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Monetary policy under currency board arrangements: An necessary flexibility for transition countries?

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W. E. P.

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Monetary Policy under Currency Board Arrangements: A Necessary Flexibility for Transition Countries?

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December 2003

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Monetary Policy under Currency Board Arrangements: A Necessary Flexibility for Transition Countries?*

Kathrin Berensmann

December 2003

---Abstract---

One of the main disadvantages of currency boards is the rule-based character of this system and the resulting inflexibility in case of shocks, a frequently recurring event in transition countries. Accordingly, central banks under currency board arrangements (CBA) are unable to respond to short-term liquidity changes in the money market. To cushion negative effects of economic shocks on interest rates and on the volatility of banks' liquidity the Estonian and Lithuanian central banks have to a limited extent used various monetary policy tools which, however, have neither undermined credibility of the central banks nor the ultimate goal of price stability. The most important instrument has been reserve requirements. Changes of the reserve requirement base, the reserve requirement ratio and several other rules to hold reserve requirements have affected the liquidity of the banking systems in both countries. The significance of reserve requirements becomes clear when reserve requirements are set in relation to the monetary base. Between 1998 and 2000 in Estonia this ratio even ranged between 40 and 50 percent and Lithuania this ratio amounted to about 20 percent during this period. Other instruments than reserve requirements played a minor role because the volume was small.

JEL classification: E42, E52, F33, F41, P20

Keywords: Monetary policy, currency board, exchange rate policy, transition economies

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I. Scope for monetary policy under the Estonian and Lithuanian currency boards	1
A. The rule-based character of currency boards	1
B. Flexibilities under currency board systems	1
1. Estonia	2
2. Lithuania	4
II. Monetary policy instruments under the Estonian and Lithuanian currency board	8
A. Reserve requirements	8
1. Functions of reserve requirements	9
2. Rules for the calculation of reserve requirements	11
3. Rules for calculating the actual level required	15
4. Deposit facility: remuneration of reserve requirements	18
B. Open market operations	22
1. Short-term certificates of deposit in Estonia	22
2. Repurchase agreements for government securities in Lithuania	22
3. Time deposit auctions in Lithuania	23
C. Loans	24
1. Emergency credits	24
2. Overnight loans	25
3. Liquidity loans	26
D. Standing facility	26
III. Conclusion	27

List of figures, boxes and tables

Figure 1: Loans of the Estonian central bank to financial institutions	3
Figure 2: Bank of Lithuania's claims vis-à-vis commercial banks	4
Figure 3: Ratio of reserve requirements to the monetary base in Estonia	8
Figure 4: Ratio of reserve requirements to the monetary base in Lithuania	9
Figure 5: Reserve requirements in Estonia	12
Figure 6: Reserve requirements in national and foreign currency in Lithuania	13
Figure 7: Fulfillment of the reserve requirements in Estonia	19
Figure 8: Interest rates of overnight loans and liquidity loans	25
Box 1: Monetary Policy Programme (1997-1999)	5
Box 2: Examples of financial support provided to banks by the Bank of Estonia	24
Table 1: Monetary policy instruments in Estonia and Lithuania	7
Table 2: Monthly and daily minimum reserve requirements in Estonia	17
Table 3: Comparison of reserve requirements (RR) rules in Estonia and Lithuania	21

Abbreviations

ALR	Additional liquidity requirements
BIS	Bank for International Settlements
BoE	Bank of Estonia
CBA	Currency board arrangement
CD	Certificate of deposit
EBRD	European Bank for Reconstruction and Development
ECB	European Central Bank
EEK	Estonian kroon
ESB	Estonian Social Bank
EU	European Union
Forex	Foreign exchange
IMF	International Monetary Fund
NEB	Northern Estonian Bank
LTL	Lithuanian litas
RR	Reserve requirements

I. Scope for monetary policy under the Estonian and Lithuanian currency boards

A. The rule-based character of currency boards

One of the main arguments against currency boards focuses on the rule-based character of this system and the resulting inflexibility in case of shocks, a frequently recurring event in transition countries. Accordingly, central banks under currency board arrangements (CBA) are unable to respond to short-term liquidity changes in the money market. Nevertheless, the Estonian and Lithuanian central banks have to a limited extent used various monetary policy tools which, however, have neither undermined credibility of the central banks nor the ultimate goal of price stability. Inflation in both countries declined substantially after the introduction of currency boards and remained below 6 percent since 1999 in both countries. (EBRD 2003)

Transition countries are characterized by a high degree of an overall economic instability. At the macroeconomic level, in particular at the initial stage of the transition process, macroeconomic instability is commonly a prevalent phenomenon. Macroeconomic shocks – such as high losses in real GDP, volatile capital flows or interest rates – are events that frequently recur. At the microeconomic level, the aim is to develop institutions as well as the enterprise and financial sector for a market system. Transition economies are often hit, for example, by banking crises which negatively affect the real economy. An appropriate monetary and exchange rate system for transition countries should therefore not only guarantee macroeconomic stability and a restructuring of the enterprise and financial sector but also be flexible enough to cope with economic shocks.

However, under a currency board it is difficult to react to shocks, since such boards are rule-based monetary systems. The three main features of a currency board – a fixed exchange rate, full convertibility and coverage of the monetary base with gold and foreign assets to at least 100 percent – have various implications for central bank balance sheets and thus also for the process of money supply. Liabilities are identical to those of a full-fledged central bank; they include currency in circulation and the total deposits of banks with the central bank. However, assets differ from those of a full-fledged central bank in that they consist only of net foreign assets and gold. Items such as credits to financial institutions or the government are not included. (Hanke et al. 1993) The Estonian and Lithuanian central bank balance sheets indicate that such balance sheets deviate only slightly from those presented under pure currency boards, as can be seen from Figure A1 and Figure A2 in the appendix.

In general, the asset side indicates how the monetary base is created and thus shows how the central bank can influence the monetary base. Consequently, under a currency board system the central bank is unable to directly control its own assets, and therefore the monetary base is beyond its control as well. What we have here is a rule-based monetary policy in which changes in the monetary base are induced by movements in balances of payments. The core of this policy is the rule that no credits will be granted to commercial banks or the government. The reason why market forces play an important role here is that changes in balances of payments are generated by the transactions of economic agents.

B. Flexibilities under currency board systems

Even though this system must be seen as a very rigid one, it does contain certain flexibilities which can cushion economic shocks. First, it provides for balance-of-payments adjustment processes which absorb economic shocks. In the short-term the adjustment

mechanism operates through the uncovered interest rate, and in the medium-term this may also involve adjustment mechanisms similar to those under the gold standard, since the two systems are very similar in nature.

Second, under currency boards central banks can influence the money supply process, at least to a limited extent, by making use of monetary policy instruments. There is one direct possibility to use monetary instruments. The central bank is able to cover the monetary base with foreign currency reserves amounting to more than 100 percent. In this case the central bank can use its reserves in excess of 100 percent for an independent monetary policy. In addition, the central bank can use monetary tools which do not require the creation of high-powered money, above all the reserve requirements. (Berensmann 2002)

The present paper deals with monetary policy instruments used by the Estonian and Lithuanian central banks. Although both systems deviate from a pure currency board system with these monetary policies, the use of such monetary tools have not jeopardized the stability of the monetary and exchange rate systems. On the contrary, this limited use of monetary policy instruments has mitigated the effects on interest rates of the volatility of bank liquidity.

1. Estonia

Although the Bank of Estonia has used several monetary policy instruments, it has neither pursued an active interest-rate policy nor influenced the liquidity of the banking system to the extent that conventional central banks have. From the technical point of view, the currency board system constantly and strongly influences the liquidity of the banking system through the forex window, but this is of course not the outcome of an active central bank monetary policy. The main aim has been to conduct a monetary policy which is based on stability and a fixed exchange rate.

“Due to the currency board arrangement and certain self-regulation of the system the monetary policy of Eesti Pank is directed not towards active interest rate policy and regular liquidity management but, first and foremost, towards a framework enhancing the smooth performance and stability of the fixed exchange rate based monetary system.” (Bank of Estonia 2000a, p. 39)

In Estonia, the central bank has at its disposal a range of instruments which can be financed by excess central bank reserves. According to Article 14 of the Law of the Bank of Estonia, the Estonian central bank can use monetary instruments and establish various regulations.

“The Bank of Estonia has the right to use the following measures to regulate the currency circulation: issuing, buying and selling of securities; establishing the reserve requirement and other regulations to apply to all credit institutions operating in Estonia; granting loans to credit institutions; establishing credit limitations for credit institutions.” (Bank of Estonia 1994b, p. 5)

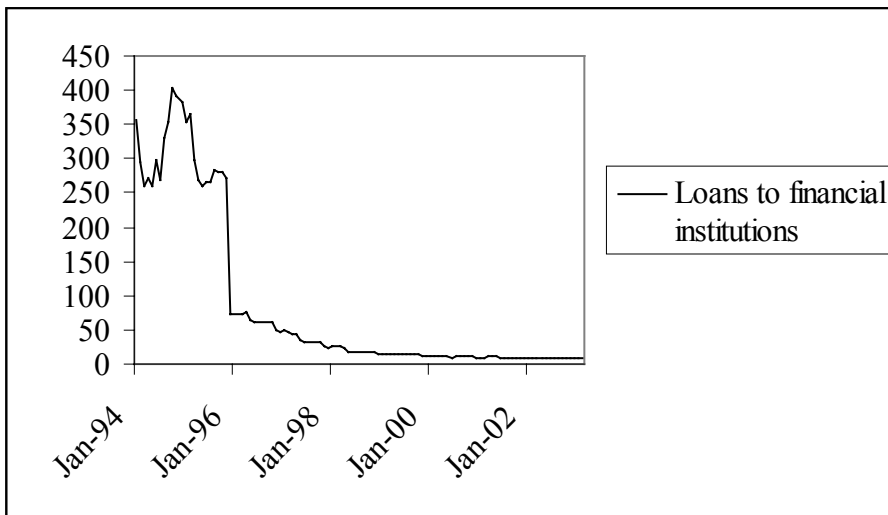
However, only a limited number of monetary tools have been used since the introduction of the currency board. These instruments include the following: changes in reserve requirements, selling or buying of certificates of deposit, the standing deposit facility, and emergency credits aimed at providing liquidity to some banks during the banking crisis.

The Estonian central bank is able to use monetary policy instruments as long as its foreign reserves exceed the minimum amount required under the Estonian currency board system. The Bank of Estonia refers to this minimum amount as the foreign reserves net:

“The central bank can interfere to the extent by which the external reserves at its’ disposal exceed the minimum determined by the currency board. Naturally, the use of such a buffer for regulating liquidity has to be clearly defined and rests on definite rules in order not to harm the general credibility of the currency board framework. On the other hand, the commercial banks’ own liquidity buffers in the central bank (reserve requirement, for example) have been strengthened or the possibilities of the banks to exchange their liquidity reserves kept in foreign currency into the national currency at the central bank (swaps, etc.) have been improved.” (Bank of Estonia 1997a, pp. 55-56)

One of the most important indicators for the use of monetary policy instruments is the central bank balance sheet. In Estonia loans to financial institutions have been very small in relation to foreign assets because credits to financial institutions have amounted at most to 4 percent of foreign assets, with the percentage declining considerably between 1994 and 2002 (Figure 1). The volume of certificates of deposit, which can be found on the liability side of the central bank balance sheet, were low: they varied between 0 and 60 million EEK during 1992 and 2000. The most important monetary policy instrument has been reserve requirements, which amounted to 15 percent of the monetary base in 1996 and rose to about 50 percent in the first half of 1999.

