth numbers reported in Table 1 on page 11 do not represent estimates of financial strength for the Bank of England as a standalone entity. This is consistent with the special character of the Bank of England with respect to financial arrangements.

notwithstanding limited financial strength, is the risk transfer arrangement. Its interplay with the location of decision authority for financially risky activities will be given more attention in Part C.

The **Central Bank of Chile** is also a special case of considerable interest. The CBC has been operating in recent years with negative equity and negative baseline earnings. Baseline earnings are projected to return to positive territory, so that accounting equity would also return to positive territory – albeit not for 25 years or so<sup>53</sup> – helped by a distribution policy that (temporarily) allows the central bank to retain all surpluses. At the same time, the CBC carries large economic exposures and applies fair value accounting with revaluations being taken straight to P&L. In view of weak baseline earnings, this implies that an exposure to a distribution asymmetry would frequently be an issue were it not for the offsetting transitional measure that allows retention of all surpluses while capital is below target. Once equity has returned to target and assuming that the transitional measure is then terminated, a continuation of high volatility around a low trend path of baseline income could reintroduce a negative trend component into the equity path. This raises the importance of baseline income turning strongly positive.

In other contexts, uncertainty about the sign of comprehensive net worth would likely have raised doubts about the sustainability of the low inflation objective, doubts that would possibly in turn have impeded the effectiveness of policy (see next the discussion in Part C). That the CBC has been very effective in delivering and maintaining price stability through this period attests to the power of the credibility engendered by institutional arrangements in Chile, coupled with the strong fiscal position.

<sup>53</sup> Restrepo et al (2009).

## Part C What level of financial resources do central banks need?

In Part B, we described the nature and range of the financial resources held by a sample of central banks, against the background of their highly heterogeneous economic exposures, as viewed through the lens of their accounting policies. The point was made that these components need to be integrated, when considering a central bank's need for financial resources. Why it is necessary to work within an integrated frame of reference was illustrated in a discussion of the evolving financial situation of five central banks. The entire discussion was descriptive, saying little about the considerations that would enter into a choice of the various components, in terms of their combined impact. In this part, we identify the main factors that would bear on such choices. In the course of doing so, we identify the chief ingredients of a central bank's requirement for standalone financial resources.

The main factors include the economic exposures resulting from the policy and operational functions assigned to the central bank; its economic environment; how exposures are manifested through accounting policies; the interaction of accounting income with the profit and loss distribution scheme; the nature of the problems associated with weak finances; and the political environment. Although these factors interact dynamically and ultimately must be considered as a package, for clarity of exposition we treat them one at a time.

### 1. Economic exposures

This section addresses the financial exposures of central banks in terms of their impact on a central bank's underlying or economic net worth, rather than in terms of their impact on accounting equity. Hence the terminology: "economic exposures". Economic exposures and accounting exposures may differ considerably. This is discussed in Section 3.

As was shown in Part B, economic exposures vary considerably between central banks – for one thing because they do not all do the same jobs; for another, because some are operating in the tails of their respective policy-operational-financial distributions, whereas others are not.<sup>54</sup> Some have quasi-fiscal obligations, others do not. Even normal monetary control is discharged in very different ways, reflecting the great variety of external environments and policy assignments.

These differences in function translate into wide variations in economic exposures. This is a vital point, since the adequacy of a central bank's standalone financial strength needs to be assessed against the financial shocks it is likely to experience.

One of the bigger sources of variation in central bank balance sheet exposures is currency exposure. Remarkably, net FX exposure, measured as the share in total assets of those denominated in foreign currency minus the share in total liabilities of those denominated in foreign currency, varies from near zero (eg Bank of Canada, Bank of Japan, US Federal Reserve) to near 100% (eg Czech National Bank, Saudi Arabian Monetary Agency, Sveriges Riksbank, Swiss National Bank). These

<sup>54</sup> (BIS (2009)) discusses the range of functions discharged by a representative sample of central banks.

large differences in FX exposure reflect the multiple and complex reasons why a central bank might hold significant foreign currency assets in proportion to its balance sheet:

- Some central banks pursue their macroeconomic stability objectives through a fixed exchange rate, which may entail large foreign currency reserves.
- Some also acquire FX assets as the inescapable counterpart of banknote issuance and other monetary liabilities. This is because underdeveloped or thin financial markets at home mean that there are no safe or non-distorting local investment opportunities.<sup>55</sup>
- Some central banks acquire FX while trying to support exporters by depreciating the exchange rate. As this is partially at the expense of others (importers, businesses in the non-tradables sector, and consumers) and could alternatively have been provided by budgetary actions, these central banks can be seen as undertaking quasi-fiscal policies.
- Some central banks hold foreign currency assets as insurance for possible disruptions to financial stability, including with respect to continuity of exchange market functioning. To a more limited extent, responsibility for discharging such an insurance function could also be allocated to the ministry of finance.

Exchange rate risk is not the only exposure that varies widely among central banks. Figure 3 (page 26) depicted remarkable variation in all types of exposure presented.

The scale and nature of recent changes in exposures is also instructive. Figure 3 shows three central banks that saw exposures grow fourfold or more between 2005 and 2010. These large changes in economic exposure highlight a non-linear connection between a central bank's core functions and its financial position. Even for monetary policy's pursuit of macroeconomic stability, strong non-linearities are relevant. In normal states of the world, central banks can induce wide variations in short-term interest rates essentially without changing their balance sheets.<sup>56</sup> When policy operates near the zero lower bound for interest rates, large variations in balance sheet size may be needed in order to exert a significant influence on interest rates. The purchase of risky assets may in turn be an unavoidable, or even a deliberate, part of quantitative easing.

Consider as well the protection of the financial system – arguably also a core role of central banks.<sup>57</sup> Given a fear-induced, system-wide increase in demand for central bank money, the central bank is the only public policy actor that can prevent the shock's negative effects multiplying via a collapse in core interbank intermediation channels. Supplying sufficient additional central bank money will expand the balance sheet – potentially very substantially – in ways that may involve the central bank taking on financial risks. These risks may include credit exposures, where full collateralisation would be inconsistent with the policy purpose; interest

<sup>55</sup> Government debt might not be established in a deep and liquid market with effective price discovery, and direct lending to the government might expose the central bank to high political risk. Investing in or lending to private sector entities may both entail significant credit risk and create distortions in the pricing of local credits.

<sup>56</sup> For a good discussion of this point, see Disyatat (2008). Theoretical foundations can be found in Woodford (2000) and Bindseil (2004), among others.

<sup>57</sup> See Goodhart (2010) on the debatability of this proposition.

rate exposures, where a re-booting of financial intermediation requires below-normal interest rates; and possibly also exchange rate exposures, where the foreign currency business of local financial intermediaries is similarly important to economic functioning and similarly affected by fear.

In short, the recent period has dramatically illustrated that a central bank's policy responsibilities may involve taking on large-scale contingent financial risks. The assessment of an individual central bank's need for financial strength must thus consider financial exposures in the tails of its particular risk distribution, over and above the financial exposures incurred in normal times.

It is therefore a difficult task to extract messages about the relationship between economic exposures and preferred or desired financial strength from central bank data. Consider the lower panel of Figure 6 (page 34), where we compare observed economic exposures (from Figure 3) with the equity-plus-banknotes measure of financial resources. A casual look suggests that large economic exposures and ample financial resources do not normally go together. That might seem counterintuitive, as large exposures might be expected to motivate the holding of large buffers, and large buffers might facilitate large exposures.

One reason for not basing conclusions on such casual looks is that the measured exposures do not include the contingent financial risks that we have just noted are potentially very large. We could make guesses as to the size of those contingent risks. But any guesses we might have made five years ago about the probability of encountering financial risks associated with the tails of central bank operations, and about the likely scale of their financial impact, would probably have been revealed by subsequent events to have been way off the mark. A second reason for not inferring revealed preference is that part of our measure of financial resources is equity, which is depleted by large exposures that have turned into large losses. We may be observing unwanted outcomes, rather than revealed preferences. And a third reason is that there are other important and yet-to-be-discussed determinants of appropriate financial strength for a central bank. These may affect, perhaps greatly, the level of standalone financial resources sought by central banks. We turn to these additional factors now.

## 2. Conventional financial risk management options are limited

Numerous financial risk management devices that are routinely used in commercial banking (eg setting credit and market risk limits, reducing credit risk by taking collateral, reducing exposures as their riskiness increases) are applicable to central banks. Given the large scale of financial exposures present in many central banks' balance sheets, one might in fact expect central banks to be leaders in the use of such devices. Indeed, central banks commonly use financial risk management systems to manage certain parts of the balance sheet, such as foreign exchange reserves. But no central bank risk manages its entire balance sheet, because to do so would incur a high risk of conflicting with policy interests. Even where risk management systems are in active use, they are almost always focused on assessing and controlling the smaller contributor to financial risk: active risk-taking (usually assessed *relative to* the structurally and policy-determined strategic benchmarks in which one finds the dominant exposures).<sup>58</sup> And, as is well known to enterprise risk managers and the boards of commercial banks, close control over risks in any one

<sup>58</sup> Borio, Heath and Galati (2008).

area may not even reduce overall financial risk, since risks in one area may offset those in another.

The limited use of active financial risk management thus reflects the dominance of policy objectives over financial ones. The exposure itself may be intentional – eg the Fed has been lengthening its asset duration at a time when interest rate risk is high in order to drive long yields down. Or, more commonly, acting to reduce the exposure would work against policy interests. Consider the following illustrations:

- In the ongoing financial crises, central banks have in many cases relaxed pre-existing collateral standards. To have enforced standards could have further harmed intermediation by reducing the available supply of good collateral used in such intermediation.
- When credit risks rise, central banks generally do not enforce the credit limits that they may have applied to domestic counterparties, let alone tighten such limits. To do so would risk precipitating a run on such counterparties.
- Central banks may incur exchange rate risk when they make FX interventions to influence the exchange rate. No immediate attempt is made to offset or hedge that risk, as to do so would involve creating equivalent new orders on the other side of the market, neutralising the desired impact on exchange rates.<sup>59</sup>
- In a similar vein, hedging (whether in the cash or derivatives markets) the interest rate risk acquired in the course of liquefying private portfolios by lengthening the central bank's assets would work against the policy objective.
- The rule that the central bank will never lend to a financial institution that may be insolvent breaks down when systemic shortages of liquidity are likely to provoke asset fire sales that could further threaten solvency. Lending into possible insolvency may be a necessary part of a solution that assures solvency.

### 3. Accounting policies and the role of distribution schemes<sup>60</sup>

Part B established that central banks use a variety of accounting policies, both for valuation and income recognition. A variety of approaches is also seen on financial buffers and provisioning. There are no common standards for central banks. Does this matter?

Accounting policies should not in principle change economic reality. This is true especially for central banks, as their accounting equity is usually not bound at zero (or a higher amount set by regulatory minima), and costly actions are thus not triggered by accounting measurements. However, accounting policies can affect

<sup>59</sup> This is not to say that FX risk cannot eventually be hedged by a central bank without undermining policy objectives. Holding a foreign currency reserve does not per se involve having a target for the exchange rate: the purpose may simply be to have the option to intervene when international capital markets are effectively closed. In New Zealand and Sweden, FX reserves held by the respective central banks are at least partially hedged (around three quarters hedged in the case of the RBNZ). And in the Netherlands, the FX risks associated with reserves on the central bank's balance sheet are totally hedged.

<sup>60</sup> This discussion proceeds as if central banks have a choice over their accounting policies and surplus distribution schemes. That is not always the case. Nor is it the case that choices once made can easily be changed, out of concern that (for example) stakeholders assume that the numbers are being massaged for convenience. Still, considering the selection of accounting policies and distribution arrangements highlights the considerations that would come to bear on those rare occasions that choices can be made.

reality through their effect on incentives and behaviour, and through their impact on distributions.

a. Accounting policies and behaviour

How things are measured can change behaviour as follows:

*Influencing the behaviour of central bankers*

In general, accounting should help provide incentives for decision-makers to pursue an entity's fundamental objectives, or at least not provide distracting incentives. But for central banks, fundamental objectives are long-term policy aims, not short-term financial ones. That might suggest, for example, valuing financial instruments according to their full-term income streams, so as to "look through" and not be distracted by their current market value. As an example, hold-to-maturity accounting could reduce potential pressures to protect the financial position at the expense of policy objectives.

Yet short-term financial outcomes may provide useful signals about public welfare, *in certain circumstances*. Central bank actions can transfer wealth from some citizens to others. Subsidising troubled banks may hurt some taxpayers and benefit others. Intervention to slow an exchange rate appreciation that reflects improving relative productivity means transferring wealth from consumers and non-tradable producers to exporters and foreigners. In both cases, overall welfare gains may more than offset the financial costs, but hiding such transfers (by not revealing them in published financial statements) could lead to errors of judgment about the evolving balance between costs and benefits. As the same time, financial results are more tangible and easily measured than society's welfare, creating a risk of over-emphasising the thing that is more apparent.

Accounting policies may disclose financial variability that, while large by some metrics, may be inconsequential for national welfare. In this case, in order to align central bankers' incentives with society's interests, profits should not be seen as an objective or losses as an indicator of failure. It may be easy enough to avoid setting profits as an objective, but it is surely more difficult to educate stakeholders to distinguish between losses that provide a useful signal of performance and losses that provide a neutral or conflicting signal. Here, the quality of the central bank's financial reporting is crucial. The explanatory material included in the financial report is increasingly recognised as an aid to managing the tension between full disclosure of financial variability and maintaining the incentives for policymakers to think long term.<sup>61</sup>

This discussion of incentives and behaviour is essentially about accountability. Central bankers are primarily accountable for their policy actions, but financial outcomes also need to be part of the cost/benefit analysis. Moreover, the stewardship of taxpayers' resources generally involves a fiduciary duty. This is true even where financial outcomes are dominated by other considerations. For example, when price stability is preferred to higher seigniorage revenues, a trade-off with tax revenues exists, even if it is rarely mentioned. Domination does not imply irrelevance.

