



WP/02/137

IMF Working Paper

Central Bank Financial Strength, Transparency, and Policy Credibility

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IMF Working Paper

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Authorized for distribution by Arne Petersen

August 2002

Abstract

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A central bank is financially strong if it possesses resources sufficient to attain its fundamental policy objective(s). Once endowed with those resources, relations between government and central bank should be designed so that significant changes in central bank financial strength do not occur unless necessitated by changes in policy objectives. The level of strength required depends on the array of policy objectives (for example, the exchange rate regime) as well as the constraints and risks presented by the operational environment. Attaining credibility is facilitated if the public can easily determine the financial strength of the bank, yet for a variety of reasons this is often difficult. Transparency requires institutional arrangements that ensure the central bank generates profit in most states of the world, is subject to strict ex post independent audit, and transfers regularly all profits, after provisions, to the treasury.

JEL Classification Numbers: E58

Keywords: Central bank losses; transparency; credibility

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¹ I would like to thank John Caskey, John Dalton, Stanley Fischer, Ian Goodwin, Alain Ize, Luis Jácome, Guillermo Le Fort, Kenneth Sullivan, and Mary Zephirin for suggestions on various aspects of this project.

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I. INTRODUCTION

Central bank financial strength can determine the success or failure of financial policy. A weak central bank will make losses, which, if they reach sufficient magnitude, will necessitate financing through current or future money creation, thereby undermining monetary and exchange rate policy. This has been evident in cases such as Argentina, where central bank losses reached 23.5 percent of GDP in the second quarter of 1989² and the Bank of Jamaica, whose losses during fiscal years 1988/89 through 1991/92 averaged 53 percent of the respective beginning-period stock of reserve money. The need to finance such losses implied the abandonment of any conflicting policy objective. Less dramatic imbalances have interfered with the central bank's ability to achieve price stability or have led to changes in policy course when losses have become worrisome.³ Furthermore, a financially weak central bank may have difficulties serving as the government's fiscal agent⁴ or even lack the credibility to maintain an effective domestic payments system.⁵ While the aforementioned are often suffered as chronic problems with institutions adapting to the situation, at times they are acute. In particular, banking crises elevate the importance of a central bank being able to credibly demonstrate its capacity to foster and maintain financial stability without resort to financial repression. A lack of such credibility would delay the restructuring of distressed assets, deter strategic investors, and perpetuate high risk premiums, thereby suppressing asset prices, fiscal revenue, and growth.

Even in cases where the central bank *is* strong, the market's belief that it may change policy course to avoid losses undermines policy credibility. In early 2002, for example, the market raised questions as to the likely duration of the Bank of Japan's willingness to use its *rinban* operations to support the long end of the government bond

² See World Bank (1993).

³ See, for example, IMF (1995) and IMF (1998).

⁴ Several possible problems exist: the central bank may not have the foreign exchange assets to cover government external payments; a weak balance sheet may complicate intermediating government foreign borrowing; the central bank may find itself in conflict with government regarding issuing debt if it itself has significant financing needs.

⁵ In extreme cases, central banks have not had the resources to purchase new banknotes and in one case the central bank was expelled from the national bank clearinghouse owing to failure to settle its obligations. More commonly, when the financial system observes signs of central bank financial collapse, financial disintermediation away from the formal payments system occurs. A past history of official financial repression tends to accelerate this process.

yield curve as an eventual rise in interest rates would subject it to losses that could exhaust its capital and reserves.⁶

Transparency is closely linked to credibility and as rule based policy has become the norm, economic agents' capacity and interest to judge performance against rule based objectives has increased. As Kopits (2001) points out, "...the usefulness of fiscal rules hinges on transparency in institutional structure and functions, that is, in the relations within the public sector...".

Central banks, however, in their financial or fiscal operations are often very opaque and a prime locus for non-transparent quasi-fiscal operations.⁷ Most worrying are central banks not subject to effective external audit whose accounts lack integrity and/or are not disseminated (See the summary results of the IMF Safeguard Assessments of 25 central banks below). This opacity has arisen from a combination of the unique nature of the central bank (unlike other monopolistic fiscal enterprises, there is no close commercial analogue to the central bank), its ability to finance itself through money creation, and the fact that central bank accounting is idiosyncratic. This makes external oversight difficult--a situation not undesired by governments who, to borrow from the language of Fry, Goodhart, and Almeida (1996) are quite content to hide the fact that they are squeezing the goose that lays the golden eggs.

These issues—appropriate central bank accounting and profit distribution policies--while rarely attracting the degree of public attention paid, for example, to monetary policy⁸ have been fairly widely discussed in recent years⁹ and significant progress in strengthening central bank balance sheets and increasing transparency has been made. Yet that improvement has not been uniform and in many countries significant issues remain under discussion.¹⁰

⁶ JPMorgan, *Japan Markets Outlook and Strategy*, January 24, 2002. See also the discussion in Okina (1999).

⁷ See, for example, the discussion in Robinson and Stella (1987); Fry (1993); Fry, Goodhart, and Almeida (1996); and MacKenzie and Stella (1996).

⁸ The brief episode involving the Bundesbank in 1997 is perhaps the most well known occasion when these issues emerged from their customary obscurity. See *The Economist* (1997), Andrews (1997) and Deutsche Bundesbank (1997).

⁹ See for example, Sedlabanki Islands (2001), Ernhagen, Vesterlund and Viotti (2002), and Gros and Schobert (1999).

¹⁰ To cite a few cases, the Central Bank of Chile began the process of obtaining a recapitalization in 2001, the Russian government and Central Bank are at odds over the
(continued...)

This paper discusses the problems of weak and opaque central bank finances, reviews the progress made during the last 5 years and the current status of the debates. It concludes that because credibility and transparency are important, central banks need to have strong and transparent balance sheets appropriate for their specific circumstances. A strong, clean balance sheet heightens the chance not only that an independent central bank will be able to successfully implement policy but also that variations in its financial results will broadly reflect the direct costs and benefits of the policy it undertakes. It also examines the question of whether a currency board presents special requirements.

The paper goes on to specifically recommend that loss-making central banks be recapitalized with equity transfusions from government which would have no impact on the fiscal deficit, properly measured, provided that all residual profit is returned to the treasury—another recommendation of the paper. If the government is serious about establishing the credibility of the central bank, the recapitalization must be “up front” and not merely a promise to cover cash losses as they occur. The equity infusion should take the form of interest-bearing marketable government debt that eventually could be exchanged for loss-generating central bank liabilities or otherwise used to cover the bank’s losses. What this proposal suggests is effectively to bring the fiscal impact of the central bank entirely on budget in a contemporaneous manner.¹¹ This is necessary in view of the bank’s unique ability to self-finance its losses and the moral hazard which ensues when the central bank becomes a black box for hidden government expenditure.¹² The exact degree of financial strength should not be set with reference to ad hoc balance sheet indicators but

ownership of the latter’s assets (See Bank of Finland(2000)), the ECB has only recently reached an agreement over the distribution of seignorage revenue and is contemplating increasing its capital while the issue of the appropriate level of Federal Reserve System surplus and the appropriate treatment of any changes in surplus continue to be raised from time to time.

¹¹ Brazil has done this by including the central bank in the definition of the central government. See IMF (2001d), *Brazil: Report on the Observance of Standards and Codes* (ROSC) Fiscal Transparency Module, paragraph 9.

¹² Provided the losses do not exceed the sustainable level of seignorage and provided of course that the central bank need not maintain price or exchange rate stability such losses and a deterioration of the central bank’s balance sheet can go on indefinitely. This issue has been particularly relevant as many central banks have directly or indirectly financed costly bank rescue operations. The resultant problems have led some to argue that the central bank’s ability to undertake such operations should be restricted or transferred to the government—see Jácome (2001) and Dornbusch (2001).

rather on the basis of the bank's ability to achieve its policy objectives under various financial shocks.

Section II reviews recent developments in central bank finances as well as in their transparency. It looks in particular at different mechanisms for profit distribution. Section III discusses credibility and financial strength and various ways in which the appropriate level of strength might be determined. It also discusses why recapitalization has an advantage over a commitment to cover central bank losses on a flow basis. Conclusions are found in Section IV. An Annex discusses the particular situation of currency board arrangements and provides an illustration of the general principle that adequate strength of a central bank is related to the policy tasks it faces.

II. RECENT DEVELOPMENTS IN CENTRAL BANK FINANCIAL STRENGTH AND TRANSPARENCY

A. Financial Strength

This section reviews developments in central bank losses for a slightly modified sample of countries studied by Leone (1994) then provides some benchmarks from financially strong central banks. Table 1 indicates that the performance is mixed. In some cases, such as Peru and Bolivia, new central bank laws and central bank recapitalization in conjunction with economic reforms led to a sustained improvement in financial positions.

In Peru, following a recapitalization and a new central bank law in 1992 limiting the range of central bank activities, losses as a percentage of central bank liabilities to the private sector fell from close to 31 percent in 1991 to 2½ percent in 1994 as the central bank accounts came into virtual balance. Peru's financial sector exhibited strong growth in the liberalized environment with broad money to GDP rising from 12 percent at the end of 1991 to 21½ percent in 1997. Bank supervision and the prudential framework were also strengthened.

In Uruguay, losses averaging 3 percent of GDP in the late 1980s were brought down to ½ percent of GDP by 1995 as the central bank transferred to the Treasury outstanding external liabilities related to the mid-1980s purchase of loan portfolios from troubled commercial banks and gradually began to replace its own bills with treasury bills in the conduct of open market operations. By the end of 1993, the entire stock of central bank bills had been replaced and the cost of open market operations was being borne by the Treasury.¹³

¹³ See IMF (1996a). A similar process is also underway in Brazil. The Brazilian Law of Fiscal Responsibility requires the central bank to cease issuing its own debt effective May 2002 at which time all monetary operations will use government securities.

