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## On the need for an international lender of last resort: Lessons from domestic financial markets

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# **W. E. P.**

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## **Würzburg Economic Papers**

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**On the need for an international lender of last  
resort:**

**Lessons from domestic financial markets**

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# On the need for an international lender of last resort:

## Lessons from domestic financial markets

Adalbert Winkler\*

### **Abstract**

The increasing incidence and intensity of crises in the international financial markets during the 1990s have given new impetus to the debate on reform of the international financial system. Much of the discussion focuses on the idea of an international lender of last resort which could provide liquidity to ensure the stability of the international financial system.

This paper responds to the question of whether an international lender of last resort is necessary by presenting both the differences and the similarities between a domestic financial market and an international one. This comparison will show that in regard to those aspects which justify the existence of a lender of last resort at the national level, the two types of financial markets are no different: If commercial banks are engaging in maturity and liquidity transformation, then the existence of a lender of last resort is a prerequisite to stable and crisis-free development of financial markets. Both the recent financial crises, and the developments which can be observed in the banking sectors of Latin America and Eastern Europe, provide empirical evidence for this thesis. In these regions, banking sectors are emerging which are increasingly dominated by foreign banks, and thus have indirect access to an international lender of last resort. At the same time, there is an increasing tendency within emerging markets to introduce regulations which limit the extent to which transformation is performed in financial markets, and thus to limit as far as possible the risks which make an international lender of last resort necessary.

JEL classification: E 42, E 44, F 33, G21

Key words: lender of last resort, maturity transformation, liquidity transformation, financial crisis, currency crisis

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## 1. Introduction

The increasing incidence and intensity of crises in the international financial markets during the 1990s have given new impetus to the debate on reform of the international financial system. Much of the discussion focuses on an idea put forth by Stanley Fischer (1999), namely that of an international lender of last resort. However, it was the Meltzer Report on the future of the international financial institutions (International Financial Institution Advisory Commission (IFAC), 2000), initiated by the U.S. Congress, which ignited the full-scale controversy over this issue. It recommended that the IMF be transformed into an international lender of last resort, subject to certain conditions, and that in regard to exchange-rate regimes, IMF member countries be forced to make a clear choice in favor of one of the two corner solutions – either flexible exchange rates or a “hard peg”, i.e. a fixed exchange-rate regime backed up by a currency board or dollarization.

This paper is intended to contribute a few thoughts to this discussion, taking for granted the need for a lender of last resort in a domestic financial market as discussed by Bagehot (1873). The focus is on the question of whether differences can be identified between domestic and international financial markets which could justify arguments that international financial markets can forego an international lender of last resort.<sup>1</sup> This question is answered in six sections. First of all, features of the recent financial crises are highlighted which triggered the debate as to whether or not an international lender of last resort is necessary (Section 2). This is followed by a presentation of the arguments in favor of the lender of last resort as one of three options for the design of domestic financial markets (Section 3). The discussion then moves from the national to the international level (Section 4), analyzing whether and under what conditions an international lender of last resort can be justified using the same arguments that justify the existence of a lender of last resort in a domestic financial market. Particular attention is paid to the interaction between exchange-rate regimes and the activities of the lender of last resort.

These considerations will form the basis for a fresh look at the developments in international financial markets in recent years (Section 5). It will be shown that the recommendations of the Meltzer Report constitute a straightforward application of the arguments used to defend a lender of last resort in domestic financial markets. The failure to implement them is mainly due to political obstacles. The improvised solutions to which regulators are currently resorting as they attempt to manage the growth

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<sup>1</sup> A broad definition of the term “financial markets” will be used in the following, one which encompasses not only markets in the narrow sense, such as securities markets or stock exchanges, but also the activities of banks. Financial markets in this broader sense are thus “the markets - i.e. the supply, demand and the coordination thereof - for the services provided by financial institutions to the non-financial sectors of the economy.” Krahen/Schmidt (1994, 4).

of international financial markets are proof that in economic terms, these recommendations are indeed relevant. Most notably, efforts are being made to reduce the scope of the liquidity problem in international financial markets by introducing appropriate regulation. A second, equally important measure is the growing presence of foreign banks in emerging markets as a means of gaining access to an international lender of last resort “through the back door”. The paper concludes with a comparison (Section 6) between a domestic and an international lender of last resort which sums up the overall discussion.

## **2. Characteristics of Recent Crises in International Financial Markets**

Crises are not new, whether in domestic or in international financial markets. However, debate on the need for an international lender of last resort has emerged only now, and there are three main reasons for this:

1. Macroeconomic approaches which attempt to explain the recent crises in the international financial markets on the basis of speculative attack and escape clause models<sup>2</sup> are increasingly being seen as unsatisfactory. This is because it is in fact fairly difficult to identify any severe and long-lasting inconsistencies in macroeconomic policy – fixed exchange rates on the one hand, for instance; expansionary monetary policy, inflation differentials, unsustainable budget or current account deficits, high unemployment and weak growth on the other – which could have been blamed for the recent spread of financial and currency crises (IMF 1998a, 73). Instead, there is a broad consensus that overreactions on the part of the financial markets, and herd behavior on the part of investors, created crises the dimensions of which were not justified by the trends in economic fundamentals (Corsetti et al. 1999, 306).
2. The recent turmoil in international financial markets closely resembles the financial and banking crises which were typical of the evolution of the domestic financial markets in Western Europe and the United States in the 19<sup>th</sup> century (Mishkin 1991), and which the lender of last resort was created in order to contain (Bagehot 1873). The focus is on the “bank run” phenomenon (Diamond/Dybvig 1983), i.e. the sudden withdrawal of short-term deposits from banks (IMF 1998, 35, Summers 2000, 5, Dadush/Dasgupta/Ratha 2000). Table 1 illustrates the presence of this phenomenon in international financial markets, showing trends in the volume and structure of

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<sup>2</sup> For an overview regarding these models, see Flood/Marion (1998) and Jeanne (1999).

private net capital inflows to the Asian countries hardest hit by the crisis<sup>3</sup>, namely Indonesia, South Korea, Malaysia, the Philippines and Thailand. The table clearly shows the sharp, bank-run-like reversal of capital flows in 1997.

