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Policy Pre-Commitment
and Institutional Design: A
Synthetic Indicator Applied
to Currency Boards

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**POLICY PRE-COMMITMENT AND INSTITUTIONAL DESIGN: A SYNTHETIC INDICATOR
APPLIED TO CURRENCY BOARDS**

by
Marie-Thérèse Camilleri Gilson

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Abstract/Résumé

Policy pre-commitment and institutional design: A synthetic indicator applied to Currency Boards

Currency boards have been portrayed as an extreme way of creating currency quality and improving monetary policy credibility in emerging market economies. Yet the link between currency board operations and credibility is far from obvious. Indeed, under the heading of currency boards, there is in fact a number of significantly diverse institutional arrangements. Furthermore, currency boards can only be viewed as part of a wider policy framework encompassing fiscal sustainability and flexibility in the real economy. Along these lines, this paper describes as precisely as possible what constitutes, in theory, a currency board. It highlights the specificities of money multiplier and balance sheet issues in currency board frameworks. The paper offers an in-depth review of the actual institutional arrangements underlying existing currency boards in Eastern Europe and Asia (as well as that of Argentina until 2001) and derives a synthetic indicator of institutional pre-commitment. The paper concludes with a discussion of flexibility and credibility tradeoffs and exit issues.

JEL classification: E 42, E 51, E 52, E 58, E 61, F 33

Keywords: Pre-commitment, credibility, monetary policy, institutional design, currency boards.

* * *

Engagement statutaire et définition institutionnelle : Un indicateur synthétique appliqué aux cas des caisses d'émission.

Les caisses d'émission (currency boards) ont souvent été décrites comme un moyen extrême de créer la qualité d'une monnaie et d'améliorer la crédibilité de la politique monétaire dans les marchés émergents. Néanmoins, le lien entre crédibilité et caisses d'émission est loin d'être évident. En effet, sous la dénomination de caisse d'émission il y a beaucoup d'arrangements institutionnels très différents. En outre, les caisses d'émission doivent être vues dans le contexte d'un cadre de politique économique englobant la soutenabilité de la politique budgétaire et la flexibilité dans l'économie réelle. Cette étude décrit de façon aussi précise que possible ce qui constitue théoriquement une caisse d'émission. Elle souligne les spécificités des multiplicateurs monétaires et la structure de bilans des intermédiaires financiers sous le régime d'une caisse d'émission. L'étude offre une revue détaillée des arrangements institutionnels sous-jacents aux caisses d'émission en vigueur en Europe de l'Est et en Asie (aussi bien que celui de l'Argentine jusqu'à fin-2001) ; un indicateur synthétique du degré d'engagement institutionnel est proposé. L'étude conclut avec une discussion sur le dilemme entre flexibilité et crédibilité, ainsi que les questions liées à une sortie éventuelle de la caisse d'émission.

Classification JEL : E 42, E 51, E 52, E 58, E 61, F 33

Mots-Clés : engagement statutaire, crédibilité, politique monétaire, définition institutionnelle, caisses d'émission.

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TABLE OF CONTENTS

POLICY PRE-COMMITMENT AND INSTITUTIONAL DESIGN: A SYNTHETIC INDICATOR APPLIED TO CURRENCY BOARDS	4
1. Introduction	4
2. Motivations for the establishment of CBAs	5
3. Workings of a currency board: the theoretical benchmark.....	7
3.1. Basic features	7
3.2. The dual currency board proposal.....	7
3.3. The backing provided by reserve assets	8
3.4. Currency board profit considerations.....	9
3.5. Money dynamics under currency boards.....	9
3.6. Setting the exchange rate peg.....	9
3.7. The price-specie flow adjustment mechanism	10
3.8. Balance sheet issues	11
3.9. Money multipliers	13
3.10. Liquidity management and the clearing system.....	15
4. Merits and drawbacks of adopting a currency board.....	16
4.1. Fiscal issues and overall policy consistency	16
4.2. Inflation convergence.....	17
4.3. Relative prices	18
4.4. Flexibility in the real economy.....	19
4.5. The cost of fixing the exchange rate	19
4.6. How CBAs may contribute to monetary credibility.....	20
5. Statutory features associated with credibility.....	23
5.1. Issues underlying the assessment of statutory credibility	23
5.2. Defining the index of statutory pre-commitment	24
5.3. Quantifying CBA deviation from the theoretical benchmark	25
5.4. Discussion of results pertaining to the synthetic index of statutory pre-commitment	30
6. Policy conclusions.....	32
APPENDIX I.....	35
APPENDIX II. DETAILED REVIEW OF THE CBA LEGISLATION IN EACH OF THE COUNTRIES UNDER STUDY.....	36
Argentina (1991-2001)	36
Bosnia and Herzegovina.....	37
Bulgaria	39
Estonia	40
Hong Kong	42
Lithuania.....	44
SUMMARY OF CBA FEATURES IN THE SIX EMERGING MARKETS UNDER STUDY	46
BIBLIOGRAPHY	60
LEGISLATIVE AND REGULATORY REFERENCES	65

POLICY PRE-COMMITMENT AND INSTITUTIONAL DESIGN: A SYNTHETIC INDICATOR APPLIED TO CURRENCY BOARDS

by Marie Thérèse CAMILLERI GILSON¹

1. Introduction

1. The objective of this paper is to take a closer look at the institutional factors underlying the credibility of a particular type of fixed exchange rate regime, the currency board. Theoretically, the case for adopting a currency board is built on issues relating to the time inconsistency of optimal discretionary policies, and the difficulty of sustaining a pegged but adjustable exchange rate regime in the presence of multiple equilibria. The analysis notes that there are substantial cross-country differences in the currency board arrangements in a sample of emerging markets, due to policy needs and constraints prevailing at the time of their establishment. An attempt is made to quantify these differences in institutional design, both with reference to a theoretical currency board (CBA) benchmark,² and in terms of a synthetic index of statutory pre-commitment. The latter is derived from a review of the legislation upholding currency boards. It provides for comparability and distinguishes between the theoretical benchmark of a currency board and the actual pegged exchange rate arrangements in the countries under review. The index covers issues relating to the nature of the legal framework and the institutional design of the board. It encompasses features of autonomy and transparency, and examines the adequacy of reserves with respect to monetary aggregates and exchange rate convertibility.

1. The mechanisms by which currency boards impart credibility are reviewed so as to give an insight into the importance of the careful design of monetary arrangements. Since the literature outlines the strict features of a currency board arrangement, the sample of countries under study is assessed in relation to this theoretical benchmark. It is interesting to note, however, that credible signals of political commitment to a fixed exchange rate peg may, in some instances, be equivalent to a legally binding arrangement. This is reflected in the differences between some of the country case studies. Public endorsement, political consensus and the adequacy of accompanying policies are highly relevant to the markets' assessment of credibility. Underlying this, is the sensitivity of exchange rate credibility to the perceived sustainability of the peg and its supporting policies.

1. Consultant, Non-Member Economies Division, OECD Economics Department. The author would like to thank Joaquim Oliveira Martins and Tristan Price for comments and useful discussion. The views expressed in this paper are those of the author and do not necessarily reflect those of the OECD and its Member countries.

2. The details of which are drawn from the currency board literature, including Schwartz (1992), Liviathan (1992), Williamson (1995) and Judy (1995).

2. The paper starts by setting out the motivating factors for adopting a currency board and the pre-requisites for its effective functioning. Currency board operations are reviewed with reference to balance sheet issues. The discussion is complemented by a taxonomy of currency boards, where a distinction is drawn between two institutional groups. First, are those currency boards introduced to offset limited experience in monetary management, primarily in small economies. These are described in the appendix to this paper but they do not form part of the analysis of the main study. Second are those boards established to respond to an economic crisis or to accompany a stabilisation programme in emerging market economies. They form the sample under detailed study.

2. Motivations for the establishment of CBAs

3. Currency boards were, historically, set up in small open economies with limited expertise in monetary management, little experience in central banking, or weak financial systems (such as Brunei Darussalam in 1967, Djibouti in 1949 and the Eastern Caribbean Central Bank in 1965). This monetary arrangement appeared to be particularly appealing to small economies, where the cost of foregoing the exchange rate instrument is negligible in view of their openness to trade. Where central banks tend to lack the required credibility to carry out policies designed to achieve price stability, simultaneously managing exchange rates, domestic liquidity and the capital account is difficult. The standard response to a threat on a fixed exchange rate would be to increase interest rates and impose capital controls. The implementation of a tighter monetary policy would, however, act as a hindrance to economic growth. The theory of optimal currency areas (OCA) for common currencies may also be applied to the adoption of fixed exchange rates under CBAs. It would then appear to be advantageous for small open economies, particularly in emerging markets and transition countries, to adopt a currency peg.³

4. Two sets of factors have encouraged emerging markets to establish a currency board.⁴ The first is to respond to an economic crisis, as was the case in Argentina and Hong Kong. The second is to support a stabilisation programme. This was the case in Bulgaria and post-war Bosnia and Herzegovina, while in the case of Estonia and Lithuania, it served to facilitate a smooth transition out of the rouble zone. More often than not, however, currency boards are considered to be remedial action to counter speculative pressures, when a lack of credibility constrains the effective conduct of monetary policy. This is particularly acute in post-crisis countries, under circumstances of exceptional hyperinflation, or when financial stability is still at an uncertain stage.

5. The literature offers an extensive discussion of the tradeoffs between flexibility and pre-commitment in the conduct of monetary and exchange rate policies. In this framework, one must determine whether currency boards are effectively “a means of bringing order to economic conditions when more conventional arrangements have proved wanting”.⁵ Alternatively, it may be argued that the stability, sensibility and credibility of underlying economic policies are of greater importance than the actual setting

3. Frankel (1999) points out that OCA criteria are not met in Argentina, in spite of the fact that in the early years, the currency board appears to have worked rather well. He suggests that the following elements be incorporated into the criteria derived from OCA theory. (i) A strong need to import monetary stability. This could be due to a history of hyperinflation, the absence of credible public institutions and/or the exposure to nervous international investors. (ii) A desire for closer integration, serving to enhance the political credibility of the commitment. (iii) The presence of foreign currency in domestic economic transactions. If wages and prices are tied to the reserve currency, a devaluation may lead to bankruptcy under liability dollarisation. (iv) The access to an adequate level of foreign reserves. (v) The enforcement of rule of law. (vi) High standards of financial sector prudential regulation and supervision.

4. The economic rationale for adopting a CBA is discussed in Santiprabhob (1997).

5. Bennett (1995) p. 39.

up of the currency board.⁶ A strong commitment to a peg is only credible if prior signals have been made as to consistent economic policies and, in particular to a sustainable course for fiscal policy. Some analysts, including Berengaut *et al.* (1998), thus question the extent to which the choice of the exchange rate regime depends on certain fiscal and financial preconditions being fulfilled. What follows, according to this line of reasoning, is that once the preconditions are fully met, the currency board arrangement may not actually be necessary.

6. Developing this line of analysis, one could question whether monetary institutions work effectively only if they are for all practical purposes redundant.⁷ Indeed, if a government is in a position to adopt the right economic policies, it may as well not set up a currency board and save itself the exposure to exogenous shocks that would require an adjustment of the nominal exchange rate parity.⁸ An element of circularity will necessarily arise as a result of institutional and environmental contributions towards the perceived feasibility of monetary reform. Fischer (1997) highlights the importance of external factors such as the level of legal compliance and the existence of developed financial markets, as preconditions for the establishment of independent central banks.

7. Issues of sequencing must also be addressed to examine whether fiscal discipline makes it easier to uphold a peg, or whether it is by fixing the exchange rate that fiscal discipline may effectively be achieved. Insights from game theoretic approaches suggest that these elements feed into one another, which makes it difficult to distinguish the marginal contribution of the exchange rate regime.⁹ A credible signal of fiscal reform accompanying the adoption of a currency peg may convey sufficient weight to anchor expectations. If currency board operations were to be formalised in a game theoretic framework, signalling would be examined in a dynamic game between the government and economic agents. Information would be derived from given statutory provisions and any subsequent policy announcements, whether in conformity or in contradiction with pre-announced policy commitments. The literature on credibility refers to a Nash equilibrium outcome, where the policy maker takes the forward-looking private sector expectations as given, under incentive constraints on optimal and consistent policymaking.¹⁰

8. The analysis of credibility under alternative exchange rate regimes indicates that without the accompanying political will and the ability to implement related policies, the exchange rate peg is ineffective in generating discipline. The question, however, is whether price stability is pursued as an economic policy objective because it is economically meaningful, or whether it is justified by technical feasibility and political legitimacy. Cottarelli and Giannini (1997) argue that as a result of fostering consensus on the importance of price stability, monetary institutions seeking to obtain credibility through a rules-based approach generate institutional endogeneity. In reviewing the evolution of monetary frameworks, they suggest that arrangements which were initially intended to credibly constrain governments, do not raise the cost of breaking the policy promise as much as they increase the perceived benefit of adhering to the chosen policy.

6. As suggested by Roubini (1995).

7. A question raised by Cottarelli and Giannini (1997) p. 64.

8. Gulde *et al.* (2000) imply that countries which were willing to adopt strict policies would have done well, regardless of the exchange rate arrangement.

9. Gulde *et al.* (2000) review the performance of the Baltic states and Bulgaria. They state (in p. 2) that it is unclear whether higher output growth under a currency board is due to a 'rebound effect' (since the regime is established after a period of crisis) or a 'self-selection bias' (since a government that is more willing to bear the cost of tighter policies is more likely to implement the required reforms).

10. The game theory dynamics underlying signaling, cheap talk and reputational issues are developed in Gibbons (1992). Walsh (1999) applies a game theoretic framework to monetary policy to illustrate how information on credibility is derived from policy targets and announcements.

9. This paper suggests that currency board arrangements are favoured by policy makers seeking to safeguard or to recover credibility under exceptional circumstances. Such arrangements must be accompanied by sustainable economic policies and structural reform. Typically, CBAs are an option for countries which have sought to put their economy in order, for instance in the context of an IMF-sponsored stabilisation policy. Yet they require a credibility boost in order to avert pressures of contagion. If the establishment of a currency board is considered as a means for resolving a crisis, however, a distinction may be drawn as to the nature of the crisis. If, on the one hand, its source lies in a loss of confidence due to a history of discretion in fiscal expansion or credit creation, a currency board may enhance policymakers' credibility. This is provided that monetary authorities invest in building a reputation for inflation aversion. Market expectations would subsequently converge on a reputational disinflation equilibrium with lower associated output losses. If, on the other hand, the domestic crisis has originated in broader financial market turmoil, the extent of real exchange rate misalignment may undermine the sustainability of the currency board arrangement. Setting the initial peg at the appropriate level is crucial in this case. If one considers a currency board arrangement to be reversible, the policy switch out of the regime must be very carefully designed, since a sub-optimal escape clause will undermine any associated reputational gains.¹¹

3. Workings of a currency board: the theoretical benchmark

3.1. *Basic features*

10. At the basis of a currency board arrangement is a legislative commitment to exchange domestic currency for a specified foreign asset (currency or commodity) at a pre-determined fixed exchange rate, on demand. The choice of this reserve asset is guided by the following considerations: a currency board may opt for a peg to a single currency, preferably a strong or reserve currency, the currency most used for international transactions or that of its main trading partner. In determining the reserve asset at the basis of the arrangement, the authorities may select a commodity, such as gold, or a basket of currencies or commodities, instead of choosing to peg to a single foreign currency. Of course, the more complex the arrangement, the less transparent it will be. The choice will depend on the structure of the country's economy, its patterns of trade and its degree of openness. The currency to which the CBA is linked tends to be issued by a country with which there is substantial foreign trade, as emphasised by Schwartz (1992). The currency board also gains from being linked to a stable reserve currency. Had Estonia chosen to tie its kroon to the Swedish krona, as was initially suggested, it would probably have been to the detriment of economic stability, in view of the subsequent turmoil in the ERM. The German mark turned out to be a much more stable option for the Estonian currency board at that time.

3.2. *The dual currency board proposal*

11. Pegs to a single currency may not be a viable solution for economies with a number of major trading partners. This is especially the case if the reserve currency tends to fluctuate in relation to that of the other trading partners of the CBA country. The issue of diversified external trade patterns is addressed in the dual currency board proposal of Oppers (2000). The use of a trade-weighted basket, however, apart from the implied loss of transparency, would render the management of convertibility more complex as it lacks a clear benchmark. A procedure would be required to review the weights of the basket over time, in line with the evolution of cross rates. In Oppers' example the dollar and the euro are combined as reserve currencies. When the former appreciates above a certain level, convertibility is based on the latter instead.

11. The discussion of Eichengreen and Masson (1998) on the adoption of greater exchange rate flexibility may be applied to the exit issues faced by currency boards.

This may circumvent a loss of competitiveness when the currency board currency is pegged to an appreciating reserve currency.¹²

12. The primary cost of an appreciating reserve currency is the overvaluation of the currency board real exchange rate. It may be noted however, that pegging to a depreciating reserve currency is not without its drawbacks. A lower real exchange rate is not necessarily less volatile, as this would depend on trade shares of various currencies and their covariances. Two additional drawbacks relate to interest rate and inflation dynamics associated with depreciating currencies. In a dual currency board, the convergence of interest rates would shift from one currency to the other, and display dynamics comparable to those of a target zone.¹³ Oppers claims that higher interest rates obtained from pegging to a more depreciated reserve currency would be offset by lower risk premia, compared to those associated with an overvalued real exchange rate.

3.3. *The backing provided by reserve assets*

13. The form and extent of asset backing required is a determinant factor in the effectiveness of a currency board. The monetary authority is bound to back any domestic currency issues with holdings of reserves or short-term interest bearing assets, denominated in the currency to which the exchange rate is pegged. Although this represents a departure from the strict CBA model, where domestic issues are to be converted into foreign currency on demand, foreign currency-denominated bonds may be accepted and paid out instead of hard currency notes and coins. If the initial holding of foreign currency-denominated reserves so permits, and there is a perceived need to impart full credibility to the currency board arrangement, the degree of backing of domestic currency will be at least one hundred percent. It is to uphold the convertibility commitment that the degree of backing by reserves should cover a substantial value of the outstanding liabilities (notes and coins in circulation). In order to guard against contingencies such as bank failures, holding surplus reserves is also beneficial.

14. When the exchange rate is set above market-clearing levels (*i.e.* it is undervalued), the required foreign reserve backing is reduced. In addition, a margin for future real exchange rate appreciation is provided for, avoiding the need to resort to inflation as a mechanism for achieving the required real appreciation. For monetary authorities wishing to set up a currency board there is the possibility of a start-up problem. This arises from gathering sufficient hard currency to back the entire money supply. In spite of providing the assurance of convertibility at a fixed rate, a crisis might erupt in the financial system if reserves are insufficient to cover a broader monetary aggregate. Banks are then called upon to ensure the convertibility of their demand deposits. If credit lines prove inadequate, the fact that the currency board is unable to intervene may exacerbate the difficulties of the financial sector. The loss of the lender of last resort function may thus be an acute drawback in the event of a liquidity crisis.