In other cases, improving or stable institutions were dealt a severe blow by central bank intervention in banking crises such as in Paraguay, where unprecedented losses amounting to almost 4 percent of GDP were sustained in 1995 and had not been totally eliminated five years later. Central banks in Nicaragua and Venezuela also experienced large losses in response to banking crises suggesting that the speed with which central banks can both spend and finance—through money creation—is an attractive quality during crisis periods as is perhaps the ability to keep the cost of rescue operations non-transparent.¹⁴

In Nicaragua, following years of losses, in 1995 the central bank suspended all financing of the state-owned banks and the Government began to make significant debt service payments on its central bank debt with the result that the latter's operating position came into balance for the first time in a decade.¹⁵ However, the banking crisis that erupted in 1998 led to a large provision of central bank paper to the intervened commercial banks thereby giving rise again to losses as well as to potential difficulties in rolling over the obligations. This situation continues unresolved with a large volume of central bank debt—roughly equivalent to the level of central bank gross foreign assets or 10 percent of GDP—falling due in the latter part of last year. A partial response of the authorities has been to increase commercial bank reserve requirements, a tax on financial intermediation.¹⁶

In Venezuela, the cost of the major banking crisis in the middle of the decade was financed by the central bank and led to a sharp increase in losses. Losses in later years also resulted from the cost of sterilizing capital inflows and from attempts to counter the fiscal stance. In 1997, for example, the central bank aggressively issued its own obligations to sterilize capital inflows but this impact was negated by a draw down of treasury deposits at the bank owing to a loosening of the fiscal position. Following further sales of its own debt and an increase of reserve requirements by a total of 5 percentage points, monetary policy was eventually eased markedly in the last few months of the year owing to growing concerns about the quasi-fiscal losses arising from sterilization.¹⁷

¹⁴ Only in 2001 did Mexico begin to publish an adjusted fiscal balance that seeks to incorporate the quasi-financial operations of the public financial institutions—most significantly those associated with the banking crisis of the mid-1990s.

¹⁵ See IMF (1996b).

¹⁶ See IMF (2001b).

¹⁷ See IMF (1998).

Table 1. Central Bank Losses in a Group of Western Hemisphere Countries
(In percent of GDP)

Country	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Argentina	-0.7	-0.5	-4.5	-0.7	-0.4	-0.1	0.4	0.2	0.2	0.3	0.3	0.3	0.2	0.3	
Bolivia	...	-0.2	-0.4	-0.7	-0.7	-0.2	0.4	0.7	0.9	0.6	0.7	0.7	0.4	0.5	
Chile	-3.1	-3.2	-1.8	-2.2	-1.1	-1.2	-1.0	-0.9	-0.6	-0.7	-1.1	-1.1	-1.1	-0.9	
Costa Rica	-3.5	-3.3	-2.8	-2.0	-1.9	-2.0	-1.5	-1.4	-1.9	-2.1	-1.8	-1.6	-1.6	-1.8	-1.2
Ecuador	...	-2.2	-2.5	-2.9	-2.3	-1.0	0.1	0.6	0.0	0.2	0.1	0.3	-1.2	0.6	
Guatemala	-1.6	-1.9	-1.5	-2.4	-1.6	-1.2	-1.1	-1.3	-1.0	-1.2	-0.8	-0.3	-0.3	-0.4	-0.8
Jamaica	-5.7	-5.4	-5.4	-5.0	-4.3	-5.6	-4.7	-1.8	-2.0	0.6	1.0	-0.3	0.0	0.3	
Nicaragua	-5.0	-8.0	-13.8	-2.8	-0.7	-1.1	-1.4	-0.6	0.1	-0.2	-0.6	-3.3	-1.7	-1.6	
Paraguay	0.2	0.2	0.1	0.6	0.8	0.5	0.1	0.0	-3.8	-1.5	-1.8	-0.6	-0.8	-0.4	
Peru	-5.4	-3.2	-0.4	-1.1	-0.4	-0.2	-0.2	0.0	0.0	0.0	0.1	0.1	0.1	0.0	
Uruguay	-2.8	-3.1	-3.4	-3.6	-2.2	-1.6	-0.8	-0.6	-0.6	-0.5	-0.5	-0.5	-0.2	-0.4	
Venezuela	-1.4	-2.9	-1.8	-2.0	-1.7	0.0	-0.2	-2.0	-1.0	-0.7	-0.6	-0.8	-0.5	0.3	0.1
Sources: Leone (1994), various IMF staff reports, Central Bank of Argentina, Central Bank of Guatemala, Central Bank of Paraguay.															

Chile and Costa Rica are cases where central bank losses have persisted, impeding the central bank's ability to achieve low inflation in the latter but not the former. By the end of 2000, the Central Bank of Costa Rica had negative capital exceeding 6 percent of GDP¹⁸. In the case of Chile the issue of recapitalization has been discussed over the last few years with the general conclusion being that the losses have not had a material impact on central bank behavior.¹⁹ Nevertheless, the central bank has requested that the Government initiate the formal procedure for a recapitalization.²⁰

Chile indeed would seem to be a significant outlier from the general rule that central bank financial weakness impacts on the quality of policy. As can be seen in Table 1, Chile consistently had central bank losses close to 1 percent of GDP during the last decade. Yet this did not prevent an impressive inflation performance. Inflation fell from an annual rate of 26 percent in 1990 to single digits by the middle of the decade. The central bank successfully adopted an inflation targeting strategy—inflation was less than 4 percent in 2000 despite central bank capital falling below zero in 1998 and remaining so throughout 2000 when it amounted to approximately (minus) 2 percent of GDP. The puzzle is not so much that capital could have been negative²¹ but that the cash losses did not interfere with monetary policy as they have in many other cases.

In understanding how negative capital, chronic losses and outstanding inflation performance can be reconciled, it seems useful to term Chile a case of “benevolent fiscal dominance”. Fiscal dominance is conventionally thought of as a situation where loose fiscal policy requires the central bank to abandon a commitment to low inflation or a fixed exchange rate to generate seignorage revenues or reduce the value of government debt.²² Benevolent fiscal dominance is a situation where tight fiscal policy contracts the monetary base or strengthens the exchange rate beyond the levels sought by the central bank in pursuit of price stability thereby requiring an active policy of monetary injections which in this case is partially served by the liquidity expansion forthcoming from central bank losses. During the last decade, Chile's public sector fiscal accounts, including the cash losses of the central bank, have been approximately in balance with surpluses through 1996 and significant deficits being recorded only since 1998. In the first half of the 1990s, the fiscal surpluses allowed not only the repayment of foreign debt, but a reduction in the

¹⁸ *Memoria Anual 2000*, Banco Central de Costa Rica.

¹⁹ See, for example, IMF (2000a) and (2001a).

²⁰ *Memoria Anual 2000*, Banco Central de Chile (2001).

²¹ See Stella (1997).

²² See Sargent and Wallace (1981) and Ize (1987).

non-financial public sector's net domestic borrowing that offset the net issuance of central bank debt. As a result, the central bank is the major issuer of public domestic debt (the non-financial public sector has virtually no domestic debt outstanding). Hence it dominates the supply side of the market for public domestic securities and avoids any potential conflict with the Government over the debt service cost of raising interest rates. Furthermore, if one analyzes the bank's balance sheet—ignoring the “alarming” negative net worth, one notes that net foreign reserves at end 2000 were almost 5 times the monetary base and 112 percent of the sum of the monetary base and central bank securities outstanding with residual maturity of one year or less. Thus the bank has more than ample reserves to exchange for its maturing obligations, provided that the implications for the exchange rate are acceptable.²³ Chile also represents a case where a financially weak central bank makes losses not only owing to past quasi-fiscal operations but from the fiscal cost of monetary or exchange rate policies. A number of countries have suffered from the latter cost since the liberalization of capital flows in the last decade.

G-7 central banks provide a very different picture. Despite discussions as to whether to eliminate its surplus and reserves and Congressional moves to require transfers from surplus to the Treasury, the consolidated accounts of the Federal Reserve System (each Reserve Bank maintains its own balance sheet), provide an example of a strong balance sheet with very low capital. Of its assets, 87 percent are holdings of U.S. Treasury securities and Federal Agency obligations, which are virtually free from default risk. The remainder is largely gold (valued at a constant accounting rate) and foreign assets.²⁴ On the liability side, Federal Reserve Notes outstanding amount to 90 percent of total liabilities (excluding capital and surplus). Reserves of depository institutions—which are non-interest bearing—account for a further 7 percent implying that Federal Reserve liabilities generate virtually no cost. Profits during the last five years averaged US\$ 25.4 billion (Table 2).

Canada is another example of a central bank with a very strong balance sheet yet minimal capital. The authorized capital of the Bank of Canada is Can\$5 million. The general reserve of the Bank was accumulated out of the bank's net revenue until it reached the stipulated maximum of Can\$25 million in 1955. Out of total assets of Can\$34 billion,

²³ The central bank suffers from a negative interest rate spread since it is forced to pay higher peso interest rates than it earns on its foreign assets. In 2000, however, owing to the depreciation of the peso, foreign exchange revaluation gains exceeded net losses from interest income. If one believes that economic agents are influenced by the accrued change in net worth rather than merely the cash losses, as suggested in Sargent and Wallace (1981) and Leone (1994) then there is even more reason to believe that the losses are not interfering with the credibility of monetary policy.