**Table 1:** Net private capital flows to five Asian countries (in billion USD)

	1993	1994	1995	1996	1997	1998	1999
Total	31.8	36.1	74.2	65.8	-20.4	-25.6	-24.6
Direct investment	7.6	8.8	7.5	8.4	10.3	8.6	10.2
Portfolio investment	17.2	9.9	17.4	20.3	12.9	-6.0	6.3
Bank loans (other)	7.0	17.4	49.2	37.1	-43.6	-28.2	-41.1
Memo item: Net official flows	0.6	0.3	0.7	-4.6	30.4	20.2	-4.5

*Source: IMF (2000, 46), IMF (1999, 44)*

Another phenomenon relevant in this connection is that of contagion, the impact of which on a domestic financial market has also been described by Bagehot (1873).<sup>4</sup> In the case of contagion, an unusually high degree of correlation develops between changes in returns on, and prices of, diverse, heterogeneous securities, expressing the fact that markets are confronted with an excess demand for liquidity (Baig/Goldfajn 1998; IMF 1998a, 11; Fischer 1999, 94; Scholes 2000, 19).

3. Finally, the reaction of the international community to the crises in international financial markets is reminiscent of the role of a domestic lender of last resort in domestic financial markets. This refers first and foremost to the reaction and role of the IMF and of other international financial institutions, of which the last line in Table 1 gives an impression by showing the anticyclical flows

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<sup>3</sup> A similar picture emerges when changes in net claims of banks reporting to the BIS on banks in the region are examined; see IMF (1998, 31).

<sup>4</sup> “At first, incipient panic amounts to a kind of vague conversation: Is A.B. as good as he used to be? Has not C.D. lost money? And a thousand such questions. ... And every day, as a panic grows, this floating suspicion becomes both more intense and more diffused; it attacks more persons, and attacks them all more virulently than at first. ... A panic grows by what it feeds on; if it devours these second-class men, shall we, the first class, be safe?” (Bagehot 1873, 25f.). Corsetti (1999, 367) picks up this train of thought 125 years later, finding that “investors overstated the perceived similarities, in terms of macro conditions, between Brazil and Russia, thus overlooking structural differences within the highly heterogeneous group of ‘emerging’ economies.”

of official funding into the affected countries. However, it is also worth noting the reaction and role of the Federal Reserve (and other Western central banks): When the contagion reached Western financial markets in autumn 1998, the Federal Reserve reacted by cutting interest rates and introducing a coordinated package of measures in order to prevent the crisis from spreading and deepening (Calvo/Mendoza 2000, 63).

### **3. The Domestic Lender of Last Resort**

#### **3.1 The rationale for a domestic lender of last resort: containing liquidity crises**

There is a broad consensus in the literature that national financial markets are in need of a domestic lender of last resort whenever there is asymmetrical distribution of information regarding the solvency of commercial banks (Freixas/Rochet 1997, 207).<sup>5</sup> If such information is asymmetrically distributed, then commercial banks incur liquidity risks<sup>6</sup> when they engage in maturity transformation and/or liquidity transformation.<sup>7</sup> This liquidity risk turns into a liquidity crisis if the bank's creditors feel that there is a doubt as to whether or not the banking system is solvent. While the seminal paper on bank runs by Diamond/Dybvig (1983, 410) suggests that such doubts can arise purely by chance, empirical studies of liquidity crises in the Western industrialized states of the 19th century have found a correlation between the outbreak of liquidity crises on the one hand, and economic trends and other information relevant for the solvency of the banking system on the other (Calomiris/Gorton 1991).

The commercial banking system is vulnerable to crisis in this situation because the interest-rate instrument fails to counteract the liquidity risk: Under asymmetric information, high or rising interest rates on deposits merely serve to increase doubts as to the solvency of the banking system, and thus

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<sup>5</sup> One exception is the "free banking school"; its representatives trace the instability of a national financial system back to state interventions rather than to inherent imperfections of the market; see Dowd (1994, 1996).

<sup>6</sup> Liquidity is defined here as the characteristic of assets being "more or less easy to use as a means of payment or to convert into a means of payment through sale or assignment." (Stützel 1959, 622) Accordingly, the difference between insolvency and illiquidity is that insolvency occurs when the value of liabilities exceeds the value of claims, i.e. the enterprise or bank has a negative net worth, whereas illiquidity refers to the situation in which claims are unsaleable due to an asymmetric distribution of information among potential buyers and sellers about their value, i.e. these claims cannot be converted into the means of payment (Greenbaum/Thakor 1995, 172). Of course, when there is completely symmetrical distribution of information, insolvency and illiquidity coincide.

<sup>7</sup> Liquidity transformation refers to the financing of illiquid assets, e.g. loans, using liabilities which can be converted into the means of payment at any time (Bagehot 1873; Diamond 1984; Goodhart 1987; Bhattacharya/Thakor 1993).

to aggravate the liquidity problem rather than solve it, because higher rates are seen as a signal of bad quality (Stiglitz 1987).<sup>8</sup> In the event that a crisis does break out, the market interest rate on bank deposits becomes endlessly high, and the interest-rate spread between bank deposits and the means of payment thus becomes enormously large (Greenbaum/Thakor 1995, 191), as the history of the financial systems of the Western industrialized nations in the 19<sup>th</sup> century also shows.<sup>9</sup> The commercial banks are no longer able to maintain the convertibility of funds on deposit in banks vis-à-vis the means of payment at the exchange rate of 1:1.<sup>10</sup> They require a lender of last resort – or else they must cease carrying out maturity and/or liquidity transformation altogether.

The notion of restricting the ability of commercial banks to carry out maturity and liquidity transformation in order to stabilize the domestic financial system is discussed today under the term “narrow banking”, but it can be traced at least as far back as Simons (1936), who strongly advocated “100% reserve banking”. The goal of such a reorganization of the financial system would be to prevent creditors (here, domestic banks) from compelling their debtors (here, the enterprises which have received credit from them) to liquidate their assets too quickly, thus triggering a liquidity crisis (Simons 1936, 17).<sup>11</sup> This proposal was put forward 70 years ago to deal with crisis in domestic financial markets. However, replace “domestic banks” with “foreign banks” as the creditors, and “domestic enterprises” with “domestic banks” as the debtors, and the result is a policy recommendation which features prominently in the current debate on restructuring international financial markets (see Section 5).