<sup>61</sup> Bank of Canada (2011) and Darbyshire (2009). For a wider discussion of central bank financial reporting and accountability, see Sullivan (2002, 2005a).

The design problem for the accountability process is how to allow useful signals to come through – in order to shape appropriate incentives, and create the trust that is needed for effective delegation – without distorting incentives by making decision-makers accountable *both* for policy outcomes and *conflicting* second-order financial ones. Again, the quality of the explanatory material accompanying policy and financial reporting may be crucial to balancing these often competing considerations.

### *Influencing the behaviour of markets*

As discussed earlier, central banks' short-term financial outcomes rarely carry useful information about central banks' *capacity* to pursue their policy objectives. But rarely does not mean never.<sup>62</sup> And, more generally, financial markets may not understand that central banks are not financially constrained in the same way as commercial banks. Either way, if the financial market through which the central bank is transmitting its policy actions reacts as if the central bank was financially constrained, the transmission of those actions will be impeded.

Consider two examples where policy effectiveness could have been compromised by perceptions of weakness in a central bank's financial resources or its willingness to deploy them. In the early 1990s, market commentators in Japan started to question whether the Bank of Japan would follow through on quantitative easing, because of a supposed aversion to capital losses and the possible effects on the Bank's newly gained independence from the Ministry of Finance.<sup>63</sup> Similarly, current headlines such as "Fears grow of ECB balance sheet stress" and "Now let us stress-test the central banks" reflect attempts by commentators to make inferences from the state of central bank finances in the context of today's extraordinary policy actions.<sup>64</sup>

Financial disclosures may also come into conflict with policy signalling. For example, a central bank that wishes to express confidence that its crisis-wracked financial system is fundamentally sound might find it awkward to reveal writedowns of claims that it holds on financial institutions.<sup>65</sup>

In short, in the contexts just discussed, markets may erroneously draw conclusions from published financial information that make it harder for the central bank to achieve its policy objectives. Again, the quality of explanatory material is important if the central bank is to avoid suppressing information

<sup>62</sup> Although the context is not identical, there are notable occasions where financial constraints do matter for policy capacity, such as defending a depreciating exchange rate through FX market intervention. Such defences require the availability of foreign currency, which a central bank cannot create. Failed exchange rate defences may linger in the consciousness of markets, creating a sensitivity to the notion of financial constraints on policy that goes beyond the specific circumstances.

<sup>63</sup> JP Morgan (2002) and *Bloomberg BusinessWeek Magazine Online* (2003). See also the discussion in Cargill (2005).

<sup>64</sup> *Financial News* (4 June 2012) and Terrence Keeley in the *Financial Times* FT Alphaville blog (26 July 2010) respectively.

<sup>65</sup> This example suggests that marking such claims to market may be preferred to taking writedowns from impairments of assets held at amortised historical costs, since the former approach usually involves the mechanical application of market prices whereas the latter often involves the application of judgment. The judgment may be soundly based and backed by audit review, or the writedown may actually be required auditor's reactions to large changes in market prices and not be reflective of central bank judgment, but observers may find it difficult to distinguish.

Finally, for many countries, the standards used by the responsible authorities serve as a guide to acceptable behaviour by the community that they oversee. Such a leadership motivation may have influenced some central banks towards adopting full fair value accounting.

### b. Accounting policy choices and distributions

Surplus (or dividend<sup>66</sup>) distribution schemes typically use accounting measures of income, and distributions are usually asymmetric: surpluses are paid out in cash<sup>67</sup> but in almost all cases losses remain on the balance sheet, depleting equity. A striking illustration of asymmetric distribution comes from Israel. In 1998 the Bank of Israel experienced substantial exchange rate translation gains as the exchange rate fell. Given its accounting policies and distribution rules, the Bank was required to pay NIS 9 billion (most of recorded profits, and nearly 10% of the Bank's assets) to the government in February of the following year, notwithstanding that those unrealised gains had already been reversed. The loss in 1999 took equity negative, by almost the same NIS 9 billion.

Asymmetric distributions can have two types of effect, each potentially very important:<sup>68</sup>

- Where the scheme results in cash distributions to governments for unrealised gains, monetary financing of government expenditures is implied. Paying the government for the unrealised gain on foreign currency assets, or on a revaluation of gold holdings, has the same effect as creating an interest-free overdraft for the government.
- Equity may be depleted even where losses in one period are fully compensated by gains in another, as financial market prices fluctuate around a flat medium-term path. Unless there is some compensating mechanism, income variability that occasionally results in a loss can introduce a negative trend into equity, since losses are rarely automatically offset by new capital resources.<sup>69</sup>

For a distribution asymmetry to have a material effect, variations in income have to be big relative to trend income. By contrast, if normal income is large relative to variations, losses may be rare. Further, when losses deplete equity, a large normal stream of income can provide the wherewithal for rapid equity rebuilding (the distribution scheme permitting).

Such large variations in income can arise from large exposures that are realised, or where changes in fair value are recognised even if unrealised. Clearly, accounting

<sup>66</sup> To allow for those cases where surpluses are distributed to the government even when the government is not a shareholder, we will use the more general terminology of "surplus distribution".

<sup>67</sup> Or, more precisely, in current transfers of central bank money to the government by way of credits to the government's account at the central bank.

<sup>68</sup> Sullivan (2005b).

<sup>69</sup> For unrealised losses, revaluation accounts in equity, above or below the line, may be charged. Alternatively, if unrealised losses pass through the P&L account and into the distribution scheme, they would deplete equity unless there is other net income to be offset against, or unless the central bank is one of those rare cases where external resources can be called on in the event of losses. When the unrealised loss results from quasi-fiscal actions, the depletion of equity has the same effect as the central bank giving an interest-free loan to the government to enable it to fund the losing investments.

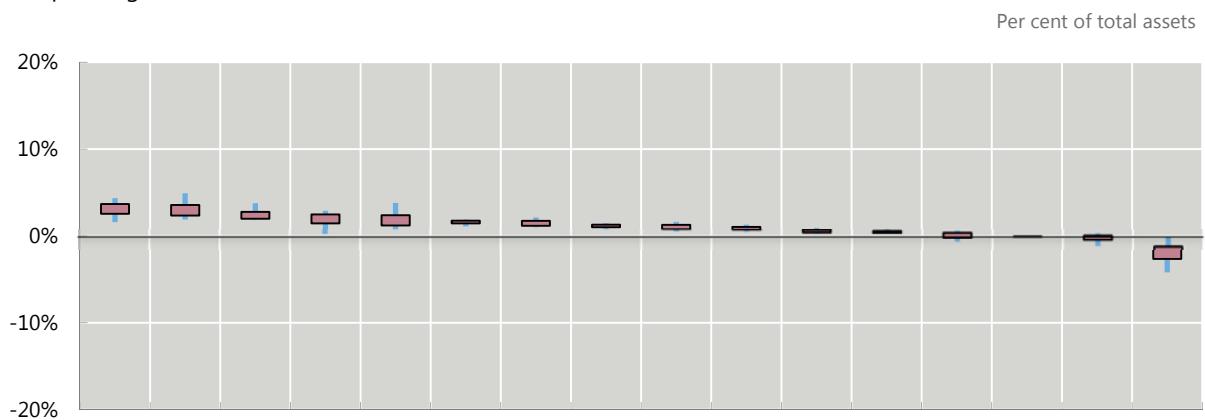
policies matter for this part of the equation. Normal income, on the other hand, is mostly independent of accounting policies.

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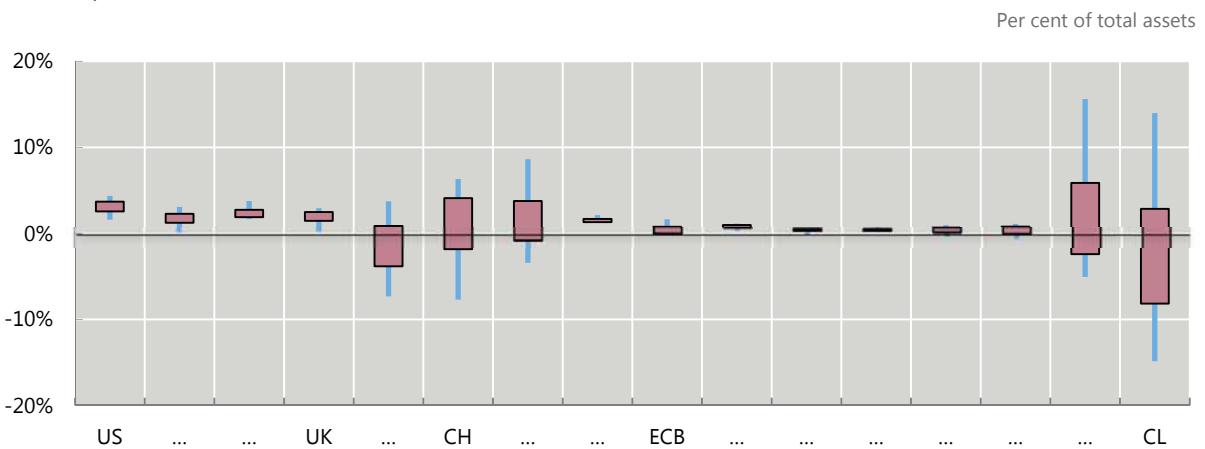
The relationship between the variability of regular income and the variability of declared profits and losses

Figure 8

Net operating income



Declared profits and losses




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Bars reflect one standard deviation, centred around the mean; lines reflect minimum and maximum; in 2006-10.

Figure 8 presents the relevant data for a group of central banks. Normal income (see top panel) is measured by net operating income (essentially net interest and fee income, less operating expenses). The data suggests that many have low or even negative levels of normal income. Some sense of the variability of normal income is provided, using the standard deviation as the measure, albeit over a rather short period (six years). The bottom panel of Figure 8 adds in income from recognised revaluations and realisations, by focusing on declared profits. For five central banks, the variability of total net income (profits) is much higher than that of normal income. Average declared profit rises relative to normal income in just one of the five cases, but the more salient point for the distribution asymmetry is that in each of these cases notable losses are incurred in some years. Recalling that exposure to a distribution asymmetry involves a high variability of income relative to the level of

normal income, these data also raise the possibility that some of these central banks may potentially be exposed to a distribution asymmetry.<sup>70</sup>

#### 4. Countering the effects of asymmetric distributions

Equity erosion via the action of a distribution asymmetry can be countered in four main ways:<sup>71</sup> by not recognising unrealised changes in value as income; by adjusting the distribution scheme so that some or all of the unrealised changes in fair value are excluded from the distribution; by smoothing or capping distributions; and by making distributions contingent on financial soundness. These approaches are described in turn, followed by a summary of some of the factors relevant to an assessment of their relative strengths.

##### a. Using accounting policies to avoid the distribution asymmetry

As the distribution asymmetry is only encountered when income variance is high relative to normal income, two standard options are to not revalue assets and liabilities as their fair or market values change, or the relevant exchange rate changes, or to not recognise as income such revaluations and FX retranslations.

Valuing assets and liabilities on an amortised historic cost basis (hold-to-maturity accounting) is, as shown in Part B, commonly used by central banks. Some of that outcome is explained by the nature of the assets and liabilities held. Some is also (in principle) a matter of accounting policy choice. Against the background of the central bank's long-term policy orientation, and given the problems that can be caused by the distribution asymmetry, the factors that might motivate a choice to revalue financial instruments (and retranslate, for those denominated in FX) during their holding periods are as follows:

- Incentive and accountability issues involved in suppressing (often but not always distracting) signals, which have already been discussed.<sup>72</sup>
- The potential for losses to become trapped in the balance sheet, when not revealed by active revaluation. Hidden reserves may be built, but equally unobserved holes may develop.<sup>73</sup>

<sup>70</sup> Note that an exposure to the distribution asymmetry does not necessarily finally result in equity erosion. A high variability of income may generate frequent losses, even if compensated by an equal amount of profits in other years. But the final impact on trend equity also depends on whether there are compensating mechanisms that serve to offset the asymmetry. In the cases of the Central Bank of Chile and the Swiss National Bank, shown in Figure 8, there are such compensating mechanisms. The nature of such mechanisms is taken up in the next Section.

<sup>71</sup> This treats the economic exposures that give rise to the potential for such income variations as largely exogenous – in the sense of them being mostly a product of the policy functions that the central bank is tasked with, and the economic environment over which it has but a marginal, short-term influence.

<sup>72</sup> A hold-to-maturity accounting approach still allows changes in the values recorded in the notes to the accounts, even if they are not registered on the face of the financial statements. This is a commonly used approach – the Federal Reserve is one example – that allows disclosure (if not full transparency) while reducing exposure to the distribution asymmetry. In terms of the question of the effect of measurement and disclosure on incentives, there is presumably a difference between recording developments in the notes as opposed to on the face of the financial statements. Otherwise, why would the most visible course – the face – not routinely be chosen?

<sup>73</sup> See Stella (2011) for examples from Hungary, Jamaica, Nicaragua, Peru and Uruguay; and IMF (1998) for the Philippines.

- The potential to distribute income that is either illusory, or the counterpart of risk. Distributing income that does not exist, or that is needed as an offset to risk, is similar to encountering a distribution asymmetry – “surpluses” are distributed but shortfalls are not compensated.<sup>74</sup>

For those that revalue financial instruments, there is also the choice as to when to recognise changes in value as income in the P&L account. The use of revaluation accounts to shield unrealised changes in value from P&L leaves equity subject to the volatility inherent in the institution’s economic exposures, but avoids passing that volatility to distributable income.

Standard revaluation accounts do not provide catch-all protection, however.