²⁴ The Federal Reserve shows only part of the stock of U.S. international reserves on its balance sheet. Part is held on account of the Treasury Exchange Stabilization Fund.

the Bank holds Can\$24 billion (71 percent) in securities issued or guaranteed by Canada.²⁵ Of its liabilities, Can\$34 billion (96 percent) consist of notes in circulation. Under these circumstances, the Bank is virtually assured a profit. In this light, it is clearly immaterial whether the Bank's capital is Can\$30 million or zero.

Table 2. United States: Consolidated Federal Reserve System
Selected Balance Sheet and Profit and Loss Accounts

(In billions of U.S. dollars)

	Capital	Profit	Transfer to Treasury	Total assets
1981	2.6	14.2	14.0	176.8
1982	2.7	15.4	15.2	190.1
1983	2.9	14.4	14.2	198.6
1984	3.3	16.3	16.1	208.5
1985	3.6	18.1	17.8	237.6
1986	3.7	18.0	17.8	267.4
1987	4.1	18.0	17.7	275.6
1988	4.2	17.6	17.4	293.7
1989	4.5	21.9	21.6	304.4
1990	4.8	23.9	23.6	327.6
1991	5.3	21.2	20.8	353.1
1992	6.1	17.3	16.8	368.0
1993	6.8	16.5	16.0	410.0
1994	7.4	21.0	20.5	436.9
1995	7.9	23.9	23.4	455.2
1996	9.1	21.0	20.1	481.5
1997	10.7	21.8	20.7	518.4
1998	12.0	27.6	26.6	548.8
1999	12.9	26.7	25.4	674.5
2000	13.8	29.9	25.3	609.9

Source: Annual Report of the Board of Governors of the Federal Reserve system, various issues.

The European Central Bank was established with a capital of EUR 5 billion. In addition, foreign exchange assets of EUR 39.5 billion were transferred to the ECB by countries participating in stage 3 of EMU in early 1999. The motivation for the capital was to fund start up costs of the bank as well as to generate continuing operating income. This

²⁵ Canada's foreign reserves are held in the Exchange Fund Account. Although managed by the Bank of Canada, they are not on the balance sheet.

was deemed particularly important as seignorage from note issue began only in 2002. Furthermore, the Bank has a large foreign exchange exposure since 90 percent of its assets are in foreign exchange and gold which has an offsetting counterpart in Euro—liabilities to national governments due to the transfer of foreign exchange. The ECB in fact made a loss in 1999 that was covered by a write down of the claims of national governments.²⁶ This ability to write down claims in response to unrealized foreign exchange losses was explicitly granted for the first three years of Stage Three of EMU—to allow the ECB breathing space before the issuance of banknotes would generate seignorage revenue and increase its reserves. The issue of allocating seignorage revenues was resolved only at end-2001 and the issue of capital remains outstanding.

To conclude, there is wide variation in central bank financial strength reflecting a lack of consensus on the relevance of the issue. Notwithstanding, the European Union has stressed the importance of financial independence as a prerequisite for member country central banks who wish to adopt the Euro.

B. Financial Transparency

Accounting

Increasing interest in financial transparency accompanied a widespread adoption of rule based macroeconomic policy frameworks in the early 1990s. The U.S. Budget Enforcement Act of 1990, the 1992 Maastricht Treaty, later to be followed by the Stability and Growth Pact's deficit and debt limits, as well as a movement toward transparency in New Zealand and Australia raised the profile of fiscal accounting while pressure also increased to enhance the openness of monetary policy. In the European Community this was accompanied by a harmonization of national statistical systems in part to allow a common measurement of national fiscal deficits in general and state aid in particular.

Later in the decade, the sustained growth in private capital flows to emerging markets, the Asian and Russian crises and the emergence of calls for a new international financial architecture accelerated an already evident trend toward greater transparency in the accounts of governments, central banks, and the financial sector. Conventional wisdom now stresses the importance of information revelation for the functioning of markets and for the reduction of risk premiums for sovereign borrowers. There is as well a strong conviction that the "...credibility of fiscal rules and objectives is strengthened if such

²⁶ Although the ECB made over EUR 6 billion in unrealized foreign exchange gains resulting from the depreciation of the Euro during 1999, its accounting policy calls for these gains to be excluded from the profit and loss account and set aside in a revaluation account. Ironically, the overall loss of EUR 247 million came largely from unrealized write downs on financial assets of about EUR 600 million which are required to be brought to the profit and loss account.

measures are accompanied by enhanced fiscal transparency, as this openness complements a rules-based approach in three ways: by removing any tendency to be nontransparent to meet rules; by facilitating judgments of actual fiscal performance against rules, which makes transparency an essential requirement for rules to be effective; and by allowing justifiable flexibility in the application of rules.”²⁷

A great deal of improvement in the basic accounting framework has been achieved.

- The IMF has developed standards and a code of good practices on transparency in fiscal and monetary and financial policies, using them to review the policies of dozens of member countries to date.
- Revisions to international accounting standards applicable to financial institutions have also been made, for example IAS 39 “Financial Instruments: Recognition and Measurement” became effective January 1, 2001, which, inter alia, broadens the application of fair value accounting. A working group of national standard setters is currently discussing the idea to apply fair value to all financial instruments.
- The IMF has worked with member countries to improve their transparency as evidenced by technical assistance and seminars (see for example “Transparency in Central Bank Financial Statement Disclosures” IMF WP/00/186 which explicitly discusses the applicability of IAS to central bank accounting).
- The IMF has also actively promoted central bank transparency through its “safeguard assessment” program introduced in 2000 to address concerns that some central banks utilizing the Fund’s resources lacked transparency and posed a risk as intermediators of Fund credit. The safeguard assessment examines the adequacy of five key areas pertaining to the central bank—external audit; internal audit; legal independence; financial reporting; and internal controls. An essential requirement is that countries publish annual central bank financial statements that are independently audited in accordance with internationally accepted standards.
- The Fund has also completely revised its basic fiscal accounting framework with the introduction of the *2001 Manual on Government Finance Statistics* to bring it in line with the U.N.’s *System of National Accounts* and to address concerns raised over the years (the previous edition dated from 1986) that it had serious analytical inadequacies.²⁸ In particular the 2001 Manual changed the basis of accounting from cash to accrual and established a fully

²⁷ IMF *World Economic Outlook—Fiscal Policy and Macroeconomic Stability*, May 2001, Chapter III.

²⁸ See Blejer and Cheasty (1993).

integrated system of accounts including stock data. The previous edition of the *Manual* limited stock data to debt liabilities.

- A greater emphasis has been placed on adjusting fiscal balances for the distorting impact of inflation, particularly important for the quasi-fiscal operations of financial institutions.²⁹
- Some central banks have moved toward full cost recovery for services and more clearly identifying the cost of undertaking other activities thereby enabling a closer examination of their cost efficiency.

While significant progress has been made and the profile of the issue has been considerably raised during the last several years, certain controversial points remain and improvements in individual countries have been sporadic. IMF safeguard assessments have identified a number of problems that have been or are being addressed in the central banks assessed but these constitute only a subset of member countries. In particular, 88 percent of assessed central banks were identified as having had inadequate accounting standards (see Table 3).

Two particular broad issues are whether IAS are fully applicable for central banks and the appropriate level of central bank capital (discussed in III.B below). Many banks have not implemented International Accounting Standards, in particular the U.S. Federal Reserve and the European Central Bank. The essential issue is whether there is something special about central banks which invalidates certain elements of IAS designed for commercial enterprises. The reasons given for why central banks are not done justice by IAS include: they are not profit maximizing institutions and indeed the profit outcome comes quite late in the central bank's policy priorities; central bank shares are never exchanged for "market" value and they are immune from bankruptcy; as a matter of policy they may be subject to significant economic risks, e.g. open foreign exchange positions; they are part of the public sector and their accounts may represent only a part of the relevant balance sheet, e.g. central bank losses on its holdings of government securities are exactly offset by government gains and vice versa. Central banks have also argued, as have hedge funds, that they should not be subject to the disclosure requirements of publicly held companies. While there is some merit in these arguments, they generally do not stand up well to good financial reporting requirements. The next section will focus on the key issue in measuring the central bank's fiscal impact—accounting for profit distribution.

²⁹ See de Rezende Rocha and Saldanha (1992).

Table 3 - Main Findings of Safeguards Assessments¹

	Type of Assessment		Total Identified ²	Total Assessed ²	Identified as Percent of Assessed
	Transitional Procedures	Full			
Central banks assessed	25	26			(in percent)
1. Non-existent or deficient external audits.	13	20	33	49	67
2. No, or delayed, publication of financial statements.	7	13	20	49	41
3. Poor controls over foreign reserves.	2	14	14	26	54
4. Inadequate accounting standards.	8	23	23	26	88
5. Deficient governance oversight.	5	20	20	26	77
6. Deficient internal audit.	1	23	23	26	88
7. Loopholes in governing legislation.	-	13	13	26	50
8. Inadequate accounting for IMF transactions.	2	9	9	26	35

¹ Data as of February 8, 2002. Source: "Safeguards Assessments—Review of Experience and Next Steps" (www.imf.org/external/np/tre/safeguards/2002/review.htm).

² Given the nature of transitional procedures, findings 3 through 8 (shaded) are not *prima facie* principal objectives of such assessments and, therefore, are excluded from the calculation of total identified cases.