A “100% reserve banking system”, however, was never adopted at the national level because the execution of maturity and liquidity transformation by the banking system leads to major gains in

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<sup>8</sup> This consideration is implicitly addressed in the model put forth by Diamond/Dybvig (1983), since the level of the interest rate paid on deposits which the bank sets, without knowing precisely the percentage of agents who will need to withdraw their deposits in the first period, affects the bank’s solvency prospects for the second period and thus influences the decisions of those agents who do not have to withdraw their deposits in the first period about whether or not to withdraw their deposits in any case, thus initiating a bank run.

<sup>9</sup> This thought is in essence the one put forth by Stiglitz/Weiss (1981) as the rationale for the rationing of credit to enterprises by the banking system, with the difference that in the above context, the banks switch from the role of creditor to that of debtor.

<sup>10</sup> Accordingly, a financial crisis was characterised by the suspension of convertibility of deposits into the means of payment; see Diamond/Dybvig (1983) and Calomiris/Schweikart (1991).

<sup>11</sup> Similar thoughts were expressed by Keynes (1936, 147ff.) in regard to the liquidity of investments in stock markets.

efficiency, and in turn to higher economic growth (Bencivenga/Smith 1991; King/Levine 1993).<sup>12</sup> Again, this is in essence the same rationale which is currently being put forth as an argument in favor of liberalized international financial markets and against capital controls (see e.g. Summers 2000). However, since it is felt that the collapse of a solvent banking system would have equally great negative external effects (Bernanke 1983), the domestic commercial banks, unlike other domestic enterprises, receive the backing of a lender of last resort.

The conclusion to be drawn from both the theory and the historical development of Western financial markets is that there are three basic options for the design of financial markets (see Overview 1): Crisis-prone financial markets; financial markets in which liquidity and/or maturity transformation is prohibited; or the establishment of a lender of last resort.

Overview 1: Options for the design of a national financial market

Option 1	Option 2	Option 3
Crisis-prone financial markets	No maturity and liquidity transformation (100% reserve banking, or “narrow banking”)	Lender of last resort

Source: Own table

**3.2 Definition and function of a lender of last resort**

The rationale for a lender of last resort gives rise to the following definition: A lender of last resort is an institution which does not face any liquidity risk, *because it is able to issue unlimited quantities of the legal tender which can be used to pay financial liabilities* (Greenbaum/Thakor 1995, 177); i.e. it is not subject to a hard budget constraint.<sup>13</sup> This implies that a lender of last resort is able to set interest rates on an autonomous basis, and to guarantee a fixed exchange rate of 1:1 between

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<sup>12</sup> Wallace (1996) even argues that a regulatory move towards narrow banking would basically mean preventing banks from fulfilling the function they were created to perform.

<sup>13</sup> It should be noted that in domestic financial markets the lender of last resort was not established by state intervention or by any other act of authority. Rather, its establishment was driven by market forces, so that it is indeed appropriate to speak of “The Evolution of Central Banks” (Goodhart 1988); see also Bagehot (1873) and Lovell (1957).

bank deposits and the means of payment. “Once the ability to print money ceases to exist, limits to the LLR function appear” (Berg/Borenzstein 2000, 21).

The means of payment represents liquidity *par excellence*, i.e. information regarding the value of this asset is distributed symmetrically (or at least, it is the asset for which such information is distributed as symmetrically as possible) among economic actors (Calomiris 1993, 67; Williamson/Wright 1994). With the lender of last resort function, however, the liquidity risk of the commercial banking system is externalized at least to some extent, whether because the lender of last resort is a state or public institution, i.e. a central bank, as is the case today, or because the lender of last resort function has emerged as a result of solvent banks cooperating to protect one another against liquidity risk, a phenomenon which has also been observed in Western domestic economies in the past (Gorton/Mullineaux 1987, Goodhart 1988). In order to ensure that the means of payment which it issues will continue to represent liquidity *par excellence*, the lender of last resort must see to it that only solvent commercial banks have access to liquidity, i.e. that moral hazard behavior can be prevented. Otherwise, it would be in danger of seeing its liabilities lose the function of means of payment, and thus of sacrificing the lender of last resort function as well (Greenbaum/Thakor 1995, 177). The obvious implication is that a lender of last resort must know before it intervenes whether the banks to which it extends funds in times of crisis are indeed solvent banks. The lender of last resort function is therefore inherently connected with banking supervision, control and regulation. The history of the creation of central banks in the developed financial systems in the West reflects this (Gorton/Mullineaux 1987; Goodhart 1988).<sup>14</sup>

In order to emphasize this point, the lender of last resort provides its funds only against good collateral and at an interest rate which is lower than the endlessly high market interest rate prevailing during the crisis, but higher than the market interest rate which prevailed prior to the crisis. This leads to the maxim put forth by Bagehot (1873), and basically adhered to by central banks since, that in times of crisis a lender of last resort *should lend freely to temporarily illiquid but nonetheless solvent banks, at a penalty rate and on good collateral* (see Giannini 1998).

### **3.3 The lender of last resort in the domestic financial market: a summary**

The points discussed above can be summarized as follows (see Overview 2): The lender of last resort issues the means of payment, i.e. it is a central bank. Its function is to counteract the systemic liquidity risk of the domestic commercial banking system which inevitably arises when maturity and

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<sup>14</sup> It will already be clear from this observation that the IMF cannot act as an international lender of last resort, because “there is no connection between current IMF programs and the historical interventions by central banks or private coalitions of banks to stem banking crises.” Calomiris (1998).

liquidity transformation is carried out and information is asymmetrically distributed, namely the risk that the commercial banking system will not be able to maintain the 1:1 exchange rate between deposits and high-powered money should doubts arise as to the commercial banking system's solvency. Only solvent commercial banks have access to the lender of last resort, however. The lender of last resort relies on its function as banking supervisory agency to adhere to this criterion and thus to avoid moral hazard behavior on the part of commercial banks. Domestic financial markets which operate without a lender of last resort are either crisis-prone or must refrain from engaging in maturity or liquidity transformation.