12. The downgrading of Argentine credit ratings further to the shift to a dual peg is suggestive of a cost associated with adjusting the institutional framework in terms of lost simplicity and transparency.

13. Reference is made to the Krugman (1991) smooth pasting effect as the exchange rate approaches the boundaries, since economic agents know when the shift from one reserve currency to the other will take place.

3.4. *Currency board profit considerations*

15. CBA profits are derived from the difference between the interest on the securities that it holds and any expenses incurred in the issue and management of domestic currency.¹⁴ These profits are usually transferred to government, in excess of the level required to build up foreign reserves to the required proportion of backing by the board. A margin of profits may also be maintained by the currency board in the form of an equity reserve to cover possible losses in the value of its reserve asset holdings. In principle, handling costs can be kept low if the board chooses to establish a minimum amount for transactions, thereby restricting dealings to large amounts of foreign exchange while allowing smaller amounts to be transacted through the banks. None of the currency boards surveyed, however, have established such arrangements. Estimates of the running costs of a currency board approximate 1 per cent of CBA assets.¹⁵

3.5. *Money dynamics under currency boards*

16. Market forces essentially dictate the amount of notes and coins issued. The supply of reserves is determined either by the reserve country, or by the producers of the commodity to which the exchange rate is pegged. The currency board acts only as a warehouse, and the only way of obtaining additional reserves is to run a trade surplus. The distribution and demand for reserves is determined by the nature of competition between banks within the currency board set-up.

17. Changes in money demand are accommodated by endogenous changes in international reserves instead of variations in net domestic assets, as would be the case in a central banking framework. Thus, domestic interest rates are determined by local market adjustments to monetary conditions prevailing in the reserve currency country. In cases where the credibility of the currency board arrangement is at stake, due to the danger of political interference, there is a distinct possibility of an in-built risk premium in local interest rates. Interest rates can also be subject to a differential as a result of bank inefficiency or credit risk.

3.6. *Setting the exchange rate peg*

18. As discussed above, the level at which the exchange rate is fixed has important implications for the operations of a currency board, particularly in cases of an undervalued currency. It may have inflationary consequences that undermine any associated gains in export competitiveness. Operational difficulties may also arise if the CBA country is at a different business cycle stage relative to the reserve country, bringing timing issues to the forefront. If a currency board is introduced to limit exchange rate depreciation in a context of crisis, pressures induced by a speculative attack may have resolved any prior overvaluation. Nominal depreciation is not permissible within the parameters of the currency board, which results in slower convergence of domestic and international price levels. Overvaluation must therefore be addressed (correcting misalignment by devaluing at a rate consistent with market forces) prior to the establishment of the peg, especially under high inflation.

14. Profits may also be computed as a product of the money base and the rate of inflation. Since the monetary aggregate depends on the required reserve deposit ratio, currency board profits may be increased by adjusting the ratio upwards.

15. Estimate drawn up by Hanke and Schuler (1991).

19. Various methods for identifying the equilibrium real exchange rate are advocated in the literature.¹⁶ Frankel and Goldstein (1986) consider the Purchasing Power Parity approach, the estimated structural monetary and portfolio balance models, and the underlying balance approach. They suggest a “consensus” based on estimates derived from various models.¹⁷ In the absence of a devaluation, severe exchange rate misalignment may tend to be remedied by tight liquidity. A tight policy stance can exacerbate unemployment and undermine the very sustainability of the exchange rate regime. The appropriateness of the currency board arrangement will, therefore, also depend on measures such as the degree of wage and price flexibility, and the sustainability of government finances.

20. For example, the choice of the exchange rate peg set in Estonia and Lithuania was determined by the pressing need to impart credibility to the currency board arrangement.¹⁸ An undervalued real exchange rate was likely to cause a disequilibrium in the goods market during the transition period preceding convergence to European levels of inflation. In the Baltics, however, overvaluation was limited due to high rates of productivity which maintained domestic competitiveness and facilitated relative price adjustment while foreign direct investment continued.¹⁹ The manner in which public perceptions of economic policies evolve, following the establishment of the peg, is critical for the duration of the transition period. Convergence may be slowed down if the government’s resolve to cut budgetary expenditure is perceived to weaken, leading to wage claims, premia on domestic prices and interest rates, as well as reduced demand for domestic currency.

3.7. *The price-specie flow adjustment mechanism*

21. Williamson (1995) claims that one of the main advantages of a currency board system is that it provides for payments adjustment in the same manner as a gold standard price-specie-flow mechanism. In the event of a balance of payments deficit and a fixed exchange rate, money supply declines as the private sector converts its domestic currency holdings into foreign reserves so as to settle import transactions. The resulting rise in interest rates serves to attract capital inflows. The higher interest rates also exert deflationary pressures by reducing domestic absorption, which improves the current account. Another way to address the deficit and avoid a contractionary effect is to tap sources of foreign reserves such as FDI or portfolio investment, and thus rely on growth to equilibrate the balance of payments. In the original adjustment mechanism, however, if prices are flexible downwards in responding to reduced domestic demand, export competitiveness will also be improved. This allows output to reach a full employment level, resolving the balance of payments deficit through deflation.²⁰

22. Such an adjustment hinges upon two additional features of currency board systems. The first is the automatic reduction in money supply when the balance of payments is in deficit. This does not hold when monetary authorities attempt to sterilise the reserve outflow. The second is the underlying assumption of wage and price flexibility. If this is absent, the (nominally) fixed exchange rate will be

16. Difficulties are particularly acute in post-conflict economies such as Bosnia and Herzegovina, however, where it is unclear what the appropriate exchange rate should be.

17. See Frankel and Goldstein (1986) p. 659.

18. The issues faced by the currency boards in the Baltics are discussed in Berengaut *et al.* (1998).

19. The absence of indexation mechanisms, flexible labour markets and low labour costs were also determinant factors in this case.

20. Prolonged deflation is not without costs however, in view of its effects on the real value of debt, and the vulnerability of the banking system to corporate bankruptcies. Dornbusch *et al.* (1995) suggest that deflation under a currency peg may not be easier to achieve than a real exchange rate depreciation would be under floating.

overvalued in real terms. As a result of tighter money supply, interest rates rise, forcing a contraction in the economy.²¹ The fall in output would be smaller the larger the price fall to restore equilibrium. Labour market flexibility is also important in the event of an external shock such as, for instance, an increase in the price of a vital imported commodity. This is due to the absence of an exchange rate depreciation as a mechanism for adjusting relative prices. If the government's commitment to the fixed exchange rate is fully credible, wage and price setters would eventually adjust their strategies to incorporate expectations of low inflation in order to remain competitive. Inflation persistence might still arise due to the prevalence of overlapping contracts or forms of indexation.²²

3.8. *Balance sheet issues*

23. A currency board arrangement is defined as “an institution that issues base money solely in exchange for foreign assets, specifically the reserve currency”.²³ The excess of highly liquid and interest bearing reserve holdings of the currency board over its issues of non-interest bearing liabilities constitutes its net worth, as indicated in Figure 1 below. Base money consists of notes and coins (“cash”) and may also include part, or all of, the reserves held by commercial banks. In a ‘pure’ currency board, unlike a central banking system, commercial banks may be required to hold their reserves (other than vault cash) in foreign currency. When the banks face a shortage of vault cash, they would sell some of their foreign currency holdings to the currency board.

24. Central banks differ from the “pure” currency board in that part of their assets is domestic, including government debt. This implies that central banks tend to have higher ratios of broad money to foreign reserves because of this partly domestic backing of base money. In addition, central banks can discount commercial bank assets, and in so doing expand the monetary base, in the same manner as when reserves are purchased. Purchasing domestic assets in the course of a sterilisation effort is intended to offset the decline in base money as a result of the sale of reserve assets in support of the exchange rate. The monetary policy pursued by the currency board is automated. Base money increases when the commercial banks wish to convert their reserve holdings into cash, either as a result of changes in money demand or in a situation of a trade surplus. Conversely, the monetary base shrinks when banks exchange their cash for foreign reserves so that their clients may finance their imports in the event of a trade deficit. Money supply is therefore exogenous under a currency board as opposed to it being a policy instrument in the hands of the central bank.

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21. Calvo (2000b) explains how setting import tariffs and export subsidies may act as artificial relative price changes. Looking at corporate balance sheets, he suggests that nominal price rigidity may be beneficial in that it slows down the adjustment in profits, thereby smoothening the business cycle. Changes in the Argentine institutional framework in 2001 led to a dual exchange rate spread of 8 per cent, which severely altered convertibility. The subsequent downgrading by Standard and Poor suggests that the gains were expected to be modest and offset by added uncertainty due to changes in the rules of the game.
22. The extent of inflation inertia may be illustrated by examining the time it takes inflationary expectations to converge to the credible fixed exchange rate equilibrium.
23. Williamson (1995) p. 2.

Figure 1. Comparison of currency board and central bank balance sheets

i. Currency Board balance sheet			
<u>Assets</u>	<u>Liabilities</u>		
Liquid reserve currency assets	Cash		}= M0
	(Deposits of commercial banks)		}Base money
	Net worth		
ii. Central Bank balance sheet			
<u>Assets</u>	<u>Liabilities</u>		
Liquid reserve currency assets	Cash		}= M0
Domestic assets (including government debt)	(including Deposits of commercial banks)		}Base money
	Net worth		

25. In theory, convertibility of the currency is guaranteed because the currency board will always be in a position to meet foreign exchange requirements when the private sector wishes to convert its cash holdings. A central bank, on the other hand, may be unable to immediately convert its entire holdings of domestic assets, be they claims on commercial banks or government paper. In practice, coverage of base money alone is insufficient to stem a bank run. In the event of a loss of confidence, depositors will seek to convert their demand deposits into the reserve currency so as to guard against any financial loss. It follows that it is up to the commercial banks to ensure the convertibility of demand deposits, either by holding sufficient foreign reserves or by establishing credit lines with international banks. Since the reserve currency and the domestic currency are for all intents and purposes substitutes, the government could encourage banks from the reserve country to set up branches or affiliates in the domestic banking sector, provided that the regulatory framework is compatible. Prudential supervision and licensing requirements enforced in the home country would thus have to be brought in line with those of the reserve country. Under a “pure” CBA, banks would be required to draw on their deposits at the currency board. Otherwise, a financial crisis could escalate since the currency board is not in a position to bail the banks out in the manner of a lender of last resort.

26. Even in its “pure” variant, the currency board can still experience severe pressure in the event of a bank run. This is due to the fact that as banks run down their currency board deposits to meet their depositors’ requirements, they are constrained to replenish their reserves by liquidating assets and cashing in their outstanding loans. At higher levels of interest rates such actions carry the risk of a credit crunch. Since the currency board *per se* is unable to provide the required liquidity, it may limit the damage by temporarily relaxing commercial banks’ reserve requirements, or turning to the international money markets. In the event of financial market pressure, convertibility may thus turn out to be quite costly for the currency board unless special arrangements are instituted. These include the holding of excess reserves earmarked for this purpose or the imposition of additional discipline on commercial banks.

27. An independent monetary agency may also be set up to provide discount facilities for banks. Provided that the latter does not hold domestic assets the convertibility upheld by the currency board will not be undermined by the provision of emergency liquidity to the financial sector. This is illustrated below with reference to the balance sheets and money multipliers of a currency board with and without a monetary agency.

3.9. Money multipliers

28. Osband and Villanueva (1993) illustrate the workings of a currency board balance sheet. They assume that the introduction of a monetary agency is designed to respond to the market's need for liquidity. Figure 2 below illustrates the balance sheet of the banking system both with and without the monetary agency.

Figure 2. **Banking system balance sheet with and without a monetary agency**

i. Banking system balance sheet under a Currency Board	
<u>Assets</u>	<u>Liabilities</u>
Liquid holdings of reserve currency	Deposits
Deposits at the Currency Board	
Vault cash	
Loans and Securities	
ii. Banking system balance sheet with the introduction of a Monetary Agency	
Monetary Agency	
<u>Assets</u>	<u>Liabilities</u>
Cash holdings	Reserves deposited by banks
Net foreign assets	
Reserves borrowed by banks	
iii. Commercial Banks	
<u>Assets</u>	<u>Liabilities</u>
Vault cash	Deposits
Net foreign assets	Reserves borrowed from Monetary Agency
Loans and Securities	
Reserves deposited at Monetary Agency	

29. The creation of a monetary agency does not affect the ratio of broad money to the monetary base since the agency does not hold domestic debt and government paper. As in the case of a currency board, the money multiplier, as derived below, will be lower than that of a central bank.

30. In order to define the money multiplier, base money is expressed as the sum of currency holdings of the non-bank public (CH) and reserves (R) of the commercial banks held at the currency board:

$$M0 = CH + R \quad (1)$$

Reserves can be expressed in terms of deposits (D) with reference to a required reserve ratio denoted ' r ':

$$R = r \cdot D \quad (2)$$

Broad money is :

$$MI = CH + D \quad (3)$$

If 'c' is the proportion of money held in cash (CH/MI), then:

$$D = (1 - c) MI \quad (4)$$

Then $M0$ can be re-expressed as:

$$M0 = c \cdot MI + r \cdot D \quad (5)$$

Since the money multiplier m is given by the ratio of broad to base money ($MI/M0$), substituting from the above relations yields:

$$m = 1 / (c + r(1-c)) \quad (6)$$

31. The larger the non-bank private sector's holdings of currency,²⁴ or the higher 'c' in MI , the less reserves available to the banking system. The limited availability of reserves restricts banks' advances to its client base. As a result, the money multiplier is smaller. Similarly, the higher the required reserve ratio, the tighter is liquidity and the smaller is the money multiplier.

32. Deriving the balance sheet identities so as to re-express the money supply in terms of credit created and reserve backing highlights the potential for greater monetary expansion by central banks, as against strict CBA frameworks. This is due to the inclusion of net domestic assets (NDA), as illustrated in Figure 3.

Figure 3. A comparison of balance sheet identities

i. Currency boards (CBA), with bank reserve requirements:

$$CBA: \quad RC = CH_P + CH_B + R_B^{CBA}$$

$$Banks: \quad R_B^{CBA} + L_P + CH_B + NFA_B = D$$

ii. Banking system with a monetary agency (MA):

$$MA: \quad CH_{MA} + NFA_{MA} + BOR_B^{MA} = D_B^{MA}$$

$$Banks: \quad D_B^{MA} + L_P + CH_B + NFA_B + R_B^{CB,CBA} = D + BOR_B^{MA}$$

iii. Central bank (CB) with holdings of domestic assets and monetary agency functions:

$$CB: \quad RC + NFA_{MA} + NDA_{MA} + BOR_B^{MA} = CH_P + CH_B + R_B^{CB}$$

$$Banks: \quad R_B^{CB} + L_P + CH_B + NFA_B = D + BOR_B^{MA}$$

Superscript denotes 'at' and subscript denotes 'of'.

Abbreviations are as follows: RC = reserve currency; NFA = net foreign assets; L = loans; BOR = borrowing; CBA = currency board arrangement; MA = monetary agency; B = banks; P = public.

33. In a CBA framework with a monetary agency, money supply is:

$$M = CH_P + D$$

34. If the balance sheet identities of Figure 3 (i) and (ii) are consolidated, the liabilities side expressed in terms of ratios to deposits (in lower case), while retaining the components of the money base, money supply under a currency board and a monetary agency can be re-expressed as follows:

$$[(ch_P + 1) / (ch_P + ch_B + r - bor)] \cdot (FR + NFA_{MA}) \quad (7)$$

35. The expressions for the money multiplier and the money supply under the different institutions clearly show that monetary expansion is likely to be smaller under a currency board, contributing to its credibility and to the stabilisation of inflation expectations. This may be illustrated with reference to the CBA money supply expressed in (7). For a central bank, reserve-backing increases with the addition of NDA_{ma} to the last term from the right. Hence a central bank would possess a greater capacity to expand the money supply on the basis of its net assets. Furthermore, the exclusion of domestic asset holdings from the balance sheet of a currency board imposes a tighter financing constraint on the government. Indeed, monetary liabilities can only be issued on the basis of increased foreign reserve holdings. Only foreign reserves are included in assessing the credibility of a currency board, since the liquidation of domestic assets may be problematic during a balance of payments crisis.

36. Including a monetary agency under a currency board does not alter its expansionary capacity, as the extension of credit is also backed by foreign assets. It may, however, ease temporary liquidity constraints faced by the banking system. Otherwise, the principal monetary policy instrument at the hands of the currency board is the required reserve ratio. It would, therefore, also be relevant to examine domestic credit creation in assessing currency board credibility. Since base money growth is constrained by increases in reserves, bank credit would provide additional information on monetary dynamics under a currency board.

3.10. *Liquidity management and the clearing system*

37. In reference to commercial banks day-to-day liquidity management, the improvement of automation in clearinghouse activity and the advent of real time gross settlement somewhat lessens the importance of the market for settlement funds. Henckel, Ize and Kovanen (1999) discuss the implications for the operations of currency boards, of the declining proportion of central bank settlement balances in total payment transactions. As currency and settlement balances shrink, their coverage by reserve currency holdings becomes largely irrelevant, and broader monetary aggregates must be considered. It is suggested that interest rate instability in the currency board systems which refrain from lending operations may increase as a result of clearinghouse participants borrowing intra-day and leaving the market short. This is especially acute in the absence of foreign interest rate arbitrage acting smoothly enough to reverse such activities.²⁵ The setting up of end-of-day liquidity support or the use of repurchase facilities for banks would, therefore, be recommended. This option is reflected in technical measures adopted by the Hong Kong Monetary Authority (HKMA). The issue is the correct setting of a repurchase rate in the interest of

24. As a result of financial innovation, a smaller proportion of money is held in cash.

25. Reference may be made to the events of 1998 in Hong Kong when speculators affected stock prices by inducing money market rates to rise and the HKMA intervened in clear breach of its proclaimed *laissez faire* approach.

the international reserves position. In this case, the definition of the monetary base may be broadened to include fully backed commercial bank required reserves with the currency board, or bills issued by the board to provide additional settlement balances for banks.

38. The HKMA²⁶ recommends that the definition of money be comprehensive (so as to cover all forms of payment that can be used to settle transactions), that it be practical (so as to enable the authorities to exercise effective control over the quantity or price of money) and that it features on the balance sheet of the monetary authority. It also suggests a revision of the traditional currency boards' focus on currency notes. This is due to the fact that large transactions are increasingly effected through electronic means, involving payments between banks on behalf of their customers and the clearing of cheques. Yet, the backing of currency in circulation remains central to the maintenance of confidence for the general public. When the monetary base comprises balances held in the banks' clearing accounts at the CBA, the latter would also be responsible for the interbank clearing system. The HKMA recommends real time settlement to minimise the need for end-of-day liquidity support from the currency board. It suggests that the board be responsible for clearing and that liquidity be provided only against collateral and at penal rates, otherwise base money might be created without an increase in reserves.