First, when losses dominate profits, the distribution asymmetry is largely irrelevant, and so too is any protection via a choice not to recognise revaluation income. The central banks of Chile and the Czech Republic have both experienced a run of losses over recent years. Both hold substantial foreign currency assets and are thus heavily exposed to exchange rate variations. Both take exchange rate translation gains and losses to P&L. But whereas the Central Bank of Chile takes unrealised changes in the domestic currency values of foreign currency instruments to the P&L statement, the Czech National Bank registers such changes in revaluation accounts. And both have experienced extended periods of negative equity from which recovery is expected to take a long time.<sup>75</sup>

Second, as illustrated by the Bank of Canada, the ECB (likewise the national central banks of the Eurosystem, which for the most part follow the same accounting approach) and the Bank of Israel, further protection can be obtained by asymmetric recognition of income from revaluations. For the Bank of Canada, unrealised revaluation income is routed to separate revaluation accounts (by income class), accounts which are not allowed to be negative. Losses that would otherwise take these accounts negative flow instead into the distribution system, offsetting other income and reducing the distribution. The non-negativity constraint thus creates an asymmetry in income recognition. However, in the Bank of Canada’s case, the effect is temporary. When (unrealised) revaluation gains subsequently occur, the first priority is to recompense the government for forgone dividends, ahead of rebuilding the revaluation account buffers. Still, a partial offset to the distribution asymmetry is achieved.

In the Eurosystem accounting case, unrealised revaluation gains are also taken to revaluation accounts and, to the extent that previous revaluation gains have occurred, unrealised revaluation losses are charged against these accounts. Unrealised losses that cannot be offset against previous unrealised gains – as for the Bank of Canada, revaluation accounts are not permitted to be negative – are instead recognised as (negative) income in the P&L account. But whereas the Bank of Canada registers gains and subsequent losses separately only by instrument class,

<sup>74</sup> Those familiar with recent debates about appropriate compensation practices for risk-takers in banking will recognise the problem. Salary or bonus payments related to risky income earned, without adjustment for unrealised risks, may distort perspectives and lead to inappropriate behaviour.

<sup>75</sup> According to Cinibuch et al (2009), around 15 years for the Czech case. And according to Restrepo et al (2009), around 25 years for the Chilean case. In both cases, trend exchange rate appreciation is the main cause of losses and negative equity, although in both cases financial system restructuring costs contributed initially. Such appreciations lead to exchange rate translation losses that in both cases flow directly to the P&L. Were such losses to flow instead to a revaluation account in equity, the point would remain – negative equity would result.

the ESCB approach does so separately for each security (by ISIN). The non-negativity constraint thus applies at a much more granular level.<sup>76</sup>

And in the case of the Bank of Israel, following the experience of 1998-99 cited earlier, accounting policies were revised such that unrealised gains that result in an increase in foreign currency reserves (measured in shekels) are not counted as income but are instead routed to a revaluation account, whereas unrealised losses that diminish reserves are counted as expenses.

These approaches prevent unrealised gains from being distributed. And to the extent that the share of unrealised losses that passes through the P&L account and into the distribution scheme reduces total profits more than it causes overall losses, an opposing asymmetry is introduced into the equity path. At the same time, by virtue of non-negativity conditions for revaluation buffers, revaluation losses cannot be "trapped" in the balance sheet.

Third, a common feature of revaluation accounts is that clear rules govern what is to be held back, and when the accumulated buffer is to be released. In the Eurosystem case, these rules are unusually detailed, *inter alia* preventing revaluation gains and losses being netted off. And under IFRS, revaluation account balances cannot be used to offset other losses, such write downs of impaired assets. A potentially less rule-bound way of holding back income is the use of general risk (or "rainy day") provisions – the setting aside (before P&L is declared<sup>77</sup>) of income, in an equity account, to provide for the possibility of future losses being incurred.

Partly because unspecified future obligations are not "current liabilities", and partly because of the risk of abuse (hiding true income volatility), the use of general risk provisions is tightly constrained by generally accepted commercial accounting standards. But for reasons already stated, for central banks such general provisions can be a natural complement to risks that are not yet well identified. At the same time, the beneficial owners of central banks also have a strong preference for smoothed distributions, and in most cases there are no potential buyers whose interests need attending to (ie central banks are by design not subject to capital market discipline).

For these reasons, one would expect a fairly common use of general risk provisions by central banks. In the Eurosystem, for example, the ECB's accounting framework and those of several national central banks allow general provisions to be made for foreign currency, interest rate, gold price and credit risk (ECB (2012)). Such provisions are allowed or about to be allowed in Belgium, Cyprus, Finland, France, Germany, Greece, Italy, Luxembourg, Portugal, Slovenia and Spain (although they are not utilised in all cases). However, there are often constraints on such general provisions. For example, at the ECB they are limited in size to the amount of

<sup>76</sup> The separate treatment of each security line amplifies the income recognition asymmetry, by increasing the probability that there will not be previously registered gains against which to offset the losses. Indeed, in many years unbuffered unrealised losses will be charged against the P&L account at the same time as revaluation account balances are increasing due to unrealised revaluation gains.

<sup>77</sup> This qualifier refers to and highlights a distinction between general risk provisions, which are decided by an entity's management within whatever rules have been set down, and general reserves used to retain rather than distribute earnings. The latter may also be decided by the entity's management, although they may also be subject to negotiation with owner(s). However, risk provisions shelter income from declared profit, whereas general reserves do not. For those who only observe final P&L numbers and do not read financial statements in detail, that makes for a difference in transparency.

paid-up capital and at other central banks they are subject to tests such as being a provision “such as are normally provided” by financial institutions. In contrast, local legislation prohibits general provisioning by central banks in Austria, Estonia, Ireland, the Netherlands and Slovakia. A similar prohibition also appears to be the case for central banks that have chosen to adopt IFRS in full.

Upcoming changes in IFRS are likely to allow limited use of forward-looking provisioning in the future, although only with respect to credit risk and still controlled by tight standards on establishing expected losses.<sup>78</sup> For central banks that use IFRS, or where IFRS adoption is contemplated, this leaves in place the main problems with respect to general provisioning, since highly uncertain exchange rate and interest rate risks are also material for many central banks. More fundamentally, for central banks more than other institutions, the main need for buffers derives from actions in, and the consequences of, tail events. Tail events are inherently unpredictable as to timing and character. In short, effective general provisions for central banks are unlikely to be compatible with commercial accounting standards any time soon.

b. Avoiding a distribution asymmetry by separating accounting and distributable income

The second approach to protecting against the distribution asymmetry is to break the one-to-one link between accounting net income and distributable net income. Although such a link is common and embedded in many central banks’ laws, it is not a requirement of internationally accepted accounting norms such as IFRS.<sup>79</sup>

The Reserve Bank of Australia provides an illustration of the point. Unrealised income is included in declared P&L, but excluded from income available for distribution. Rules and judgment about what to distribute or retain in reserves are applied to distributable income.

The Bank of Canada achieves a similar outcome. The Bank, which uses IFRS, calculates a “net income” that does not include changes in the value of held instruments, and a “comprehensive income” that does include some such changes.<sup>80</sup> By agreement with the government, the distribution is keyed off net income. A possible loss in transparency, relative to the Reserve Bank of Australia case, arises from there being not one but two focal points for the declaration of income. That said, having more than one income construct, each serving a different purpose, may sometimes better convey the economic reality, especially where the different constructs are meant to illuminate rather than obfuscate.

c. Distribution smoothing and capping

The distributable income of the Sveriges Riksbank – Sweden’s central bank – is based on the five-year moving average of accounting income, after certain

<sup>78</sup> Recent draft proposals from both the IASB and FASB describe forward-looking approaches based on “expected losses”, to replace the current more restrictive “incurred loss” model.

<sup>79</sup> The relationship between accounting net income and distributable net income in the UK is comprehensively covered in ICAEW (2010).

<sup>80</sup> Treasury bills (and the equity position in the BIS – other foreign currency assets are immaterial) are treated as available for sale, and are accordingly revalued to equity; government bonds are treated as hold-to-maturity, and are accordingly not revalued. The bulk of other assets is repos, and hence is treated as loans.

adjustments, rather than being keyed off the year's declared P&L.<sup>81</sup> To the extent that unrealised income volatility offsets within the smoothing period (ie the moving average of unrealised income tends towards zero), the distribution asymmetry is avoided.

The central bank of the Netherlands has another smoothing approach. There, losses can be offset – and hence equity rebuilt – by retaining subsequent surpluses for up to six years.

A different approach is to use a distribution cap that prevents pay-outs of exceptionally large surpluses, such as those caused by revaluation gains. The Swiss National Bank's distribution scheme caps profit transfers at an amount periodically agreed with the government, with surpluses that exceed the cap being retained in a distribution reserve.

d. Offsetting the effects of asymmetric distributions via contingent distribution schemes

As discussed in Section 7 of Part B, distributions can be contingent on the state of the central bank's finances. If they are fully contingent, the distribution asymmetry is nullified by future retentions of surpluses (if they are sufficient), thereby allowing equity to be rebuilt to target.

In some cases, distributions of surpluses are mildly contingent on the state of the finances; in some cases, fully so. Relatively few central banks have schemes that make distributions contingent on having large equity buffers, with the Swiss National Bank being a notable exception. Should the SNB's special distribution reserve go negative, distributions are halted. Future surpluses go first to satisfy the target for general reserves (known as the currency reserves provision), then to rebuild the distribution reserve, and only then to fund (still capped) distributions.<sup>82</sup>

Even fewer central banks have direct access to external resources to compensate for losses. Direct access to external resources would provide a mechanism that could offset a distribution asymmetry, and protect equity in case of realised and lasting losses (such as those that the Central Bank of Chile experienced in the 1980s when it was obliged to finance failing banks). Two cases provide partial illustrations – partial in the sense that external resources can only be used to offset a single year's loss, and not to make up a continuing equity shortfall. In the case of the Bank of Korea, the law provides that the government budget will cover losses that exceed reserves, such that reserves do not go negative. In principle, this is hard-wired and non-discretionary. In the ECB's case, losses can be covered by appropriating the monetary income that would otherwise remain with the

<sup>81</sup> Accounting income in the Riksbank's case is calculated according to Eurosystem rules, with asymmetric treatment of unrealised revaluation income. However, among the adjustments made to determine distributable income are some that add back unrealised gains and losses that have been withheld from the P&L through the application of ESCB accounting.

<sup>82</sup> Ironically, the SNB also provides a striking example of non-contingent distribution arrangements. In order to provide a degree of predictability in annual profit transfers to the federal and cantonal governments, the SNB periodically agrees with the Department of Finance the annual distribution for five years ahead. This can result in a distribution even when annual profit is negative, as occurred in 2008 and 2010 (losses of CHF 4.7 billion and CHF 20.8 billion were recorded, inclusive of and indeed caused by unrealised revaluation losses, yet distributions of CHF 2.5 billion were made each year). Nonetheless, the continued payment of the agreed amount is ultimately subject to the mechanism described in the text, making the overall scheme contingent – unlike the Sveriges Riksbank case, where the smoothing mechanism continues to determine annual dividends irrespective of both annual profits and the level of equity.

Eurosystem's national central banks. This requires a decision of the Governing Council. To date, whenever confronted with such a choice, the Governing Council has always decided to cover the ECB's losses with the monetary income of the NCBs, even when in some of these years the NCBs have also suffered losses.

Another interesting example is the Federal Reserve. Here, the relevant "distribution" is not a dividend, but instead a voluntary transfer of surpluses to the Treasury.<sup>83</sup> Being voluntary, transfers could in principle be fully contingent on the Board's independent assessment of the need to retain surpluses in order to build buffers, although politics and history may constrain its freedom in that regard.<sup>84</sup> However the point of interest is not so much the determination of transfers and their ultimate degree of contingency, but instead how the Fed accounts for losses that would lead to lower future transfers to the Treasury. The Fed has recently clarified that losses that lead to shortfalls in the reserves (the "surplus") relative to their required level (see footnote 83) would be registered as an asset that represents the amount of the reduction in future transfers to the Treasury that is needed to rebuild reserves. With this practice, which is allowed by US GAAP (on the presumption that future earnings are sufficiently certain that the claimed value of the asset will be realised), accounting equity would not fall in the face of a temporary negative shock to earnings.<sup>85</sup>

There are three ways to conceptualise this accounting treatment. One is to consider it as equivalent to the treatment of deferred tax liabilities as assets. Such a treatment is allowed under most accounting standards when there are tax losses that can be carried forward into future years *and* when taxable income in those future years is sufficiently certain. The equivalence is not exact, since the Fed's transfers are voluntary and to the beneficial (though not formal) owner, rather than being externally mandated. A second conceptualisation is to consider the "deferred transfer" asset as a partial and temporary recognition of the unrecorded asset that is the franchise value represented by the net present value of future seigniorage (see Part A). Both conceptualisations highlight the key role played by the presumptions that the future income stream will be sufficient – neither conceptualisation would be valid were losses to be ongoing or normal income small – and that future surpluses can be retained. As such, the approach would not be available to many central

<sup>83</sup> The Treasury is not a shareholder; the Federal Reserve System comprises regional Reserve Banks, which are owned by private commercial banks ("member banks"), and the Board of Governors, which does not have a corporate structure. That the Treasury would receive the entirety of any surplus, after (as implied by law) the payment of small dividends to member banks and retention of a sufficient amount to equate a reserve (the "surplus") to the amount of capital paid in by members, was decided by the Federal Reserve Board in the 1950s. This decision has effectively been endorsed by successive governments and the legislature (by way of an absence of challenge), although on two occasions in the 1990s, Congress passed laws requiring special transfers, additional to the normal amounts.

<sup>84</sup> The political deal referred to in the preceding footnote implies constraints, but to a degree that is unknown, since to date the Fed has not made a loss and consequently has never been forced to stop transfers. In connection with the Fed's emergency actions to support the financial system, the then Secretary to the Treasury, Henry Paulson, acknowledged on 17 March 2008 (see Cecchetti (2009)) that if the Federal Reserve suffered losses, that would reduce transfers. Fed Chairman Ben Bernanke has subsequently signalled that under some scenarios, losses could be large enough that transfers would cease for a period (Bernanke (2011)).