Overview 2: The lender of last resort in the domestic financial market

Lender of last resort:	Central bank
Systemic risk:	1:1 exchange rate of bank deposits vis-à-vis central bank funds may not be guaranteed
Criterion for willingness to act as lender of last resort:	Solvency of the commercial banks which have access to lender of last resort facilities
Beneficiaries:	Commercial banks which have access to lender of last resort facilities
Risks for the lender of last resort:	Moral hazard behavior on the part of the commercial banks
Risk containment strategy:	Lender of last resort as banking supervisory agency
Consequence if no lender of last resort is established:	(Regulatory) restrictions on the performance of maturity and/or liquidity transformation  Financial crises

Source: Own overview

**4. Liquidity Risks in International Financial Markets**

**4.1 Definition of international financial markets**

International financial markets are defined as the supply and demand for deposits (assets) in a currency which is a *foreign currency* for at least one of the parties to a given transaction (See Kloten/von Stein (1980, 885) and Dichtl/Issing (1993, 1015)). The main difference between domestic and international financial markets is thus the use of a currency other than the domestic currency. Overview 3 demonstrates this using the example of the USA and Korea; it shows financial transactions between Americans and Koreans which are denominated either in US dollars or in Korean won.

Overview 3: Currencies and market participants in domestic and international financial markets: a two-country example

<i>Creditor</i>	<i>Debtor</i>	
	Koreans	Americans
Koreans	Won	Won
	US Dollar	US Dollar
Americans	Won	Won
	US Dollar	US Dollar

Source: Own overview

In this two-country example, an international financial market results whenever the two parties to a particular financial relationship belong to different currency areas, or a creditor and debtor within the same currency area carry out a financial transaction denominated in the foreign currency. In contrast, domestic financial markets are defined as financial transactions carried out between creditors and debtors belonging to the same currency area on the basis of the domestic currency (a situation represented by the shaded-in fields in the table). Following on the considerations set forth above, i.e. that domestic financial markets require a domestic lender of last resort, the question as to whether international financial markets also require an international lender of last resort can be formulated as follows: *Does the use of a currency other than the domestic currency, which is the defining characteristic of international financial markets, imply that a lender of last resort is unnecessary?*

**4.2 The domestic lender of last resort, international financial markets and the exchange-rate regime**

The function of a lender of last resort is to enable solvent commercial banks to incur the liquidity risks involved in maturity and/or liquidity transformation without inherently incurring the risk of a liquidity crisis. A domestic lender of last resort is responsible for the domestic commercial banking system; in this example, the Bank of Korea is responsible for providing liquidity to Korean commercial banks (see Overview 4, column 2) and the Federal Reserve is responsible for providing liquidity to American commercial banks (see Overview 4, column 3).

Overview 4: Domestic and international financial market and the domestic lender of last resort: a two country example

<i>Creditor</i>	<i>Debtor</i>	
	Korean banking system (lender of last resort: Bank of Korea)	American banking system (lender of last resort: Federal Reserve)
Koreans	<u>Won</u>	<b>Won</b>
	<b>US Dollar</b>	<u>US DOLLAR</u>
Americans	<u>WON</u>	<b>Won</b>
	<b>US Dollar</b>	<u>US Dollar</u>

**Boldfaced:** Lender of last resort function can only be exercised within the limits set by the amount of foreign reserves, irrespective of the exchange-rate regime.

UNDERLINED: Lender of last resort function can only be exercised within the limits set by the amount of foreign reserves, assuming that a fixed exchange-rate policy is pursued.

Source: Own overview

The definition of a lender of last resort implies that the Bank of Korea and the Federal Reserve cannot fulfill the function of lender of last resort for their respective banking systems if domestic banks are engaging in maturity or liquidity transformation on the basis of foreign currencies (fields labeled in boldface in Overview 4). The Bank of Korea cannot provide unlimited quantities of US dollars, nor can the Federal Reserve provide unlimited quantities of Korean wons. Rather, both are as illiquid, in terms of the other country’s currency, as are their own domestic commercial banks.<sup>15</sup>

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<sup>15</sup> The problem that central banks face the same liquidity constraints in international financial markets as commercial banks do in domestic markets had already been noted by Bagehot (1873, 22): “Within a country the action of a Government can settle the quantity, and therefore the value, of its currency; but outside its

Only the Federal Reserve can function as a lender of last resort in regard to US dollar deposits in the Korean banking system, and only the Bank of Korea can serve as a lender of last resort for won deposits in the American banking system. Since, by definition, they would be assuming this function in an international financial market, they can be described as international lenders of last resort.

Moving on from the two-country example, any central bank whose currency is used in foreign banking systems to carry out maturity or liquidity transformation could thus theoretically serve as an international lender of last resort. De facto, however, it is a matter of only two currencies, namely the US dollar and, to a much lesser extent, the D-Mark, i.e. now the euro, which have replaced bullion as the ‘cash’ of international trade. Foreign financial markets which use these currencies to conduct maturity or liquidity transformation are therefore often referred to in simplified terms as “dollarized”. Only the Federal Reserve and the European Central Bank, therefore, come into question as international lenders of last resort. Accordingly, the IMF, which is often put forth – not least of all in the Meltzer Report – as a candidate for the role of international lender of last resort, could only assume this function if these two central banks were to agree to provide funds to it on an unlimited basis.<sup>16</sup>

If the Korean banking system attracts won-denominated deposits from foreigners, however, then this also represents a transaction on the international financial market (see column 2, line 3 of Overview 4). For this transaction, there is by definition no need for an international lender of last resort, because the Bank of Korea is able to counteract the relevant liquidity risks. As long as the commercial banking system engages in maturity and liquidity transformation only on the basis of the won, it does not require an international lender of last resort (see also Mishkin (1999, 712) and Chang/Velasco (2000, 72)).

This situation changes, however, if the Bank of Korea follows a policy of fixed exchange rates. The implication is then that, as part of its function as the domestic lender of last resort, the Korean central bank will guarantee the exchangeability of all short-term won-denominated deposits in the Korean banking system into US dollars at a fixed rate, so that “all liquid money assets can potentially be converted into foreign exchange.” (Corsetti et al. 1999, 342). Accordingly, in a fixed exchange-rate

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own country, no Government can do so. Bullion is the ‘cash’ of international trade; paper currencies are of no use there, and coins pass only as they contain more or less bullion.”