39. If the financial system is efficient, the balances held at the currency board are likely to be small, and the resulting leverage may lead to unnecessarily sharp fluctuations in interest rates which would put undue pressure on banks. There are opportunities for arbitrage when market rates deviate from the parity through deposits and withdrawals of currency notes against credits and debits of the clearing accounts of banks, unless the convertibility undertaking extends also to currency notes. This is a particularity in the form and extent of convertibility upheld in Hong Kong's CBA. Indeed, the HKMA suggests that banks could also provide for the convertibility of their customers' deposits since they have clearing accounts at the currency board which are fully backed by foreign reserves. The extent to which banks will allow their customers to withdraw large amounts of currency notes against their deposit balances is limited. This is particularly the case if the exchange rate is weaker than parity. In obtaining currency notes for their customers in exchange for foreign reserves the banks may consequently have to impose a fee reflecting this exchange rate differential.

4. Merits and drawbacks of adopting a currency board

40. The credibility achieved by monetary institutions in emerging markets is not only dependent on time inconsistency, nor on the incentives for the monetary authorities to deviate from their announcements ex-post. It also depends on the expected ability to implement the policy strategy,²⁷ which is a function of the reform stage reached and the overall consistency of the policy framework.

4.1. Fiscal issues and overall policy consistency

41. It is important to highlight policy linkages and alternative claims on reserves, in addition to a simple assessment of reserve adequacy in terms of outstanding monetary liabilities. Indeed, the claim that an exchange rate peg is protected from speculative pressure, by virtue of the CBA's full backing of base money, is debatable. The literature requires monetary liabilities, generally taken as currency in circulation plus banks' deposits at the central bank, to be backed by reserves. Since domestic financial assets can be used to buy foreign currency and the entire stock of liquid monetary assets is usually a large multiple of the monetary base, the ratio of money assets to foreign reserves may be a better indicator of reserves adequacy.

26. In its web-site and the information leaflets it provides on the CBA.

27. An issue raised in Wagner (1998).

Sachs, Tornell and Flask (1996a) and Calvo and Mendoza (1996) refer to a ratio of M2 to foreign reserves as an indicator of foreign reserve adequacy when reviewing the incidence of currency crises. The balance sheet issues reviewed above also illustrate the importance of access to international credit lines in the event of a bank run, over and above the reserve coverage.

42. The advantages of setting up a currency board derive principally from the achievement and the maintenance of confidence. Without these conditions, effective disinflation and exchange rate stability would be illusory. Currency boards generally enhance the transparency of exchange rate regimes by making them rule-bound and placing an upper limit on base money supply, determined by net capital inflows. CBA operations also force a government to restrict its borrowing to levels which are acceptable to the market in terms of price and quantity, thereby improving confidence in the soundness of economic policies.²⁸ The self-imposed pressure to maintain macro-economic discipline, particularly with regards to fiscal policy, strengthens the deflationary properties of a fixed exchange rate regime and provides an in-built mechanism for balance of payments adjustment.

43. Policy makers seeking alternative means to adjust to exogenous shocks are subject to public finance constraints when the exchange rate has been relinquished as a policy tool. A number of interesting fiscal policy linkages are worth pointing out. They include the constraints on public debt, whether domestic or external, and the increase in debt servicing costs due to interest rate premia in the event of a credibility loss. The harder budget constraint imposed on the deficit, referred to earlier, is reinforced by the fact that Treasury securities are only purchased by the private sector and subject to market rates. The literature on central bank independence²⁹ also suggests that an institutional framework based on improved transparency would weaken the incentive that ministries have to bid for increased budgets.

44. A signaling effect of exchange rate targeting comes into play, as the peg is expected to provide the private sector with transparent information about the future inflation rate.³⁰ Compared with a monetary target, the commitment may be stronger as it can be controlled daily by the general public. Wagner (1998) identifies a nominal anchor effect and a disciplinary effect. The nominal anchor effect involves the inflation rate becoming exogenous, as suggested below in the discussion of inflation convergence. As price increases of tradeables are brought down to the world rate, prices of non-tradeables are eventually also expected to be stabilised and inflation would be brought down in the long term. The increase in the inflation rate of non-tradeables and the real appreciation of domestic currency would become problematic, should stabilisation lead to an output increase at the very outset. The disciplinary effect is exerted on fiscal and monetary policy: a higher inflation rate causes real appreciation and a reduction in the demand for domestically produced goods. Meanwhile, an increase in demand for imports leads to a recession, which eventually slows down the rate of price increases. Either way, price stability is only achieved through credible economic policies. These depend on adequate fiscal policies that reflect the inflation target and are fully supported by institutional factors.

4.2. *Inflation convergence*

45. The benefits of establishing credibility under a currency board relate to the provision of an anchor for inflationary expectations, for two reasons. The first of these is a discipline effect, attributed to slower money growth rates. The second is a confidence effect, which for a given money growth rate would tend to boost demand for domestic currency. Fixing the exchange rate will not necessarily limit inflation,

28. Judy (1995).

29. Reviewed in Alesina and Summers (1990), Valila (1999) and Borrero (2001).

30. This is discussed in Agenor *et al.* (1992).

particularly if the parity was set at an undervalued level or if the reserve currency depreciates relative to the home country's other trading partners. A further consideration is the relative importance of inertia and the role of expectations in inflation dynamics under currency boards. If inflation is 'backward looking' due to indexation or overlapping contracts, disinflation would rely on the emergence of excess capacity. However, an emphasis on forward looking expectations would imply that more irreversible forms of fixed exchange rates would carry greater disinflation credibility.

46. This hypothesis of credibility is supported by a standard expectations augmented Phillips curve, reflecting the statement that a more credible monetary authority can reduce inflation at a lower cost. If greater credibility brings down the cost of reducing inflation, in terms of the Phillips curve, this means that inflation shocks are less likely to become embedded in inflationary expectations if a central bank is a more credible inflation fighter. Credibility tends to give monetary authorities increased margin of manoeuvre and greater strategic flexibility. They are then able to change operating procedures, in the event of exceptional unforeseen circumstances, without generating inflationary expectations. Additional credibility also gives a monetary authority the possibility of counting on public support when drastic, unpleasant measures have to be taken.³¹

47. It is also relevant to highlight the costs of disinflation. If prices are downwardly rigid due to backward-looking expectations or indexation mechanisms, disinflation requires a slowdown in economic activity leading output to decline to levels beneath productive capacity. The actual costs of disinflation will depend on the nature and outlook of inflation expectations, the credibility and coherence of policies and the actual speed of disinflation. It is a focus of policy because the short run costs of a decline in employment and output under disinflation are smaller than the long run costs of high inflation. Besides, the relationship is somewhat asymmetric: excess demand is more inflationary than excess supply is disinflationary. This implies that the output and employment gains under high inflation and excess demand are more than offset by the losses necessary to reverse the rise in inflation. The high net cost of over-heating thus justifies a pre-emptive role for monetary policy and the avoidance of a boom and bust cycle. Furthermore, there is the possibility that a liquidity trap and a floor under real interest rates might undermine the effectiveness of an expansionary monetary policy in a recession. It is thus easier to react to excess demand by tightening monetary policy than it is to boost weak demand at low levels of output, a policy option in any case foregone under a currency board arrangement.

4.3. *Relative prices*

48. Inflation convergence in the context of exchange rate regimes generally focuses on the prices of tradeable goods, since the price of non-tradeables are affected by relative productivity growth. Thus, to the extent that purchasing power parity holds, or that relative differentials in purchasing power remain constant, domestic inflation in the currency board country is tied to inflation in the reserve country provided that there is no need to make relative price adjustments. As with interest rates (which follow those of the reserve country with a premium) inflation rates may still diverge considerably due to persistent structural differences.

49. The reserve country is likely to be a mature industrial economy with productivity and income in the traded goods sector growing relatively slowly. With non-tradeable goods in inelastic supply, their relative prices would tend to rise faster in developing countries or emerging market economies. This is especially relevant to transition economies adjusting from artificially low prices for capital intensive services such as housing, utilities or transport and attempting to enhance the efficiency of the public

31. A factor recognised by the Governor of Eesti Pank, and his public acknowledgment of the Estonian national support for the economic policies pursued by the currency board, in Kraft (1997).

provision of services. Following the increase in income levels and the upgrading of a capital stock priced below cost, prices converge upwards towards the level of those in mature economies. The real exchange rate expresses the change in the ratio of domestic prices of non-tradeables to domestic prices of traded goods. A relative price adjustment thus implies the real appreciation of domestic currency, leading to inflation in the presence of downward price rigidities.³²

4.4. *Flexibility in the real economy*

50. The burden of adjustment to a loss in competitiveness in a currency board country must come from the real economy, and not an exchange rate devaluation. This adjustment would be facilitated by structural policies designed to increase the flexibility of the labour market and by monetary policies which improve credibility and speed up the convergence of inflationary expectations, both of which are at the heart of the currency board strategy. Furthermore, a distinction can be drawn between different types of inflation. Hyperinflation and chronically high inflation require different policy prescriptions. The former, characterised by very high and rapidly accelerating rates of inflation is short lived. The latter, tends to be longer lasting and may be self-perpetuating due to indexation mechanisms and accommodating policies. Hyperinflation would thus require an effective and discrete fiscal adjustment with emphasis on convertibility, while policies against chronic inflation rely on nominal anchors to stabilise inflationary expectations.

4.5. *The cost of fixing the exchange rate*

51. Disadvantages pertaining to the adoption of currency boards are similar to those associated with fixed exchange rate regimes. They relate primarily to the loss of monetary policy discretion and to the loss of the exchange rate instrument for balance of payments adjustment. Net exports are the channel through which the exchange rate may smooth output over the business cycle. The higher the mobility of capital, however, the looser is the link between an exchange rate depreciation and an improvement in the current account. Besides, the effect of the exchange rate depreciation on real income may offset the boost to net exports. The influence that the exchange rate has on output and the business cycle depends on the elasticity of trade flows with respect to prices and the response of trade prices to the exchange rate. This is why currency boards are better suited to small open economies.

52. The extent to which the loss of monetary policy discretion represents a cost depends on two factors. The first of these relates to the role which the authorities attribute to monetary policy, although Schwartz (1992) doubts that central bankers can effectively use discretionary policy under conditions of capital mobility and globalised financial markets. The second factor relates to country-specific flexibility requirements. Williamson (1995) identifies, by way of example, a time period in which interest rates in Hong Kong converged to low US levels in spite of high domestic asset prices which would have required a monetary policy tightening.

53. Essentially, the costs pertaining to the loss of flexibility will vary from country to country, in a similar way to the degree of credibility imparted by the exchange rate regime. Berengaut *et al.* (1998) examine whether giving up monetary flexibility is detrimental to countries in transition owing to persistent structural rigidities and imbalances. They acknowledge that fiscal and structural policies provide better instruments for addressing such issues, while monetary policy maintains its focus on price stability. In addition, there is a tendency for money supply and demand functions to be neither stable nor predictable in

32. Studies on adjustment in transition economies find a correlation between relative price variability and inflation; they are reviewed in IMF (1996).

transition economies. This is due to policy uncertainty, ongoing financial innovation and changes in the degree of monetisation.

54. One of the potential drawbacks of currency boards, referred to earlier, is the limited scope for credit expansion. This is due to the institutional set up whereby monetary creation is prohibited unless reserve holdings increase. The behaviour of foreign reserves is, in turn, dependent on the balance of payments position. Provided that capital flows freely and that the currency is convertible, the balance of trade should not impose strict limits on a currency board's ability to expand money supply. The reverse is also interesting, since a trade surplus will lead to an increase in money supply through an inflow of reserves. Depending on the degree of openness of the economy and on terms of trade effects, some of the additional earnings from exports will be directed towards the purchase of imported goods. This may thereby limit the inflationary impact of the surplus and restore balance of payments equilibrium.

55. The issue is whether a tight monetary policy designed to stabilise inflationary expectations, would also hamper growth.³³ Demand conditions tend to affect output growth in the short term only. In spite of the possibility of ongoing resource underutilisation, the long run determinants of growth are related to capital, labour and productivity growth. This is an important factor underlying the emphasis on supportive supply-side policies under a currency board. Macroeconomic stability, credible institutional and social structures, and a sound financial market also sustain growth and the efficiency of production.

4.6. *How CBAs may contribute to monetary credibility*

56. The mechanisms by which currency boards impart credibility³⁴ are similar to those derived from the operations of a central bank that is statutorily independent in its conduct of monetary policy. Both represent institutional measures that create a culture of stability through monetary policy delegation. This serves to convince economic agents that the authorities will not tolerate inflation. The adoption of a fixed exchange rate promotes domestic discipline, which enables governments to achieve desired credibility more quickly. Vegh (1991) notes that in the event of a failed exchange rate stabilisation program, inflation rates in the long term accelerate to levels higher than those which would have prevailed before the start of the stabilisation policies, hence the importance of careful management. Currency boards can help reap the benefits associated with policy announcements and pre-commitment, a topic discussed at length in the literature pertaining to central bank independence.³⁵

33. There is some empirical evidence that in Latin America the current and lagged value of the output gaps and the deviation of current inflation from its expected value are not significantly correlated. This suggests that an anti-inflationary stance may not be detrimental to growth. There is a significant relationship between changes in monetary aggregates and inflation, however (IMF, 1996, p. 62).

34. Cottarelli and Giannini (1997) offer an economic history review of the notion of credibility and discuss the relative merits of exchange rate and monetary targets. They highlight the evolution of monetary frameworks in the post-Bretton Woods era and the switch towards greater discretion. As authorities invested in anti-inflationary reputations, they combined instrument flexibility and long-run goal credibility. This was supported by delegating monetary policy to an independent institution, backed by measures to guarantee transparency. It is suggested that the shift towards exchange rate targets was largely due to increased capital flows and the globalisation of markets.

35. Reference may be made to the work of Väililä (1999), Fischer (1997) and Funke and Hall (1995).

57. The key to the degree of credibility which a commitment confers is customarily equated to the perceived cost of breaking it.³⁶ Cukierman (1992) finds a correlation between the estimated cost of abandoning a peg and the perceived commitment of the government towards it. This is contested by Cottarelli and Giannini (1997) who argue that a central bank's commitment towards price stability will tend to affect public perceptions about the desirability of low inflation, especially if active public relations and information campaigns are pursued.³⁷

58. Hansson (1997) refers to the Baltic experience to illustrate the importance of policy announcements in bringing down inflation within a specifically designed legislative and institutional framework. The case of Estonia underlines the fact that firm supportive policies are required to accompany a tight monetary stance within a comprehensive package designed to strengthen the exchange rate peg. The credibility of the stabilisation policy is central to its success, together with a public perception that the authorities are effectively committed to following their policy announcements through. When disinflation is the sole goal of economic policy at the cost of other objectives, however, the output cost of the policy pursued may be so prohibitively high as to render its continued implementation politically unsustainable.

59. Much also depends on the nature of informational asymmetries. In cases where the public knows and understands the policies that are followed, expectations would tend to reflect these policies. With flexible prices and wages, a fully credible disinflationary policy would, in theory, carry no output costs. On the other hand, floating exchange rates will tend to promote disinflation at the cost of output losses. The latter would undermine the credibility of the exercise and adversely affect other sectors of the economy, and most notably, the financial system.

60. An important distinction must be drawn between a temporary and a permanent peg when analysing issues related to discipline. Even without longer-term commitment, moving to a peg or a fixed exchange rate may confer sufficient short-term confidence so as to bring real interest rates down and reduce the cost of stabilisation.³⁸ Whatever exchange rate arrangement is chosen to signal disinflation commitment, it is at best a necessary, not a sufficient, condition in the restoration of credibility. The sustainability of other aspects of economic policy is equally important.

61. It is at this point that issues of overall policy consistency arise. In addition to evaluating the policy focus on the peg, the markets must also assess the ability of the government to implement policies rendering the fixed exchange rate feasible. In itself, exchange rate policy is no substitute for monetary and fiscal discipline, a combination of which is essential for a successful stabilisation policy. Exchange rate commitments serve as a complement to institutional arrangements designed to insulate monetary and fiscal policies from short-term political pressures. The extent to which currency boards represent a credibility improvement on simple pegs relates to the marginal contribution of the reserve backing of monetary liabilities. For this commitment to be effective, the board must be given complete independence from fiscal financing requirements or the obligation to extend liquidity to banks. Both these requirements would represent alternative claims on reserves which would undermine the backing of monetary liabilities.

62. The strength of the currency board arrangement is derived from the simplicity and transparency of its fixed rules. However, this is at the cost of foregoing some of the functions normally carried out by

36. The higher the cost of renegeing, the stronger the commitment and the greater its credibility. However, the greater the loss of flexibility (as devaluation is not permitted in adjustment to an external shock), the greater the cost of achieving disinflation.

37. They refer to the Bank of Finland's practice of distributing monetary policy pamphlets to schools, as one way in which a central bank can instill an anti-inflationary culture.

38. Hansson (1997).

central banks. The rules upholding the currency board arrangement simplify the public's monitoring task. Moreover, by institutionalising monetary independence, clear signals are sent to the markets, thereby adjusting inflationary expectations and promoting price and wage discipline. In the conduct of an exchange rate-based disinflation policy, policy credibility is enhanced by deliberately limiting monetisation under conditions of fiscal consolidation and constrained credit creation. In setting required amounts of foreign currency for every note issued and committing itself to offer convertibility on demand, a government tied into a CBA gives up the option of printing money in a discretionary manner to cover outstanding fiscal obligations. Access to the inflation tax, through a surprise devaluation of existing fiscal claims such as wages, pensions or domestic currency-denominated debt, is also eliminated. This encourages holdings of domestic currency, reduces risk premia on interest rates, improves nominal wage negotiations and generally reinforces investor confidence. Such ready and pre-announced currency convertibility also tends to reduce transaction costs in foreign trade and investment.³⁹ Although similar to exchange rate pegs, currency boards are less prone to policy reversals and thus less prone to capital outflows and speculative attacks. In the conduct of stabilisation policies, economic recovery is facilitated by the convergence of interest rates to lower international levels while enhanced credibility and the elimination of exchange rate uncertainty serve to attract additional capital inflows.

63. Schwartz (1992) draws attention to certain limitations in the discussion of rules and discretion under CBAs. There seems to be insufficient attention awarded to the negative effects which an unanticipated disturbance originating in the reserve country would have on the CBA economy. A rules-based approach ignores the effects of discretion in the reserve country. Besides, credibility is not necessarily rule-dependent if one concedes that discretion does not necessarily lead to high-inflation equilibria. This would only be the case if the policy maker recognises the futility of trying to surprise the private sector. The issue becomes one of how to achieve credibility without losing flexibility, thus minimising the impact of the tradeoff. The answer lies in building an anti-inflationary reputation through deeds, revealing information about policy preferences. "In the real world, [credibility] is not normally created by incentive-compatible compensation schemes nor by rigid pre-commitment. Rather it is painstakingly built up by a history of matching deeds to words. A central bank that consistently does what it says will acquire credibility almost regardless of the institutional structure".⁴⁰

64. The exit from a CBA framework could thus coincide with the time when sufficient credibility is deemed to have been achieved and the focus shifts to regaining flexibility. As attested in the discussion on CBA statutory features, however, an exchange rate peg signals stronger commitment if there are institutional hurdles to changing the regime. The advantages of being able to pull out of the peg in the event of adverse circumstances would be dissipated by the uncertainty surrounding the ability to withdraw from the commitment. The clarity of the currency board statute is crucial in reducing uncertainty and improving monetary policy credibility.