<sup>85</sup> Other central banks have also used this treatment, eg the Deutsche Bundesbank in the 1970s. See also the following footnote.

banks, even if permissible under their accounting rules.<sup>86</sup> The third conceptualisation is to consider equity to be partly constituted by a target that is not yet reached, with the deferred transfer asset registering how far paid-in capital and retentions are short of the target. Netting the two would provide the equity number more familiar to most observers.

One reason for having dwelled on this accounting policy choice is to highlight the importance that some central banks place on maintaining positive equity – at least in accounting terms. Possible explanations for this sensitivity are explored in the section 5 below.

#### e. Factors relevant to assessing the options

The options for avoiding a distribution asymmetry described above involve alternative arrangements for accounting policies and for distribution schemes. Such alternatives may not be available, or attempts to modify existing arrangements might carry too much risk, especially where conditions are adverse. Having said that, given a blank sheet of paper, various factors suggest that focusing on the design of the distribution system itself might be preferable to adopting accounting policies specifically designed to prevent large economic exposures from flowing through into high P&L variance. There are four main factors.

First, each of the accounting policy options for avoiding P&L variance work well in some circumstances but not others (eg accounting at amortised cost can allow distributions to continue while the underlying economic situation deteriorates). Second, accounting tends to be rule-driven, and the general usability of financial buffers may be constrained by the rules used to create them. By comparison, distribution schemes can be designed to provide more all-purpose protection. Third, the accuracy of the presentation of financial outcomes may be reduced when accounting policies are designed to smooth profit variance. This may erode trust, especially in circumstances where abnormal policy measures are required. And fourth, the distribution system is relatively simple and serves a single purpose (to transfer resources), while the accounting system is complex and has multiple objectives (which suggests the possibility of trade-offs between objectives).

### 5. The consequences of financial weakness

The theory covered in Part A suggested some reasons for believing that central bank financial strength – low or high – may empirically be a non-issue for advanced economy central banks with apparently narrow mandates. Yet central banks tend to display a strong aversion to financial weakness. Three examples are:

- the Fed's adoption of an accounting policy that rules out posting negative accounting equity even in the context of unusual losses;

<sup>86</sup> Examples of cases where losses were recorded as assets or negative liabilities rather than as reductions in equity are Costa Rica in the early 1980s, Peru in the 1980s, Thailand after the 1997 crisis, and Hungary in the 1990s. In each of these cases, future income was not assured. These special assets often grew to be very large components of the balance sheet (over 50% in the Costa Rican case, 25% in the Peruvian case; in Hungary, the unserviced notional claim on the government ended up by swamping accounting capital by a factor of 20). In these cases, such treatments confused analysis of the underlying economic situation, and contributed directly to a worsening of the central banks' finances by allowing continued distributions to the government despite significant and growing financial weakness.

- the Bank of Canada's agreement with the government that unrealised losses would be covered by the government if large enough to result in components of equity that are negative (Bank of Canada (2011)); and
- the ECB's Convergence Report 2012 which asserts that "... financial independence also implies that an NCB should always be sufficiently capitalised. In particular, any situation should be avoided whereby for a prolonged period of time an NCB's net equity is below the level of its statutory capital or is even negative, including where losses beyond the level of capital and the reserves are carried over."

Moreover, some central banks have acknowledged that their finances have played a role in their decision-making – or were at least a consideration in policy analysis. Bank of England Governor Mervyn King recently dismissed suggestions that government debt held by the Bank could be cancelled (as a way of more permanently financing government spending through money creation), partly on the grounds of the impact on the Bank's finances. Such an approach would leave the Bank with "no income, in the form of coupon payments on gilts, to cover the [higher] payments of interest on reserves" when interest rates eventually return to a more normal level. "The Bank would become insolvent unless it created even more money to finance those interest payments, and that would lead ultimately to uncontrolled inflation."<sup>87</sup>

As will be illustrated in this section, it seems that good policies, and good policy institutions, tend to push the question of the central bank's finances into the background. The reason for a continuing aversion to displaying weak financial positions even among central banks with strong reputations therefore seems to have three prongs:

1. Key central bank constituencies, including politicians and markets, may misunderstand apparently weak finances as implying past mistakes or imminent failure. Their misunderstanding may affect their behaviour in self-fulfilling, harmful ways.
2. Sometimes, weak finances may actually imply past mistakes or imminent failure, and it is difficult for politicians and markets to interpret accurately such noisy signals.
3. For some jurisdictions, the effect of policy actions on finances may contribute to creating a boundary line between decisions for the central bank alone and those that should at a minimum involve the fiscal authorities. If taxpayers (or some of them) are to be put at risk, the matter may *prima facie* be quasi-fiscal in nature. In such jurisdictions, the political authorities – and hence the central bank itself – may by design be sensitive to financial outcomes.

We consider these elements in more detail below.

<sup>87</sup> King (2012). Other examples include: the Central Bank of Chile announced in 2012 that it would cease adding to its portfolio of FX assets, in part because of the financial risks involved. The Reserve Bank of New Zealand in 2004 sought a capital injection from the government to allow it to absorb short-term mark-to-market losses from a new (more active) FX intervention policy "without appearing to jeopardise its solvency" ([www.rbnz.govt.nz/finmarkets/foreignreserves/intervention/0147138.html](http://www.rbnz.govt.nz/finmarkets/foreignreserves/intervention/0147138.html)).

### a. Harmful self-fulfilling prophecies

Credibility has also long been recognised as important for the effectiveness of monetary policy, in terms of the costs of attaining the objective.<sup>88</sup> In recent years, the roles of expectations and credibility have been central to explanations of both pre-crisis macroeconomic stability (under the so-called “Great Moderation”) and the emergence of liquidity traps in Japan (in the 1990s and 2000s) and perhaps elsewhere.<sup>89</sup> Governor King ascribed in 2005 much of central banks’ influence over interest rates to the power of market expectations, illustrating the point by reference to Argentine footballer Diego Maradona’s ability to beat opponents by inducing them to react to what they expected him to do.<sup>90</sup>

If politicians misinterpret financial weakness as meaning that the central bank is now dependent on them for a bailout if policymaking is to continue, the power relationship is likely to be affected. Seeking a recapitalisation from the government would then be a double-edged sword. The mere act of seeking one might give up to elected politicians an authority that had been purposefully delegated to the central bank.

### b. Noisy signals

As Part A showed, history seems to provide examples where a central bank’s financial problems have caused its policy problems or at least contributed to them. Yet the historical record is not clear; there are important counterexamples; and more careful empirical research suggests that strong conclusions are difficult to draw. The signal about potential policy problems that is provided by the existence of financial difficulties is noisy at best.

However there are clear instances where the signal of problems matches with self-assessment. In Costa Rica, by the end of 2002, interest-bearing liabilities were almost double interest-bearing assets. Given such a loss-making structure, the central bank was reluctant to lower its target rate of inflation, in view of the further reduction in seigniorage that would be involved, as well as of the costs of implementing the monetary contraction needed. The central bank’s governor stated, “We, the central bank, have a negative net worth ... and this remains our greatest challenge.”<sup>91</sup>

And there are instances where the costs of policy actions being registered in the central bank’s financial statements are consistent with an evaluation of the net benefits of policy actions. For instance, the holding of FX reserves often entails financing and opportunity costs.<sup>92</sup> These costs may be viewed as an insurance premium, paid against an expected but uncertain gain from the assured availability of FX assets when needed. Additional to the sterilisation cost, perhaps, may be a

<sup>88</sup> Ball (1993); Hutchinson and Judd (1989).

<sup>89</sup> Ahearne et al (2002); Mishkin (2011).

<sup>90</sup> King (2005).

<sup>91</sup> Francisco de Paula Gutiérrez, quoted in Stella (2008).

<sup>92</sup> Financing costs may be proxied by the spread between domestic and foreign interest rates, and thought of as equivalent to the sterilisation cost (Garcia and Soto (2004), Kletzer and Spiegel (2004) and Mohanty and Turner (2005)). Opportunity costs may be proxied by the difference between earnings on reserve assets and either the cost of maintaining external liabilities that could otherwise be repaid by the public sector (Edwards (1985)) or the private sector (Rodrik (2006)) or the forgone returns on domestic investments (Hauner (2005)). These costs should be related in equilibrium.

revaluation loss in the case of the domestic currency's trend appreciation, and a cost associated with the higher variance of the value of the central bank's balance sheet. While these costs might be viewed as offsetting corresponding gains in the private sector,<sup>93</sup> and perhaps also in the rest of the public sector, the existence of large losses at the central bank might provide a useful trigger for a policy reassessment.

To reinforce the point that few conclusions can be drawn when a central bank takes a financial hit as to whether policy will turn out well or otherwise, consider four recent examples of clear policy success, notwithstanding weak central bank finances: Chile, the Czech Republic, Israel and Mexico. At the end of 2010, these central banks had equity levels (relative to total assets) of -23%, -17%, -5% and -6% respectively, and these were not one-off instances of negative equity. Each had experienced negative equity over most of the preceding nine years, as a result of FX losses (and, in the case of Chile and the Czech Republic, significant costs from restructuring their weak financial sectors in earlier years). But in each case, macroeconomic stability has been progressively attained alongside a noticeable improvement in trend growth rates (the recent period of global slowdown somewhat excepted). The resulting real exchange rate appreciations have hit these central banks' finances, but as a reflection of upturns in their economies.

These benign cases are distinguished from others by the existence of successful institutions (governance arrangements) focused on macroeconomic stability (with inflation targeting featuring in all four cases), and by the fact that the source of recent losses was either politically acceptable (FX losses caused by exchange rate appreciation) or regarded as necessary (eg financial sector bailouts and restructuring costs in turnaround episodes). Moreover, there is a widespread understanding that these long-term financial positions are structurally sound (including those of the corresponding governments).

Still, given the mixed record, one might expect observers of a central bank with apparent financial difficulties to accord a low but non-zero probability to the existence of current or future problems in executing policy.

### c. Quasi-fiscal boundaries

The third prong mentioned concerned the financial position of the central bank being sensitive because it was meant to be, explicitly or implicitly. Illustrating the latter, in 2010 Governor Shirakawa of the Bank of Japan noted that asset purchases for quantitative easing involved financial risk that was quasi-fiscal in character. In his view, the central bank needed to take seriously the question of its authority to take such decisions independently.<sup>94</sup>

In this construction, the level of the central bank's financial strength reflects a social decision to provide the financial resources needed to implement autonomously those functions assigned to the central bank for independent execution, and no more. The limits can take several forms. One form is provisions within the central bank law that authorise particular types of financial risk-taking under defined conditions, with the implication that risk-taking outside such conditions is forbidden. Two examples might suffice.

- Up until the passage of the Dodd-Frank Act in 2010, Section 13(3) of the Federal Reserve Act provided the Federal Reserve with the authority to lend to

<sup>93</sup> See, for example, Holub (2004).

<sup>94</sup> In the case of asset purchases for QE, his answer was yes, as explained in Shirakawa (2010).

individual non-depository financial institutions (such as AIG, but more generally also to individuals, partnerships and corporations) in “unusual and exigent circumstances”, subject to a qualified majority of Board members voting to do so. With the passage of the Dodd-Frank Act, that independent authority has been curtailed. Such lending is now restricted to those participating in a programme or facility with broad-based eligibility. More saliently for our purpose, such lending is also now required to be in a manner “consistent with sound management practices” that protects taxpayers from losses, and subject to the authorisation of the Treasury Secretary. According to records of the Congressional debate, the motivation for the restriction was to limit the ability of the Federal Reserve to put taxpayer money at risk through emergency lending.

- Following a protracted financial crisis in Japan, the statute governing the Bank of Japan was amended in 1998 to carefully define responsibilities for the Bank’s risk-taking. There is now a formal structure for consultation with political and other authorities whenever unconventional lender-of-last-resort operations (ie those involving credit risk to the Bank of Japan or involving non-standard counterparties) are contemplated (BIS (2009)).

A second form is illustrated by examples where the central bank explicitly acts as an agent for the government, with the government owning the financial risks and rewards. The situation of several advanced economy central banks with respect to foreign exchange market intervention is illustrative. In Canada, Japan, the United Kingdom and the United States, the central bank holds few if any of the nation’s official foreign exchange reserves on its balance sheet, yet the central bank is a prominent or the main agency involved in deploying these reserves in market interventions. Crucially, these central banks do not have unfettered independence in decisions to intervene. The location of the financial resources and associated financial gains and losses is substantially aligned with the location of decision-making authority.<sup>95</sup>

In this regard, the example of the Reserve Bank of New Zealand is also worth mentioning. As noted before, the central bank’s governing law makes a distinction between government and central bank decisions on FX intervention. Where the government directs the central bank to intervene (or to implement a policy that requires intervention), gains and losses are for the government’s account. Where the central bank decides to intervene, gains and losses are for its own account.<sup>96</sup> When in 2004 the central bank proposed to the government a policy change in favour of more active intervention, it was seeking (and did receive) both additional authority and additional financial resources in the way of more capital.<sup>97</sup>

<sup>95</sup> The South African Reserve Bank illustrates a variation on the same theme. In that case, the FX reserves are on the SARB’s balance sheet, but FX gains and losses (including those arising from FX translations) are charged to an account of the government. By agreement, the government settles up for amounts that generate domestic cash flows, thereby sterilising such flows, leaving unrealised components effectively as a valuation item on SARB’s balance sheet. In South Africa, decisions on FX intervention (including the amount of reserves held) are formally the responsibility of the government (or the Minister to be more specific) but the SARB is responsible for the day-to-day administration of the exchange rate controls.

<sup>96</sup> At least initially. Ultimately, as the government owns the central bank’s equity and receives its dividends, all gains and losses flow to the treasury.

<sup>97</sup> See footnote 87.