Figure 1: Loans of the Estonian central bank to financial institutions
(In millions of EEK)



Source: Bank of Estonia, 2003b, central bank balance sheet

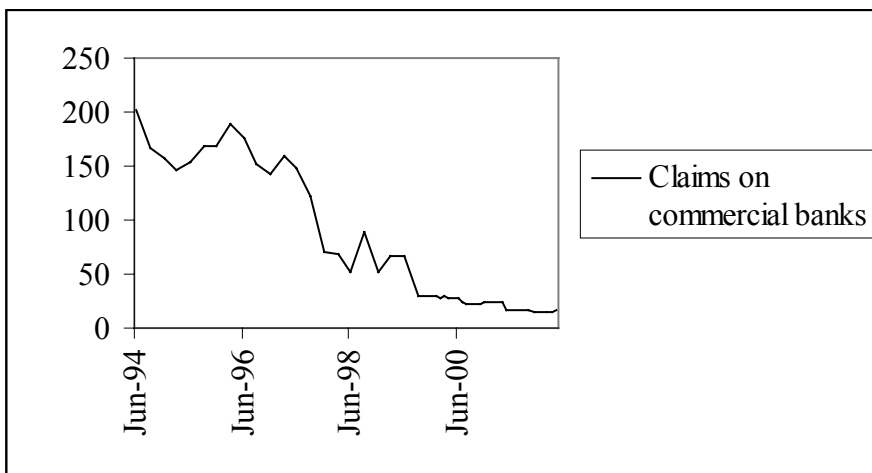
In view of this limited scope, the Estonian central bank is unable to control interest rates. However, if the aim is to express the system in terms of the conventional framework, the indirect ceiling for money market interest rates must be seen as the penalty rate. The indirect floor is the remuneration rate for required reserves, because reserve requirements are the most important instrument of domestic liquidity management. (Bank of Estonia 1998a, Lepik 2000)

“If in these circumstances the lowest possible interest rate is the so-called standing deposit facility rate, then the highest rate on the interbank market is theoretically shaped by the penalty interest rate applied by Eesti Pank to punish credit institutions for non-compliance with the reserve requirement.” (Bank of Estonia 1998a, p. 56)

2. Lithuania

Similarly, the Bank of Lithuania has used monetary policy instruments since the introduction of the currency board in 1994. From 1997 to 1999 the Lithuanian central bank established the Lithuanian Monetary Policy Program, in the course of which the currency board was to have been replaced by a full-fledged central bank. (Bank of Lithuania 1997a) However, in 1999 the Bank of Lithuania set out its Guidelines for the Application of the Bank of Lithuania Monetary Policy Instruments. (Bank of Lithuania 2000b) Under these guidelines, the three main characteristics of currency boards were not to be abandoned, although a wider range of monetary tools had been established since mid-1997. The central bank balance sheet indicates, however, that the volume of credits granted to banks was small between 1994 and 2002 as can be seen from Figure 2.

Figure 2: Bank of Lithuania’s claims vis-à-vis commercial banks
(In millions of litas)



Source: Bank of Lithuania, 2003

Monetary policy instruments prior to the Monetary Policy Program (1994-1997)

Under the Law of the Bank of Lithuania, the use of monetary instruments was restricted by the “Law on the Credibility of the litas”; the following monetary or other instruments were available between 1994 and 1997: Rediscount operations (Article 26), credit operations (Article 27), reserve requirements (Article 2), purchase and sale of debt instruments (securities) issued by the Republic of Lithuania (Article 26). In the latter case, since the Bank of Lithuania acted only as a fiscal agent, these instruments could not be seen as a monetary tool of the central bank.

The Monetary Policy Program

In January 1997 the Bank of Lithuania established the Monetary Policy Programme for 1997-1999 in order to provide a three-stage exit strategy for the currency board system (Box 1). The main aim of the Monetary Policy Program was to intensify economic relations with the EU and, finally, to join the EMU. Although the program was to consist

of three stages, the Bank of Lithuania failed to implement the second and third stages. (Bank of Lithuania 1997a; Berensmann 2002, IMF, 1999b)

Box 1: Monetary Policy Programme (1997-1999)

The first stage

In the first stage the Bank of Lithuania introduced several monetary instruments such as repo transactions for government securities between the central bank and banks; these were interest-rate auctions. Lombard loans were provided for but not used. Reserve requirements were maintained. The Bank of Lithuania could have issued rediscount bills of exchange and reverse repos, though it chose not to do so.

The second stage

At this stage the currency board was to have been replaced by a full-fledged central bank which would have been able to conduct monetary policy. At the same time, the indicators and limitations were to have been shifted from net foreign reserves to net domestic assets, defined as reserve money minus net foreign reserves. The net foreign reserve requirements of the Bank of Lithuania established in Article 1 in the Law on the Credibility of the litas would thus have been abolished. However, net foreign reserve requirements would not have been abrogated fully because Article 1 would have included the following provision: “the litas put into circulation by the Bank of Lithuania must be covered by gold reserves and convertible foreign currency reserves of the Bank of Lithuania to the extent necessary to ensure uninterrupted external payments and stability of the above amendments.” (Bank of Lithuania 1997a, pp. 13)

Formally, the Bank of Lithuania would have advised the government to amend the Law on the Credibility of the Litās. One amendment would have referred to the assets of the Bank of Lithuania, which would have been allowed to provide credits to domestic credit institutions. However, the Bank of Lithuania would not have been allowed to provide credits to the government. The second feature of the currency board (established in Article 3), the fixed exchange rate, would have changed in the following way: the anchor currency would have been a currency basket of euros and US-\$. The exchange rate and the composition of the basket would have been established by the Bank of Lithuania in coordination with the Government of the Republic of Lithuania.

In the case of crisis, a 20 percent decrease of the foreign currency reserves of the Bank of Lithuania and/or if the crisis continued for more than three months, the Bank of Lithuania would have established the following provisions: 1.) the required reserves against foreign currency liabilities could have been converted into litas; 2.) commercial banks would be able to include cash balances to meet their reserve requirements; 3.) government securities denominated in litas would be accepted as part of the required minimum reserves; 4.) the central bank would be able to require different rates for reserve requirements on different kinds of deposits; 5.) the Bank of Lithuania would be able to extend repo transactions of government securities in the primary and secondary markets; 6.) the Bank would be allowed to provide more liquidity loans to commercial banks with the aim of bolstering public credibility; and 7.) the Law on the Insurance of Deposits of Individual would be open to extension.

The third stage

This stage would not have begun before 1999, i.e. before the introduction of the euro. At the beginning of this stage, the litas would have been pegged to a single currency or to a currency basket. However, this pegging of the litas to the euro and US-\$ basket would have ended after two years because Lithuanian monetary and financial policy must comply with the EU membership requirements by the end of 2000. The peg to the euro -US-\$ currency basket would not have been implemented if external payments (structure of public debts and deposits at banks) had increased in EU currencies. Initially, the exchange rate would have been fixed in absolute terms. However, an exchange rate band could have been introduced, at the end of 1999 at the earliest.

Source: Bank of Lithuania 1997a

Guidelines for Monetary Policy

In contrast to the Monetary Policy Program, the Guidelines for Monetary Policy, which were established on 1 July 1999, abide by the main features of the currency board.

“I. General Provisions

1. The Guidelines for the Application of the Bank of Lithuania Monetary Policy Instruments have been prepared in accordance with the Monetary Policy Programme of the Bank of Lithuania for 1997-1999.

2. The purpose of this document is to specify the guidelines for the application of the monetary policy instruments of the Bank of Lithuania under the conditions of the fixed exchange rate regime of the Litas by defining the goals, conditions and limits thereof, and to provide for the improvement of monetary policy instruments having regard to the changes in the economic environment and Lithuania’s intention to become a member of the European Union and, at a later stage, to satisfy requirements set for the participation in the Economic and Monetary Union.

3. The guidelines for the application of the monetary policy instruments of the Bank of Lithuania shall depend upon:

3.1 fixed exchange rate regime of the Litas and unrestricted exchange of the Litas into the anchor currency (currencies) and the anchor currency (currencies) into the Litas, performed by the Bank of Lithuania; and

3.2 the principle of full backing of the Litas-denominated liabilities of the Bank of Lithuania by gold and convertible foreign currency reserves held by the Bank of Lithuania.” (Bank of Lithuania 2000b, Resolution of the Board of the Bank of Lithuania, On the Guidelines for the Application of the Bank of Lithuania Monetary Policy Instruments)

“The Bank of Lithuania is committed to stabilisation of the external value of the currency. The use of monetary policy instruments shall be based on the principle of the full backing of the litas denominated liabilities of the Bank of Lithuania by gold and convertible foreign currency reserves held by the Bank of Lithuania.” (Abazorius 2000, p. 3)

Since 1997 the Bank of Lithuania has been allowed to pursue monetary policy on the basis of monetary tools which grant commercial banks access to new credit lines. These monetary instruments include: overnight lombard facilities, liquidity loans (lender of last resort loans), repurchase transactions, reserve requirements and time deposit auctions. (Bank of Lithuania 1997a) Reserve requirements were not abolished and are still in use, as described above. Table 1 provides an overview of the instruments used by both central banks.

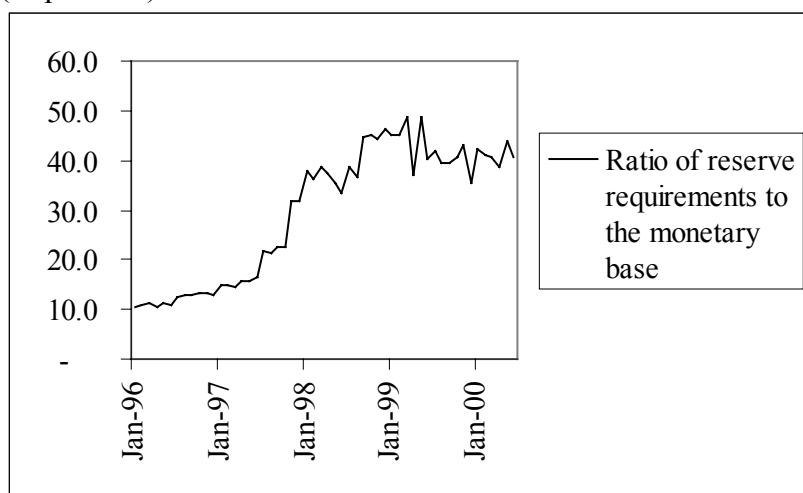
Table 1: Monetary policy instruments in Estonia and Lithuania		
	Estonia	Lithuania
RR^a	The most important instrument	The most important instrument
Standing deposit facility	a) Remuneration of the whole RR since 7/00 at the ECB deposit rate b) Remuneration of the RR above the monthly minimum rate <ul style="list-style-type: none"> • 7/96-10/97: interest set by the BoE • since 11/97: Bundesbank discount rate • since 1/99: ECB deposit rate 	
Emergency credits	Few emergency credits	Few emergency credits
Standing facility	Forex market <ul style="list-style-type: none"> • 6/92 – 6/96 exchange rate spread of DM/EEK purchases and sales: 0.002 EEK • since 7/96 no spread 	Forex market Since 4/94 exchange rate spread of US-\$/LTL (Euro/LTL) purchases and sales: <ul style="list-style-type: none"> • 0.1 % of amount for 2-day transactions • 0.15 % of amount for 1-day transactions • 0.25 % of amount for same-day transactions
Overnight loan		Has rarely been used until 6/2003
Liquidity loans		<ul style="list-style-type: none"> • Interest rate: Until 11/1999: 13%; since 11/1999: VILIBOR+4% • Maturity 1-3 month • Irregular
Open market operations: repurchase agreements	Short-term certificates of deposit 3/93 – 5/00 28-days discountable CDs with a limited issue up to 30 mill. EEK transactions on the secondary market	a) Repurchase agreements 4/97-10/98 <ul style="list-style-type: none"> • Repurchase transactions for government securities • 1 month • interest rate auctions b) Time deposit auctions 8/97-2/00 <ul style="list-style-type: none"> • Lower limit of interest rates • Irregular • Maturity: 6-14 days
Facility to sell foreign securities	Since 1/2001 the BoE can buy securities from banks, which fulfill the quality requirements established to meet RR	
^a For a detailed description of RR see Table 2 and Table 3. Source: Bank of Estonia (1997a), (2000), (2001) and (2003a); Bank of Lithuania (1997a), (1998a), (1999a), (2000a), (2001), (2002)		