65. Enforcing the CBA option through a clear statute is one way of addressing the problem of uncertainty. In transition economies, the ambitions of the stabilisation programme combined with the fragility of the socio-political system require reforms to be institutionalised.⁴¹ However, in the absence of political consensus on the necessity of the chosen policy, the enforcement of discipline through institutional means is unlikely to succeed. Publicising strong political consensus on the desirability of the fixed exchange rate is thus another way of dealing with commitment uncertainty.⁴² The relative ranking of

39. Osband and Villanueva (1993) p. 205.

40. Blinder (1998) p. 65.

41. This is illustrated in the strict CBA framework adopted in Bosnia and Herzegovina.

42. The HKMA regularly reaffirms its support for the Hong Kong dollar link, for instance, making statutory commitments less relevant in the enforcement of discipline.

these two strategies to attain credibility is complex due to the difficulties encountered in quantifying commitment obtained from tying one's hands or ensuring widespread public endorsement of the stabilisation policy. This is, therefore, fertile ground to examine the extent of credibility which variants of CBA frameworks yield, and their effects on reputation and commitment.

5. Statutory features associated with credibility

66. The following sections review the statutory features of pre-commitment under CBAs. After an in-depth analysis of the legislative framework, the objective is to construct an index of statutory pre-commitment. The actual currency board arrangements are related to a theoretical benchmark drawn from the literature, as reviewed above. Some features of the index relate to the legal framework and the institutional design of the board, covering elements of autonomy and transparency. The index also examines the adequacy of reserves, both with respect to the coverage of monetary aggregates and to the quality of currency convertibility. The design of existing CBAs in selected emerging markets of South-East Asia (Hong Kong), Eastern Europe (Bulgaria, Bosnia and Herzegovina) and the Baltics (Estonia, Lithuania) is compared with that of Argentina, as it stood prior to the unfolding of the crisis.

67. The appendix reviews each of the emerging markets' currency boards in turn and highlights the features which are relevant to the derivation of the index of statutory pre-commitment. For currency board frameworks that deviate considerably from the theoretical norm, the analysis highlights the particularities of their operating procedures. The statute and accompanying legal texts are the main sources of information.⁴³ In assessing the appropriateness of the reserve backing and the quality of the convertibility undertaking, a distinction must be drawn between the legal basis and any deviations from the statutory provisions. The existence of alternative claims on reserves that represent a potential source of vulnerability is highlighted. Payment arrangements and systemic liquidity management are reviewed, and banks' access to international credit lines assessed.

68. The discussion on pre-commitment and credibility has previously underlined the importance of transparency in policy making and the careful design of escape clauses. An evaluation of the currency board's conformity with the IMF data dissemination standards is, therefore, also included as it provides a proxy for cross-country measures of operational transparency and public awareness of currency board issues. Finally, the analysis supporting the index also describes the possibility for the revocation of the exchange rate regime, examining exit issues and the design of any escape clause.

5.1. Issues underlying the assessment of statutory credibility

69. The literature on the dynamics of monetary policy and fixed exchange rate regimes is at the basis of the following assessment of statutory currency board credibility, which relies on the construction of an index of statutory pre-commitment. The primary features of the index reflect the 'pure' CBA framework referred to in the literature. Based on a review of institutional design, the analysis examines the deviations of the arrangements of the six currency boards currently in force, from the theoretical benchmark.

70. It is relevant to highlight the main features of the statutory framework for the following reasons: the statute directly impinges upon the degree of pre-commitment, serves to reinforce transparency and helps channel expectations. The extent of political commitment and public endorsement are also considered as determinant factors in the choice of legal basis and institutional design, together with the circumstances in which the currency board was initially established. In Bosnia and Herzegovina, for

43. Exact legal and regulatory references are included in the relevant section of the bibliography.

instance, the legal framework is highly formal, due to the pressing need for imparting credibility to monetary policy. In terms of credibility, however, a regulatory framework with monetary rules ill suited to the fundamentals of the economy would not be an improvement over discretion. What is at stake, therefore, is the suitability of the exchange rate regime.

5.2. *Defining the index of statutory pre-commitment*

71. The synthetic index of statutory pre-commitment groups the CBA features which are associated with credibility under seven headings. These consist of: (i) the clarity of basic provisions in the legal basis, (ii) the quality of the reserve backing in terms of denomination and liquidity; (iii) the coverage of the monetary rule; (iv) the vulnerability of the arrangement to alternative claims on reserves; (v) regulatory autonomy and operational authority; (vi) transparency and accountability provisions and (vii) regime revocation arrangements.

72. In reviewing the framework, the index captures whether the reference to the board is explicit under a specific statute or just implied in the central bank legislative framework. It highlights the exact reference to the quantity and quality of backing, *i.e.* whether a 100 per cent backing is stipulated and whether the assets eligible for backing fall short of the theoretical 'pure' CBA. The coverage of monetary aggregates is clarified, together with relevant definitions of the selected aggregates. The convertibility undertaking is also detailed according to its legal specification; *i.e.* one or two way, with or without restrictions on access, and whether or not subject to a spread.

73. The index features additional elements drawn from legal provisions on regulatory autonomy and policy making authority. It notes whether the objective of currency stability is legally enshrined, and whether direct references are made to autonomy and the prohibition of lending to government. It also examines freedom in determining interest rates charged on facilities, and the provisions guiding the transfer to government of earnings on reserves. The index highlights appointment, dismissal and accountability procedures, and describes the relationship between the currency board and the central bank in each country, pointing out whether the former has any bank supervision responsibilities.

74. It is worth noting that two main weaknesses tend to afflict any political economy analysis that relies on index values. The first relates to the sensitivity of the results to the selected weighting scheme applied to the index. This issue is addressed in this analysis by selecting the components on the basis of the literature on currency board credibility. The weighting scheme that is chosen is generally neutral as all components are attributed equal weight. The only particularity is the relative emphasis on reserve coverage in two components of the index. Indeed, it is assessed both qualitatively, with reference to the liquidity and denomination of reserves, and quantitatively, with reference to the monetary aggregate. This is supported by the literature, however, as it is the principal feature that distinguishes a currency board from any other exchange rate regime.

75. The second weakness of analyses based on indices relates to the loss of information when various elements are combined in a composite indicator. The conclusions derived from these results could be both simplistic and misleading. This is why the overall index value, attributed to each of the currency boards in the sample, is essentially only used to obtain an idea of ranking. The focus of the analysis must remain on the individual components of the index, and the relative deviation of each of the currency boards in the sample *vis-à-vis* the theoretical benchmark.

5.3. *Quantifying CBA deviation from the theoretical benchmark*

76. The tables below elaborate the range of possibilities, from the theoretical CBA benchmark to the minimum requirement for the arrangement to be considered as a currency board. Under each of the headings described above, the theoretical benchmark is assigned a maximum value of $1/n$ where n is the number of sub-criteria in each of the seven sets of CBA features. The minimum requirement, which is still stricter than other exchange rate arrangements, is assigned a value of zero. The weighting issue is simplified by assigning each of the criteria composing the index an equal weight. As an exception, the feature on reserve adequacy is disaggregated into coverage and quality, thus, as noted above, the index doubles the emphasis on the feature considered in the literature as being one of the most important elements of a currency board.

Table 1. Legal basis and statutory features

1: Legal basis and statutory features	Theoretical benchmark	Minimum requirement
1.a Reference to CBA	Clear and explicit definition of a currency board = $\frac{1}{4}$	Indirectly inferred from monetary policy description = 0
1.b Currency stability objective	Primary objective enshrined in legislation = $\frac{1}{4}$	No direct reference, but amongst other economic policy objectives = 0
1.c Backing commitment	Clearly specified type of reserves and target aggregates = $\frac{1}{4}$	Briefly referred to without defining reserves or money explicitly = 0
1.d Convertibility undertaking	Two way convertibility, no restrictions on access, no transaction costs or spread = $\frac{1}{4}$	Limited convertibility / access, presence of transaction costs or spread = 0
Range of values for criterion	1	0

- As regards sub-criterion 1.a, the currency board regime in Bosnia is the only currency board which is explicitly referred to as such in the legislation. All the others are implied from the description of the monetary rule and exchange rate regimes contained in the statutes. Under 1.b, the only currency board statute which does not explicitly feature currency stability as a primary objective in the statute is that of Hong Kong. Policy statements in support of the link and the reaffirmation of government support through various channels compensate for this lack of formal commitment. However, under 1.c, all statutes without exception refer directly to the reserve backing of monetary liabilities in the basic provisions.
- The extent of the convertibility undertaking varies from country to country, with full two-way convertibility guaranteed in Bosnia, Bulgaria and Lithuania. Furthermore, in Lithuania, charges imposed by banks are subject to a ceiling. In Argentina, convertibility was statutorily guaranteed one way, although it would also have been operationally two-way. The same still applies to Estonia. In Hong Kong, access to convertibility is limited to note-issuing banks and subject to a narrow spread. A binary approach is adopted since it is the nature of the commitment which is of relevance rather than the range of possibilities, even though these are worth examining for the existence of transaction costs or the direction of convertibility. One way or restricted convertibility undertakings are assigned values of zero since in absolute terms they both fall short of the theoretical benchmark.

Table 2. Reserve backing

2: Quality of reserve backing	Theoretical benchmark	Minimum requirement
2.a Denomination of eligible assets	Reserve currency = ½	Other convertible currencies = 0
2.b Liquidity of reserve asset holdings	Foreign currency reserves or short term interest bearing assets = ½	Government paper and less liquid securities = 0
Value range for criterion	1	0

77. Theoretically, monetary liabilities should be backed by reserve currency. To limit exchange rate instability *vis-à-vis* third currencies, however, modern currency boards may opt for a mixed portfolio of reserve assets, the composition of which reflects the currencies of the country's main trading partners. The statutes which allow assets in denominations other than the reserve currency yet impose restrictions on the third currency component, may thus be attributed a value of ½ under 2.a. Examples of this include Bosnia, where reserves are largely held in marks with other currencies subject to a ceiling. In Bulgaria, the statute specifically calls for reserves to be restructured in line with the exchange rate peg. In Estonia, the statutory reference is to the bulk of reserve assets being denominated in German marks. In contrast, according to their statutes, the reserves of currency boards in Hong Kong and Lithuania may be held in unspecified foreign or convertible currency, not necessarily the reserve currency. This was also the case in Argentina. These three countries are therefore assigned a statutory value of zero. The issue here is that currency board assets held in the reserve currency would greatly facilitate the public's assessment of reserve adequacy.

78. The theoretical benchmark provides for reserves to be held other than in cash form, due to the need to optimise interest earnings on the currency board reserve portfolio. The statutes which stipulate that reserves must be highly liquid and risk-free are thus attributed higher values in the satisfaction of sub-criterion 2.b, as compared with those containing no such reference. The former comprise Bosnia, Bulgaria and Estonia, while Hong Kong and Lithuania fall in the latter category. The currency board of Argentina would have also featured in the latter category. The Estonian statute authorises the CBA to engage in asset management, subject to the satisfaction of a number of conditions. They are, in order of importance: the maintenance of value, the constant maintenance of liquidity, the diversification of risks and the optimisation of profit. Argentina's currency board would have been assigned the value of zero on the liquidity sub-criterion because the BCRA was entitled to hold public bonds. Rather than deducting one third from the relevant result, since such holdings are subject to a ceiling of 33.3 per cent (and an annual growth of 10 per cent), the aforementioned binary approach is maintained.

79. The index values assigned to reserve holdings may seem to penalise a currency board which is effective in portfolio management. However, the strict statutory feature is highly relevant. This is because in the event of a crisis, the CBA would require immediate access to its liquid and freely convertible reserves. Such features were designed to limit mismanagement of asset holdings, particularly since currency boards were often established because of limited experience in monetary policy. With expertise in portfolio management, a currency board can engage in maturity matching. Thus, perfectly liquid and risk-free assets would be held in amounts equivalent to cash in circulation, while the excess covering broader monetary aggregates could be invested in interest-bearing assets.

Table 3. **Monetary aggregates**

3: Definition of monetary rule	Theoretical benchmark	Minimum requirement
Selected monetary aggregate	Broad money = 1	Narrow or base money = 0
Value range for criterion	1	0

80. Broad money may be selected as the theoretically preferred aggregate, in spite of references to base money in the original currency board literature. The preference for broader coverage is derived from developments in financial innovation and the consequent requirement for coverage to be extended to deposits that may be converted into cash upon demand. It is also supported by the declining importance of bank settlement balances.⁴⁴ The need to cover broader aggregates is also recommended in the speculative attack models, with reference to a threshold level of reserves. An alternative is to cover base money and to broaden coverage as the exchange rate regime strengthens, or to announce at regular intervals that the bulk of a broader aggregate is adequately covered.

81. The statutes providing for backing beyond base money refer to national particularities in the monetary framework. The Bosnian currency board includes residents' accounts on its books, while the Estonian currency board, within the Central Bank, backs all liabilities including any collateral extended. These two countries are awarded a full value on criterion 3, whereas the other four are awarded the value of zero.

Table 4. **Other claims on reserves**

4: Claims on reserve base	Theoretical benchmark	Minimum requirement
4.a Bank supervision role and lender of last resort responsibilities	CBA supervisory role only, separate authority endowed with LOLR responsibilities = 1/3	Possibility of bailing-out banks in the event of systemic risk, using excess margin of reserve holdings = 0
4.b Clearing / payment arrangements and liquidity management	No rediscounting facilities or liquidity management, banks to establish international credit lines = 1/3	Temporary and exceptional provision of end-of-day liquidity to solvent banks at penal rates = 0
4.c Financing the government	Clear and explicit statutory prohibition of credit to government = 1/3	Purchase of government paper at market rates subject to a ceiling = 0
Value range for criterion	1	0

82. The statutes of Bosnia and Estonia satisfy the sub-criterion of bank supervision and lender of last resort facilities. This previously applied to the currency board in Argentina too. It arises from the fact that the currency board is largely entrusted with monitoring the adherence of financial institutions to prudential requirements, without any provisions for bailing them out. For 4.a, these three countries are thus assigned the full value of 1/3, while the other three currency boards obtain the value of zero. Indeed, the Bulgarian

44. As discussed in Henckel, Ize and Kovanen (1999).

currency board is charged with the stability of the banking system and the protection of depositors. The Lithuanian currency board may extend credit to banks up to 60 per cent of the value of their liabilities. The statute governing the HKMA refers to the requirement to ensure the stability and integrity of the monetary and financial system.

83. As regards the involvement of the currency board in liquidity management and clearing and payment systems, the sample is divided along the same lines. The strictest is the Bosnian statute which does not provide for any money market operations. Argentina, under its previous CBA framework, and Estonia satisfy sub-criterion 4.b, and may be attributed the value 1/3. In the former, rediscounting was temporary and banks were encouraged to establish their own international credit lines. In the latter, loans may be extended to banks subject to the regulation of currency in circulation, and provided there are excess reserves. As regards the third alternative claim on reserves, in 4.c, the statutes of the currency boards in Hong Kong and Lithuania are the only ones that do not explicitly prohibit the provision of credit to government. They are therefore assigned the value of zero while the other four currency boards obtain a value of 1/3.

Table 5. Operational autonomy

5: Currency board independence	Theoretical benchmark	Minimum requirement
5.a Regulatory autonomy	Currency board independence clearly established in legal basis = ¼	No direct references to autonomy in the statute = 0
5.b Appointment / dismissal provisions	Clear contract terms and conditions of dismissal = ¼	Short term appointment, unclear dismissal procedures = 0
5.c Policy making authority - setting interest rates	Sole responsibility of currency board = ¼	Subject to government approval = 0
5.d Transfer of earnings on reserves	Retained interest earnings to supplement reserve assets = ¼	Bulk transferred to government, minimum only retained = 0
Value range for criterion	1	0

84. It is interesting to note that all the statutes affirm currency board autonomy from the government, except that of Hong Kong, which thus obtains the value of zero for sub-criterion 5.a. All the statutes include detailed provisions relating to the appointment of the chairman of the board, and the procedures and conditions for the dismissal of its executives. This makes 5.b, on appointment and dismissal provisions, another sub-criterion, in addition to that of backing commitment under 1.c, where all the currency boards are assigned the full value. The arrangement in Bosnia is the strictest in that no national may be appointed to head the currency board, with the procedure being in the hands of the IMF. This removes all objective forms of government involvement. Some statutes specify the attributes of candidates to the post and refer to more detailed provisions regarding breach of contract as grounds for dismissal.

85. Accordingly, most statutes also reinforce CBA autonomy with provisions relating to policy making authority in setting interest rates. Even though the currency board is free from government directives on policy making in the Bosnian and Hong Kong statutes no reference is found to the setting of interest rates. Bosnia and Hong Kong may thus be assigned the value of zero, while the other four currency boards obtain a value of ¼ in policy making authority under 5.c.

86. The CBA's discretion in managing its budget is also of interest when discussing the extent of autonomy. The theoretical benchmark provides for the retention of earnings on reserves so that the currency board may supplement its reserve fund. At the other extreme, earnings are transferred to the government and only a minimal fraction is retained by the currency board. In the case of Bosnia, only a minimal share is transferred to the government, and the HKMA may transfer part of its earnings, without being required to do so. In Lithuania, most of the reserves are retained for various funds and only the excess is transferred. These three countries are assigned a value of $\frac{1}{4}$ on sub-criterion 5.d. The other three obtain a score of zero. The exact proportion of earnings transferred to the government may also depend on the net worth of the currency board at the start of its operations, as is the case of Bosnia.

Table 6. Disclosure requirements

6: Transparency and accountability	Theoretical benchmark	Minimum requirement
6.a Public disclosure and accountability	Required by and detailed in the statute = $\frac{1}{2}$	No statutory reference to accountability or disclosure = 0
6.b Transparency	Full conformity with IMF SDSS and Code of Good Practices = $\frac{1}{2}$	Satisfaction of partial requirements, Article IV notices = 0
Value range for criterion	1	0

87. All the statutes require the publication of economic data on a timely basis and some even set out the reporting procedures. The notable exception is Hong Kong, although it is the currency board with the most information readily available to the public on monetary and financial policies. Consequently, only Hong Kong is attributed the value of 0 in this component of the statutory index while the other frameworks obtain the full value of $\frac{1}{2}$ under 6.a. Where currency boards have adhered to IMF standards of data dissemination and codes of good practice, they may be judged to be in conformity with the transparency sub-criterion 6.b. The only outlier in this respect is Bosnia, where only IMF Staff Reports in the context of Article IV consultations are published.