<sup>16</sup> The contrast between the IMF and a lender of last resort could hardly be greater given that the Bretton Woods institution was conceived by its creators as a “revolving fund of relatively small short-term loans that countries repaid so that others could borrow” (Schwartz 1999, 2). While this was fully adequate for an international exchange rate system in which freedom of international capital flows was not a factor, it is absolutely inadequate as the basis for a stable international exchange rate regime in which free capital mobility is assumed.

system and with free capital mobility, a central bank assumes, de facto, the role of an international lender of last resort; i.e. it incurs a theoretically unlimited contingent liability in the foreign currency to which it is pegging its currency, in this example US dollars (Blejer/Schumacher 1998; Wyplosz/Jeanne 1999; Summers 2000, 9).

Even large, liquid foreign reserves, however, are not sufficient to meet this liability, as the Asian example shows (IMF 1998a, 15). For however large these currency reserves may be, they are necessarily limited.<sup>17</sup> Thus, the central bank is permanently risking a liquidity crisis, which takes the form of a currency crisis, should doubts regarding its solvency arise. Speculative attacks on a currency exploit the illiquidity of a central bank in a foreign currency that arises due to the maturity transformation carried out by the banking system: If investors enter into an open position in won, for example, by taking out a three-month loan from a Korean commercial bank, and then convert these funds into US dollars at the central bank, then, given a fixed exchange rate, the Bank of Korea faces the same scenario as the commercial bank analyzed by Diamond/Dybvig (1983), namely the sudden withdrawal of a deposit payable on demand. Of course, as in domestic financial markets, these currency crises are usually no sun-spot phenomena, but can be linked to inconsistent policies or deeper underlying structural problems. However, “the financial sector’s ability to leverage and mobilize resources ... may serve to be rather pernicious if fundamental imbalances distort proper incentives.” (Bell 2000)

In essence, these considerations are based on the well-known “impossible trinity” of monetary policy, i.e. the impossibility of setting a fixed exchange rate, enabling the free flow of capital and pursuing an independent monetary policy, i.e. an autonomous interest-rate policy, all at the same time (see also Fischer, 2001). In order to function as a lender of last resort, a central bank must be free to set interest rates. In the event of a liquidity crisis within the domestic banking system, this means setting interest rates which are lower than the endlessly high market interest rate (see Section 3). However, if the exchange rate is fixed and capital flows are liberalized, the domestic interest rate must always be kept in line with the open interest rate parity, regardless of the liquidity needs of the domestic banking system; obviously, in this situation, a central bank cannot perform its function as a lender of last resort (Jeanne/Wyplosz 2000). Since the lender of last resort function is the *raison d’être* of a central bank (Goodhart 1988, Friedman 1989), this can be seen once again as proof that the combination of a fixed exchange rate and free flow of capital implies, at the same time, waiving the right to conduct an independent monetary policy.

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<sup>17</sup> It should be remembered that Krugman’s seminal article on currency crises is based on the “theory of exhaustible resources”. And in Diamond/Dybvig (1983) as well, the bank run equilibrium arises because the bank faces a hard intertemporal budget constraint.

**4.3 Interim conclusion: options for the design of international financial markets**

As an interim conclusion, it can be said that international financial markets require a lender of last resort for the same reasons that domestic financial markets require them. An international lender of last resort is needed to guarantee a stable international financial system if

- local commercial banks engage in maturity and liquidity transformation on the basis of a foreign currency, and/or
- central banks have established a fixed exchange rate.

In contrast, an international lender of last resort is unnecessary if exchange rates are flexible and the local banking system does not engage in maturity and liquidity transformation on the basis of foreign currencies. The options for the design of the international financial markets can therefore be summarized as follows (see Overview 5): Crisis-prone international financial markets (option 1) which do not have access to an international lender of last resort will be able to avoid the kinds of crises to which they are vulnerable only if the local commercial banking system refrains from engaging in maturity or liquidity transformation on the basis of foreign currencies (option 2), or if flexible exchange rates are opted for in the case of non-dollarized financial markets (option 3). If the local financial markets are highly dollarized, however, or if the exchange rate is fixed, then an international lender of last resort is required in order to make international financial markets more resistant to crises.

Overview 5: Options for the design of international financial markets

Option 1	Option 2	Option 3	Option 4
Crisis-prone financial markets due to significant maturity or liquidity transformation on the basis of foreign currencies or under a fixed exchange-rate regime	No maturity or liquidity transformation on the basis of foreign currencies	Flexible exchange rates; no dollarization	International lender of last resort <ul style="list-style-type: none"> <li>• dollarized financial markets</li> <li>• fixed exchange rates</li> </ul>

*Source: Own overview*

## 5. Trends in international financial markets

### 5.1 Crisis-prone financial markets

The monetary and financial crises in Asia and the financial crisis in late 2000/early 2001 in Turkey reflect what can happen in an international financial market designed according to option 1, because in these cases the local commercial banks were engaged in extensive maturity and liquidity transformation, on the basis of both domestic and foreign currencies, under a fixed exchange-rate regime, and without the benefit of an international lender of last resort. Both in the Asian countries hit by the crisis and in Turkey, the domestic banks were net debtors vis-à-vis Western banks, and they primarily incurred short-term liabilities – with the terms becoming ever shorter over time – in order to use them as onlending funds to finance long-term loans, or in the case of Turkey, long-term government bonds (OECD 2001). Therefore, it was only a matter of time until “international banks’ ... concern ... with local banks’ foreign currency liquidity” (IMF 1998a, 30) exposed the banking systems of the countries affected to illiquidity.

However, there is still room for doubt as to whether an international lender of last resort would indeed have intervened in the specific cases discussed above, i.e. Asia and Turkey, and acted to help prevent the crisis. A lender of last resort only provides liquidity to banks which are solvent. The question of whether the affected banking systems were indeed solvent prior to the outbreak of the crisis cannot be answered, however, in light of the qualitative problems with local banking supervision and regulation (Calomiris/Powell 2000). In Asia, it can be ascertained that there was already a high percentage of arrears in credit portfolios as early as 1996 (Corsetti et al. 1999, 331). Added to this was the problem of poor governance at both state-owned and private banks. The situation was similar in Turkey prior to the outbreak of the financial crisis, even though the stabilization program agreed upon with the IMF at the end of 1999 had introduced an extensive package of measures designed to overcome the weaknesses of the banking system and to institute better supervision and control. The question is thus whether the most recent events in the international financial markets are best described as “financial crisis” due to “bad banking” (Krugman 1998) or rather “financial panic”, since a lender of last resort can only intervene to stabilize the situation in the latter case (Schwartz 1999).