These examples suggest a conceptual and political/constitutional framework that recognises exchange rate policy and associated interventions as quasi-fiscal in nature, and draws a connection between the authority to act in the foreign exchange market and the financial capacity to do so. In fact, exchange rate policy (ie regime and strategy choice) is usually a matter reserved for governments, for that reason – even if the central bank has been delegated the authority to implement exchange rate policy involving interventions (though subject to the policy objectives or targets established by governments).<sup>98</sup> In this context, the financial capacity to bear the risks of implementing policy can serve both as a signal about the degree of delegated authority, and a check on its use. In the examples discussed, both these strands are evident.

The idea that financial capacity can be used as a signal and constraint on quasi-fiscal actions by central banks has a more general application in some jurisdictions, notably in the United Kingdom. The Bank of England is thinly capitalised, consistent with an understanding that decisions that would put capital at risk are effectively decisions to put public funds at risk, and such decisions are properly for the government to take: "... the decision on whether to use taxpayers' money, no matter whether it is £60 billion or £6, always has to be for the Chancellor. There is no question about that."<sup>99</sup>

Several illustrations of the United Kingdom's perspective on the dividing line between matters for political versus central bank decisions are available.<sup>100</sup>

- New crisis management arrangements will provide for special support operations to be conducted by the Bank of England at the direction of the Chancellor – with a special purpose subsidiary being used to ring-fence the operation from the Bank's balance sheet – and under indemnities provided by the Treasury.<sup>101</sup>
- The principle of political responsibility for public money has also long been evident in the Bank's lender-of-last-resort arrangements. Unlike in many other jurisdictions where decisions on exceptional liquidity support operations are in the sole purview of the central bank, in the United Kingdom the Chancellor decides on operations that go beyond the Bank's published framework for operations in the money market.<sup>102</sup> This reflects an awareness that exceptional

<sup>98</sup> Moser-Boehm (2005).

<sup>99</sup> From Governor Mervyn King's testimony to the Treasury Committee of the House of Commons, 17 January 2012.

<sup>100</sup> In view of the UK's approach to dividing responsibilities between elected representatives and the relevant administrative organs of state, the Bank of England has often been described as an "agency central bank". The Bank frequently refers to its role as an agent of the government, with respect to various functions. Those functions extend to the monetary policy sphere: in relation to the choice of policy target, it is for the Chancellor annually to determine, and the central bank to pursue. Nonetheless a recent controversy in the UK with respect to the disposition of cash surpluses arising from actions by the Bank of England that were indemnified by the Treasury suggests that not everyone is au fait with the dividing line under discussion.

<sup>101</sup> UK Treasury (2012). Annex E contains a draft Memorandum of Understanding between the Treasury and the Bank of England (jointly with its subsidiary, the Prudential Regulation Authority) that spells out the arrangements for Bank advice to the Chancellor on risks to public funds; use of the Chancellor's powers to direct the bank; and financial arrangements that transfer risk to the public account.

<sup>102</sup> Memorandum of Understanding between HM Treasury, the Bank of England and the Financial Services Authority, March 2006.

liquidity support operations can involve credit risk, even if there is no intention of supporting an insolvent institution.

- The principle has also been evident in the Chancellor's specific authorisation of each stage of the Bank's recent asset purchase programme. Quantitative easing has been implemented through the Asset Purchase Facility, under Monetary Policy Committee decisions, but subject to limits provided in stepwise authorisations by the Chancellor. Again, in other jurisdictions, QE decisions are typically for the central bank alone (even if, as in the Bank of Japan's case mentioned at the beginning of this section, the central bank is especially careful in taking such decisions because of their quasi-fiscal aspects).
- The aforementioned reaction of the Governor to the idea that the Bank create money to finance, directly and irreversibly, government spending (see the introduction to this Section) – a reaction that was partly based on the quasi-fiscal nature of the proposed action (King (2012)).

The clear thread through these UK examples is that it is the responsibility of politicians to take decisions involving the expenditure of public money (or the risk thereof), and that the Bank of England's lack of a deep capital backing provided by Parliament reflects and reinforces this view. Accordingly, notwithstanding the absence of a legal requirement for positive equity, losses that drove equity into negative territory would raise questions of the legitimacy of decision-taking.

In summary, central bank financial weakness might not be an issue in its own right, but rather it could be an issue because it *may* signal something about the central bank having stepped into quasi-fiscal territory, which *may* raise questions of legitimacy. Whether financial outcomes are valid signals of such issues depends very much on the jurisdiction and its norms with respect to the delegation of state powers and responsibilities – as well as, obviously, on the particulars of each case.



## Part D Assessing the appropriate amount of financial resources – a framework

What is the right amount of capital? The question is asked both by central banks themselves and by other interested parties. In the United States, for example, the General Accounting Office in 2002 reviewed the Federal Reserve's Surplus Account (one of the two main components of Fed equity) with the idea in mind that less might be needed.<sup>103</sup> And in Sweden, a commission of inquiry was set up to recommend legislation for the Riksbank's financial independence with a view to buttressing the central bank's institutional independence. The commission had to grapple with the question of the appropriate amount of financial strength.<sup>104</sup>

Risk-adjusted capital adequacy ratios are sometimes computed for central banks, similar to those applied to commercial banks under Basel banking regulation guidelines.<sup>105</sup> And VaR-type analysis is also suggested as a way of understanding the financial exposures of the central bank, as a step in determining capital needs.<sup>106</sup> However, each of these approaches deals with only part of the question.

In this concluding section, we suggest a framework for assessing what level of capitalisation is appropriate, within the context of the equally important question of financial resource adequacy. As will be evident, a framework is required rather than a formula, given the diversity of situations faced by central banks. We take as given the very different economic and geopolitical contexts within which central banks operate. And for the most part we take as given their mandates, although ultimately we suggest that financial consequences ought to be a consideration in society's choice of the mandate. The suggested framework attempts to be comprehensive in all important dimensions.

### "Financial strength" revisited

First, we revisit the concept of financial strength as used in this paper, in case this section is read separately. As explained in Part A, we are concerned with *standalone* financial strength. Financial strength means the capacity to continue performing the functions for which the central bank is responsible. As there is usually no legal lower limit for equity, continuity of performance involves the ongoing ability to *fund* and *implement* operations without the central bank being obliged to do things that would prevent it from attaining its objectives.

<sup>103</sup> It concluded that "We found no widely accepted, analytically based criteria to show whether a central bank needs capital as a cushion against losses or how the level of such an account should be determined." United States General Accounting Office (2002).

<sup>104</sup> The Commission was asked to consider the appropriate amount of "own capital", but it could not in the end determine whether the appropriate concept for financial independence (strength) ought instead to be a wider one that includes currency in circulation as a source of (nearly) cost-free income. Commission of Inquiry (2007).

<sup>105</sup> The Bank of Japan reports a capital adequacy ratio (which uses banknotes issued as the denominator) in its annual financial statements. However, unlike capital adequacy ratios under Basel banking regulation guidelines, the capital adequacy ratio reported by the BOJ is not risk-weighted.

<sup>106</sup> Blejer and Schumacher (1998), Nocetti (2006).

As discussed in Part A, these points have the following implications for our definition of financial strength:

- Future earnings capability is more important than current accounting equity, which is in turn more important than accounting capital.
- The ability to create new money and hence fund *current* operations is important to releasing the liquidity constraint. But, if this comes at the expense of achieving policy objectives, the power of creating money ceases to be a source of strength. Given the relevance of expectations, this applies also to future money creation implied by current operations.
- Placing emphasis on an ongoing capability to *fund* operations consistent with objectives expands the focus beyond equity as a cost-free base for income generation. Also to be considered are banknotes on permanent issue, and the permanent component of commercial bank deposits at the central bank.
- Placing emphasis on an ongoing ability to implement operations draws attention to political and market behaviours in response to the state of a central bank's finances. To insiders, the ongoing ability to fund operations may be assured, but political or market doubts about that may create insurmountable implementation difficulties. The eye of the beholder matters, though perhaps more for the required amount of financial strength than for its form.
- Placing emphasis on standalone financial strength draws attention to the central bank's mandate to *independently* formulate and/or implement policies and functions. We distinguish agency functions from independent ones, in accordance with the ideas that policy and functional independence is vitiated without independent access to the necessary resources – including financial resources – and that those who pay have (or feel they have) the right to say.

In short, financial strength refers to the ongoing ability of the central bank to fund and implement operations in line with the policy aims for which it has independent responsibility.<sup>107</sup> But because financial strength on this definition is usually difficult to observe, the amount of available and accessible financial resources becomes the key element of financial strength.

With these considerations in mind, we identify four steps in this framework.

## 1. Financial exposures arising from policies and functions

*What are the financial consequences of the policies and functions for which the central bank has independent responsibility?*

It is widely accepted that independent control over financial resources should be matched to the delegated responsibilities for policies and functions that require such resources. In normal times, it is relatively straightforward to estimate how large those financial resources should be.<sup>108</sup> The difficulties arise when estimating the

<sup>107</sup> This is similar to Stella's (2008) definition of financial strength as "the extent to which an entity is [not] constrained by its financial situation in pursuing its strategic goals or policies", but Stella crucially restricts this definition to consideration of those goals and policies for which the institution has independent responsibility.

<sup>108</sup> The central bank of the Netherlands, among others, has experience with using VaR and ALM techniques (Bakker et al (2011)).

scale of the financial resources that will be needed in abnormal times. We identify three major difficulties:

First, the central bank may have independent responsibility for the provision of **systemic insurance**. Last-resort functions – whether with respect to liquidity provision, capital support or market-making – can involve massive financial exposures. The potential scale of last-resort interventions, and the nature of the financial risks involved, may be without historical precedent, although data from other countries' experiences can probably be more actively used than they are at present.

A stumbling block is that the central bank's degree of responsibility for such systemic insurance functions is rarely well spelled out, in statute or elsewhere. Even where emergency liquidity provision (lender of last resort) has been assigned to the central bank, it is commonly constrained by a provision, or at least an understanding, that it be deployed only where credit risk is negligible.<sup>109</sup> Yet in systemic liquidity crises, credit risk is no longer negligible.<sup>110</sup>

To arrive at reasonable guesstimates, clearer statements of responsibilities for the independent implementation of systemic insurance functions may be required. This may seem like the tail wagging the dog – such statements ought to exist in any case, for the sake of good governance. But the decision to delegate such responsibilities for independent execution should also take account of the potential financial consequences. Legitimacy and sustainability could otherwise be undermined. Hence the tasks of spelling out independent responsibilities and of assessing their possible financial consequences cannot ultimately be separated.

Second, **crises alter the financial risk characteristics** of conventional policy functions, as when monetary policy is applied in pursuit of macroeconomic stability aims. For example, QE involves taking interest rate risk out of the market and onto the central bank's balance sheet, and may also involve the acquisition of credit risk. These have potential fiscal consequences.

Third, standard **risk management mechanisms can conflict with policy objectives** (as discussed in Part B). Collateral policies may need to be relaxed, to avoid choking off the supply of low-risk instruments, and to deflect the charge that the central bank is protecting itself at the expense of less able creditors. It may be impossible to withdraw credit lines; indeed, they may need to be expanded to avoid exacerbating an already difficult situation.

The point is that when an independent policy responsibility rests with the central bank, the potential financial consequences need to be considered in any assessment of its appropriate financial strength. Moreover, a growing record of crises makes it clear that exposures to tail events must be considered, since that is where the real action is with respect to central bank finances. If the central bank's independent responsibility extends to systemic insurance functions, these and the

<sup>109</sup> Few laws contain direct expressions of such restrictions (one of them being that of the central bank of Guatemala which can lend "only to resolve temporary deficiencies of liquidity, taking into account that for this the Superintendent of Banks must present a report on the equity situation and the portfolio of the requesting bank"), although several laws associate powers to undertake emergency lending with "temporary liquidity problems". In most cases, the restrictions are either contained in policy documents or are understood.

<sup>110</sup> As explained in, *inter alia*, the Ingves Report on "Central bank governance and financial stability" (May 2011), especially in the box on pages 38–9.

associated financial risks would need to be factored into the assessment of financial needs, to the greatest extent possible.

The situations of the Bank of England, the Eurosystem central banks and the Federal Reserve – discussed earlier in this paper – provide an illustration of these various factors, with particular reference to unconventional policy actions for unusual circumstances.

In the United Kingdom, the situation is quite clear-cut.<sup>111</sup> Decision-making for unconventional actions (ie those not provided for by regular facilities) occasioned by a financial crisis that may put public funds at risk remains with politicians and is not delegated; the financial consequences (positive and negative) likewise revert directly to the public purse. In these cases, the Bank of England has primary operational responsibility, acting as an agent of the government.

In the euro area, the ECB and the Eurosystem NCBs have taken on credit risk in their attempt to keep monetary transmission channels functioning throughout the eurozone. The ECB and the NCBs would bear the initial losses arising from their share of writedowns on Eurosystem holdings, and (for the NCBs) any additional losses from own-portfolio holdings not covered by loss-sharing arrangements. The NCBs could also bear additional losses if monetary income were to be surrendered to assist the ECB.<sup>112</sup> Other things equal, compared with the Bank of England's situation, more financial strength would be needed under such an arrangement than in the Bank of England's situation.<sup>113</sup>

In the United States, the use by the Fed of its Section 13(3) powers to lend to individual non-banks in the early phase of the subprime crisis raised questions in the minds of legislators about control over decisions involving financial risk and distributional effects. The Fed's powers were subsequently circumscribed by the Dodd-Frank Act: they now require the decision of the Treasury Secretary.

The FOMC, however, retains independent decision-making authority over QE. Financial risks are primarily associated with the interest rate exposure, but could also involve credit risk in some configurations (as when private paper is purchased).