Profit Distribution

Transparency in profit calculation and distribution is important for several reasons. As central bank profits transferred to the treasury are considered budget revenue, it is important that they be distinguished from transfers more properly classified as credit to government or changes in government equity in public corporations. It is also important to understand whether profit distribution follows the basic principle of accrual accounting, i.e., do profits transferred to government correspond roughly in time to the activity that earned the profit? A further key fact is that in the vast majority of countries, the treatment of profit and losses is asymmetric, namely that profits are transferred to government but losses are not covered, i.e., losses lead to a reduction in capital or reserves. This asymmetry makes problematic judging overall public sector finances.

Progress in improving the transparency of central bank profit determination has come with a general improvement in accounting and in some cases with recapitalization of the central bank—which brought to an end a chronic problem with losses. The IMF, in its surveillance work has for certain countries long found it important to report the overall

public sector deficit—including the cash losses of the central bank—in its assessment of the fiscal stance. The *2001 Manual on Government Finance Statistics* also covers these issues.

The European Union has made an important contribution through its convergence requirements for central banks wishing to participate in the monetary union. Among the required features of national legislation is financial independence of the central bank and among the specific requirements is that national central banks “in those countries where third parties and, particularly, the government and/or parliament are in a position, directly or indirectly, to exercise influence on the determination of an NCB’s [National Central Bank’s] budget, or the distribution of profit, the relevant statutory provisions should contain a safeguard clause to ensure that this does not impede the proper performance of the NCB’s ESCB-related tasks”.³⁰ Ireland and Finland amended their legislation to meet this requirement while the European Commission recently stated that Swedish legislation is incompatible with the financial independence of the Riksbank and, in that respect, assessed it as not compatible with the EC Treaty and the ESCB Statute.³¹ The EU requirements are also having an impact on the relevant legislation of states hoping to become members of the EU later this decade.

Outside Europe, these issues continue to be discussed in various contexts. In 2001, the Central Bank of Venezuela paid unrealized foreign exchange gains to the government which, in its turn, has not fully recognized the cost of the bank rescue operations indirectly financed through the central bank.³² The Central Bank Accounting and Budget Committee, formed of representatives of various central banks in the Americas, has yet to adopt standards for determining profits and on the appropriate level of central bank capital.³³ There have also been serious problems in a number of the newly independent central banks coming out of the formerly socialist countries. The 2000 IMF ROSC on Azerbaijan, for example, notes that the profit transferred by the central bank to the budget is not determined according to objective criteria but is negotiated at the time of budget preparation.³⁴

In the United States, the General Accounting Office acted transparently but questionably when it took the position in 1996 that transfers of accumulated Federal

³⁰ European Monetary Institute (1998), page 295.

³¹ See European Commission (2002).

³² See Jácome (2001).

³³ See CEMLA (2000) “Reunion sobre aspectos contables y presupuestarios de Banca Central: Conclusiones y recomendaciones.”

³⁴ See IMF (2000b) Azerbaijan: ROSC Fiscal Transparency Module, paragraph 8.

Reserve surplus to the Treasury should be counted as fiscal receipts and reduce the budget deficit in the year received.³⁵ This discussion followed the 1993 Omnibus Budget Reconciliation Act which required the Federal Reserve to transfer from surplus US\$106 million and US\$107 million in fiscal years 1997 and 1998 respectively which reduced the federal government's projected deficit in those years. Congress acted again in late 1999 by amending the Federal Reserve Act to require a transfer of Federal Reserve surplus to the Secretary of the Treasury of US\$3.752 billion during fiscal year 2000 and additionally forbade the Fed from recouping the loss in that fiscal year. Because the Government's and the Federal Reserve's fiscal years are not synchronous, the Federal Reserve was nevertheless able to replenish most of its surplus through retained profits by the end of its own fiscal year.³⁶

One of the more contentious issues in profit determination is the timing of income and loss recognition. Two sources of particular controversy are provisions and revaluation of assets owing to market price or exchange rate fluctuations.

IAS 39 requires loans and receivables to be written down if viewed as impaired either directly or through provisions. Certain central banks, for example the Bank of Japan, do maintain provisions for possible loan losses and carefully describe them as suggested in Sullivan (2000)---“Disclosure of reserve information is very important in central bank circumstances to allow users to understand the reasons why reserves are maintained. This disclosure should be accompanied by a description of the nature and purpose of each reserve class”.

In some cases, however, reserves have been utilized to cushion the treasury from a deterioration of central bank finances. The case of Portugal is interesting in this respect. Owing primarily to the cost of remunerating required reserves and absorbing excess liquidity through the use of its own paper, the central bank's operating results were negative each year from 1988 through 1992. Nevertheless, the Bank officially reported positive net income and dutifully paid a dividend to the government by relying extensively on the reintegration of general provisions that had earlier been established to cover potential losses. Such provisions in the balance sheet fell from about 7 percent of GDP in 1986 to zero in 1993 following the Bank's operating loss of 0.7 percent of GDP the preceding year. Rather than using provisions to capture the economic impact of a loss in the Bank's income statement at the time it occurred, this use of provisions effectively did the opposite—

³⁵ See U.S. General Accounting Office (1996).

³⁶ Goodfriend (1994), in addition to pointing out that the federal deficit properly measured would not be affected by such a transaction, presciently pointed out that the 1993 Congressional decision “...could set a harmful precedent for further stripping the Fed of assets...”

reducing the profit transfer in the years income was earned and increasing it in years when losses occurred. This example points to the importance of a strong independent external audit function and the application of the “substance over form” principles of IAS.

The Czech National Bank has made use of provisions to account for anticipated losses in connection with commercial bank rescue operations and for various items in connection with the transfer to Government (at nominal cost) of claims resulting from the dissolution of the former State Bank of Czechoslovakia. This has not, however, meant that the losses have had their impact immediately on treasury receipts nor that transfers were required from Government. For example, despite a profit of CZK 2.5 billion (roughly US\$50 million) in 2000, the need to cover accumulated losses meant that no transfer to Government was made. The remaining accumulated loss of CZK 15.9 billion is to be made up out of future profits.³⁷

In many of these cases the central bank may be viewed benignly as a fiscal buffer, or malevolently as a black hole, enabling government to elude fiscal constraints. While there are clearly cases where flexible or fuzzy fiscal rules are preferable to strict and inflexible ones, intentionally compromising the integrity of the underlying data seems very ill advised. (For an interesting discussion of these issues, see Milesi-Ferretti (2000)).

The treatment of asset revaluations in the incomes statement is often significant. Actual practice is quite varied with the Fed taking all gains and losses, realized and unrealized, to the profit and loss account and distributing profits on a weekly basis. The European Central Bank posts unrealized *gains* from price or currency revaluation to a revaluation account shown on the liability side of the balance sheet and hence they are not shown as income. Unrealized *losses* are reflected in the profit and loss account if they exceed previous revaluation gains registered in the corresponding revaluation account. These losses are not reversed in following years against new unrealized gains.³⁸

IAS calls for a more complicated approach. Only assets classified as “held for trading” and “available for sale” are required to be revalued for price changes with the former adjustment taken to the income statement. In the latter case the enterprise has a once and for all choice as to whether it wishes to reflect the changes in the income statement or post them to a revaluation reserve until the gain/loss is realized. Assets classified as “held to maturity” and “loans and receivables” are not revalued. For revaluation owing to exchange rate changes, IAS 21 calls for all gains and losses on “monetary assets” to be recognized in the profit and loss statement. “Nonmonetary assets” are not revalued.

³⁷ See Czech National Bank (2001).

³⁸ See Sullivan, ed. (2000) for a discussion of how ECB accounting and reporting principles differ from IAS.

The implications of IAS 21 are rather serious as no flexibility is provided and central banks often have large open positions in foreign exchange as a matter of policy. Central banks also have expressed several concerns about paying out unrealized gains. One seems to be based on a notion of negative autocorrelation of price and exchange rate changes and a desire to smooth the variance in profit transfer. Another is concern with the monetary impact of paying out nonmonetary income which is implicitly a concern about fiscal profligacy as there would be no monetary impact were the government to save the profit at the central bank. A further question is whether it is correct to increase fiscal receipts only because central bank assets increase in value when the government's liabilities are likely to have risen at the same time—if the central bank's portfolio is mostly government debt or the government has foreign exchange denominated debt.

While Norway and Iceland bring realized and unrealized foreign exchange gains and losses to the profit and loss account—as did Finland prior to the EMU—they have established mechanisms to smooth the transfer of profit as does Sweden (guidelines for distribution of the annual result stipulate that the annual transfer to the Treasury shall not be affected by fluctuations in the value of the Swedish krona). The mechanisms also effectively make capital and reserves a function of the net open foreign exchange position. These countries in particular are exposed to large potential losses from foreign exchange movements. For example, in comparison with Canada and the United States, a large portion of the Norges Bank assets are international reserves and other foreign assets—82 percent (end-2000). On the liability side, notes and coins in circulation account for only 16 percent. As a result, the Bank usually has net domestic interest expenses and net foreign interest revenue. Changes in the market value of its security portfolio as well as changes in exchange rates lead to volatile financial results. For instance, the 2000 profit of NOK 14 billion contrasts with a previous year loss of NOK 3 billion.

The Norges Bank undertakes to minimize the significant fluctuations in its profits in two major ways. First, part of its foreign securities portfolio is structured so as to hedge the government's foreign debt (due to be fully retired in 2004). Second, it maintains reserves amounting to 5 percent of the Bank's holdings of domestic securities and 25 percent of its net foreign exchange reserves excluding the government's petroleum fund. Annual profits that are in excess of what is needed to maintain the reserve are transferred to a holding account. The amount distributed to the treasury is the average amount transferred to the holding account during the preceding three years.