II. Monetary policy instruments under the Estonian and Lithuanian currency board

A. Reserve requirements

Since the introduction of the currency boards in Estonia and Lithuania, reserve requirements have been used actively as a monetary instrument and have been the most important monetary tool in use. The significance of reserve requirements becomes clear when the Estonian reserve requirements are set in relation to the monetary base (Figure 3). At the beginning of 1996¹ monthly minimum requirements amounted to roughly 15 percent of the monetary base, but this ratio increased substantially to 22 percent in July 1997, rising to 32 percent in November 1997. The latter upsurge reflected the introduction of additional liquidity requirements in the same month; these are added to the minimum monthly reserve requirements in Estonia. Additional liquidity requirements have nearly the same effect as an increase in the reserve ratio. The rises in May 1998 and also in September and December 1998 were due primarily to substantial declines in the monetary base² and a broadening of the base of calculation. The decline in this ratio in April 1999 was mainly generated by a substantial increase of the monetary base.

Figure 3: Ratio of reserve requirements to the monetary base in Estonia
(In per cent)



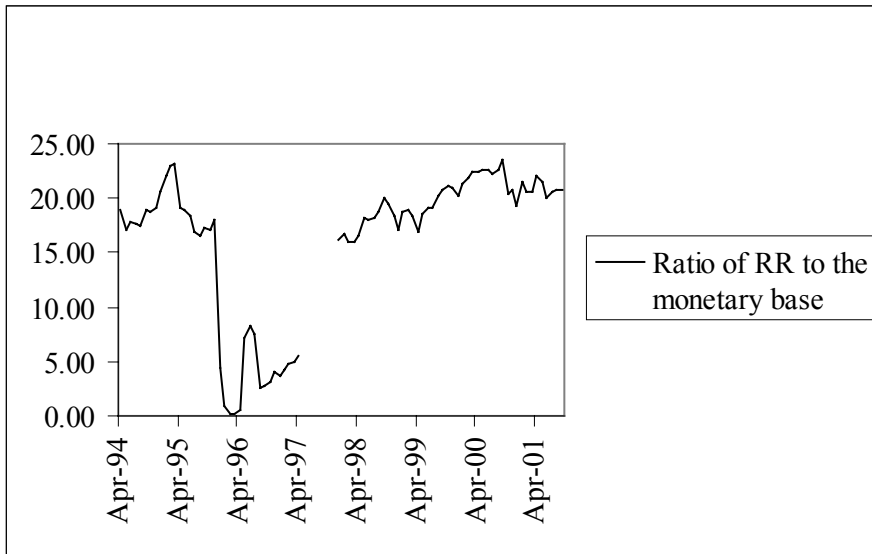
Source: data provided by the Bank of Estonia and IMF, 2001, own calculation

Reserve requirements in Lithuania have been less important compared to Estonia. Before the banking crisis of May 1994 to November 1995, reserve requirements in national and foreign currencies were between 17 and 23 percent of the monetary base (Figure 4). Subsequently, the Bank of Lithuania decreased reserve requirements substantially to 0.2 percent of the monetary base in order to ease a liquidity crisis of the banking system which occurred between November 1995 and April 1996. However, during 1997, reserve requirements as a percent of the monetary base went up again. (Berensmann 2002)

¹ Earlier data were not available.

² These low levels of the monetary base mainly resulted from the Russian crisis and the subsequent capital outflows, which took place in August of the same year.

Figure 4: Ratio of reserve requirements to the monetary base in Lithuania
(In per cent)



Between May and November 1997 data for reserve requirements were not available.

Source: data provided by the Bank of Lithuania and IMF, 2001, own calculation

1. Functions of reserve requirements

Five main functions of reserve requirements are relevant for the transition process: they provide a monetary tool for which the central bank does not need to create central bank money; they limit the expansionary effects of capital inflows on domestic credit; they assume the role of a buffer and stabilizer of money market interest rates; they serve to control the liquidity of commercial banks; and they serve to avoid crises of confidence.

Both central banks have sought to limit capital inflows by extending the reserve requirement base. The central banks have sterilized capital inflows, which have had an expansionary effect on the monetary base and thus on monetary aggregates, by extending the reserve requirement base to include net liabilities of banks vis-à-vis foreign banks. (Bank of Estonia 1999b and Bank of Lithuania 1999a and 2000a)

“Whereas the restrictive and liquidity functions of the minimum reserve system have been the matter of reserve requirement level, the capital inflow sterilisation issues have been first and foremost related to the composition of the reserve base. For example the introduction of financial guarantees and net credit position of the resident banking sector vis-à-vis the foreign banks in the reserve base have served the aim of dampening excessive capital inflows inflating the macroeconomic environment. Thus the sterilisation issue has to be analysed also through reserve requirement base.”
(Bank of Estonia 2000c, p. 10)

According to resolution No. 52 II 1. of the Board of the Bank of Lithuania, reserve requirements are to be used as a monetary policy instrument aimed at influencing the liquidity of the Lithuanian banking system. (Bank of Lithuania 1995 and 2000a, p. 42) Reserve requirements are an indicator of the liquidity stance of banks, an especially

important factor in transition countries, where banking supervision is difficult. (Abazorius 1996)³

“Required reserves shall be an instrument of the monetary policy of the Bank of Lithuania, which aids in the regulation of money supply and liquidity of the banking system.” (Bank of Lithuania 1995, p. 63)

The stabilizer or buffer function is important in currency board regimes because the institutional setting of currency boards lacks a lender of last resort. Other than monthly averaging, under currency boards central banks lack built-in stabilizers such as the monetary policy tools used. In addition, the stabilizer or buffer function is crucial in transition countries because the risk of monetary shocks is more severe in the environment of transition countries than in advanced industrialized countries.

“Within Estonia’s monetary policy set-up the main objectives of the reserve requirements has been to act as a liquidity buffer in the monetary system and in certain cases also to curb excessive economic activity. At the same time has prevailed the liquidity guarantee function, which lies in creating sufficient buffers against short-term volatility. As the currency board arrangement limits the ability of the central bank to manage the liquidity in the monetary system as well as to provide liquidity support, the reserve requirement has a significant role in securing the stability of the Estonian kroon.” (Bank of Estonia 1999b, p. 40)

In both countries reserve requirements can to some extent serve to cushion interest rate movements. In Estonia, for example, reserve requirements as a percentage of the monetary base have ranged between 15 and 50 percent. Moreover, the fact that banks are allowed to hold their reserves on a monthly-average basis contributes to cushioning interest rates. The influence of these monetary tools on the monetary base has been substantial by currency board standards. However, their influence is quite small compared to the discretionary powers of central banks in industrialized countries, where the central bank has a greater influence on the monetary base.

“Its main function is to provide buffer reserves for the settlement system in order to guarantee the regular daily payments.” (Ross, T. and M., 1995, p. 14)

Under currency board regimes, reserve requirements can be a very important instrument for releasing or absorbing at least some of the system’s liquidity because central banks under currency boards have access to other instruments only to a limited extent. For reserve requirements, however, central banks do not need high-powered money to use this instrument. Both central banks affected the liquidity of the banking systems by changing reserve requirement bases, by varying the amount of cash holdings, which banks are permitted to deduct from their required reserve holdings. In Estonia, additional liquidity requirements served to absorb liquidity. In Lithuania, reserve requirement ratios were changed several times since the introduction of the currency board arrangement.

In view of the level of confidence in the banking system, already low as a result of its underdevelopment, the risk of crises of confidence is a good reason to introduce reserve

3 “On the other hand, primitive as it may seem, reserve requirements is the indicator of liquidity and solvency. The failure of the bank to implement reserve requirements is the primary sign of a liquidity crisis.” (Abazorius 1996, p. 10)

requirements in transition economies . In fact, all of the Baltic states experienced deep banking crises between 1992 and 1996, some of which resulted in bank runs. (Berensmann 2002)

“To increase the liquidity of the financial system and to reduce its vulnerability to runs of deposits, banks may be subject to reserve requirements in excess of amounts strictly needed by banks as settlement balances, as in Estonia and Lithuania and, until recently in Argentina.” (Balino et al. 1997, pp. 21-22)

2. Rules for the calculation of reserve requirements

Reserve requirement base

In Estonia credit institutions are required to pay reserve requirements for demand, savings and time deposits in domestic and foreign currency which are owned by central and local governments, non-financial public enterprises, private enterprises, non-bank financial institutions and individuals. (Bank of Estonia 1992; Decision No. 1 of 17 June 1992; BIS, 1995 and 1998) The following items were excluded from the base used to calculate reserve requirements until 1996: commercial bank debts to the central bank, lending and foreign grants (= technical assistance funds) to the government, deposits from other commercial banks and net liabilities vis-à-vis foreign banks.

In July 1996 the calculation base was extended to include other securities or other bank debts of the same nature⁴. It also became necessary to cover certain types of securities because commercial banks were seeking to minimize their reserve requirement levels. (Bank of Estonia 1996, President's decree No. 16) Since banks did not have to pay in reserve requirements for credits with foreign banks, reserve requirements had negative allocation effects. As a consequence, banks sought to circumvent them. For these reasons – i.e. to achieve an equal treatment of foreign and domestic credits, to limit credit expansion and to enhance liquidity buffers – net liabilities of banks vis-à-vis foreign banks have been included in the reserve requirement base since July 1997.

Furthermore, non-monetary financial institutes which offer close substitutes for the credits granted by commercial banks were not affected. Accordingly, commercial banks had a disadvantage compared to non-monetary financial institutes. Banks sought to circumvent reserve requirements by channeling capital inflows through non-bank financial institutions. Consequently, the basis was further extended: credits to other commercial banks and financial guarantees issued to financing institutions and non-resident credit institutions have also been subject to reserve requirements since August 1998.⁵ This measure has not only limited the circumvention of reserve requirements but has also improved the monetary system's liquidity buffers. The volume of required reserves has gone up and the volume of banks' guarantees to foreign credit institutions and non-bank financial institutions has declined. (Bank of Estonia 1998b; 1998c; 1999a)

The Bank of Estonia successfully used these extensions of the reserve requirement base to influence the liquidity of the banking system. Figure 5 shows that reserve requirements increased considerably in July 1997 as well as in August/September 1998. However, these extensions were necessary to ensure that all domestic and foreign financial institutions

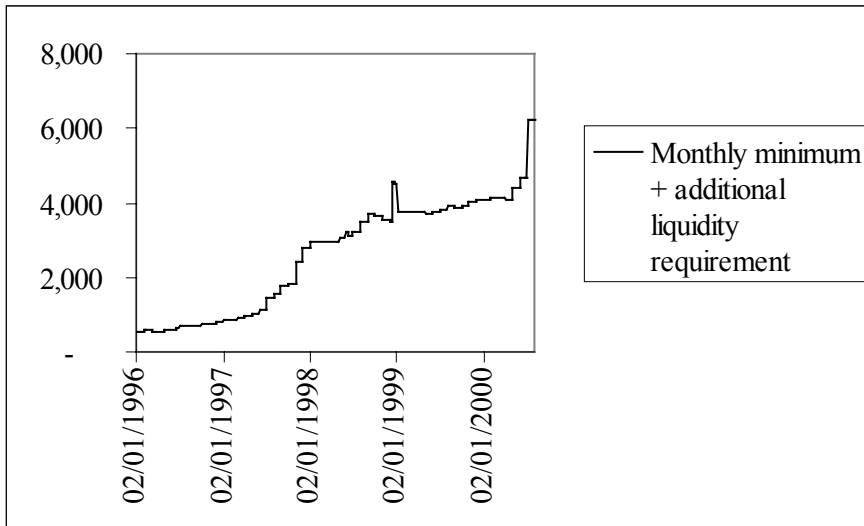
4 No further information is available on maturities.