The question is easier to answer in regard to the Western financial markets and the crisis in the fall of 1998. In this case, institutions were considered *ex ante* to be of sound reputation and high quality.<sup>18</sup>

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<sup>18</sup> For example, the employees of the enterprise which triggered the crisis, LTCM, were considered “legendary for being the best and brightest technicians in the hedge fund industry” (IMF 1998, 54).

However, this did not safeguard them against the outbreak of a severe liquidity crisis (IMF 1998, 36 und 64). Rather, the pending crisis was averted by the Federal Reserve, acting in its capacity as the lender of last resort. Accordingly, the conclusion can be drawn that while more transparency, better banking supervision and regulation, and incentive and control systems are certainly key factors in minimizing the solvency problems of banking systems, these factors alone are not enough to prevent liquidity crises (Stiglitz 1999, 1514). Therefore, international initiatives on banking regulation and supervision cannot take the place of an international lender of last resort; rather, they are prerequisites paving the way for intervention on the part of an international lender of last resort if necessary. This is precisely the message of the Meltzer Report, which prescribes as a general rule that “to be eligible to borrow in a liquidity crisis, a member should meet minimum prudential standards... IMF assistance should be limited to illiquid not insolvent borrowers.” (IFAC 2000, 27).

## **5.2 Exchange-rate policies: Preference for corner regimes**

A further recommendation of the Meltzer Report is that the policy of fixed but adjustable exchange rates should be abandoned. Instead, the choice should be between either flexible exchange rates, or a fixed rate supported by an irrevocable waiver of the right to conduct domestic monetary policy, whether via a currency board or via full-scale dollarization. This proposal seems radical at first glance, because fixed exchange rates with some provision for adjustment have been, at least de facto, the prevailing exchange-rate regimes worldwide since the end of the Bretton Woods system (Reinhart 2000). Only the exchange rates between the major Western currencies and the Japanese yen can be described as flexible, while the so-called “hard pegs”, currency boards and completely dollarized economies have emerged only in recent years as alternative models (Fischer 2001, 13ff.).

The recommendation in favor of so-called corner solutions is based on the fact that with the increasing liberalization of the capital account, violations of the “impossible trinity” have been the main cause of the numerous financial and currency crises of the past 20 years. This was the case, for example, with the Asian financial crisis: All the Asian crisis countries had unilaterally pegged their currencies to the US dollar, but at the same time, had set interest rates in their domestic money and capital markets which were higher than those prevailing in the USA. The high volume of short-term capital inflows in 1995 and 1996 (see Table 1), which enabled the liquidity crisis of 1997, was triggered by a positive interest-rate spread which was not offset by any expectations of depreciation or risk premiums (BIS 1998, 124; Corsetti et al. 1999, 326). Where international capital flows are unrestricted, it is therefore logical to demand of IMF member countries that they make a clear decision, choosing either to pursue an independent monetary policy and, with it, flexible exchange

rates, or to give up the right to conduct a monetary policy dedicated to domestic goals entirely.<sup>19</sup> The only case in which this would not apply would be a situation in which it appeared likely that an international exchange rate system, with clearly defined rights and obligations for the key currency country or countries and the other participating states, were about to be introduced. However, if central banks act unilaterally to fix the exchange rate, as they did in Asia, the Federal Reserve cannot be expected to retroactively approve, via the lender of last resort function, policy choices which violated the law of the “impossible trinity”. If the Federal Reserve did so, it would encourage moral hazard behavior which could lead to the loss of the US dollar’s status as the international means of payment in the medium to long term.

One important argument against hard pegs is the absence of a domestic lender of last resort (see Bennett 1994, Caprio/Dooley/Leipzig/Walsh 1996). However, this holds true only when the prerequisites are in place which would allow the respective local central bank to serve effectively as a lender of last resort. In many developing countries and transition economies, the latter is no longer the case, because a significant share of total deposits in the local commercial banking system is held in foreign currencies (see Table 3). In 1995, foreign currency deposits made up more than 30% of the M3 money supply in 18 countries, while in another 34 countries, the share of foreign currency deposits in the M3 money supply came to 16.4% on average (Balino et al. 1999). In terms of Overview 4, this implies that for these countries the field column 2, line 3 is of major empirical relevance, while the domestic financial market (the field column 2, line 2) plays only a relatively small role.

Accordingly, it is already the case that many local central banks can serve as domestic lenders of last resort only to a very limited extent, because on the one hand, their domestic financial markets are severely underdeveloped, and on the other, the central banks do not have unlimited foreign reserves. At the same time, these countries cannot pursue the option of a transition to flexible exchange rates, since, given the considerable share of short-term liabilities in foreign currencies, a regime of flexible exchange rates would increase uncertainty as to the solvency of the local banking sector, leading to an even greater need for liquidity in foreign currencies and increasing the risk of a financial crisis (Wyplosz/Jeanne 1999, 12). This will be the case whenever the banks are engaging in maturity and liquidity transformation in a foreign currency. Conversely, in many countries, as noted by Hausmann et al. (1999), economic actors are so distrustful of the domestic currency that they would not even

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<sup>19</sup> The goal of both options is to remove a country’s yield advantage, which is what attracts short-term capital flows, either by smoothing it out (by means of giving up autonomous monetary policy), or by offsetting it by means of an expectation of currency depreciation of equally large scope, or a risk premium (flexible exchange rates). Bofinger/Wollmershäuser (2000) suggest, as a further option for countries with capital inflows, that the central bank sets a fixed rate of currency depreciation corresponding to the interest differential, ensured via sterilised interventions in the forex market if necessary.

be willing to engage in financial intermediation on the basis of it, given de facto flexible exchange rates.<sup>20</sup> This implies that “with respect to the asset markets, a country obtains essentially no benefit ... from exchange rate flexibility.” (Fischer 2001, 16)

**Table 3:** Degree of dollarization of selected developing countries and transition economies (share of deposits in foreign currencies in a broad monetary aggregate, in %)

	1990	1995	1999
Argentina	34.2	43.9	52.3
Bolivia	70.8	82.3	84.1*
Bulgaria	12.0	28.4	61.4
Costa Rica	37.7**	31.0	41.4***
Mozambique	11.8**.	32.6	35.2
Nicaragua	28.7**	54.5	63.7***
Peru	59.9**	64.0	69.7
Romania	3.9**	21.7	37.6
Russia	n.a.	20.6	29.2
Turkey	23.2	46.1	39.3 <sup>+</sup>
Ukraine	n.a.	26.9	25.1
Uruguay	80.1	76.1	75.4

\* = 1st quarter 1999; \*\* = 1991; \*\*\* = 1998; <sup>+</sup> = June 1999.