In Iceland, from 1986 to 2001, the average profit over the previous three years was the basis for the profit transfer. However, the central bank paid the treasury only 50 percent of the average profit and only after charging "price-level adjustment" as an income expense in the profit and loss statement, an amount that represented indexation of the capital of the bank. The amount resulting from the price-level adjustment or indexation was applied directly to capital and reserves as was the profit remaining after transfer to the treasury. This system reflected adaptation to high inflation during the early part of the period (averaging 38 percent per annum during the 1980s). The new central bank law (2001)

abolished this system as inflation had been brought down to industrial country levels during the 1990s.

In sum, one can find a number of different approaches to central bank accounting and profit distribution policy as well as marked differences in how timely profit transfers are made. In general, there is a growing recognition that from a corporate governance and financial reporting perspective, acceptable divergence from IAS should broadly be limited to cases where a central bank's profit distribution mechanism does not properly distinguish between realized and unrealized income.

III. CREDIBILITY AND CENTRAL BANK FINANCIAL STRENGTH

A. Credibility

Since rational expectations became a common assumption in economic theory and central bank policy has been frequently viewed in a game-theoretic framework, credibility of policy has become an essential feature both in theory and practice. In his survey of central bank credibility, Blinder (2000) notes that central bankers and economists agree that credibility is important and that it is attained by building a reputation for doing what you say you will do. Effectively this implies that there are three key issues. The first is adopting the right objective function, the second is enabling the attainment of the objective, and the third is being transparent. Insights into the issue have been gained by analyzing the preferences of policymakers, the degree of central bank legal independence, the consistency and credibility of central bank objectives, as well as their consistency with fiscal policy³⁹.

Germane to the discussion of this paper is the substantial attention paid to the relation of central bank independence and inflation performance. Interestingly, the demonstrated link tends not to be found outside the developed economies⁴⁰. There are a variety of possible reasons, one of which is that there has been insufficient attention paid to actual financial independence in the measurement of the independence variable. Indeed Jácome (2001) finds in a study of Latin American central banks that "legal" independence alone is actually *inversely* related to good inflation performance and only by including "economic" and "financial" independence variables does the expected correlation emerge.

The importance of financial strength has been argued, albeit indirectly, by

³⁹ See Sargent and Wallace (1981), Rogoff (1985), Cukierman (1992), and more recently Faust and Svensson (2001) and Woodford (2001).

⁴⁰ See Cukierman, Miller and Neyapti (2001) and Jácome (2001).

Vaez-Zadeh (1991) and Leone (1994) in the context of central bank losses and remedies, and Beckerman (1997) and Stella (1997) who approached the question from the standpoint of the required level of central bank capital.

The most straightforward argument in favor of central bank financial strength is simply that central bank financial weakness leads to central bank losses. Such losses are financed through financial repression, reserve money creation, or debt issuance--leading to expectations of future money growth.⁴¹ If the reserve money injection is consistent with the monetary program, exchange rate or other central bank objective then no immediate difficulty ensues. If, however, the monetary injection is not consistent with the central bank's policy objectives, it will need to be offset with countervailing action.

Here the central bank has a choice. One avenue is to suppress the impact of the monetary injections by direct means involving repression of the financial system. However, in light of increasing recognition of the efficiency losses associated with such policies, the use of more market friendly indirect instruments has gained wide acceptance.⁴²

Accomplishing the withdrawal of liquidity through "market-friendly" means requires the central bank to induce a voluntary action on the part of the public. The central bank will need to offer the market an asset bearing a market return in exchange for reserve money. This will lead to further operational expenses or loss of revenue. There are clearly limits to this policy as eventually the central bank will exhaust its supply of valuable liquid assets.

The next step sometimes is to issue central bank own liabilities. The sustainability of central bank debt issuance is a function of the same factors that determine the sustainability of government debt in general⁴³. These include expectations of the future income and expenditure stream of the central bank, the growth rate of demand for the securities being purchased from the central bank, the reputation of the issuer of the security, macroeconomic developments, the government's commitment to guarantee obligations of the central bank, budgetary developments, etc. Furthermore, chronic central bank losses and

⁴¹ That the latter situation could lead to immediate inflation is shown in Sargent and Wallace (1981).

⁴² See Alexander, Baliño, and Enoch (1995), and Giovannini and De Melo (1993).

⁴³ See MacArthur's annex to Vaez-Zadeh (1991) for an explicit derivation of the transversality conditions.

high inflation lead to institutional adaptations, such as the proliferation of indexed debt instruments, which reduce the scope for the use of the inflation tax.⁴⁴

Apart from the straightforward infeasibility of certain policy commitments when they violate the central bank's intertemporal budget constraint, a less severe degree of weakness decreases the central bank's credibility and worsens the policy cost/benefit tradeoff. This would be the case where the current constellation of exogenous factors are consistent with the chosen policy but the central bank would not be able to withstand shocks to its balance sheet that might be forthcoming. Here what is relevant is not so much the consistency of the policy but its vulnerability and the possible volatilities of certain variables that would impact on central bank strength and correspondingly on its ability to fulfill its policy obligations.⁴⁵ A third issue is that central bank concern with its balance sheet, even though not vulnerable, would lead to a policy reversal. Hence the importance of choosing the right measure of strength.

B. How to Assess the Appropriate Level of Strength

The approach to this problem taken by central banks is generally made operational by discussing a target or target band for central bank *capital*.⁴⁶ Targets generally fall within one of 4 types, although some banks take a hybrid approach. The first is an absolute nominal level of capital. The second is a target ratio of capital to another central bank balance sheet item. The third category sets a ratio of capital to a macroeconomic variable (excluding central bank balance sheet items). The last bases the level of capital on the perceived risks to the "solvency" of the bank (which often is the underlying basis for the actual target chosen in the other 3 categories). Here "solvency" is sometimes interpreted as positive capital, sometimes as the more general concept of maintaining the ability of the central bank to undertake its policy goals.⁴⁷

⁴⁴ For example, the Central Bank of Argentina made losses during most of the high inflation period in the second half of the 1980s.

⁴⁵ This is the emphasis of Blejer and Schumacher (1998).

⁴⁶ See Ernhagen, Vesterlund, and Viotti (2002) for a discussion of this issue in the Swedish context.

⁴⁷ The notion that solvency is defined not as a balance sheet concept but as a capacity to meet policy goals is not entirely divorced from the concept espoused in Fry, Goodhart and Almeida (1996)—there insolvency is "negative net worth at all steady state rates of inflation" so a central bank is insolvent if it is financially incapable of holding the rate of inflation steady.

In practice, the Bank of Canada is an example of a bank in the first category. The Bank has a nominal level of capital and pays all of its accrued profits to the government.

The Federal Reserve, Bank of Japan, the Bulgarian National Bank, and the central banks of Iceland and Estonia are all examples of banks falling into the second and third categories. The Bank of Japan and the Bulgarian National Bank target internal balance sheet indicators while the Federal Reserve, Central Bank of Iceland and Bank of Estonia target “external” indicators.

The Bank of Japan targets a capital adequacy ratio which consists of the capital base divided by the period average of banknotes issued, of around 8–12 percent. Specific reserves against possible loan losses are not included in calculating the capital ratio. The National Bank of Bulgaria sets a nominal floor on foreign exchange assets in excess of what is necessary under the rules of the Bulgarian currency board. These assets constitute a pool from which the Bank is able to provide a lender of last resort facility. As the Bulgarian legislation limits the amount the Bank can lend to banks (based on volumes in the payments system), this reserve is clearly related to the Bank’s policy commitments and constraints.

Federal Reserve System member banks are required to make capital contributions proportional to their own level of capital. The Federal Reserve then matches these contributions with retained earnings. The effect is to index the level of Federal Reserve capital to the aggregate capital of Federal Reserve member banks.

The Bank of Estonia, operating in a currency board framework, took a decision in September 1999 to alter its capital target.⁴⁸ Prior to that Board decision, the Bank had a three tier objective. The first, statutory capital, was set in nominal terms. The second level—reserve capital—was set at a level equal to statutory capital. Once those two objectives had been achieved through accumulated retained earnings, the Bank had significant discretion as to how to distribute profit. Indeed the Bank used such discretion to make “advance payments of future transfers” to resolve a banking crisis in 1997 (see page 37 below). In 1999, the Bank, with a view toward eventual membership in the European Monetary Union changed its distribution policy to focus on preventing an “excessive” decline in surplus reserves of the currency board. While noting that some decline from the level then prevailing was warranted in view of declining risk in the financial environment, the Board decided to set a floor for foreign exchange reserves, net of currency board liabilities, equal to the greater of 2 percent of GDP or 5 percent of broad money, M2.

The Central Bank of Iceland, since 2001, should transfer two-thirds of its profit to the Treasury unless capital and own reserves at the end of the fiscal year are less than 2.25

⁴⁸ See Bank of Estonia (1999).

percent of the amount of lending and domestic securities assets of the credit system at the end of the preceding fiscal year. In that case the transfer is reduced to one-third of profit.⁴⁹

The European Central Bank presents a hybrid system. As noted above, the ECB chose a nominal level of capital with an option to require further transfers from member banks. The ECB motives were explicit in two respects. First, capital was viewed as an income source to fund the operations of the bank during start-up and to absorb initial losses—which is a very conventional view of commercial bank minimum capital requirements. Second, independence, in general, and financial independence in particular, requires that capital adequacy be kept under review.