5 In August 1998 only 50 per cent of the enlarged part of the reserve requirement base was subject to reserve requirements, and in September the figure was 100 per cent. The Bank of Estonia's intention was to cushion the effect of the extended reserve requirement base. (Bank of Estonia 1999a)

were treated equally. In addition, they absorbed liquidity from the banking system in the face of substantial capital inflows. Moreover, these changes improved liquidity buffers.

Figure 5: Reserve requirements in Estonia

(In millions of EEK)



Source: data provided by the Bank of Estonia

In Lithuania, the reserve requirement base has been enlarged considerably since April 1994. Initially, reserve requirements were only demanded for liabilities to residents in domestic currency as well as in freely convertible currencies (time and demand deposits, including balances in customers' clearing, current and other accounts). Since January 1997, commercial banks' liabilities in foreign currency have also been subject to reserve requirements. In August 1997 the reserve requirement base was enlarged to include commercial banks' liabilities in non-convertible currencies. As a result of these expansions, and due to increasing deposits at banks, the calculation base went up considerably from January 13, 1997, to December 13, 1997 (maintenance starting 13, December): in domestic currency the increase amounted to 62.5 percent and for foreign currency the figure was 42.1 percent. (Bank of Lithuania 1998a)

In January 1998⁶ the calculation base was extended to non-residents holding both domestic and convertible currencies. The reasons for this were, first, that the Bank of Lithuania desired to treat all banks equally; and, second, the central bank aimed to guarantee bank liquidity. To avoid negative effects on the liquidity of banks, the Bank of Lithuania required only 5 percent for non-residents' liabilities in mid-January 1998; this was increased by 1 percent every month until a figure of 10 percent was reached.⁷

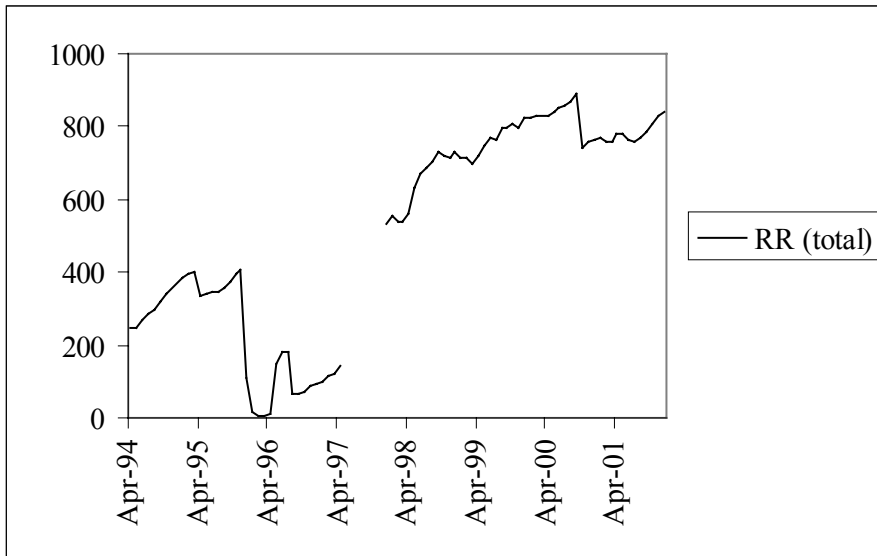
In April 1998 the base was further enlarged to include commitments to foreign commercial banks. Like the Estonian central bank, the Lithuanian central bank set out to limit bank lending in foreign currencies and thereby to restrict capital inflows. Nevertheless, foreign liabilities of banks increased by nearly 50 percent from the end of 1997 to the end of 1998. Since April 1998 commitments to other domestic financial institutions have also been included in the base used to calculate reserve requirements. These extensions of the calculation base increased reserve requirements, which is shown in Figure 6. Required reserves in domestic currency

6 The Bank of Lithuania had already decided about this extension in 1997, although it became effective only in January 1998.

7 Reserve requirements imposed against convertible foreign currencies and paid either in US-\$ or in German marks. (BIS 1995; Lithuania VI. Conduct of Monetary Policy)

went up by 19.3 million litas, the corresponding figure for foreign currencies being 180.3 million litas. The calculation base increased 2.1-fold (1803.1 million litas). In April 1998 reserve requirements in foreign currency increased by 52 million litas compared to March of the same year. (Bank of Lithuania 1999a, 1999b and 2000a)

Figure 6: Reserve requirements in national and foreign currency in Lithuania
(In millions of litas)



Between May and November 1997 data for reserve requirements were not available.

Source: Bank of Lithuania, 1999a, 2000a and data provided by the Bank of Lithuania

Moreover, the Russian crisis also affected the development of reserve requirements. While reserve requirements increased steadily from May to October 1998, they declined considerably in the fourth quarter of 1998. Reserve requirements in domestic currency declined by 4.8 percent between 13 October and 12 December because a substantial amount of litas was exchanged into foreign currency. Since the first stage of the restoration of savings began in November 1998, required reserves in domestic currency equaled those at the end of the third quarter. Similarly, required reserves in foreign currencies went up between April and September 1998, but remained at the same level in the fourth quarter of 1998, despite exchange of domestic currency into foreign currency. Domestic and foreign investors began to exit the Lithuanian financial market. However, in December part of restored savings was also deposited in foreign currencies. (Bank of Lithuania 1999a)

As deposits of the State Social Security Fund, state and local governments, and assets of private enterprises in transit accounts declined in 1999, required reserves in domestic currency fell by 3.2 million litas, despite savings restoration (1,260.46 million litas) in 1999. The latter led to an increase of deposits in litas by 33.5 percent (483.1 million litas). However, a considerable share of these savings was held in foreign currency deposits. The calculation base for reserve requirements in foreign currencies went up by 27.6 percent (944.6 million litas). Consequently, required reserves grew by 94 million litas. (Bank of Lithuania 2000a)

Deposits with maturities above one year denominated in both domestic and foreign currencies have not been subject to reserve requirements since October 1997. This policy aims at raising the incentive for commercial banks to attract long-term deposits, as these banks are able to offer better conditions for long-term credits. However, in view of the relatively low deposits at banks with these maturities, this measure had not had a decisive

influence on reserve requirements by the end of 1999. This measure took time to become effective. (Bank of Lithuania 1998a and 1998b, Rules for required reserves of commercial banks, Resolution 18 September 1997, No. 205 and June 26 1997 No. 141)

Additional liquidity requirements

Estonian commercial banks had to meet so-called additional liquidity⁸ requirements between November 1, 1997, and June 30, 2000; these were introduced for the following reasons: to increase liquidity buffers, to contribute to a declining credits and to maintain financial stability in case of financial crisis. Consequently, deposits of banks with the Bank of Estonia increased substantially. In addition, the establishment of additional liquidity requirements provided a positive signal during the Asian crisis at the end of 1997. (Bank of Estonia 1998a and 1999a)

The base used to calculate additional liquidity requirements is identical to the base used for reserve requirements. Banks can use their demand deposits only to meet additional liquidity requirements. As for reserve requirements, additional liquidity requirements only have to be met on a monthly-average basis, and they are calculated in the same way as reserve requirements. The maintenance period begins on the first banking day of the following month. Initially, the ratio amounted to 2 percent of the reserve requirement base, though this figure this was increased one month later to 3 percent. The penalty for failure to meet additional liquidity requirements was a rise in reserve requirements. (Bank of Estonia 1997c, President's decree: on establishing additional liquidity requirements to credit institutions)

Additional liquidity requirements have nearly the same effect as an increase of the reserve ratio. In contrast to the reserve requirements, additional liquidity requirements were remunerated at the Deutsche Bundesbank's discount rate until December 1998, and since January 1999 they have been remunerated at the ECB deposit interest rate. Reserve requirements have only borne interest since July 1999. Figure 5 illustrates the impact of additional liquidity requirements on reserve requirements in November/December 1997.

Calculation period

To calculate the required reserve level, liabilities are usually multiplied by reserve ratios. In Estonia, the calculated reserve requirement level has been based on the average of the liabilities at the end of three ten-day periods (end of the month, following 10 days, following 20 days) since July 1996. In Lithuania, the required reserve level is calculated by multiplying liabilities by reserve ratios. In Lithuania calculation of reserve requirements is based on the average of four specific dates during a one-month period (7th, 15th, 23rd, and 30th/31st). The exchange rates on these days are used as the base to calculate the reserve requirements in foreign liabilities.⁹

Reserve ratio

In Estonia, the ratio was changed only in 1992 when it was reduced from 15 percent to 10 percent. On the contrary in Lithuania, reserve ratios have been used actively as a monetary tool to provide liquidity to commercial banks.¹⁰ In April 1995 the Bank of

8 One reason for introducing additional liquidity requirements and not increasing the reserve ratio was that the central bank was able to establish this measure without a legal act; i.e. it could be put into effect immediately.

9 If these days are bank holidays, the exchange rates of the preceding business days are used instead.

10 Apart from one exception, all Lithuanian commercial banks have been subject to reserve requirements. At the end of 1994, the State Agricultural Bank was exempted from reserve requirements because it

Lithuania lowered the reserve ratio from twelve to ten percent, a level at which they remained until February 1996. However, banks had been exempted from reserve requirements from February until May 1996 because they faced liquidity problems, partly due to the banking crises. In May 1996 the rates of required reserves were raised to five percent, in June they rose to six percent, and subsequently they were gradually extended by one percentage point in every three-month period, reaching a level of 10 percent in June 1997. In 2001, reserve requirement ratio was lowered to 8 percent. (Bank of Lithuania 1996 Resolution No. 122, 1998a and 2002)

3. Rules for calculating the actual level required

The rule used to calculate the actual level required determines whether banks have to maintain actual reserve requirements on average over a month or on a daily basis. In Estonia, commercial banks had to hold reserve requirements on a daily basis until July 1996. Since then, reserve requirements have only had to be met on a monthly-average basis. This new regulation is advantageous since it cushions fluctuations in liquidity needs during a reserve period without the intervention of the central bank. Banks are able to balance short-term deficits with surpluses over a month, which also supports the stability of interest rates in the money market. Reserve requirements are a kind of working balance. (Bank of Estonia 1997a) This buffer function decreases within the maintenance period because the number of days available to compensate for reserve deficiencies on previous days declines towards the end of the period.

The calculated reserve requirement level has been based on the average of the ends of three ten-day periods (end of the month, following 10 days, following 20 days) since March 1993. The last calculation is done on the 20th, and it is valid for the following month. Reserve requirements for the next month begin on the first banking day of each month. (Bank of Estonia 1996, President's decree No. 16) Hence, the calculation period goes ahead the maintenance period. This increases bank flexibility because banks are aware of the required reserve level before they have to meet the reserve requirements.