The Fed has assessed the potential financial impact of the rapid interest rate rises that could conceivably be needed to control inflation during the exit from QE, and has concluded that losses in some scenarios could be large enough to swamp other earnings.<sup>114</sup> It believes, however, that its baseline earnings capacity, coupled with the ability to capture all of future surpluses when necessary, is sufficient to provide financial strength even in such circumstances. (The question of the impact

<sup>111</sup> For example, QE has mostly been conducted through the Bank's special purpose subsidiary (the BEAPFF). The maximum size of BEAPFF is subject to control by the Chancellor, making the size of QE also effectively subject to his control. In return, BEAPFF (and the Bank itself) are indemnified by the Treasury for related actions. Such a division of responsibilities is now fully elaborated in the Memorandum of Understanding on financial crisis management required by the 2012 Financial Services Act.

<sup>112</sup> As previously described, in the year of a loss, the ECB may be able to appropriate the monetary income that would otherwise remain with NCBs, subject to the agreement of the Governors of those NCBs in the Governing Council. But that transfers most of the equity-rebuilding task to the NCBs.

<sup>113</sup> The ECB's financial strength was increased following a 2010 decision to increase its capital, expressly in response to greater market volatility and hence market risk. However, the increase lifted the ECB's capital to the maximum allowed under its statutes, and credit risk may have been given comparatively low probability weight in simulations, given its absence in the historical record.

<sup>114</sup> Bernanke (2011).

on equity has been rendered moot by the change in accounting arrangements previously discussed, whereby accounting equity would not be affected by a temporary dip in economic net worth.)

## 2. Risk transfer

*To what extent has the government agreed unconditionally to bear the financial risks of potentially costly policies and functions for which the central bank has independent decision authority?*

The organising principle of the framework being outlined is that control over financial resources should be aligned with independent responsibility for resource-using functions. This is to ensure legitimacy and sustainability. Consider unconditional puts to the taxpayer.

It is possible to construct arrangements that impose the costs of specific actions directly on the taxpayer while leaving full decision authority in the hands of the central bank. Here we are talking about the government taking direct responsibility for paying the bill (or receiving the income), rather than making good after the fact.

An example noted earlier in this paper may be the South African Reserve Bank's ability to route gains and losses from exchange rate translations on the FX reserves (which dominate the balance sheet) to a government account.<sup>115</sup> Other examples are the power of the Reserve Banks of India and New Zealand to create (within limits and rules) treasury bills for sale in open market operations. Being debt instruments of the state rather than the central bank, the government pays the interest.

The inherent asymmetry of risk-shedding may at first sight seem inconsistent with the principle of the alignment of independent financial resources and independent policy responsibility. However, this principle is not bi-directional – reflecting the asymmetry in power between the central bank and government. It is legitimate for legislatures to contract to pay the costs of actions decided by others, and sustainable if those costs fall within expected bounds. On the other hand, giving an agent the formal authority to take decisions but withholding the resources that might be needed constitutes an incomplete arrangement.

## 3. Choices on accounting policies and distribution schemes

*What are the consequences for equity (and hence earnings capacity) of the interaction of accounting policies and the distribution scheme? Can the distribution scheme be modified to prevent an erosion of equity?*

Part C extensively discussed the issue of distribution asymmetries and their potential toxicity for financial strength. Exposure to distribution asymmetries

<sup>115</sup> The qualifier refers to two points. Such gains and losses are initially registered as a claim on (or obligation to, depending on the sign of the balance in the special GFECRA accounts) and need subsequently to be settled with external resources (or claims thereon) in order for the central bank's financial position to be genuinely insulated. That settlement takes place later conflicts with the idea of avoiding the uncertainties inevitably involved in making good after the fact. And in the SARB case, although there is an agreement with the government to settle the part of the flows that might affect monetary policy, it is not hard-wired as a legislative provision. Accordingly the arrangement may fall short of being an "unconditional" put.

depends on the earnings structure – mean and variance – of the balance sheet in accounting terms; the role of accounting income in the distribution system; and the conditionality (with respect to financial strength) of distributions.

The discussion in Part C pointed to a complex trade-off in decisions on appropriate financial disclosure. On the one hand, disclosure can cement trust and effective accountability for financial resources; on the other, it has the potential to misdirect attention towards short-term and financial objectives rather than long-term and public welfare aims. The hope was held out that the trade-off can be alleviated, to a greater or lesser extent, by a high-quality discussion of the relationships between policy and financial objectives in the presentation of financial results.

Preferences with respect to this trade-off may have implications for the distribution asymmetry, and hence the need for financial strength. The greater the variance of distributable income relative to normal income, the more likely it is that a distribution asymmetry is encountered, eroding financial strength. Taking policy and operational mandates as given, the options for dealing with such a threat were set out as:

- (i) do not revalue;
- (ii) do not recognise unrealised revaluations as income (with asymmetric treatment being an option);
- (iii) use general risk buffers to hold back risk income;
- (iv) adjust accounting income to remove potentially dangerous elements (such as unrealised revaluations) from the distribution stream; and
- (v) make distributions conditional on the state of the central bank's finances before determining the share to be distributed.

Arguments were rehearsed as to why some combination of the last two options might be preferred to the second and third, which are in turn preferred to the first. But it was recognised that the preferred choices may not be available in many cases (legislation may have predetermined the choices, and reopening legislation may not be an option), and that preferences will vary with the widely varying circumstances of central banks.

The net result, however, is a greater or lesser exposure to a distribution asymmetry. Other things being equal, the greater the exposure, the greater the need for financial strength in the shape of formal, visible financial buffers.

#### 4. Prepositioning financial strength in the form of capital

*In view of the foregoing, and likely political and market reactions to (imperfect signals from) financial outcomes, to what extent should financial strength be prepositioned in the form of capital?*

The final step in this framework is to bring together the considerations laid out above. This allows the assessment of the amount of capital that may need to be prepositioned at the central bank to avoid harm. The harm to be avoided is the constraint that might be placed on actions in pursuit of policy and operational objectives; and the source of such constraints is adverse stakeholder reactions to

financial weakness.<sup>116</sup> The stakeholder reactions that are of concern are market reactions that could damage the transmission mechanism for policy, and political reactions that could undermine independence. Such reactions may feed off negative financial results which would otherwise pose no threat to the central bank's operational capacity, but that are either (i) misunderstood, for instance, as a result of wrongly applying commercial norms to a policy institution, or (ii) misinterpreted noisy signals of circumstances where financial results could matter.

Key to the potential for misinterpretation is, first and foremost, the central bank's credibility among stakeholders, as well as (again) its ability to explain the relevance of its financial results to policy and operational objectives. Important to credibility are the quality of institutional arrangements, and the track record. Four cases of policy success despite long periods of negative equity were discussed – the central banks of Chile, the Czech Republic, Israel and Mexico. These central banks all have good recent track records with respect to macroeconomic and financial stability, even though these track records are short. They also share modern institutional designs that clarify responsibilities, objectives and accountabilities, helped in each case by the adoption of inflation targeting frameworks. Their credibility may also be helped by a higher than average willingness (among central banks) to use fair value accounting, the greater transparency of which may promote trust.

Thus:

- The potential for harmful stakeholder reactions to weak finances depends on the ability of the central bank to convincingly explain the policy relevance (or otherwise) of its financial results.
- The potential for weak finances depends on underlying economic exposures, as intermediated via accounting policies through the distribution system, which has the potential to create or reinforce financial weakness via a distribution asymmetry.
- The need for financial strength increases as credibility falls and economic exposures rise. More financial strength is needed where unrealised changes in value are treated as distributable income, and less if the distribution system responds to shortfalls in financial buffers relative to the levels that are appropriate for the independent discharge of policies and functions.
- Credibility may in turn be aided by the transparency of fair value accounting for the parts of the central bank's balance sheet that may involve notable fiscal consequences, at the potential cost increasing the variability of distributable income and encountering the distribution asymmetry. The key to ameliorating that risk is in the design of the distribution system, as noted in the preceding bullet point.

The wisdom of prepositioning financial strength in the form of subscribed capital or retained earnings – as opposed to plugging holes afterwards through recapitalisation – depends on some of the same factors. Where exposure to the distribution asymmetry is high and the distribution system does not provide a

<sup>116</sup> In focusing on stakeholder reactions, we do not dismiss the possibility of a direct impediment to policy capacity from monetary injections due to losses that are sufficiently large to conflict with monetary control. Such situations have been observed. But they are sufficiently rare for us to leave them to one side in order to focus on the issues most likely to be relevant to the largest number of central banks.

powerful compensating state-contingent mechanism, more financial strength needs to be prepositioned. In contrast, when future income streams are large relative to their variance, and the distribution system provides for capturing a large proportion or all of that income until buffers are rebuilt to appropriate levels, less prepositioning is required.

Prepositioning financial strength in the form of subscribed capital need not necessarily be costly for the government. Capital is commonly provided by way of gifting government securities to the central bank. To qualify as providing strength, such securities need to bear interest at market rates, and to be saleable (ie transferable without restriction). From the government's perspective, the net impact of the new securities is zero (absent a change in the behaviour of the central bank), since the government acquires an equal increase in its investment (actual or beneficial) in the central bank, and increased debt service outlays are offset by the increased revenue from higher transfers of surpluses.

The key difficulties would appear to be where gross (rather than net) government debt matters for perceptions of a country's financial health; where the increased equity releases a desired constraint on the central bank's freedom for independent action; and where the size of apparently unused capital reserves suggests to future politicians the existence of a source of funds.<sup>117</sup> All three potential problems grow in magnitude when a central bank's tail financial needs have been used as the scalar for the appropriate amount of prepositioned capital. This is because such an amount is likely to be orders of magnitude larger than the income variance encountered in normal times, and in normal times it is hard to imagine that such sums could be needed to support the central bank's independent operations.

## A final word on timing

To conclude this discussion, it has to be acknowledged that the timing can rarely be right for discussing, deciding and implementing such a framework. If changes are needed to existing arrangements in order to assure financial independence even during a crisis, they are likely to be needed in the distribution mechanism and capitalisation, two politically sensitive areas.

The framework may still be useful, however, either in case an opportunity arises to tackle otherwise politically too difficult hurdles, or to create a benchmark against which possible initiatives can be assessed.

<sup>117</sup> Attempts at capital extraction are not uncommon. Politicians frequently suggest that a central bank's hidden reserves, such as gold holdings valued at low historic values, be realised through transactions or revaluations and transferred to the government for expenditure on worthy projects. This was done in Lebanon in 2002 and 2007, and in many countries during the 1930s. In 2003, Finland's government actively considered extracting capital from the central bank, and in 2006-07 a Commission of Inquiry was established in Sweden to investigate how much capital was needed by the Riksbank and whether some could be given back, although the purpose of the enquiry was to recommend arrangements for safeguarding the Riksbank's independent finances. Earlier, in 2001 and 2002 the Riksbank had been required by Parliament to pay extraordinary dividends. The Fed had also been required by Congress to provide extraordinary transfers in 1997, 1998 and 2000, and when the Federal Deposit Insurance Corporation was established in the 1930s the reserves of Federal Reserve Banks were used, at the direction of Congress, to provide the FDIC's initial subscription. Other examples of direct or indirect capital extraction include Argentina during the period 2005-2011; Peru over many years prior to a new central bank law in 1993; and Venezuela in 2005.

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## Annex 1: Central bank accounting policies

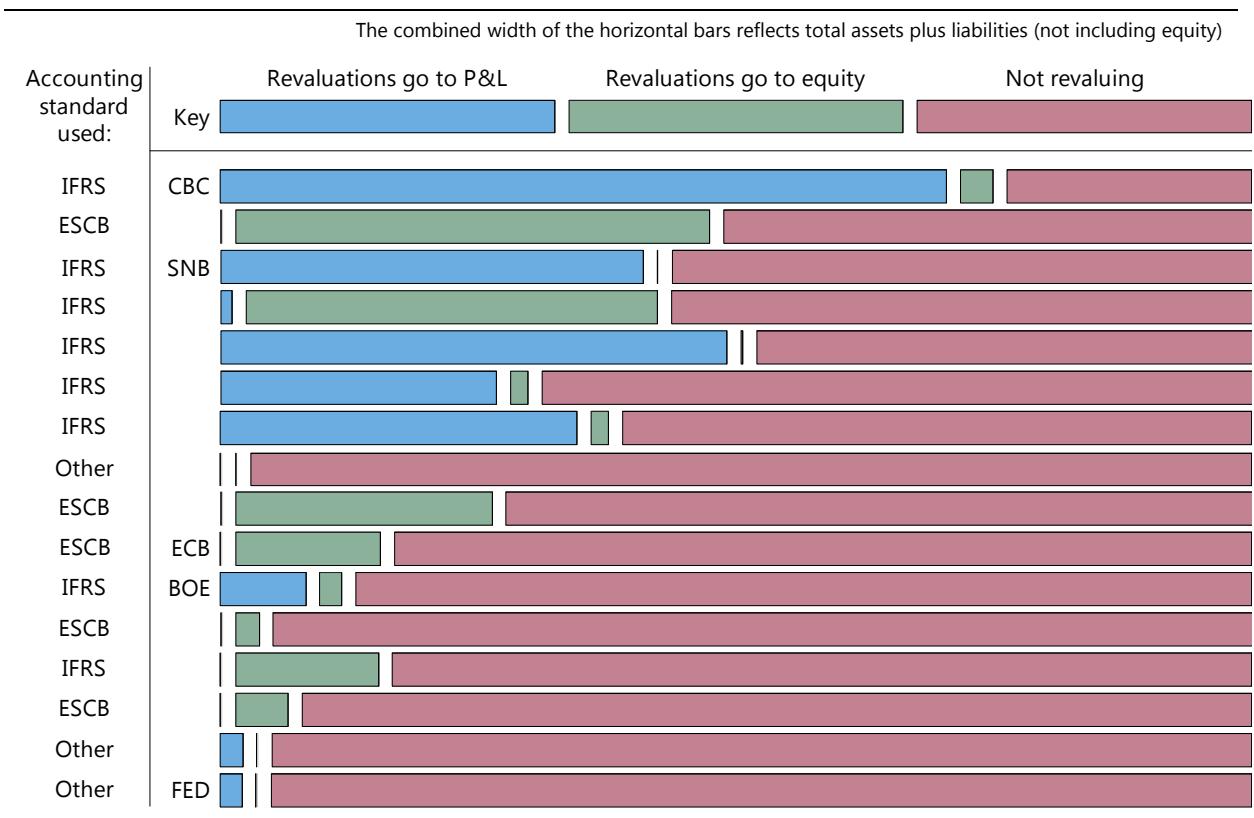
In this Annex, we document in more detail the accounting treatments used by a representative group of BIS shareholding central banks. The point of departure from the main text is Figure 5 (page 29), which summarises the accounting treatments of 16 central banks for price (value) changes (if relevant) of their assets and non-equity liabilities. Figure 5 is reproduced below, now labelled A1 (see the main text for details).