Table 7. Revocation and escape clauses

7: Revocation and escape clauses	Theoretical benchmark	Minimum requirement
7.a Regime revocation arrangements	CBA regime abandoned strictly upon parliamentary ruling = $\frac{1}{2}$	No direct reference, no possibility of government discretion = 0
7.b Exit issues and escape clauses	Clear or implied time horizon and specified contingencies = $\frac{1}{2}$	Open-ended currency board commitment without exit details = 0
Value range for criterion	1	0

88. The review of the revocation and escape clause provisions implies that currency boards fall short of a permanent arrangement in the emerging markets under study. Indeed, Estonia and Lithuania have explicitly adopted the currency board in the process of their transition out of the rouble zone and towards EMU, while Argentina had originally sought to address a period of hyperinflation and limit contagion from regional spill-overs. In Hong Kong, in view of the uncertainty surrounding the return of the province to

Chinese sovereignty, the currency board was also a product of its time. The conditions under which the exchange rate regime can be revoked are central to the credibility of the currency board, particularly in times of crisis. All the statutes constrain the ability of the government to opt out of the currency board, except those of the HKMA and the Central Bank of Bosnia and Herzegovina (CBBH), which contain no such reference. The case of Lithuania is ambiguous. This is because the statute provides for the exchange rate regime to be changed by government in consultation with the Bank. There are no detailed provisions relating to procedures that are to be followed in the event of disagreement, however. Accordingly, these three countries are awarded the value of 0 with respect to feature 7.a. In Bulgaria on the other hand, only an Act of Congress or National Assembly could change the regime. The same applied to the legal framework previously in place in Argentina. In Estonia, it is clearly stated that the currency board has no right to devalue the exchange rate. As regards the final sub-criterion, none of the statutes specify clear escape clauses, and they are thus all assigned the value of zero. It may be noted, however, that exit issues are currently discussed in the Baltics and Bulgaria, with reference to a transition phase prior to accession to the European Union.

5.4. *Discussion of results pertaining to the synthetic index of statutory pre-commitment*

89. The discussion of this section focused on the main features of the statutory frameworks and characterised the deviation of the six currency boards under study relative to each of the seven sets of credibility features. The table below shows the value attributed to each country according to the various sub-criteria of statutory pre-commitment. It concludes with the overall value of the index obtained by each of the six currency boards.

Table 8. Overall index values compiled for each the countries under study

Criteria	Argentina	Bosnia	Bulgaria	Estonia	Hong Kong	Lithuania
1.a	0	1/4	0	0	0	0
1.b	1/4	1/4	1/4	1/4	0	1/4
1.c	1/4	1/4	1/4	1/4	1/4	1/4
1.d	0	1/4	1/4	0	0	1/4
2.a	0	1/2	1/2	1/2	0	0
2.b	0	1/2	1/2	1/2	0	0
3	0	1	0	1	0	0
4.a	1/3	1/3	0	1/3	0	0
4.b	1/3	1/3	0	1/3	0	0
4.c	1/3	1/3	1/3	1/3	0	0
5.a	1/4	1/4	1/4	1/4	0	1/4
5.b	1/4	1/4	1/4	1/4	1/4	1/4
5.c	1/4	0	1/4	1/4	0	1/4
5.d	0	1/4	0	0	1/4	1/4
6.a	1/2	1/2	1/2	1/2	0	1/2
6.b	1/2	0	1/2	1/2	1/2	1/2
7.a	1/2	0	1/2	1/2	0	0
7.b	0	0	0	0	0	0
Index¹	0.54	0.75	0.62	0.82	0.18	0.39

1. Normalised value of the index defined as $\sum \omega_i \delta_{ij}$ where the weight ω assigned to each of the seven criteria i is equal to $1/7$ and the value assigned to each of the subcriteria j is binary, that is zero or $1/n$, n being the number of sub-criteria in each of the 7 criteria (as set out in Tables 1 to 7).

90. The index values obtained by the currency board frameworks under study are interesting on a number of accounts. The range of 0.64 from the minimum to the maximum total normalised index values is a clear numerical illustration of prevailing cross-country differences in the statutory features. Yet all the emerging markets under study are referred to as currency board countries in publications⁴⁵ which classify economies according to their exchange rate regime. Studies which compare credibility issues across exchange rate regimes may thus lead to misleading conclusions if no account is taken of these differences. This is one reason why the analysis of this paper placed considerable emphasis on determining which statutory features are particularly relevant for exchange rate credibility (*e.g.* the quality of backing, alternative claims on reserves, autonomy in policy making and revocation clauses).

91. The actual index value obtained by a particular currency board is of limited significance, other than in providing a quantitative measure to express its deviation from the theoretical benchmark. What is also interesting, is that it provides information on how strict the currency board arrangement is relative to the institutional framework adopted in the other countries. It was noted in the discussion at the start of the paper that currency boards enhance the transparency of monetary and exchange rate policies. To a certain extent, this may also be achieved through the ongoing diffusion of information and the regular publication of data on monetary and reserve aggregates. It was also suggested that monetary authorities might reinforce public consensus on the suitability of the exchange rate peg through such information campaigns. They may thereby strengthen the credibility of the currency board through firm reiteration of their policy commitment. This may provide an alternative to the adoption of the strict currency board framework described in the literature. It was suggested earlier that the credibility of a commitment to a fixed exchange rate is greater, the higher the cost of abandoning the peg. Small open economies would tend to have a rapid pass-through of a nominal devaluation to domestic prices. In this case, the market's perception of the government's willingness to defend the peg will be strong, in addition to the signals conveyed by the extent of statutory pre-commitment.

92. The example of Hong Kong is particularly interesting in this respect. It is therefore not surprising that the index value which the HKMA obtains is the lowest of the sample. At the other end of the spectrum, the finding that Estonia and Bosnia achieve the highest index values is also conformity with expectations. It was suggested earlier that the stronger the need to impart credibility to exchange rate policy, the greater the likelihood of opting for a strict currency board framework. In the case of the former, the currency board was in transition out of the rouble zone, while for the latter, it was part of the post-war institution-building process.

93. In spite of the focus on stabilisation policy in Bulgaria, the index value is lower than that of Estonia and Bosnia. This is principally on account of the fact that the nature of the currency board adjustment mechanism is not strictly automatic, as it would be under the theoretical benchmark.⁴⁶ The overall index value for the currency board which was in place in Argentina until recently is also downgraded, due to the inclusion of domestic government securities within reserve assets. Finally, the score of the Lithuanian currency board is lower as it is penalised by the present definition of the index for not excluding the possibility of extending credit to banks and government.

45. Such as Johnston *et al.* (1999).

46. Nenovsky and Hristov (1999) qualify the Bulgarian exchange rate regime as a quasi-currency board on account of its elements of central bank flexibility. Although the adjustment mechanism is different to that of orthodox currency boards, they find evidence of a long-run cointegration relationship between reserves and monetary liabilities.

6. Policy conclusions

94. This paper has discussed the workings of currency boards in order to illustrate how credibility issues can be addressed by this variant of fixed exchange rate regimes. The mechanisms through which reputational gains may be reaped by monetary authorities were discussed with reference to the CBA balance sheets and the dynamics of policy formulation. A strong emphasis was placed on institutional design and the implications of currency board features for the achievement and maintenance of credibility. It appears, from a review of the statutory framework in the countries under study, that the automatic nature of the adjustment mechanism at the heart of CBA success is not always allowed to operate. Indeed, an in-depth examination of the supporting legislation and the operating procedures for monetary and exchange rate policies, revealed that the regimes adopted by sample emerging markets deviate considerably from the theoretical blueprint for a currency board.

95. The present study suggests that it is beneficial for policy makers seeking to avert currency or financial market pressure, to pay particular attention to details of the institutional design at the basis of exchange rate stability. This is an important premise underlying the discussion on statutory pre-commitment. The legislative review of the six emerging markets under study confirms that most of the statutes feature direct or indirect references to the basic provisions of currency board arrangements. It is noteworthy, however, that none of the statutes clearly sets out how to exit from the currency board regime.

96. To a certain extent, the lack of an escape clause may be linked to the objective underlying the establishment of CBAs, which is largely to achieve reputational gains so as to address the problem of dynamic inconsistency. Indeed, a currency board statute which ties the hands of the monetary authorities whilst providing them with a loophole, is unlikely to impart credibility. However, this does not make the currency board a “one-way system”, legally. Indeed, its longevity falls short of that of dollarisation or the adoption of a common currency, by the legislative procedure required for its statutory amendment. Although *de jure*, it may not be a permanent⁴⁷ regime, there are considerable operational difficulties in abandoning a currency board without dissipating credibility gains.⁴⁸ In the Baltics, the possibility of designing an escape clause around the prospect of EU accession renders this exit less problematic.

97. The literature on speculative attack models⁴⁹ suggests that if the perceived cost of adhering to a fixed exchange rate is prohibitive, expectations of a devaluation may become self-fulfilling. This is particularly the case in the absence of a sustainable fiscal policy and a sound banking system. A legally enshrined objective of exchange rate stability may serve to temporarily reduce the probability of a currency crisis occurring, without removing it altogether. The dynamics of exchange rate credibility suggest that, provided the statutory framework is robust and the underlying economic policies are supportive, the probability of a devaluation is at its lowest in the early phase of a currency board. This corresponds to a “honeymoon” period. The market recognises that the monetary authorities, having invested in a reputation-enhancing institutional framework, have a strong incentive to sustain it. Should a speculative attack be successfully averted by the currency board, its credibility will be further strengthened.

98. The way in which the economy evolves following the establishment of the currency board will impinge upon the circumstances in which it may be abandoned. In the best case scenario, with market expectations converging on an equilibrium of non-inflationary growth, the discipline enforced by the

47. In a democratic framework, monetary institutions are ultimately, though indirectly, accountable to the electorate. They may therefore be abandoned should preferences regarding the objectives of economic policy, or the nature of the exchange rate regime change.

48. The details of their eventual transition are discussed in Gulde, Kahkonen and Keller (2000).

49. See, in particular, Obstfeld (1994), Flood and Marion (1998) and Bensaid and Jeanne (1997).

currency board may appear to be unnecessary. Furthermore, once financial markets and institutions are consolidated, constraints may not be as relevant since discretionary policy will tend to be less harmful. Indeed, the effects of a devaluation on inflationary expectations are lower, the higher the credibility of monetary policy.

99. The mechanics of speculative pressure suggest that the monetary authorities may wish to seize the window of opportunity provided by expectations of an exchange rate appreciation, and engineer the transition to a more flexible exchange rate regime. However, the exit from a currency board cannot be sprung upon the public as a surprise, due to the legal constraints on amending the statutory framework. A transition period, with a known trigger point⁵⁰ for the repeal of the convertibility provisions, might then provide for capital gains in the foreign exchange market. The currency crisis literature suggests that this would lead to a run on domestic assets. Whether or not it is contained depends on the efficiency of the financial intermediation process and the adequacy of foreign reserves. The authorities can prepare for this eventuality by limiting the monetisation of reserve inflows through, for instance, higher reserve requirements in the months preceding the exit. Combined with the establishment of contingent credit lines, the additional reserve holdings thereby generated may serve to avert the run on the currency.

100. It is only in this best case scenario, with economic and financial stability as an essential prerequisite for the exit, that a move towards greater exchange rate flexibility could be effected without incurring credibility losses. Even then, the difficulty of upholding pegged but adjustable regimes, suggests that monetary and exchange rate policy would need to provide alternative anchors for expectations. Monetary and inflation targets may be adopted instead, provided certain institutional prerequisites are met. The latter include the achievement of a sound central banking experience, with in particular, stable and effective monetary policy instruments, an in-depth knowledge of the monetary transmission mechanism, and an efficient system of financial intermediation with sound reserve and liquidity management.

101. A number of conditions must be satisfied for an orderly exit from the currency board in this manner. The financial sector must be able to cope with the prospect of a temporary liquidity crunch, the buoyancy of economic activity must not be undermined by high interest rates, domestic savings ratios should be high enough to compensate for limited access to international finance, and unit labour costs must be low enough to uphold competitiveness in the face of an appreciating real exchange rate. How strong is “strong enough”, for the economy to exit the currency board, remains to be determined. These conditions are not sufficient, however, otherwise currency boards would have incorporated a Maastricht-type set of criteria in their statutes to satisfy the need for transparency while providing for an escape route. Indeed, even if economic conditions such as these were to be satisfied for long enough to allow for a repeal of the currency board statute, there still remains the possibility of an adverse exogenous shock. A devaluation of the currency of a major trading partner, or a shift in investor perceptions regarding emerging markets’ outlook, would clearly exacerbate the operational difficulties of a smooth CBA exit.

102. In the worst case scenario, the weaknesses of the currency board economy might become increasingly apparent once the honeymoon period comes to an end. Yet, the longer a currency stays on an inappropriate peg, the more costly it is to devalue. Furthermore, if the burden of adjustment imposed on the real economy is perceived as being too high a price to pay for exchange rate stability, the currency risk would be so high as to become self-validating. In this case, should the monetary authorities wish to pursue their quest for exchange rate stability, they have no other option but to raise the stakes and adopt dollarisation or a common currency. A shift to a weaker reserve currency might also temporarily address exchange rate misalignment and reverse capital outflows. It would need to be properly designed to avoid further undermining credibility further, since it is essentially a breach of the currency board provisions.

50. As discussed in Mihalke (1997) p. 28.

103. A number of policy insights may be derived from a review of CBA institutional design. Emerging markets may wish to strengthen the resilience of their economies to external shocks by striving to enhance the credibility of monetary and exchange rate policy. CBAs may be one way of achieving this as they are essentially institutional frameworks exclusively directed towards safeguarding the value of their currencies. Throughout the discussion, a strong emphasis was placed on the overall consistency of the underlying economic policy framework, without which any fixed exchange rate regime would soon become unsustainable. Indeed, clear signals of political commitment to a currency board might boost credibility and provide some breathing space in a crisis situation. In the absence of fiscal consolidation and structural reforms, however, fixing the exchange rate may impose a prohibitive cost on the real economy. This would render the peg inappropriate thereby dissipating any credibility gains. In this case, there is a need for pragmatism in determining the optimal degree of pre-commitment to a fixed exchange rate regime. Indeed, successive attempts to create excessive credibility by increasing commitment to an inappropriate peg may turn out to be very costly if the strategy fails.

APPENDIX I

Table 9. **CBA**s introduced to offset limited experience in monetary management.

Country	Duration	Currency	Permissible Reserve Assets	Minimum Cover
Antigua and Barbuda	36 yr.	USD	Foreign assets and gold	60% of M0
Brunei-Darussalam	34 yr.	SGP\$	Liquid foreign assets, accrued interest	70% of currency board demand liabilities
Djibouti	52 yr.	USD	Foreign assets	100% of currency in circulation
Dominica	36 yr.	USD	Foreign assets and gold	60% of M0
Grenada	36 yr.	USD	Foreign assets and gold	60% of M0
St. Kitts and Nevis	36 yr.	USD	Foreign assets and gold	60% of M0
St. Lucia	36 yr.	USD	Foreign assets and gold	60% of M0
St. Vincent and Grenadines	36 yr.	USD	Foreign assets and gold	60% of M0

NB: This table is drawn from the analysis of Ghosh, Gulde and Wolf (1998).

APPENDIX II. DETAILED REVIEW OF THE CBA LEGISLATION IN EACH OF THE COUNTRIES UNDER STUDY

Argentina (1991-2001)⁵¹

1. Convertibility of the austral was established on the 1st of April 1991 at a rate of 10,000 australes to the US dollar in Law No. 23,928 of March 1991. The currency board arrangement required that at all times, the freely available reserves of the Central Bank in gold and in foreign currency were equivalent to at least 100 per cent of the monetary base. Sections 617, 619 and 623 of the Civil Code were amended to provide for this. By Decree No. 2128/91, the National Executive Power, set up on the 1st of January 1992, declared that a new currency denominated as "peso" would be equivalent to 10,000 australes. The "peso" was thus convertible with the U.S. dollar at a rate of one peso to one US dollar at sale, pursuant to the conditions established in the Convertibility Law. The convertibility undertaking provided for sales of foreign exchange to be carried out at the official exchange rate while purchases of foreign exchange are subject to market prices.

2. In spite of the fact that the Convertibility Law referred to the freely available reserves of the Central Bank in gold and in foreign currency, the BCRA Charter, under Chapter VIII Article 33, added that up to one third of freely available reserves held as ordinary pledge, could be paid in with public bonds at market price. This implied that by law only a fraction of two thirds of the reserves essentially satisfied the quality and quantity backing conditions which are at the basis of a strict currency board arrangement. Furthermore, according to the reserve management issues referred to in this Article of the Law, a portion of external assets could be kept outside the BCRA. Such holdings could be in interest bearing deposits or other investments with foreign banking institutions or in low risk, high liquidity bonds payable in gold and foreign currency. Although these guidelines on reserve management contributed to profit maximisation, they implied that reserves were not immediately available in the vaults of the BCRA, or in call accounts. Thus, the condition for immediate access to full reserves was not strictly satisfied either.

3. The Charter of the BCRA, under Article 43, originally set out that it shall supervise financial and exchange activities through the Superintendency of Financial and Exchange Institutions. The latter reported directly to the Chairman of the Bank and was defined in Article 44 as a decentralised agency subject to the Central Bank. Liquidity management operations consisted of repurchase agreements (using government bonds or certificates of deposits of financial trusts), reverse repurchase agreements of public bonds by BCRA as well as overdraft and liquidity facilities. To provide a margin of security, in light of the potential role of currency substitution, the BCRA had arranged for a contingent repurchase agreement with a group of foreign banks. The latter agreed to make additional funding available to Argentine banks in the event of a systemic liquidity problem.

51. Further references on the Argentine currency board include Banco Central de la Republica Argentina (2000), which reviews the main features of financial regulation, Caprio *et al.* (1996) on lender of last resort issues and Hanke (1995) on exchange rate policy. As indicated earlier, the framework is described up to 2001.

In view of the BCRA's responsibilities in liquidity management, there was a possibility of additional claims on the reserve holdings of the currency board arrangement. Indeed, Article 17 paragraphs (b) and (c) referred to the granting of rediscounts and overdrafts to banks in cases of temporary lack of liquidity. This was subject to certain conditions. It would only be for periods of up to 30 days and up to a maximum of the equity capital of the institution, with limits extended only in extraordinary circumstances. The absolute majority of the Board of Directors was required to increase the individual banks' permissible ceilings if there was a systemic need for liquidity. This provision was resorted to in the first quarter of 1995 due to the financial crisis in the aftermath of the Mexican peso devaluation. It was intended to provide for greater flexibility in LOLR facilities. Financial assistance could then be provided for a longer time period of 120 days and for a value in excess of financial institutions' net worth. The BCRA, through this provision would have had greater discretion in the use of assets obtained from troubled financial institutions. Article 17 stated that this would be done "without in any case affecting the freely available reserves that guarantee the monetary base".