In Lithuania, commercial banks have to meet their reserve requirements on average over a given month. The maintenance period starts on the 13th day of every month and ends on the 12th day of the following month. The calculation periods for actual and required reserves are therefore not identical: they are instead staggered, with the calculation period preceding the maintenance period. For example, if the calculation period is April, then the maintenance period begins on 13 May and ends on 12 June. The central bank is obliged to calculate required reserves by 10 May.¹¹

Consideration of vault cash for meeting reserve requirements

Since July 1994 banks have been allowed to include their EEK cash in their required reserves, though initially they were able to use up to 50 percent of total reserve requirements. This measure boosted the liquidity buffers of banks and reduced the level of reserves required to be held with the Bank of Estonia. In 1994 this released funds totaling about 160-170 million kroon to the banking system. (Bank of Estonia 1994c, Decree No. 1 of the 4 July 1994, (1), (2), (3); Bank of Estonia 1995; Ross, M. and T., 1995) Restructuring of reserve requirements in July 1996 by the Bank of Estonia decreased the deductibility of cash holdings by 10 percent. From July 1997 until June 1998 banks were

provided US-\$ 12.5 million to the state energy system. Foreign banks and their branches are obliged to meet the same reserve requirements as residents.

11 This is based on the Resolution 52 and its various extensions (Bank of Lithuania, Acts of Law Regulating the Activities of the Banks of Lithuania, various issues).

allowed to put only 30 percent into account. As cash demand declined, banks have been able to deduct only 20 percent since July 1998. In addition, the Bank of Estonia sought to increase liquidity buffers. (Bank of Estonia 1997c and 1998b and 1999a)

In general, vault cash is barred from consideration in Lithuania, but during the banking crisis (from January until March 1996) banks were able to use their entire cash balances as reserve holdings. In December 1994 banks were allowed to cover a part of their reserve requirements with newly issued treasury bills (US-\$ 12 million) as a means of increasing bids at treasury bill auctions. This measure served to support the government's fiscal policy. At the same time, this implied a relaxation of reserve requirements. (Camard 1996)

Consideration of foreign assets for meeting reserve requirements

Since January 2001 banks have been allowed to include foreign assets in fulfilling their reserve requirements. Eligible assets have to be denominated in euro and they need to be high quality assets which have a credit rating (at least S&P AA-/Moody's Aa3). Between January and June 2001 banks were permitted to meet 25 percent of their reserve requirements with foreign assets and since July 2001 banks could cover 50 percent of their reserve requirements with foreign assets. The Bank of Estonia has intended to make this instruments more market-based.

Banks used foreign assets to meet reserve requirements. Consequently, banks increased their external buffers, i.e. Estonian banks extended their opportunities to manage their liquidity in money markets of the euro area. According to the Bank of Estonia the monetary effect of the reform has been neutral since the reform was established because the expansion of high quality foreign assets equaled the contemporaneous reduction in the kroon reserve requirement. (Bank of Estonia 2002 and 2003a)

Daily minimum reserve requirements

Substantial fluctuations of reserve requirements can be reduced by establishing ceilings on daily variations of reserve requirements from the average or by establishing a floor referred to as the daily minimum reserve requirement. Since July 1996 the balance of any account has not been allowed to fall below the minimum level during any one banking day (Table 2).

Table 2: Monthly and daily minimum reserve requirements in Estonia

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Monthly minimum RR¹ with ALR²	10% of the RR-base	10% of the RR-base	10% of the RR-base	10% of the RR-base	10% of the RR-base	13% of the RR-base (since 1.12.97)	13% of the RR-base (since 1.12.97)	13% of the RR-base (since 1.12.97)	13% of the RR-base (since 1.12.97)	13% of the RR-base (since 1.12.97)
- ALR	-	-	-	-	-	3% of the RR-base ³ (1.12.97)	3% of the RR-base	3% of the RR-base		
Monthly minimum RR (MMRR) without ALR	15% of the RR-base (1.6-1.10.92) 12% of the RR-base (1.10-1.12.92) 10% of the RR-base (since 1.12.92)	10% of the RR-base	10% of the RR-base	10% of the RR-base	10% of the RR-base	10% of the RR-base	10% of the RR-base	10% of the RR-base	13% of the RR-base	13% of the RR-base
cash component in monthly RR	-	-	50% (1.7.94)	50% of monthly minimum RR	40% of monthly minimum RR (since 1.7.96)	30% of monthly minimum RR (since 1.7.97)	20% of monthly minimum RR (since 1.7.98)	20% of monthly minimum RR (since 1.7.98)	20% of monthly minimum RR (since 1.7.98)	20% of monthly minimum RR (since 1.7.98)
Daily minimum RR	100% of MMRR	100% of MMRR	100% of MMRR	100% of MMRR	20% of MMRR	40% of MMRR ⁴	40% of MMRR	40% of MMRR	40% of MMRR	40% of kroon RR

1 RR=Reserve requirement

2 ALR=Additional liquidity requirements

3 2% in 11/97

4 since 1.11.97

Source: Bank of Estonia, 1997a, p. 61; 1998a, p. 57 ; 1999a, p. 50; 2000c, pp. 3 and 2001, p. 45; 2002, 49; IMF, 1995, p. 25

In Estonia daily minimum reserve requirements have changed substantially. In 1996 daily minimum reserve requirements amounted to 20 percent of the reserve requirement (or 2 percent of the reserve requirement base) and to 4 percent of the reserve requirement base in November 1997 and 5 percent in December 1997. The increase of both levels is due to the introduction of additional liquidity requirements, with commercial banks having to meet additional liquidity requirements since 1 November 1997. The purpose of the augmentation of daily minimum reserve requirements set by the Bank of Estonia was to stabilize bank liquidity fluctuations over a month, which were high at the time of introduction as a consequence of the Asian crisis. In addition, the higher reserve requirements offer more flexibility to the Bank of Estonia in times of crisis. (Bank of Estonia 1997a and 1998a)

The increase of daily minimum requirements effected by means of additional liquidity requirements in November 1997 is clearly evident in Figure . The difference between monthly minimum requirements with and without additional liquidity requirements can also be observed. In addition, the figure depicts fluctuations of the balance of banks' clearing accounts with the Bank of Estonia at the end of the day. (Bank of Estonia 1997b) The monthly average balance of banks' accounts for the most part surpassed additional liquidity requirements and monthly minimum requirements until the autumn of 1998. The figure shows that banks had large amounts of excess reserves for a long period of time. However, liquidity buffers declined as a result of the Russian crisis. In the last quarter of 1998 the monthly average balance accounts of banks were below the additional liquidity requirements for a longer period.

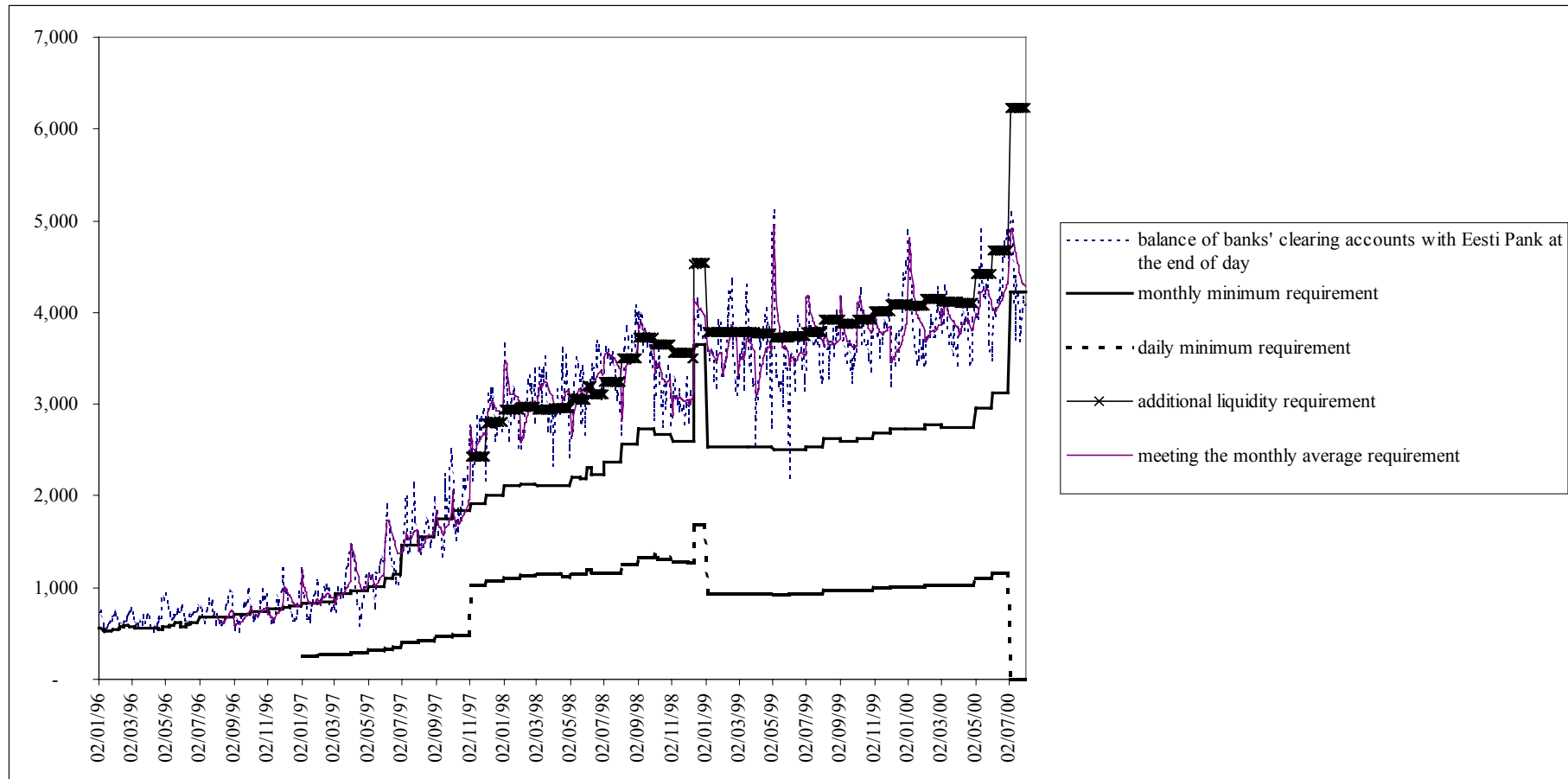
The increased additional liquidity requirements implemented in December 1998 were imposed for one month by the central bank as a penalty, because banks had failed to meet the previous month's minimum requirements. However, already by the end of February 1999 banks' accounts with the central bank surpassed additional liquidity requirements by 100 million EEK. (Bank of Estonia 1999a) The increase in reserve requirements in May 2000 was related to an international bond issue by Hansapank (2.35 billion EEK) and the rise in July 1999 was generated by the first step of operational framework reform: the unification of additional reserve requirements with minimum reserves or liquidation of additional reserve requirements with a simultaneous rise in reserve requirements. For banks nothing really changed, except for the abolishment of harsh penalty measures for failure to meet additional liquidity requirement. (Bank of Estonia 2001)

4. Deposit facility: remuneration of reserve requirements

Since July 2000 the Bank of Estonia has remunerated reserve requirements at the ECB deposit interest rate¹² to compensate for distortions of financial markets and to reduce the disadvantages of banks vis-à-vis other financial institutions which are not subject to reserve requirements. In addition, the Bank of Estonia's intention was to relieve pressure on interest margins. This measure makes the operational framework more market-oriented. With a view to Estonia's accession to the EMU, the measure was introduced as a means of approximating the ECB's operational framework. (Bank of Estonia 1999b and 1999c, Eesti Pank Decree No. 13, 15 June 1999, Procedure for calculating and meeting the reserve requirement, and 2000a and 2000b)

12 The interest rate was the same for all types of deposits. (Lepik 2000, p. 5)

Figure 7: Fulfilment of the reserve requirements in Estonia¹³
(In millions of Estonian kroon)



Source: data provided by the Bank of Estonia

¹³ Data before 1997 are not available.