In a nutshell, the more blue in Figure A1, the more assets or liabilities are revalued with valuation changes going through P&L; the more green, the more revaluation accounts are used; and the more red, the more assets and liabilities are held at an unchanging book value (eg at acquisition cost).

### Balance sheet composition by accounting treatment for price changes

(averages of financial years 2006-10)

Figure A1



As before, the main things to notice are: first, the major part of the balance sheet, for the majority of central banks, is not subject to revaluation (red dominates.) Second, for items revalued as market prices change, revaluation gains and losses go to P&L and to revaluation accounts in about the same number of cases (blue and green are similarly represented). Third, the dominant accounting framework used provides relatively little insight (by itself) into the valuation dynamics of the balance sheet.

On the third point, the accounting treatment of financial positions depends both on the accounting standard/framework being followed *and* the inherent nature of the position. Central banks frequently have assets and liabilities that are

not subject to change in nominal value, being legally and/or practically fixed. Regardless of the chosen accounting treatment, there are no revaluations.

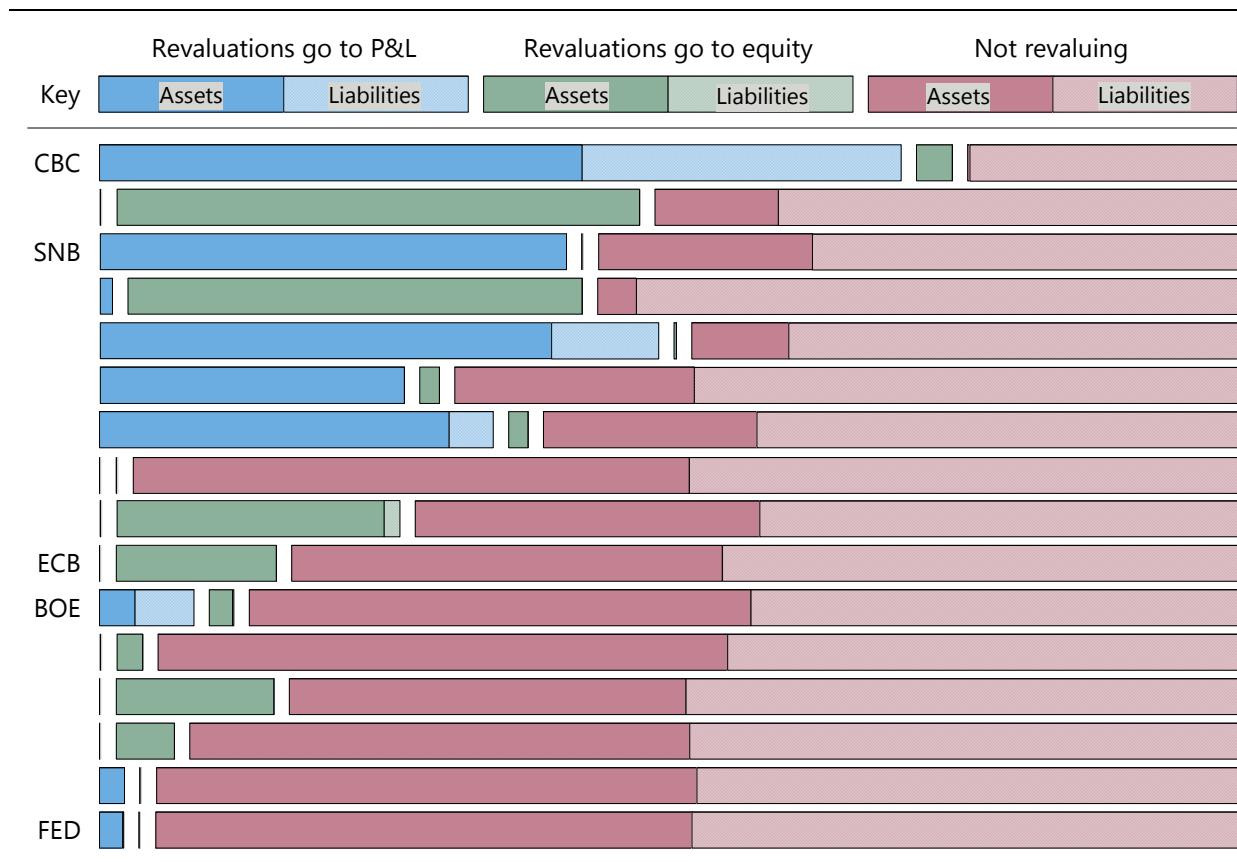
#### a. Treatment of valuation changes, by assets and liabilities

It is very common for central bank liabilities to be dominated by banknotes and deposits at fixed values while assets are dominated by marketable securities that change in market (and fair) value. The resultant interest rate exposures are often much larger than would be contemplated by most types of commercial financial institution. If the accounting treatment registers those changes in value, the

Balance sheet composition by accounting treatment for price changes, by assets and liabilities

(averages of financial years 2006-10)

Figure A2



financial statements will reflect the inherent dynamics of the institution's economic exposures. That such exposures are commonplace for central banks can be seen in Figure A2, which repeats Figure A1 but now with a decomposition into assets (on the left of each coloured block, solid in colour) and liabilities (on the right of each coloured block, crosshatched in colour). Substantial mismatches between the valuation treatments of assets and liabilities are revealed. (For example, looking at the fourth central bank from the top, assets are almost all revalued, but liabilities are not).<sup>118, 119</sup>

<sup>118</sup> Such valuation mismatches normally indicate an underlying interest rate mismatch, although they could in principle also be caused by an accounting treatment mismatch (whereby assets and liabilities with similar economic value sensitivities to changes in interest rates are accounted for differently).

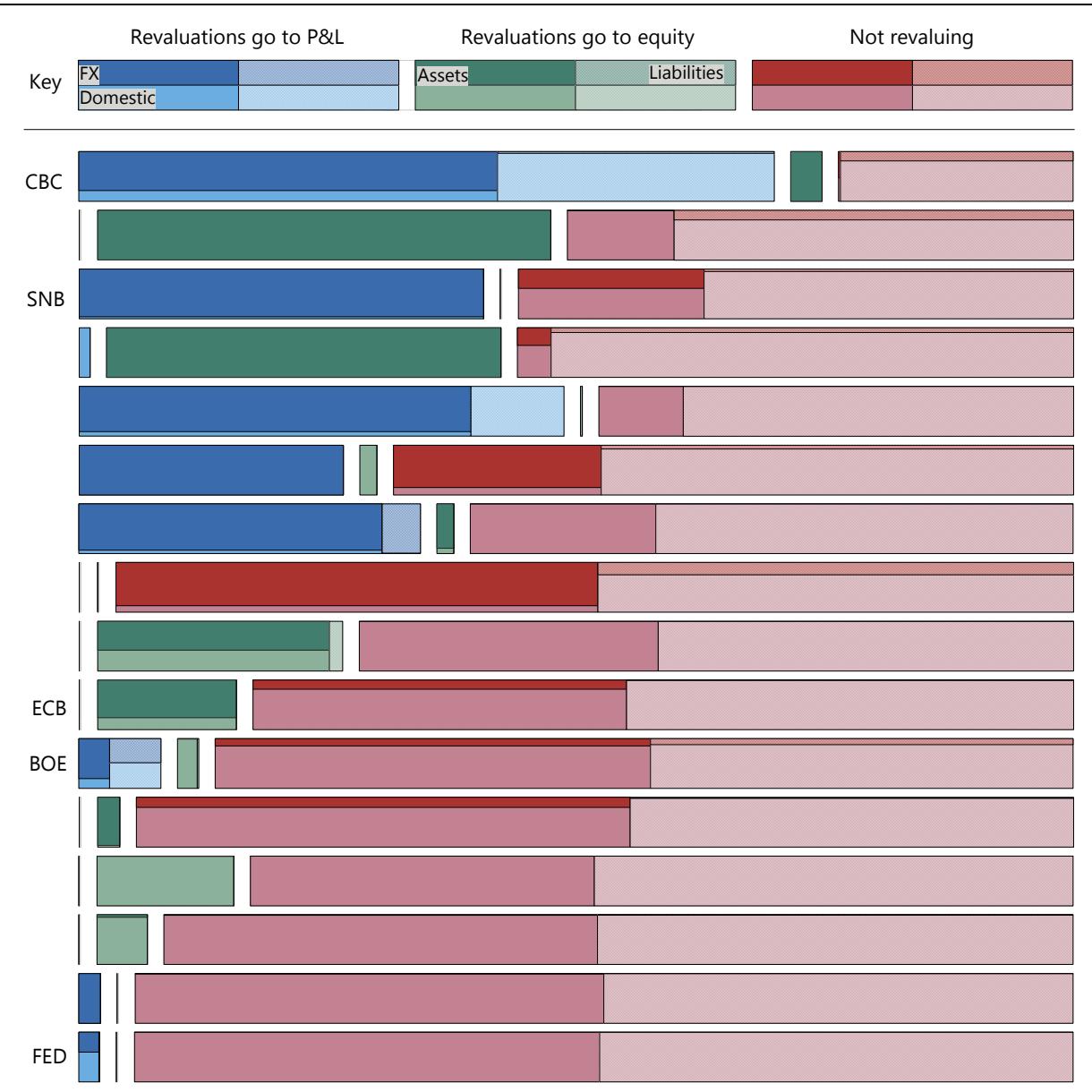
## b. Treatment of changes in value due to foreign exchange translation

At the same time, many central banks have assets in foreign currency (including gold); some also have FX liabilities. Again, both underlying and accounting mismatches arise (the latter mostly between assets of a similar type, where those in domestic currency are treated according to one accounting method, and those denominated in foreign currency to another). Figure A3 further breaks down the accounting treatment of assets and liabilities by currency denomination.

### Balance sheet composition by accounting treatment for price changes, by assets and liabilities and by domestic and FX components

(averages of financial years 2006-10)

Figure A3



<sup>119</sup> The SNB (third from the top) is a case where assets are normally all revalued, but the majority of liabilities are not. Unusually, during the period 2008-10 the SNB had a claim (on the UBS Stabilisation Fund) that was not subject to revaluation. That position has run down subsequently.

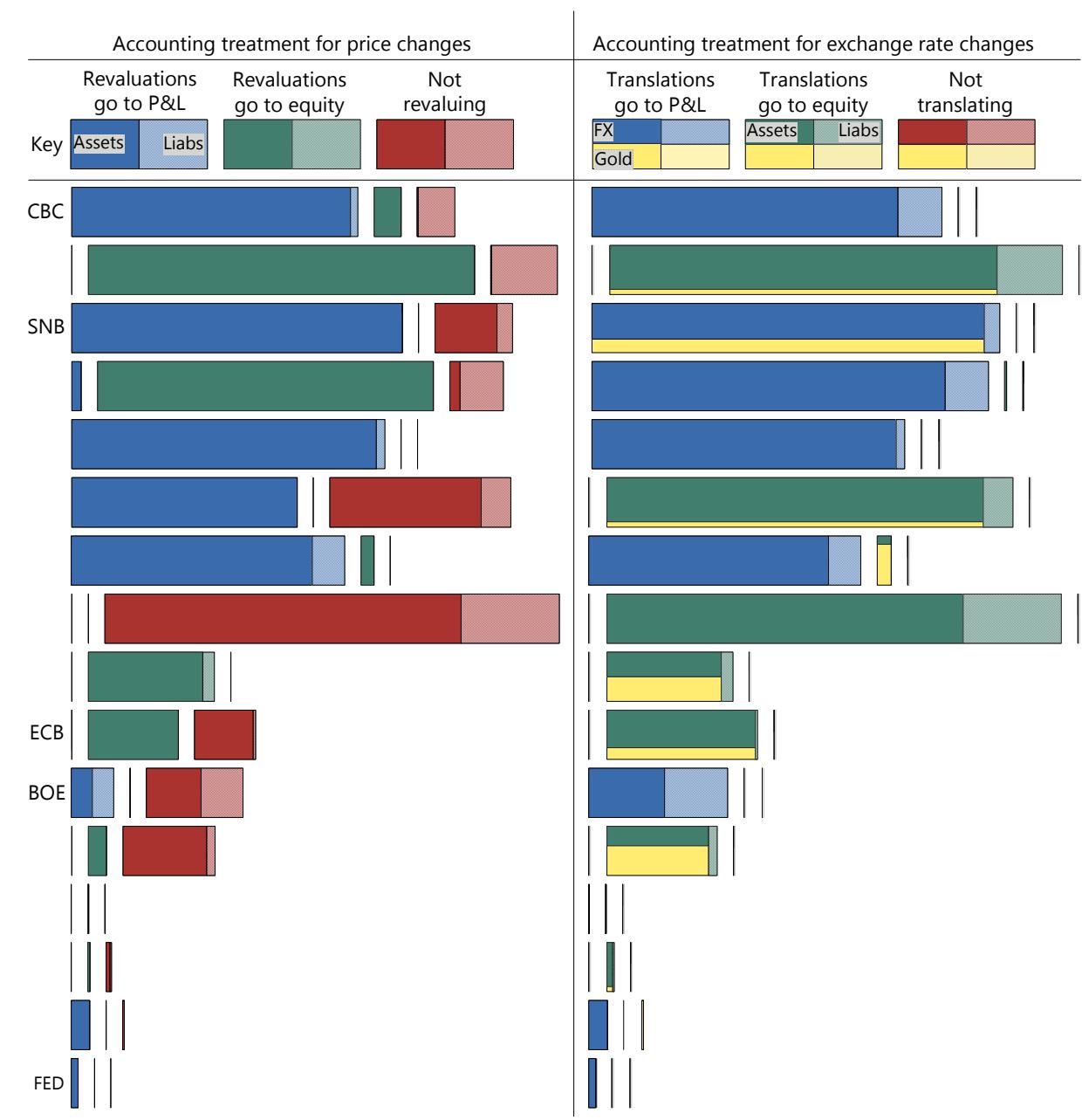
Here, two types of value change may be relevant:

- A foreign currency asset (or liability) may be subject to changes in market price or fair value, in the currency of denomination. The accounting treatment of these “price revaluations” is shown in Figure A3, which is a repeat of Figure A2 but with the addition of the further decomposition into foreign currency denomination (dark shades, in the upper part of each block) versus local currency denomination (light shades, in the lower part of each block).