4. The Convertibility Law allowed the BCRA to grant credit to a financial institution and in so doing, under exceptional circumstances, the ratio of gross international reserves to the money base could have declined to two-thirds of its normal value. In such cases, the financial institution's assets would have been considered as collateral and its controlling interest would have been pledged, according to the procedures set in Article 35 bis of the Law on Financial Institutions.

5. Although Article 19 of the BCRA Charter stipulated that the Bank should not grant loans to the national government, Article 20 allowed it to finance the national government through the purchase of marketable Treasury securities, at market values. There was a limit of 10 per cent on the growth of the Bank's holdings of such securities however, in addition to the ceiling of 33 per cent set out in Article 33. The fact that such purchases were subject to market prices imposed somewhat of a constraint on the fiscal authority.

Bosnia and Herzegovina

6. A preliminary reading of the legal basis⁵² supporting the Central Bank of Bosnia and Herzegovina (CBBH) indicates that the currency board arrangement is very close to the strict concept outlined in the literature. Numerous references are made in the Statute to the details of the currency board. It is even specifically defined as an operational rule for issuing domestic currency against purchases of convertible foreign exchange, at a one-to-one exchange rate with the German mark.⁵³ An October 2001 amendment provides for the official conversion to an Euro rate of 1.95583 marka. The principal objective of the CBBH is to achieve and maintain the stability of the domestic currency, with a direct prohibition on the extension of any form of credit. The Statute stipulates that the Central Bank must ensure that the aggregate amount of its monetary liabilities shall at no time exceed the equivalent of its net foreign exchange reserves.

7. Assets held by the CBBH are defined to include gold, cash in freely convertible foreign currency, credit balances in its name with foreign central banks or financial institutions. Reserves comprise SDRs, bills of exchange, promissory notes, CDs, bonds and debt securities issued by residents of countries other than Bosnia and Herzegovina. However, they must be payable in freely convertible foreign currency. Forward purchase or repurchase agreements concluded with or guaranteed by foreign central banks or

52. Reference is hereby made to IMF (1998) as well as to various legal and regulatory texts pertaining to Bosnia and Herzegovina as set out in the bibliographical section.

53. The Draft Law on Amendments and Supplements to the Law on the Central Bank of Bosnia and Herzegovina includes provisions relating to the conversion of the peg from the German mark to the Euro.

international financial organisations are also included in the definition. Any futures and option contracts of the CBBH providing for payment by non-residents are permissible provided that they are denominated in freely convertible foreign currency (as referred to in Article 31). The total amount of gross foreign exchange reserves in currencies (other than the German mark in the original Statute) is subject to a ceiling of 50 per cent of unimpaired capital and reserves.

8. The monetary liabilities which must be covered by the currency board arrangement consist of bank notes and coins in circulation, resident account credit balances on the books of the CBBH, and net foreign exchange reserves. As set out in Articles 31 and 33, the CBBH purchases and sells convertible marka on demand at the official exchange rate. Commercial banks and financial institutions thus have access to convertibility without restriction, fees, commissions or any other charges.

9. Article 3 states that within the limits of the Central Bank's authority, as established in its Statute, it shall be entirely independent from the Federation of Bosnia and Herzegovina, the Republika Srpska, any public agency and any other authority. It is thus autonomous in the pursuit of its objective and the performance of its task. The statute calls for the independence of the Central Bank to be respected and discourages any person from seeking to influence any member of its decision making body or interfere in its activities. Autonomy is referred to again in Article 70. This provision states that in carrying out its tasks the CBBH shall enjoy autonomous regulatory powers and that any regulations, guidelines and instructions that it issues will have force of law throughout the Federation.

10. The duration of appointments is referred to in Article 8. In the first six years of operation of the Central Bank, the Governor is appointed by the International Monetary Fund after consultation with the Presidency. The Presidency appoints three other members of the Governing Board. The Governing Board consists of five members selected after the initial six-year period is over.

11. Article 52 describes the role of the Central Bank as banker, advisor and fiscal agent to the government. It stipulates, however, that no transaction carried out by the Bank may serve to extend financial assistance (especially credit) to, or for the benefit of, Bosnia and Herzegovina. Furthermore the Central Bank will act as banker and fiscal agent only if there is an agreement between the two parties. Under Article 67 entitled "prohibited activities of the Central Bank", it is reaffirmed that "except as otherwise specifically authorised by [the Statute], the Bank shall not, under any circumstances, grant any credit." Article 53 provides for the Bank's consultation in matters related to public sector borrowing. Article 37 clearly prohibits the CBBH from engaging in money market operations involving securities of any type.

12. The allocation of net profit is made according to Article 27 in the following order of priority. The first priority is to increase the authorised capital to a level equivalent to 5 per cent of the aggregate monetary liabilities, the second is to increase the amount of the General Reserve to a level equivalent to the amount of the authorised capital; the third is directed to special reserves for specific purposes established by the Bank. Finally, any residual net operating profits are distributed to the fiscal authorities while any residual net unrealised valuation gains go to a Valuation Reserve Account maintained on the balance sheet of the Bank.

13. The Central Bank Statute requires the CBBH to co-ordinate the activities of agencies responsible for bank licensing and supervision in ways to be determined by the Governing Board as per Article 2 (e).

Bulgaria

14. The Bulgarian currency board rules,⁵⁴ embodied in the Law on the Bulgarian National Bank (BNB), fix the exchange rate of the lev. Only an act of the National Assembly can change this exchange rate peg. The choice of the original reserve currency as the German mark instead of the US dollar was fairly controversial due to the importance of oil imports. However, this was deemed to be in conformity with the country's objectives of EU accession, and the adoption of the Euro to which the lev is currently fixed. Article 20 describes the function of the Issue Department as maintaining full exchange cover for the total amount of monetary liabilities, by taking actions needed for the efficient management of the Bank's international foreign exchange assets. Also, Article 28 states that the aggregate amount of monetary liabilities shall not exceed the lev equivalent of the gross international foreign exchange reserves. Inflation and exchange rate devaluations in the early years of the currency board served to reduce the foreign currency value of domestic money and led to the monetary authorities' accumulation of excess coverage.

15. The existence of a currency board arrangement is derived from the statutory provisions on the operating principles of monetary and exchange rate policies. The CBA was established within the framework of the existing central bank rather than being set up as a separate institution. The reserves which back monetary liabilities include foreign currency bank notes and coins, funds on accounts of foreign central banks (or highly rated foreign financial institutions), SDRs and highly rated and convertible foreign debt instruments. A government deposit is also included in the CBA balance sheet.

16. The monetary liabilities which the BNB reserves relate to, according to Article 28 (2), consist of bank notes and coins issued by the BNB (*i.e.* cash in circulation) as well as balances on accounts held by other parties with the BNB, except those of the IMF. As regards convertibility, under Article 30 it is stipulated that the BNB shall be bound to purchase and sell German marks (now Euros) against levs on demand up to any amount. This is to be done on the basis of spot exchange rates and the latter shall not depart from the official exchange rate by more than 0.5 per cent inclusive of any fees, commissions and charges.

17. The BNB's purpose is clearly to support of the exchange rate peg since the Law stipulates that it shall "contribute to the maintenance of the stability of the national currency, through implementation of the monetary and credit policy". The relationship between the government and the Bank is such that in the formulation of economic and monetary policy outlines, the two parties are required to inform one another of their intentions and actions. Article 49 requires the publication, at the end of each month, of the balance sheet of the Issue Department as well as the release of a statement of the assets and liabilities position. Transparency arrangements are such that the market is given all relevant information about government borrowing plans and auction outcomes on a timely basis.

18. These transparency and accountability provisions complement the reference to autonomy in Article 44. The latter states that in performing its functions, the Bank shall be independent from any directions of the Council of Ministers and from other State bodies. Furthermore, the BNB cannot extend credit in any form whatsoever to the State, unless it is against purchase of SDRs from the IMF under the conditions set out in Article 45 (1). It is not permitted to buy or sell government securities or any other securities issued by residents.

19. The government deposit in the Banking Department balance sheet has a sterilisation purpose. It limits the effect that the disbursement of IMF tranches and the settlement of large foreign debt service obligations would have on the money supply. The IMF tranches pass through the Banking Department,

54. Further details on the Bulgarian currency board may be obtained from Zloch-Christy (1999).

with borrowings considered as a liability, and there is a four-week window during which the government can decide to borrow the money. This has direct implications on the adjustment mechanism since changes in the monetary base are not equivalent to the current account position when the government engages in any international financial transactions. In fact, the latter are spontaneously sterilised whether they are IMF tranches, foreign debt repayments, or receipts from privatisation deals with foreign investors.

20. Accountability and autonomy provisions are reflected in the sections on the appointment and removal of the Governor and Managing Board under Article 12. The Governor is elected by the National Assembly. The Assembly also elects three Deputy Governors, upon recommendations of the Governor. The other three non-executive members of the Managing Board are appointed by the President of the Republic. All seven members serve staggered six-year terms and can only be dismissed as set out under Article 14. On the formulation of policy, Article 35 empowers the BNB to announce the basic interest rate in accordance with a method determined by the Managing Board to be published in the State Gazette. It distributes net income to the government according to Article 8, with the actual distribution reported in the BNB's Annual Report. The reserve fund is credited with 25 per cent of the excess of revenue over expenditure, together with a contribution towards special funds, while the state budget is credited with the remainder.

21. Statutory references to bank supervision are laid out in Article 2 (3) which states that the BNB shall regulate and supervise banks' activities, ensuring the stability of the banking system and protecting depositors' interests. At the time of the CBA establishment, the body of banking laws and prudential regulations were also strengthened. To increase confidence in the banking system, the currency board plan provided for the possibility of banks receiving limited but sizeable assistance. This amounts to about \$300 million, equivalent to one-fifth of Bulgaria's foreign reserves at the time the currency board was introduced. The entire reserves of the Banking Department can be resorted to in the event of a systemic crisis.

22. Article 33 prohibits BNB credits to banks except in cases where liquidity risk has systemic implications. Credits may only be extended in cases of excess reserve backing. In this case, the BNB may then extend lev-denominated credits to a solvent bank with a maturity of no longer than three months and collateralised by gold, foreign currency or high-liquid assets. The BNB may perform a lender of last resort function as set out in Article 20 and BNB Regulation No. 6. The only discretionary tool at the disposal of the Bank is the minimum reserve requirement ratio, as defined in BNB Regulation No. 21, an instrument expected to be resorted to in the event of a liquidity crisis, with changes to its level and the conditions for access. The Bank is also empowered to assist in the establishment and functioning of efficient payment mechanisms.

Estonia

23. The legal basis of the Estonian currency board, enacted in 1992, is the Law of the Republic of Estonia on the Security for Estonian Kroon.⁵⁵ This is a short piece of legislation complementing the Law of the Central Bank of the Republic of Estonia and the Eesti Pank Statute. The legislation implies that the exchange rate arrangement is a currency board as this term is not referred to explicitly. Clause 1, entitled 'Security for Estonian kroon' does however state that "Estonian kroon (cash in circulation, currency in current accounts and in accounts of a fixed date) is issued fully secured by the gold and convertible foreign exchange reserve of Eesti Pank". According to Clause 11.6, the gold and foreign exchange reserves that constitute the backing of the kroon may also be invested with internationally credible and highly rated

55. The Estonian currency board is discussed in Bennett (1992), Funke and Hall (1995), IMF (1997b) and, together with other currency boards in Central and Eastern Europe, in Gulde *et al.* (2000).

institutions. The balance sheet liabilities of Eesti Pank are fully backed by net foreign assets with the reference monetary aggregate consisting of cash in circulation, currency in current accounts and in accounts of a fixed date. According to clause 4, Eesti Pank is given the right to change the amount of Estonian kroons in circulation only after a change in gold and foreign exchange reserve. Clause 2 entitled "Rate of Estonian kroon" stipulates that "Eesti Pank has no right to devalue Estonian kroon[and that] the limit of technical fluctuation of Estonian kroon is 3 per cent".

24. As regards convertibility provisions, Clause 3 on the exchangeability of Estonian kroon states that "Eesti Pank guarantees on the territory of the Republic of Estonia the free exchange of Estonian kroon to convertible foreign currencies for current needs of customers, according to the official rate of Eesti Pank". According to Clauses 11.3 and 11.4 of the Eesti Pank Statute, transactions using the assets of the Bank may be authorised by the President but their feasibility will be assessed according to the following criteria in order of importance: maintenance of value and liquidity, risk diversification and profit optimisation.

25. Under Article 2 (1) of the Central Bank Law, Eesti Pank is directly charged with maintaining the stability of the legal tender of the Republic of Estonia, conducting monetary and banking policy and directing credit policy (further to paragraph 5). The official exchange rate was originally set at one German mark to eight kroon. Eesti Pank Decree No. 1 sets out the internal procedures for the automatic fixing of the Estonian kroon exchange rates while Decree No. 39 fixes the exchange rate against the Euro at 15.6466 kroon as of the 1st of January 1998. Article 30 of the Central Bank Law provides for the statutory and reserve capital to be augmented by a transfer of 25 per cent from annual profits.

26. The President is appointed in accordance with the Constitution and following the procedures set out in the Central Bank law. Pursuant to Clause 3.1, the line of reporting is both to the Board and to Parliament. The President is nominated by the Chairman of Eesti Pank (according to Article 10). The latter is nominated by the President of the Republic (according to Article 7 (1)) and is expected to serve a five-year term in the original statutory provisions. The amended Article 8 (1) however, states that the members of the Board of Eesti Pank shall be appointed by Parliament (Riigikogu) on the motion of the Chairman of the Board of Eesti Pank while Article 8 (5) provides for their five-year appointment. The appointment of the President of Eesti Pank terminates upon his resignation.

27. Article 3 of the Central Bank Law is entitled "Independence of Eesti Pank". It states that the Bank is independent from all government agencies, reporting to the Riigikogu only. It is not subordinated to any executive institution of the State. Article 4 regulates the relationship between the government and the Central Bank. It states that the Bank shall, "in conformity with its mandate, support the economic policy of the Government of the Republic of Estonia to the extent that these policies do not conflict with the mandate (...) to secure the stability of the national currency". However, Article 16 of the Central Bank Law explicitly prohibits direct and indirect granting of credits to the state or local authorities budget, as well as the purchase of securities issued by government executive bodies. Loans may be granted to credit institutions however, with LOLR facilities initiated under systemic and emergency situations. These are limited to the excess of foreign exchange reserves over the backing requirement, which is equivalent to the reserves of the Banking Department.

28. Accountability provisions complement autonomy safeguards with the reporting and transparency provisions established in Clause 5 entitled "Informing on the security of Estonian kroon". These require that "Eesti Pank, at least once a month, makes public information about the amount of its gold and convertible foreign exchange reserve as well as the amount of Estonian kroon in circulation". Reporting procedures are also set out in Clause 13 of the Eesti Pank Statute. This does not apply to Board meetings however. Indeed, Article 9 (5) was amended to read "Meetings of the Board of Eesti Pank shall be private and closed to the public. The Minister of Finance shall participate with the right to speak".

Hong Kong

29. The CBA in Hong Kong was established as a loose legislative framework. The exchange rate policy is set out in the Basic Law, under Section 4 entitled 'Certificates of indebtedness' of Chapter 66 on the 'Exchange Fund Ordinance' (EFO). The EFO vests the authority in the Financial Secretary (FS) in consultation with an Exchange Fund Advisory Committee (EFAC) of which he/she is the ex officio chairman. Other members of the Advisory Committee are appointed by the Governor. Article 111 of the Basic Law stipulates that 'the issue of Hong Kong currency must be backed by a 100 per cent reserve fund'. This fund may be held in Hong Kong currency, foreign exchange, gold, silver or invested in such securities or other assets considered appropriate after consultation of the FS with the EFAC.

30. The required backing for certificates of indebtedness for note-issuing banks is the main reference to backing in the Basic Law. Convertibility is limited to note-issuing banks subject to a narrow spread reflecting transaction costs, a spread which is expected to reduce further with electronic means. It is not always triggered at precisely the fixed exchange rate level however. Also, prior to 1988, the aggregate balance was not subject to the Monetary Rule of coverage, and no convertibility undertaking was applied to it. The monetary base consists of the Aggregate Balance (which is directly featured on the balance sheet of the currency board) and Bank Notes (indirectly featured through Certificates of Indebtedness issued to Note Issuing banks). They are now both subject to the Monetary Rule in that changes are brought about only by corresponding changes in foreign reserves held by the currency board. There is no transferability between the Aggregate Balance and Bank Notes. The Exchange Fund (EF) debt paper, issued by the currency board and largely backed by foreign reserves, is not part of the Monetary Base.

31. Article 112 of the Basic Law states that no foreign exchange control policies shall be applied and that the Hong Kong dollar shall be freely convertible. Technical measures led to a formalisation of the undertaking by the Hong Kong Monetary Authority to convert banks' clearing balance into foreign exchange. In the interest of efficient reserve management, the Financial Secretary may, on account of the Fund, buy or sell currency, foreign exchange, gold, silver, securities or assets. Having consulted the Exchange Fund Advisory Committee, he/she may enter into any financial arrangement considered appropriate for the prudent management of the Fund. The FS may borrow for the account of the Fund either in Hong Kong or elsewhere, on the security of the general revenue. The Fund is to be credited in subsection (3) with the value of coinage issued, legal tender note, and any proceeds from the sale of coinage after it has ceased to be legal tender. The aggregate amount of borrowing outstanding at any one time, which can be changed subject to the provisions of subsection (5), shall not exceed 50,000 million dollars, or equivalent in foreign exchange as set out in subsection (4).

32. The EF retains interest from foreign exchange holdings and fluctuations in the value of gold. The FS may transfer excess assets to the general revenue and other funds of the government, after consulting with the EFAC with the approval of the Chief Executive in Council. This is provided that such a transfer does not adversely affect the use of the Exchange Fund to influence the exchange value of the currency. To cover the contingency under which assets may need to be transferred to the Fund, injections of public funds to the EF may be provided by Legislative Council resolution under legislation such as the Public Finance Ordinance. The monetary authority may also act as an agent to manage the Government's fiscal reserves. There is no provision in the Ordinance for the EF to finance fiscal operations.

33. The Exchange Fund under the control of the Financial Secretary is set out in the EF Ordinance. It is used primarily for purposes affecting the exchange value of the currency of Hong Kong. The objective of currency stability is not explicitly defined in the legislation, but it is publicly disclosed and explained through various channels. These include publications of the HKMA, policy statements to the Legislative Council, the Authority's web-site, technical briefings to reporters, and public seminars. A loose regulatory framework with strong government commitment to the peg may be as credible than strict legislative pre-

commitment. The crucial factor might reside in the public's endorsement and understanding of the currency board operating principles, as this could affect market expectations.