Less definitive approaches have been adopted in Latin America as evidenced by the failure of accounting experts to agree a position on this issue.⁵⁰ Ulrich (1998) made two proposals with reference to pre-dollarization Ecuador. One, analogous to the Basle capital criterion, that the central bank should hold capital and reserves equal to at least 9 percent of risk weighted assets according to the provisions of the legislation applicable to private commercial banks. The second, based on a currency board analogy, is that capital plus net international reserves be at least as great as the monetary base.

New Zealand and Australia take the third approach which is best summarized as protecting the strength of the balance sheet by explicit control on risks that are not strictly necessary for policy purposes and undertaking a review of the adequacy of the balance sheet before determining profit distribution. Essentially in a position where the balance sheet is deemed strong enough, the banks are focused on ensuring it remains that way but without reference to a specific benchmark. The RBNZ employs Value at Risk (VaR) model limits as well as stop-loss limits in managing its foreign asset portfolio but does not attempt to manage the risk coming from its holding of domestic securities for monetary policy purposes as (a) this might lead the operations department to act counter to monetary policy objectives—exactly what the market suggests the Bank of Japan might do; and (b) because any capital gains or losses on its holdings of government securities would be mirrored by the government.

The Board of the Reserve Bank of Australia reviewed in 2000/01 the structure and adequacy of its capital and reserves and decided to consolidate disparate reserve accounts.⁵¹ The amount to be transferred to the consolidated reserve fund is determined by the Australian government after consultation with the Board. A key element of the profit

⁴⁹ See Sedlabanki Islands (2001).

⁵⁰ See CEMLA (2000).

⁵¹ See Reserve Bank of Australia (2001).

transfer policy is that while all unrealized gains and losses are taken to the profit and loss account, unrealized gains are not made available for transfer to the government. They are held in a separate account until realized or offset by unrealized losses. Although the RBA does not have an explicit target for its reserve fund, it noted that at June 30, 2001 it stood at 10.6 percent of total assets which the Board regarded as adequate. The Bank attempts to pay the determined profit early in the financial year following the year in which it was earned but on occasion this has not been done as in 1998/99 when the government chose to spread the dividend from that year over the two following.

In assessing the various options, the focus on balance sheet capital is problematic in that it tends to frame the discussion in terms of capital being used to avoid insolvency and hence “zero” becomes a very important number as it is for commercial banks. For a commercial bank, negative capital—or the fear that a bank is approaching negative capital has clear implications. But for central banks zero has no special meaning for two reasons. The first is that central banks are not subject to insolvency procedures, the second is that central banks, in their conventional state have a significant unrecorded asset, namely the monopoly right to issue fiat money (currency boards and countries participating in a monetary union are an important exception here). This monopoly right, were it capitalized on the balance sheet in the form of franchise value or goodwill, could easily be in the range of 20 percent of GDP, depending on the steady state level of the inflation tax and the discount rate. Taking a low inflation country—the Fed’s 2000 profit of approximately US\$30 billion is roughly 0.3 percent of GDP. Calculating the annuity value with a 2 percent discount rate yields a net worth of 15 percent of GDP or approximately US\$ 1.5 trillion compared with balance sheet capital of \$14 billion. Looked at differently, the average annual increase in U.S. reserve money during the last 10 years was US\$ 27 billion. This is equivalent to the monetization of a six percent coupon on net liabilities of US\$ 450 billion.

The point here is that the nominal level of central bank capital—in the absence of any knowledge of the policy regime—is a rather meaningless statistic. Only when provided with policy objectives, such as price or exchange rate stability, can a threshold for central bank net worth or strength be determined. That said, the financial strength of the central bank does not provide a sufficient condition for those policy objectives to be achieved. It merely provides a floor under which the central bank cannot achieve its objectives. Hence, it is first necessary to determine the bank’s objectives, then to determine the minimum strength of the balance sheet to achieve those objectives, the exposure to risk that the bank is likely to experience, and finally a mechanism that ensures that enough reserves are available to absorb the risk.

This argument is a specific application of the more general methodology presented by Blejer and Schumacher (1998), in effect suggesting that central bank strength be determined by utilizing a value at risk approach in light of the cost and benefit matrix attached to its policy choice. As an example, a central bank that does not determine foreign

exchange policy—such as the Bank of Canada—need hold no foreign exchange reserves.⁵² Banks that do hold large foreign reserves would need to adopt hedging strategies or hold additional capital to prevent devastating losses as is the common practice in Scandinavia. Members of the European System of Central Banks having adopted the euro need not hold the level of reserves they held prior to the introduction of the euro, which has led Gros and Schobert (1999) to argue that they are overcapitalized and to call for a significant reduction in their foreign assets.

C. Treasury Financing Versus Recapitalization

A country with a central bank suffering from large negative net worth faces a choice between strengthening the balance sheet or covering losses on a cash flow basis from the treasury. The latter option is a frequent feature of central bank law. For example, the new (2002) organic law for the Central Bank of Guatemala has a clear provision covering cases where the Bank suffers losses that it cannot cover with own reserves. In this event, the Ministry of Public Finances should submit in the draft budget law a proposal to cover the losses through the provision of marketable interest bearing debt to the Central Bank in the following fiscal year. This type of solution is what Edwards (2000), in his advice to the Bank, called an “automatic” recapitalization of the Central Bank and which he motivated from the importance of isolating this issue from the pure short-term political arena.

One difficulty with relying on transfers alone is that treasuries are rarely so flexible that they can be provided on a timely basis.⁵³ A budgetary allocation is normally required and it generally is not possible to usurp the legal framework of an authorized budget law through an *ex ante* requirement that central bank losses be covered. Thus in the case of Guatemala, although the economic form of the recapitalization is quite clearly spelled out, the legal requirement is for the Government to *submit* legislation, not pass legislation. Thus, the likelihood of passage of the legislation is clearly subject to the will of the legislators at the moment the budget is approved and does not depend solely on the Government even if well intentioned⁵⁴.

⁵² In Canada, the Ministry of Finance decides foreign exchange intervention and the country's foreign assets are not on the books of the Bank of Canada.

⁵³ Normal budget procedures would require a specific allocation for interest expenditure during the year and frequently place a limit on government debt outstanding.

⁵⁴ The law in Guatemala actually makes the State responsible for covering the losses which may imply that should the approved budget not be adequate another method must be found. The law also provides for a “recapitalization of the Bank's accumulated losses through the issuance of a long term zero coupon bond. See García Lara (2002) for a thorough discussion of the motivations for these and other provisions of the new law.

A second concern would be that were the treasury to have sufficient discretion to fund losses on a timely basis, this would also suggest it would have discretion to control the size and timing of the transfers which in effect would place monetary policy in the hands of the treasury rather than the central bank. If institutional independence is desired for the central bank, it is difficult to see how this can be maintained when the central bank relies on the constant goodwill of the treasury to undertake policy implementation.

In assessing the difference between covering losses on a periodic basis and through a lump-sum recapitalization, one may consider the following situation. Suppose, in order to achieve its price stability goal, the central bank must receive either an annual transfer of government securities equal to X or a one time transfer of the present discounted value of the stream of X s through time, Y . In the latter case, the central bank would issue the securities as needed to the market. The budgetary impact on the consolidated public sector would be identical in both cases. In the annual transfer case, the central bank would immediately issue the government securities hence the budget impact would be equivalent to the debt service on the transferred securities. In the second case, the nominal debt service on the government securities would be much larger but the amounts in excess of the quantity issued to the private sector would remain in the public sector and the attendant income transferred back to the government at the end of the financial year.

The lump-sum recapitalization additionally provides a signal of the government's commitment to allow the central bank the financial possibility to implement appropriate policy. Conversely, the failure to provide the resources "up front", given that the net financial impact on the public sector is nil, could only call into question the government's long term commitment to the annual transfer policy. This in turn would lead to skepticism on the part of the public as to the central bank's policy capability. In cases where the government is particularly concerned about influencing the public's expectations about the medium term policy framework this uncertainty could be very costly.

The aforementioned discussion is placed in a formal model in the remainder of this section. The model draws from Barro and Gordon (1983a&b) and is analogous to Backus and Driffill (1985). The general outline is that the government wishes to undertake a financial reform which is taken to be a reduction in the rate of inflation. The central bank is in a weak financial situation and is not capable of bringing the rate of inflation down to the desirable level without an infusion of government securities. More broadly, there is also the need for fiscal consolidation in the overall public sector accounts. Hence we are not speaking of a recapitalization or fiscal transfers for purely transparency purposes.⁵⁵

⁵⁵ A recapitalization purely for transparency purposes would involve the provision of government debt to the central bank sufficient for it to generate a profit. The conventional fiscal balance would fall by an amount equivalent to the higher interest cost (net of central bank profit), which would be financed by interest-free central bank credit. Effectively, this
(continued...)

The government has a choice between transferring the required securities in a lump sum fashion at the beginning of the reform or transferring only the minimal amount of securities required each time period or budgetary year. To introduce the notion of credibility, it is assumed that the public does not know the true objective function of the government and therefore must form expectations of future government policy on the basis of incomplete information. For simplicity, it is assumed that the public does know the objective function of the central bank and that there are only two possible types of government, one that has the same objective function as the central bank, the other which is weaker in the sense that under certain circumstances it would choose to accept higher inflation than the other government or relax the fiscal constraint which in the model can be thought of similarly. That is, the choice variable is the rate of inflation but the instrument is the quantity of government bonds to issue to the central bank each period which has a government debt service cost as well as a monetary implication. This motivation is but one of many for including surprise inflation in the reduced form for the government's objective function. These are discussed extensively elsewhere in the literature and we merely use the following:

$$V^i = b^i(\pi\{t\} - \pi^e\{t\}) - a/2(\pi\{t\})^2 \quad (1)$$

π is defined as inflation and π^e , expected inflation, “ i ” is the index for government type.