All Estonian compulsory reserves in excess of the minimum monthly level have carried interest since July 1996. The interest rate is calculated on the basis of an average balance for one month. The monthly average is based on a daily balance sheet, and it therefore also includes non-banking days. The interest rate is set by a special Decree of the Central Bank President, a procedure which makes it easier to change the rate. Commercial banks receive their interest on the first banking day of the following month. At first, the interest rate for the reserve requirements was calculated according to the German Bundesbank discount rate minus 1 percent on the last banking day of a month (15 percent on an annual basis). (Bank of Estonia 1997a) The interest rate equaled the Bundesbank discount rate between November 1997 and December 1998. Since January 1999 this rate has been identical to the ECB deposit rate. The main aim was to absorb the relatively high excess reserves of commercial banks and thus to stabilize the demand of commercial banks for high-powered money. Furthermore, commercial banks now had an incentive to hold liquidity in EEK, and high reserve requirements were compensated for in this way. (Bank of Estonia 1997b and 1998a)

“Eesti Pank pays credit institutions an interest on the account balance above minimum required level. ... The aim of the so-called standing facility is to foster the increase of domestic liquidity reserves. Interest payment on the amount exceeding the reserve requirement also allows to offset to some extent revenue earning advantages of financial intermediaries who are not subject to the reserve requirement and to diminish market distortions in the evolution of deposit and loan interest rates.” (Bank of Estonia 1998a, p. 56)

In sum, reserve requirements have been the most important monetary tool in Estonia and Lithuania. Both central banks have changed several characteristics of this monetary instrument to affect the liquidity of the banking system. Table 3 provides an overview of the reserve requirements (RR) rules in Estonia and Lithuania.

However, reserve requirements under currency boards have some disadvantages: they amount to a kind of tax¹⁴ on commercial banks because the latter are required to hold non-interest-bearing deposits with central banks. Reserve requirements entail some negative allocation effects in that commercial banks seek to circumvent them. Even though, since July 1999, these deposits do bear interest (ECB deposit rate), the rates are low. Similarly, the Bank of Estonia has tried to compensate for these negative effects by allowing banks to use their foreign assets to meet reserve requirements. Moreover, adoption of reserve requirements as a monetary policy instrument may be inefficient because this instrument is not, like open market operations, a market-based one. Banks can use substantial portfolio shifts to react to changes in reserve requirements.

Nevertheless, reserve requirements have many advantages for currency boards in transition countries. In the first place, the Estonian central bank does not need to create additional central bank money for this monetary tool. Second, reserve requirements take on a limited buffer function for interest rates, since these reserves have to be held on average only one month. Third, they can limit capital inflows by extending the reserve requirement base to include net liabilities vis-à-vis foreign banks as well as by introducing additional liquidity requirements.

14 This tax can also be regarded as compensation for central bank services, which cost less than market rates (Bisignano 1996, p. 14).

Table 3: Comparison of reserve requirements (RR) rules in Estonia and Lithuania		
	Estonia	Lithuania
Changes of RR base	<ul style="list-style-type: none"> • 1992-7/1996: demand, savings and time deposits in domestic and foreign currency • since 7/1996 debt securities issued by banks • Since 7/1997: net liabilities of Estonian vis-à-vis foreign banks • Since 8/98: credits to other commercial banks and financial guarantees issued to financing institutions and non-resident credit institutions 	<ul style="list-style-type: none"> • liabilities to residents in domestic currency and in freely convertible currencies (time and demand deposits, including balances in customers' clearing, current and other accounts) • Since 1/1997: commercial banks' liabilities in foreign currency • Since 8/1997 commercial banks' liabilities in non-convertible currencies • Since 1/1998 non-residents holding both domestic and convertible currencies • Since 4/1998 commitments to foreign commercial banks
Change of reserve ratio	Only in 1992: 15 to 10%	Yes, several times
Cash component in RR	7/1994-6/1996: 50% of the monthly minimum RR 7/1995-6/1996: 40% of the monthly minimum RR 7/1996-6/1997: 30% of the monthly minimum RR since 7/1997: 20% of the monthly minimum RR	In general not: exceptions during the banking crisis
Use of RR as settlement credits	Yes, against penalty interest rate	Yes, against penalty interest rate
Daily minimum RR	1996: 20% of the monthly minimum RR 1997-2000: 40% of the monthly minimum RR since 1/2001: 40% of kroon RR	No
Maintenance period	1 month	1 month
Monthly averaging	Since 1996	Yes
Remuneration of RR	Since 1.7.99, ECB discount rate	No
Additional liquidity requirements	11/1997-6/2000: 3 % of the RR-base	No
Assets eligible for meeting reserve requirements	<ul style="list-style-type: none"> • "Deposits with the BoE" since 6/1998 • "Credits institutions cash in hand up to 20% of the monthly minimum RR" since 6/1998 • Banks can use quality foreign securities to meet up to 25% of RR between 1 and 6/2001 and up to 50% of RR since 7/2001 	No
Source: Bank of Estonia (1997a), (2000), (2001) and (2003a); Bank of Lithuania (1997a), 1998a), (1999a), (2000a), (2001), (2002)		

Fourth, this tool can help prevent confidence crises in transition countries. Frequent use of reserve requirements has not undermined the stability of the system in Estonia. Conversely, this flexibility has enhanced the stability of the liquidity system: it has been necessary to offset developments which boost or curb liquidity as a response to short-term changes in bank liquidity. This buffer is crucial because economic shocks frequently occur during the transition process. For these reasons this may be seen as an appropriate instrument for currency boards in transition countries. (Berensmann 2002)

B. Open market operations

1. Short-term certificates of deposit in Estonia

Between May 1993 and May 2000 the Bank of Estonia issued certificates of deposit (CDs). As the overall volume ranged between 1 and 30 million EEK, the impact on the liquidity management of banks was small. Interest rates were between 4 and 8 percent. The Bank of Estonia issued 28-day discountable CDs with a nominal value of 100.000 EEK; these were sold at bi-weekly¹⁵ auctions.¹⁶ Nearly all banks were eligible to participate. (Bank of Estonia 1993b and 2001, p. 44)

The main functions of the Estonian CDs were to stabilize the money market, provide technical assistance, create an embryonic tool, and to offer a small subsidy to commercial banks. (Bank of Estonia 2000c; IMF, 1994b; Ross, T., 1994) In this way the Bank of Estonia provided banks an instrument for use in their dealings in the secondary market, since CDs also served as a collateral for interbank transactions.

The Bank of Estonia was able to buy back or repurchase CDs at any time in the secondary market. When a bank bought a CD, it could resell it to the issuer or to a third party on the same day. The Bank of Estonia was obligated to redeem CDs before maturity at any time commercial banks wished. However, repurchase rates were above money market rate. Moreover, banks were able to use CDs as loan collateral which the borrower received back when he repaid the collateralized loan. The lender could hold the CD as long as the loan was not repaid, and he was even allowed to sell it. Since the Bank of Estonia promised to repurchase the CD, the lender had no reason to fear borrower illiquidity. CDs therefore increased trust among banks and supported the development of the money market. In addition, the Bank of Estonia could use the base money it received from the sale of certificates to provide liquidity assistance to commercial banks. (Bank of Estonia 1993a and 1993b; Ross T. 1994)

2. Repurchase agreements for government securities in Lithuania

Between June 1997 and October 1998 the Bank of Lithuania adopted repurchase transactions for government securities in which the central bank bought government securities from banks. This instrument was implemented as a means of cushioning short-term money market interest rates.

15 Between 4 June 1994 and 20 June 1994 the sales were conducted every week (Bank of Estonia 1994a, p. 4).

16 On the day before the auction, the Bank of Estonia was required to inform banks of the total amount and maturity of the certificates. The commercial banks offering the highest bids were given CDs, although the Bank of Estonia was able to set the lower and upper limits of the interest rates on CDs in accordance with the interbank market in Frankfurt and with a view to general conditions in the Estonian money market. The auction took one hour, and each participant (bank) was allowed to place two different bids. The sum of the bids was allowed not to be in excess of the banks' corresponding accounts. In addition, the sum of the bids of all banks plus interest was not to exceed the amount offered by the Bank of Estonia (Bank of Estonia 1993b; IMF, 1994a).

Repurchase transactions for government securities provided commercial banks with access to short-term liquidity loans (up to one month) at periodic auctions.

These were interest-rate auctions and therefore entailed an interest-rate tender. The Bank of Lithuania fixed the maximum volume of repurchase agreements, and commercial banks competed for loans by bidding for interest rates.¹⁷ Until the end of 1998, the notice period for the repo auctions was 7 days, though the frequency was not fixed. (Bank of Lithuania 1997a; 1998a; 1998b, On the procedure for concluding and executing repurchase agreements of the Bank of Lithuania, Resolution No. 17, January 30, 1997 and No. 161, July 17, 1997 and 1999a) During the first fifteen months interest rates were relatively stable, ranging between 8 and 10 percent. However, interest rates increased in the autumn of 1998, a development which may have been a spillover effect from the Russian financial and currency crisis in mid-August 1998.

As the transaction volume was low, amounting to 20 to 60 million LTL, this instrument did not significantly affect the liquidity of the banking system. However, the demand by the banks for repurchase transactions exceeded the volume offered by the central bank. Transactions took place irregularly and involved only small volumes. Since the end of 1998 no repo transactions have taken place because the intention of the central bank is to encourage banks to pursue transactions in financial markets. Furthermore, banks have received liquidity from the interbank market, the secondary government securities market or the forex market. (Bank of Lithuania 2000a and 2001)

3. Time deposit auctions in Lithuania

The interest-rate floor for the money market issues was set by time deposit auctions conducted between August 1997 and February 2000; these were designed as an absorption facility for commercial banks. The aim of this instrument was to smooth out short-term interest rate fluctuations of the reserve requirement period when banks meet reserve requirement but have a surplus on their accounts. Time deposit auctions were conducted only until February 2000, because the authorities of the Bank of Lithuania were of the opinion that money markets work better without this monetary instrument. (Bank of Lithuania 2001) According to Resolution No. 75 of April 17, 1997, the auction procedure for time deposits with the Bank of Lithuania may be both an interest rate and a volume tender. (Bank of Lithuania 1997b) However, usually the Bank of Lithuania adopted an American-style method. Interest rates fluctuated between about 3 and 10.5 percent.