Source: Balino et al. (1999); IMF Staff Country Reports.

The third option for the design of international financial markets, namely flexible exchange rates and the free flow of capital, is therefore a viable one only for economies in which the banking sectors are not dollarized and in which it need not be feared that they will be. Only such economies are able to conduct a truly independent monetary policy, i.e. to realize the potential benefits of a combination of flexible exchange rates and free flows of capital (a similar thought was put forth by Summers 2000, 8). This basically refers to the economies which issue hard currencies, i.e. the United States,

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<sup>20</sup> On this point see also Eichengreen (2000) and Calvo (2000). Once again, the comparison with domestic financial markets in the Western industrialised countries in the 19<sup>th</sup> century arises; for “flexible exchange rates between monies in a domestic money market has not been a common historical experience.” (Klein 1974, 442). Despite the liquidity risk which it entailed, all newly created banks set the value of their liabilities, i.e. deposits, at a fixed exchange rate vis-à-vis the prevailing means of payment in order to acquire the necessary reputation as a “good debtor” (Brunner/Meltzer 1971, 802f.)

Euroland, Japan, Great Britain and Switzerland, and which, as the Meltzer Report logically notes, do not require an international lender of last resort (IFAC, 2000 27).

For all other economies, however, this is not a realistic option, because they do not have currencies which are generally accepted as a basis for financial transactions without being coupled to any other currency. Therefore, they follow a policy of fixed exchange rates – often despite having made official announcements to the contrary (Hausmann et al. 1999; Reinhart 2000). Since, due to the free flow of capital, they are also exposed to the liquidity risks of international financial markets, however, they require an international lender of last resort if the local banking sector is to carry out maturity and/or liquidity transformation. This would require solvency standards which would enable the international lender of last resort to provide “immediate assistance without further deliberation or negotiation” (IFAC 2000, 27) in the event of a crisis. If a lender of last resort of this type is not available – whether because the prerequisites have not been met, or because the Federal Reserve and/or the ECB are not prepared to act as such – then “hard pegs” such as a currency board will also be crisis-prone, as the example of Turkey at the end of 2000/beginning of 2001 makes amply clear.

To the “impossible trinity” of monetary policy must therefore be added the “indispensable trinitities” for the crisis-free design of international financial markets as implicitly defined by the Meltzer Report: Waiver of an independent monetary policy, fixed exchange rates, and (direct or indirect) banking supervision by the international lender of last resort, on the one hand; retention of an independent monetary policy, flexible exchange rates, and domestic banking supervision by the domestic lender of last resort, on the other.

### **5.3 Intermediate solutions: Regulatory restrictions on maturity/liquidity transformation; approximations of an international lender of last resort**

The recommendations of the Meltzer Report are derived from an extension of the arguments in favor of a domestic lender of last resort to the international financial markets.<sup>21</sup> The political implications, however, make it fairly unlikely that the recommendations will be implemented: Establishing an international lender of last resort would mean officially assigning responsibility for international financial markets to an institution, the Federal Reserve, which is currently not prepared to accept it.<sup>22</sup> An equally great difficulty is the loss of sovereignty faced by those countries which would be required (de facto) to give up their currencies. However, the experiences of the past decade have shown that crisis situations can be so overwhelming as to sweep aside political concerns about giving up the right to conduct an independent monetary policy (Fischer 2001, 17). Argentina, Estonia, Bulgaria and, most recently, Ecuador are examples of this.

Further evidence that the recommendations made by the Meltzer Report are fundamentally correct is provided by the variety of small steps and measures already being taken by emerging market countries in order to make their financial systems less crisis-prone. The focus is either on regulatory measures intended to limit the extent to which maturity and liquidity transformation is carried out, particularly on the basis of foreign currencies, or on opening domestic financial markets to foreign banks which have access to an international lender of last resort.

One regulatory measure which is particularly popular in this context is to raise the liquidity requirements applied to commercial banks. Very much in the spirit of Simons (1936), it is part of the post-Asian-crisis consensus that banks in emerging markets must maintain higher reserves against inter-bank liabilities and deposits in foreign currencies, or in other words, that their ability to carry out maturity and liquidity transformation must be limited (Gulde/Nascimento/Zamalloa 1997, Corsetti et

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<sup>21</sup> One exception is the problem already mentioned, namely that the IMF cannot act as an international lender of last resort, as proposed by the commission, because it is not able to issue unlimited quantities of international means of payment.

<sup>22</sup> In 1997/98, for example, the Federal Reserve did not reduce interest rates until the domestic financial system encountered major liquidity risks (Calvo 2000, 5). Thus, the unwillingness of the Federal Reserve and the US Treasury Department to assume the role of lender of last resort or banking supervisor vis-à-vis national economies which may choose to pursue full-scale dollarization (Mack 2000, 10) represents consistent behavior on their part. This attitude on the part of the Federal Reserve is in line with the tradition in which central banks are prepared only on the basis of reciprocity – i.e. as members of a club with common interests – to function as lenders of last resort for the financial systems of other countries (Bordo/Schwartz 1999, 686); a club which up to now was made up solely of the industrialized nations. Finally, the political implications of an official lender of last resort function exercised by the Federal Reserve and/or the ECB would be serious and far-reaching (Summers 1999, 16).

al. 1999, 363, and Fischer 2001, 10). In Argentina, for example, banks have been required since the tequila crisis to maintain 20% of all deposits with a maturity of less than 90 days as liquid reserves. In the Philippines, banks have been required since June 1997 to invest 30% of all foreign-currency liabilities in liquid assets. The same applies to Estonia and Lithuania, while in Hong Kong, the liquidity coefficient is 25% (IMF 1998a, 158ff.). Moreover, in many emerging markets the equity capital requirements for banks are being increased to a level higher than the 8% of risk-weighted assets recommended in the Basel guidelines.