34. The currency board framework in Hong Kong is highly publicised and fully transparent. The Financial Secretary's web-site includes a quarterly updated fact sheet and basic statistics about the financial sector, together with policy objectives, speeches, press releases, reports, and consultative documents on policy proposals. The transparent operation of the linked system has also been enhanced by a number of supportive measures. The first of these is the announcement of a formula for determining the interest rate charged for access to the HKMA's discount window. An additional measure relates to the publication and forecast of the aggregate clearing balance of the banking system on an almost real-time basis. The publication of the size of the monetary base is also carried out on a daily basis.

35. The Fund is charged with maintaining the stability and integrity of the monetary and financial systems with due regard however to its primary purpose, under clause (1B) relating to the EF. The HKMA operates a discount facility from which banks may borrow overnight funds against their holdings of EF and eligible paper. Banks' access to the facility will be limited if they are judged to be supporting market manipulation. The HKMA has reaffirmed its role as lender of last resort to all authorised institutions in a policy statement. Support is provided to solvent institutions facing short-term funding difficulties, subject to the precondition of possible systemic risk that could arise from the failure of a troubled institution deprived of liquidity assistance. Other conditions include a sufficient margin of solvency, adequate collateral, and the ability of the institution to demonstrate that it has tried to tap alternative sources of funding.

36. The question that arises is whether the Liquidity Adjustment Facility corresponds to a lender a lender of last resort function or rather, a lender of convenience, enabling banks to settle their residual end-of-day interbank payments. The potential problem is that with the additional liquidity, money is created in the form of larger overnight balances of the banking system, and this appears not to be matched by an increase in the HKMA holdings of foreign reserves. The liquidity is provided through a repurchase arrangement of paper issued by the HKMA. High quality private sector debt securities are also eligible for repurchase. The liquidity is awarded at highly penal rates however, with the LAF offer rate averaging 150 basis points above the US Federal Funds Target Rate. The rate for repeated borrowings, defined as eight occasions in any period of twenty-five days or four consecutive days, is entirely at the discretion of the currency board.

37. The paper used in the repurchase agreements is in the form of Exchange Fund bills and notes, the proceeds of which are converted into foreign currency. Outstanding liabilities are fully backed by foreign currency assets managed by the HKMA. The authorities claim that without the LAF, the volatility of interest rates would be even higher in the event of a capital outflow as banks bid for liquidity which is not available. The fear is that such tensions in the interbank market could damage confidence in the financial sector as a whole, and the authorities have thus reserved themselves the right to intervene so as to dampen interest rate fluctuations. This would also be the case in the event of an IPO or large scale domestic currency transactions, which may create extreme conditions in the interbank market and affect the stability of the exchange rate.

38. The pamphlets⁵⁶ describing the operations of the currency board in Hong Kong elaborate on technical issues relating to arbitrage, interbank adjustment and the mechanics of speculative attacks. The description of the CBA points out that the most crucial element of the monetary base which influences the

56. The following analysis draws on non-legal documentation on the Honk Kong link including Tsang (1999) and Yam (1998a), (1998b) and (1999). Various statements issued by the monetary authorities are readily available to the public on the HKMA web-site.

level of interest rates is the Aggregate Balance which banks hold in their clearing accounts with the currency board. This balance, in spite of the large volume of transactions, is quite small, due to the efficiency of the financial infrastructure. As a result of real time interbank payments, and the absence of reserve requirements, banks need not maintain large balances in their accounts at the currency board.

Lithuania⁵⁷

39. The legal basis for the currency board arrangement in Lithuania consists of the Law on the Bank of Lithuania and the Law on the Credibility of the Litas, but neither offer a direct reference to the currency board. Instead, they imply its establishment pursuant to the description of the central bank's operations. According to Articles 1 and 2 of the Credibility Law, the litas in circulation are fully covered by gold (at market prices) and foreign exchange reserves (according to the official exchange rate). Furthermore, the Bank of Lithuania may change the total amount of litas in circulation only by changing gold and foreign exchange reserves.

40. The foreign exchange reserves consist of banknotes and coins of convertible currency, the amount of convertible currency held in the correspondent accounts in foreign banks and the IMF, and promissory notes, certificates of deposits, bonds, other debt securities payable in convertible currency held by the Bank of Lithuania. This is set out in Article 2 of the Credibility Law and detailed further in Article 31 of the Central Bank Law. Article 2 of the Credibility Law clarifies that what is meant by litas in circulation and states that it comprises bank notes and coins in circulation, balances of nominal accounts of other banks and holders of litas, accounts kept with the Bank, securities and other promissory notes of the Bank in litas. When referring to the distribution of profits, the Statute shows that once losses are covered, 20 per cent of profits are attributed to form the authorised capital of 50 million litas while 50 per cent go towards the reserve capital until the latter reaches 200 million litas. When these amounts are reached, the excess is transferred to government.

41. On convertibility provisions, Article 4 of the Credibility Law guarantees, to the extent of the Bank's gold holdings and foreign exchange reserves, the free exchange of litas into the anchor currency, according to the official exchange rate, as well as the free exchange of the anchor currency into the litas. Other foreign currencies are exchanged into litas, and litas are exchanged into other foreign currencies, according to market exchange rates. Maximum amounts of charges on banks for exchange operations are established by the Bank.

42. Article 7 of the Central Bank Law sets out the principal objective of the Bank of Lithuania as being the stability of the currency. This is subject to two provisos, the first of which is the reliable functioning of the currency market and the system of credit settlements. The Bank is also called upon to support the economic policy carried out by the government provided however, that this is in compliance with the Bank's principal objective. Article 3 of the Central Bank Law is entitled "Independence of the Bank of Lithuania" and states that in implementing its objectives and carrying out its functions, while being governed by the Constitution and Laws of the Republic of Lithuania, it is independent from the government and any other institutions of executive authority. Article 3 of the Credibility provisions however, provides for the official exchange rate of the litas and the anchor currency to be changed by the Government. nevertheless, the Statute specifies that this must be done in co-ordination with the Bank.

43. The Chairperson of the Board is appointed for five years with terms and conditions determined by Parliament upon recommendation of the President of the Republic, according to Article 10. Members of

57. The Lithuanian currency board is also discussed in Schuler, Selgin and Sinkey (1991), Camard (1996), Enoch and Gulde (1997) and IMF (1997a).

the Board are appointed to nine-year terms by the President on the recommendation of the Chairperson and such appointments are renewed by one third every three years. As regards accountability and transparency, Article 5 of the Credibility Law requires information on the total amount of litas in circulation, gold holdings and foreign exchange reserves, to be published in the “Valstybės žinios” (Government Records) at least once a month.

44. In describing the functions of the Bank of Lithuania, Article 8 also states that the Bank shall act, in accordance with the procedure established by law, as lender of last resort in the banking system. It is charged with the duties of competent authority in the licensing, accounting and reporting of banks. Bank supervision provisions are detailed in Article 36 of the Central Bank Law, while Article 28 empowers the Bank to establish the rates for rediscounts and credit operations. Under “extraordinary economic conditions” it may impose a maximum rate of interest on all credit institutions. Credit may be granted by the Bank of Lithuania up to a limit equivalent to 60 per cent of a bank’s liabilities. It is secured by pledged assets or guarantees pursuant to Article 27. Article 11 provides for the Bank to carry out monetary and liquidity operations including open market operations. It may also rediscount bills of exchange and other debt instruments, grant credits, change reserve requirements of banks, organise credit and deposit auctions and grant special purpose loans.

SUMMARY OF CBA FEATURES IN THE SIX EMERGING MARKETS UNDER STUDY

Table 10.i. From Latin America to South East Asia: Currency Boards in Argentina (1991-2001) and Hong Kong

CBA credibility features	ARGENTINA	HONG KONG
LEGAL BASIS FOR CURRENCY BOARD	<p>CONVERTIBILITY LAW NO. 23928 OF 1991 (HEREINAFTER REFERRED TO AS 'C LAW')</p> <p>BANCO CENTRAL DE LA REPUBLICA ARGENTINA, LAW 24,144 OF 1992 (HEREINAFTER REFERRED TO AS THE BCRA CHARTER)</p>	<p>Basic Law Chapter 66 'Exchange Fund Ordinance' (EFO)- Section 4 'Certificates of indebtedness'</p> <p><i>Financial Secretary is hereinafter referred to as 'FS' and Exchange Fund Advisory Committee as 'EFAC'</i></p>
Reference to currency board -- explicit or implied	Implied by the description of the fixed exchange rate regime and the full backing of monetary base as set out in C Law -- not referred to directly	Implied by the workings of monetary and exchange rate policy and the convertibility undertaking, no direct references to the currency board
Quantity of backing- 100% backing requirement in the relevant statute¹	Backing by reserves stipulated to be equivalent to at least 100% as set out in C Law	Article 111 of the Basic Law stipulates that 'the issue of Hong Kong currency must be backed by a 100% reserve fund' also covers Cert. of Indebtedness
Quality of backing -- do the assets eligible for backing include government paper	C Law reference to freely available reserves in gold and in foreign currency. BCRA Charter Ch.VIII Art.33 added that up to one third of freely available reserves held as ordinary pledge could be paid in with public bonds at market price. A portion of external assets could be kept in interest bearing deposits or other investments with foreign banking institutions or in low risk, high liquidity bonds payable in gold and foreign currency.	The Fund backing the issue of currency, as set out in Art. 111 of the Basic Law, may be held in Hong Kong currency, foreign exchange, gold, silver or invested in such securities or other assets considered appropriate after consultation of the FS with the EFAC.

Coverage -- what monetary aggregates are covered	Full coverage of the monetary base (currency in circulation plus deposits of financial institutions with Central Bank)	The backing for certificates of indebtedness for note-issuing banks is the only reference found in the Basic Law
Convertibility undertaking -- specified in law, one way or two way, restrictions on access, existence of spread	The Peso was set to be convertible with the U.S. dollar at a rate of 1 Peso = 1 USD at sale, under the conditions of the C Law Articles 2 and 3. Convertibility : statutorily one-way, operationally two-way, with sales of foreign exchange at the official exchange rate while purchases were effected at market prices. Art. 18 of the BCRA Charter also provided for the purchase and sale of assets at market prices in spot and forward transactions for the purpose of monetary and exchange regulation.	The convertibility is limited to note-issuing banks subject to a narrow spread reflecting transaction cost, which is expected to reduce further with electronic means. Article 112 of the Basic Law states that no foreign exchange control policies shall be applied and that the Hong Kong dollar shall be freely convertible. Recent formalisation of the HKMA's undertaking to convert banks' clearing balance into foreign exchange. Convertibility may be 'triggered' at levels close to parity.
Actual reserve coverage of monetary aggregates	Out of the 2/3 fraction of reserves satisfying the strict backing conditions, a portion was invested in interest bearing deposits with foreign banking institutions or in low risk, high liquidity bonds payable in gold and foreign currency. For comparability, the measure of actual reserve coverage was to be based on a strict definition of reserves, therefore excluding reserves which are not in the form of gold and foreign currency, and which are not immediately available.	In the interest of efficient reserve management, the FS may for the account of the Fund buy or sell currency, foreign exchange, gold, silver, securities or assets. Having consulted the EFAC, it may enter into any financial arrangement appropriate for the prudent management of the Fund. The FS may borrow for the account of the Fund either in Hong Kong or elsewhere, on the security of the general revenue. The Fund is to be credited in subsection (3) with the value of coinage issued, legal tender note, and any proceeds from the sale of coinage after it has ceased to be legal tender. The aggregate amount of borrowing outstanding at any one time shall not exceed \$50,000m, or equivalent in foreign exchange as set out in subsection (4). This amount can be change subject to the provisions of subsection (5).
Alternative claims on reserves detracting from safeguarding the currency²	Art. 17 b and c referred to the granting of rediscounts and overdrafts to banks in cases of temporary lack of liquidity, for periods of up to 30 days up to a maximum of the equity capital of the institution, with extensible limits in extraordinary circumstances.	The resources for providing such support would be drawn from the Exchange Fund in accordance with the EFO.

Deviation of official exchange rate from market exchange rate	Convertibility undertaking provided for sales of foreign exchange to be carried out at the official exchange rate while purchases of foreign exchange were subject to market prices.	Possibility of arbitrage, especially prior to 7 technical measures. Convertibility triggered at levels stronger than official 7.8 parity.
Regulatory and policy making authority : legally enshrined currency stability objective	Art. 3 of the Charter stated that the primary and essential mission of the BCRA was to preserve the value of the currency.	The EF under the control of the FS as set out in the EFO is used primarily for purposes affecting the exchange value of the currency of Hong Kong. The statutory reference points to the stability and integrity of the monetary and financial system with due regard to the primary purposes, without further details. The objective of currency stability is not explicitly defined in the legislation, but it is publicly disclosed and explained through various channels. These include publications of the HKMA, policy statements to the Legislative Council, the website, technical briefings to reporters, and seminars to the public.
References to autonomy	Art. 3 of the Charter stated that as regards the design and implementation of the monetary and financial policy, the BCRA would not be subject to any order, suggestion or instruction given by the National Executive Power, and that it would undertake no obligation that may, without the explicit authorisation of Congress, have caused the exercise of its legal authority to be subject to a condition, restrained or delegated. Art. 4 regulated the full execution of exchange policy subjecting the BCRA to the observation of Congress legislation.	No direct references to autonomy but the HKMA is not subject to government directives on policy making and has a high profile in the financial sector.
Direct prohibition of lending to government	Under Art. 19 of the BCRA Charter it was stipulated that the Bank would not grant loans to the national government, except as provided for in Art. 20. The latter stated that the Bank would only finance the national government through the purchase of marketable Treasury securities, at market values. There was a limit of 10% on the growth of the Bank's holdings of such securities in addition to the ceiling of 33% set out in Art. 33.	The monetary authority acts as an agent to manage the Government's fiscal reserves. There is no provision in the Ordinance for the EF to finance fiscal operations. It performs the role of a fiscal agent managing the government's reserves.

Freedom in determining interest rate charged on facilities	Art. 14 of the BCRA Charter empowered the Board of Directors to determine interest rates and the conditions of the credit operations which would not imply the granting of any subsidy.	No direct reference to the formulation of interest rate policy.
Transfer of earnings on reserves	Central bank profits were used to build reserve fund transfers up to 50% of the Bank's capital according to Art. 38 of the Charter. Once this limit was reached profits that are not capitalised or allocated to reserves were to be freely transferred to the national government account. Losses were to be deducted from the reserves made in previous years or failing that from the Bank's capital.	The EF retains interest from foreign exchange holdings and fluctuations in the value of gold. The FS may transfer excess assets to the general revenue and other funds of the government, after consulting with the EFAC with the approval of the Chief Executive in Council and provided such a transfer does not adversely affect the use of the Exchange Fund to influence the exchange rate.
Board appointment, dismissal and accountability provisions	The members of the BCRA Board were appointed by the National Executive Power in agreement with the Senate for a 6-year renewable term according to Art. 7 of the Charter. They could be discharged from service on account of unobservance of the provisions of the Charter or as a result of falling within the scope of cases of incapacity as set out in Art. 8 and 9.	The Exchange Fund vests the authority in the FS in consultation with an Advisory Committee of which he is the ex officio chairman. Other members of the Advisory Committee shall be appointed by the Governor.
Relationship between currency board and central bank	The definition of the currency board arrangement was derived from the operations of the BCRA, not referred to explicitly.	Neither a separate central bank statute nor an explicit reference to the CBA are included in the basic law, references are made to monetary and exchange rate policy.
Bank supervision responsibilities	The Charter of the BCRA, under Art. 43 set out that it would supervise financial and exchange activities through the Superintendency of Financial and Exchange Institutions which reported directly to the Chairman of the Bank and was defined in Art. 44 as a decentralised agency subject to the Central Bank.	The Fund is charged with maintaining the stability and integrity of the monetary and financial systems with due regard however to its primary purpose, under clause 1B relating to the EF.

Payment arrangements and systemic liquidity management	Art. 17b and c referred to the granting of rediscounting and overdrafts to banks in cases of temporary lack of liquidity, with extensible limits in extraordinary circumstances. Liquidity management operations consisted of repurchase agreements (government bonds or CDs of financial trusts), reverse repurchase agreements of public bonds by BCRA, overdraft and liquidity facilities. To provide a margin of security, in light of the potential role of currency substitution, the BCRA arranged for a contingent repurchase agreement with a group of foreign banks that would have made available additional funding to Argentine banks in the event of a systemic liquidity problem.	The HKMA operates a discount facility from which banks may borrow overnight funds against their holdings of EF and eligible paper. Banks' access to the facility will be limited if they are judged to be supporting market manipulation. The HKMA has reaffirmed its role as lender of last resort to all authorised institutions in a policy statement. Support is provided to solvent institutions facing short-term funding difficulties, subject to the precondition of possible systemic risk that could arise from the failure of a troubled institution deprived of liquidity assistance. Other conditions include a sufficient margin of solvency, adequate collateral, and demonstration of attempted tapping of alternative sources of funding.
Banks' access to international credit lines	BCRA encouraged banking sector to establish highly transparent contingent credit lines with foreign banks to offset limited LOLR facilities.	No reference in the legal basis, but Hong Kong is widely perceived as an international financial centre of high repute.
Conformity with IMF transparency codes	The arrangement had resulted in a high degree of transparency in the formulation and conduct of monetary policy, and led to effective and timely disclosure (on a daily basis) of international reserves and the composition of monetary liabilities. Art. 35 of BCRA Charter called for regular publication of summary balance sheet. The use of the BCRA contingent repurchase agreement with a group of foreign banks for additional funding in the event of a systemic liquidity problem was immediately transparent.	The FSB web-site includes a quarterly updated fact sheet and basic statistics about the financial sector, together with policy objectives, speeches, press releases, reports, and consultative documents on policy proposals. The transparent operation of the linked system has been enhanced by measures including the announcement of a formula for determining the interest rate charged for access to the HKMA's discount window, the publication of the aggregate clearing balance of the banking system almost on a real-time basis, and the publication of the size of the monetary base on a daily basis.
Exchange rate regime revocation arrangements	Possibility to change exchange rate and backing rules by Act of Congress	No direct reference
Exit issues and escape clauses	Proposal to dollarise the economy through a "treaty of monetary association" negotiated with the US -- in January 1999	No direct reference

1. Statutes all refer to backing by foreign reserves, since this is the crucial feature of currency board arrangement together with the fixed exchange rate. It is the extent and the quality of backing which is therefore of interest.
2. Alternative claims on the given stock of reserves might inhibit the efficient functioning of the currency board arrangement.