Composition of FX components of the balance sheet, by assets and liabilities and by accounting treatment for price and exchange rate changes

(averages of financial years 2006-10)

Figure A4



- The accounting treatment of changes in the local currency value of the asset or liability arising from changes in exchange rates ("FX translation changes") is also determined by the accounting policies. To illustrate, consider differences in the accounting practices for changes in market price and for changes in exchange rates, Figure A4 focuses on foreign currency assets and liabilities alone. The accounting policy for changes in market price is shown in the left panel, and that for changes in exchange rates is shown in the right panel of Figure A4. Accounting treatments of FX translation changes are depicted in a manner analogous to those for price revaluations, using the same colour scheme. Gold is shown separately, at the bottom of the relevant accounting treatment block.

The main message to be drawn from Figure A4 is that very substantial exchange rate exposure mismatches exist within the central bank world. In the right panel, if FX liabilities exist at all (at the right side of each block in the right panel), they are small relative to FX assets (left side of each block). However, accounting policy differences are also identifiable. In several cases the accounting treatment of FX translations is different from that of price changes in the financial instruments denominated in foreign currency.

In sum, actual accounting treatments vary widely, even between central banks using the same accounting standards, and between central banks with similar underlying balance sheet structures. In view of the large economic exposures that central banks often carry, accounting policies can thus have an important impact on P&L dynamics.



## Annex 2: Components of selected distribution schemes

This Annex presents the data underlying Figure 7, in a table (Annex Table A5) that is organised so as to distinguish the elements of distribution schemes that prevent a distribution asymmetry arising, or having a permanent effect on the capital position of the central bank, from those that do not work against such an asymmetry. The elements in the former category (placed at the top of the table; in deeper shades of green as their strength rises) work to make the financial position of the central bank more robust to large negative variations in distributable profit; the elements in the latter category (placed at the bottom of the table, not coloured) do not.

At the top of the table are two cases where losses can to a significant extent be offset by tapping external resources in the same time period. In the Bank of Korea's case, the law provides that if reserves go to zero, the government budget will make up any remaining deficiency, as long as that capital remains positive. In the ECB's case, losses can be covered by appropriating the monetary income that would otherwise remain with NCBs. The Bank of Korea's access to external resources is hard-wired into law as non-discretionary. The ECB's would require the votes of the Governing Council, which comprises Governors of euro area central banks whose own financial positions would be adversely affected.

Also in this area of the table are distribution scheme elements that provide for additional retentions when the central bank's financial strength has been depleted. Such conditional distribution mechanisms include capital targets, or mechanisms that act like targets that affect the distribution beyond the year in which a loss led to a depletion of reserves. Thus, distributions can be stopped until reserves are rebuilt (in the cases of strongly acting state contingent mechanisms) or at least adjusted in favour of higher retentions (in the cases of modestly acting state-contingent mechanisms).

The area in the table shaded light green contains certain mechanisms that could, under certain circumstances, provide strong protection against a distribution asymmetry, but without as much certainty as mechanisms higher in the table. For example, the discretion provided to the Deutsche Bundesbank and the South African Reserve Bank to create provisions is in principle constrained by tests of a qualitative nature (as indicated by the use of qualifiers such as "reasonable"/"normal"). In recent times, these banks have both allowed substantial control over retentions. The Riksbank's trailing five-year average distribution guards directly against that part of the distribution asymmetry associated with high variance in P&L, but may still mandate large distributions well into a longer-lasting episode of weakness in the Riksbank's finances.

The unshaded block of the table contains elements of distribution schemes that have somewhat more uncertain effects on the financial strength of the central bank, as they may expose the bank to a distribution asymmetry, depending on how net income variance turns out compared with normal net income. In many of these cases, distribution is on a standard sharing basis – often 5%, 10% or 20% is or may be retained, and the rest must be distributed. With these mechanisms, if normal net income is low, reserves may accumulate too slowly to cover an occasional loss. And the mechanisms are non-contingent, so that hits to reserves would not trigger greater retention in following years, potentially making equity a random walk around a declining path – unless offset by another component of the distribution

schemes, as, for example, in Chile and Korea's cases (and to a certain extent, the Netherlands too).

A categorised list of components of distribution schemes (excluding residual distributions to governments)

Annex Table A5

Category		Cases	Details
Can draw on external resources	With strong-acting effect on the distribution (up to 100% of any year's surplus can be retained in order to achieve the targeted outcome).	Korea	Art 100: If reserves are insufficient to absorb a loss for the year, the budget will make up the deficiency.
		ECB	Art 33: If reserves are insufficient, the Gov Council may appropriate the ESCB's entire monetary income for the year.
		Peru	Art 93: If reserves are insufficient to make up loss, Treasury must issue and deliver to bank non-negotiable, interest-bearing debt titles to make up deficiency
		Czech Rep	Art 47: surplus shall be used to replenish reserves.
		US	S7 + B/A: surplus retained to maintain reserves = paid-in capital (around 1% of assets recently). Paid-in capital grows with member bank capital. B/A: Transfers to Treasury stop in the event of a loss, until loss is fully covered. (Accounting treatment would give the appearance of no reduction in capital, notwithstanding losses that exceed capital plus reserves.)
		Switzerland	Art 99 (Const) + Art 30 (Act) + B/A: first allocation to a reserve determined by the Bank (recently, a target that grows with nominal GDP). (Reserve has been in range of 15-30% of assets recently.) Art 99 (Const) + Art 30 (Act) + B/A: standard distributions halted if below target reserve
		Chile	Transitional provision (S2): All of surplus can be retained until capital = mandated initial capital (indexed).
		ECB	ECB/2010/24: ECB may transfer up to 100% of surplus to a general risk provision [limited to paid-up capital less general reserves].
		Mexico	Art 55: All surplus retained if there are negative reserve balances.
		Iceland	Art 34: If equity is less than 2.25% of lending and domestic securities assets of credit system, 2/3 of profit are retained
		Finland	Art 21: Part of loss that is not covered by reserves can be left temporarily uncovered, and any profits in subsequent years shall be used first to cover such uncovered losses.
		Singapore	Art 6: All net profit retained if General Reserve Fund less than half paid-up capital; not less than 30% of net profit retained if General Reserve above half but less than twice paid-up capital.

A categorised list of components of distribution schemes (excluding residual distributions to governments)

Annex Table A5

Category	Cases	Details
<i>Equity target or equivalent that either (a) allows future surpluses to be retained to an unusual extent, to cover losses and/or rebuild equity or (b) allows retentions to build buffers towards a target level (continued)</i>	With modest-acting effect on the distribution (a capped amount of the surplus can be retained in order to achieve the targeted outcome, and/or the targeted outcome is quite capped).	Germany Art 27: 20% of surplus or €250m (whichever greater) until reserves $\geq$ €2.5bn.
		Netherlands B/A: 1/6th of an earlier loss, for following 6 years (implicit capital target = capital level before loss).
		Peru Art 92: 75% of net profit to be used to constitute and increase reserve fund [limited to capital]
		Israel Art 76: If capital is 1% or less of total assets all profits shall be retained; if capital is between 1% and 2.5% of total assets 50% of net profits (less the surplus balance (=accumulated profits & losses from previous years) if it is negative) is to be transferred; if capital is 2.5% of total assets or more, net profits (minus surplus balance if negative) are to be transferred.
		Philippines Art 44: 50% of net profits to be carried to surplus (however, full capital subscription remains outstanding)
		Thailand Art 14: 25% of net annual profit (after deduction of accumulated loss) to general reserve.
		Turkey Art 60: 20% of annual net profit to be allocated to reserve fund.
		Spain Art 1.1.b of Royal Decree 2059/2008: 90% of profits earned to be paid to Treasury
		Poland Art 62: 5% of profit to reserve fund [limited to paid-up capital]
		ECB Art 33: 20% of surplus may be retained to replenish general reserve if below 100% of paid-up capital.
Full bank discretion		Germany May transfer to a general risk provision (above the line) without specific limit, but subject to "reasonable commercial judgment" test.
		India Art 47: May make provisions without specific limit, subject to "usually provided for by bankers" test
		Malaysia Art 7: Provisions may be made without specific limit, subject to "usually provided for by bankers" test; reserves may be established as Board deems prudent or necessary.
		Singapore Art 6: Provisions may be made without specific limit, subject to "usually provided for by bankers" test; General reserves may be established as Board deems prudent or necessary.
		Slovakia Art 39(4): NBS shall use profit for allocations to reserve fund and other funds created from profit, or for covering accumulated losses from previous years.
		South Africa S 24: SARB may create provisions without specific limit, but subject to "normally provided for by bankers" test, and payment of the dividend. Transfers to provisions have recently absorbed over 90% of the surplus.
		Turkey Art 59: Provisions in amounts deemed appropriate by Board may be set aside from gross profit to meet contingent risks in future years due to operations exclusive to the Bank.

A categorised list of components of distribution schemes (excluding residual distributions to governments), continued.

Annex Table A5

Category	Cases	Details
Distribution smoothing	Sweden	B/A: Dividends are paid from a five-year trailing average of adjusted income.
	Switzerland	B/A: CHF1b pa to cantons for 5 years, subject to non-negative balance in distribution reserve.
Retention of a set or restricted share of each year's surplus (not contingent on the capital position)	By category	<p>Netherlands B/A: All profits from gold sales to general reserves.</p> <p>Sweden B/A: 20% of smoothed (five-year avg) surplus retained.</p> <p>Ireland SI93: CBI may retain up to 20% of surplus.</p> <p>UK Act: ½ of surplus of Bkg Dept &amp; 0% of Issue Dept retained; typically &lt;15% of total net income available for distribution.</p> <p>Korea Art 99: 10% of surplus retained to build reserves.<sup>1</sup></p> <p>Chile Art 77: CBC may retain up to 10% of surplus.</p>
	By per cent of each year's surplus	<p>Netherlands B/A: 5% of surplus net of gold profits &amp; smoothing retentions.</p> <p>Iceland Art 34: If equity is at or above target then 1/3 of profits can be retained (otherwise 2/3; see above)</p> <p>Japan Art 53: 5% of surplus retained to build reserves.</p> <p>Finland Art 21: 50% of profit shall be transferred to the reserve fund.</p> <p>South Africa S 24: 10% of profit after tax, dividend and discretionary provision retained in a statutory reserve.</p>
		<p>Limited by an absolute amount</p> <p>Canada Art 27.1: Create and maintain a special reserve fund (up to CDN 400 million) to offset unrealised valuation losses on investment portfolio</p>
	Systematised	<p>Chile S 5: Board may request a capital increase (which under S 77 may be funded by retention of surplus).</p> <p>Japan Art 53: BoJ may retain additional amounts to build reserves, on authorisation of Minister of Finance.</p>
		<p>Finland Art 21: 50% of profit shall be transferred to the reserve fund, but Parliamentary Supervisory Council may decide on other use of profit if justifiable given Bank's financial condition or size of reserve fund. (In practice Board makes related proposal to supervisory council.)</p>
		<p>Denmark Art 19: Board of Directors may decide on amount allocated to reserves, with approval of Royal Bank-Commissioner. (In practice, reserves are maintained at a constant level in real terms.)</p>
		<p>Australia Art 30: Treasurer, after consultation with RBA Board, may determine amounts to be set aside for contingencies or into Reserve Fund</p>
		<p>Malaysia Art 7.4: Minister, on recommendation of Board, may credit part of net profit to General Reserve Fund.</p>
		<p>Thailand Art 14: Other reserves may be established for particular purposes, as specified by Board, on approval by Minister</p>
		<p>New Zealand Art 162: Bank must recommend dividend, consistent with statement of intent; Minister must determine dividend; both recommendation and determination to be published.</p>

A categorised list of components of distribution schemes (excluding residual distributions to governments)

Annex Table A5

Category	Cases	Details
<i>Joint decision (continued)</i>	<i>Systematised (continued)</i>	Israel Art 76: Bank may record capital funds originating in accounting rules, if balance of net profits not transferred to government (per rules above) is added to "surplus balance" and not recognised as other capital item, unless Governor and Minister agree otherwise.
		Korea Art 99: BoK may, with approval of government, establish reserves, for specific purposes.
	Unspecified	Mexico Negotiation was used in 2008.
At government discretion	(none)	
Standard/promised distribution, limited conditionality	Switzerland	B/A: CHF1b pa to cantons for 5 years, subject to non-negative balance in distribution reserve.
	US	S 7: 6% dividend on paid-in capital.
Mandatory unconditional distribution	South Africa	S 24: 10 cents per share = R200,000 pa.
	Switzerland	6% of face value of shares (trivial amounts involved).

<sup>1</sup> The retention ratio is being adjusted upwards from 10% to 30% as a result of a revision to the Bank of Korea Act, which will be in effect as of 17 December 2011.