The solution for the government if this is a one-stage game is to set $\pi = b^i/a$. Rational expectations with complete information requires $\pi^e = \pi$. We now discuss the situation with the possibility that there are two types of governments either A or B.

The government can be one of two types. One type, type A, is strongly committed to the reform. That is, they claim $b^a = 0$. This government will always choose $\pi = 0$ as would the central bank.

The other government, type B, has a parameter $b \gg 0$. In what follows, when the parameter “ b ” is mentioned it always refers to that of the type B government, therefore it will no longer be superscripted. The payoff for the type B government, when it sets $\pi = 0$, and is expected to do so, is zero. The payoff for the B government when it chooses its optimal one-stage solution, $\pi = b/a$, when people anticipate $\pi = 0$ is:

$$-a/2(b/a)^2 + b(b/a - 0) = -b^2/2a + b^2/a = (1/2)b^2/a$$

is identical to simply changing the name of the obligor on central bank interest bearing liabilities and continuing to finance the payments through money creation.

So the dominant strategy, if this were a single stage game, would call for government A to play $\pi = 0$ and for government B to play $\pi = b/a$.

The subjective probability that the government is of type A is denoted p^a .

Individuals begin the game with a prior about the type of government that is in power. The formation of these priors is not modeled.

The prior is updated according to Bayes rule as long as the government's type has not been completely revealed. (If type B is revealed, the model collapses to the perfect information case). Bayes rule implies:

$$\begin{aligned} p^a(t) &= \frac{p(\pi\{t+1\} = 0|A)p^a(t+1)}{p(\pi\{t+1\} = 0|A)p^a(t+1) + p(\pi\{t+1\} = 0|B)p^{0b}(t+1)} \\ &= \frac{p^a(t+1)}{p^a(t+1) + [1 - p^a(t+1)]p^{0b}(t+1)} \end{aligned}$$

Where $p^{0b}(t+1)$ is the probability that the government of type B would play $\pi = 0$ in $t+1$. Time is indexed by t where $t = T$ is the first period and $t = 1$ the last. Thus t represents the number of periods remaining in the game. Notice that if $p^{0b}(t) = 1$ then $p^a(t) = p^a(t+1)$. And, since any rate of inflation greater than zero is completely revealing, $p^a(t) = 0$ if at any time, s , prior to t , $\pi(s) > 0$. This "sharp" conclusion is the result of two assumptions, that the government has perfect control over the rate of inflation and that there are only two, quite different, types of governments.

The Bayesian probability, at any time in the game, that the rate of inflation will be set equal to zero is $p^a(t) + p^{0b}(t)p^b(t)$. Where $p^{0b}(t)$ is the probability that the government of type B will set $\pi = 0$ in period t . This equals $p^a(t) + p^{0b}(t)[1 - p^a(t)]$. Since any choice of inflation above zero will reveal the government of type B, if it decides to reveal itself it will choose the optimal level of inflation, b/a . Therefore, the probability that the rate of inflation will be equal to b/a is $1 - p^a(t) - p^{0b}(t)[1 - p^a(t)]$. It then follows that the expected value of the rate of inflation in any period is:

$$\begin{aligned} &[p^a(t) + p^{0b}(t)p^b(t)] \times 0 \\ &+ [1 - p^a(t) - p^{0b}(t)(1 - p^a(t))] \times b/a \\ &= b/a - b/a[p^a(t) + (1 - p^a(t))p^{0b}(t)] \end{aligned}$$

This, then, is the way people form expectations of inflation along the equilibrium path.

The government of type A will set the rate of inflation equal to zero for each period. It is committed to the rule. The most complicated strategy is that of the government of type B. It is found by working recursively from the end of the game. The government's strategy at time 1, the last play of the game, is clear. It will always set the level of inflation equal to b/a . The decision faced by the government in the next to last period, period 2, is the following. The payoff equation for the government in 2 is:

$$-a/2[\pi(2)]^2 + b[\pi(2) - \pi^e(2)].$$

If the government sets $\pi = 0$ and retains its reputation, it gains $-b\pi^e(2)$. In period one it sets $\pi = b/a$ and gains $-a/2(b^2/a^2) + b[b/a - \pi^e(1)]$. The sum equals $-b\pi^e(2) + b^2/2a - b\pi^e(1)$. This is the undiscounted payoff to setting the rate of inflation equal to zero in the next to last period and then setting it equal to b/a in the last period.

Alternatively the government of type B could set the level of inflation in the next to last period equal to b/a and thus reveal it is of type B. It would then, of course, set $\pi = b/a$ in the last period as well. The payoff to this strategy would be:

$$-a/2(b^2/a^2) + b^2/a - b\pi^e(2) = b^2/2a - b\pi^e(2),$$

in the next to last period. Then in the last period the gain would be equal to $-a/2(b^2/a^2) = -b^2/2a$. The undiscounted sum of these two payoffs is $-b\pi^e(2)$. This policy represents breaking from the "rule" at the next to last period, losing credibility, and then accommodating people's high inflationary expectations in the last period.

Comparing the relative payoffs it is clear that if $b/2a > \pi^e(1)$ then the optimal strategy is to set $\pi(2) = 0$. The government of type B will always follow the rule if this leads people to believe, next period, that it is of type A with sufficient probability to make abiding by the rule the best strategy.

People form inflationary expectations about time t according to the following formula:

$$\pi^e(t) = b/a - b/a[p^a(t) + \{1 - p^a(t)\}p^{0b}(t)] \quad (4)$$

The government, if it is of type A always sets $\pi = 0$. If it is of type B it sets $\pi = 0$ if $p^a(t) > (1/2)^{t-1}$. If $p^a(t) < (1/2)^{t-1}$ then it sets $\pi = 0$ with probability:

$$p^{0b}(t) = \frac{[2^{t-1} - 1]p^a(t)}{1 - p^a(t)}$$

It sets $\pi = b/a$ with probability $1 - p^{0b}$.

To clarify the way expectations adjust after a possible financial reform, a simple numerical example is provided based on the following assumptions.

Suppose $b/a = 20\%$; T , the number of periods is 10, and z , the prior on the probability that the government is of type A, is $1/20$. Recall that $\pi^e(t) = b/a - b/a[p^a(t) + (1 - p^a(t)) p^{0b}(t)]$.

The rate of inflation expected to hold in each period then, from the information available at time T , the first period can be calculated. This is given below:

10-6		=	0%
5	$19/20[4/19](20)$	=	4%
4	$19/20[12/19](20)$	=	12%
3	$19/20[16/19](20)$	=	16%
2	$19/20[18/19](20)$	=	18%
1	$19/20(20)$	=	19%

The first number in each calculation is the belief, formed at time T , that the government is of type B; the second is the probability that the government will set the rate of inflation equal to 20% in the given period plus the cumulative probability that it has set it equal to 20% prior to this period. The numbers trace out a term structure of inflationary expectations that takes on an S shape. Note also that this configuration does not change until the fifth period. That is, since there is no new information about the government prior to this period, expectations are static.

The model is clearly simple and many others have been analyzed that are more sophisticated, for example in Cukierman (1992). But the point was not to take into account the variety of policy uncertainties. In fact the idea was to introduce only one kind of uncertainty and demonstrate that it is enough to lead to credibility problems. To the extent that other difficulties would cause even further uncertainties about future policy only would serve to strengthen the point that should the government really intend to undertake financial reform it ought to provide the financial resources to the central bank to undertake this policy at the beginning and not merely commit to transfer amounts according to losses. Provided, of course, that the central bank has the correct incentives.

It should be clear that recapitalization is not *sufficient* for the central bank to achieve its objectives. Just as the revenues/costs of monetary policy have a fiscal implication, the government's fiscal policy has monetary and exchange implications. However, the failure to recapitalize the central bank, in cases where the public sector has chosen to have an independent monetary policy, creates unnecessary uncertainty and undermines credibility. In cases where credibility is important, i.e., when the private sector's expectations about the medium term are important, the lack of credibility can be very costly.

IV. CONCLUSIONS

If credibility is important for the success of financial policy, the central bank must be financially strong. The practical implication of this premise is that financially strong central banks should ensure that their strength remains adequate to cope with their policy responsibilities and attendant risks. Their auditors should in turn utilize risk based models to ascertain whether in most circumstances the central bank can survive adverse events without the need to abandon its objectives. Clearly when the objective changes the appropriate degree of central bank financial strength should be reevaluated.

A second implication of this approach is that central banks ought to earn profit on a regular basis. However it also implies that profit in excess of what would need to be maintained to keep the central bank financially strong ought to be delivered to the treasury. The accumulation of “excess” net worth is not justified; could require the government to borrow from private capital markets at excessively high interest rates; and create a temptation to plunder the central bank’s reserves for reasons of political expediency.

Profit transfers should be closely related in time to the activities that generate the profit. The appropriation of profit generated in previous accounting periods produces incorrect fiscal statistics, i.e., nontax revenue earned in one period is brought to another period and vitiates the essential link that ought to exist between central bank income and government revenue. Severing this link often makes the annual or more frequent profit distribution the subject of political discussion and is absolutely equivalent in macroeconomic terms to arguing over an annual credit tranche to government, a possibility that has been explicitly ruled out in dozens of “independent” central bank laws over the past two decades. Transfers of profit that have or will be realized in other accounting periods are equivalent to credit. For both macroeconomic analysis and statistics, it is essential to draw a distinction between distributed central bank profit (non-tax revenue) and credit to government as the latter creates additional claims on resources while the former reflects the payment to government of nonrepayable resources withdrawn from the economy.