Table 10.ii. **The Experience of the Baltic States: Currency Boards in Estonia and Lithuania**

CBA credibility features	ESTONIA	LITHUANIA
LEGAL BASIS FOR CURRENCY BOARD	Law of the Republic of Estonia on the Security for Estonian Kroon (1992) Law of the Central Bank of the Republic of Estonia, Eesti Pank Statute	Law on the Bank of Lithuania Law on the Credibility of the Litas
Reference to currency board – explicit or indirectly referred to	Legislation implies that the exchange rate arrangement is a currency board although this term is not referred to explicitly.	The legislation's description of the central bank operations implies that a currency board arrangement is in place without direct reference.
Quantity of backing- 100% backing requirement in the relevant statute	Clause 1. entitled 'Security for Estonian kroon' states that "Estonian kroon (cash in circulation, currency in current accounts and in accounts of a fixed date) is issued fully secured by the gold and convertible foreign exchange reserve of Eesti Pank". Furthermore, according to clause 4, Eesti Pank is given the right to change the amount of Estonian kroons in circulation only according to a change of its gold and foreign exchange reserve. A broad definition of reserve coverage.	According to Art.1 and 2 of the Credibility Law, the litas put into circulation is fully covered by gold (at market prices) and foreign exchange reserves (according to the official exchange rate of the litas). Furthermore, the Bank of Lithuania may change the total amount of the litas in circulation only by changing gold and foreign exchange reserves.
Quality of backing - do the assets eligible for backing include government paper	The legislation refers to gold and foreign exchange held by Eesti Pank for the backing of domestic monetary liabilities. The latter include interest-bearing assets, in the original statute they are referred to as being denominated in German marks (DM).	Foreign exchange reserves consist of bank notes and coins of convertible currency, the amount of convertible currency held in the correspondent accounts in foreign banks and the International Monetary Fund, and promissory notes, certificates of deposits, bonds, other debt securities payable in convertible currency held by the Bank of Lithuania, as set out in Art. 2 of the Credibility Law and detailed further in Art. 31 of the Central Bank law.

<p>Coverage - what monetary aggregates are covered</p>	<p>The balance sheet liabilities of Eesti Pank are fully backed by net foreign assets. The monetary aggregate covered consists of cash in circulation, currency in current accounts and in accounts of a fixed date according to Clause 1.</p>	<p>Art. 2 of the Credibility Law clarifies that what is meant by litas in circulation comprises bank notes and coins in circulation, balances of nominal accounts of other banks and holders of litas, accounts kept with the Bank; and securities and other promissory notes of the Bank in litas.</p>
<p>Convertibility undertaking -- specified in law, one way or two way, restrictions on access, existence of spread</p>	<p>Clause 3. On the exchangeability of Estonian kroon states that "Eesti Pank guarantees on the territory of the Republic of Estonia the free exchange of Estonian kroon to convertible foreign currencies for current needs of customers, according to the official rate of Eesti Pank". The original official exchange rate was 1 DM = 8 EEK. Eesti Pank decree No. 1 sets out the internal procedures for the automatic fixing of the Estonian kroon exchange rates while decree no.39 fixes the exchange rate against the Euro at 1 EUR = 15.6466 EEK as of the 1st of January 1998.</p>	<p>Art. 4 of the Credibility Law guarantees, to the extent of the Bank's gold holdings and foreign exchange reserves, the free exchange of litas into the anchor currency according to the official exchange rate, as well as the free exchange of the anchor currency into the litas. Other foreign currencies are exchanged into litas and litas shall be exchanged into other foreign currencies according to market exchange rates. Maximum amounts of charges on banks for exchange operations are established by the Bank.</p>
<p>Alternative claims on reserves detracting from safeguarding the currency</p>	<p>In Clauses 11.3 and 11.4 of the Eesti Pank Statute, transactions using the assets of the Bank may be authorised by the President but their feasibility will be assessed according to the following criteria in order of importance: maintenance of the value, constant maintenance of liquidity, diversification of risks and optimisation of profit. In Clause 11.6 the gold and foreign exchange reserves that constitute the backing of the kroon may be invested with international institutions. In Art. 14 (5) loans may be granted to credit institutions. LOLR facilities may be used under systemic and emergency situations, limited to excess of foreign exchange reserves over backing requirement.</p>	<p>Credit may be granted by the Bank of Lithuania up to a limit equivalent to 60% of a bank's liabilities secured by pledged assets or guarantee pursuant to Art. 27.</p>

Regulatory and policy making authority : legally enshrined currency stability objective	Under Art. 2 (1) of the Central Bank Law, Eesti Pank is charged with maintaining the stability of the legal tender of the Republic of Estonia, conducting monetary and banking policy and directing credit policy (para. 5). the objectives of Eesti Pank are referred to in the law but linked to general economic policy. The Minister of Finance attends as an observer.	Art. 7 of the Central Bank law sets out the principal objective of the Bank of Lithuania as being the stability of the currency. This is subject to two provisos, the first of which is the reliable functioning of the currency market and the system of credit settlements. The Bank must also support the economic policy carried out by the government provided this is in compliance with the Bank's principal objective.
References to autonomy	Art. 3 of the Central Bank Law is entitled "Independence of Eesti Pank" and states that it is independent from all government agencies, reporting to the Riigikogu only and not subordinated to any executive institution of the State. Art.4 regulates the relationship between the government and the Central Bank however and it states that the Bank shall, "in conformity with its mandate, support the economic policy of the Government of the Republic of Estonia to the extent that these policies do not conflict with the mandate (...) to secure the stability of the national currency". Art. 9 (5) was amended to read 'Meetings of the Board of Eesti Pank shall be private and closed to the public. The Minister of Finance shall participate with the right to speak'	Art. 3 of the Central Bank law is entitled "Independence of the Bank of Lithuania" and states that in implementing its objectives and carrying out its functions, while governed by the Constitution and Laws of the Republic of Lithuania, it is independent from the government and any other institutions of executive authority.
Direct prohibition of lending to government	Art. 16 of the Central Bank Law prohibits the direct and indirect granting of credits to the state or local authorities budget and the purchase of securities issued by government executive bodies.	The Bank of Lithuania is the fiscal agent of the government. The legal texts do not explicitly prohibit the provision of credit to government, nor do they require such borrowing to be made at market rates.
Freedom in determining interest rate charged on facilities	Art. 14 states that Eesti Pank sets the interest rate to regulate currency in circulation.	Art. 28 of the Central Bank law empowers the Bank to establish the rates for rediscounts and credit operations. Under "extraordinary economic conditions" it may impose a maximum rate of interest on all credit institutions.

Transfer of earnings on reserves	Art. 30 of the Central Bank Law provides for the statutory and reserve capital each to be augmented by a transfer of 25% from annual profits.	Art. 24 refers to the distribution of profits. Once losses are covered, 20% of profits are attributed to form the authorised capital of 50m litas while 50% go towards the reserve capital until the latter reaches 200m litas. When these amounts are reached, the excess is transferred to government.
Board appointment, dismissal and accountability provisions	President appointed in accordance with the Constitution following the procedures set out in the Central Bank law, reporting to the Board and to Parliament. (Clause 3.1) He/she is nominated by the Chairman of Eesti Pank (Art.10), who is in turn nominated by the President of the Republic according to Art.7(1); to serve a 5 yr. term. The amended Art.8(1) states that the members of the Board of Eesti Pank shall be appointed by Riigikogu on the motion of the Chairman of the Board of Eesti Pank while Art.8(5) provides for the members of the Board to be appointed to a term of five years, except for the President of Eesti Pank whose membership shall terminate upon his resignation.	The Chairperson of the Board is appointed for 5 years with terms and conditions determined by the Parliament upon recommendation of the President of the Republic. (Art. 10) Members of the Board are appointed to 9-year terms by the President on the recommendation of the Chairperson and such appointments are renewed by one third every 3 years.
Relationship between currency board and central bank	Currency board arrangement not institutionally separate from central bank.	The currency board arrangement is derived from the operations and set up of the central bank and the convertibility provisions, no direct reference to a separate institution is made in the law.
Bank supervision responsibilities	Art. 20 of the Central Bank Law requires the Bank to regulate the activities of credit institutions by ensuring implementation of prudential ratios and liquidity requirements. This complements Art. 2 (5) which states that Eesti Pank supervises banks and monitors their adherence to laws, prudential norms and regulations. 1999 Law on credit institutions.	In describing the functions of the Bank of Lithuania, Art. 8 also states that the Bank shall act, in accordance with the procedure established by law, as LOLR in the bank system. It is also charged with the duties of competent authority in the licensing, accounting and reporting of banks. Bank supervision provisions are detailed in Art. 36 of the Central Bank law.

Payment arrangements and systemic liquidity management	Eesti Pank may provide loans to banks in case of systemic liquidity pressures, but its primary role is one of monitoring the banks' adherence to prudential requirements.	Art. 11 provides for the Bank to carry out monetary and liquidity operations including open market operations, to rediscount bills of exchange and other debt instruments, grant credits, change reserve requirements of banks, organise credit and deposit auctions and grant special purpose loans.
Conformity with IMF transparency codes	Clause 5 entitled "Informing on the security of Estonian kroon" requires that "Eesti Pank, at least once a month, makes public information about the amount of its gold and convertible foreign exchange reserve as well as the amount of Estonian kroon in circulation". Reporting procedures are also set out in Clause 13 of the Eesti Pank Statute.	Art. 5 of the Credibility Law requires information on the total amount of litas in circulation, gold holdings and foreign exchange reserves to be published in the "Valstybės žinios" (Government Records) at least once a month. Commended by the IMF, publication of IMF Staff Reports under Article IV consultation.
Exchange rate regime revocation arrangements	Clause 2. Entitled 'Rate of Estonian kroon' stipulates that "Eesti Pank has no right to devalue Estonian kroon. The limit of technical fluctuation of Estonian kroon is 3%".	Art. 3 of the Credibility provisions provides for the official exchange rate of the litas and the anchor currency to be changed by the Government upon co-ordination with the Bank.
Exit issues and escape clauses	No reference in law -- loose references to EMU	No reference in law – loose references to EMU

Table 10.iii. **Stabilisation policy in Eastern Europe: Currency Boards of Bosnia and Herzegovina and Bulgaria**

CBA credibility features	BOSNIA and HERZEGOVINA	BULGARIA
LEGAL BASIS FOR CURRENCY BOARD	Constitution (reference in Art.VIII) Central Bank of Bosnia and Herzegovina (CBBH)	Law on the Bulgarian National Bank (BNB)
Reference to currency board -- explicit or implied	Direct reference to currency board arrangement in Art. 1 and Art. 2. The currency board is defined in Art. 72(h) as an operational rule for issuing domestic currency, whereby domestic currency is only issued against purchases of convertible foreign exchange with full backing by net foreign exchange reserves. It is added that the central bank is thus unable to extend credit.	Bulgarian currency board rules embodied in BNB Law with exchange rate fixed to the Euro, which only an act of the National Assembly can change. Art. 20 describes the function of the Issue Dept. as to maintain full exchange cover for the total amount of monetary liabilities by taking actions needed for the efficient management of the Bank's international foreign exchange assets.
Quantity of backing -- 100% backing requirement in the relevant statute	Art. 2 stated that the convertible marka was issued at a 1-to-1 exchange rate with the DM with full backing in freely convertible foreign exchange. It was amended to account for the official conversion to a Euro rate of 1.95583 marka. Art. 31 sets out the rule for issuing currency by stipulating that "the Central Bank shall be obligated to ensure that the aggregate amount of its monetary liabilities shall at no time exceed the equivalent (in terms of the currency of Bosnia Herzegovina) of its net foreign exchange reserves".	CBA narrow definition ensuring full cover of currency and settlement accounts as set out under the provisions of Art.20.
Quality of backing -- do the assets eligible for backing include government paper	Assets held by the CBBH include gold, cash in freely convertible foreign currency, credit balances in its name with foreign central banks or financial institutions, SDRs, bills of exchange, promissory notes, CDs, bonds and debt securities issued by residents of countries other than Bosnia and Herzegovina and payable in freely convertible foreign currency, forward purchase or repurchase agreements concluded with or guaranteed by foreign central banks or international financial organisations, and any futures and option contracts of the CBBH providing for payment by non-residents in freely convertible foreign currency (Art. 31). The total amount of gross foreign exchange reserves in currencies other than the DM is subject to a ceiling of 50% of unimpaired capital and reserves.	Art. 28 states that the aggregate amount of monetary liabilities shall not exceed the lev equivalent of the gross international foreign exchange reserves. The reserves include foreign currency banknotes and coins, funds on accounts of foreign central banks, or highly rated foreign financial institutions, IMF SDRs, highly rated and convertible foreign debt instruments, Foreign exchange reserves have been restructured in line with DM peg.

Coverage - what monetary aggregates are covered	The monetary liabilities which must be covered by the currency board arrangement consist of: banknotes, coins in circulation, residents' accounts credit balances on the books of the CBBH, and net foreign exchange reserves as set out in Art. 31	The aggregate amount of monetary liabilities, according to Art. 28 (2) consists of bank notes and coins issued by the BNB in circulation, balances on accounts held by other parties with the BNB except those of the IMF. Narrow definition of a CBA.
Convertibility undertaking -- specified in law, one way or two way, restrictions on access, existence of spread	Art. 33 states that the CBBH purchases and sells convertible marka on demand for DM at an official exchange rate of 1 marka per mark. This is done by commercial banks and financial institutions without restriction, fees, commissions or other charges.	Under Art. 30 it is stipulated that on demand, the BNB shall be bound to purchase and sell DM against levs up to any amount on the basis of spot exchange rates which shall not depart from the official exchange rate by more than 0.5% inclusive of any fees, commissions and charges.
Alternative claims on reserves detracting from safeguarding the currency	The bank is responsible for licensing and supervision not LOLR issues. No money market operations are carried out and credit to government is prohibited, limiting alternative claims on reserves.	The Central Bank is called upon to ensure the stability of the banking system and to protect depositors in the event of systemic risk with excess reserves. Government financing is prohibited but an element of subsidy is provided in payment services for the ministry of finance.
Regulatory and policy making authority : legally enshrined currency stability objective	Art. 2 clearly states that the objective of the CBBH shall be to achieve and maintain the stability of the domestic currency by issuing it according to the rule known as a currency board.	The BNB's purpose is to "contribute to the maintenance of the stability of the national currency, through implementation of the monetary and credit policy" as provided for in Art.2.
References to autonomy	Art. 3 states that within the limits of the Central Bank's authority as established in its Statute, it shall be entirely independent from the Federation of Bosnia and Herzegovina, the Republika Srpska, any public agency and any other authority in the pursuit of its objective and the performance of its task. It calls for the independence of the central bank to be respected and discourages any person to seek to influence any member of its decision making body or interfere in its activities. Autonomy is referred again in Art. 70 which states that in carrying out its tasks the CBBH shall enjoy autonomous regulatory powers and that any regulations, guidelines and instructions it issues have force of law.	Art. 3 describes the relationship between the government and the Bank. In formulating the general outlines of economic and monetary policy, the two are required to inform each other of their intentions and actions. This is complemented by Art. 44 which states that in performing its functions, the Bank shall be independent from any directions of the Council of Ministers and from other State bodies. Appointments are in staggered periods with terms subject to government recommendations.

Direct prohibition of lending to government	Art. 52 describes the role of the central bank as banker, advisor and fiscal agent to the government while stipulating that no transaction carried out by the Bank may serve to extend financial assistance including credit to or for the benefit of Bosnia and Herzegovina. Furthermore it will act as banker and fiscal agent only if there is agreement between the two parties. Art. 53 also provides for the Bank's consultation in matters related to public sector borrowing. Under Art. 67 entitled "prohibited activities of the Central Bank", it is reaffirmed that "except as otherwise specifically authorised by [the Statute], the Bank shall not, under any circumstances, grant any credit."	BNB cannot extend credit in any form whatsoever to the State unless against purchase of SDRs from IMF under the conditions set out in Art. 45 (1) and it is not permitted to buy or sell government securities or any other securities issued by residents.
Freedom in determining interest rate charged on facilities	The operational autonomy is affirmed in a number of articles of the Statute, since the CBBH does not offer any credit, no direct reference to rates charged on facilities could be identified.	Art. 35 empowers the BNB to announce the basic interest rate in accordance with a method determined by the Managing Board and published in the State Gazette.
Transfer of earnings on reserves	The allocation of net profit is made according to Art. 27 in the following order of priority: to increase the authorised capital to a level equivalent to 5% of the aggregate monetary liabilities, to increase the amount of the General Reserve to a level equivalent to the amount of the authorised capital, to special reserves for specific purposes established by the Bank, and any residual net operating profits distributed to the fiscal authorities while any residual net unrealised valuation gains to a Valuation Reserve Account maintained on the balance sheet of the Bank.	The distribution of the BNB's net income to the government is provided for in the Law under Art. 8, and the actual distribution of net income is reported in the BNB's Annual Report. The reserve fund is credited with 25% of the excess of revenue over expenditure, together with a contribution towards special funds, while the state budget is credited with the remainder.
Board appointment, dismissal and accountability provisions	In the first 6 years of operation of the Central Bank, the Governor shall be appointed by the IMF after consultation with the Presidency which will appoint 3 members of the Governing Board. The latter will include 5 members thus selected after this period. Appointments are for 6 year. (Art. 8).	Provisions of the BNB Law for appointing and removing the Governor and the Managing Board are set out under Art. 12. The Governor is elected by the National Assembly, as are 3 Deputy Governors from the recommendations of the Governor. The other 3 non-executive members of the Managing Board are appointed by the President of the Republic. All 7 members service for (staggered) 6-yr terms and can only be dismissed as set out under Art. 14.

Relationship between currency board and central bank	The Central Bank statute clearly states that it operates as a strict currency board arrangement.	The establishment of a currency board arrangement is implied by the BNB law.
Bank supervision responsibilities	The Central Bank Statute requires the CBBH's co-ordination of the activities of agencies responsible for bank licensing and supervision in ways to be determined by the Governing Board as per Art. 2 (e).	Statutory references to bank supervision are laid out in Art. 2 (3) which states that the BNB shall regulate and supervise banks' activities ensuring the stability of the banking system and protecting depositors' interests.
Payment arrangements and systemic liquidity management	Art. 37 clearly prohibits the CBBH from engaging in money market operations involving securities of any type.	Art. 33 prohibits BNB credits to banks except in cases where liquidity risk has systemic implications. It will then extend lev-denominated credits to a solvent bank with a maturity of no longer than 3 months and collateralised by gold, foreign currency or high-liquid assets. The BNB performs the lender of last resort function as set out in Art. 20 and BNB Regulation No. 6. Credits may only be extended in cases of excess reserve backing.
Conformity with IMF transparency codes	Art. 36 calls for the monthly publication of information on the total of convertible marka in circulation and the official foreign exchange reserves of the CBBH, by currency.	Art. 49 regulates the regular publication of the Issue Dept. balance sheet and the assets and liabilities position at the end of each month. The market is given all relevant information on a timely basis about government borrowing plans and auction outcomes.
Exchange rate regime revocation arrangements	Requires a parliamentary decree – no reference to exit contingencies	Only an Act of National Assembly can change CBA – exit loosely linked to EU integration

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