The volume of time deposit auctions varied substantially between 10 and 250 million LTL. The central bank's decision concerning the volume of time deposit auctions was mainly dependent on two criteria: interest rates in the interbank market and the liquidity position of banks. In the first half of 1998 the restoration of the population's savings generated a liquidity surplus in the banking system which induced the Bank of Lithuania to issue time deposits. The frequency of time deposit issues increased in the first half of 1999, but it declined again in the second half of the year. In the first six months the Bank of Lithuania conducted 10 auctions of time deposits with maturities of 6 to 14 days, with an average interest rate of 4.88 percent and with a volume of about 100 million litas each. The consequence was reduced excess banking system liquidity. Between July and October 1999 the amount and frequency of time deposit auctions declined again, because part of restored savings and other investor funds were exchanged into foreign currency. Moreover, savings

¹⁷ The Bank of Lithuania planned to establish a fixed-rate tender, but no date was set for this. At such auctions the Bank of Lithuania would have fixed the interest rate and the banks would have announced how much of the issue they wanted at the fixed interest rate.

restoration declined. Only four auctions of time deposits with a maturity of 7 days for 5.29 percent were conducted in this period. In November and December the central bank's intention was set out to prevent negative effects of the Year 2000 problem on the money market and the forex market. The number of bidders varied between 1 and 9.

C. Loans

1. Emergency credits

Both central banks provided to a limited extent emergency credits to banks. Previously, the Bank of Estonia had been able to provide emergency liquidity loans to banks that were unable to meet their reserve requirements. A loan committee formed by the Bank of Estonia¹⁸ made the decisions relating to these emergency credits. Subsequently, conditions for these credits were fixed, in a contract, by the Bank of Estonia in cooperation with the respective bank. However, the bank was not allowed to grant new credits to any customer until the credit was repaid. This restrictive measure did not apply to credits which had been agreed upon prior to liquidity problems. If the liquidity loan was not repaid on time, the Bank of Estonia imposed a lending moratorium on the bank until its solvency was reestablished. These emergency credits were abolished in 1994.¹⁹ In addition, the Bank of Estonia provided some financial support to various banks (Box 2).

Box 2: Examples of financial support provided to banks by the Bank of Estonia
<ul style="list-style-type: none"> • Summer 1992: The Bank of Estonia provided 75 million EEK in emergency credits to the NEB, the Union Baltic Bank and the Tartu Commercial Bank. • 4 August 1994: ESB The Bank of Estonia deposited 70 million EEK with the ESB as emergency liquidity assistance. • 26 September 1994: ESB The Bank of Estonia provided the ESB a new credit (180 million EEK). • 3 October 1994: ESB The Bank of Estonia provided a credit to the ESB.^a Total support amounted to about 6 percent of reserve/base money. • March 1995: The Bank of Estonia provided EEK 40 million in subsidies to the Northern Estonian Bank (NEB) with. • End of 1995: the government and the Bank of Estonia provided guarantees (of 220 million EEK) against specified bad loans. • September 1998: The Bank of Estonia bought the majority of shares of the merged Forekspank and the Estonian Investment Bank, thereby providing these banks with capital totaling 255 million EEK.
<p>a No data was available on the amount.</p> <p>Sources: De Castello Branco 1996; Hansson et al. 1996; IMF 1999a</p>

18 "The membership of the loan committee and their authority shall be determined in the form of regulations issued by the President of Bank of Estonia". (Bank of Estonia 1993b)

19 "Bank of Estonia shall grant banks with liquidity problems a possibility to apply for an emergency liquidity loan in order to re-establish their liquidity." (Bank of Estonia 1993b) There are no data available on the value of these emergency credit loans.

With reference to the Law of the Credibility of the Litas, the central bank was allowed to grant credits to commercial banks only in emergency cases during 1994 and 1997, when it acted as a lender of last resort for commercial banks. (BIS 1995, Lithuania. VI. Conduct of monetary policy) During 1995 and 1996 the Bank of Lithuania provided 210.8 million litas to commercial banks, a figure which amounted to 10 percent of the monetary base. (Bank of Lithuania 1997a) In the summer of 1995 the Bank of Lithuania provided liquidity to the Aura Bank, exhausting all of its excess reserves. (Hansson et al. 1996) The Vakaru Bank was likewise given financial support. In total, these two banks were given 70 million litas.

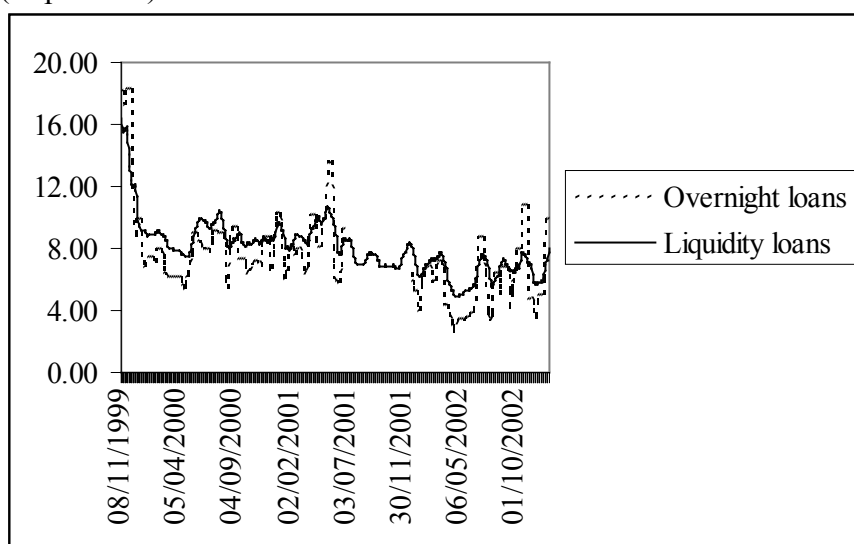
2. Overnight loans

The upper limit of interest rates is set through the overnight loans or liquidity loans: banks receive overnight loans against collateral such as government securities²⁰ only in the case of banks having a negative balance of their account at the central bank. This instrument aims to secure ongoing interbank settlements. Overnight loans have rarely been used by banks and therefore play an important role to manage the liquidity of the banking system. In 2001 only one commercial bank was given an overnight loan (1.0 million LTL).

Between December 1999 and March 2003 interest rates fluctuated between about 5 and 13 percent. Since November 1999 the interest rate for overnight loans has been calculated as follows: the average of the highest value of overnight VILIBOR²¹ over the last 15 calendar days (including the day on which the interest rate of the overnight loan is established) plus 2 percent (Figure).²² (Bank of Lithuania 1999b and 2002)

Figure 8: Interest rates of overnight loans and liquidity loans

(In per cent)



Source: Bank of Lithuania, 2003

20 Initially, banks need collateral in the form of government securities with a nominal value of 80 per cent; later on the value was set at 1.25 times the amount of the credit in question (Bank of Lithuania 2002).

21 VILIBOR is the Vilnius interbank offered rate; it was introduced in November 1999.

22 Between June and December 2001 no overnight loans were granted due to temporary technical problems (Bank of Lithuania 2002).

3. Liquidity loans

The main purpose of liquidity loans is to support banks with liquidity problems and thus to enhance public confidence in commercial banks. Since the Lithuanian central bank reacts to banks' needs, the frequency of such transactions has been irregular. However, as all other instruments except reserve requirements the significance of liquidity loans was low because the volume was small.

Liquidity loans are subject to a strict procedure: each use of these standing facilities is carefully examined by the Bank of Lithuania. Initially, the Lithuanian central bank granted liquidity loans to commercial banks at an interest rate of 13 percent, with maturities of 1-3 months, against government or other guarantees²³. Since November 1999, the interest rates on loans and direct repurchase agreements have been calculated on the basis of the average value of the overnight VILIBOR over the last 30 days plus 4 percent. (Bank of Lithuania 1999a and 1999b)

In 1997 the Bank of Lithuania provided liquidity loans amounting to about 70 million litas to commercial banks. Long-term purpose-oriented loans in national currency²⁴ declined by 37.9 million litas in the last quarter of 1997 in relation to the third quarter. The main factor behind this was financial support provided to the Agricultural Bank. At the end of 1997 a "Law on Using Part of the 1992 Credit Emission of the Bank of Lithuania to Increase Share Capital of the Agricultural Bank" was adopted which allowed 55.4 million litas of the credit emission to be used to increase the Agricultural Bank's share capital. A second tranche of the credit issue was used to buy the newly issued shares of the Agricultural Bank. (Bank of Lithuania 1998a)

In 1998 commercial banks were given no liquidity loans. However, the Lithuanian central bank executed five short-term (7 days) direct repurchase agreements amounting to 154.25 million litas. As with liquidity loans, direct repurchase agreements are subject to a strict procedure. At the end of 1998, long-term loans had declined by 22 million litas compared to the end of 1997. (Bank of Lithuania 1999a) In 1999 the Bank of Lithuania made only one liquidity loan (20 million litas) and executed one 2-month direct repurchase agreement for 80 million litas. By the end of 1999, the outstanding loans amounted to 20 million litas, which is very low (Bank of Lithuania 2000a). In 2000 the Bank of Lithuania provided no liquidity loans. (Bank of Lithuania 2001)

D. Standing facility

Under a currency board regime forex markets take on the role of a standing facility. The Bank of Estonia or its staff have often stressed this specific role in their publications. (Bank of Estonia 2000c; Lepik 2000)

"The CBA by itself sets the limits for available monetary policy tools. Rapid development and further globalisation of financial markets induce further combination of CBA principles with modern liquidity management practices. For a CBA this means ensuring smooth functioning of standing facilities in broad sense, as discretionary means are normally not used for achieving monetary policy goals. Under standing facilities in broad terms we mean a standing facility for buying/selling forex deposit facility and required reserves system." (Bank of Estonia 2000c, p. 6)

23 Other guarantees are not specified.

24 "Long-term purpose-oriented loans in the national currency" are not defined precisely.

“The most important channel stabilising the monetary environment is standing facilitating forex market provided by the central bank. This can also be interpreted as an unlimited forex window where transactions of buying/selling foreign exchange against reserve currency are initiated by commercial banks.”(Lepik 2000, p. 1)

Even though the forex market is not a monetary policy instrument, the central bank can influence the liquidity of the banking system by changing the spread of purchases and sales for forex transactions. Initially, the exchange rate spread of DEM/EEK purchases and sales for transactions between the Bank of Estonia and commercial banks amounted to 3 percent.²⁵ From May 1994 to July 1996 the spread was 0.002 EEK. At first glance, these small transaction costs may seem unimportant, but these costs prevented interest arbitrage from working efficiently. (Bank of Estonia 1997a) In July 1996 the Bank of Estonia eliminated commissions for the buying and selling of foreign exchange; this resulted in a substantial increase in foreign exchange transactions between banks and the Bank of Estonia in the second half of the year. (Bank of Estonia 1997a) Similarly, introduction of real-time settlement systems has improved the efficiency of the forex market, and thus of the currency board as well, because this settlement system improves the convertibility of domestic currency into the anchor currency. (Lepik 2000)

Not unlike the Estonian forex market, the Lithuanian forex has assumed the role of a standing facility since the introduction of the currency board arrangement. However, the spread for buying and selling forex was much higher than in Estonia: the bid-asked spread has amounted to 0.05 percent for two-day transactions, to 0.075 percent for one-day transactions and 0.125 percent for same-day transactions. (Bank of Lithuania 2000b, Rules for Entering into and Handling the Litas and Anchor Currency Exchange Transactions between the Bank of Lithuania and Banks) Due to this spread for periods of up to one week, it is cheaper for banks to borrow in litas in the domestic interbank market than in international financial markets. The main reason behind the introduction of these commissions was to foster trade in domestic currency.

III. Conclusion

On the whole, the Bank of Estonia has used its monetary instruments in a prudent manner; it was flexible enough to provide liquidity to the banking system when banks were threatened by illiquidity. Other instruments than reserve requirements played a minor role in Estonia because the volume was small. Certificates of deposit, for example, were introduced to stabilize the money market, provide technical assistance, serve as an embryonic tool for the underdeveloped money markets, and to function as a small subsidy to commercial banks. Since the volume of CDs was very small, they had no more than only a limited influence on the liquidity of the banking system. In addition, the Estonian central bank provided emergency credits to domestic banks only in a limited number of cases which has not endangered price stability.