All of these measures have the effect of reducing the efficiency of the banking systems concerned (Calvo 1996; Gulde/Nascimento/Zamalloa 1997). This leads to the paradoxical situation that, on the one hand, the advantages of the free movement of capital are constantly being touted,<sup>23</sup> while on the other, the process of realizing of these advantages is being critically re-examined in the course of the ex-post analysis of recent crises.<sup>24</sup> The more stringent regulations instituted after a financial crisis therefore represent a balancing act: International capital flows should not be impeded; at the same time, however, caution must be exercised with regard to the efficiency gains which unrestricted capital flows allow in principle, in order to avoid the liquidity risks which those same capital flows bring.<sup>25</sup>

Apart from the efforts to limit maturity and liquidity transformation by means of regulation, another measure being taken is to increase the presence of foreign banks in local banking systems (see Table 4). While there are many reasons for doing so, a particular implication of the entry of foreign banks into local banking systems is that the banking systems thus gain access to an international lender of last resort (see also Calvo/Mendoza 2000, 63). This is because, in the event of a liquidity crisis, foreign banks have access to funding facilities from their international headquarters in the home country and/or their owners, and, via their home country headquarters or owners, to the Federal Reserve or to the ECB as well, i.e. to an international lender of last resort. To that extent, the increased presence of foreign banks in the banking systems of emerging markets is one way to establish the functionality of an international lender of last resort without having to formally create such an institution (see also Berg/Borenzstein 2000, 22). In terms of the two-country example set forth in Overviews 3 and 4 this intermediate solution can be described as follows: If the Korean

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<sup>23</sup> The prominent exception is Bhagwati (1998).

<sup>24</sup> While Summers (2000, 3), for example, mentions that one main advantage of the free international flow of capital is that it makes it possible “[to] provide capital to local businesses on what are often the best available terms”, the BIS (1998, 129) criticises Asian banks, in its analysis of the Asian crisis, for investing too much of the inflowing foreign capital in domestic assets and too little of it in foreign assets.

<sup>25</sup> Fischer (2001, 10) speaks of “market-based capital inflow controls” in this context.

banking system were dominated by American (international) banks, the Federal Reserve would implicitly assume the role of a lender of last resort for the Korean banking system as well.

**Table 4:** Share of banks with more than 50% foreign capital in the consolidated assets of the banking sector in selected emerging markets, 1994 vs. 1999 (in %)

	1994	1999
<b>Central Europe</b>		
Czech Republic	5.8	47.3
Hungary	19.8	59.5
Poland	2.1	52.8
<i>Total</i>	7.8	44.0
<b>Turkey</b>	<b>3.0</b>	<b>5.2</b>
<b>Latin America</b>		
Argentina	17.9	41.7
Brazil	8.4	18.2
Chile	16.3	53.6
Colombia	6.2	16.2
Mexico	1.0	18.6
Peru	6.7	33.2
Venezuela	0.3	34.7
<i>Total</i>	7.5	24.2
<i>Total (excluding Brazil and Mexico)</i>	13.1	39.5
<b>Asia</b>		
Korea	0.8	11.2
Malaysia	6.8	14.4
Thailand	0.5	6.0
<i>Total</i>	0.5	6.0

Source: IMF (2000, 153), The Banks Association of Turkey

As Table 4 shows, what may be the greatest steps towards international financial markets with an international lender of last resort have already been made in this manner in recent years. In Latin America and in Central Europe, foreign banks in the meantime hold 40% of all assets of the local banking system. In contrast, the banking systems in Asia and in Turkey, which have been hit particularly hard by international financial crises in recent years, are still almost completely under the control of local owners.

## **6. Domestic and international lender of last resort: a final comparison**

Do international financial markets require an international lender of last resort? Comparison with domestic financial markets yields the answer “yes”, if commercial banks engage in maturity or liquidity transformation, domestic financial markets are dollarized or central banks pursue a policy of fixed exchange rates. The answer is “no”, however, if exchange rates are flexible and the domestic financial markets are not dollarized and/or do not engage in maturity or liquidity transformation on the basis of foreign currencies (see also Overview 6).

To the extent that an international lender of last resort is necessary, it must ensure, just as a domestic lender of last resort does, that only solvent banks receive access to funds in the event of a crisis. The prerequisite is therefore that the international lender of last resort assumes the function of banking supervisor for these financial markets and/or has some way to maintain an overview of the banking supervision carried out in these financial markets. With fixed exchange rates and liberalized capital flows already in place, the “indispensable trinity” – waiver of autonomous monetary policy, international banking supervision, and an international lender of last resort – is thus established.

Most developing countries and transition economies have liberalized their capital accounts over recent years and decades while maintaining de facto fixed exchange rates, yet have failed to ensure that this “indispensable trinity” is in place. And even after the most recent financial crises, it does not appear that it will soon be instituted. The option of flexible exchange rates is not really a viable one for these countries in light of the high degree of dollarization of their financial markets. They are therefore striving to reduce their financial systems’ vulnerability to crises by introducing regulation limiting the extent to which maturity and liquidity transformation is carried out, or by encouraging foreign commercial banks with either direct or indirect access to the funding facilities of an international lender of last resort to enter their banking markets.

Overview 6: The lender of last resort in the national and international financial market

	National	International
Lender of last resort:	Domestic central bank	Federal Reserve/ECB
Systemic risk:	Exchange rate: Bank deposits against central bank money	Exchange rate: US-dollar-denominated bank deposits against US dollars  Exchange rate: local currency against the US dollar (fixed exchange rates)
Criterion for the willingness to serve as a lender of last resort:	Solvency of the commercial banks which have access to lender of last resort facilities	Solvency of the commercial banks which have access to lender of last resort facilities
Beneficiaries:	Commercial banks which have access to lender of last resort facilities	Commercial banks which have access to lender of last resort facilities  Local central bank (fixed exchange rates)
Risks for the lender of last resort:	Moral hazard on the part of the commercial banks	Moral hazard on the part of the commercial banks  Moral hazard on the part of the local central bank (“poor economic policy”)
Risk containment strategy:	Lender of last resort as banking supervisory body	Lender of last resort as banking supervisory body  Conditionality
Consequence if no lender of last resort is established:	Limitation of maturity and/or liquidity transformation  Financial crises	Limitation of maturity and/or liquidity transformation  Flexible exchange rates  Financial crises

Source: Own overview

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