The situation with financially weak central banks is not so facile. In this case, government/society has three options. One is to relieve the central bank of some of its policy goals, e.g., price stability or maintaining a fixed exchange rate. The second option is to achieve the goals through direct instruments and financial repression. The attractiveness of such a solution has been demonstrated to be low almost universally. The third solution is to strengthen the balance sheet, either now or at some time in the future.

The paper has argued that to be credible, the strengthening must be contemporaneous with the policy commitment. A promise on the part of government to solve this problem later is not credible. Market participants will not believe this since clear efficiency gains are to be had from acting now rather than later. The economic cost of credibility problems can be severe, particularly when the country has embarked on a major financial reform. Market participants contemplating purchasing a failed bank, for example, and investing in its real and human capital, would clearly find attractive a credible

commitment to financial stability within a framework that rules out financial repression. Similarly, a commitment to improve bank supervision, viewed from the Value-at-Risk approach, increases solvency as the central bank would be expected to bail out fewer insolvent banks in the future.

Recapitalization involves the transfer of real resources to the central bank such that it attains profitability and its balance sheet becomes capable of recovering from adverse shocks without resort to the treasury. In determining how much capital a central bank should have, a number of factors are important. The correct amount will differ, depending on the economic environment in which the central bank operates, the historical legacy reflected in the balance sheet at a particular point in time, and the status of institutional relations with government.

If the central bank is subject to large profit and loss shocks, it may need quite a substantial amount of capital. Here the diversity of foreign exchange reserve policies provides a good example. In Canada, the central bank does not hold the country's foreign reserves on its balance sheet and thus is subject to very little foreign exchange risk. In the United States, the Federal Reserve System does hold part of the country's foreign reserves, but in comparison with other items on the balance sheet they are quite small. In Norway, Sweden, and Iceland—on the other hand—the central bank holds a large portion of its assets in foreign reserves and is thus very exposed to foreign exchange risk. In consequence, they hold relatively large capital reserves and tend to relate this to the size of their open foreign exchange position.

In other cases, central banks may be exposed to losses from quasi-fiscal operations, or from extensive credits to unsound banks. While the first-best solution would be to eliminate quasi-fiscal operations, a second-best solution would be to provide sufficient capital so that the operations do not generate losses that interfere with monetary policy and indirectly force the budget to bear the burden through lower profit transfers.

Greater independence should go hand in hand with greater accountability. A central bank with good management, strong internal audit, and close external oversight could be trusted with a large capital base.⁵⁶ In less ideal cases, the government has a legitimate interest in not allowing the central bank excessive latitude to finance operational losses.

Central banks often have a source of "hidden" capital. Fixed assets are sometimes held off balance sheet, gold is often valued at a historical rate, securities may be valued at

⁵⁶ "Excess" central bank capital, if properly monitored, has a neutral fiscal impact provided that all of the central bank profit is transferred to the treasury. In cases where the treasury receives only a fraction of central bank profit, the situation is more complex, less transparent and hence ill-advised.

the lower of historical cost or market value. Hidden liabilities—particularly large negative net foreign asset positions resulting from devaluations and credit exposure to weak commercial banks—are also common. As demands for transparency and accountability mount, central banks will need to move toward applying an internationally recognized accounting framework such as IAS where the only prima facie reason for divergence would be where the profit distribution mechanism is not proper. Once the accounting is transparent, the transfer to government should then be derived from a clear set of rules designed to ensure central bank solvency. Institutional arrangements for careful auditing of the preparation of central bank accounts as well as of budgetary expenditures are an important complement to central bank financial independence.⁵⁷

Determining the financial strength of a central bank requires careful analysis, not only of the balance sheet and economic environment but also of the accounting rules, profit transfer rule, and the bank's institutional status within government. Appropriate accounting rules and profit transfer rules will serve to safeguard the soundness of the central bank, differentiate genuine central bank profit from disguised credit to government, correctly reflect any central bank losses in the government accounts, and prudently provide for the future flow implications of changes in the current value of items on the central bank balance sheet. The appropriate level of central bank net worth is that sufficient to ensure that in the normal course of operations, the bank will be able to meet its policy goals and preserve its financial independence from the treasury.

⁵⁷ Audit is far from budgetary control, however, which is also important for independence. As Volcker (1986) noted "In substance, the Congress has repeatedly reached the judgment that the Federal Reserve's functional independence is inextricably intertwined with its budgetary independence."

Are Currency Boards Special?

Currency boards (CB) and CB embedded within conventional central banks have particular and simple policy requirements. This makes them easy to analyze and one can build up from them more complex policy commitments. The most basic CB may be viewed as nothing more than an exchange bureau holding foreign exchange banknotes that match—at the given exchange rate—the value of local currency banknotes and coins in circulation. If there is no exchange spread, the CB earns no income.⁵⁸ To finance a minimal staff; insurance costs against physical loss of the foreign currency notes; and—if a responsibility of the CB—maintenance costs of the domestic stocks of notes and coins; a small endowment or annual funding from the budget would be needed. As the CB would not be profit making, it would not have a significant franchise value and balance sheet capital would be equivalent to net worth. So capital would be small but positive.

The CB as described above is not readily observed in actual practice but is usually embedded within a central bank empowered to undertake a variety of other operations. To reflect this difference, such situations are called currency board arrangements (CBAs). Bulgaria, Estonia, Hong Kong, Djibouti, Lithuania and until recently Argentina, to varying degrees, have central banks or monetary authorities involved in intervention in the money market, payments systems management, bank supervision, deposit insurance, and lender of last resort activities. They have depository liabilities which may be met through exchanges for dematerialized foreign assets held abroad. This opens up the opportunity for the bank to earn income on the interest spread that may arise between its liabilities and assets. While it is reasonable to anticipate a fairly steady demand for domestic currency notes, CBAs nevertheless need to be cautious in managing their foreign assets to ensure that they do not endanger their nominal commitment. In particular, there could be little justification for CBAs to hold a currency mismatch or open forex position.

This opportunity to share seignorage with the reserve currency country creates a franchise value while also raising risk. To cover the risk, a small amount of balance sheet capital would be needed at the beginning of the central bank's fiscal year. As accumulated seignorage profits rise during the year, interim profits could be transferred to the treasury. However, the increased franchise value would mean that the credibility of the CB would not hinge to as great a degree on balance sheet capital and, indeed, CBAs have been successfully created with less than full reserve coverage and also when part of the necessary reserve cover was borrowed. Borrowing reserve coverage can be credible if the terms of the loan fit within the profile of the bank's future seignorage income.⁵⁹ For the same reason,

⁵⁸ In this case the seignorage on the domestic money would be obtained by the reserve country issuing bank, not the currency board.

⁵⁹ This was the case with the Bank of Lithuania which was allowed to retain profits during the initial period following its establishment.

even a CBA need not have positive balance sheet capital at the start of the arrangement—depending on the exchange rate chosen.

Similarly, seignorage could be foreseen to cover at least part of the provision of public goods through bank supervision, or the operation of the payments system. This would make the bank less profitable and increase its vulnerability to shocks to the income stream and more capital would be required.

If deposit insurance and lender of last resort (LOLR) obligations are placed on the central bank, the situation begins to resemble less and less a currency board. Some CB advocates in fact argue that permitting LOLR activity interferes with market efficiency and therefore oppose CBs retaining seignorage income to fund such operations. Ideology aside, if one believes that the resolution of financial crises usually requires the injection of real resources⁶⁰ then the CBA, if required to address these situations on its own, will need the financial resources to cope. As in the general discussion of financial strength, the central bank has the option to have the financial capacity on hand or to borrow it and expect any shortfall to be covered eventually by government.

In Argentina, the central bank arranged contingent credit lines that could be on-lent to commercial banks while Bulgaria established a prefunded reserve—foreign assets on the asset side of the balance sheet, capital on the liability side—to cover such contingencies. One of the advantages of the Bulgarian solution is the explicit ex ante limitation on the amount of fiscal resources that may be placed at risk in the banking system thereby ensuring that currency board commitments are met. In contrast, the Argentine situation exposed the central bank to potential losses that could have led to the prospect of either abandoning the currency conversion pledge or requiring a fiscal recapitalization. A more spontaneous approach was evident in the Bank of Estonia's decision to support the rescue of the Land Bank of Estonia through an "... advance payment of future [profit] transfers, since the quick solution of the crisis was particularly important for maintaining financial stability...". The Bank later recognized that "...it is clear that in case of one-off transfers of exceptional size such an approach [reflecting the profit transfer as a source of budget income comparable to the "usual" taxes] is unjustified and such income cannot be used to cover the deficit of the state budget."⁶¹

To conclude this section one can say that currency boards are special to the extent that their policy mandate implies a tight limit on the revenue available from seignorage. This in turn makes it clear that to the extent it is called upon to undertake responsibilities alien to the CB itself, it would need additional capital. The distinction should not be

⁶⁰ See Fischer (2001).

⁶¹ Bank of Estonia (1999).

overemphasized, however. While the franchise value of a central bank operating under no constraints is large, that of one operating under a fixed exchange rate or low inflation target regime is, like a currency board, similarly restricted not by law but by the economic implications of the policy target. While central banks can generate significant seignorage in the short run through money creation if they need to mount a bank rescue operation, for example, they do so often at the cost of forfeiting macroeconomic stability. Just as in the case of the CB, a conventional central bank, if it wishes to inject significant real resources into the economy while keeping to a nominal policy commitment, will not be able to simply create fiat money.

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