Using monetary instruments, the Bank of Lithuania has been seeking to affect the liquidity of the banking system. In 1997 the Lithuanian central bank introduced the Monetary Policy Program for 1997-2000, which was intended to abolish the currency board system. However, in 1999 the Bank of Lithuania established the Guidelines for Monetary Policy, which do not supersede the currency board.

25 According to the second clause of the Law of the Republic of Estonia on the Security of the Estonian Kroon (Clause 2: Rate of the Estonian kroon), “... the limit of technical fluctuations of the Estonian kroon is 3 per cent.” (Bank of Estonia 1992, p. 38)

Since 1997 the central bank has used monetary policy instruments to influence the short-term liquidity of the banking system; these include repo auctions, time deposit auctions, liquidity loans and reserve requirements, but these instruments have been small in volume. Therefore, the Bank of Lithuania has only affected substantially the liquidity of the banking system by using reserve requirements.

Reserve requirements are the most important monetary tool in both countries, a fact which is clearly demonstrated by the high ratio of reserve requirements to the monetary base, especially in Estonia. Reserve requirements were introduced because central banks were able to restrict capital inflows by enlarging the reserve requirement base to include net liabilities vis-à-vis foreign banks. Also, reserve requirements assume a limited buffer function, since these holdings are based only on the average over a month. Nevertheless, frequent use of reserve requirements has not endangered the stability of the system. In fact, this flexibility has improved the stability of the liquidity system: it has been necessary to cushion developments which boost or curb liquidity as a response to short-term excess liquidity or shortages of banks.

In 1996, the Bank of Estonia has abolished the spread for buying/selling forex, the forex market operates efficiently as a standing facility. The growing level of integration into international financial markets has also been reducing the significance of the domestic interbank market as a liquidity buffer. This is reflected in declining turnovers in the domestic interbank market since the end of 1998. On the contrary, the Lithuanian central bank has not abolished the spread for buying/selling forex. Consequently, the forex market does not function as efficiently as a standing facility as in Estonia. The interbank market offers a cheaper possibility for short-term borrowing (up to one week).

Overall, the monetary policies of the Estonian and Lithuanian central bank have not endangered the stability of the monetary and exchange rate systems. On the contrary, monetary policy instruments have cushioned the effect of economic shocks on interest rates and on the volatility of banks' liquidity.

References

- Abazorius, Darius.** “Monetary Policy in Lithuania.” Paper presented on the Analysis & Operations course, Bank of Lithuania, 12-23 February 1996.
- _____. “Strategy of the Bank of Lithuania during the Integration into the EU.” Paper presented on the seminar: Currency Boards – Experience and Prospects, Bank of Estonia, 5-6 May 2000.
- Balino, Tomas Jose / Enoch, Charles** and comprising Alain IZE, *Veerathai Santipraho/Stella Peter*, (1997), Currency Board Arrangements. Issues and Experiences, IMF Occasional Paper No. 151, Washington D.C.
- Bank for International Settlements (BIS).** “Handbook on Central Banks of Central and Eastern Europe.” Basle, 1995.
- _____. “Handbook on Central Banks of Central and Eastern Europe.” Basle, 1998.
- Bank of Estonia.** “The Monetary Reform in Estonia 1992.” Tallinn, 1992.
- _____. *Eesti Pank Bulletin*, No. 2, Tallinn, 1993a.
- _____. “Various Regulations and Decrees in 1993.” Tallinn, 1993b.
- _____. “Annual Report 1993.” Tallinn, 1994a.
- _____. “Law on the Central Bank of the Republic of Estonia.” Tallinn, 1994b.
- _____. “Various Regulations and Decrees in 1994.” Tallinn, 1994c.
- _____. “Annual Report 1994.” Tallinn, 1995.
- _____. “Various Regulations and Decrees in 1996.” Tallinn, 1996.
- _____. “Annual Report 1996.” Tallinn, 1997a.
- _____. “Various Press Releases.” Tallinn, 1997b.
- _____. “Various Regulations and Decrees in 1997.” Tallinn, 1997c.
- _____. “Annual Report 1997.” Tallinn, 1998a.
- _____. “Monetary Developments & Policy Survey.” Tallinn, 1998b.
- _____. “Monetary Policy and Policy Survey. First Half of 1998, Tallinn, 1998c.
- _____. “Annual Report 1998.” Tallinn, 1999a.
- _____. “Monetary Policy and Policy Survey.” First Half of 1999, Tallinn, 1999b.
- _____. “Various Regulations and Decrees in 1999.” Tallinn, 1999c.
- _____. “Annual Report 1999.” Tallinn, 2000a.
- _____. “Monetary Developments & Policy Survey: March 2000.” Tallinn, 2000b.
- _____. “Monetary Policy Operational Framework Reform 2000.” Tallinn, 2000c.
- _____. “Annual Report 2000.” Tallinn, 2001.
- _____. “Annual Report 2001.” Tallinn, 2002.
- _____. “Annual Report 2002.” Tallinn, 2003a.
- _____. “Statistics on the internet side of the Bank of Estonia.” Tallinn, internet: <http://www/ee/epbe>, as of end-March 2003b.
- Bank of Lithuania.** “Law on the Credibility of the Litas.” Vilnius, 1995.
- _____. “Acts of Law. Regulating the Activities of the Banks of Lithuania in 1996.” Vilnius, 1996.
- _____. “Monetary Policy Programme of the Bank of Lithuania for 1997-2000.” Vilnius, 1997a.
- _____. “Acts of Law. Regulating the Activities of the Banks of Lithuania in 1997.” Vilnius, 1997b.
- _____. “Annual Report 1997.” Vilnius, 1998a.
- _____. “Acts of Law. Regulating the Activities of the Banks of Lithuania in 1998.” Vilnius, 1998b.
- _____. “Annual Report 1998.” Vilnius, 1999a.
- _____. “Acts of Law. Regulating the Activities of the Banks of Lithuania in 1999.” Vilnius, 1999b.
- _____. “Annual Report 1999.” Vilnius, 2000a.

- _____. "Acts of Law. Regulating the Activities of the Banks of Lithuania in 2000." Vilnius, 2000b.
- _____. "Annual Report 1999." Vilnius, 2001.
- _____. "Annual Report 2001." Vilnius, 2002.
- _____. Statistics on the internet side of the Bank of Lithuania. internet: <http://www.lbank.lt/Eng/about/Kryptis.htm>, as of end-March 2003.
- Berensmann, Kathrin.** "Currency Boards: A Monetary and Exchange Rate Solution for Transition Countries? The Cases of Estonia and Lithuania.", in: Duwendag, Dieter, *Schriften zur Monetären Ökonomie*, Vol. 45, Nomos Verlag, Baden Baden, 2002, pp. 256.
- Bisignano, Joseph.** "Varieties of Monetary Policy Operating Procedures: Balancing Monetary Objectives with Market Efficiency." Bank for International Settlements, Working Paper, No. 35, Basle, 1996.
- Camard, Wayne.** "Discretion with Rules? Lessons from the Currency Board Arrangement in Lithuania." IMF Paper on Policy Analysis and Assessment, No. 1, Washington D.C., 1996.
- De Castello Branco, Marta/Alfred Kammer/L. Effie Psalida.** "Financial Sector Reform and Banking Crises in the Baltic Countries." IMF Working Paper, No. 134, Washington D.C., 1996.
- European Bank for Reconstruction and Development (EBRD):** Transition Report 2003. Integration and Regional Cooperation, London, 2003.
- Fleming, Alex/Lily Chu ; Marie-Renee Baker.** "The Baltics-Banking Crises Observed, World Bank Policy Research." Working Paper, No. 1647, Washington D.C., 1996.
- Hanke, Steve H., Lars Jonung and Kurt Schuler.** "Russian Currency and Finance. A Currency Board Approach to Reform", Routledge, London and New York, 1993.
- Hansson, Ardo/Triinu Tombak.** "Banking Crises in the Baltic States: Causes, Solutions, and Lessons." Paper Prepared for the Second Dubrovnik Conference on Transition Economies, Dubrovnik, Croatia, 26-28 June, 1996.
- IMF.** "Memorandum of Economic Politics of the Government of the Republic of Lithuania for the Period of October 1, 1994 to September 30, 1997." Washington D.C., 1994a.
- _____. "Estonia, Economic Review." No. 7, Washington D.C., 1994b.
- _____. "Republic of Estonia: Selected Issues and Statistical Appendix." IMF Staff Country IMF Report, No. 99/74, Washington, D.C., 1999a.
- _____. "Republic of Lithuania: Staff Report for 1999, Article IV Consultation." Washington, D.C., 1999b.
- _____. "International Financial Statistics, various issues." 2001.
- Lepik, Ilmar.** "Evolution of Monetary Operational Framework & Challenges Ahead." Bank of Estonia, Tallinn, 2000.
- Ross, Tanel.** "Some Aspects of the Monetary Policy of the Bank of Estonia, Central Bank Policy Department." Paper presented at the International Conference: Financial Policy and Transition in Central and Eastern Europe, Budapest, September, 2-3, 1994.
- Ross, Tanel and Märten.** "The Lessons of Currency Board Approach in Stabilising Transitional Economies: The Case of Estonia." Preliminary draft presented at the seminar: Monetary Reform: Key Priorities and Challenges, in Kiev, April 22, 1995.

Appendix

Figure A1: Estonian central bank balance sheet as of January 2003	
(In million of EEK)	
ASSETS	
Foreign assets	15881.7
Gold	44.2
Convertible foreign currency assets	14526.0
Special Drawing Rights (SDR's)	1.0
Participation in IMF	1298.4
Other claims to IMF	12.2
Non-convertible foreign currency	0.0
Domestic assets	264.0
Loans	71.1
government	0
financial institutions	9.1
other	62.0
Bonds	0
Shares and participations	0.1
Other assets	11.1
Fixed assets	181.8
Total assets	16145.8
LIABILITIES	
Foreign liabilities	1446.8
Foreign debts	144.3
IMF kroon accounts	1298.3
Accounts of non-residents	4.2
Domestic liabilities	11287.1
Notes and coins in circulation	7783.6
Accounts of banks and other current liabilities	3466.6
accounts of banks	3411.5
other	55.1
Securities (certificates of deposit issued)	0
Convertible foreign currency deposits	5.5
Non-convertible foreign currency deposits	0
Other liabilities	31.4
Provisions	0
Capital and reserves, profit/loss	3411.9
Total liabilities	16145.8
Source: Bank of Estonia, 2003	

Figure A2: Lithuanian Central Bank balance sheet as of January 2003 (In million of LTL)	
ASSETS	
Foreign assets	8 202,3
Claims on:	
central government	6,8
private sector	7,8
commercial banks	15,8
nonbank financial institutions	0,0
Other assets	213,6
Total assets	8 446,4
LIABILITIES	
Foreign liabilities	493,9
repurchase agreements	490,7
IMF loans to the LB	0,0
other liabilities to nonresidents	3,2
o/w: in convertible currency	0,0
Domestic liabilities	
currency outside the LB	4 221,4
deposits of commercial banks	808,9
o/w: in convertible currency	346,8
central government deposits	2 128,0
o/w: in convertible currency	1 913,3
deposits of other residents	22,2
o/w: in convertible currency	0,1
Counterpart funds	28,5
Capital accounts	704,4
Other liabilities	39,1
Total liabilities	8 446,4
Source: Bank of Lithuania, 2003	

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